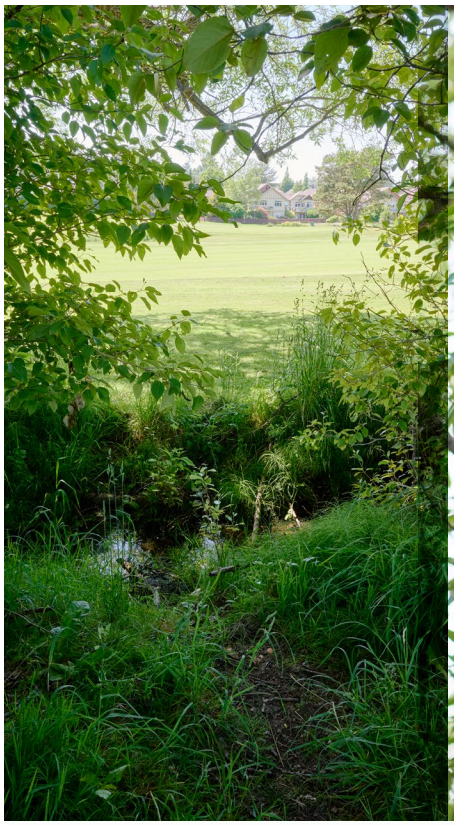
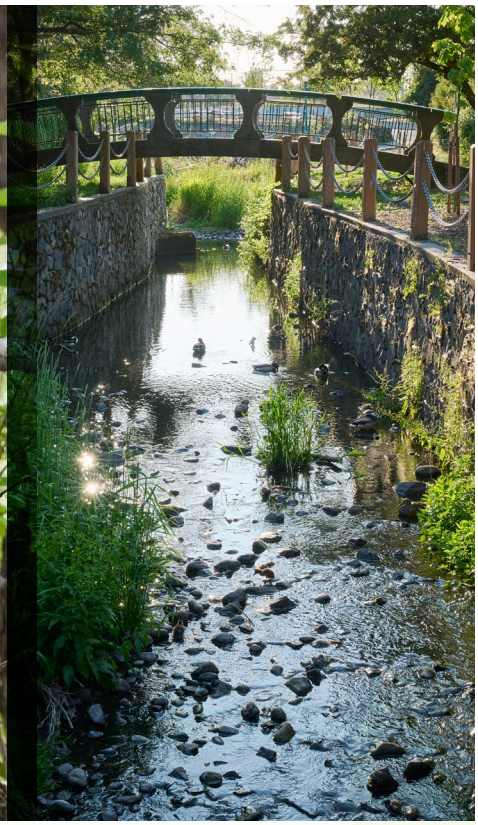
engage with Nature-Based Solutions





BC Urban Streams & Watersheds

A UNIT PLAN FOR **ENVIRONMENTAL SCIENCE 12**

The Big Idea

Human actions affect the quality of water and its ability to sustain life in urban streams.

BC Urban Streams & Watersheds

A UNIT PLAN FOR ENVIRONMENTAL SCIENCE 12

This unit plan was created by **Jennifer Walton**, BA, BEd, Diploma in Environmental Technology, Teacher in Greater Victoria, BC.
This version is from March 6, 2025.

This is published by **Engage with Nature-Based Solutions**. Engage with Nature-Based Solutions is an initiative to support communities who apply nature-based solutions to their local lands and waters. We acknowledge and take inspiration from Indigenous peoples, whose cultures and traditions support healthy ecosystems and the interconnection and importance of all living things.

Engage with Nature-Based Solutions is a collaboration between the **University of Victoria** and many local community organizations, and is funded by **Environment and Climate Change Canada**.
The grant Principal Investigator is **Dr Kris Dubrawski**.
The Program Lead is **Dr Maleea Acker**.

Contents

Engage with Nature-Based Solutions: About the Initiative

Natural systems work. Natural systems – such as wetlands, estuaries, forests, and prairie – provide immense benefits to people and nature. They clean water, absorb floods, cool the climate, and remove carbon from the atmosphere. There is a pressing need to mitigate the stresses that human activity places on these natural systems. Urban development and climate change threaten biodiversity, fragment previously healthy ecosystems, increase droughts and flooding, and affect the security of our food and clean water.

Nature-based solutions support the health of natural systems, while addressing societal challenges. The design of these solutions are based on our planet's natural systems, working with, and for, nature. They increase climate-resilient natural capital (such as wetlands and forests) and provide ecosystem services (such as water filtration). Communities can use nature-based solutions to support the resiliency of our climate, environment, and human society.

Engage with Nature-Based Solutions is a new initiative to support communities who apply nature-based solutions to their local lands and waters. We acknowledge and take inspiration from Indigenous peoples, whose cultures and traditions support healthy ecosystems and the interconnection and importance of all living things.

We collaborate with communities, collect and curate resources, produce education modules, facilitate storytelling, and provide technical equipment (for monitoring and testing in the field). All of our work supports access, engagement, and education, and illustrates the impact and benefits of nature-based solutions.

→ Learn more at *www.engagewithnbs.ca*

engage with Nature-Based Solutions

communities in local stewardship of lands & waters

About this Unit Plan

This BC Urban Streams & Watersheds unit plan for Environmental Science 12 connects to the **Environmental Science 12 Big Idea: Human actions affect the quality of water and its ability to sustain life in urban streams.**

As an Environmental Science teacher and outdoor educator in Victoria, BC, I designed this unit to help teachers guide their students in learning about British Columbia's watersheds through inquiry, experiential and project-based learning, and outdoor education.

Learning about British Columbia's watersheds through local case studies provides an engaging way to connect students to their local streams, and apply their knowledge to global case studies and the United Nations' Sustainable Development Goals. Students can collaboratively connect Indigenous perspectives and ways of knowing to scientific evidence, as they contribute to finding solutions to local watershed issues.

Educators are encouraged to collaborate with local community organizations to learn more about environmental stewardship initiatives, stream restoration, urban watersheds, riparian vegetation, water quality, chum salmon recovery, biodiversity, impacts of climate change, sustainability, and hopeful nature-based solutions when using this unit plan.

I firmly believe that students need to spend time outdoors in our watersheds if they are going to learn to appreciate the environment and ultimately want to protect it.

We hope this unit plan will be helpful to your classrooms. We would love to hear from you – how you found it useful, and any suggestions you have for improvement. Contact our team at *info@engagewithnbs.ca*.

Jennifer Walton
BA, BEd, Diploma in Environmental Technology,
Teacher in Greater Victoria, BC

BC's Curriculum: Environmental Science 12

This unit plan was developed with an *Environmental Science 12* classroom in mind. However, these lessons could be easily modified to also meet classrooms for *Life Sciences 11*, *Human Geography 12*, *Geology 12*, *English Language Arts*, *Contemporary Indigenous Studies 12*, etc.

For *Environmental Science 12*, the BC Ministry of Education lists a variety of Big Ideas, Competencies, and Content for the students to work towards, all of which are listed below (from BC Ministry of Education, June 2018). This BC Urban Streams & Watersheds unit plan aims to support the items in this list which have check marks beside them.

Big Ideas

- ☑ Human actions affect the quality of water and its ability to sustain life.
- ☐ Human activities cause changes in the global climate system.
- ☐ Sustainable land use is essential to meet the needs of a growing population.
- ☐ Living sustainably supports the well-being of self, community, and Earth.

