

## Grade 9 Resource (SNC1W) – Biology (Climate Change)

### Overview

\* This activity requires students to have access to electronic devices (e.g., chromebooks, iPads, laptops). Smart phones could be used, although it is more difficult to see the entire map.

**Day 1** Refer to [Student Handout A](#) (Solutions also provided [here](#)).

**Minds-on:** Ask students to brainstorm in small groups possible impacts of climate change on Canadian ecosystems and communities. Brief class discussion. The class can also watch an introductory [video](#).

### Action:

#### **Part A: Analyzing Climate Change Modeling Data**

Using an interactive [climate atlas map](#), students will examine the impacts across Canada of high carbon emissions. Students will choose certain parameters to analyze a possible model or scenario and observe how the map changes by choosing:

- i) Climate Change Variables (hot weather, cold weather, temperature, precipitation and agriculture).
- ii) Time period (recent past, immediate future, near future).
- iii) Climate Change Scenarios: (more and less climate change)

Students will go through their [Student Handout A](#) to examine the data for the city of Toronto (or a city/community of their choice).

The teacher can help students navigate the website and handout using the accompanying [slide deck](#).

**Day 2** Refer to [Student Handout B](#).

#### **Part B: Investigating Impacts, Initiatives and solutions**

Students will explore:

- Various topics and videos that showcase people talking about the **impacts** of climate change and the **initiatives** and **solutions** that are being done across the country.
- Perspectives and practices done by Indigenous, Métis and Inuit communities.
- In small groups (watch videos on one device) or quietly on their own (with headphones).
- Using the [Student Handout B](#) to help them organize their notes.

The teacher can help students navigate the website using the accompanying [slide deck](#).

### **Consolidate and Close:**

1) Students may watch and reflect on [video](#) on Colonialism and Climate Change.

2) *Think, pair and share...* With another classmate, students can reflect on their learning by going through a set of questions at the bottom of their handout.

### **Learning Goals**

*We are learning to ....*

- Assess the impacts of climate change on the sustainability of Canadian ecosystems.
- Describe Canadian initiatives for combating climate change and solutions to address the impacts.

- Assess the impacts of climate change on Canadian communities, including First Nations, Métis and Inuit communities.
- Explain how sustainable practices used by various communities, including First Nations, Métis, and Inuit communities, reflect an understanding of maintaining balance within the ecosystem.

### Success Criteria

I can ...

- *Investigate and evaluate climate change data.*
- *Describe how various regions are impacted by climate change and how reducing carbon emissions will reduce these impacts.*
- *Describe the various effects of climate change across Canada, including one example of the impacts on First Nations, Métis, and Inuit communities.*

### Curriculum Expectation(s)

#### Overall Expectations

#### B2. Investigating and Understanding Concepts

Demonstrate an understanding of the dynamic and interconnected nature of ecosystems, including how matter cycles and energy flows through ecosystems.

**B1. Relating Science to Our Changing World** Assess impacts of climate change on ecosystem sustainability and on various communities and describe ways to mitigate these impacts.

#### Specific Expectations

**B2.6** identify and use various indicators of climate change to describe the impacts of climate change on local and global ecosystems, and analyse how human activities contribute to climate change

**B1.1** assess impacts of climate change on the sustainability of local and global ecosystems, describe local or global initiatives for combating climate change and identify solutions to address some of the impacts.

**B1.2** assess impacts of climate change on communities in Canada, including

**B1.3** investigate and explain how sustainable practices used by various communities, including First Nations, Métis, and Inuit communities, reflect an understanding of the importance of the dynamic equilibrium of ecosystems

### Student Prior Learning

- Students may have already learned about climate change.
- Students should be familiar with sources of carbon dioxide (e.g., burning of fossil fuels) and have an understanding that carbon dioxide is a greenhouse gas that traps heat, contributing to global warming.
- Learning of the carbon cycle and its role in the dynamic equilibrium of ecosystems beforehand may enhance learning.  
(For a review, see [Introduction Lesson](#) from the Climate Atlas of Canada - Optional).

### Lesson Descriptor

**Minds-on:** Ask students to brainstorm possible impacts of climate change on Canadian ecosystems and communities. The class can also watch from the Climate Atlas website an introductory [video](#) or refer to the [guidebook](#).

