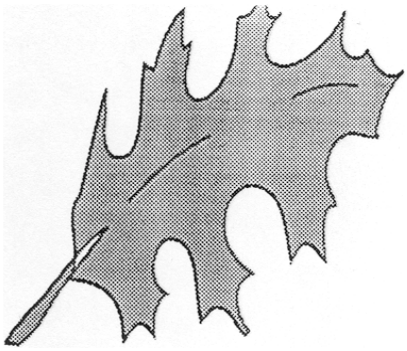
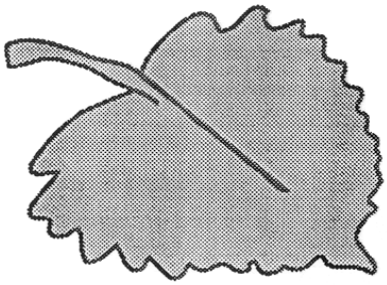
Michigan
Arbor Day
Education Booklet



Grow as the trees grow,
Your head lifted straight to the sky,
Your roots holding fast where they lie,
In the richness below;
Your branches outspread
To the sun pouring down, and the dew,
With the glorious infinite blue
Stretching over your head.

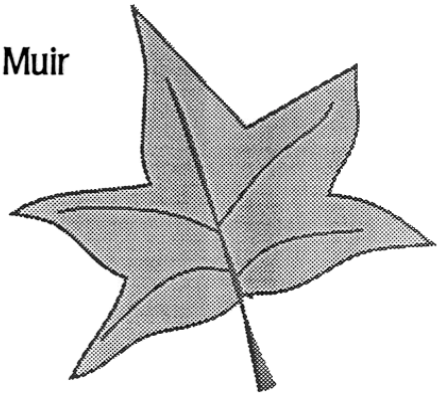
from "Growth"
~Ellen Bugbee



The natural world allows us to make peace with our own contradictory natures. We are returned to a balance of mind and spirit. We are healed.
~Terry Tempest Williams

The clearest way into the universe is through a forest wilderness.

~John Muir



The leaves that fall in autumn, the sap that rises in spring -- is that not, after all, the symbol of the life to come?

~Rosa Bonheur

Quote selections from:
Sister of the Earth, edited by Lorraine Anderson
An Introductory Guide to Arbor Day, International Society of Arboriculture
Celebrate Arbor Day, The National Arbor Day foundation
By Means of Trees, University of Connecticut Cooperative Extension system

Other holidays repose upon the past:

Arbor Day proposes for the future

J. Sterling Morton, Arbor Day Founder

Arbor Day is a time to celebrate trees and their importance in our lives; it is also a time to think about what we can do for trees and the world in which we live. Healthy natural resources are vital to environmental quality and quality of life. Trees are in our backyards, neighborhoods, cities, farms, and forests, they connect us to our past and our future.

This Arbor Day packet has information and activities that emphasize what trees and forests provide, from oxygen, wood products, animal habitat, and recreation, to improving people's physical, mental, spiritual, emotional and cultural well-being.

As we celebrate Arbor Day we must look to the future and our stewardship of natural resources, and remember the connectivity of all living things.

Plant a tree !!!

> He who plants a tree, plants hope
>
> ~Lucy Larcon

Acknowledgments

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White Pine
Michigan's State Tree

Michigan's state tree, the Eastern white pine (*Pinus strobus*), is a graceful and beautiful tree. The bark is smooth and dark green when the tree is young and as it matures, the bark becomes thick, gray and blocky. The branches grow horizontally, which makes it an excellent climbing tree. The needles grow in clusters of five and are a pale blue-green. The needles are soft and pliable; they do not snap when bent.

Although the white pine is mostly found in the Upper Peninsula and northern half of the Lower Peninsula, it is often planted and grows very well statewide as an ornamental or yard tree. The white pine grows well on a variety of sites. It prefers well-drained sandy loams but can grow in poorly drained soils, rocky outcroppings, flood plains and ridges.

The white pine is not commonly planted commercially because of its susceptibility to white pine blister rust and white pine weevil. White pine blister rust is a fungus that must have gooseberry or current bushes present to complete its life cycle. White pine is valued, however, for its light, soft, easily worked wood and is often made into doors, cabinets and construction timber. It is one of the most useful of all American woods.

From the late 1800's to the early 1900's, there was a huge demand for cheap, strong building material because the Midwest was growing so fast. Michigan's white pine was discovered and became the most sought-after tree in Michigan and the Lake States. From 1860 to 1900, Michigan led the nation in timber production. The lumbermen in Michigan rushed to provide material for this growth of cities and towns. During this peak, the dollar value of timber cut in Michigan exceeded California's gold rush by more than $1 billion dollars, and most of that timber was white pine. The result was the financial, industrial and commercial rise of Michigan and the large scale harvest of white pine stands. But the costs of this rapid tree cutting were forest fires, river and stream degradation , soil erosion, and wildlife habitat loss. However, changes in timber harvesting practices, wildfire control, and tree planting efforts like the Civilian Conservation Corps have renewed our forests. Today Michigan's forests are healthy and growing, providing wildlife habitat, recreation, wood products, stream protection, and other values.

The large, beautiful stands of white pine in Michigan were the greatest the world had ever seen. It has been said that Michigan's forests were so thick, the white pine being a major component, that a squirrel could travel from one side of the state to the other without touching the ground! It was in recognition of this tree's beauty, importance and economic contribution to the state that the white pine was designated as the official state tree of Michigan.

The History of Arbor Day

The first Arbor Day was celebrated in Nebraska on April 10, 1872. J. Sterling Morton, a pioneer and journalist championed the idea of a "tree planting holiday" in the Nebraska Territory. In the 1800's the plains had been cleared for building materials, fuel and farming. The pioneers quickly warmed to the idea of planting trees because trees reminded them of the homes they left in the east , and they needed windbreaks to reduce soil erosion, and shade from the hot sun.

Morton became the editor of Nebraska's first newspaper. He used that forum to spread agricultural information and the need for trees. On January 4, 1872 he proposed an April tree-planting holiday to the State Board of Agriculture. He advocated tree planting by individuals and by civic organizations for the public good. Prizes were offered to counties and individuals for properly planting the most trees. It is estimated that Nebraskans planted over one million trees that first Arbor Day.

In 1885 Arbor Day was named a legal holiday in Nebraska; Morton's birthday, April 22 was selected for its permanent observance. During the 1870's other states passed legislation to observe Arbor Day, and the tradition began in schools in 1882.

J. Sterling Morton's love for trees came from his life in Michigan. Morton's family lived in Detroit and he went to public school in Monroe, then later Albion College (Class of 1850), and the University of Michigan (Class of 1854). Morton missed the array of vibrant green trees he grew up with in Michigan and continued to plant them throughout his life.

Today the most common date for state observances of Arbor Day is the last Friday in April and several U.S. presidents have proclaimed a national Arbor Day on that Friday. There are a number of state Arbor Days at other times to coincide with the best tree-planting weather.

In 1885 the Michigan Legislature resolved "that the Governor is hereby requested to call the attention of the people of the state to the importance of planting trees for ornament and by naming a day upon which the work shall be given special attention, to be know as Arbor Day".

Until 1965, the Upper and Lower Peninsulas had separate Arbor Days in the spring because of the difference in weather conditions for tree planting. Governor George Romney proclaimed an Arbor Week for the last week of April, 1966. In his proclamation, Governor Romney broke with the traditional one day "Because of the increased interest in, and the importance of the statewide keep Michigan Beautiful program, one or two day do not afford enough time and opportunity for a full and proper observance of Arbor Day.

"It is well that we bring attention to our trees and the need to continue to plant them about our homes, our places of business, our industries, our schools, our highways, and throughout the landscape so that their majesty will reflect our appreciation of the grandeur of nature and further the culture and economy of our state".

Each year the Governor and Michigan Legislature proclaim the last week of April as Arbor Week and Arbor Day as the Friday of that week.

Adapted from *A Brief History of Arbor Day*, The National Arbor Day Foundation

Plan an Arbor Day Ceremony

An Arbor Day ceremony can be a simple and brief gathering or an elaborate all-day event, either way it can be a fun and memorable experience for adults and children alike. It is especially meaningful to children if they have discussed the history of Arbor Day and have learned how to plant and care for trees before the ceremony is held.

A basic Arbor Day ceremony might include:

1. Greetings by a school principal or community leader.
2. Reading the history of Arbor Day.
3. Singing songs and reading poems about trees, tree planting, and Arbor Day.
4. Planting a tree together, demonstrating proper tree care. Children may help with a handful or shovelful of soil to cover the roots. A small tag or sign may be posted listing children's or participant's names for future generations to see.
5. Closing by principal or community leader. The ceremony may be closed by a poem, a song, or a brief statement about people and trees. This time may also be used for answering questions and an inviting participants to join in next years' ceremony.

—Adapted from "Celebrate Arbor Day"
by the National Arbor Day Foundation

Tree Dedication

We dedicate (these or this) tree to beauty, usefulness and comfort. May our lives grow in beauty, usefulness, and comfort to others even as these trees expand their leafy boughs. Let us strive to protect and care for them that they may so be enjoyed by all people that they, in turn, will leave, as a memorial of their appreciation, trees to be enjoyed by posterity.