Competencies

Questioning & predicting

- ☑ Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
- ☑ Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world
- ☑ Formulate multiple hypotheses and predict multiple outcomes\

Planning & conducting

- ☑ Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)

- ☑ Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods
- ☑ Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- ☑ Apply the concepts of accuracy and precision to experimental procedures and data:
  - » significant figures
  - » uncertainty
  - » scientific notation

Processing & analyzing data & information

- ☑ Experience and interpret the local environment
- ☑ Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
- ☑ Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies
- ☑ Construct, analyze, and interpret graphs, models, and diagrams
- ☑ Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- ☑ Analyze cause-and-effect relationships

Evaluating

- ☑ Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
- ☑ Describe specific ways to improve their investigation methods and the quality of their data
- ☐ Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
- ☑ Demonstrate an awareness of assumptions, question information given,and identify bias in their own work and in primary and secondary sources
- ☐ Consider the changes in knowledge over time as tools and technologies have developed
- ☐ Connect scientific explorations to careers in science
- ☑ Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources

- ☐ Consider social, ethical, and environmental implications of the findings from their own and others' investigations
- ☐ Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems
- ☑ Assess risks in the context of personal safety and social responsibility

Applying & innovating

- ☑ Contribute to care for self, others, community, and world through individual or collaborative approaches
- ☑ Co-operatively design projects with local and/or global connections and applications
- ☑ Contribute to finding solutions to problems at a local and/or global level through inquiry
- ☑ Implement multiple strategies to solve problems in real-life, applied, and conceptual situations
- ☐ Consider the role of scientists in innovation

Communicating

- ☐ Formulate physical or mental theoretical models to describe a phenomenon
- ☑ Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations
- ☑ Express and reflect on a variety of experiences, perspectives, and worldviews through place

Content

Students are expected to know the following:

- ☑ water quality parameters and bioindicators
- ☑ availability and water use impacts
- ☐ global water security:
  - » laws and regulation
  - » conservation of water
- ☐ changes to climate systems
- ☑ impacts of global warming

- ☐ mitigation and adaptations
- ☐ soil characteristics and ecosystem services
- ☑ land use and degradation
- ☑ land management
- ☐ personal choices and sustainable living
- ☐ global environmental ethics, policy, and law

Core Competencies

The BC Ministry of Education also identifies a list of Core Competencies. (This text is extracted from *https://curriculum.gov.bc.ca/competencies* in 2024.) These are sets of proficiencies that all students need in order to engage in deep, lifelong learning: Communication; Thinking; and Personal & Social abilities.

Communication

Encompasses the knowledge, skills, processes, and dispositions we associate with interactions with others. Through their communication, students acquire, develop, and transform ideas and information, and make connections with others to share their ideas, express their individuality, further their learning, and get things done. The communication competency is fundamental to finding satisfaction, purpose, and joy.

Thinking

Encompasses the knowledge, skills, and processes we associate with intellectual development. It is through their competency as thinkers that students take subject-specific concepts and content and transform them into a new understanding. Thinking competence includes specific thinking skills as well as habits of mind, and metacognitive awareness. These are used to process information from a variety of sources, including thoughts and feelings that arise from the subconscious and unconscious mind and from embodied cognition, to create new understandings.

Personal & Social

The set of abilities that relate to students' identity in the world, both as individuals and as members of their community and society. Personal and social competency encompasses what students need to thrive as individuals, to understand and care about themselves and others, and to find and achieve their purposes in the world.

Associated Files

The lesson plans within this unit reference a variety of files that we've created or assembled for you to download from our website. Each is available in PDF, and many are also available in additional, easily editable formats.

SUPPLIED SUPPLEMENTS:

- *CRD - Look Inside a Watershed* (PDF)
  used in Lesson 1
- *ENBS - Introduction to Water Systems* (PPTX · PDF)
  used in Lesson 1
- *ENBS - Science Notebook & Nature Journaling Guidelines* (RTF · DOCX · PDF)
  used in Lesson 2
- *ENBS - Science Notebook & Nature Journaling Evaluation* (RTF · DOCX · PDF)
  used in Lesson 2 and 3
- *ENBS - Environmental Status Field Report* (RTF · DOCX · PDF)
  used in Lesson 3
- *ENBS - Water Pollution* (PPTX · PDF)
  used in Lesson 3
- *CRD - Nutrients in Lakes* (PDF)
  used in Lesson 4
- *CRD - Vision for a Healthy Lake* (PDF)
  used in Lesson 4
- *ENBS - Impacts of Eutrophication Cards* (RTF · DOCX · PDF)
  used in Lesson 4
- *MPCA - photo of blue-green algae 1, 2* and *3* (JPG)
  used in Lesson 4
- *ENBS - Eutrophication Lab* (RTF · DOCX · PDF)
  used in Lesson 5
- *ENBS - Eutrophication Lab Rubric* (RTF · DOCX · PDF)
  used in Lesson 5
- *RUSH - Tree Equity brochure* (PDF)
  used in Lesson 6 extension

- *CRD - Riparian Zone Ecosystem* (PDF)
  used in Lesson 7
- *Pacific Streamkeepers - Handbook Module 3* (PDF)
  used in Lesson 7
- *UW - Key to Macroinvertebrate Life* (PDF)
  used in Lesson 7
- *Biomimicry Institute - Design Challenge Rubric* (PDF)
  used in Lesson 9
- *Biomimicry Institute - Video Pitch Tips* (PDF)
  used in Lesson 9
- *ENBS - Stream Solutions Biomimicry Design Challenge* (RTF · DOCX · PDF)
  used in Lesson 9
- *ENBS - Stream Solutions Biomimicry Design Challenge Map* (RTF · DOCX · PDF)
  used in Lesson 9
- *ENBS - Stream Solutions Biomimicry Team Project Portfolio Guide* (RTF · DOCX · PDF)
  used in Lesson 9
- *ENBS - Urban Stream & Watersheds Final Assessment* (RTF · DOCX · PDF)
  used in Lesson 10
- *ENBS - Urban Streams & Watersheds Final Assessment Rubric* (RTF · DOCX · PDF)
  used in Lesson 10

The complete set is available to download at: *https://engagewithnbs.ca/for-schools*

The Big Idea

Human actions affect the quality of water and its ability to sustain life in urban streams.

LESSON 1

Introduction to Urban Streams & Watersheds

Learning about British Columbia's watersheds through local case studies provides an engaging way to connect students to their local streams. In this lesson, students study the key components of a watershed and begin exploring how human actions affect the water quality in our urban streams and watersheds. Students reflect on their own connections and experiences in their watershed, while considering the United Nations' Sustainable Development Goals #14 Life Below Water and Goal #15 Life on Land.

Essential Questions

What is a watershed and what are its key components?

Which human actions affect the quality of water in our watersheds or urban streams?

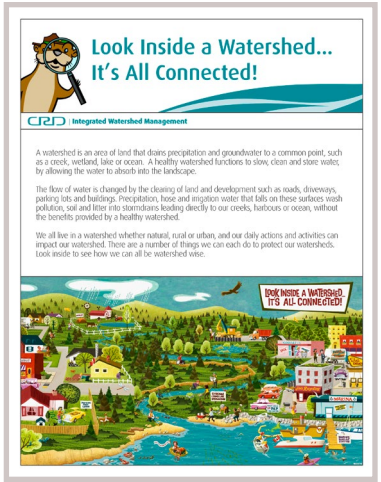
What is your connection to your watershed?

Objectives

Students will be able to:

- Define watersheds and describe how a watershed is part of a larger system.
- Identify the watershed in which they live.

Materials & Preparation

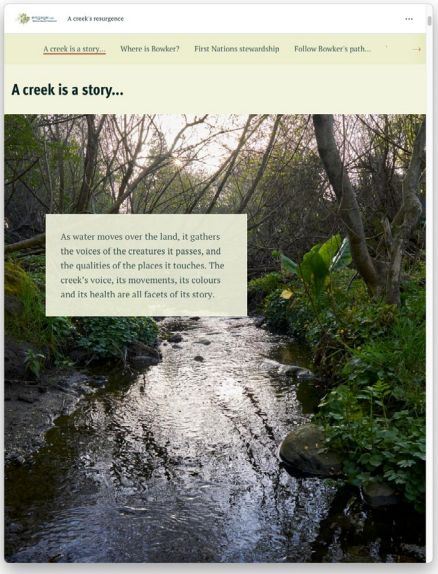


- SUPPLIED SUPPLEMENTS:
  - » *CRD - Look Inside a Watershed* (PDF)
  - » *ENBS - Introduction to Water Systems* (PPTX · PDF)
- Internet access, computer, projector, speakers
- 1 gallon jug or bucket, 1/2 measuring cup, tablespoon, dropper/pipette or straw for demonstration
- Paper and writing tool



Introduction

- Use the *ENBS - Introduction to Water Systems* presentation slides guide your lesson.
- Start with a demo and use a liquid measuring cup, teaspoons, and pipette to demonstrate all the available water on Earth:
  - » 1 gallon (100%) = all water on Earth
  - » ½ cup (3%) = all of Earth's freshwater
  - » 4 tablespoons (0.6%) = non-frozen freshwater
  - » 1 drop (0.003%) = available, drinkable non-frozen freshwater
- Check in with your students' prior knowledge about the water/hydrological cycle and understanding of watersheds and their functions.
- As a class, determine which watershed you live in.



