

trackingchange

Local and Traditional Knowledge in Watershed Governance

Lessons for Science Classrooms

Turning Research Findings into Student Friendly Learning

Teaching students about change in the Mackenzie River Basin...

The **Tracking Change – Lesson Plans for NWT and Alberta Secondary Science Classrooms** are based on extensive research with Indigenous peoples and local communities in the Mackenzie River Basin through Tracking Change. This research is intended to strengthen the voices of subsistence fishers and Indigenous communities in governance, as well as to demonstrate how the rivers are socially, economically, culturally, and ecologically important to the place and people.

It was important to local communities that the knowledge they shared as part of Tracking Change was passed on to young people. These inquiry-based lesson plans bring research findings to life for youth in junior high and high school. The lesson plans were created to both meet curriculum outcomes and to share interesting aspects of the research done by local communities within the students' own region.



Motivation for the Lesson Plans:

The Tracking Change Traditional Knowledge Steering Committee has emphasized the project should “do something for youth.” For this reason, Tracking Change has sought out ways to engage youth throughout the 4 year project. From Traditional Knowledge Fish Camps to Youth Knowledge Fairs, we have tried to support communities in bringing together youth and Elders.

These 12 lesson plans are one way Tracking Change is giving longevity to the amazing research projects communities have completed. Lessons are built around knowledge holders' quotes, community case studies, and other research findings. We have built the lessons around NWT/Alberta Science Curriculum to make it as easy as possible for teachers to use these materials in their classrooms. We hope these lesson plans will engage students from across the Mackenzie River Basin and allow them to investigate their local environmental conditions and those in other communities.

What lesson plans are available?

1. **Science 7: Informed Decision-Making** The importance of using all knowledge available (traditional, local, and scientific) in making decisions about current and future environmental problems.
2. **Science 7: Ecosystem Shift – Ice** Sharing important quotes from Elders, land users, and community members who have noticed shifts in ice.
3. **Science 7: Ecosystem Shift – Fish** Sharing important quotes from Elders, Land Users and community members who have noticed a shift in fish health and populations.
4. **Science 7: Fish Monitoring** The concept of fish monitoring through Indigenous knowledge systems, indicators of fish, and how to monitor fish habitat, health, and populations.
5. **Science 8: Issues** Students will learn how to analyze the different factors affecting marine and freshwater environments, the human impacts on the environment, and how to address these issues.
6. **Science 8: Local Aquatic System Health** Students will get firsthand experience completing scientific monitoring by investigating water pollution in order to understand the consequences of human activities on the environment.
7. **Science 8: Local Drinking Water** 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.
8. **Science 10: Climate Change** This lesson introduces students to ways young Indigenous peoples are involved in climate activism and allows them to investigate climate impacts in their own community.
9. **Science 10: Global Climate Change and Rivers in Different Biomes** This lesson introduces students to ways communities in three different parts of the world contribute to and experience climate impacts on freshwater environments.
10. **Experiential Science 30: Disturbance and Development** This lesson exposes students to resource development projects in the Northwest Territories, introduces how Indigenous knowledge and local communities contribute to understanding of toxins, and allows students to investigate the environmental disturbances that can arise from development.
11. **Experiential Science 30: Freshwater Ecology** Students will conduct fieldwork to investigate local fish resources in a way that is rooted in Indigenous knowledge and on-the-land experience.
12. **Experiential Science 30: Sustainability and Freshwater Resources** Introduces the concept of sustainability from Indigenous perspectives, as well as how the principle can be applied to ecotourism in northern communities. Students will learn to listen to Elders and/or local fish harvesters define sustainability and apply local and Indigenous knowledge to decision-making around ecotourism.

Words in traditional Indigenous languages are also included for many of the lessons!



What are the links to Tracking Change?

These lessons were created using research findings from community projects across the Makenzie River basin. Many lessons use quotes from Elders, land users, and community members as the foundation for learning. We've also highlighted community monitoring projects and fish camps through videos and case studies. Many students in the North will recognize people from their own community or surrounding area while working through the materials.

Check out a Sample Lesson!

Science 7 - Fish Monitoring

Overview: Human societies are a major part of their local ecosystems, and human activities have both direct and indirect impacts on those ecosystems. One of these impacts is on fish habitat, health, and population - including on the fish human beings rely on for food. These changes have significant impacts on the lives of the people who live in this region. After all, humans are part of their ecosystems - shaping and being shaped by the environment around them.

Activating Strategy:

1. Show the short film of Mikisew Cree First Nation's community-based fish monitoring program. The video gives insight to community approaches to monitoring, including the use of Indigenous knowledge and western science at Fish Camps, and the role of youth in monitoring.
2. Ask students to take notes using the viewing guide. Discuss responses as a group.

Extension Activity (land based):

- Take students out on the land, ideally with an Elder and/or fisher, to get firsthand experience assessing the health of fish in a local body of water.

Main Learning Experience:

1. Introduce the handouts, "Dehcho Area Case Study" and "Akaicho Area Case Study," which provide excerpts from Indigenous knowledge holders about fish monitoring in their region. These excerpts were gathered as part of a research project called Tracking Change to understand local people's knowledge of changes to the fish.
2. Have the students read the case studies and respond to the questions as they read. They may work individually or in groups. Discuss student responses together as a class.
3. Challenge students to apply their learning to an imagined situation in their own community. Distribute the handout, "Persuasive Letter: A Gold Mine in Your Community" and go through the assignment together as a class. Ask students to write their own persuasive letter.