Author unknown

Michigan Forest Facts.....
Did You Know?

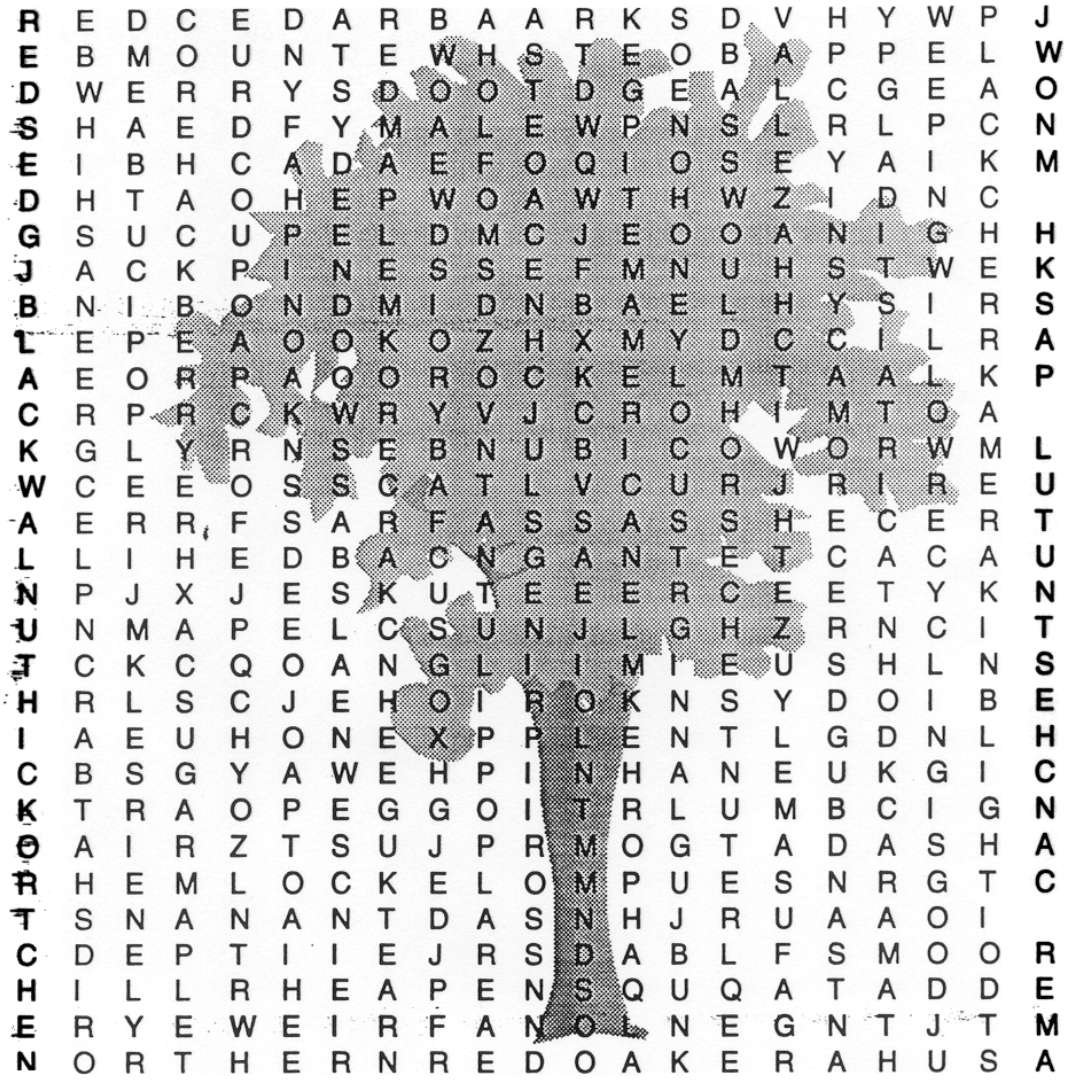
- Of Michigan's 36 million acre land base, 19.3 million acres are forested.
- Michigan forests are an important economic resource, providing wildlife habitat, Watershed protection, recreation opportunities and wood products.
- Michigan has a 3.8 million acre state forest system, the largest in the United States.
- Michigan's timber products economy provides approximately 150,000 jobs statewide.
- Michigan plants over 30 million tree seedlings each year.
- Michigan has increased property values and reduced energy costs through numerous community and city tree plantings.
- Michigan is home to over 500 native vertebrate species, including the white-tailed deer, trout, Northern leopard frogs and blue jays.
- Michigan's jack pine barrens are the only place in the US that the endangered Kirtland's warbler nests.
- Michigan's protection and management of the native gray wolf and its habitat has had encouraging results since 1991, with successful reproduction and pack formation in the Upper Peninsula.
- Michigan has 86 individual National Champion Big Trees, including a Northern Catalpa (*Catalpa speciosa*), that is 242-inches in girth, stands 107 feet high, and grows on the State Capitol grounds.

They hear. They all hear
The speaking of the Tree.
They hear the first and last of every Tree
Speak to humankind today. Come to me, here beside the River.
Plant yourself beside the River.

--Maya Angelou

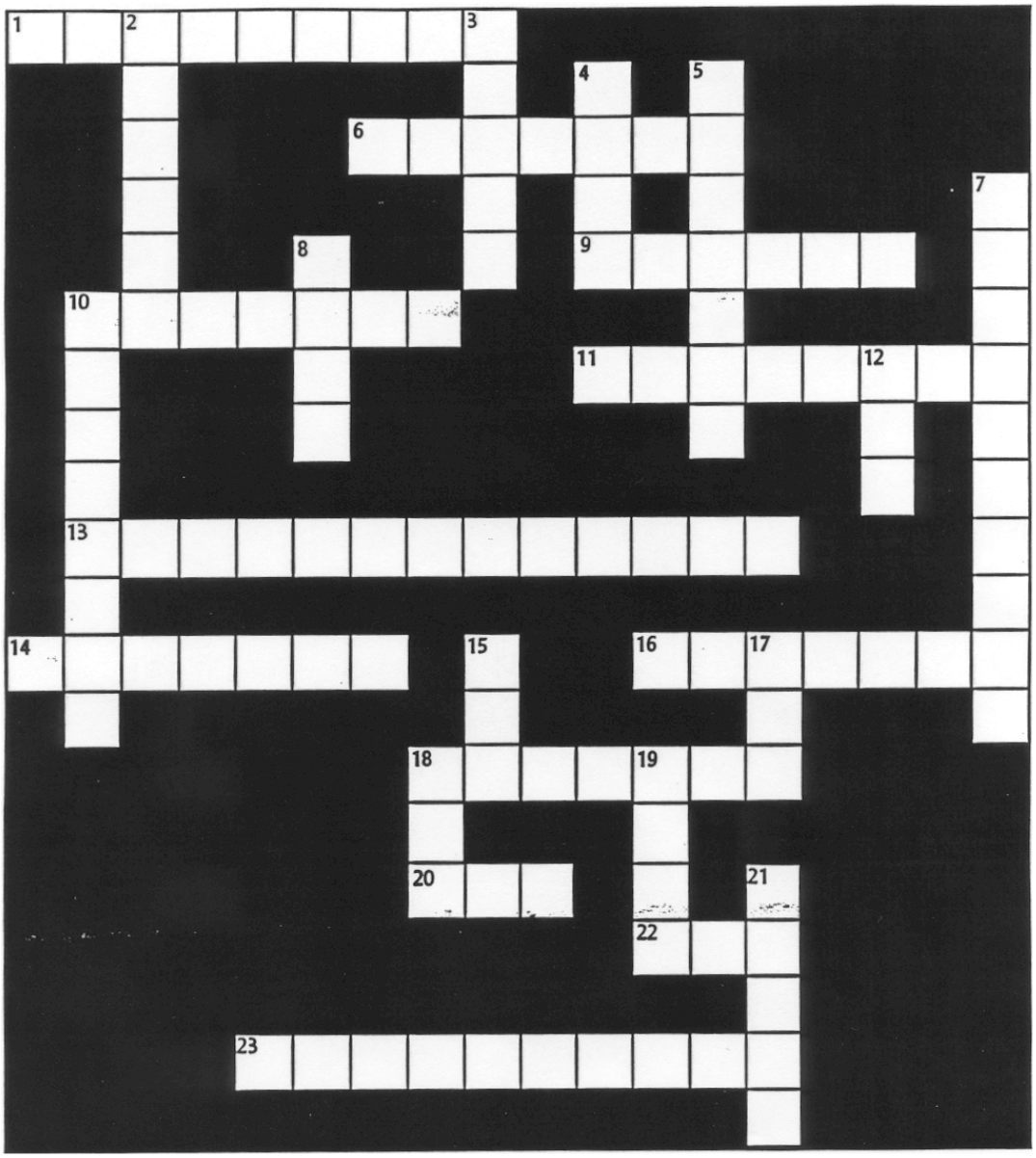
Michigan Native Tree Species Word Find

Can you find them all?