Activity

- Watch the video, *Capital Regional District's Watershed Stewardship: We all live in a watershed*
  https://youtu.be/dYpCpqbbsjk

- Using copies of *CRD - Look Inside a Watershed*, have students work in partners to identify and discuss the positive and negative impacts humans have on urban streams.
- Give time to explore case studies of urban streams and watersheds including:
    - » Use this story map from Engage with Nature-Based Solutions to explore the urban impacts and restoration efforts on Bowker Creek (Victoria, BC): *https://engagewithnbs.ca/community-story/bowker-creek/* (Students will have more time to learn about Bowker Creek in subsequent lessons.)
    - » Explore the Fraser River Watershed CPR website: *https://watershedcpr.canadiangeographic.ca/*
    - » Watch (8 minute) video from Bogotá, Colombia, *Water: the Source of Life:* *https://vimeo.com/262206813*
    - » Find local case studies in your area or have students research articles in the news about urban streams.

Extensions

- Bring in a watershed model or borrow one from a local organization to demonstrate the water cycle and systems.
- Have students create their own watershed model, urban stream case study, or map.
- Take more time to explore the United Nations' Sustainable Development Goals and the connections to global water systems: *https://sdgs.un.org/goals*

Assessment

Exit cards: choose 2–4 questions for students to respond to and check in on their understanding of the lesson. Some examples include:

- What conclusions can you make about the importance of watersheds?
- Which human actions affect the quality of water in our watersheds or urban streams?
- Which of the United Nations' Sustainable Development Goals can you connect to watershed security?
- What is your connection to your watershed?

Additional Resources

- The Nature Conservancy: *Nature Lab Lesson Plans for the Bogotá Watershed*: *https://www.nature.org/content/dam/tnc/nature/en/documents/nature-lab-lesson-plans/Finding-Your-Flow-A-Toolkit.pdf*
- Project Wet: *https://www.projectwet.org/*
- Watershed model to borrow in Greater Victoria: *https://www.crd.bc.ca/education/school-programs/field-trips-presentations/harbours-and-watersheds*
- CRD Watershed Curriculum: *https://www.crd.bc.ca/docs/default-source/partnerships-pdf/environmental-education/hw-lessonplan-what-is-a-watershed(middle-school-).pdf*
- BC Water Resources Atlas: *https://maps.gov.bc.ca/ess/hm/wrbc/*

LESSON 2

Indigenous Relationships to Freshwater

Through this lesson, students explore the Indigenous relationships and interconnectedness to freshwater. They will develop an understanding of Traditional Ecological Knowledge, while interacting with their natural world and nature journaling.

Essential Question

How can water resources be understood from the perspective of First Peoples and Traditional Ecological Knowledge?

Objective

Students will be able to:

- Interact with the natural world through observing, thinking, wondering, and reflecting.
- Identify the Indigenous lands in which they live.
- Connect the Indigenous relationship to freshwater to develop an understanding and appreciation for Traditional Ecological Knowledge.

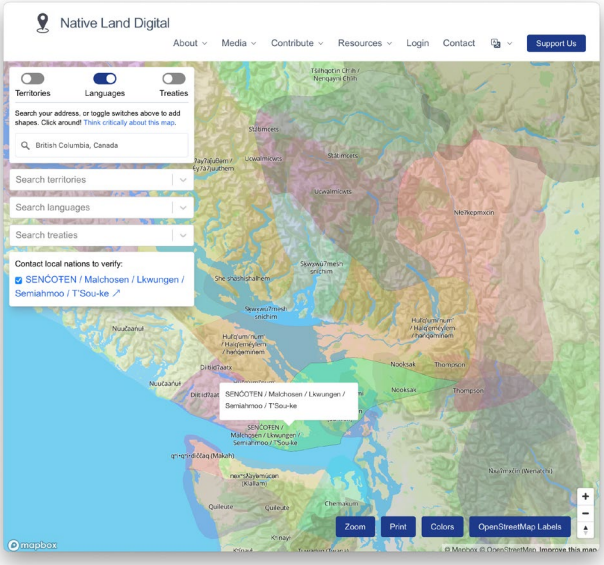
Materials & Preparation

- SUPPLIED SUPPLEMENTS:
  - » *ENBS - Science Notebook & Nature Journaling Guidelines* (RTF · DOCX · PDF)
  - » *ENBS - Science Notebook & Nature Journaling Evaluation* (RTF · DOCX · PDF)
- Internet access, computer, projector, speakers
- Science notebooks or blank paper and clipboards
- Writing tool, coloured pencils

Introduction

- Discuss the Indigenous concept of place, as noted in the BC Curriculum: "*Place is any environment, locality, or context with which people interact to learn, create memory, reflect on history, connect with culture, and establish identity.*" The connection between people and place is foundational to First Peoples perspectives and Indigenous Knowledge.
- Take time to explore the Indigenous teachings in this visual storymap *Our Water Connection*: *https://arcg.is/0iGHa81*
- Ask students to discuss in partners or small groups how they think their local watershed has changed due to colonization.

Activity



- Determine the traditional Indigenous lands of your watershed using Native Land Digital: *https://native-land.ca* or Whose Land: *https://www.whose.land/en/*
- Go for a walk outdoors or to a nearby body of water, and ask students to think about the following guiding questions:
  - » What are the names of some water bodies near where you live and learn?
  - » Do you know of any Indigenous names of places in your community?
  - » How do you think these bodies of water are connected?
  - » What are your connections to water?
- Introduce elements of nature journaling with your students using the guide.
- Have students take time to sit by themselves within a given boundary and nature journal to observe their land, stream, pond, or lake engaging all of their senses.
- Encourage students to use the **See-Think-Wonder** strategy:
  - » What do you **see**?
  - » What do you **think** about that?
  - » What does it make you **wonder**?

Assessment

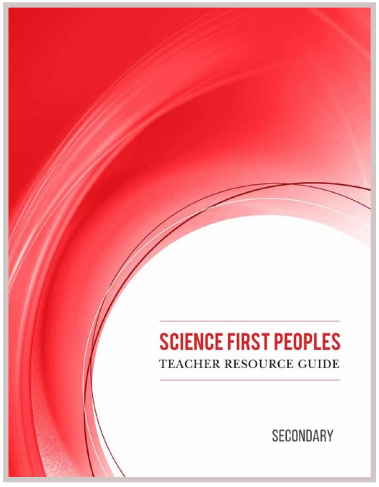
- Students can share their nature journal reflection with a peer and discuss: *How can water resources be understood from the perspective of First Peoples and Traditional Ecological Knowledge?*
- Collect students' science notebooks and share written feedback.

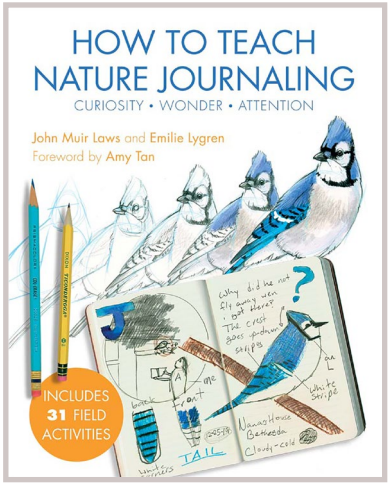
Extension

- Invite an Elder or Indigenous knowledge holder to discuss their relationship to water and Traditional Ecological Knowledge.

Additional Resources

- FNESC (First Nations Education Steering Committee) *Science First Peoples Teacher Resource (Secondary)*: Unit 3, Relationship to Freshwater. *https://www.fnesc.ca/sciencetrg/*
- Indigenous Knowledge and Perspectives: Science K–12: *https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/curriculum/indigenous-knowledge-and-perspectives/science-K-12-indigenous-knowledge-and-perspectives.pdf*
- John Muir Laws: *How to Teach Nature Journaling*: *https://johnmuirlaws.com/product/how-to-teach-nature-journaling/*
- Project Zero's See-Think-Wonder Visible Thinking routine: *https://pz.harvard.edu/sites/default/files/See%20Think%20Wonder_3.pdf*





LESSON 3

Human Impact on Streams

Essential Questions

Which human actions affect the quality of water of urban streams?

