

Educational Packet: Teacher Resources

Activity Overview

This packet is to be used as a backpack project to educate students on the importance of trees and how they can protect our tree canopy, especially here in Louisville. With carbon emission rates increasing at an exponential level and more urban heat islands, it is important now more than ever that we understand why protecting trees is crucial as early in our lives as possible. The packet is divided into six activities, each with a different focus. During each activity, students will add something to their poster, so the finished project should be a collage of the various sections. Almost every section has an outdoor activity, and most of them can be completed by students at home with the help of a parent or guardian. The finished poster and bonus activity work will be submitted to the students' digital backpack as evidence.

Prior Knowledge

Before students begin this project, they should already have a basic understanding of:

- Impact of trees in the water cycle
- Difference between deciduous and coniferous trees
- Key terms listed in each section

The most important key terms are **photosynthesis**, **tree canopy**, and **species**.

Students should know what is required for photosynthesis, what the goal of the process is, and what the end products are. Similarly, students should know what a tree canopy includes and what species are in the levels of classification. Basic math skills and knowledge of bar graphs and maps will be required for the tree mapping activity.

Complete List of Key Terms

- Species
- Native
- Family
- Photosynthesis
- Carbon Dioxide
- Byproduct
- Capillary Action
(Video Resource Available)
- Sustain
- Erosion
- Atmosphere
- Tree Shape
- Tree Density
- Analyze
- Data
- Tree Canopy
- Bar Graph
- Conserve

Bonus Activities

These are additional activities related to the general topic of each section which can be added to the lesson plan if further investigation of the topic is desired. The activities in this document include special instructions for the teacher. If you do not wish to use each part of the packet, you may request individual PDFs for each section to tailor it to your classroom needs.

Background Information Links

These are links to resources related to each topic which can assist the teacher in instructing the class or build on background knowledge of each subject.

Introduction Activity

As a fun warm up activity for this project consider doing the following game:

Materials: Space with trees, blindfolds

1. Split the class into partners outside in a tree dense area.
2. Give each partnership 1 blindfold and have one student put it on while the other helps.
3. When the teacher says go, the student who can see will lead their partner to a tree which the blind partner must hug and try to remember.
4. After they have hugged the tree, the students should return to the starting point.
5. Have the blindfolded students remove their blindfold and try to guess which tree their partner had them hug. Have the partners switch roles once the first partner completes the activity.

Wrap up

Ask students for some of the identifying factors to figuring out their tree: bark, size, leaves, smells, distance from the starting point. Discuss how different trees have different attributes that distinguish them from others.

Activity Resources

Native Trees of Kentucky

<https://www.uky.edu/hort/Native-Trees-of-Kentucky>

If you want to make sure your students can find their tree for this project, we suggest walking around the school property or local neighborhood and writing down the species you find the most of. From that list, you can assign a student a species.

Arbor Day Foundation “What Tree Is That?” Species ID guide

<https://www.arborday.org/trees/whatTree/>

Part B:

- More information on parts of a tree: <https://www.snohomishtree.com/blog/basic-tree-anatomy-the-parts-of-a-tree-and-their-function>
- Capillary Action Explanation and Experiment Demonstration: <https://www.youtube.com/watch?v=Klug9Foou3s>

Part C:

More information on why trees are important:

- <https://www.savatree.com/whytrees.html>
- <https://treeslouisville.org/why-trees-matter/>
- <https://www.americanforests.org/af-news/what-is-the-urban-heat-island-effect/>

Part D:

- Tree Identification Website: <https://www.arborday.org/trees/whatTree/>
- Tree Identification App: <http://leafsnap.com/>

Part E:

- More information on tree inventories: <https://extension.psu.edu/conducting-a-community-tree-inventory>

Outdoor Activity

This activity will require each student to have a map of the school campus or a local neighborhood (please note that a large park could be difficult because of the high tree density). This map can be hand drawn or printed from the internet/Google Earth. [Google Earth Link](#)

Bonus Activity

Students will need to be provided with the approximate size of the area they assessed during the outdoor activity to determine their area's tree density. This value can be found online using Google Maps, Google Earth, or other resources (unit: square feet).

- More information on tree density: <https://www.hunker.com/13428942/how-to-calculate-tree-density>

Bonus Activity (Part II)

For this activity, students will need an accurate scale bar for their map. This can be obtained using Google Earth or other resources. Students may need to know that 1m≈3ft.

Part F:

More information on how students can help trees:

- <http://goexplorenature.com/2013/04/7-ways-kids-can-help-save-trees.html>
- <https://cabooproducts.com/20-ways-conserve-trees/>

A Note from the TreesLouisville Staff

Thank you so much for your willingness to explore the outdoors with your students and encourage a better understanding of trees. We believe that trees are a vital part of our community and create a healthier environment for us all to live in.

