

WHY IS IT SO HOT IN THE CITY?

75 MINUTES
+ TAKE HOME
ASSIGNMENTS
CDG3M, CGU4M

A high school lesson plan provided by the University of Guelph

In this lesson students will explore urban climatology and learn about the various factors that make cities feel hotter. Students will talk about solutions that can help to cool down cities, while participating in engaging discussions that reveal the challenges and opportunities in implementing these solutions. Students are able to actively participate in sharing facts and opinions about urban climatology & how it correlates with climate change.

This lesson plan surrounds Episodes 10 of The Why and How Podcast [“Why is it so hot in the city?”](#) The podcast looks to answer big questions in agriculture, food, and the environment through casual conversations rooted in research. It is hosted by undergraduate students and published by the Ontario Agricultural College of the University of Guelph.

Curriculum Alignments and Expectations

- Explain how climate change currently affects a region and how it is likely to do so in the future
- Analyze the effects of rural-to-urban population shifts on the region
- Evaluate, through research, the effectiveness of selected greening initiatives in urban communities (e.g., rooftop gardens, community gardens, bike lanes, public transit improvements, alternative energy projects), and assess the potential for implementing such initiatives in their own community
- Describe actions that individuals can take to contribute to the sustainability of their own communities

Learning Objectives

- Learn about the urban heat island phenomenon

- Explore urban heat mitigation strategies that have been researched and implemented
- Establish a connection between climate change and heat in cities
- Critically think about city amenities through designing a city street

Assessment Strategies and Success Criteria

- Research and summarizing of information
- Group and class discussions
- Creative project

Cross Curricular Links

- Career Studies – Identifying Possible Destinations and Pathways
- Geography- The Environment and Resource Management: Human Impacts

Materials

- Access to internet
- Post-its or white board
- Large chart paper
- Coloured drawing utensils
- Small pieces of paper
- Writing utensils



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TEACHER NOTES

Pre-Lesson Discussion

1. Before playing the podcast, have a discussion with students to investigate their current level of knowledge about weather and urban climatology.

- *By observation, do you think cities or smaller towns and rural areas would be hotter in the summer here in Canada? Briefly explain to students the concept of urban climatology and the urban heat island phenomenon.*
- *What are some factors that might contribute to cities being hotter?*
 - *Less trees and grass*
 - *More concrete and hard surfaces that trap heat*
 - *More people, vehicles, and emissions*
- *Can you name some negative effects of cities being hotter?*
 - *Economically*
 - *Socially*
 - *Environmentally*

2. Assign students the task of listening to the podcast as their homework (40 minutes) and to define the following terms discussed in the episode. Some terms may require additional online research to provide a definition.

- Urban climatology
- Urban morphology
- Urban heat island vs microclimate
- Infrared radiation
- Evapotranspiration
- Atmospheric science
- Shoulder season

Take-Home Work

Required Materials: Internet to watch this [video about why it's usually hotter in the city](#)

3. Professor Scott Krayenhoff mentioned several methods that have been or could be implemented in cities to mitigate negative effects of urban heat. Some mitigation strategies include:

- Reflective surfaces
- Green roofs or reintroduce vegetation to cities
- Building external shading devices
- Access to cooling facilities
- Planting trees for shade
- Use of sustainable transportation

Have students choose one of these methods and do some research on how it is being implemented in cities around the world.

- *What cities are using this method?*
- *Has there been any recorded improvements to heat in the city since implementing the mitigation strategy?*
- *Has there been any recorded economic, social or environmental benefits since implementing the mitigation strategy?*

In-Class Lesson

4. Activity 1: Urban Heat Mitigation Strategy Discovery

Required Materials: post-it paper or white board to compile discoveries



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In a class discussion, ask them to explain the difference between similar terms they researched as part of their pre-discussion homework.

Break class into smaller groups of approximately four students per group. Ask students to discuss the following amongst themselves:

- *If and how your perception of weather and urban climatology has changed since listening to the podcast?*

Ask students to discuss their research about the urban heat mitigation strategies. Allow students a few minutes to discuss their findings. Encourage them to discuss whether these strategies could be applied to their own home or neighbourhood. Then, allow a representative from each group to share at least three interesting discoveries they have made from their research. Compile/document suggestions where everyone can see them.

5. Activity 2: Ideal street activity

Required Materials: large chart paper, coloured drawing utensils

"...[I]f we want to design an ideal city street, not an ideal city, but an ideal city street for a person to be most comfortable, say, on a hot summer day to walk down that street, what does that street look like?" – Prof. Krayenhoff

Divide the class into small groups of about four to five students. Hand out the paper and drawing utensils to each group.

Have students close their eyes and visualize themselves walking down a city street on a hot day (1-2 minutes).

- *What type of structures do you see on this street?*
- *What type of structures do you wish was on this street to make it more comfortable for walking?*
 - *Buildings*
 - *Trees*
 - *Shaded areas*
 - *Shadows casted by street signs*

Have students open their eyes. Allow each group to design and draw their ideal city street. Urge them to consider the comfort of the city dwellers and the practicality of the design.

After 10-15 minutes have each group present their ideal city street and explain its features.

6. Activity 3: Discussion

Ask a series of open-ended questions about urban climatology, climate change and urban heat island mitigation:

- *In what ways could the research discussed in the podcast change the future of urban Canada?*
- *How does climate change have disproportionate effects on people depending on where they live?*
- *In what ways do you think Dr. Krayenhoff's research could impact different groups in society?*
 - *Households/homeowners in urban settings*
 - *Government/Policy makers*
 - *Architects*
 - *Businesses/office buildings in cities*



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- *Who do you think would most benefit from adaption?*
 - *People who work outdoors, in jobs such as construction*
 - *Homeless individuals*
 - *Others?*
- Discuss with students the following careers that incorporate knowledge of climate change and urban climatology.
 - *Climate change specialist*
 - *Urban and land use planner*
 - *Meteorologist*
 - *Environmental consultant*
 - *Urban planner*
 - *Landscape architect*

7. Activity 4: Debrief and Reflection

Required materials: Small pieces of paper and writing utensils

Hand out small pieces of paper and ask students to anonymously write one thing they are taking away from the podcast or accompanying activities. Collect the responses and read a few of them aloud. Continue with a larger debrief if desired.

Additional Resources

- [Podcast Episode Transcript](#)
- [Canada's Changing Climate Report](#)
- [Climate Trends and Projections](#)
- Visit us by registering for an [on-campus experience](#)

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