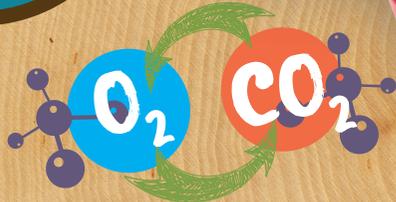
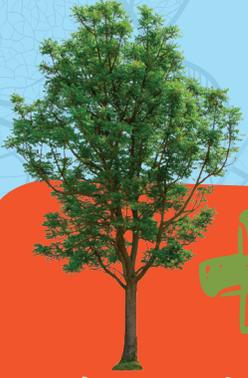


LEVEL 4
6th - 8th





A LOT!

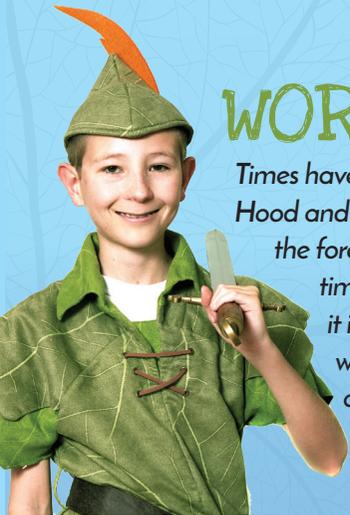
You can take a deep breath of clean air... You can take a big drink of clean water... These are just two of the many ways that trees have an impact on YOU. We depend upon forests every day, all day. Earth would NOT be a good place to live without trees! Forests are one of the most vital ecosystems to human life. Trees and other plants produce the oxygen in Earth's atmosphere that we MUST have to breathe. Their roots hold soil in place, keeping it out of waterways. Their shade helps cool and regulate the Earth's temperature. A list of just a FEW of the thousands of things we get from trees is on the right. Circle every item you need, use or want!



- Oxygen
- Candy wrappers
- Shoe heels
- Books
- Birthday cards
- Ink
- Price tags
- Ping pong balls
- Tires
- Toilet seats
- Football helmets
- Guitars
- Fireworks
- Charcoal
- Toilet paper
- Chewing gum
- Makeup
- Roofs
- Vitamins
- Hockey sticks
- Clean water
- Egg cartons
- Paper towels
- Nail polish
- Toothpaste
- Shampoo
- Syrup
- Computer casings
- Movie tickets
- Toothpicks
- Shade
- Bowling alley lanes
- Animal bedding
- Pie filling
- Ice cream thickener
- Baseball bats

WORKING FORESTS

Times have changed since story book characters, Robin Hood and the Sherwood bandits were hanging out in the forest. Modern forestry isn't just about providing timber for all of those wood products we use - it involves equal concern for wildlife habitat, watershed and water quality management, carbon sequestration, biodiversity issue, recreational areas and much more. Life without forests is hard to imagine!



MYSTERY PHOTO

Can you guess what it is?
Write your answer here:

LIVING IN THE CITY-LOOKING FOR A FOREST!

A lot of people believe that there are no forests or true "green" areas in cities. Incorrect! Over **130 MILLION acres of forests** are located in America's cities and towns. These are referred to as urban forests. Urban forests include: parks, gardens, green-ways, nature preserves, street and landscape trees and more. These urban forests help filter air pollution, control stormwater, reduce noise, and provide habitat for wildlife.

DO YOUR PART: WOODSY OWLS MOTTO IS: REDUCE, REUSE, RECYCLE AND ROT (COMPOST)!



Make it a goal to create as little waste as possible. Trees are a big part of the resources we use every day.

TREES + ME = CLEAN HAIR

Sodium-Lauryl-Sulfate, a byproduct that is a result of using trees to make paper, is used to make shampoo and other soap products foamy.

