



Lesson Plan: Signs of Climate Change

Why teach this lesson?

As our climate changes, different areas in our communities will react and adapt in different ways. In this lesson plan, your students will have the opportunity to explore the characteristics of their local setting that reflect our carbon footprints and make us more or less vulnerable to climate change, and involve them in visualizing local solutions for low-carbon resilient communities.

This lesson plan uses content from the Citizens Coolkit to engage students in fun, hands-on activities and discussions that will make vulnerability in their local context feel real to them, and further empower them to envision and perhaps initiate changes in their neighbourhoods.

The lesson plan can be adapted to suit various grades of high school students, and can be used in conjunction with other lesson plans and Cool Tools from CALP.

Session 1: Climate Change Detective Quest

This Session introduces climate change concepts in a local context. Students complete the Climate Change Detective Quest in order to explore and learn to recognize contributors to climate change and signs of vulnerability or resilience in their surroundings.

Session 2: Visioning

This Session provides a hands-on opportunity for students to imagine what their surroundings will look like in the future. By drawing or using other graphic and visual techniques, students may choose to imagine a future that is more climate change friendly.



Signs of Climate Change

Introduction

How is climate change experienced at the local scale, and how can we recognize it? What features contribute to vulnerability, and how can we enhance resilience? The purpose of this lesson plan is to introduce students to concepts of climate change causes, vulnerability and resilience, using the Citizen's Coolkit. By focusing on the local scale through experiential activities and reflective group discussions, this lesson plan is meant both to increase students' climate change awareness, and hopefully empower them to be able to envision and make changes.



Lesson Objectives

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

- Identify common local features that contribute to causing climate change
- Identify common signs of low vulnerability (or strong resilience) to climate change in their neighbourhood
- Identify existing features or conditions that help reduce carbon footprints and vulnerability to climate change
- Participate in visioning exercises to imagine alternative futures for their school grounds & adjacent block(s)



Time Requirements

2 x 80 minute class periods

** And possibility of extending to one more session if adding the planting option (see end)*



Materials Needed

- Climate Change Detective Quest handouts (Step 2: Mapping from full Coolkit, page 17-18, enclosed in the Appendix)
- Visioning instructions (Step 4: Visioning from full Coolkit, page 28-32, enclosed in the Appendix)
- Powerpoint slides, projector and computer
- Coloured markers
- Photos of adjacent block(s) prepared by instructor (printouts, 8.5 X 11")

Relevant Curriculum Context Example: Social Studies 10

(extract from <https://curriculum.gov.bc.ca/curriculum/social-studies/10/>)

Environmental, political, and economic policies

- *Sample topics:*
 - *environmental issues, including **climate change**, renewable energy, overconsumption, water quality, food security, conservation*
 - *stakeholders (e.g., First Peoples; industry and corporate leaders; **local citizens**; grassroots movements; special interest groups, including environmental organizations)*
 - *other considerations in policy development, including cultural, societal, spiritual, land use, **environmental***

This lesson is compatible with the curricula for the following courses:

- Science 8-10
- Social Studies 8
- Social Studies 9
- Social Studies 10
- Social Studies 11
- Urban Studies 12
- Human Geography 12
- Physical Geography 12
- Social Justice 12



Session 1: Climate Change Detectives (80 minutes)

1.1 Pre-preparation

- Print Climate Change Detective Quest sheets (page 17 in the Coolkit) for student use.
- Have the accompanying powerpoint slides ready, if desired.

1.2 Discussion (30 mins)

As an ice-breaker game, and to ascertain the level of knowledge the students already have, play a round of “climate change caterpillar.” Each student takes a turn saying one word they associate with climate change. The game ends when each student in the class has said a word. However, if a student repeats a word that has already been said by one of their peers, the whole “caterpillar” must begin again. The words said can be recorded on the board.

Once the students have completed the icebreaker game, transition into the following discussion, which introduces the central concepts of this lesson plan. The accompanying powerpoint slides show each discussion question, followed by its answer to be used during the discussion. The slide headings match the session numbers in this document. If not using the slides, use the questions below as prompts for discussion. All discussions in this lesson plan can be conducted as large group discussions, or by splitting the students up into smaller groups and getting representative groups to report their answers afterward.

1. What are the main causes of climate change?

Response: (from Coolkit, pg. 4) “The main CAUSE of climate change is carbon emissions produced from human activities (e.g. driving cars, building and heating houses), which adds to the greenhouse effect, trapping heat and further warming the Earth’s surface. Canada has committed to keep global warming below 2 °C (relative to preindustrial levels)”, requiring GHG reduction targets of at least 80% by 2050.

2. What are the risks associated with climate change in the local Vancouver context?

Possible Responses: sea-level rise; warmer, wetter winters; less snowcap on local mountains, meaning less available water in summer; hotter summers; drought; flooding; heatwaves; health impacts; loss of biodiversity.

