



LESSON SUMMARY

Students will learn the importance of conducting an urban tree inventory and will undertake a simplified inventory to assess the health of a local urban forest.

Activity Information

Grade Level:	Senior
Estimated Duration:	1 to 3 hours outside, 1 hour in the classroom
Materials:	Tree identification guides Writing utensils Copies of the information sheet (one per group or student) Copies of the activity sheet (one per group or student)
Setting:	Outdoors and Indoors
Key Vocabulary:	Inventory, Dieback, Biotic, Abiotic, Intolerance, Tolerance, Crown, Chlorosis
Learning Goals:	By the end of the lesson, students will be able to: ○ Observe a tree for signs of poor health ○ Conduct a simplified tree inventory

Curriculum Links

Grade 9 (Academic) Canadian & World Studies
E2.1 access the impact on natural system, CGC1D

Grade 11 Environmental Science
E. Natural Resource Science and Management, SVN 3E

Grade 12 Environment and Resource Management
C. Sustainability and Stewardship of Natural Resources, CGR4M

Lesson plan adapted from: Neighbourwoods (<http://neighbourwoods.org/>)

Background Information

Tree inventories are conducted to collect information about the state of a forest, including health and diversity. In an inventory, one gathers information about trees including size, species, location, and health. Inventories are the first thing that should be completed before any action should be taken regarding a tree or a forest. Even when only a single tree is concerned, a professional arborist should inspect the tree before any action is taken.

There are many **biotic** and **abiotic** factors that influence the health of a tree or forest. Biotic factors are those that are alive, such as fungi or insects. Abiotic factors are those that are not living, such as wind, road salt, or freeze-thaw patterns in winter. Trees living in an urban environment can have different stresses than those in a forested setting.

In an urban setting, tree inventories are necessary to help the community keep track of what tree species are present and how healthy the urban forest is. Urban tree inventories are conducted to ensure the forest remains healthy and monitor for signs of distress including infestations. Urban tree inventories can also help the community maintain biodiversity as the inventory would show if a single species is over represented in the urban forest. When a single species comprises the majority of an urban forest biodiversity is reduced and the forest is susceptible to illness or invasive species (i.e. Dutch elm disease, Emerald Ash Borer).

In this activity, students will undertake an urban tree inventory individually or as a group. With this inventory students will assess the health of a forest in your community. Questions students should keep in mind include:

1. Are there signs of stress?
2. Are the trees planted in an appropriate place?
3. Do the trees have enough room to grow?

Advance Preparation

1. Locate a study site. This may be a park nearby, the school's playground, or the trees on the street outside.
2. Mark the trees you want students to inventory. A good inventory should include at least 5 trees, if possible select multiple tree species.
3. Print (one per student or group) the Simplified Tree Index Sheets.

Activity

Step 1

Distribute and review the Background Information Sheet with students. Make sure they understand the importance of conducting an inventory to determine the state of their local urban forest.

Step 2

Bring the students to the pre-determined site and have them conduct their inventory.

Step 3

After the inventory, give students 30 minutes or more to discuss these questions within their groups:

1. Were everyone's observations the same? What could account for any differences?
2. Did any species of tree seem to be doing better or worse in the urban environment? Why do you think this is?
3. Think about the area in which you conducted this inventory. Are there any abiotic or biotic explanations for why the trees were in poor or good health? (e.g. street trees get a lot of road salt in the winter, lack of growing space or impermeable ground).
4. If there are trees in poor health what can be done to make them healthier?

Step 4

Have each group present their discussion question answers to the class.

Extension

While forest inventories can help arborists to assess the health of an urban forest, they are also an important forest management planning tool. In addition to measuring the amount of wood in a stand, foresters also determine the depth and texture of the soil, types of vegetation, moisture content, the volume of given species of trees and tree height. This ecological information is used, along with other factors such as site accessibility, to help determine the management strategy for each area.

As an activity extension, have your students learn about forest sampling methods and techniques and learn to determine basal area using the [How Much Wood](#) lesson plan accessible through the [Resource database](#).

Simplified Tree Index

Live crown ratio – this is the percentage of the tree’s total height that is comprised of living crown. Therefore, if the top of the tree is dead, but the middle has leaves, you do not include the top portion as part of the live crown ratio. Use the following values when indicating the live crown ratio on the activity sheet:

1 (0-25%) **2** (26-50%) **3** (51-75%) **4** (76-100%)

Proportion healthy crown – this is the amount of crown that is healthy, or free from dieback. Dieback is when the leaves at the edges of the tree are missing. It usually looks as if the crown has little branches sticking out of it. The following ranks will be used when indicating the proportion healthy crown on the activity sheet:

1 (0-25%) **2** (26-50%) **3** (51-75%) **4** (76-100%)

Crown density – this is the percentage of the sky or light that the tree’s leaves block when you stand next to the trunk and look up through the canopy. For example, if the leaves block 75% of the sky, and you can see 25% of the sky, then the crown density is 75%. The following ranks will be used when indicating the crown density on the activity sheet:

1 (0-25%) **2** (26-50%) **3** (51-75%) **4** (76-100%)

Resistance to chlorosis – Chlorosis is a yellowing of the leaves. It is caused by a lack of chlorophyll, which usually makes the leaves look green. If 25% of the leaves have turned yellow, then 75% of the leaves have resisted chlorosis. The following ranks will be used when indicating the chlorosis resistance on the activity sheet:

1 (0-25%) **2** (26-50%) **3** (51-75%) **4** (76-100%)

Root Space – this indicates whether the roots are confined or in an open space. An example of a confined root space would be a street tree that has its root encased in concrete; while an open root space would be a tree in a park where nothing confines the roots to a limited volume of soil. The following ranks will be used when indicating the root space on the activity sheet:

10 (open root space) **5** (confined roots)

Fill out the following chart. Tally the rankings under each category for each tree. The **higher** the ranking, the healthier the tree! Don't forget to make comments about the tree's surroundings! Is it beside a road? On a boulevard? Beside a building? Was there anything interesting or noticeable about the tree?

Tree Species					
Live Crown Ratio (1-4)					
Proportion Healthy Crown (1-4)					
Crown Density (1-4)					
Resistance to Chlorosis (1-4)					
Root Space (5 or 10)					
Ranking Totals					
Comments					

Notes:

[illegible]

Health Ranking Sheet (Example)

Tree Species	Sugar Maple	Red Oak			
Live Crown Ratio (1-4)	3	2			
Proportion Healthy Crown (1-4)	2	1			
Crown Density (1-4)	1	3			
Resistance to Chlorosis (1-4)	1	4			
Root Space (5 or 10)	5	10			
Ranking Totals	5	10			
Comments	On sidewalk	In park			