How'd we create the lessons?

- Reviewed curriculum to identify outcomes relevant to Tracking Change
- Brainstormed learning activities and sought feedback from Steering Committee
- Drafted 12 lesson plans with various learning experiences and extension activities
- Sent lessons to northern student and teacher for feedback, to ensure materials are appropriate for community context
- Made modifications based on feedback



Excerpt from (Un)Learning about Girls & Women for Intersectional Climate Justice: 7 Stories from Across The World

By: Emily B. N'Dombaxe Dola

Not feeling listen to (excerpt): Kaidynce is a teenage girl from **Tuktoyaktuk**, a small town in North-West Canada. She is Inuit, from the Inuvialuit community. Tuktoyaktuk is a coastal settlement that is predominantly indigenous, with its residents seeing first-hand the effects of climate change. Houses are sinking due to coastal erosion and rising sea levels, and people are unsure about what to do about it. Food production systems have been affected too: whereas fruits like berries are taking longer to grow, fish like salmon are more abundant than normal. Another prominent issue is that whilst the community is used to travelling on ice, they can no longer do it easily due to seasonal changes and safety concerns. Higher temperatures have meant more snow, and it is harder for people to tell if the ocean, lakes or creeks they normally travel on are frozen or not.

In essence, the natural world of Kaidynce's community is changing, and with that, everything else. In particular, Kaidynce is concerned about how their traditional indigenous knowledge is becoming obsolete and less applicable owed to changes to their environment, and subsequently way of life, due to climate change. Nevertheless, though Kaidynce didn't discard the importance of climate adaptation, she argued that climate mitigation was the main imperative: without it, there wouldn't be anything left to adapt to. Indeed, as part of mitigation efforts, her community has been using windmills to reduce their dependence on fossil fuels. In addition, there are ongoing efforts to educate youth about the environmental changes affecting their community, to push for the inclusion of climate change in the school curriculum, and to form local groups (made up of harvesters, experts, youth, researchers...) that can work on collecting data, monitoring the land, and acting on climate change.

At a personal level, Kaidynce was involved in a community research project from the University of Alberta, focused on youth involvement in knowledge production, mainly in relation to climate change and indigenous knowledge. Kaidynce was one of the First Nation and Inuit teenagers at the 14th Conference of Youth (COY) who showcased their resulting research from this initiative. As an Inuit teen, she contended that young girls like her aren't very involved and/or represented in climate change discussions and action, even if people are working to improve this. In her opinion, the reasons for this lack of inclusion range from the girls' own shyness to them "not feeling listened to". Indeed, Kaidynce shared surprise at how people cared for and listened to her, and her peers, discussing their research during the COY session. She particularly liked when an indigenous girl from New Zealand stood up and spoke in her native language, showing solidarity with indigenous communities in Canada. It made her feel appreciated.

This excerpt (and more!) is included in our Science 10 – Climate Change Lesson Plan!

Image: Kaidynce Storr presenting her research project at the Tracking Change 2018 Youth Knowledge Fair!



What do teachers think of the lessons?

Science 10: Climate Change - “Science 10 is an extremely dense course and I know that this last unit is often overlooked because more emphasis is placed on the Chemistry, Physics, and Biology portion. I think if this becomes the case, this would be an excellent inquiry project that students can work on.”

Experiential Science 30: Disturbance and Development – “This lesson plan can be easily incorporated into my unit plan. I would place it into Unit 4: Freshwater Resource Management because there is an emphasis on Science, Technology, Society and the Environment (STSE)... I think this can be a great final project because it touches on the four Key Concepts in Unit 4.”



Teacher Resources:

These lessons welcome teachers from a diversity of communities, both Indigenous and non-Indigenous. We've also created a Teachers Package to introduce educators to the lessons and relevant context. The materials cover:

- What is Indigenous Knowledge?
- Indigenous Knowledge in Science Classrooms
- Introduction to the Mackenzie River Region
- Cultural Awareness

Thank you to our contributors!

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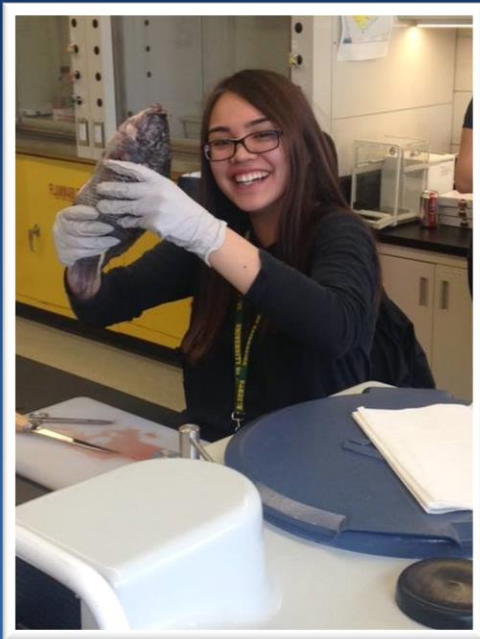
Julien Schroder (photos)

Each lesson plan includes photos from Tracking Change Projects in the Mackenzie, Amazon, and Mekong River Basins!

Image: Fish Harvest in the Sahtú Region – Chelsea Martin

For more project information visit our website:

www.trackingchange.ca/outreach/in-the-classroom



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Images from top to bottom: 1. Tracking Change has been working with Indigenous Youth since 2016 at our Youth Knowledge Fairs! 2. Each lesson plan features unique cover art – this one is by Patrick Boucher!

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