How does stormwater runoff affect water quality?

Objectives

Students will be able to:

- Identify human actions that affect the water quality of urban streams.
- Describe how stormwater runoff affects water quality.

Materials & Preparation

- SUPPLIED SUPPLEMENTS:
  - » *ENBS - Science Notebook & Nature Journaling Evaluation* (RTF · DOCX · PDF)
  - » *ENBS - Environmental Status Field Report* (RTF · DOCX · PDF)
  - » *ENBS - Water Pollution* (PPTX · PDF)
- Internet access, computer, projector, speakers
- Chart paper or white board
- Science notebooks and pencils

Introduction

- Share out some key ideas noted on the EXIT CARDS from LESSON 1.
- As a class, watch (5 minute) video *Watershed Stewardship: Contaminants in Stormwater*: https://youtu.be/r0KEBORn4E4

- Using chart paper or white board, have students in groups create a mind map with some examples of water pollution and sources of contaminants.
- Identify and review some water pollution sources and key vocabulary in the *ENBS - Water Pollution* slides.

Activity

- Conduct a basic environmental status field report or record your observations from a nearby stream or pond to apply understanding of water pollution.
- Have students use the *ENBS - Environmental Status Field Report* and record and consider possible point or nonpoint source pollution due to run-off and impervious surfaces. Some possible contaminants and nonpoint source pollutants could include:
  - » Runoff – overflow of fluid from nearby farm, urban area, industrial or construction site
  - » Soccer field – fertilizer or pet waste
  - » Industrial business or construction site – sediment, gas, oil, chemicals
  - » Storm sewer – a system of pipes (separate from sanitary sewers) that carry only water runoff from building and land surfaces
  - » Residential houses – fertilizers, outdoor maintenance or washing, impervious services
  - » Agricultural land – pesticides, fertilizers, herbicides, manure
- Have students illustrate the stream, or sketch a map of the water system or draw a systems diagram, with possible inputs and outputs.

Assessment

- Provide feedback on the students' science or field notebooks using the *ENBS - Science Notebook & Nature Journaling Evaluation*.

LESSON 4

Eutrophication Case Study

Eutrophication is a very common environmental problem associated with water bodies. In the next two lessons, students explore the cause-and-effect relationships of eutrophication with the Elk/Beaver Lake Case Study in Victoria, BC. (This case study can be easily adapted to a local eutrophication example.) Then students will demonstrate the effects of eutrophication by designing and conducting an experiment using the scientific method, gaining skills in collecting data using probes and sensors, and writing a lab report.

Essential Questions

Which environmental factors influence the occurrence of algae blooms in water bodies?

To what extent does water pollution contribute to eutrophication in a local environment?

Objectives

Students will be able to:

- Identify environmental factors influencing the occurrence of algae blooms in water bodies.
- Analyze cause-and-effect relationships of water pollution and eutrophication in a local environment.
- Measure dissolved oxygen levels at a local water body using scientific tools.
- Understand the significance of dissolved oxygen in the survival of aquatic life and the importance of water monitoring to support healthy aquatic ecosystems.

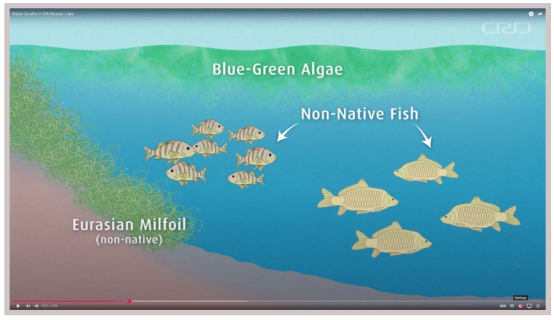
Materials & Preparation

- SUPPLIED SUPPLEMENT:
  - » *CRD - Nutrients in Lakes* (PDF)
  - » *CRD - Vision for a Healthy Lake* (PDF)
  - » *ENBS - Impacts of Eutrophication Cards* (RTF · DOCX · PDF)
  - » *MPCA - photo of blue-green algae 1, 2* and *3* (JPG)

- Internet access, computer, projector, speakers
- Prepare by exploring the webpage, *What is the Elk Lake/Beaver Initiative?* https://www.crd.bc.ca/project/elk-beaver-lake-initiative

Introduction

- Display a photo of blue-green algae blooms in a body of water (such as *MPCA - photo of blue-green algae 1, 2 and/or 3*) and ask students if they have ever seen it before. Have they ever seen Public Health Advisory signs near water systems warning people about blue-green algae?
- Introduce the case study of Elk/Beaver Lake at the head of Colquitz River by watching the (2 minute) video *Water Quality in Elk/Beaver Lake*: https://youtu.be/HsxsBul4DDs



- Discuss eutrophication and blue-green algae blooms.
- Distribute printed copies of *CRD - Nutrients in Lakes* and give students time to read through the infographic.
- Discuss in their small groups the causes of nutrient loading and environmental stressors and how they affect this aquatic ecosystem.

Activity

- Distribute *ENBS - Impacts of Eutrophication Cards* and instruct students to cut the cards and place them in a flowchart to demonstrate the relationship between cause-and-effect using arrows between the boxes. (There will likely be more than one way to demonstrate the cause and effect relationships of eutrophication in this case study.)
- Share the *CRD - Vision for a Healthy Lake* document and have students add cards to display a flowchart that depicts how coordinated efforts and stream/lake restoration can improve the health of a lake.
- Do a gallery walk around the classroom to observe similarities and differences.

Assessment

- Students draw their own flowchart to demonstrate the cause-and-effect relationship of eutrophication in their science notebooks.

Extension

- Have students create cards using eutrophication pollution management strategies that alter human activity, control the release of the pollutant, or clean-up and restore water systems (for example: restore riparian zones by pulling invasive species and planting native species; use organic fertilizers or rotating crop methods to eliminate the use of harmful fertilizers; ban or limit detergents or cleaning supplies that contain phosphates; pump oxygen into lakes; educate the public)
- Explore the guiding question: *How does agriculture affect aquatic ecosystems?* Adapt the *From Farms to Phytoplankton* lesson plan from California Academy of Sciences to demonstrate a model of a local watershed / drainage basin map. *https://www.calacademy.org/educators/lesson-plans/from-farms-to-phytoplankton*
- Use chalk and an outdoor space to draw a local watershed model / drainage basin map. Include water quality monitoring stations, nutrient packets, tributaries, organisms, and several scenarios (such as drought, flooding, new farms, and local and nationwide regulations passed for fertilizer use).
- Have students kinesthetically demonstrate how we can use a model to predict the impacts of nutrient pollutants from agricultural runoff on aquatic ecosystems and produce dead zones at the mouth of a drainage basin.

Additional Resources

- Let's Talk Science's *Eutrophication: Why you should care about pond scum?* *https://letstalkscience.ca/educational-resources/stem-in-context/eutrophication-why-you-should-care-about-pond-scum*

LESSON 5

Eutrophication Lab

Essential Question

What is the effect of different fertilizer concentrations on the dissolved oxygen, nitrates, phosphates, and pH of pond water?

Objective

Students will be able to:

- Collaboratively plan, select, and use appropriate investigation methods to collect reliable qualitative and quantitative data.
- Analyze patterns, trends, and connections in data by observing relationships between variables and performing some calculations.
- Construct, analyze, and interpret a graph.
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.
- Evaluate their methods, identify sources of error, and describe specific ways to improve their investigation methods and the quality of their data.