3. What does *vulnerability* mean in a climate change context?

Response: Vulnerability is the susceptibility of an area to damage by either environmental or human-caused threats such as climate change. For example, some neighbourhoods in Vancouver are vulnerable to sea-level rise, as they are close to low-lying shores.

4. What habits do we have that emit lots of carbon, and therefore contribute to climate change and our vulnerability to it?

Possible Responses may be in these areas (for visual graphic and percentages of emissions, see Coolkit pg.4): Transportation by cars, trucks and planes; industrial farming; space heating and cooling; water heating; waste disposal in landfills.

5. What low-carbon (mitigation) features/activities and resilient (adaptation) features/activities help reduce vulnerability to climate change?

Possible Responses: Urban forests for cooling; permeable ground surface and raingardens; vegetable gardens; renewable energy, such as wind and solar; carpooling and public transit, walking and cycling; light-coloured roofs that absorb less heat.

Today we will be seeking to answer some of these questions very locally-- by exploring the reality on and around our school grounds in the following activity...



1.3 Activity-- Climate Change Detective Quest (35 mins)

Distribute the Climate Change Detective Quest (you can choose to do this activity individually, in pairs or groups). This will be an outdoor activity on the school grounds and sidewalks immediately adjacent to the school (no need to cross streets). Before beginning the exercise, take a few minutes to explain any words they are told to look for that might be unknown to the group, such as *carshare*. Before dispersing, establish a muster point where students will know to find you if they need anything. As a class, ask the students to point out signs of high and low carbon emissions or high and low vulnerability to climate change as you go along. Have the students keep track on their Climate Change Detective Quest handouts. Give a set time to meet back at the muster point. Once the class is assembled, return to the classroom and lead into the following discussion.

1.4 Discussion and Wrap-Up (15 mins)

Lead a discussion about the results of the Climate Change Detective Quest based on the questions below. You can open slide #8, if using the powerpoint: please adapt based on the time you have.

1. Is there a team that would like to share some of their findings, e.g. how many cars they found, how many gardens they found?
2. Categorize the features below as either a cause of /contributor to climate change (ie. features that emit carbon), or as something that will help reduce vulnerability to climate change and explain your classification:
 - a. Cars (regular cars, EVs, hybrids, carshares)
 - b. Gardens
 - c. Solar panels
 - d. Light-coloured roofs
3. Did you find anything that surprised you?
4. Did you find more features that contribute to vulnerability to climate change, or more that reduce it?
5. Which areas around the school do you think are the most vulnerable to climate change? The least vulnerable? Why?

Possible Responses: areas around the school that are paved, such as parking lots and roadways would be highly vulnerable, as they absorb heat and are not permeable, leading to flood risk. Permeable areas, such as grassy fields are likely to be less vulnerable, and any wooded areas or gardens even less.

***Alternate/Additional Activity Students could also complete **Vulnerability Mapping activity**, starting on page 23 of the Full length Coolkit (instruction enclosed in the Appendix), with printed Google Maps /satellite view images of the school and surrounding area. This could follow a walk outside in order to get a real sense of what is represented in the image, or could be done indoors instead if weather is poor. The Vulnerability Mapping activity could also be completed at the beginning of Session 2, if desired.

Optional: Homework

Instruct students to redo the Climate Change Detective Quest (or the Vulnerability Mapping Activity- whichever was done in class) on their street or gardens at home, and to come prepared to discuss next class.

Ask them to take a picture of their block, and print it out on a full page (8.5x11") in colour, and to bring to the next class to use. You may want to show them some example photos of what to take, like the one on page 25 of the Coolkit. You can also ask them to send it to you, in advance, so you can print it for them.

Coolkit Module

LOCAL LESSONS FOR A COOL CLIMATE



Homework Alternatives:

- If printing photos and drawing with markers are undesirable, and your students all have access to a smartphone, ask them to take a photo of their block with their phone, and they can edit it using their phone's basic editing software. Having students take these photos of the school grounds during class time is another way homework could be avoided.
- If homework is undesirable for these lessons, or a shorter lesson is preferable, session 2 could be conducted using photos or Google Street View photos prepared by the teacher, of the school grounds or blocks nearby, and the comparative Climate Change Detective Quest done at home could be omitted (omitting the relevant discussion questions that follow as well).





Session 2: Introduction to Visioning (80 minutes)

2.1 Pre-preparation

- Take and print photos of school yard or adjacent street.
- Print visioning instructions from the full Coolkit (page 29-30) to distribute to students if desired.

2.2 Discussion (homework followup. Skip if none was assigned). (20 mins)

Ask students to refer to their completed Detective Quest sheets from Session 1 and from their homework. Guide them to share what they observed/ what types of features they identified, using the following questions:

1. How did the activity go at home?
2. What were features on your block that contribute to causing climate change?
3. What signs of vulnerability to climate change did you see on your block?
4. What features were there on your block that would help reduce carbon emissions or vulnerability to climate change?
5. Were there any features, in either of these categories (ie. cause of climate change and vulnerability to climate change), that you noticed at either school or home, but not at both?
6. If there were some features that were more prominent in one location and not the other, why do you think that is? What social or geographical processes (eg. community culture of food gardens, proximity to public transport) might exist to make that the case?
7. What do you think we can do or add to these locations to reduce their contributions and their vulnerability to climate change?