Beech	Tulip poplar	Rock elm
Sassafras	American elm	Hackberry
Witch hazel	Red cedar	Pin Oak
Black locust	Hemlock	Horsechestnut
Sugar maple	Green ash	Black walnut
Basswood	Red maple	Weeping willow
Jack pine	Dogwood	American chestnut
White pine	Ironwood	Tamarack
Northern red oak	Honeylocust	

What We Get From Trees



Across

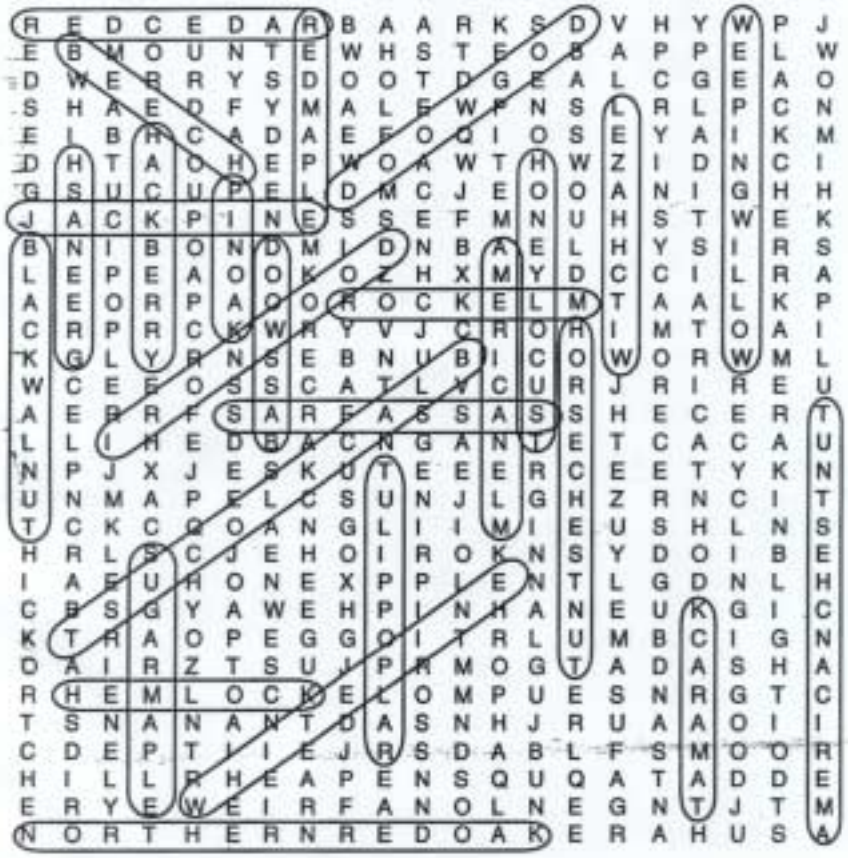
1. 4th.of July light show
6. scented liquid
9. squishy scrubber
10. rainbow in a box
11. just a spoon full of sugar hilips this go down
13. a guinea pig's matress
14. a shiiny furniture finish that rhymes with tarnish
16. fire starters
18. tanins from trees tan _____
20. stuff on the underside of your desk
22. this choice drink comes after S
23. dentists say to use this 3-times a day

Down

2. tires and bouncing balls are made of this
3. pancake topper
4. squirrels stuff their cheeks with these
5. people listened to these before they had CDs
7. this can also make your boots shine
8. mom make you wash behind your ears with this
10. BBQ beginner
12. pencils have lead; pens have this
15. changes your hair color
17. fills the cracks in streets
18. Abe Lincoln was born in a ____cabin
19. your fireplace produces this
21. books are made of this

Michigan Native Tree Species Word Find

Solution



Beech
Sassafras
Witch hazel
Black locust
Sugar maple
Basswood
Jack pine
White pine
Northern red oak
Tulip poplar
American elm
Red cedar
Hemlock
Green ash
Red maple
Dogwood
Ironwood
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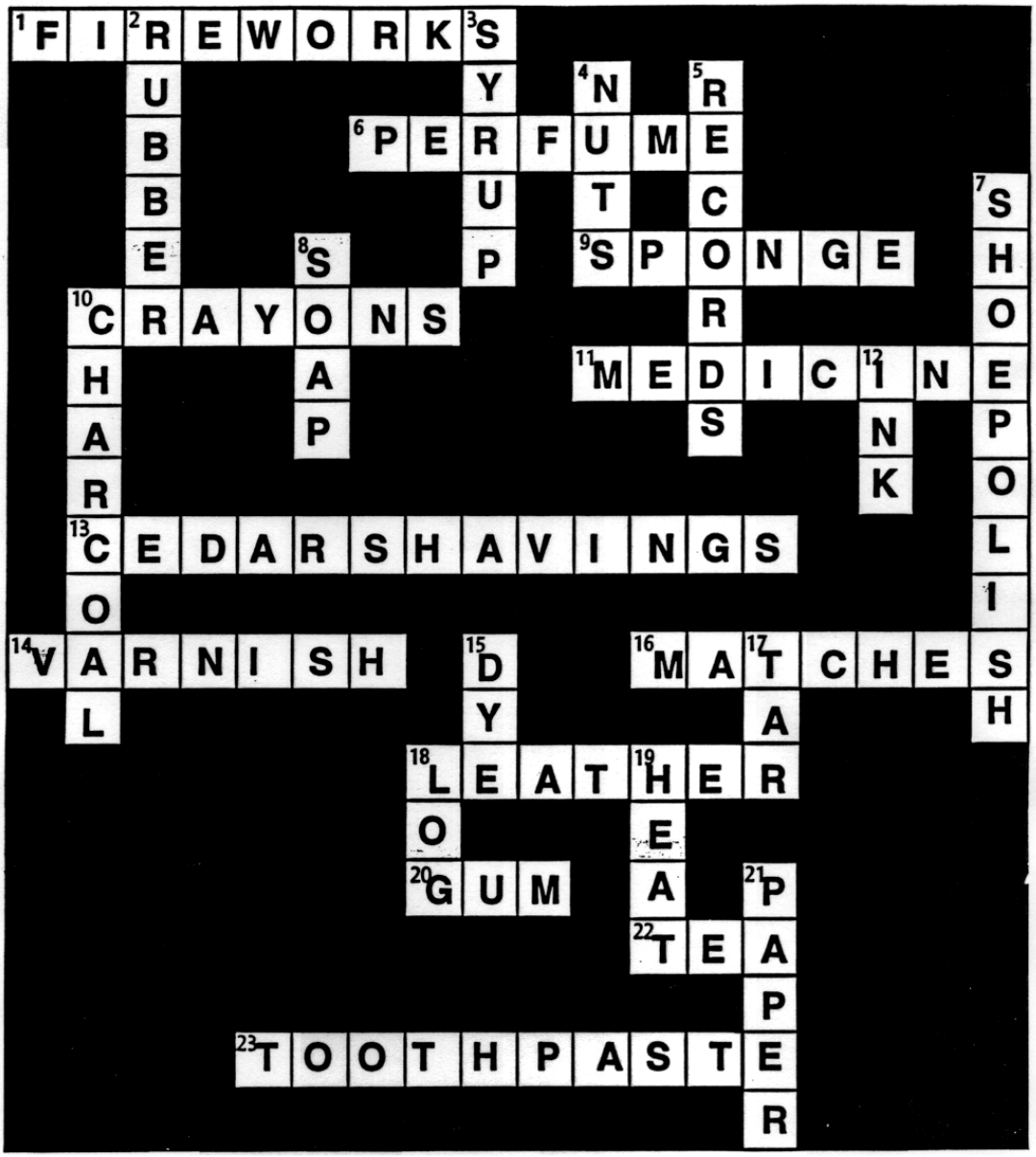
Rock elm
Hackberry
Pin Oak
Horsechestnut
Black walnut
Weeping willow
American chestnut
Tamarack

What We Get From Trees

Solution



People Helping Trees

The Civilian Conservation Corps

The Great Depression of the 1930's caused widespread unemployment all over the United States. Many people lost their jobs. There were virtually no jobs to be found, even for the most earnest of job searchers. During this time in history the country's natural resources were severely degraded. Much of this degradation was the result of unregulated harvest of everything from timber to fish. President Roosevelt wisely believed that if the young men of this country were making an honest living and learning valuable skills, they would become an asset both to their country and their families. To accomplish both this goal and return health and vigor to our landscapes, President Roosevelt created the Civilian Conservation Corps (CCC).

The purpose of the CCC was to employ US citizens and initiate the "construction, maintenance, and carrying out of works of a public nature relating to forestation of land, prevention of forest fires, floods, and soil erosion, and maintenance or repair of paths, trails, and fire lanes." The men were given room and board and $30 per month. Most of their income was sent back to their families, which provided much needed aid. The men of the CCC, together with the US Forest Service, improved the status of our state's natural resources by creating and enhancing parks and forests.