Materials & Preparation

- SUPPLIED SUPPLEMENTS:
  - » *ENBS - Eutrophication Lab* (RTF · DOCX · PDF)
  - » *ENBS - Eutrophication Lab Rubric* (RTF · DOCX · PDF)
- Buckets or jugs (for collecting water samples in advance)
- Pond or stream water
- Clear plastic bottles or glass jars with lids
- Liquid fertilizer / plant food
- Plastic pipettes

- Small test tubes
- API Pond Master Test Kit (this can be purchased at many pet stores)
- Universal indicator or pH sensor with Vernier LabQuest software
- Dissolved Oxygen (DO) Test Kit or Vernier dissolved oxygen (DO) probe connected to Vernier LabQuest software

Introduction

- Have students read through the Introduction of the *ENBS - Eutrophication Lab*.
- Discuss what is dissolved oxygen and why it's important in aquatic systems. Share the general guidelines for dissolved oxygen concentrations measured in milligrams per litre (mg/L) in the resource section.
- Assign groups of 3 to 4 students, and together they can write an appropriate experimental question: *What is the effect of* _____ *on* _____*? To what extend does* _____*?*
- Encourage students to make a prediction about dissolved oxygen levels (and/or other nutrients) of their pond water after different amounts of liquid fertilizer are added to the samples. Write the hypothesis using the the following format:
  If _[condition exists]_ *then* _[this should happen]_, *because* _[reason]_.

Activity

- On the first day, have students set up their microcosms to simulate the process of eutrophication and follow the procedure in the lab.
- Over the course of the next 2 to 3 weeks and at the beginning of each class, have students take measurements on water samples and record qualitative and quantitative data.
- Using the prompts in the lab report, students will write their individual analysis, discussion, and conclusion based on shared data.

Assessment

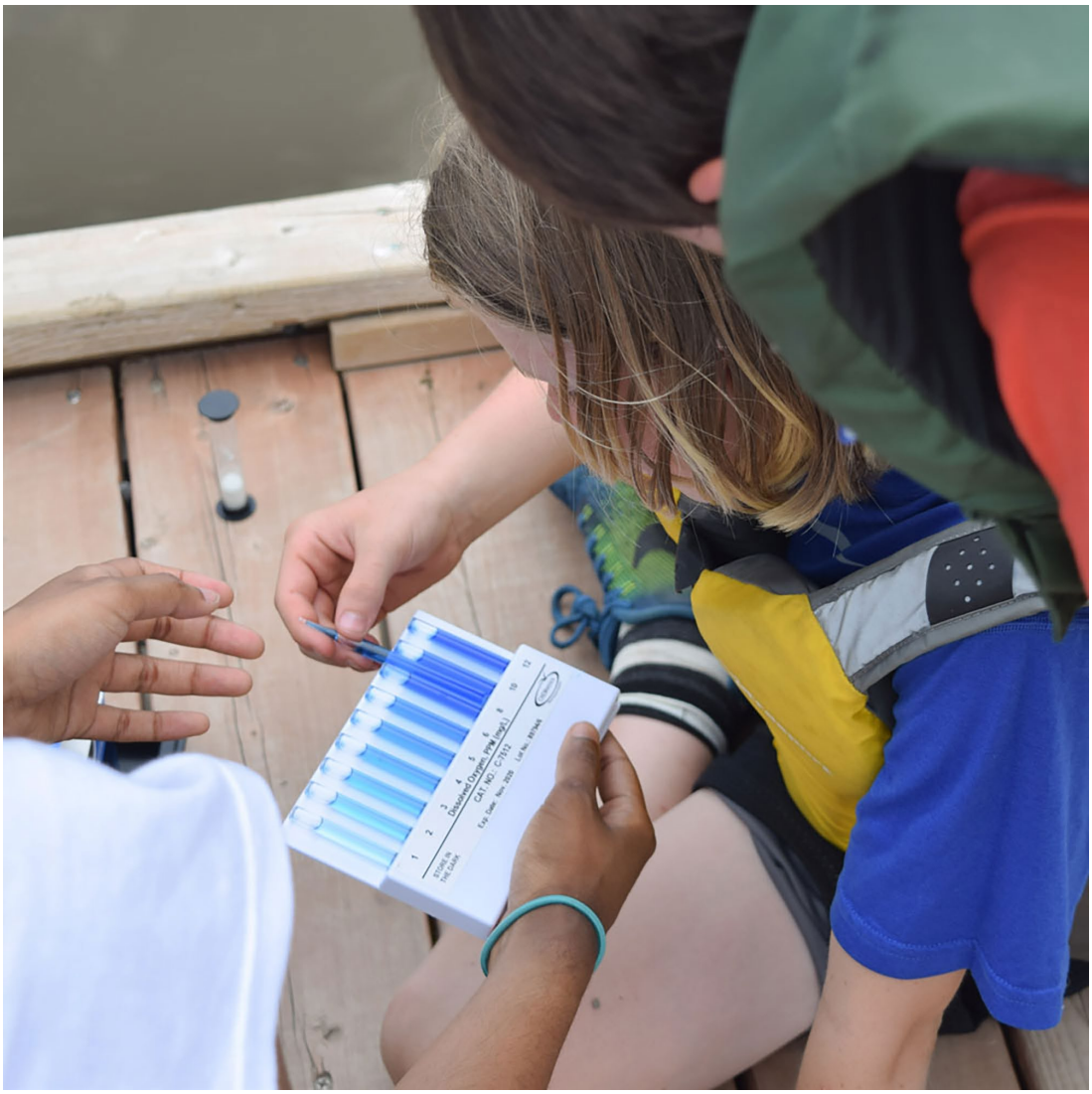
- Use the *ENBS - Eutrophication Lab Rubric* to assess this lab for each student.

Extension

- Students can research scientific and environmental journals for studies conducted on eutrophication and peer-reviewed articles to further help with their analysis and interpretation of their data.

Additional Resources

- See Water Rangers' *Dissolved Oxygen and Algal Blooms* lesson plan for DO information and general guidelines. Water Rangers also sells the testing kits (photo below).
  https://waterrangers.com/test/educational-resources/lessons/dissolved-oxygen-and-algae-blooms/



LESSON 6

Evidence of Climate Change in Watersheds

This lesson is adapted from the *Citizen's Cool Kit on Climate Change & Urban Forestry* from UBC (*https://calp.forestry.ubc.ca/urban-forestry-toolkit/*). This adaptation has more focus on exploring your school's neighbourhood to consider nearby watersheds or local urban streams. Consider doing this lesson after your students learn about global climate systems and the causes and impacts of climate change. Students will use the Claim-Evidence-Reasoning Model (CER) to guide their thinking and investigation.

Essential Question

How might our school grounds and neighbourhood contribute to climate change and impact our watershed?

Objective

Students will be able to:

- Identify common local features that contribute to the causes and show evidence of the impacts of climate change in urban watersheds.
- Apply the Claim-Evidence-Reasoning Model (CER) to guide their investigation and analysis.

Materials & Preparation

- Internet access, computer, projector
- Class set of clipboards
- Pencils
- Highlighters or coloured pencils
- Printed aerial maps (such as Google Maps) of your school grounds and neighbourhood
- Extra blank paper to record quantitative and qualitative data (or use page 17 of UBC's 2022 full CoolKit for a more guided approach, *https://calp.forestry.ubc.ca/urban-forestry-toolkit/*)

Introduction

- Play "climate change caterpillar" as an ice-breaker game where each student takes a turn saying one word they associate with climate change. If words are repeated, begin the round again. Consider making a climate change word wall for students.
- Review the causes of climate change and brainstorm a list of local features that could enhance global warming and lead to climate change. For example:
  - » Burning fossil fuels and carbon emissions from transportation and heating buildings;
  - » Dark impervious surfaces (such as concrete, roads, sidewalks, driveways, and parking lots) absorb a higher amount of solar radiation;
  - » Urban Heat Island Effect (UHIE) results in temperature differences between urban and surrounding rural areas; and
  - » Buildings, development, and construction reduces the amount of green space available and contributes to burning fossil fuels.
- Make connections to your watershed and discuss impacts that climate change has on the area or a local urban stream. For example:
  - » Impervious surfaces increases surface runoff and poor drainage, and contributes to flooding;
  - » Urban Heat Island Effect (UHIE) impacts the vulnerability of local waterways by increasing in water temperature; and
  - » Limited trees and basic green lawns increase temperature and risk of drought.
- Create a chart on the board or individually to highlight points from this discussion, and use the following questions to further guide your students:
  - » *What are the main causes of climate change?*
  - » *What are some local features that emit carbon emissions? How do greenhouse gas emissions enhance global warming and contribute to climate change?*
  - » *What are the risks and impacts associated with climate change in our watershed? How is the local watershed vulnerable to climate change? (For example, coastal areas are at risk of sea levels rising, flooding can harm an aquatic ecosystem or infrastructure, and droughts can lead to loss in biodiversity.)*