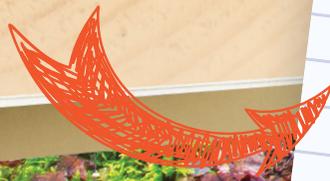
FST: FOREST SCENE INVESTIGATION

More than 200 square miles of land that was once heavily wooded has shown alarming transformations. Native wildlife is becoming decimated by lack of food, plant species are disappearing and local industry has been impacted due to declining tree populations. Officials launched an investigation by examining the following factors:

- Biodiversity
- Species Population
- Food Web
- Habitat Condition
- Soil Sample

The data has been processed by experts, evidence has been photographed on scene, samples have been collected, and testimony has been gathered from individuals living near or within the forested area.

Now it is time for YOU to go to work. Use the following clues to help determine what is causing the decline in this particular forest.



My Clues

1. Available wildlife habitat has been reduced due to timber harvesting.
2. Native food web structure is incomplete due to a marked lack of biodiversity.
3. Large populations of English Ivy, a nonnative plant species, were found. This ivy covered the ground and was wrapped around tree trunks, preventing sunlight from reaching plants and trees.
4. Small mammal population density has dropped by over 60%. These mammals spread seeds, mix soil and decomposed organic matter, eat harmful insects and are a food source for larger animals.
5. Soil sample results showed a ratio of Calcium (Ca) to Aluminum (Al) in the soil at a level that indicates forest ecosystem stress resulting from acidic deposition or harvesting.
6. Soil sample results indicated a deficiency in minerals needed for healthy plant root growth.
7. Forest areas that have had timber harvested have been replanted with Douglas-fir trees.
8. Squirrel populations have decreased dramatically, possibly due to lack of acorns as a food source.



TREES + ME = CHEWING GUM

Ever wonder why chewing gum is sticky? It contains lignin. Lignin is found in trees; it is the glue that holds cellulose fibers together to form wood.

DO YOUR PART: CONTROL INVASIVE PLANTS

Control invasive plants on your property and report invasive plant infestations to your local land management agency. Invasive plants take nutrients (sunlight, soil chemicals, water) from naturally-occurring species and compete with them for space.



Use the following chart to record information from the clues gathered by the investigation into the declining forest ecosystem. Place a "y" for yes or an "n" for no in each box to indicate what living organisms are affected by the results of the investigation.

	Organisms Affected	Habitat Reduction	Incomplete Food Web	Nonnative Plant Species	Reduced # of Small Mammals	Deficiencies Soil	Harvesting Timber	Replant with Douglas-fir Trees	Shrinking Squirrel Population
Animals									
Native Plants									
Humans									



In order to determine what is causing damage to this forest. **Draw a line** matching the term or phrase on the left with the definition or explanation that best matches it on the right.

- BIODIVERSITY** The variety of plant and animal life that can be found in a particular habitat.
- FOOD WEB** A nonnative species that can reproduce rapidly, compete aggressively for resources and displace native species, disrupting ecosystems.
- HABITAT** Illustrates feeding relationships of organisms in an ecosystem.
- INVASIVE SPECIES** The natural home or environment of a living organism.



FSI: THE RESULTS

Use all of the information gathered to determine two possible causes of the damage to the forest under investigation.

1. _____

2. _____



Trees can be identified by their leaves, bark, buds and even the wood that is harvested from them. Trees are most commonly identified by their leaves. To get started with tree identification, take a look at the leaves pictured on this page. Use the number each leaf is labeled with to answer the questions.

- If the leaf is **needle-like**, write the number(s) here: _____
These trees are called **CONIFERS**, they usually have pinecones.
- If the conifer has **single needles that are directly attached to the twig**, write the number(s) here: _____
- If the conifer has **clusters of needles**, write the number(s) here: _____
- If the leaf is **flat and thin**, write the number(s) here: _____
These trees are called **BROADLEAF**, they usually shed their leaves each year.
- If the leaf is **simple—one leaf on one stalk**—write the number(s) here: _____
- If the leaf is **compound—more than one leaf (called leaflets)** on a single twig or stalk—write the number(s) here: _____
- If the leaf is **simple and has no lobes—the edge is fairly even with no projections**—write the number(s) here: _____
- If the leaf is **simple and has lobes—the leaf edge has projections**—write the number(s) here: _____

Visit the Arbor Day Foundation's website for a great online tree ID guide.
<https://www.arborday.org/trees/whattree/>

MyTreeTracker.org is a great citizen science site with additional resources.

