QUILLS
Queen's University Indigenous Land-Based Learning STEM
Queen's University Biological Station

Lakes and Oceans as Sentinels of Climate Change

Organization:

Title: Lakes and Oceans as Sentinels of Climate Change
Summary: Students learn about the potential of lakes to act as sentinels of climate change by examining a STEM study that uses lake cores to understand the impact of climate change on a local aquatic ecosystem. Students can engage in an optional math extension activity in which they graph diatom sediment data and compare patterns present in the data.
Inquiry Question: Inquiry Question 4 (Gifts of the Lake): How does Indigenous knowledge help us to understand the impact of climate change?
Duration: 1 class period
Learning Environment: Classroom
Season: All
Materials:

- Resources providing an overview of the Rühland and co-authors (2013) STEM study including:
  - Lake Cores Study.pdf
  - *CBC- Overview of Study:* https://rb.gy/xpz0d
  - *Nunatsiaq News*: https://rb.gy/9jrfc
- Heat Sinks.pdf
- Diatom Sediment Data.pdf
- Diatom Data-mania.pdf

Curriculum Links:

Grade 9 Destreamed: B1.1, B1.2, B2.1, B2.6
Grade 10 Academic: D1.1, D2.1, D2.3, D2.5, D3.1, D3.2, D3.8
Grade 10 Applied: D1.1, D2.1, D2.4, D2.6, D3.1, D3.3, D3.7

Meta Data:

Content Type: Activity
Bundle: Food
Theme: Global Climate Change
Subject Area: Biology, Environmental Education, Geography, Mathematics, Science, Social Studies
Curriculum Focus: 9, 10

Teacher discusses with students how Western scientists often look to lakes and oceans to understand the impacts of climate change. Oceans play a significant role in understanding and slowing climate change as they are massive *heat sinks*. Teacher reviews this vocabulary word with students along with atmosphere, lithosphere, cryosphere, biosphere, and hydrosphere using the **Heat Sinks.pdf.**

Western STEM Connection:

Scientists can also study past and current climates by examining cores taken from aquatic ecosystems. Ice core samples, for example, help scientists understand past ecosystems. Ice core samples from polar and glacial ice can be very useful to scientists for finding climate information as far back as 800 000 years. Scientists can also understand how climate change impacts current aquatic ecosystems by taking sediment cores from lakes. This was done in the following study:

Rühland, K.M., Paterson, A.M., Keller, W., Michelutti, N., and Smol, J.P. 2013. Global warming triggers the loss of a key Arctic refugium. Proceedings of the Royal Society B: 280: 20131887. http://dx.doi.org/10.1098/rspb.2013.1887

Teachers familiarize themselves with the study by reviewing the following sources.

- *CBC- Overview of Study:* https://rb.gy/xpz0d
- *Nunatsiaq News*: https://rb.gy/9jrfc
- *Queen's University Press Release*: https://www.queensu.ca/pearl/media/hudsonbay/

Teachers then introduce the study to their students using the **Lake Cores Study.pdf** and by playing the following recording: https://rb.gy/3cc6s

Next teachers have students engage in the following graphing math extension activity found in the documents titled **Diatom Sediment Data.pdf** and **Diatom Data-mania.pdf.**

