Western STEM Connection -Tree Migration

Organization:

Title: Western STEM Connection – Tree Migration

Summary: Students learn about how the changing climate is affecting expansion and population dynamics of trees and shrubs, learn to identify local tree species, and use tree cookies to make predictions regarding the impact of climate change on local tree species. Students can also engage in an optional math extension project in which they use graphing and patterning principles to make predictions regarding tree growth.

Inquiry Question: Inquiry Question 1: Forest Harvesting: How does observing the land teach us that an ecosystem is comprised of interdependent beings (including humans) which all have important roles and responsibilities that must be fulfilled in order for an ecosystem to thrive?

Duration: 2-3 classes

Learning Environment: Classroom, outdoor

Season: All

Materials:

- Class trip to the Elbow Lake Environmental Education Centre (ELEEC)
- Subarctic Tree Line Dynamics.pdf
- Tree cookie samples
- Website:
  Tree rings provide snapshots of Earth's past climate – Climate Change: Vital Signs of the Planet (nasa.gov)
- A Closer Look: A Tree Identification Guide.pdf
- Lesson Plan-The Best Time to Plant a Tree.pdf
- Tree Cores.pdf

Curriculum Links:

Grade 9 Destreamed: A1.1, A2.4, B2.5, B2.6

Grade 10 Academic: A1.1, D1.1, D2.3, D3.8

Grade 10 Applied: A1.1, D1.1, D3.7

Meta Data:

Content Type: Activity

Bundle: Food

Theme: Global Climate Change

Subject Area: Biology, Environmental Education, Mathematics, Outdoor Education, Science,

Curriculum Focus: 9, 10

Teacher introduces students to study that shows how climate change (caused by not living in reciprocity with the natural world) can change the makeup of a forest. Summary of study found in **Subarctic Alpine Tree Line Dynamics.pdf.** The following study shows how changing

temperatures in arctic and subarctic regions affect the movement and population dynamics of trees and shrubs.

Variability, contingency and rapid change in recent subarctic alpine tree line dynamics; Landscape variability of vegetation change across the forest to tundra transition of Central Canada. Ryan Danby: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/j.1365-2745.2006.01200.x

- Teacher can relate this study to the experience students had in the forest discussing Maple trees in Learning Activity 3 of the Food Bundle: *Gifts of the Forest*. This can be done by explaining that, because of climate change, over 1000 plant and animal species are shifting their range towards the Southern and Northern Poles. Maple, however, does not appear to be moving into the Boreal Forest, north of where it currently grows. This is because compared to southern soils, boreal soils are acidic and low in nutrients. There are also different fungi living in the Boreal Forest which are not compatible with those required by Maple trees to thrive. Because of this, even though Maple trees are disappearing from regions further south in the US, such as Washington State, they are not migrating North. This may mean that in the future maple land distribution will be significantly reduced. Teachers ask students to consider what this might mean for the Indigenous land-based practices and language connected to Maple trees and their gifts.

Activity: Taking a Closer Look
- Students take a closer look to determine what the inside of trees can teach us about the changing climate.
- Trees investigated in the study include white spruce, willow, and birch. First, students will learn how to properly ID these tree species. They will also learn about what conditions and climates these trees prefer. A worksheet for students containing this information can be found in **A Closer Look: A Tree Identification Guide.pdf**.

Elbow Lake Extension:
- Teacher gives students tree cookie samples from ELEEC and ask them what features they see. Students might already know that they can count the lines to figure out the age of a tree, but there's more! For instance, students can look at the rings of a tree to determine the environmental conditions in the region where the tree grew. The lighter part of each ring is the spring season's growth and is where most of the growth happens. The darker part of the ring is the summer or fall growth, which is when the rate of growth slows. The darker colour is made by cells growing smaller, closer together, and with thicker cell walls. Black parts can show when a fire has reached a tree and wide rings show a rainy season where much water led to increased growth.
- Students view tree cookies (in a safe and sustainable way) to explore growth rings and what they tell us about the tree and the area in which it grew. Students can use the same
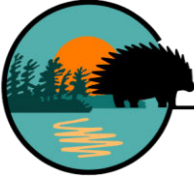
techniques that were used in the following study. How tree rings are used to infer past climates:

[Tree rings provide snapshots of Earth's past climate – Climate Change: Vital Signs of the Planet (nasa.gov)](#)

- The teacher then asks:
    - If trees grew this much in the warmth and this much in the cold, then how might they grow with temperature increased caused by climate change?
    - What about extreme climate events caused by climate change such as drought, flooding and fire? How might these factors impact tree growth? To find out more students can check out this resource: https://www.scienceworld.ca/resource/tree-cookies/

Math Extension:

- Math Connection: See **Lesson Plan The Best Time to Plant a Tree.pdf** and the **Tree Cores.pdf** for a math extension.