During its existence (1933-1942), the CCC employed 3 million men, almost 100,000 in Michigan alone. These men built 504 bridges, erected 221 buildings, built 33 landing strips, constructed 7,000 miles of roads, fought 140,000 man-days of fires, developed 1,481 acres of public campgrounds, stocked 156 million fish, strung 2,065 miles of telephone line and planted 484 million trees! The logging camp and other cabins at Hartwick Pines State Park were built by the CCC. The DNR Ralph A. MacMullen Conference Center near Higgins Lake was also contributed by these young men learning and working in the rugged wilderness of Michigan's forests. An enormous amount of conservation work was accomplished, money was released into the economy and the lives of countless young men and their families were forever enriched by the Civilian Conservation Corps.

Genevieve Gillette

Genevieve Gillette loved nature and committed her life to protecting and conserving Michigan's natural resources. The list of the achievements and awards she attained during her 88 years is too long to print here. Miss Genevieve, as she called herself, was one of Michigan's most important advocates of the reservation of land for parks The only tools she used to accomplish her goals were accurate information, warm and effective communication and persistence, persistence, persistence. In 1920 Genevieve Gillette was the first woman to graduate from Michigan Agricultural College's (now Michigan State University) landscape architecture program.

Miss Genevieve supported herself by working at everything from receptionist to florist to landscape designer. However, her full time position was as one of the most effective volunteer lobbyists for conservation this state has ever known. She was constantly searching for lands to set aside as parks, working to improve overused or misused parks and rescuing existing parks from the threat of decline. Among many other forms of recognition and appreciation, the nature center at P. J. Hoffmaster State Park (Muskegon) has been named for Genevieve Gillette. Miss Genevieve Gillette's efforts have shaped Michigan's entire park system into what is today one of the most beautiful and visited park systems in the country.

Smokey Bear

Smokey Bear has been reminding people that "Only you can prevent forest fires" since 1947. Over 95% of all forests fires are a result of people's carelessness with matches, campfires, trash burning, and cigarettes. These fires have resulted in wildlife habitat loss, burned trees, soil erosion, burned houses, barns and cabins, and loss of human and animal life. The Smokey Bear program was developed to teach people about the dangers of wildfire.

In 1950 on the Lincoln National Forest in New Mexico a forest fire started because of a person's carelessness. The fire burned out of control for five days burning 17,000 acres and killing many different wildlife species. The firefighters found a badly burned bear cub clinging to a charred tree limb—the only survivor of this devasting forest fire. They named him Smokey.

The cub was nursed back to health.. He became the living symbol of forest fire prevention. He appeared on radio, TV, and in posters teaching about the dangers of wildfire.

In Michigan, Smokey Bear can be found at schools and other events reminding us "Only you can prevent forest fires".

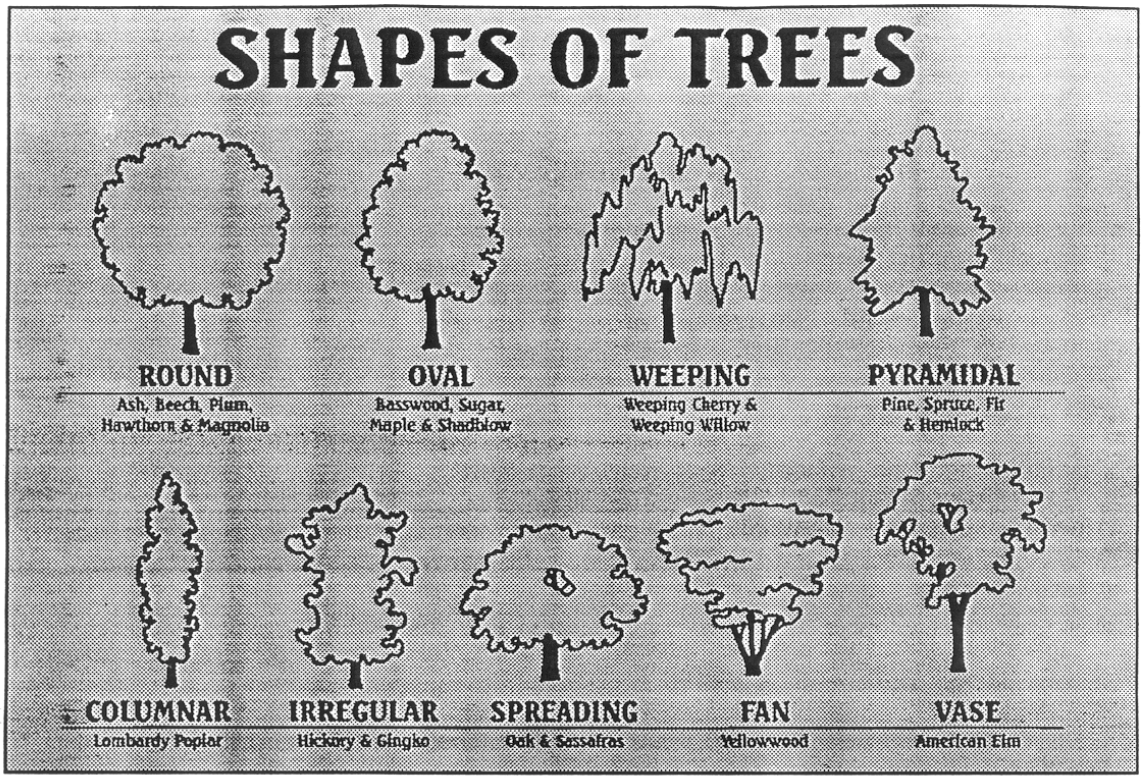
Golightly Education Center

The Golightly Education Center, located in the heart of urban Detroit, is a lovely older building surrounded by vacant land and bordered on one side by an intersection of two major expressways. The students wanted to attract urban wildlife to their school, so they decided to build suitable habitat: a deciduous hardwood forest.

Under the direction of science teacher Beth Clawson, they studied Michigan species to choose trees that were suited to the soils and climate at their school. They planted seedlings, saplings, shrubs and large, balled and burlapped trees. Among the vegetation planted were red oaks, green ash, witchhazel, fragrant sumac, serviceberry, cinnamon fern and white pine. In order to provide water for the wildlife that would be attracted, they created a small wetland area, complete with native wildflowers and grasses.

According to Michael Hammond, a 7th grader at Golightly School, the students worked very hard to develop the site. It took 6 dump truck loads of woodchips to simulate a forest floor, the woodchips would also control grass growth so the trees would thrive. Watering was done by hand every other day. Soil health is monitored to ensure healthy trees. Michael says they have approximately 22,000 worms on the site. Worms are important to the ecosystem because they enrich and aerate the soil as they live and move about in it.

Golightly School plans to continue the important work it started by reforesting around the playground edges.



Michigan Forest Succession

Change. In Michigan our forests have undergone centuries of change. This change is called **Succession**, the orderly replacement of one plant community by another. Along with the plant communities, the wildlife that inhabits these areas will change, too. This change takes place over a long period of time and can occur naturally or with human interference.

Long before Michigan was settled, our state was covered almost entirely by forests. On occasion a bolt of lightening would ignite a forest fire and the burned timber would create a place for a new plant community. The same would happen if an ice storm or tornado destroyed parts of the forest. As the new plant community became established, the wildlife adapted to the change.

As Michigan became more populated and settlement occurred, it was human interference that added a new dimension to succession. It was the ax, saw, and plow that changed the established forest communities. The building of towns, creation of farms, and logging of forests accelerated succession. Natural succession is good and because it takes time, most wildlife can adapt easily. When it occurs at too great a speed, succession can alter the natural habitat of wildlife species before they can adapt. Today forest and wildlife managers are aware of this concept. On the reverse of this page is an example of succession.

In this diagram, a farm has been deserted leaving only bare soil behind. Soon weeds spring up everywhere. Weeds are extremely important plants because they readily adapt to disturbance and rush in to fill a vacated niche. As the weeds become established they keep the soil from eroding. Without weeds, wind and rain combine to remove soil from the land. Without weeds, some of the rain that does fall quickly evaporates. The new weeds hold the moisture in place. As weeds die, their nutrients enrich the soil. Not many forms of

wildlife live in bare soil, but as the weeds are taking over they produce food for seed-eating animals. Mice, gophers, quail, and pheasant are just a few of these.

After about fifteen years, the area now becomes dominated by **shrubs**. These sun-loving species of dogwood, sumac, blackberry, and hawthorn gradually replace many of the weeds and grasses. New mammals and birds (rabbits, groundhogs, and bluebirds) that prefer more cover and eat parts of these plants will become more abundant.

These animals bring new seeds along with them. Some of these seeds may have been eaten somewhere else, but are deposited here. Other seeds hitchhike on animals due to a prickly outer covering. Some seeds, such as acorns, may be deposited by squirrels from an adjacent forest. And, of course, many seeds arrive by the wind.

