



Healthy Trees, Healthy Forests

NAAEE Guidelines for Learning:

4th Grade

Strand 1 C, E, G; 2.2 A; 2.4 A; 3.1, A, B

5th - 8th Grade

Strand 1 C, E; 2.2 A; Strand 4

Lesson Outcomes:

Students will understand...

- environmental factors that can impact the health of trees
- that human activities can affect trees, both positively and negatively
- how to assess the overall health of a tree by observing physical features
- specific causes of inhibited tree growth and tree mortality
- that humans must be invested in long term care of trees

Students will be able to...

- estimate the height of a tree
- discover specific threats to a tree's health
- record physical and environmental conditions of trees
- assess the health of a tree

Duration of Activity:

Two hours

Vocabulary Words:

Biomass, cambium, developed, fragmentation, germinate, invasive plants, photosynthesis, prune, pupae, sapling, watershed, xylem

Setting:

Indoors and outdoors

Materials:

Student Pages:

1. "Tree Inventory Data Sheet:" One printed copy per student
2. "Environmental Factors Affecting Tree Health Cards:" One printed copy, cut along the lines into 12 cards
3. "Environmental Factors Presentation Form, Invasive Plants:" One printed copy
4. Environmental Factors Presentation Form, Animal Browse:" One printed copy
5. "Environmental Factors Presentation Form, Development:" One printed copy
6. "Environmental Factors Presentation Form, Soil Compaction:" One printed copy
7. "Environmental Factors Presentation Form, Fire Suppression:" One printed copy
8. "Environmental Factors Presentation Form, Insects and Disease:" One printed copy
9. "Healthy Trees, Healthy Forests Worksheet:" One printed copy per student

Teacher Pages:

1. "Teacher Directions for Evaluating Overall Tree Health"
 2. "Healthy Trees, Healthy Forests Worksheet Answer Key"
- Tree dichotomous key or Mid-Atlantic region tree field guide
 - Blackboard/whiteboard and chalk/dry erase markers, or sheet of butcher paper and markers/crayons
 - Clipboards (one per student pair/group, if possible)

Summary

Students will complete a tree inventory and learn about environmental factors that impact tree health. They will use forest survey field tools to assess the health of trees in their community.

Background Information

To the untrained eye, a dense area of trees may look like a healthy forest, but there is more to a healthy forest than just appearance. A healthy forest is a well-balanced ecosystem composed of several layers—including a floor, **understory**, and **canopy**—that work interdependently with one another. Within each of these layers lives a **diversity** of plants and animals, each adapted to the distinct amounts of sunlight, water, and nutrients at that particular level. A healthy forest includes trees of varying sizes and ages, and it is constantly, but slowly, changing.

But a variety of factors can negatively impact the health of a forest. **Invasive plants** and animals, pests and diseases, fire suppression, and urban development can all have adverse effects on forest health.

Development, the leading cause of **deforestation**, is taking a major toll on forest health in our region. Daily, development results in the loss of up to 32 acres of forest within the Potomac River watershed¹. In many areas, development has fragmented large forests into small sections, which are susceptible to **edging effects** that disrupt the forest ecosystem's natural balance.

Edging effects weaken trees, making them more vulnerable to pests, disease, and invasive species. As a result of invasive

¹Todd, Albert. H. and Eric Sprague. "Interstate Commission on the Potomac River Basin Symposium" PowerPoint presentation. USDA Forest Service, The Conservation Fund, October 29, 2005.



species out-competing native species, fragmented forests tend to lose native **biodiversity** critical to their natural stability. In developed areas, the replacement of vegetation with asphalt and concrete compacts soil, which can damage and destroy tree roots and further weaken trees. Development also increases air pollution, which clogs leaf pores and may eventually suffocate trees.

With ever-increasing pressures on the natural resources of the Potomac River watershed, it is critical that we proactively protect and restore our forests. It is not enough to plant trees. We must invest in the long-term care and health of these ecosystems, on which we rely for clean water and air.

Essential Questions

- Can trees get sick?
- Can you determine if a tree is healthy just by looking at it?
- Do human activities affect the health of trees?

Pre-assessment

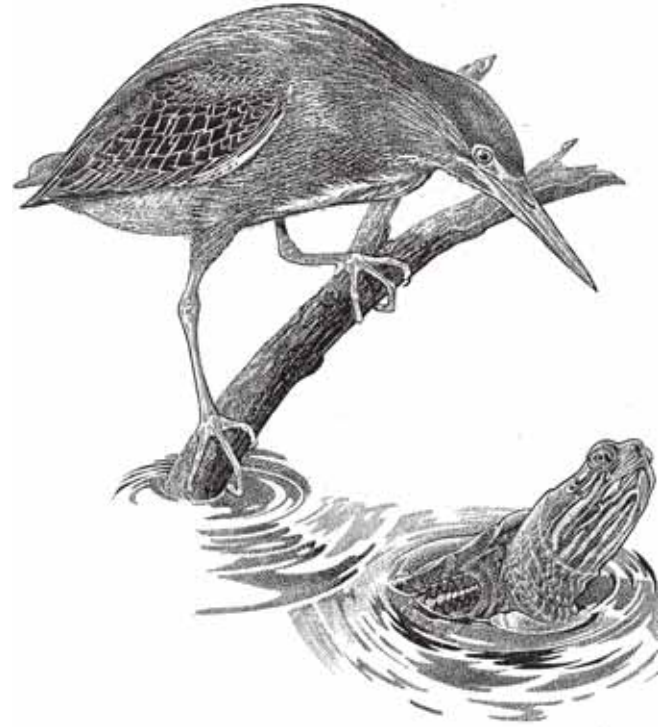
On a chalkboard, whiteboard, or piece of butcher paper, draw two columns. Title the first column, “Positive Environmental Impacts” and the second, “Negative Environmental Impacts.” Ask students to share their ideas of positive and negative **environmental impacts** that might affect the health of trees. For example, the students may say that rain is a positive impact, but soil erosion is negative.