If you would like for TreesLouisville to be involved in your tree backpack projects either as a guest speaker or a facilitator of a tree planting or maintenance project, please contact Morgan Grubbs, Volunteer & Programs Manager at morgan@treeslouisville.org.

We also encourage you to consider enrolling your school in the Arbor Day Foundation's Tree Campus USA Program for national recognition. More information can be found on their website: <https://www.arborday.org/programs/tree-campus-k-12>

Below you will find the Science Kentucky Standards for 5th grade and how our tree curriculum ties into each.

Thank you,

The TreesLouisville Team

5th Grade Math and Science Standards

<p style="text-align: center;">Academic standard as determined by the Kentucky Department of Education</p>	<p style="text-align: center;">How standard relates to each lesson in the education packet</p>
<p style="text-align: center;">Why are trees important?</p> <p>LS2.A: Interdependent Relationships in Ecosystems The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. (5-LS2-1)</p> <p>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)</p> <p>ESS2.E: Biogeology Living things affect the physical characteristics of their regions. (4-ESS2-1)</p>	<p>This page explains the importance of trees in the survival of our environment by listing some of the roles they play. This includes:</p> <ul style="list-style-type: none"> - Providing oxygen which connects to the cycles of matter because trees intake carbon dioxide and produce oxygen in photosynthesis - Providing food like fruits and nuts for other organisms - Holding the soil in place to prevent erosion which affects the physical characteristics of our environment
<p style="text-align: center;">Tree Species Identification</p> <p>LS2.A: Interdependent Relationships in Ecosystems ...A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)</p>	<p>In this activity, students are given the opportunity to explore several of the most prominent tree species in Kentucky and identify those trees in their own environment. It also challenges students to consider the effects of introducing a new species into our state.</p>

<p>Identifying Parts of a Tree</p> <p>LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</p> <p>Systems and System Models A system can be described in terms of its components and their interactions. (5-LS2-1)</p>	<p>Students will study and identify some of the basic parts of a tree as well as their purposes. They are also asked to explain why a tree can be considered a biological system using what they know about the different parts.</p>
<p>Capillary Action Lab</p> <p>LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</p>	<p>This activity takes the previous study a step further by asking students to study a specific occurrence in the stem of the tree: capillary action. They will learn how this phenomenon is possible and what its purpose is while watching the process take place.</p>
<p>Tree Cycle</p> <p>Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1),(4-ESS3-2)</p> <p>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena Science explanations describe the mechanisms for natural events. (5-LS2-1)</p>	<p>The tree cycle is reliant on the tree's access to sunlight, so the amount of sunlight a tree is exposed to in a day determines its behavior. This is an excellent example of cause and effect, and one which students have witnessed throughout their lifetimes. The scientific explanation for this occurrence, which students will begin to learn, explains the natural occurrence of a tree's cycle.</p>
<p>Carbon/ Water Cycle</p> <p>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems, Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)</p>	<p>The carbon and water cycles include trees as a key component. Students will learn about both cycles and focus specifically on the tree's role in each. Students will be able to identify how the exchange of matter occurs in both cycles.</p>

<p>Climate Factors</p> <p>Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1),(4-ESS3-2)</p>	<p>Climate factors, such as wind and light sources, significantly affect the shape and behavior of a tree. Students will be able to determine what a tree might do or look like after being exposed to a variety of climate factors. In other words, they will identify a cause and predict its effect.</p>
<p>Tree Mapping</p> <p>Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)</p> <p>Using Mathematics and Computational Thinking Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2- 2)</p>	<p>Students will be asked to collect and create data both inside and outside the classroom during this activity. The students will be asked to use computational skills to determine where a tree should be planted depending on its size. Students will then be asked to collect data by counting and identifying the trees on their school campus before creating a graph to determine the tree density and species frequency. All computations will use standard units of measurement.</p>
<p>Case Study</p> <p>LS2.A: Interdependent Relationships in Ecosystems ...Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life.... (5-LS2-1)</p> <p>Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1),(4-ESS3-2)</p>	<p>After learning about some of the many diseases that can negatively affect trees, students will be given case studies which present symptoms and ask them to identify the disease. In this case, they identify the effects and determine the cause. At the end of the activity, students are asked to predict what would happen if a disease significantly depleted a particular tree population.</p>

Human Environmental Impact

ESS3.C: Human Impacts on Earth Systems

Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

3-5-ETS1-2.

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem...At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)

Students will learn about how certain human behaviors and actions negatively impact a tree's health and the health of our natural environment. The worksheet will also explain how local environmental organizations are working to diminish the negative impact of human behaviors. Then, using that knowledge and the tree knowledge that students have gained through these lessons, they will be asked to develop a list of ways that they can live more sustainably. Finally, the students will share and discuss the solutions with their peers.