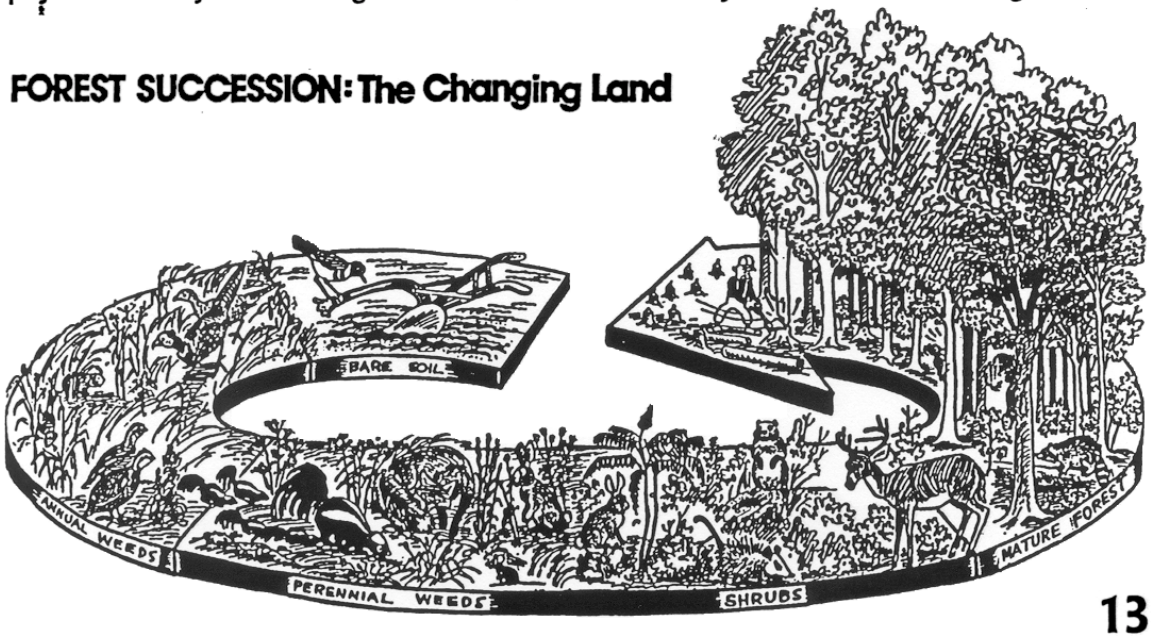
These new seeds may include some sun-loving trees species like aspen, black cherry, sassafras, or jack pine. These trees are often referred to as pioneers because they are the first trees to venture into these unclaimed territories. Pioneers love the sunlight and soon grow above the shrubs and now-disappearing weeds that cannot compete. The whitetail deer and ruffed grouse do exceptionally well in these early stages of pioneer species growth. After 35 years this young forest looks nothing like the farmland it had once been.

But succession doesn't stop there. Dependent on soil type, moisture, and seed availability, new species continue to move in and replace others. The young sun-loving pioneers will eventually have a difficult time replacing themselves in the now-shaded understory. Trees more tolerant of shade will become established. Oaks, hickories, beech, and sugar maple can grow in less sunlight. In several hundred years, an initial forest of aspen and cherry may become a forest of sugar maple and beech.

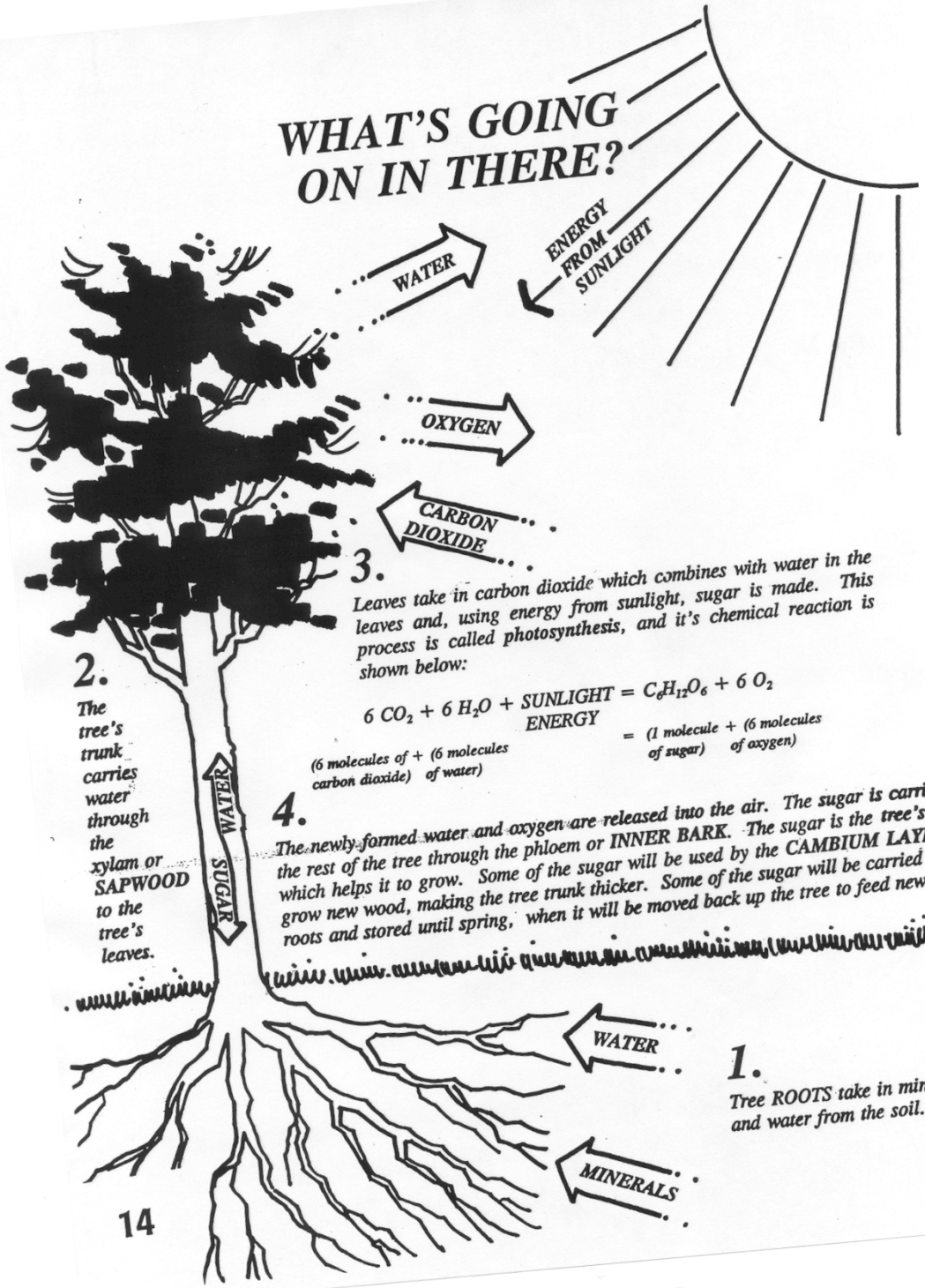
As this forest becomes older, different wildlife species will choose it for habitat. If the browse line becomes too high and the forest floor too shaded for ground cover plants the deer will become less abundant. Cavity-nesting animals drawn to older trees with decaying wood will be more common. Woodpeckers, raccoons, and squirrels are examples of these. The forest that grows old and allows only more of its own shade tolerant kind to grow is referred to as a **mature forest**. It may remain a mature forest for a very long time unless a farmer returns to cut down the trees, pull the stumps, and plow the soil. Remember, this is how our diagram began.

As we have seen, succession does not happen overnight. Yet, if you are observant, you can see the difference in plant communities and understand that wildlife is dependent of them. The meadow where children play baseball today will no doubt grow into a forest tomorrow. It's only a matter of time...and change.

FOREST SUCCESSION: The Changing Land



WHAT'S GOING ON IN THERE?



2. The tree's trunk carries water through the xylam or SAPWOOD to the tree's leaves.

3. Leaves take in carbon dioxide which combines with water in the leaves and, using energy from sunlight, sugar is made. This process is called photosynthesis, and it's chemical reaction is shown below:

$$6\ CO_2 + 6\ H_2O + \underset{\text{ENERGY}}{\text{SUNLIGHT}} = C_6H_{12}O_6 + 6\ O_2$$

(6 molecules of carbon dioxide) + (6 molecules of water) = (1 molecule of sugar) + (6 molecules of oxygen)

4. The newly formed water and oxygen are released into the air. The sugar is carried to the rest of the tree through the phloem or INNER BARK. The sugar is the tree's food which helps it to grow. Some of the sugar will be used by the CAMBIUM LAYER to grow new wood, making the tree trunk thicker. Some of the sugar will be carried to the roots and stored until spring, when it will be moved back up the tree to feed new buds.

1. Tree ROOTS take in minerals and water from the soil.

Adopt A Tree

Activity: Grades 3-8
Variation 1: Grades preK-1
Variation 2: Grades K-4

Science, Math, Languages Arts, Visual Arts, Social Studies

Organisms are interdependent; they all depend on nonliving components of the Earth. (4.1)

While every organism goes through a life cycle of growth, maturity, decline, and death, its role in the ecosystem also changes. (13.3)

Observing, Concept Forming, Reasoning, Organizing Information

Students will 1) describe a chosen tree using personal observation and investigation, and organize information about the tree, 2) identify relationships between their tree and other organisms, and 3) put together a book or portfolio about their tree.