By answering this last question, the students have already begun a process called visioning, which the next activity explores more in-depth.

2.3 Activity-- Visioning (30 mins)

Learning and being informed about climate change in the places we inhabit is most empowering when we use that knowledge to inspire action. An important next step to get from problem-identification to action is visioning, which we start to do by imagining how we can change or add things to our neighbourhood blocks and school grounds to make them lower carbon or more resilient to climate change.

First, go through some visioning examples with the students. See the Visioning section of the Coolkit, starting on page 29 of the full version, for examples. Show students different sets of before- & after-visualizations through powerpoint slides. While going through the examples, ask students to point out the differences in before & after photos to get some idea of the features that can reduce the cause of climate change and increase resilience to climate change.

Then, go over the Visioning instructions. Distribute some printouts of the instructions. You can also have them projected on the screen for students to refer to, if using the slide deck (see slides 10-11). This activity allows students to explore potential futures for their block or school—whichever area they have a picture of. Based on the features identified in the Detective Quest (and vulnerability mapping exercise if this was completed), and in class discussions, students will choose either to imagine resilient & low-carbon alternatives, or vulnerable & high-carbon alternatives, and will draw them into their photo. Here are some examples of low and high carbon features students can consider:



LOW CARBON FUTURE

- More road surface is converted to greenspace
- A community garden/orchard is developed for local food
- Solar panels are installed
- More bike lanes are in place

OR

HIGH CARBON FUTURE

- Mature shade trees are gone (because of climate change)
- Streets are wider to allow for more cars
- More street parking near your place
- Potential flooding if close to sea-level, streams, or low-spots

Have students think about both effects of global climate change futures and of potential local activities or designs.

Give students sufficient time (15 minutes recommended) to draw their imagined changes onto the pictures of their block they brought from home, or the pictures you have prepared. If you choose to go the digital route, this can be done by editing photos on smart phones. Assure students that artistic ability does not matter for this activity! The most important thing is to get their ideas on paper, as clearly as they can.

2.4 Activity Next Step (20 mins)

Once the students have completed their visioning drawing, instruct them to find a partner and swap drawings with them. Students should take a few moments to examine their partner's vision, and then should try to interpret what they have represented back to their partner. Alternatively, students may simply explain their own visioning result to their partner. Encourage students to engage in a discussion around the choices they made, and to respectfully offer each other further suggestions. After 15 minutes of partner discussion, lead into the following group discussion.

2.5 Wrap Up Group Discussion Questions (20 mins)

1. Show of hands: How many students decided to imagine a future where their block is less vulnerable to climate change? How many students chose to imagine a future where their block is more vulnerable?
2. Is there a volunteer to show the class how you envisioned your block's future?
3. What features did you add or take away to make the desired changes? How would these actions affect the neighbourhood/schools and residents/students?
4. How do you think you would go about making these changes in reality?
5. What might be some further barriers to implementing changes?

Possible Responses: Local government and regulations, public vs. private land, car dependency meaning continued paving of roads, difficulty predicting a changing climate and how certain plants will react; neighbours who are opposed to any changes.

6. What are your main takeaways from these sessions?



Evaluation:

Activity output, both the Detective Quest and the Visioning exercise can be collected and graded. A sample rubric for their evaluation is as follows:

5 – student work shows comprehension and inclusion of concepts and features covered. Work shows thoughtful application of these concepts.

4 – student work shows good grasp of certain elements, and that some thought has been given to their inclusion and application.

3 – student has grasped some concepts, but missed others. Their application is perhaps not well thought out, or too few examples/ responses have been included.

2 – student demonstrates little understanding of concepts, and has put little effort into applying them.

1 – minimal or no comprehension or effort shown.

For the discussion portions of the lesson plan, student evaluation may be done according to usual participation-grading practices.

Lesson Extensions

Consider posting or displaying in school the results of the students visioning exercises. A selection of the students pictures could be used as posters for presentation at City Hall, or to promote discussion with parents and neighbours in the students' own neighbourhoods

If extending the lesson is desirable, the teacher could consider incorporating Step 5 from the Coolkit (starting on page 44 of the full Coolkit): Taking Action, and have a follow-up take-action session, e.g. where students could make plans for developing a small raised-bed garden together at school, or plant vegetable seedlings in a small pot to take home and plant, while covering some of the Step 5 material from the Coolkit. This could be a good way to go from visioning—especially if they included a garden in their low-vulnerability future vision—to action!

For additional lesson plans, those found in the Teacher's Guide offer complementary content to this one. Another good option for lesson extensions beyond the Coolkit are the Climate Justice in BC Lessons for Transformation. These would connect well to themes of social justice, food systems, or Canadian politics if these are covered in your class. Their modules can be found at this link: <https://teachclimatejustice.ca/>