Activity

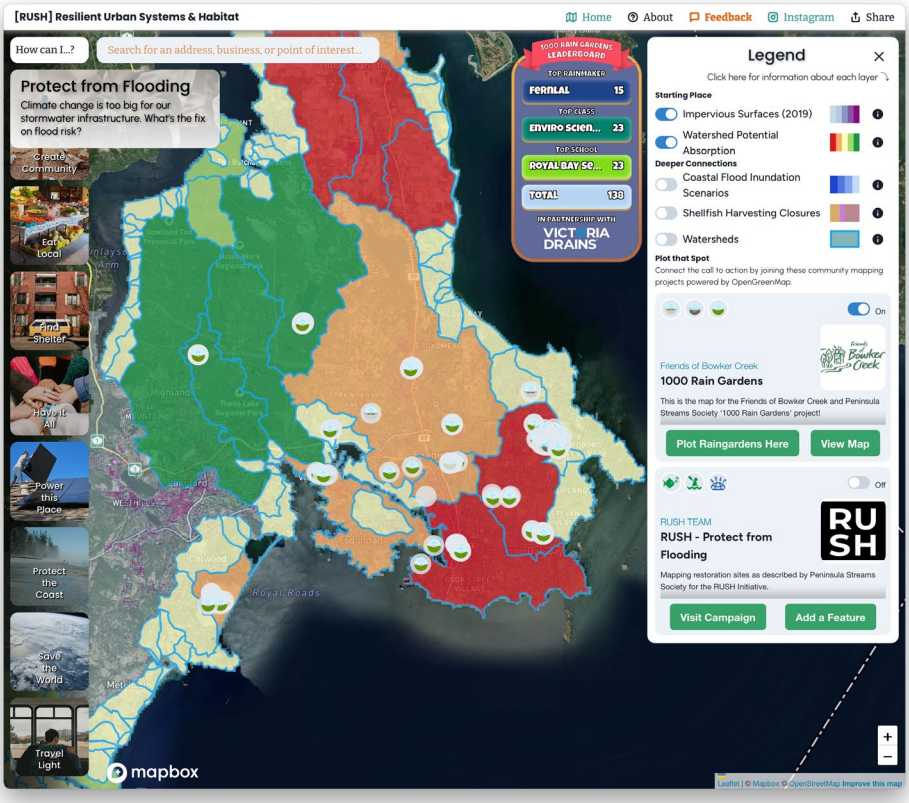
- Introduce the Claim-Evidence-Reasoning Model (CER) in relation to this activity with the research question: *How might our school grounds and neighbourhood contribute to climate change and impact our watershed?*
- Distribute printed maps of your school grounds and neighbourhood to students, working in pairs.
- Instruct students to make a claim or hypothesis about their mapping investigation in one sentence that answers the research question. Encourage students to be specific. For example, *"Impervious surfaces absorb more heat."*
- Take students outdoors and walk around the school grounds and neighbourhood to make annotations on their maps identifying local features that contribute to causes of climate change.
- Have students consider transportation use and record the number of vehicles – as well as how many of these are electric, hybrid, and car share vehicles – and determine the percentage of more sustainable cars. Count and record the number of bicycles they see.
- Have students use coloured pencils or highlighters to annotate areas that are more vulnerable to the impacts of climate change.
- Calculate percent coverage of impervious surfaces using the map.
- Alternatively, have some groups of students map trees, biodiversity, food gardens, or solar panels.

Assessment

- Regroup and give time for students to share their findings.
- Instruct students to write a reflection paragraph using the CER model. Students reiterate their claim about the outcome of their investigation. Then have students present examples and evidence from the data they collected through the school and neighbourhood mapping investigation. Have students explain *why* and *how* the evidence supports their claim. They should conclude the paragraph with any *questions* or *wonders* they have, and identify further experimentation that is required.

Extension

- Have students design an experiment question, determine variables, and create a methodology to explore their claim further.
- Conduct an inquiry project and research the impact of climate change on urban streams or watersheds.
- Consider exploring climate solutions such as low carbon features, activities, and innovations that help reduce watershed vulnerability, and that either mitigate or adapt to climate change.
- If living in Greater Victoria, have students explore the RUSH (Resilient Urban Systems & Habitat) Initiative web map at *https://whatstherush.ca* . Students can use this reference to help them map evidence of climate change. Explain the 3-30-300 rule: tree equity standard in Canada states that you can see at least 3 trees from your home, communities should have 30% tree canopy in neighbourhoods, and you can walk to a green space within 300 metres.
- Have each student map trees in your neighbourhood using the SUPPLIED SUPPLEMENT *RUSH - Tree Equity brochure* (PDF).



LESSON 7

Stream Survey Investigation

In this practical fieldwork lesson, students use their water sampling skills (from the eutrophication lab) to conduct a stream survey investigation. Connect with The Pacific Streamkeepers Federation, local municipality parks or education department, or environmental organizations to support your students with their stream survey investigation and to help you find an appropriate sampling site that minimizes impact.

Choose an appropriate research question pertaining to your local stream, lake, or wetland. Students will gather quantitative and qualitative data on water quality parameters, physical measurements, biodiversity in the riparian zone, identify invertebrates and streamside plants, and draw an aerial sketch of the sampling site. You can use basic water quality parameters (temperature, dissolved oxygen, pH, turbidity, and water quality index) or additional chemical tests like nitrite, nitrate, and ammonia.

Essential Questions

Does the storm drain of our local creek impact the water quality of the stream?

Does our local stream provide essential conditions to support salmon habitat?

To what extent is our local stream biodiverse?

Objective

Students will be able to:

- Conduct a series of water quality tests to determine the health of a local stream.
- Identify the physical elements of the stream and draw an aerial sketch with specific stream features.
- Analyze quantitative and qualitative data to prepare a report about the water quality and stream health.

Materials & Preparation

- SUPPLIED SUPPLEMENT:
  - » *CRD - Riparian Zone Ecosystem* (PDF)
  - » *Pacific Streamkeepers - Handbook Module 3* (PDF)
  - » *UW - Key to Macroinvertebrate Life* (PDF)
- FNESC (First Nations Education Steering Committee) *Science First Peoples Teacher Resource (Secondary)*: Activity 3.4 Water Sampling Investigation (pages 95–97 of the full PDF) and Blackline Master 3.3 Water Sampling Investigation (pages 105–110 of the full PDF): *https://www.fnesc.ca/sciencetrg/*
- Plant guide books or plant identification apps such as PictureThis, iNaturalist, Pl@ntNet, or Google Lens and a smartphone to take photos
- Aquarium or Freshwater Testing Kit (such as API) or Water Rangers Water Testing Kits (*https://waterrangers.com/product-category/water-rangers/*) to test for pH, nitrate, nitrite, ammonia, phosphate, etc
- pH sensor or strips
- Internet access, computer, projector
- Clipboards with blank paper
- Pencils
- Large buckets (for carrying materials)
- Two meter sticks
- Thermometer (°C)
- Dissolved oxygen (DO) sensor or kit
- Stopwatch
- Calculator
- Camera
- Flagging tape
- Long tape measure (~30m)
- Biodegradable float for flow test (such as an orange or radish)
- Plastic containers with lids
- Standard ruler (30 cm)
- Turbidity test like a Secchi disk
- Small garden shovel
- Small aquarium net
- Ice cube trays
- Magnifying glass

Introduction

- For additional guidance, explore the *Pacific Streamkeepers - Handbook Module 3* and FNESC (First Nations Education Steering Committee) *Science First Peoples Teacher Resource (Secondary)* pages 95–97 of the full PDF). https://www.fnesc.ca/sciencetrg/
- Decide on the purpose of conducting water sampling data to determine what tests to conduct. For example, the purpose may be "salmon habitat assessment" or "sample the biodiversity of an urban stream."
- As a class, write a research question pertaining to their investigation purpose.
- Provide an information packet about a local stream or have students conduct their own research about the stream and make predictions about what they expect to find in their stream survey investigation.
- Have students conduct research on their local watersheds including collecting watershed maps, as well as current and historical information.
- Review water quality parameters that you will be sampling and investigation methods prior to visiting the stream. You can use basic water quality parameters using the *Pacific Streamkeepers - Handbook Module 3* record sheet as guidance (temperature, dissolved oxygen, pH, turbidity, and water quality index) or more chemical tests like nitrite, nitrate, and ammonia.
- Study the *CRD - Riparian Zone Ecosystem* and discuss what you would expect to see at the stream, importance, and impacts.
- Gather materials needed for the stream investigation.
- Divide students into groups depending how much time your class has for the stream survey investigation. For a limited time, groups can take on one section including physical measurements, chemical measurements (water quality testing), riparian zone plant biodiversity, and macroinvertebrate identification. For longer periods of time, students can rotate through the above stations to collect trials of data.