Activity: notebooks, pencils, drawing paper, crayons or markers, camera, copies of page 68, (optional), student page 69

Preparation: 15 minutes
Activity: 50 minutes (longer projects can be done throughout the year)

Getting Ready

Have students make "Adopt a Tree" notebooks for recording information. Students can fold a sheet of construction paper in half, insert blank pages, and staple the book along the folded edge. They can draw or paste a photo of their adopted trees on the cover. Make copies of student page 68 for each student.

Doing the Activity

1. Ask students to name something that is their very own or is special to them in some way. For example, someone might mention a pet. Someone else might mention a present received from a relative or close friend, and so on.

2. Explain that each person will choose his or her very own special tree to adopt. With younger students, you can have the whole group adopt a particular tree. Where there's a shortage of trees, you might have teams adopt trees. Students will observe their trees throughout the school year, or for how ever long you decide to conduct the activity. How they select their tree is up to them. Some students may choose the tallest or fullest tree. Others may choose the smallest, "cutest" tree. Some may pick a seemingly average looking tree, only to discover that there's more to it than meets the eye. No matter which tree they pick, students should be able to say why they chose it. you might have students tie a colored piece of yarn around their tree to identify it.

3. Provide each student with a small notebook, and explain that students should use their notebooks to record observations and answer questions about their trees. You can also have them make and decorate their own notebooks.

4. Take students outside and let each choose a tree. If you're working with older students, or if there aren't trees near your school, you might have students choose trees near their yard or in their neighborhood. Students could briefly visit their tree before or after school.

5. Have students write the answers to the questions on the student page in their "Adopt a Tree" notebooks. For younger students, you will need to read and explain the questions to them.

6. You might give younger students "Adopt a Tree" certificates) to fill out after they've chosen their trees.

7. Have students visit their trees on a regular basis. Each time they visit, have them write a few sentences or make sketches in their notebooks describing any changes they notice (broken branches, new leaves); animal or human activity taking place on or near the tree

From Project Learning Tree. Used by permission ©1993 American Forest Foundation

Variation 1 — Growing Up Together

1. Take the class outside to a grove of trees. Give students a few minutes to use their senses of smell, touch, hearing, and seeing to get acquainted with the area. Choose a particular tree to observe in different ways. For example, how does the tree look when you are sitting? When you are lying on your side? When you are lying on your back?
2. Ask students to volunteer to describe the tree, using their senses. Summarize each student's description by making comparative statements. You may structure students' comments by asking individuals to complete this sentence: "The tree is ___."
3. Ask students whether they think the tree is alive. Do not discount their answers but ask students how they know whether the tree is alive or not. (Trees need food and water to grow, just like people.)
4. Use these discussion questions: How are all the trees here alike? How are they different? Are they all alive? Are other plants alive in the area? What are the benefits these trees provide for them and the environment?

Variation 2—Adopt an Object

Rather than limiting this activity to trees, allow students to adopt any special object (house plant, pet, statue, billboard, a store window) from their indoor or outdoor environments. Adapt the "Adopt a Tree" student so that it encompasses non-tree and human-made items. Include questions that relate the object to people. How did it get there? How does it benefit society? What is its special meaning to you?

Enrichment

1. Have students work in pairs to measure the height, circumference, and crown of their trees. Afterward, have each pair use those measurements to design several math problems. Have the pairs share their math problems with the rest of the group.

2. Have students create a picture of a tree with flip-up windows portraying the life on their tree, in their tree, and among the tree's roots.

3. Raise money to buy a class tree. Take students to a nursery to pick out the tree; then hold a tree-planting ceremony.

4. Create a "Whole Language Tree." Use a large, bare tree, painted or modeled in the classroom, as a focal point for various curriculum topics. Through the year, have students show how the tree is constantly changing: from green leaves and apples to changing colors and falling leaves; and from winter skeletons to bursting buds, flowers, and bees. You can also use the tree to demonstrate ideas associated with plants, wildlife, holidays, and social and environmental issues.

END NOTES ...

ASSESSMENT OPPORTUNITY

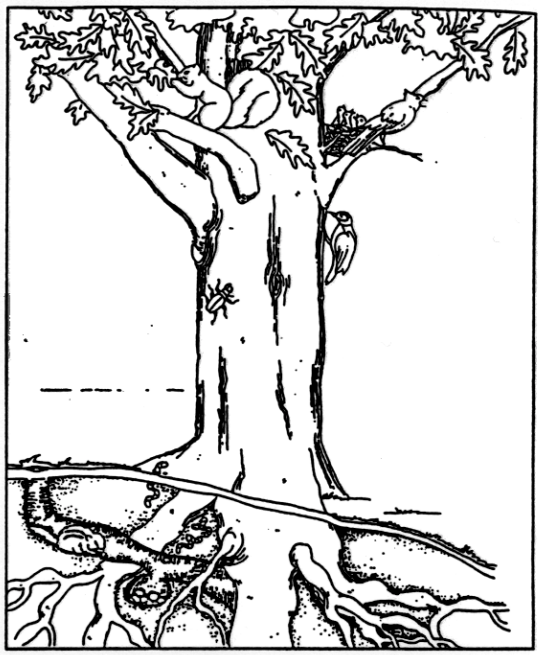
1. Over short or extended periods, younger students can create books or portfolios about their adopted trees. On the first book page, each student can glue a picture of himself or herself standing next to the adopted tree. Students' books can also include drawings, poems, stories, pressed leaves, rubbings, flowers, or twigs.
2. Older students can write an essay about life from their tree's perspective. For example, a student who adopts a very old tree might write a story in which the tree "talks" about the days when small farms dotted the landscape or when horses and buggies crowded city streets. The tree could also talk about how it relates to the plants, animals, and people around it, and what problems it has.

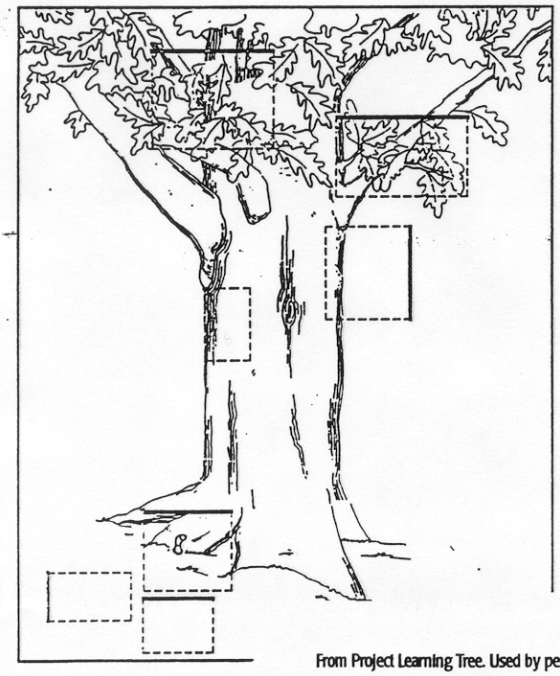
RELATED ACTIVITIES

Trees as Habitats, Plant a Tree, We All Need Trees, Trees for Many Reasons, Tree Lifecycles, Trees in Trouble, Tree Cookies, Signs of Fall, How Big is Your Tree?

From Project Learning Tree. Used by permission © 1993 American Forest Foundation

DIAGRAM OF FLIP-UP WINDOWS





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Adopt A Tree Questions

On Your First Visit

1

Where is your tree?
Draw a map to show its location.

2

Is your tree alive? How can you tell? Is it healthy? In what ways are people helping or hurting it?

3

Draw a picture of your tree from various perspectives: from a distance, from a high place, or from lying underneath looking up.

4

Write a paragraph or poem describing your tree.

5

Draw a picture of a leaf from your tree. How does the leaf smell? How does it feel?

6

Do you know what kind of tree you have adopted? Does your tree have any fruits, nuts or seeds that help identify it? Use a field guide to look up your tree.

7

Make a rubbing of your tree's bark. How does the bark feel? How does it smell?

8

Are any animals on or near your tree? Don't forget to look for insects, spiders, and other small animals.

9

Are there any signs that animals have used your tree in the past? Look for holes, nests, trails, and other animal signs. How do those animals depend on your tree? Do they harm it?

On Additional Visits

Review the notes from your previous visit.

How has your tree changed?

(Use the questions above as a checklist.)
How has your tree stayed the same?

