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Science 8:

Local Drinking Water

Indigenous Knowledge Lesson Plan

Local and Traditional Knowledge in Watershed Governance
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Science 8: Local Drinking Water

Rationale of Curriculum Connections

This lesson meets cross-curricular outcomes for Science 8 and Mathematics 8. Students will administer a survey and analyze the results to investigate the ways that water is used in their community, the quality of the water, and the perceived threats to the water.

SCIENCE 8: FRESHWATER AND SALTWATER SYSTEMS (SOCIAL AND ENVIRONMENTAL EMPHASIS)

Focusing Questions: How do water, land and climate interact? What are the characteristics of freshwater and saltwater systems, and how do they affect living things, including humans?

- Describe the distribution and characteristics of water in local and global environments, and identify the significance of water supply and quality to the needs of humans and other living things
- Identify major factors used in determining if water is potable, and describe and demonstrate tests of water quality (e.g., investigate and describe the physical characteristics of a sample of water, such as clarity, salinity and hardness; investigate biological tests).

MATHEMATICS 8:

General Outcome: **Number.** Develop Number Sense

- Demonstrate an understanding of percents greater than or equal to 0%, including greater than 100%.

General Outcome: **Statistics and Probability.** Collect, display and analyze data to solve problems.

- Critique ways in which data is presented in circle graphs, line graphs, bar graphs and pictographs.

Purpose

Many First Nations across Canada face challenges in ensuring the drinking water they have from the land and in their communities is safe to drink. Various industries, such as oil and gas and pulp mills, affect local drinking water. In this lesson, students will come to understand the significance of water supply and quality to the needs of humans and other living things in their local community. To do so, they will administer a survey and analyze the results to investigate the ways that water is used in their community, the quality of the water, and the perceived threats to the water.

Cover Photo: Sparrow Lake Sahtu Region
Photo Credit: Julien Schroder

Teacher Resources

- Reconciling Promises and Reality: Clean Drinking Water for First Nations: https://davidsuzuki.org/science-learning-centre-article/reconciling-promises-and-reality-clean-drinking-water-for-first-nations/
- WWF Watershed Reports Canada Interactive Map: https://watershedreports.wwf.ca/?_ga=2.140303475.17364954.1598042656-375027484.1542421119#canada/by/threat-overall/profile
- Ending Long-term Water Advisories Government of Canada Page: https://www.sac-isc.gc.ca/eng/1506514143353/1533317130660
- Mackenzie River Basin (location and introduction): http://www.trackingchange.ca/river-basins/mackenzie/
- This lesson is based on research from Tracking Change: Local and Traditional Knowledge in Watershed Governance: http://www.trackingchange.ca/

Materials Needed

- Copies of water quality reports for Katl'odeeche First Nation and/or Dene Tha' First Nation http://www.trackingchange.ca/outreach/publications/newsletters/
- Drinking Water Survey (attached)
- Drinking Water Survey Summary (attached)
- Youth Making a Difference: Speaking Up at Meetings (optional case study and video) https://youtu.be/BP1FHvcrBM8
- Optional: Computer and projector to watch video (4:57) of Autumn Peltier speaking at the UN https://youtu.be/zg60sr38oic

INTRODUCTION

Many Indigenous communities in Canada do not have access to clean drinking water. Lack of infrastructure (e.g. water treatment plants, type of piping in buildings) and pollution are two of the reasons why some communities face long-term boil water advisories. For this reason, some communities rely on a truck to deliver water to homes or may drink bottled water. This lesson introduces students to the importance of clean water and allows them to investigate the quality and perceptions of drinking water in their own community.

Key questions for student inquiry:

- Do people in our community feel the water they drink in their homes is safe? What about the water they drink from the land (lakes, rivers, streams)?