Activity

- After arriving to the stream, encourage students to observe their surroundings and make basic qualitative notes:
  - » *What do they see/notice?*
  - » *What sounds do they hear?*
  - » *What do they smell from where they are standing?*

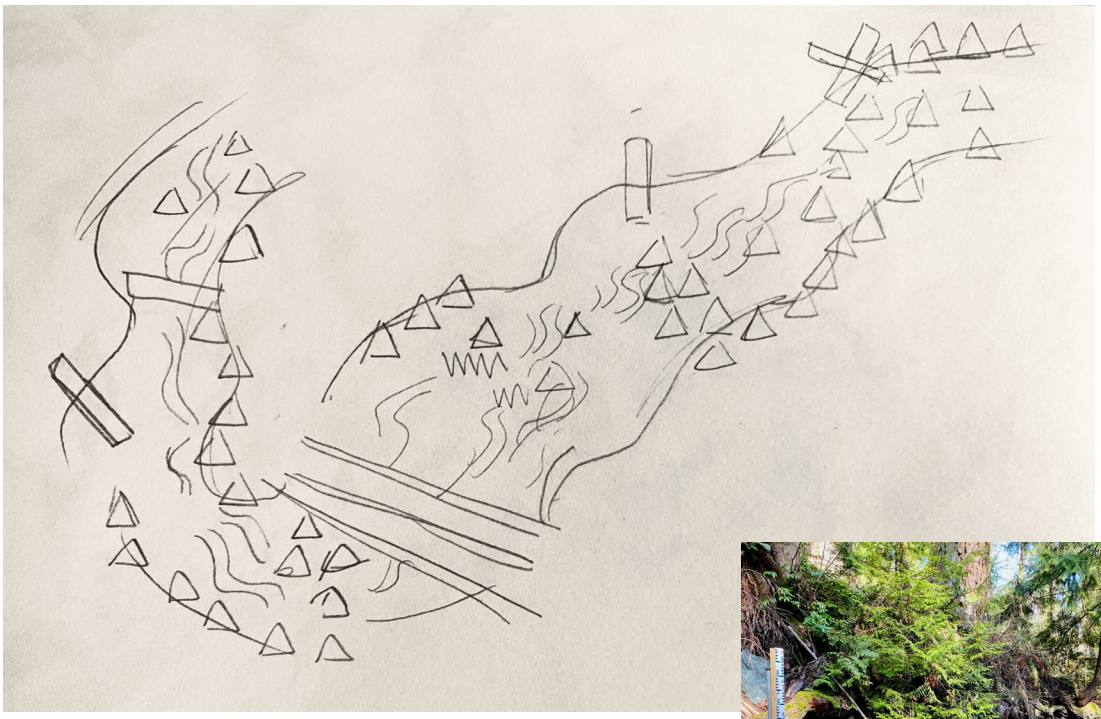
- Decide on what Stream Study Data Recording Sheet to use, and print for each student or group:
  - » You can use FNESC (First Nations Education Steering Committee) *Science First Peoples Teacher Resource (Secondary)*: Blackline Master 3.3 Water Sampling Investigation (pages 105–110 of the full PDF): https://www.fnesc.ca/sciencetrg/
  - » Or use the *Pacific Streamkeepers - Handbook Module 3* (pages 15–16)
  - » Or create your own recording sheet.
- Using the Stream Study Data Recording Sheet for guidance, follow the instructions of the water testing kits.
- Demonstrate how to search for invertebrates in the stream by gently disturbing some of the rocks in the pools. Take pictures of the invertebrates and temporarily store them in the ice cube tray to get a closer look. Leave no trace and reposition rocks as found. Use the *UW - Key to Macroinvertebrate Life* to identify invertebrates before returning them back to the stream.
- Identify the plant species in and around the riparian zone of your water sampling site. Take photos and use books or apps to help with identification.
- Instruct each student to draw an aerial sketch of the stream location and note the following features at the location: logs, riffles, rapids, pools, rocks along shoreline, overhanging banks or cutbacks (evidence of erosion),plants, and garbage or litter. (See following page for example.)

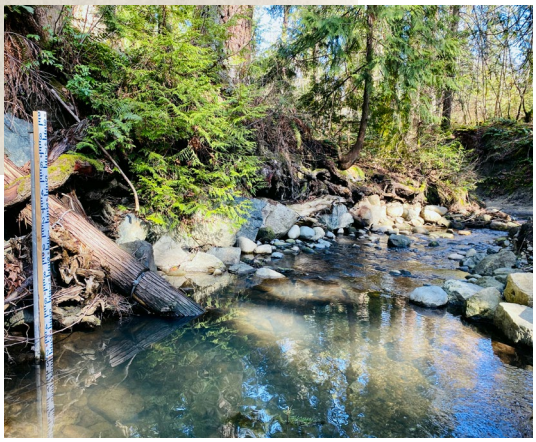
Assessment

- Guide students in analyzing the results based on classifications in *Pacific Streamkeepers - Handbook Module 3* handbook or through their own research.
- Encourage students to share their findings with the class and contribute to writing up a class report about the stream survey investigation. Alternatively, have students do their own report write-up using the collaborative collected data.

Additional Resources

- Pacific Salmon Foundation's salmon spotting map to locate spawning salmon run in rivers and streams of British Columbia: https://psf.ca/salmonspotting/#map
- Water Rangers program: https://waterrangers.ca





KEY:

log

riffle

rapid

rocks along shoreline

overhanging banks or cutbacks (evidence of erosion)

plants

garbage or litter

Urban stream design sketching at Douglas Creek at PKOLS (Mount Douglas Park) in Victoria, BC (by student Kelly Li)

LESSON 8

Stream Solutions & Stewardship Projects

When studying environmental issues and the effects of human activities on watersheds, it is important to spend time exploring hopeful solutions. By engaging in environmental stewardship and demonstrating ability to take action, students can feel empowered and hopeful. You can guide students through a local initiative to take part in stream restoration or have students research and implement their own ideas.

Essential Question

How can we develop a sense of care and stewardship for an urban stream or watershed?

Objective

Students will be able to:

- Conduct research related to environmental issues of an urban stream and use existing skills and new skills to take action in environmental stewardship.
- Address an environmental issue in the community and coordinate action through collaboration in your community.

Materials & Preparation

- Internet access, computer, projector, speakers
- Science notebooks and pencil
- Extra materials depending on the students' project (such as gardening gloves, poster paper, wood and tools, etc)

Introduction

- Familiarize yourself with the 5 videos within the CRD *Prevent Pollution* series: *https://tinyurl.com/CRD-prevent-pollution-videos* ... which are each on a different theme:

  1. preventing storms drain pollution,
  2. preventing pesticide and fertilizer pollution,
  3. removing invasives and enhancing biodiversity,
  4. managing rain water, and
  5. using pervious surfaces to reduce runoff.

- Divide students into five groups, and assign each group to one of the videos above. Use a jigsaw strategy to have each group summarize and share their understanding from their video.

