Chapter 2: How Does Climate Change Affect Our World

Inquiry 2: What Systems are at Work in a Neighbourhood?

- ***Provocation*** *–Neighbourhood Walk, I Wonder Wall*
- ***Question Generation*** *– Concept Mapping,*
- ***Knowledge Building*** *– Parts, Perspectives, Me*
- ***Determining Understanding*** *– Back and Forth, Habits of a Systems Thinker Scenarios*
- ***Pursuing learning*** *– Habitat Exploration*
- ***Consolidation*** *– Triangle, Square, Circle*
- **Assessment** *– 30 Second-one minute sound bite*
- ***Take Action***

A. Provocation

To hook student interest, introduce the provocation to initiate student thinking.

Neighbourhood Walk

Take your class outside on a neighbourhood walk to observe the local environment. This could include both the natural and built environment. You could ask your students to look for anything from flora and fauna to evidence of adaptations to climate change.

On this walk challenge students to find three to five **"I wonders"** about how climate change is affecting or may affect the environment in your local area. Compile all of the "I wonders" into a list for students to refer back to when developing **umbrella questions**. For example, "I wonder how bees are being affected by climate change."

Biodiversity or species at risk modification:
Before leaving for your walk, encourage students to bring a device along to allow them to photograph their "wonderings". (Students may be able to download the free app, iNaturalist. The app allows them to take photos of plants, animals or insects for identification and will suggest probable species. Data uploaded into iNaturalist is shared with scientists to help conduct research and monitor invasive species). If students do not have the app (or data on their device), simply take photos of interest to explore further upon returning to the classroom.

B. Question Generation

At this point in the inquiry, we want to harness students' curiosity and build off of the provocation that has captured their interest by generating meaningful questions to continue to drive the learning process. This section will outline a pathway for question generation depending on the provocation(s) that your class engaged with.

Consider the neighbourhood to be another system and explore questions using **concept mapping** that can connect the different parts.

Example Activity:
Create your own concept map using the essential question, **"What are the systems in our neighbourhood?"** See Systems Thinking in the Elementary Classroom for some ideas.

C. Knowledge Building

At this stage, students may be ready to engage in a group knowledge building activity. It will encourage students to open their minds to many alternative ways of thinking about the provocations and ideas that have been generated thus far in the inquiry process.

Using the **Parts, Perspectives, Me** routine, encourage students to examine, in detail, a part of the system.

Example Activity:
Following the neighbourhood walk have students choose an object/subject of interest they discovered on their walk. In pairs or small groups have students explore the following ideas in order to build knowledge and explore alternative perspectives.

Possible Discussion Questions:

- What are the various parts or components of the object or subject of choice?
- Explore this object or subject from a different perspective such as one of the parts or components that you identified above. How do these parts or components contribute to the function of the whole?
- What personal connections can you make to this object or subject? Try also taking the perspective of the specific component or part that you identified.

D. Determining Understanding

Use responses to inform and guide the learning process. They can provide insight into which concepts need clarity, what many students are already well informed about, and a general direction that many students want to pursue.

After experiencing some of the provocations and participating in the Parts, Perspective and Me activity, explore this strategy to determine next steps and levels of understanding.

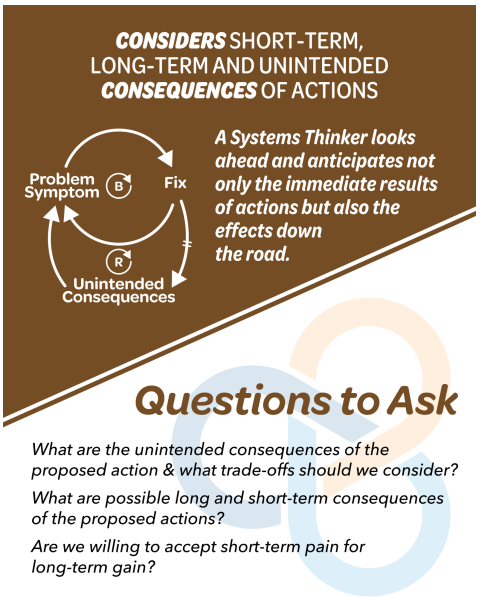
The **Back and Forth** technique allows students to explain a concept or idea and share thoughts with a partner.

Example Activity 1:

In pairs, student A explains a problem or an issue they observed on their walk (such as vandalism in the woodlot) and perhaps a potential solution to the problem. Student B writes down what they think they understood the problem to be and the potential solution and then shares what they wrote with student A. Students reverse roles and check each other's work for clarity and accuracy.

Example Activity 2:
Using the **Habits of A Systems Thinker** cards, consider "short-term, long-term, and unintended consequences of actions".

Exploring our own community through a systems thinking lens creates opportunities for us to examine our actions and the consequences of them. Allow students time to discuss these scenarios using the **Back and Forth** strategy, until they come up with a collaborative possible solution to address the scenario. Students can then present their solutions to the class for feedback.



Scenario 1:
Problem: too many cars on our roads contributing to air quality problems as they sit idling in traffic
Short-term consequence: build more roads so that cars continue to move freely, less idling
Long-term consequence: people more apt to use their cars to get around because traffic is moving more freely
Unintended consequence: more people driving, more carbon dioxide released into the air contributing to air pollution

Scenario 2:
Problem: coyotes killing and eating chickens on local farms
Short-term consequence: extend hunting season and quotas on coyotes to reduce the population
Long-term consequence: less coyotes means increase in some animal populations such as rabbits and deer; increased population of rabbits and deer means more grazing on available plants and trees, particularly in the winter months
Unintended consequences: rabbits and deer starving as their food source is limited

E. Pursuing Learning: Impacts on the Environment

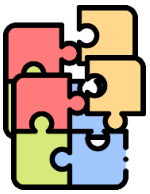
At this stage, students may begin research to pursue some of their questions, or some of the following activities could be integrated into the process to ensure that students have an understanding of foundational climate science. The activities listed below will enrich the understanding of climate change.