LESSON PLAN PROPER

- **Location:** In classroom and in the school/community (survey)
- **Length of activity:** 90-120 minutes / 2-3 class periods
- **Activating Strategies:**
    - *Introduction.* Opening question to activate student knowledge: is the water in your community safe to drink? As a class, draw a scale of water sources (tap, bottled, well, river, lake, etc.) from safest to least safe, based on student perceptions and experiences.
    - Once the class has created a scale of water sources, discuss the following:
        - What kinds of evidence did students use to rate water quality? What other forms of evidence could students collect in order to refine their ratings of water quality?
        - How do people's perceptions of water quality affect their behaviors? Do all people have the same choices about the water they use?
    - Indigenous youth in Canada are strong leaders in protecting water. Autumn Peltier is one of these young activists. At the age of 12 she became involved in environmental activism and was named Chief Water Commissioner by the Anishinabek Nation when she was 14 years old. Watch Autumn speak at the United Nations General Assembly for the declaration of the International Decade for Action on Water for Sustainable Development. As a class, discuss student reactions to seeing a young person fighting so hard for water protection.
        - https://www.youtube.com/watch?v=zg60sr38oic
    - This lesson will give us the tools to answer the following questions: Do people in your community feel the water they drink in their homes is safe? How concerned are people about the water they drink from the land (lakes, rivers, streams)?
- **Learning Experiences:**
    - *Class Activity.* Introduction to water quality assessment in a First Nations community.
        - Introduce: Many First Nations across Canada face challenges in ensuring the drinking water they have from the land and in their communities is safe to drink. Various industries, such as oil and gas and pulp mills, affect local drinking water. Today, we will look at a case study of how people in one First Nations community understands and responds to the safety of their local water sources.
        - Distribute copies of a study on water quality assessment with either Katl'odeeche First Nation or Dene Tha' First Nation. Read the case study together as a class, in small groups, or individually, and respond to the following questions:

- What does the article say is the cause of poor water quality in the community you studied? Who is responsible? How do these changes impact the lives of the people? How are people responding?
    - http://www.trackingchange.ca/newsletters/summer-2018-drinking-water-and-dene-tha-first-nation/
    - http://www.trackingchange.ca/newsletters/drinking-water-and-katlodeeche-first-nation/

- *Group Activity.* Drinking Water Survey
    - Display the "Drinking Water Survey" for students using a projector. Walk through the survey together. Discuss with the students whether they would like to change any of the questions and adapt accordingly. Ask the students if they have any questions to add, and append accordingly. Make a few copies of the finalized survey for each student.
    - Have students collect survey responses around the school, from other students, teachers, administrators, parents, or community members. For homework, have students collect survey responses from parents, community members, elders, etc. Allow enough time for students to gather responses.
    - Input survey responses into the "Drinking Water Survey Summary."
    - Conduct simple statistical analysis with the "Drinking Water Survey Summary" spreadsheet.
        - Identify the "population" and "sample size."
        - Calculate simple statistics (e.g. 10/15 people were concerned about the water quality; 28% of people thought resource development was a risk to the water).
    - Review the Survey Summary together as a class.
    - Display the results of the survey in graph form (bar graph, line graph etc.). As a class, compare the graphical representations focusing on how each graph helps us understand the survey results.

CONCLUSION

- *Individual or Group Reflection. Write and/or discuss:*
    - What did you notice about the survey responses? Was there anything you were surprised by? Anything you wanted to learn more about? If you wanted to learn more, who in your own community could you ask about this topic?
    - What do you think is the value of research that surveys people in this way?
- **Class Discussion for Moving Forward.** Based on the group discussion, ask students to brainstorm ways community members and leaders can respond to issues of water quality (e.g. share observations about water quality on Facebook groups; present/write to local or national governments to advocate about decisions that affect water quality).

- **Extension:** Students use the information they gained through the survey to spark further research about water issues relevant to their community. Options:
    - Scientific testing is another way to understand water quality. Scientific testing can work hand in hand with people's observations and behaviors for a more full understanding of water-related issues. Conduct scientific testing on various local water sources identified through the survey using school resources or test kits offered through the Safe Drinking Water Foundation site - https://www.safewater.org/
    - In small groups, identify areas of further research raised by your survey. Hold in-depth interviews with community members, conduct online research on key topics, and carry out scientific testing. Based on further research, small groups prepare presentations about what they learned and give some recommendations regarding water management, to be delivered to leaders, community members, and/or key stakeholders. Students might host an event at the school or present at a local meeting.
    - Take a field trip to your local water treatment plant to learn about how your community gets clean water.

INDIGENOUS LANGUAGES - WORD BANK

Indigenous knowledge of the land is interwoven with language. The following are key terms in northern languages that are directly related to this lesson. Following the NWT's whole-school approach to language learning, we recommend bringing these terms into the science classroom, according to the language(s) spoken in your community. In this way, it is possible to provide students with a holistic understanding of the land, language, and culture in ways that support their own identities.

