# Lesson 5: Why we need urban forests as the climate changes

By **Chloe Faught**

**Overarching inquiry question(s):** Why are plants and forests important in urban environments? Do we have enough urban forests in our neighborhoods? What can we do to protect and increase forest cover in our communities?

**Target age group:** Grades 7–12

## Curricular competencies (listed in brief):

- Understanding how deforestation has played a role in human history for hundreds of years as well as the main causes (farming, unsustainable resource use, and urbanization)
- Learning the importance of protecting and replanting urban forests
- Analyzing the tree canopy cover and green space of a few blocks in your neighborhood
- Comparing the extent of tree cover to both averages in various cities as well as Toronto's goal of 40% urban forest
- *Extension: Taking action to help improve the urban forest in your community*

## Terminology:

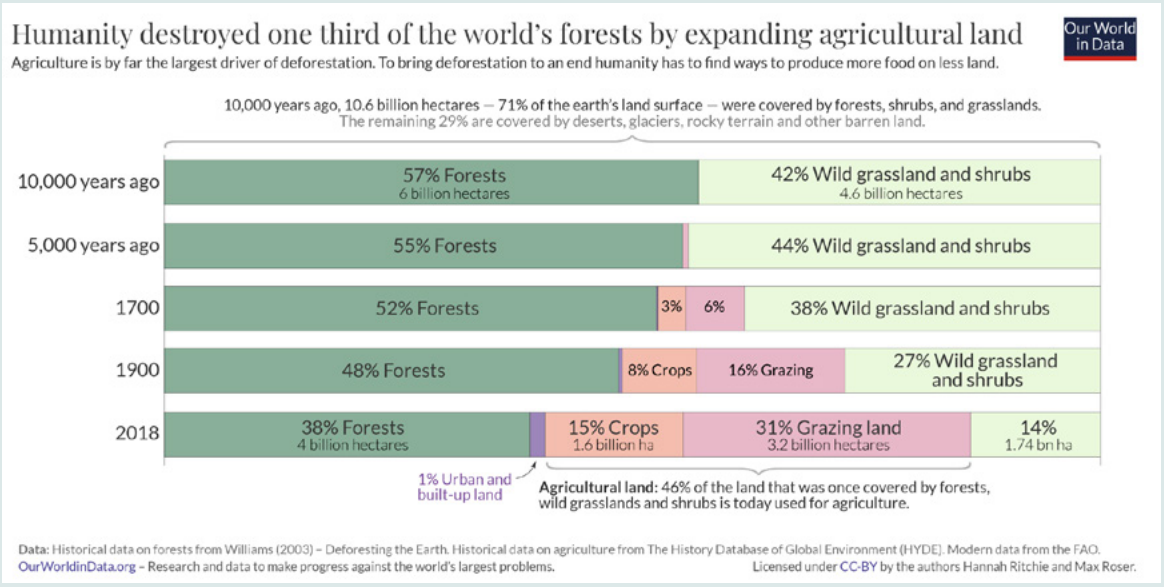
**Urban forest:** Urban forests include natural areas as well as planted areas that are parks, boulevards, and private yards. They are not necessarily connected as a natural forest would be and they include both native ecosystems as well as planted, landscaped places. Urban forests provide many of the same benefits as natural forests. In addition to their unique benefits due to the proximity to people.

## Recommended materials:

- Clipboards
- Tree identification guides
- String or measuring tape
- Satellite images of your neighborhood