Students become explorers through **Habitat Exploration**.

Example Activity:
"Are you ready to go on a habitat exploration? If you took a trip around your neighbourhood, you would see an incredible variety of habitats, everything from parks to ponds. In this activity, students will be explorers who travel around their communities to observe various land and water habitats. Students will collect, record, organize, and compare data about the variety of habitats and take note (using field notes and by taking pictures) of the cleanliness of the habitat and take a survey of the biodiversity, both plants and animals, that make it their home."
(Adapted from zspace.com)

Possible Discussion Questions:

- What is the biggest environmental impact in our area? Do you see any evidence of climate change in your study area?
- From your field work, determine which species are most common in your area? Did you find any evidence that other species may also use this study area?
- Do you see any risks for any species in your study area?
- How are we, as humans, connected to any of the species you found?
- What are the best restoration actions (best ways to improve these areas) that will encourage biodiversity and maintain healthy habitats?



F. Consolidation

This step is designed to encourage students to integrate and synthesize key ideas. When students make connections and see relationships within and across lessons, this helps them to solidify knowledge and deepen understanding.

Determine three important issues identified on the neighbourhood walk using the **Triangle, Square, Circle** routine.

Example Activity:
Based on the activities that followed the neighbourhood walk, have the class, together as a group, (or in small groups for older children), use a triangle shape to determine 3 important issues, problems or discoveries they made, one for each point Use a square shape to explore things that "squared" with them or that they agree with. Finally, use a circle shape to identify what is still "circling" in their minds or questions that they still have regarding how climate change affects our local habitats.

Assessment Idea

Teachers will assess learning at different points throughout the inquiry using multiple methods. The following assessment provides an alternative evaluation method to standard quizzes and tests, that can be used after consolidation or at any point in the lesson to check for understanding.

As an assessment tool, I have students try the **30 Second - 1 Minute Sound Bite** strategy.

Example Activity:
Have students work in pairs or small groups to create a short and succinct PSA about the need to care for a specific local habitat or a species at risk within a local habitat.

Take Action:

These ideas for action can be utilized at any point in the learning process, whether it's now or after completing more guided inquiries. Note, the suggestions are consistent in each chapter.

Allowing time for students to take action is an essential part of the learning process on climate change, as it empowers students and eases their eco anxiety.

Choose any or all of the 4 suggested videos to view, discuss and to spark an inquiry.

- **Save Tomorrow** [Young Voices for the Planet] 7:21 minutes
  Inspired by the other Young Voices for the Planet films, three 9-year-old girls realize that they might be able to make a difference, too. These youth in Lexington, MA team up together to change a town law (with unanimous support!) to allow solar panels on public buildings. They then turn their passion towards protecting the local forest habitat.

- **How we children save the world** [Plant for the Planet]: 5:21 minutes
  The story behind Plant for the Planet—a youth perspective on how children can change the world and make a real impact in the climate crisis.

- **Canada Living Report** [World Wildlife Fund] 0:59 seconds
  WWF's 2017 living planet report brings attention to the significant wildlife loss and takes a look forward to see "what can be done?"

- **Artivism for Nature** [World's Largest Lesson] 2:02 minutes
  Students explore what it means to be Nature Positive and design a creative image of a tree, uploading it to a virtual forest as a demonstration of their commitment to being Nature Positive and wanting others to be too.

Possible Discussion Questions:

- What is your favourite place to be outdoors?
- How are young people making their voices heard?
- How can a "nature positive" attitude help local habitats and biodiversity?

Ideas for Taking Action:

- Plant trees
- Habitat restoration
- Collect data as citizen scientist such as local bird counts, schoolyard tree and plant surveys or participate in a **local bioblitz**
- Join student council and support initiatives and campaigns that help habitats and increase biodiversity
- Share your learning within your school and share your learning outside the class

Action Project Examples

- Ten Canadian Schools' stories of Climate Action
  - This document outlines a collection of promising practices of climate action taking place in 10 Canadian UNESCO Associated Schools. These 10 schools participated in a worldwide UNESCO pilot project to implement climate action as recommended in the UNESCO (2016) publication, *Getting Climate-Ready: A Guide for Schools on Climate Action.*
- Young Voices for the Planet
  - This website documents youth speaking out, creating solutions and leading the change. These youth solutions to the climate crisis include stories of California kids banning plastic bags, Florida students saving their school $53,000 in energy costs, an 11-year-old German boy planting millions of trees and other young people changing laws, changing minds and changing society as they reduce the carbon footprint of their homes, schools and communities.
  - Check out resources for Kids Taking Action here.
- The Great Plant Hunt from Ecoschool Global
  - The campaign aims to educate students about biodiversity, its importance and encourages them to take positive action.
- Warming, Waste, Water, Watts, Wildlife (W5)
  - Through this project, thousands of students will be given opportunities to assess, design, and build innovative solutions to environmental challenges.

- Community Conversations for Climate Change
    - In this activity, students talk to members of their community about some of the environmental and climate change they have noticed since they were young.