- Revisit the Bowker Creek case study from **LESSON 1**, and provide background information regarding the environmental concerns including stream channel degradation, impervious surfaces, habitat loss and degradation, poor water quality, pollution, flooding and safety, and invasive species. In addition to the storymap noted in **LESSON 1** (*https://engagewithnbs.ca/community-story/bowker-creek/*), you can share:

  - » The (1 minute) video *Time Lapse of Bowker Creek Reconstruction at Oak Bay High School*: *https://youtu.be/A4LqOJT2fqw*
  - » The (3 minute) Engage with Nature-Based Solutions video *Local by Nature: The Bowker Creek Watershed* to provide an example of how rain gardens minimize threats to this salmon habitat: *https://youtu.be/3Ho3jborUew*

  - » This storymap about Bowker Creek to help vocabulary such as surface runoff, water pollution, etc. *https://arcg.is/09zCzy*

Activity

- Take action! Have students contribute to the care for an urban stream or find solutions to a watershed environmental issue through a collaborative inquiry action project.
- Divide students into groups to discuss, research, and brainstorm ideas (using *The 3 Whys* thinking routine, *https://pz.harvard.edu/resources/the-3-whys*) with these guiding questions:
  - » *Why might this [urban stream] matter to me?*
  - » *Why might it matter to people or biodiversity around me [family, friends, neighbours, salmon]?*
  - » *Why might it matter to the city, province, or world?*
- Prompt students, if necessary, to brainstorm some ideas that would benefit a local stream or support an organization (such as Friends of Bowker Creek Society, *https://bowkercreek.org/*) with their projects such as:
  - » Pulling invasive species and restoring stream riparian
  - » Picking up litter in a watershed
  - » Creating a campaign to raise awareness and educate others
  - » Building a rain garden on your school grounds
  - » Raising salmonids in the classroom (see *Stream to Sea Program* *https://www.blscs.org/salmon/sitc.html*)
  - » Building birdhouses for wood ducks at a nearby pond
  - » Organizing a field trip with a local watershed educational program (such as Peninsula Streams & Shorelines Program, *https://peninsulastreams.ca*) to learn more stream stewardship.
- Have students outline and document tasks to be completed, timeline, budget, and progress.
- Support students in taking action! These environmental stewardship projects can be small group projects or full class initiatives.

Assessment

- Have students reflect on their own learning, role in the community, and impact on the environment.
- Use the Environmental Service Learning Rubric as guidance: *https://www.rcampus.com/rubricshowc.cfm?code=Z67WW8&sp=yes*

Extension

- Get your whole school involved or have your students spread awareness of urban stream stewardship with younger grades.

Additional Resources

- Bowker Creek Homeowner's Guide: *https://www.crd.bc.ca/docs/default-source/initiatives-pdf/bci-pdf/brochures/bci-homeowners-guide.pdf*
- Bowker Creek Initiative from the CRD: *https://www.crd.bc.ca/bowker-creek-initiative*
- (32 minute) video *Building a Rain Garden in the Pacific Northwest*: *https://youtu.be/9Kti4HJ45BM*
- (3 minute) video *Vital People: Bowker Creek*: *https://youtu.be/dNFG0_o07WQ*

LESSON 9

Urban Stream Biomimicry Design Challenge

In this lesson, students will work together to apply biomimicry (nature-inspired innovation) to address an environmental issue related to a local stream or watershed. Students will connect their project to one or more UN Sustainable Development Goals (*https://sdgs.un.org/goals*). Use a local stream in your design brief to set up the environmental issues of the stream, and outline the design problem. If students are new to biomimicry, you can use the free *Biomimicry Youth Design Challenge Curriculum* (*https://www.youthchallenge.biomimicry.org/curriculum-download*) to make this design challenge a mini unit on nature-based solutions.

Essential Question

How can learning from nature help us solve a local environmental issue that affects our streams or watersheds?

Objective

Students will be able to:

- Propose a well-researched biomimicry solution to the local stream environmental problem using technology, a process, or a system.
- Collaboratively compile a portfolio demonstrating the biomimicry design process.
- Design a prototype that addresses an environmental issue and provides solutions to a local stream or watershed.

Materials & Preparation

- SUPPLIED SUPPLEMENTS:
  - » *Biomimicry Institute - Design Challenge Rubric* (PDF)
  - » *Biomimicry Institute - Video Pitch Tips* (PDF)
  - » *ENBS - Stream Solutions Biomimicry Design Challenge* (RTF · DOCX · PDF)

» *ENBS - Stream Solutions Biomimicry Design Challenge Map* (RTF · DOCX · PDF)

» *ENBS - Stream Solutions Biomimicry Team Project Portfolio Guide* (RTF · DOCX · PDF)

NOTE: You can use the *ENBS - Stream Solutions Biomimicry Design Challenge* (which is specific to Bowker Creek in Victoria, BC), or create your own based on a local stream, or keep it more broad connecting to your watershed.

- Internet access, computer, projector, speakers
- Access to materials for building prototypes such as design software, Play-Doh, Lego, wood pieces, tools, recyclables, and hot glue.

Introduction

- Introduce the topic by watching this (22 minute) *Biomimicry* video: *https://youtu.be/sf4oW8OtaPY*
- Have students make connections to examples shown in the video that relate to water systems or aquatic life.
- Use AskNature (*https://asknature.org*) to share other examples of biomimicry that are related such as:
  - » Interacting Organisms Filter Water: *https://asknature.org/strategy/interacting-organisms-remove-nutrients/*
  - » Native Plants Persist in Changing Conditions: *https://asknature.org/strategy/native-plants-persist-in-changing-conditions/*
  - » Water Keeps Plants Matter From Releasing Carbon: *https://asknature.org/strategy/habitat-stores-carbon/*
  - » Nest Openings Protect From Floods: *https://asknature.org/strategy/nest-openings-protect-from-floods/*
- Use the free Biomimicry Toolkit (*https://toolbox.biomimicry.org*) or the Biomimicry Youth Design Challenge Curriculum (*https://www.youthchallenge.biomimicry.org/curriculum-download*) to guide your students' learning about biomimicry.
- Take your students outside with their science notebooks to explore and illustrate functions and patterns they see in nature.

Activity

- Introduce the design brief to address a threat to a stream habitat and collaborative biomimicry design project. Specify that students should focus on addressing one of the concerns in their innovation (such as run-off filtration system, litter catcher, habitat restoration system, flooding prevention, or a salmon egg protective box).
- Have students begin by filling out their *ENBS - Stream Solutions Biomimicry Design Challenge Map* to compile ideas and sketch their prototype with labels.
- Provide access to materials based on their planning sheets and time to build prototypes.
- Encourage students to prepare a video pitch or project portfolio to share with the class using the *ENBS - Stream Solutions Biomimicry Team Project Portfolio Guide* and *Biomimicry Institute - Video Pitch Tips*.

Assessment

- Share students' stream solutions for biomimicry projects with the whole class.
- Use the *Biomimicry Institute - Design Challenge Rubric* to evaluate individual student work.

Extension

- Register and submit student projects to the annual Biomimicry Youth Design Challenge: *https://www.youthchallenge.biomimicry.org*
- Invite community members or designers that use biomimicry in their work to inspire and guide students through their projects.

LESSON 10

BC Urban Stream & Watershed Final Assessment

In this culminating assessment, students apply their learning about how human actions affect the water quality in our watersheds and urban streams using key vocabulary, explanations, and diagrams in their responses.

Essential Question

How can I demonstrate my understanding of how human actions affect the quality of water and its ability to sustain life in urban streams and watersheds?

Objective

Students will be able to:

- Apply unit-specific vocabulary, explanations, and diagrams to demonstrate their understanding of how human actions affect the quality of water and its ability to sustain life.

Materials & Preparation

- SUPPLIED SUPPLEMENT:
  - » *ENBS - Urban Streams & Watersheds Final Assessment* (RTF · DOCX · PDF)
  - » *ENBS - Urban Streams & Watersheds Final Assessment Rubric* (RTF · DOCX · PDF)
- Decide how many scenarios and responses you would like your students to do.
- Prepare questions specific to the streams or water systems your students visited during this unit.

Introduction

- Introduce final assessment to your students and review key vocabulary from the unit.
- Discuss ways in which students can prepare for the final assessment.
- Remind students to underline the vocabulary, use paragraphs or detailed point form and diagrams to support their understanding in their responses.

Activity

- Present this assessment as an in-class write or take-home culminating assignment where students could research, use class material, and cite their resources.

Final Assessment

- Use the proficiency scale in the *ENBS - Urban Streams & Watersheds Final Assessment Rubric* to provide evidence of meeting each learning target.

www.engagewithnbs.ca/for-schools

engage with
Nature-Based Solutions

communities in local stewardship of lands & waters