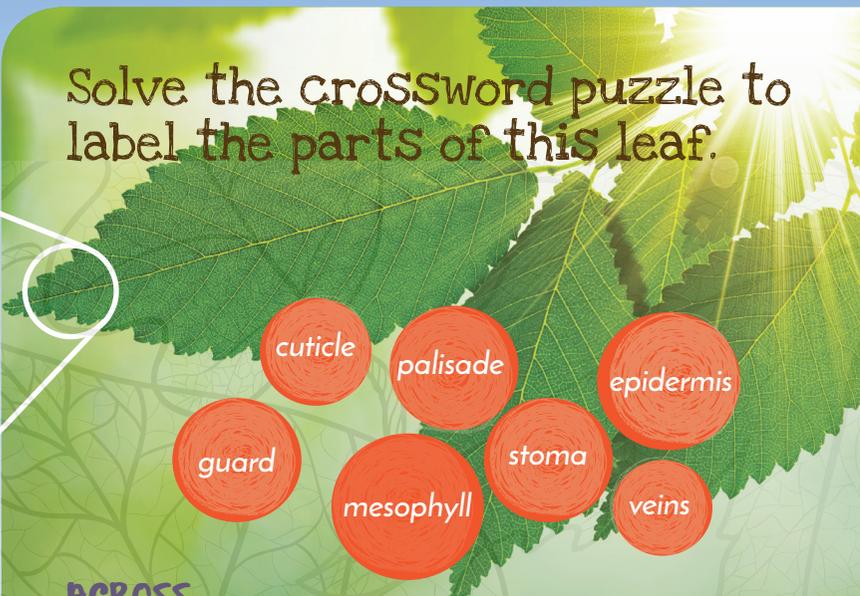
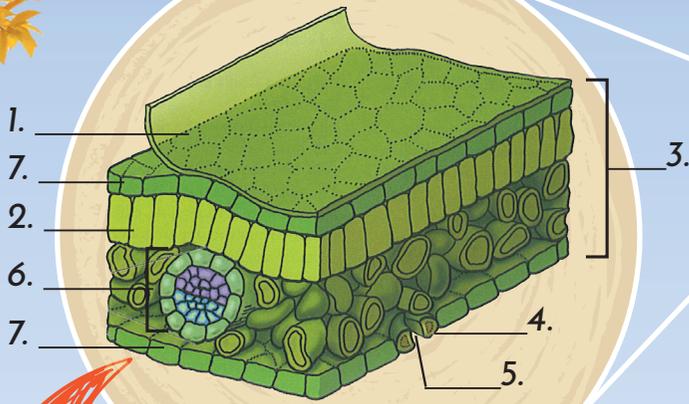
Label each tree name with the number of the leaf on this page that comes from that tree.

_____ Loblolly Pine _____ Douglas-fir _____ Quaking Aspen
 _____ White Oak _____ Pecan

DO YOUR PART: It is important to plant native trees. They are adapted to your soil as well as good for native wildlife food and shelter. Want to find out what trees are native to your state? Research your state Department of Natural Resources, Forestry Division. Or check with you local soil and water conservation district. Find yours at: <http://www.nacdnet.org/general-resources/conservation-district-directory/>



Solve the crossword puzzle to label the parts of this leaf.



ACROSS

- 2. _____ is an outer layer of cells that protects the leaf from water loss.
- 4. _____ tissue is found within the mesophyll layer. Their chloroplasts absorb a large portion of the light energy needed by leaves.
- 6. _____ is a protective film covering the epidermis of leaves.
- 7. _____ cells are located in the epidermis of leaves and are used to control gas exchange.