#### Part A: Analyzing Climate Change Data (Day 1)

**Materials:** students will need access to electronic devices (e.g., chrome books, laptops)

- ❖ **\*Tip:** Prior to the lesson, it is recommended students watch the [demo video](#) (play from 9:52-13:54) so students understand how to navigate the Climate Atlas map before the lesson

(e.g., assigned the day before or could watch as a class).

- ❖ **\*Tip:** If there are not enough chrome books or laptops for each student, alternatives could be:
  - students use their own personal electronic devices (although the entire map may not be visible).
  - one chrome book per small group of students.
  - Change parameters together as a class on the projected screen and compile data as a class (if the screen is a SmartBoard, then a student could come up and change the parameters themselves).

1. The teacher can help students navigate the website using the accompanying [slide deck](#). (optional)
2. Students will explore the interactive [climate atlas map](#) to see how climate change is affecting different communities across Canada. Based on climate change modeling, the interactive map projects what conditions can be expected in Canada, based on different greenhouse gas emission scenarios. Any part of the map can be clicked on to access climate data at that location.

To create a possible model and see how the map changes, students choose (at the **bottom** of the screen):

- i) **Climate Change Variables:** The five variables that can be examined are: hot weather, cold weather, temperature, precipitation and agriculture. (For more information on the variables, click [here](#)).
- ii) **Time period** (Recent past (1976 - 2005), immediate future (2021 - 2050), near future (2051 - 2080))
- iii) **Climate Change Scenarios:** More Climate Change (“High carbon” scenario) and Less Climate Change (“Low carbon” scenario)

3. After the teacher has gone through the interactive map, the teacher could provide approximately 10 minutes of ‘**Freestyle**’ for them to explore the interactive map on their own.

4. To start analyzing the data, students will begin to work through their [Student Handout A](#). To begin, the class will click on the city of “Toronto” on the climate atlas map (or they may choose another community or city they are interested in alternatively). The teacher will go through the **first variable - Hot weather**, with the entire class to model how to navigate through the map and data (See accompanying [slide deck](#)).

5. Students will then work through the remaining 4 variables and analysis questions (independently, in pairs or small groups). The teacher can take up answers the next day (see [Solutions](#))

Note: Alternatively, the teacher could assign one variable **per group** (and corresponding questions) and then have the class compile and analyze the data together to save time.

## **Part B: Investigating Impacts, Initiatives and Solutions (Day 2)**

**Materials:** students will need access to electronic devices (e.g., chrome books, laptops)

Students will explore on the [climate atlas map](#) various topics and videos that showcase people talking about the **impacts** of climate change and the **initiatives** and **solutions** that are being done across the country. Students can access the videos in a number of ways:

- On the map directly.
- In the ‘Menu’ icon, at the top left corner of the screen..
- Clicking on the First Nations Icon and choosing which Indigenous markers you want displayed on the map (First Nations Communities, Inuit Communities, Métis Projects)
- From the ‘video’ tab at the top of the [main page](#).

Students may explore in small groups (watch videos on one device) or quietly on their own (with headphones). Students will fill out the table on their [Student Handout B](#) to help them organize their notes.

The teacher can help students navigate the website using the accompanying [slide deck](#). **(Part B)**

1) Students may watch and reflect on [video](#) on Colonialism and Climate Change.

2) *Think, pair and share...* With another classmate, students can reflect on learning by going through a set of questions at the bottom of their handout.

- What was the most surprising thing you learned from any of the videos?
- Explain one example of how Indigenous knowledges can help combat climate change, where Western science is limited?
- What is one word that best describes how you are feeling after watching the videos? (e.g., hopeful, overwhelmed, surprised, empowered, inspired, nervous). Explain briefly.
- Combating climate change involves many different stakeholders, with various backgrounds and experiences. Which trades, careers or fields of study were reflected in the videos?

## Lesson Extensions

### The Class Creates their Own Climate Atlas Map

1. The class can create a display case (e.g. bulletin board, website) to share their learning with the school community.

2. Using the map of Canada as a background or template, in groups of 2-3, students highlight something they learned from Part A or Part B of the lesson for a particular region or community in Canada (e.g., each group can have an assigned province or territory).

3. Students can choose a topic/community and create a video, audio, reel, slideshow etc. that links viewers to a QR code. The video or audio should be concise, informative and engaging. Project description with a sample rubric is provided [here](#).