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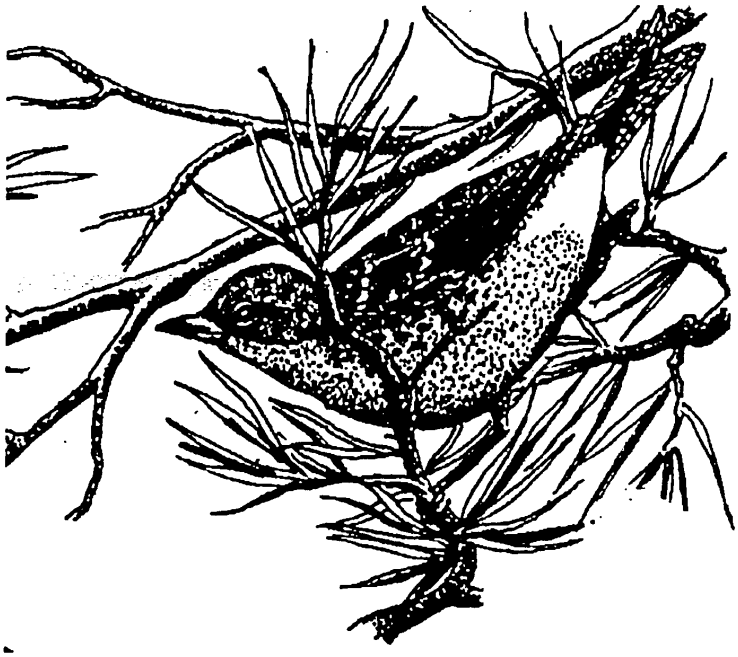
Official PLT

Adopt a Tree Certificate

Official Tree Name		
Nickname		
Birthplace		
Circumference	Height	Age
Identifying Characteristics		
Adopted By		Date

One Especially Interesting Thing About My Tree Is:	Leaf Rubbing From Your Tree

Migration Barriers



Objectives Students will be able to: 1) define migration as it relates to wildlife; 2) describe possible impacts on wildlife migration patterns as a result of human activities; and 3) give an example of the importance of land-use planning as it affects people, wildlife, and the environment.

Method Students draw murals showing deer migration routes and the consequences of development of a highway through the area.

Background The major purpose of this activity is for students to recognize some of the problems that can arise as a result of human actions affecting aspects of the environment. In this case, road building through deer migration route is used as an example.

Materials drawing materials; large butcher or poster paper; background information about deer or other animals in your region that migrate seasonally on land; information about the animals' habitat needs. Check with local wildlife specialists for assistance.

Age: Grades 4-6
Subjects: Social Studies, Science
Skills: analysis, application, comparing similarities and differences, description, drawing, evaluation, generalization, media construction, observation, problem solving, reporting, small group work, synthesis, visualization
Duration: one or two 30-45 minute periods
Group Size: any; small groups for mural-making
Setting: indoors or outdoors
Conceptual Framework Reference: VI.A., VI.A.2., VI.A.3., VI.A.4., VI.A.5., VI.B., VI.B.1., VI.B.2., VI.B.3., VI.B.4., VI.B.5., VI.B.6., VI.C., VI.D., VI.D.4., VII.A.1., VII.A.2., VII.A.3., VII.B., VII.B.1.

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Key Vocabulary: migration, land-use planning, consequences

Procedure

1. Divide the students into small working groups, with each group provided with drawing materials and a large piece of butcher or poster paper. Ask each group to draw a mural of a deer habitat (or habitat for another migrating land animal in your area) that includes a variety of environments from mountains to valleys. The deer herd in this habitat lives in the mountains in the summer and moves or migrates to the valleys in the winter. Ask the students to put in appropriate vegetation, water sources, and pictures of other animals in addition to the deer that might live in this environment. The students may choose the time of the year to be represented in their mural. Ask them to put their herd of deer in the area they think the deer would most likely be living at that time of year. Also ask them to draw a set of arrows to show the path they think the deer would likely take each year during the time they move from one feeding area to another; for example, from the mountains to the valleys as winter nears, and from the valleys to the mountains in the summer. (Note: Get background on the animal habitat characteristics and migration patterns in your area or region, if possible.)

2. Once the murals are complete, either ask the students to describe what they have included in their murals, pointing out the deer travelway... OR... simply move on to the next step in this activity. The next step is to tell the students that a major highway has been proposed for the area they have drawn. The highway is to be built somewhere in between the mountains and the valleys that the deer travel to and from in their annual migration. An Environmental Impact Statement has been done which indicates that it is possible to build the highway in ways that can minimize the negative consequences for wildlife and other elements of the natural environment. The Environmental Impact Statement is being contested in court, therefore it is not clear whether the highway will actually be built. Introduce the concept of land-use planning to the students. Each group is attempting to plan for the land use in their area, represented by their mural. Ask each group to discuss how they could draw a highway on their mural in a way that they think would have the least possible negative consequences. How could the highway be built in a way that would do the least harm to the environment and its wildlife? They could consider impact to the environment during the actual road construction, ways to minimize runoff and erosion, replanting any areas where vegetation is destroyed in the building, and replanting with what kinds of plants. Ask them to pay particular attention to the herd of deer and its migration pattern, trying to figure out a way for the deer to move from their summer to their winter ranges and back again. NOTE: Sometimes this can be done by building underpasses or overpasses for the deer to use so that they don't actually have to try to cross the highway. Sometimes the highway can be built in such a way that the migration route is avoided entirely. Groups that achieve a consensus – making a land-use planning decision – can draw the highway on their murals.

3. Ask each group to report. What land-use decisions did they make? With what consequences? To the deer? Other wildlife? Vegetation? Soil? People? Ask them to identify solutions they think would be acceptable, those that would be unacceptable, and for what reasons. What about convenience to people in transportation? Other possible questions include: What about costs to the builder of the highway? Who pays the builder? Is it actually taxpayer dollars? What are some of the factors to be considered in land-use decisions?

Extensions and Variations

1. Pick an actual situation in your region or anywhere on the planet – with similar concepts.

2. Use a topographical map rather than a mural. Provide each person with copies of the map. Compare similarities and differences in solutions, all working from the same visual reference (the maps).

3. Represent the area in question in three dimensions using clay, paper mache, or even mud!

Evaluation

- Define animal migration.
- Name three animals that migrate. For each, describe a human activity that might interfere with migration.
- Offer one or more suggestions for decreasing the negative impacts of human land use on animal migrations. Explain the reasoning behind your suggestions.

Water Models

Grade Level:
Upper Elementary, Middle School

Subject Areas:
Earth Science, Ecology, Geology, Physical Science

Duration:
Preparation time: 30 minutes
Activity time: two 50-minute periods
Setting: Classroom

Skills:
Gathering information (observing, researching); Analyzing; Applying (making models); Presenting

Charting the Course
"Piece It Together" and "Wet Vacation" help students understand more about climates and ecosystems. Other water cycle activities include "The Incredible Journey," and "Imagine!" Further investigations of climate and culture are found in "The Rainstick" and "Raining Cats and Dogs."

Vocabulary
climate, condensation, ecosystem, evaporation, precipitation, transpiration, water cycle

From The Watercourse & Western Regional Environmental Education Council . Used by permission©1995

Students construct models of the water cycle to illustrate its major components and processes, and adapt their models to show how they think water would cycle in various ecosystems.

Objectives

Students will:

- recognize the roles of condensation and evaporation in the water cycle
- relate the water cycle to different climates and ecosystems around the world.

Materials

- Heat source
- Frying or cooking pans
- Ice
- Duct tape
- Large plastic or glass jars with tops
  (Students can bring empty pickle or peanut butter jars from home.)
- Water
- Sand
- Rocks
- Items that represent components of different climates or ecosystems (collected by students)
- Heat-resistant gloves (or oven mitts)
- Copies of **Water Cycle in a Jar**
- Copies of **Observation Sheet**

Making Connections

When it rains and when water flows down a river, students see evidence of water moving through the water cycle. But some components of the water cycle are not visible to the eye and may be overlooked. Constructing water cycle models can help students better appreciate how evaporation and condensation help move water through the environment and around the world.

Background

Earth's water supply is finite, and this same water has been moving over, on, and under Earth's surface for thousands of years. The continual movement of water – often called the water cycle – collects, purifies, and distributes water around the world. The pull of gravity, electromagnetic forces, and the sun's energy keep water in continual motion.

Solar energy heats water on Earth's surface and in oceans, streams, lakes, soil, and vegetation and causes it to evaporate into the atmosphere. Heat from the sun also causes snow and ice to melt and then evaporate. Sometimes snow and ice can evaporate directly rather than going to the liquid state first; this process is called sublimation. Winds and air masses, also energized by the sun, flow around the globe, carrying water vapor with them. Falling temperatures cause water vapor to condense into tiny droplets that form clouds or fog. Water then leaves the atmosphere as precipitation (rain, snow, hail, etc.) Water often leaves the atmosphere many miles from where it originated. About 77 percent of the precipitation over the surface of the earth falls into the oceans. Water that falls on the ground seeps downward through soil and permeable rock formations, flows over the surface, or evaporates again.

There are three major climates (polar, temperate, and tropical). At the poles the air is cold and dry. The Arctic and the Antarctic are covered with snow throughout most of the year. Limited sunlight and cold temperatures allow very few plants to exist. Examples of plants that live in the tundra of the Arctic include mosses, lichens, and other plants that grow close to the ground. Although water at the poles stays frozen for a long time, sometimes it does evaporate. The water vapor eventually condenses and falls back to Earth as snow or it may be carried by global wind currents to other parts of the planet. At lower latitudes, the snow may melt and be absorbed by plants or flow for a while over the surface.

