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CLIMATE IMPACT MAP · CLASSROOM EDITION · ONTARIO 🍁

LESSON PLAN · GRADES 10–12 · ONTARIO

Wildfire Risk & Climate Change: A Toronto-Centred Investigation

📚 Grades 10–12 (ages 15–18) ⏱ 75 minutes 📍 Ontario 🌐 theclimateimpactmap.com

🗓 [Date]

🌍 Required Tool: Climate Impact Map

This lesson is built around hands-on use of Climate Impact Map (theclimateimpactmap.com). Students should spend the majority of class time actively exploring the map. Ensure all students have device access before the lesson begins. Classroom licence unlocks all IPCC AR6 scenarios, storm surge, and infrastructure overlays.

Learning Objectives

By the end of this lesson, students will be able to:

1. Describe the key IPCC AR6 sea level rise scenarios and explain the difference between SSP pathways.
2. Use Climate Impact Map to identify flood risk for communities in Ontario, including Toronto.
3. Explain how wildfire risk & climate change affects people, infrastructure, and ecosystems differently based on location and socioeconomic status.
4. Connect global climate data to local risk in Ontario using real NASA and IPCC datasets.

5. Reflect on the relationship between climate science and Indigenous knowledge traditions in this region.

Materials & Setup

- **Climate Impact Map** — theclimateimpactmap.com (Classroom licence required for full access)
- Device per student or per pair (tablet, laptop, or desktop)
- Student observation worksheet (create or adapt from this lesson plan)
- Whiteboard or shared digital document for class discussion
- Optional: printed map of Toronto and surrounding region for reference

Teacher prep: Before class, navigate to theclimateimpactmap.com and confirm Classroom access is active. Pre-load the map centred on Toronto and test all scenario buttons referenced in the Main Activity.

Background for Teachers

> 🛰️ **Live NASA Data Integration:** Climate Impact Map displays live Arctic and Antarctic sea ice extent from NSIDC (updated weekly) and active fire detections from NASA FIRMS VIIRS (updated every 24 hours). The Stats panel in the app shows current anomalies versus the 1981–2010 baseline. Reference this data during your introduction to ground the lesson in current conditions.

Wildfire is increasingly recognized as a climate-amplified hazard, with longer fire seasons, more intense fires, and burning in regions previously considered low-risk. The 2018 Camp Fire in California killed 85 people and destroyed the town of Paradise. The 2019–2020 Australian "Black Summer" burned 18.6 million hectares. Canada's 2023 wildfire season set records, with over 18 million hectares burned and mass evacuations across British Columbia, Alberta, Northwest Territories, and Nova Scotia.

The connections between wildfire and sea level rise may not be immediately obvious, but they are real. Drought stress driven by temperature increases and changing precipitation patterns creates fuel conditions. Warmer winters allow bark beetle infestations that kill vast areas of forest, creating standing dead fuel. Post-fire erosion removes soil that would otherwise absorb precipitation, increasing downstream flood risk. The climate system's components are deeply interconnected.

Climate Impact Map's NASA FIRMS VIIRS fire data layer shows active fire detections updated every 24 hours globally. Combined with the 5-metric climate risk score (which includes wildfire risk), students can examine the geographic distribution of fire hazard and its relationship to other climate risks.

Local context — Ontario: Lake Ontario shorelines and the Greater Toronto Area face increasing flood risk from storm surge, extreme rainfall, and changing ice conditions.

Lesson Plan

Introduction (11 min)

Begin by asking students: *"What would happen to Toronto if sea levels rose by 1 metre? By 7 metres?"* Allow 2–3 minutes of discussion. Do not correct or confirm answers yet — capture predictions on the board.

Briefly introduce Climate Impact Map: explain that it uses real GEBCO terrain elevation data, IPCC AR6 projections, and live NASA satellite data. Show the Stats panel briefly to demonstrate that the tool connects to real-time observations.

Frame the lesson: today students will use the same data that climate scientists and emergency managers use to assess flood risk — and they will ground it in the specific geography of Ontario.

Main Activity — Climate Impact Map Exploration (41 min)

Have students open Climate Impact Map on their devices. Walk through the interface briefly (scenario panel, overlays, Cities tab, click-to-explore). Then proceed through the following steps:

1. **Activate live fire data**

   On Climate Impact Map, enable the **Live NASA Fires** overlay from the overlays panel. Zoom to your region. Are there active fires? Where are the highest concentrations globally?

2. **Climate risk score — wildfire**

   Click on a forested or semi-arid area in your region. In the popup, note the **wildfire risk score** (0–10). Click several different land cover types and compare scores.

3 **Wildfire + sea level interaction**

Navigate to a coastal region that also has high wildfire risk (e.g., coastal California, Vancouver Island). Apply **SSP5-8.5** sea level scenario. Observe how fire-prone areas relate to flood-risk areas.

4 **Historical fire context**

Research the largest wildfires in your region in the past decade. Using Climate Impact Map, navigate to those areas and record their climate risk scores. Do they match the historical record?