## Background information:

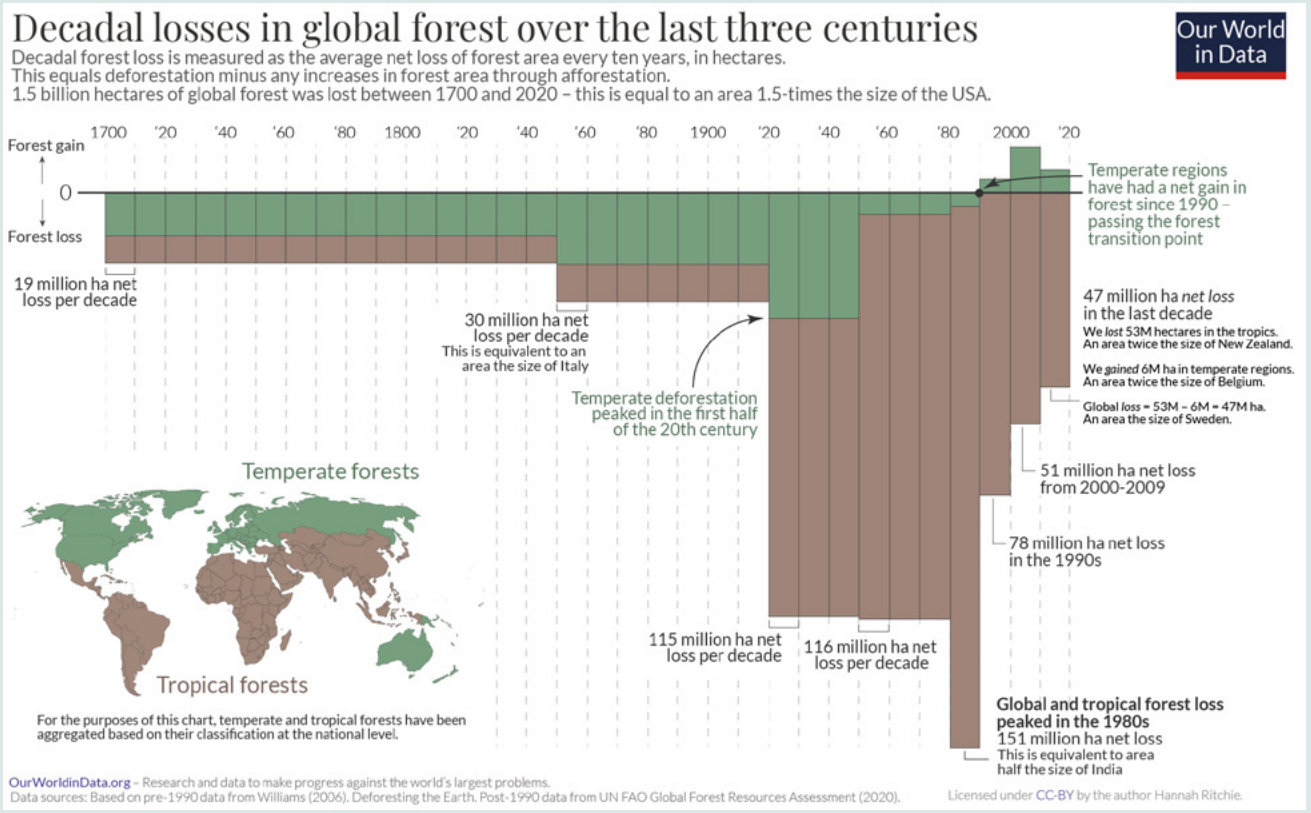
Deforestation — the permanent removal of trees and forests on a large scale without replanting new trees— is a centuries-old practice. While tree removal has been part of humans' and trees' entwined life histories, larger-scale deforestation really began in the 1700s as forests were increasingly converted to agriculture (see Graph 1). Today, this trend has shifted as agricultural land is now shrinking and commercial forestry and urbanization exert pressures on our forest coverage. However, in Canada[1] and the U.S.[2] strong reforestation laws mean deforestation is virtually nonexistent.




Graph 1: Forest and wild grassland coverage changes over time (According to this graph and informed estimates, we have lost 2 billion trees since the end of last ice age (~10,000 years ago). This is largely due to agricultural practices.

Overall, for the last 30 years, deforestation rates have been declining worldwide from their peak of 151 million hectares in the 1980s. In temperate forests (notably in North America, Europe, and Australia) reforestation has outpaced deforestation (see Figure 2). This is a small piece of good news; however, the reality is that globally we are still deforesting at a huge rate in tropical forests, and billions of hectares of forest have been lost in the last few hundred years.

Earlier lessons have focused on the myriad of benefits that forests and trees provide to us, especially in the face of a warming climate with increased carbon dioxide in our atmosphere. Together, there is a very strong case to support reforesting our landscape where it is feasible and improving the quality of our urban forests. Urban forests include natural areas as well as planted areas that are parks, boulevards, and private yards. This lesson is focused on encouraging students to evaluate our urban forests to see if they are sufficient or if there are places that can be enhanced. 2021–2030 is the UN Decade on Ecosystem Restoration.




Graph 2: Decadal losses in global forest over the last three centuries. This graph demonstrates the history of deforestation on Earth and the scale of the loss.

Overall, there has been a decline in tree canopy cover in urban areas in Canada. For instance, as discussed in Vancouver's Urban Forest Strategy, the current coverage declines every year and overall it is estimated to be at 18%. Some urban cities, like Toronto, ON, have pledged to reverse those trends and aim for 40% coverage.

Urban forests are particularly important as the climate warms, as they can provide shade. Continuous canopies in an urban neighborhood create a cooling effect or cooler microclimate while also reducing stormwater flooding, since tree coverage slows water's flow into the ground as trees absorb water through their roots.

## Summary (Learning & pedagogical outcomes; goals & activities in brief):

Students will begin by exploring how important trees are for creating microclimates and how they play a role in the design of sustainable communities now and in the future (Extension: Exploring legislation to protect and enhance tree cover in cities).

Then, students will undertake one or both of the following activities, each of which involves exploring whether their neighborhoods have sufficient tree cover and forests from the perspective of supporting a healthy community.

## Opening:

Open by asking the question, *are trees and forests necessary in cities or urban areas?* This will hopefully prompt some lively discussion and potentially some arguments or differences in opinion. Brainstorm as a class before having students watch the following video. Use this as a discussion opener. Then ask students to re-evaluate and see if there is anything that needs to be adjusted about their understanding.