After all students have had the opportunity to share their thoughts, lead the class in a discussion of the Essential Questions. Write down and keep the students’ comments posted on the board throughout this Lesson to refer back to as needed.

Lesson Procedures

1 Read the “Teacher Directions for Evaluating Overall Tree Health” so that you understand how to use the “Tree Inventory Data Sheet.” Distribute a copy of the “Tree Inventory Data Sheet” to each student. Review with the entire class how to use the sheet, being sure to review vocabulary terms and concepts that students may not yet know. Encourage students to ask questions, and make sure that they are comfortable with the purpose and use of the data sheet.

2 Take the class outside. Use the “Teacher Directions for Evaluating Overall Tree Health” to guide the class in assessing the health of the trees in their schoolyard or neighborhood. The students will need guidance in completing their forms. You may want to invite another adult—perhaps a local forester, naturalist, or arborist—to assist with this activity.



HELPFUL HINT

If you do not have trees in your schoolyard, locate a nearby park, church, or other area of well-forested land. If the area is not public, be sure to ask permission from the landowner before you use it for the Lesson.

3 Once the groups have completed their “Tree Inventory Data Sheet,” ask each group to present its findings to the class. Tally all of the groups’ ratings for each section of the Data Sheet. On the basis of the total ratings, ask students to rate the overall health of trees at the study site and to explain their conclusions. Ask them to, based on their observations and inventory, discuss what problems may impact the future health of the trees at the study site.

4 Use the “Environmental Factors Affecting Tree Health Cards” to lead the class in a group activity. Revisit the positive and negative environmental impacts that the class identified during the Pre-assessment. Select volunteers to read the cards one at a time to the class, and decide into which column each should go. Encourage the students to, based on their observations while outside at the study site, add other factors to each column.



5 Divide the class into groups of five and have each group research one of the negative environmental factors that affect tree health: invasive plants; animal browse; development; soil compaction; fire suppression; and insects and disease. Distribute one copy of the appropriate “Environmental Factors Presentation Form” to each group. Provide class time for groups to research their topic on the Internet, or assign it for homework, having them complete their Presentation Form. Allow each group one minute to present its research conclusions to the rest of the class

Post-assessment

Distribute one copy of the “Healthy Trees, Healthy Forests Worksheet” to each student and assign it for homework. Collect the worksheets and use the “Healthy Trees, Healthy Forests Worksheet Answer Key” to assess students’ work.

Extensions

- Research common invasive plants in your area, and observe nearby parks and forests to identify instances of invasion by these plants.
- Make a clinometer to measure the height of trees. You can download instructions for making a clinometer from the American Forests CITYgreen web site (<http://www.americanforests.org/productsandpubs/citygreen/>). You may choose to have students use the clinometer during the Lesson to complete the “Tree Inventory Data Sheet.”



Take Action:

Encourage students to:

- Contact their local parks and planning office or city arborist if the trees on the study site had a low health rating. Request that the planners perform a formal assessment and address the problem.
- Plant only native trees and plants. Download a free copy of *The Good Neighbor Handbook* from www.potomac.org to learn about additional actions to take to improve tree health.
- Look for and report any signs of pest or disease infestation of trees.

Additional Resources:

- American Forests: www.americanforests.org.
- Potomac Conservancy’s and The Nature Conservancy’s *Good Neighbor Handbook: Tips and Tools for River-Friendly Living in the Middle Potomac Region*: http://www.potomac.org/site/wp-content/uploads/pdfs/good_neighbor_handbook.pdf.
- Pennsylvania State University Cooperative Extension College of Agricultural Sciences’ “Pest Activity:” <http://woodypests.cas.psu.edu/PestActivity/index.html>,
- Plant Amnesty’s “Tree Pruning Tips:” www.plantamnesty.org/pruning_tips_content.htm.
- TreeHelp.com’s “Pruning Trees, A Step-by-Step Guide:” www.tree-pruning.com.
- Virginia Naturally: www.VaNaturally.com.
- Maryland Department of Natural Resources Wild Acres Program’s “Creating a Wild Backyard - Native Maryland Trees:” <http://www.dnr.state.md.us/wildlife/wamdtrees.asp>.