DOWN

- 1. _____ are made up of the xylem cells which carry water and minerals from the roots to the leaf, phloem cells which carry sap out of the leaf and lignin tissue which helps give the leaf structure.
- 3. _____ cells are the green cells located in the middle of a leaf and are responsible for photosynthesis.
- 5. _____ is a pore located in the epidermis of leaves that allows air containing oxygen and carbon dioxide to enter the leaf.

TREES + ME = BETTER BEACH TIME

Cellulose – a fiber found in trees and other plants (its rigid structure helps them stand upright) is used as a thickening agent in suntan lotion.



There are no trees in the Artic Tundra





ASK MAXINE

Question: Why trees have leaves?

Answer: A tree can't live without leaves and different trees need their leaves to function in different ways. For example, one of the benefits of the thin leaves found on broadleaf trees is that sunlight can pass through and reach all of its leaves—allowing photosynthesis to the max—which the tree needs for food and energy and we need for air to breathe! The leaves of a tree are a source of food, water and temperature control for the tree. As temperatures begin to cool in the fall these leaves begin to change color as they lose chloroplasts. They have done their job for the year, providing the tree with food and energy and eventually fall to the ground. Trees can't survive without leaves and we can't survive without trees!



Maxine worked for NACD for 47 years. That's why we always ask Maxine.

IS IT TRUE OR FALSE?

Mark each statement with a "T" for true or an "F" for false.

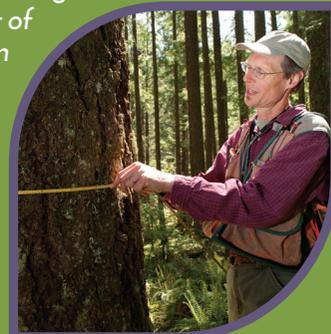
- Trees are the largest and longest living organisms on the planet.
- One large tree can provide the oxygen needed for 2 people to breathe.
- A tree can absorb 48 pounds of carbon dioxide from car emissions per year.
- Invasive plants cover about 133 million acres of land in the U.S., and are spreading over a million acres per year.
- One large tree can remove up to 100 gallons of water out of the soil and release it into the air in a single day.
- One person uses enough wood-related products per year to equal a 100-foot tree that is 18 inches in diameter.
- Giant sequoia trees can weigh over 4 million pounds.
- There are Bristle Cone pines in California and Nevada that are over 4,000 years old.
- If you hang a birdhouse in a tree, it remains at the same height even though the tree grows taller.



Thinking About a Career in Forestry?

Research your state universities and colleges on this topic. Your state Department of Natural Resources, Forestry Division will have information as well.

Also check out the Oregon-based website www.LearnForests.org for videos for students in grades 4-12. The videos contain career insights, various forest facts and first-person accounts of those who are currently have a forest career.



Answer Key: Pg 2 Mystery Photo—stomata Pg 3 Scrambled words: water quality, oxygen, biodiversity, habitat, ecosystems. Phrase: "Trees: natural, renewable, sustainable, and necessary!" Pg 5 Term match: Biodiversity—The variety of plant and animal life; Food Web—illustrates feeding relationships; Habitat—The natural home; Invasive Species—A nonnative species. FSI results: lack of biodiversity and/or invasive species. Pg 6 1. Loblolly Pine, 2. Quaking Aspen, 3. Pecan, 4. Douglas-fir, 5. White Oak. Pg 7 Crossword: 1. vein 2. epidermis 3. mesophyll 4. palisade 5. stoma 6. cuticle 7. guard. Pg 8 True/False: all true



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National Association of Conservation Districts
National Association of Conservation Districts (NACD)
www.nacdnet.org

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Visit: <http://www.nacdnet.org/conservation-education-hub/> for the educators guide and additional resources

Booklet designed for use with Grades 6-8

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