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|---|---|---|
| What happens if you cut down all of a city's trees? by Stefan Al | Grades 7–12 | This is an engaging animated TEDx video showing how trees and forests are important in urban areas for a wide variety of reasons. |

## Map practice exercise: Which neighborhood map has the preferred urban forest?

Next, use the three satellite images of different urban neighborhoods in Toronto to discuss and set some general criteria for what would be a preferred amount of forest and natural (green) space as well as street and neighborhood tree cover.

## Activities:

For both of these activities the class needs to know which exact geographic region where you will be conducting the tree and urban forest analyses. Consider exploring a block or two around the school. Secondary students could break into groups, with each assigned a block, OR groups could each do the analysis for the same block and then compare results. Use Google Maps to help you decide which area would be best for your class.

**1. Is there enough shade & tree habitat? Counting trees and the squirrel leap test**

This activity is one that is commonly done in community urban planning, and you can find similar examples of it in the Citizens Coolkit on Climate Change & Urban Forestry and the BC Climate Action Toolkit.

**Counting trees:** With the block or blocks or area you have picked, students will be counting the number of street trees and the number of trees on the street boulevards as well as the number of trees in front yards or other areas. Students will walk one to two blocks on both sides of the street, counting the trees and giving estimates on their respective ages according to the following categories: seedlings, saplings, mature, old-growth, decayed/dead

**Squirrel leap test:** Can a squirrel leap* from tree to tree all along the street(s) that you are walking? Can it cross the street through the canopy at least twice per block? Then the canopy (tree coverage) is considered continuous and will provide benefits in terms of lowering the microclimate, providing shade and habitat and reducing stormwater flooding.

**An Eastern Gray Squirrel (*Sciurus carolinensis*) can jump a maximum of two meters.*

Use the worksheet provided to allow students to complete the two activities above before sharing the worksheet.

**2. Habitat and tree coverage mapping**

This second activity extends the first activity and allows students to map the forest canopy and other coverage "habitats" using any satellite photo of their neighborhood/block.

**Instructions:** (This activity is adapted from a similar one from the Climate Coolkit.)

- Print out a Google Map (or a digital mark-up if doing this activity on a computer) of a block or region that students will explore. If they have completed Activity 1, then use the same location where they counted trees.
- Using the map, students mark and color different areas to show different habitats. Have them then use the colored images to estimate the percentage (%) of coverage of each type of habitat (see provided worksheet and example). Habitats include the following:
  - » "Squirrel Habitat" – Trees and Canopy
  - » "Worm Habitat" – Lawns & Soil
  - » "Car Habitat" – Pavement
  - » "Pigeon Habitat" – Buildings and Roofs

## How to estimate % coverage:

1. **Eyeball method:** This method involves a rough estimate, which is perfectly fine for this type of study. First, in your head (or with tick marks on the map), mark the halfway point and each 25% of the map. Then, starting with one of your habitats, try to 'fill up' one side of the image by imagining pieces of the colored portions all squished together on the left side. Can you get to 10% of the way across? 25%? 50%?
2. **Grid method**: This method is more precise. You can create a grid across squares. A 5cm x 5cm grid would allow you to look at each square and get a better estimate of the % in each one. Then, tally all the estimates and divide by the total number of squares. This will give you an overall estimate of the average percentage of coverage.

**% in each square/number of squares= Average % of coverage**

*Note: Do not worry if some of the areas overlap. This is likely to happen. If there is lots of "squirrel habitat," then the trees will overlap and your overall coverage will be >100%.*

**If you prefer to use a digital tool like Google Earth or i-Tree, see the Climate Coolkit for a quick primer on these tools (pages 50–54).**

- Discuss and compare your results among different groups and compare your results to those of your street tree survey. Are they similar?

### Extension: Helping your community with its urban forest renewal project:

After you have completed these lessons, you might feel compelled to do something. Here are some suggestions:

- Are there grants or ways you can get your school involved in generating native trees or natural areas to your schoolyard or community?
- Can you use your knowledge to educate neighbors and inspire them to plant more native trees, native plants, and natural areas in their yards? Perhaps you could create a pollinator garden.
- Have students create a map or drawing or have them upload a photo of their own yard or living space. Then, have them alter the space to allow for increased trees and greenspace. Perhaps they can share their map with their family or the property owner of their building (if a rental) to prompt discussions.

**Endnotes:**


1. The State of Canada's Forests Annual Report 2022, Natural Resources Canada, https://natural-resources.canada.ca/sites/nrcan/files/forest/sof2022/SoF_Annual2022_EN_access.pdf#page=33
2. https://www.fs.usda.gov/speeches/state-forests-and-forestry-united-states-1#:~:text=The%20United%20States%20has%20the,third%20of%20our%20land%20area.


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