5 **Drought risk correlation**

Use the climate risk popup to compare drought risk and wildfire risk scores in several locations. Is there a correlation? Why would drought increase wildfire risk?

6 **Global fire patterns**

Zoom out to global scale with the fire overlay active. Identify the three regions currently showing the most fire activity. Research what is burning and why.

Discussion & Analysis (15 min)

Bring the class together. Use the following discussion questions to deepen analysis and connect data to broader themes:

- How does climate change increase wildfire risk? What specific mechanisms are involved?
- Who is most affected by wildfire smoke? Is wildfire risk distributed equally across populations?
- What is the relationship between drought, bark beetle infestations, and wildfire? How does this create a feedback loop?
- Can prescribed burning and Indigenous fire management practices reduce wildfire risk? What does the evidence say?

Closing & Exit Ticket (8 min)

Ask students to complete a brief exit ticket (written or verbal) responding to: *"What is one thing you learned today that surprised you, and one question you still have?"*

Collect responses to inform follow-up instruction. Consider sharing standout observations in the next class as a warm-up.

Indigenous Knowledge & Wildfire Risk & Climate Change

The land on which Toronto stands is the traditional territory of the Mississaugas of the Credit First Nation, Anishinaabe, Haudenosaunee, and Wendat peoples. Climate change is not an abstract future threat to Indigenous peoples — it is a present reality reshaping relationships with land, water, and community that have been sustained for thousands of years.

Traditional ecological knowledge held by Indigenous peoples in this region provides a long-term record of environmental change that predates Western scientific instrumentation by centuries. Changes in seasonal timing, species behaviour, water levels, and weather patterns observed by knowledge keepers offer invaluable context for interpreting Climate Impact Map data.

When using Climate Impact Map to explore wildfire risk & climate change scenarios, consider: whose land are you mapping? Whose communities appear in the flood zones? How does Indigenous land stewardship — including practices like cultural burning, salmon habitat management, and coastal resource governance — relate to climate resilience?

Reflection Prompt

How can Western scientific data (like IPCC AR6 projections and NASA satellite data) and Indigenous traditional ecological knowledge complement each other in understanding and responding to climate change? What would it look like to genuinely centre Indigenous voices in climate adaptation planning for this region?

Suggested resource: Consult the First Peoples' Cultural Council (BC), Ontario Native Education Counselling Association, or your region's tribal nation websites for climate-related traditional knowledge resources.

Assessment Rubric

Criteria	Beginning (1)	Developing (2)	Applying (3)	Extending (4)
Analyzes IPCC AR6 scenarios with accuracy	Shows limited understanding; requires significant support to complete tasks.	Shows basic understanding; completes tasks with some guidance and occasional errors.	Demonstrates solid understanding; completes tasks independently with minor errors.	Demonstrates thorough understanding; extends thinking beyond task requirements with insight.
Evaluates regional risk with supporting evidence	Shows limited understanding; requires significant support to complete tasks.	Shows basic understanding; completes tasks with some guidance and occasional errors.	Demonstrates solid understanding; completes tasks independently with minor errors.	Demonstrates thorough understanding; extends thinking beyond task requirements with insight.
Synthesizes CIM data into coherent arguments	Shows limited understanding; requires significant support to complete tasks.	Shows basic understanding; completes tasks with some guidance and occasional errors.	Demonstrates solid understanding; completes tasks independently with minor errors.	Demonstrates thorough understanding; extends thinking beyond task requirements with insight.
Critically examines equity and policy dimensions	Shows limited understanding; requires significant support to complete tasks.	Shows basic understanding; completes tasks with some guidance and occasional errors.	Demonstrates solid understanding; completes tasks independently with minor errors.	Demonstrates thorough understanding; extends thinking beyond task requirements with insight.

Extension Activities

1. Research the role of Indigenous fire stewardship practices (such as cultural burning by First Nations in BC or prescribed fire by tribal nations in California) in wildfire risk reduction. Compare these approaches to conventional fire suppression policy.

2. Using NASA FIRMS data (firms.modaps.eosdis.nasa.gov), download fire detection data for your region over the past 5 years. Create a visualization showing trends in fire frequency and intensity.
3. Develop a community wildfire risk assessment for a municipality in your region. Use Climate Impact Map risk scores, topographic data, and vegetation maps to identify high-risk zones and recommend adaptation measures.

Curriculum Connections

Curriculum Standard: Ontario Ministry of Education — Science and Technology, Geography, Environmental Education

This lesson addresses outcomes related to: Earth and environmental science; climate systems and human impact; geographic inquiry and spatial thinking; data literacy and scientific reasoning; social justice and equity in environmental contexts; Indigenous perspectives and land relationships.

Cross-curricular connections: Social Studies (geopolitics of climate change), Mathematics (data interpretation, percentages, scale), Language Arts (persuasive writing, research), Indigenous Education.