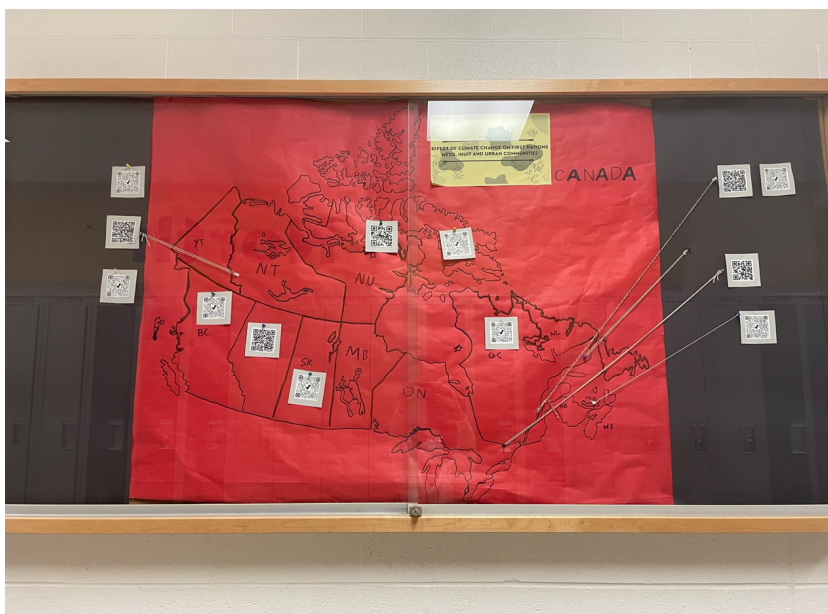


4. The class can connect their display case to their school's EcoSchools Program and contribute to their school EcoSchools certification. This activity could also be connected to an event (e.g. Earth Day in April, June is Indigenous Month).

- ❖ *Note: If the video link is posted in the science hallway of the school, remind students not to include their name or image in the video.*
- ❖ *Note: Ensure students are citing your images and/or using images that are free to use (e.g., [Wikimedia Commons](#)).*
- ❖ *The teacher should review projects and provide descriptive feedback before final projects are displayed.*
- ❖ *The teacher should remind students about what is acceptable for choosing images and review student content before they present to ensure appropriateness and accuracy (e.g. avoid images that perpetuate romanticism or stereotypes).*

5. **Cross-curricular connection:** This class project also connects to Grade 9 Geography (e.g., C1.1 describe strategies that industries and governments have implemented to increase the sustainability of Canada's natural resources). The display case could be a joint project between grade 9 science and grade 9 geography classes.

Here is an example of one grade 9 science class' display case.



## Resources

Anishinabek Nation. (2022, October 19). *Colonialism and Climate Change*. YouTube. Retrieved December 3, 2022, from <https://www.youtube.com/watch?v=6idqbCp9y1I>

Prairie Climate Centre - University of Winnipeg. (2022). *Climate Atlas of Canada*. Climate Atlas of Canada. Retrieved November 11, 2022, from [https://climateatlas.ca/map/canada/plus30\\_2030\\_85#](https://climateatlas.ca/map/canada/plus30_2030_85#)

Prairie Climate Centre - University of Winnipeg. (2022). *Climate Atlas*. Climate Atlas of Canada: Climate Change in Canada. Retrieved November 11, 2022, from <https://climateatlas.ca/>

Prairie Climate Centre - University of Winnipeg. (n.d.). *Educator Resources*. Climate Atlas of Canada. Retrieved December 3, 2022, from <https://climateatlas.ca/educator-resources>

Prairie Climate Centre - University of Winnipeg. (n.d.). *Explore Videos*. Climate Atlas of Canada. Retrieved December 12, 2022, from <https://climateatlas.ca/videos>

Prairie Climate Centre. (n.d.). *LEARNING FOR SUSTAINABILITY - The Climate Atlas of Canada: A Tool for Climate Action*. YouTube. Retrieved December 8, 2022, from <https://www.youtube.com/watch?v=QZ3J-MgrFyo&t=592s>

**Part A lesson from:**

Prairie Climate Centre - University of Winnipeg. (2022). *Lesson Plan 1*. Climate Atlas of Canada.

Retrieved November 11, 2022, from <https://climateatlas.ca/lesson-plan-1>

**Images:**

Images from [www.canva.com](http://www.canva.com)

Prairie Climate Centre - University of Winnipeg. (July 10, 2019). *The Climate Atlas of Canada*.

[Screenshot used with Permission]. Climate Atlas of Canada.

[https://climateatlas.ca/map/canada/plus30\\_2030\\_85#](https://climateatlas.ca/map/canada/plus30_2030_85#)