> *To use any of the Northern Indigenous languages fluently means that the speaker observes and interacts with their environment. They are relational languages. The connection between the speaker, their actions and the environment speaks to a worldview where relationships are important – relationships with self, others, the land and one's spirituality* - Our Languages, 2020, p. 5

We encourage collaboration with language teachers where available to support student learning. A few ideas to bring northern languages into science classrooms include:

- Creating classroom displays that highlight terms from this list using diagrams, photographs, artwork, and/or definitions.
- As a teacher, using these words in conjunction with or in place of English words throughout the lesson (and others) where possible.
- Encouraging students to incorporate these terms into written and oral components of this lesson (and others).
- Discussing with students how the precision of some of these words is linked with Indigenous knowledge of the land.

- Incorporating terms into a game/activity/lab assignment to make language learning fun.

Source: https://www.ece.gov.nt.ca/sites/ece/files/resources/our_languages_curriculum_2020_low_res.pdf

TRADITIONAL WORDS					
English	**Tsaat'ine tthadeh/Dene (Beaver or xe'ghont'e)**	**Sahtúǫt'ıne/ Dene (Slavey or Kaguntu)**	**Nēhiyawēwin/ Cree**	**Dinjii Zhu' Ginjik/ Gwich'in**	**Inuvialuktun/ Inuvialuit**
Drinking Water	Tu tsedǫ	Tu tse'tsehi	minihk-wayâpoy	Chuu Tr'idinii	Imiq
Good tasting	Tu łuko	Tu theka'	wîkasin nîpîy	Gwiinzii vigwaan-daih	Mam-maqtuq imaq
Dirty water	Tu tsene'	Tu dzǫ t'ehi	wîpahtan nîpîy	Chuu vee	Imaq salum-aittuq
Bad tasting water	Tu dehtsį	Tu nezų'ile	Ispakowan nîpîy	Chuu tr'aakaii	Imaq mama-ittuq
Bad smelling water	Tu woteh dehtsį	Duye' tu de'tsį	Wicekan nîpîy	Chuu nididzin	Imaq tipa-aqtuaq
Water that is healthy	Tu mbe uujǫ ghe'tse'da	Tu beta nezų ts'ena	kanâtastêw nîpîy	Chuu diiyeenjit nizih	Imaq surraituq
Water that might make you sick	Tu edu mbe ujoǫ ghet'tse'da	Tu beta dedihi ati'	kahâh-kosînkôn nîpîy	Chuu k'iighè' duuleh tr'iłts'ik	Imaq anniarun
Water I would never drink	Eyi tu la edu ghǫ'don esi	Tu edu tsetsehi'ile ǫt'e	nîpîy môywîhkât kaminih-kwan	Aii chuu duuyeh shinih	Imigna-iqtuq
Town water from the tap (water truck)	Tu wo'dłutthe tsi tu	Tu me'ch'ine tsi' tu	ôcenas oschi nîpîy	Kaiik'it gwizhìt chuu diits'an tr'ahtsih	Imaq imira-urvik

Keywords: drinking water; survey

Themes: water; traditional knowledge; community perceptions

Student Handout: Drinking Water Survey

NAME _____ **DATE** _____

Community: _____

1. Gender:

2. Age:

3. Where do you normally get your drinking water from?
   a. Tap
   b. Bottle
   c. Holding tank
   d. Other

4. Do you use your tap water for:

5. How often do you have to boil water before drinking it?

6. Do you drink bottled water? If so, why (convenience, taste, etc.)?

7. Do you drink bottled water when you are out on the land? If so, why (convenience, taste, etc.)?

8. Other than bottled water, where are the best places for drinking water supplies? Why?

a. Muskeg?

b. Spring water?

c. Snow water?

d. Ice water?

e. Rain water?

9. Has the water from this source always been the same or has it changed in the last ten years?

10. What are some of the factors that affect water quality in that place?

11. Do you think this water source will continue to be healthy in the future? Why?

12. Where are the areas where water (for drinking) is poor?

    a. Why do you think they are poor?

    b. Are these areas places where people did get water from in the past, but now don't? If so why?

13. If you have concerns over drinking water sources, have you brought those concerns forward? To who?

14. Have those concerns been addressed / acknowledged? By whom?

15. Anything else you would like to say about water?