



SPEAK FOR THE TREES, Boston

TreeBoston.org | @Trees_Boston | trees@treeboston.org

Speak for the Trees Urban Heat Island Effect

Grades: 7th - 12th

Setting: Indoor and Outdoor

Purpose of Lesson: Students will be able to learn to explore the importance of reducing the Urban Heat Island Effect, and understand its connection to climate change.

Essential Questions:

- What is the Urban Heat Island Effect?
- How does the Urban Heat Island Effect affect climate change?
- How can we reduce the Urban Heat Island Effect?

Materials: Google slides, laser thermometers, construction paper, markers, crayons, cones

Program Session Schedule [~2 hours]:

Self Introduction & Group Check-ins: 10 mins

Icebreaker: 10 mins

Discussion of lesson topic: 20 mins

Activity: 30 mins

Review & Wrap-Up: 10 mins

Lesson Implementation

Self Introduction & Group-Check-ins (10 mins): Take this time to introduce ourselves and our organization. Who we are, what we do, and our goal for today's lesson. Use this time to let the students share their names and grades as well.

Icebreaker (15 mins): Friendly Debates!

Have everyone physically divide into sides—pro pizza to the right; and pro taco to the left. Let all the like-minded people discuss the virtues of their position for a while, and then have a representative try to sell the other side of the room. This will give everyone a chance to see things from different perspectives. It will open everyone's minds for a productive meeting.

Which food is better: pizza or tacos?

Would you rather go on a hike or to a movie?

What skill is more valuable: creativity or logic?

Which is better: a dog or a cat

Which is better: the ocean or the pool

Which is worse: being bored or being too busy?

Would you rather be rich but dislike your job or struggle with money but love what you do?

Guided Discussion (30 mins):

1. Why is climate change important? What are the trends we have discovered about climate change so far?



SPEAK FOR THE TREES, Boston

TreeBoston.org | @Trees_Boston | trees@treeboston.org

- Climate change will frequently lead to longer, more severe, and longer heat waves during the summer months.
- These longer heat waves lead to an increase in illnesses, death, poverty, deforestation, and usage of energy and electricity.

*Definition of the *Urban Heat Island Effect* = Heat islands are urbanized areas that experience higher temperatures than outlying areas.

- Fun fact: The daytime temperatures in urban areas are about 1-7 degrees Fahrenheit higher than temperatures in outlying areas and nighttime temperatures are about 2-5 degrees Fahrenheit higher.
2. What are some examples of Boston infrastructures?
 - Pavement/Cement, buildings, bridges, trains, airports, tunnels, subway systems, and railroads.
 3. How do these infrastructures impact our environment and ecosystems?

Infrastructure:	Impact on the environment:
Pavement/Cement	<ul style="list-style-type: none"> - Petroleum-based asphalt is a high-VOC (volatile organic compound) substance. The molecules released from the asphalt could lead to between 1000 to 2500 tons of particulate air pollution. - Roadways have also damaged lands and are associated with habitat loss. Noise and air pollution are created by highways and roadways.
Subway System	<ul style="list-style-type: none"> - Subway riders and transit workers in major cities are being exposed to levels of air pollution that could increase the risk of heart and lung problems. - The continuous subway construction causes a significant demand for construction materials and an increase in greenhouse gas emissions.
Buildings	<ul style="list-style-type: none"> - Poorly designed and constructed buildings use more energy, increasing the demand for energy production and contributing to global warming. - Land, air, waste, noise pollution, and soil erosion are harmful outcomes for our environment by constructing buildings.

5. How could we reduce the urban heat island effect?

Strategies:	Outcomes:
Trees and Vegetation	<ul style="list-style-type: none"> - Increasing tree and vegetation cover lowers surface and air temperatures by providing shade and cooling through evapotranspiration. The trees and vegetation can also reduce stormwater runoff and protect against erosion.



SPEAK FOR THE TREES, Boston

TreeBoston.org | @Trees_Boston | trees@treeboston.org

Green Roofs	<ul style="list-style-type: none"> - Growing a vegetative layer (plants, shrubs, grasses, and/or trees) on a rooftop reduces temperatures of the roof surface, and the surrounding air, and improves stormwater management. - Also, known as, “rooftop gardens” or “eco-roofs”, green roofs achieve these benefits by providing shade and removing heat from the air through evapotranspiration.
Cool Pavements	<ul style="list-style-type: none"> - Using paving materials on sidewalks, parking lots, and streets that remain cooler than conventional pavements (by reflecting more solar energy and enhancing water evaporation) not only cools the pavement surface and surrounding air but can also reduce stormwater runoff and improve nighttime visibility.

Activity (20 mins):

Essential questions for the students to think about:

1. Is our city an urban heat island?
2. Where do you think are some “hot spots” and cooler areas in our city or in our current environment?

Today, students will be using a laser thermometer to measure the temperature of different locations during the day when they are in direct sunlight and under shaded areas. After being split into two or four groups, they will create a mini data table in their journals to record the temperature of each material they will be measuring for this experiment. The materials will be soil, pavement, river, and rock. Students will be able to have enough time and freedom to either walk around the different parts of the park or walk towards the neighborhood with the assistance of interns or staff.

An example of their data chart for them to design in their journals could look like:

Data Table	Soil in the park	The pavement under the train station/neighborhood	River within the park	Any space/soil under a rock
Temperature in the sunlight (F)				
Temperature in the shaded area (F)				

Review & Wrap-Up (10 mins): Bring students back together to share their recordings about their group findings and the trends from the activity. Questions to ask: What are some trends that you have found? What was a challenge?



SPEAK FOR THE TREES, Boston

TreeBoston.org | [@Trees_Boston](https://www.instagram.com/Trees_Boston) | trees@treeboston.org