Tropical climates are hot and humid. The tropics, especially the rain forests, are densely populated by a great diversity of plants. Very tall trees, whose tops form a dense canopy, cover much of the land area. Some plants growing beneath this crown cover have large leaves to catch sunlight that filters through the canopy, while others (epiphytes) grow far above the ground on the branches of taller trees. The ground is moist throughout most of the year, so plants do not need to grow deep roots to find water. Rain forests create their own weather systems. Water evaporates from the ground or from plants (through transpiration) and rises to the top level of the trees, where it condenses and then falls back to the ground. The water may flow over the surface, be absorbed by plants, or filter to the ground. Some water vapor does eventually escape to the atmosphere, where global winds carry it to other places.

While weather at the poles and in the tropics is fairly consistent throughout the year, the temperature climates (Earth's mid-latitude regions) experience seasons. A variety of plants live in this climate, such as deciduous trees, flowering plants, mosses, and grasses. Their life cycles and growing patterns must comply with the changing seasons. In this climate, water flows over the surface, seeps underground, freezes, and evaporates. Water moves through the atmosphere as vapor, eventually falling back to Earth – sometimes many miles away or in a different climate.

Geographic qualities, such as nearness to the ocean, elevation, and extent of land mass, create a variety of ecosystems within the temperate climate. For example, deserts are hot and dry. To live in these conditions, some plants such as mesquite, have extremely deep root systems. Other plants, such as cacti, have fleshy tissue and very few pores, so they can retain large quantities of water instead of losing it through transpiration.

The processes of evaporation and condensation within all these climates help water move around Earth's surface. In this way, water is used and reused, with all parts of Earth eventually sharing the same water.

Procedure (Warm Up)

- Set up the following teacher demonstration:
- Place a hot plate or other hear source on a table at the front of the room.
- Place a pot of water over the heat source.
- Once the water is hot, hold a pan of ice above the rising water vapor. (Wear heat resistant gloves for protection.)
- Drops of water vapor should condense on the bottom of the pan of ice.
- The drops of liquid water will fall and return to the pan of hot water.
- Have the students make a list of observations and explain each. Ask students to list the processes that are occurring and how these might be exhibited in nature.

The Activity

1. Provide groups of students with a copyof Water Cycle in a Jar and have them construct their model and record observations on the Observation Sheet.

2. Have students summarize their observations, identifying and explaining the processes of evaporation and condensation. Help students understand the role of solar energy in these processes. Runoff, filtration through sand, and other aspects of the water cycle can also be discussed.

3. Discuss the role of plants in the water cycle. Have students research different climates (polar, temperate, tropical) and/or ecosystems around the world (rain forest, desert, tundra, etc.). They should focus their search on learning how water moves in the area. Would water evaporate quickly? Would there be much standing water? Does water remain frozen? Students could further their investigations by finding out what plants live in the area. How do they manage to live in these different climates?

4. Challenge students to adapt their jar model to represent the climate or ecosystem they are studying. For example, if the model represents a desert, they could put in tiny cacti, sand, and a little water, and place it in the sunlight.

Wrap Up

Have students present their models to the class and describe how water moves within the model and within the climate or ecosystem represented by the model.

After the presentations are complete, draw a large circle on the floor that represents Earth. Bisect the circle with a line to indicate the equator. Have students arrange their models comparable to where they are located on Earth. (An alternative is to lay a world map on the ground). Students should extrapolate how evaporation and condensation and other processes of the water cycle help water travel from one part of the world to another. Have students summarize how the world shares water.

Assessment

Have students:

construct a simple model of the water cycle and identify the processes of evaporation and condensation (steps 1 and 2).create a model simulating the water cycle of different climates or ecosystems throughout the world (step 4).use the model to explain how the world shares water (Wrap Up).

Extensions

Involve students in the following activities to further explore condensation and evaporation. Hand out paper towels soaked with equal amounts of water to groups of students. Charge them with finding the fastest way to dry the towels using only things they find in the room. Students should discover that motion, heat, and increasing the exposed surface help the water evaporate more quickly. Discuss where the evaporated water goes. Challenge students to retrieve water from the air. Discuss the process of condensation. Provide helpful hints by having metal or glass containers and ice water available.

Resources

Alexander, Grethchen. 1989. Water Cycle Teacher's Guide. Hudson, N.H.: Delta Education, Inc.

Biological Science Curriculum Study. 1987. Biological Science: An Ecological Approach. Dubuque, Iowa.: Kendall/Hunt Publishing Company.

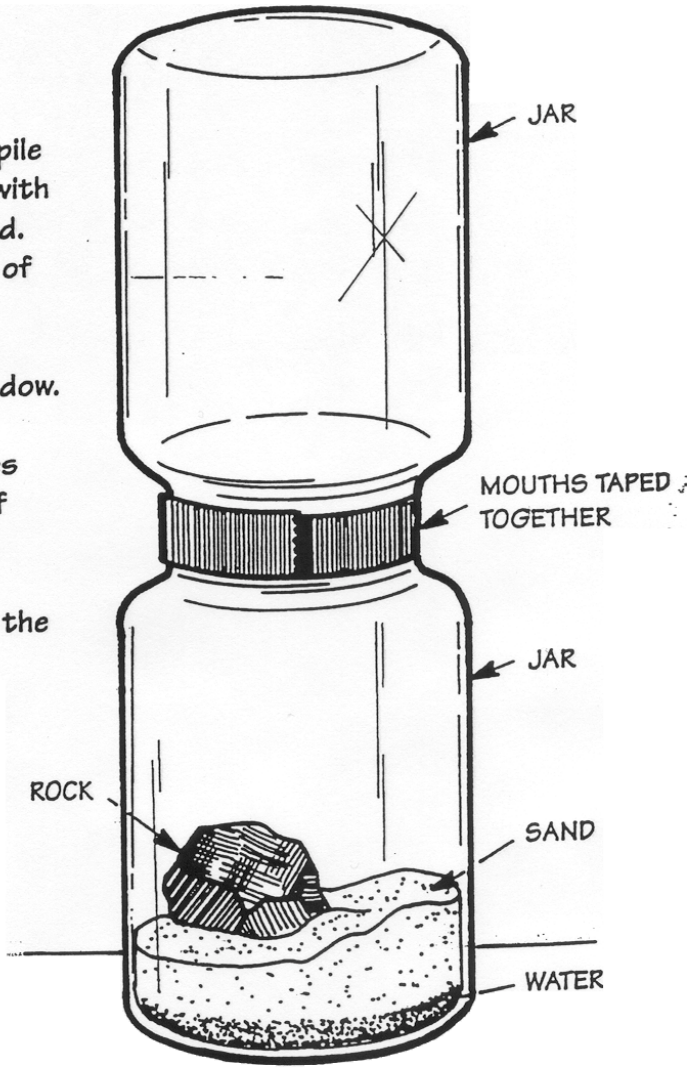
Water Cycle in a Jar

1. Take two identical jars; put a pile of sand in one and saturate with water. Place a rock in the sand. Tape together the open ends of the two jars. (See diagram.)

2. Put the jars near a sunny window.

3. Observe the jars several times during the day for a period of at least a week.

4. Record your observations on the observation sheet.



Observation Sheet
Water Cycle Model

Date:

Team Members:

What time of day does condensation usually appear

What processes are occurring to make these changes?

What is the role of sunlight and temperature?

Conclusions:

Urban & Community Forestry Council
Sources of Information / Local Action Groups

Nationwide

The National Arbor Day Foundation
100 Arbor Avenue
Nebraska City, NE 68410
phone: 402-474-5655
fax: 402-474-0820
email: postmaster@arborday.org
internet: http://www.arborday.org

Ecology Crossroads Cooperative Foundation
Arbor Day Public Services Programs
PO Box 231
Berea, KY 40403
phone: 606-986-7334
fax: 606-986-8638
internet: http://www.arborday.com

American Forestry Association
1516 P Street NW
Washington, DC 20005
phone: 1-800-368-5748 or 202-667-3300
internet: http://www.natural-connection.com/institutes/forestry.html

National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266
phone: 202-797-6800
fax: 202-797-6646
internet: http://www.nwf.org

USDA Forest Service
PO Box 96090
Washington, DC 20090-6090
phone: 202-205-1657
fax: 202-205-1174
internet: http://www.fs.fed.us/

International Society of Arboriculture (ISA)
PO Box GG
Savoy, IL 61874-9902
email: isa@isa-arbor.com
internet: http://www.ag.uiuc.edu/~isa

Society of Municipal Arborists
7000 Olive Branch Road
St. Louis, MO 63130-2300
fax: 314-862-1711
internet: http://www.urban-forestry.com/

Statewide

Michigan Department of Natural Resources
Forest Management Division
PO Box 30452
Lansing, MI 48909
phone: 517-373-1275
fax: 517-372-2443
internet: http://www.dnr.state.mi.us/

Michigan Arbor Day Alliance (MIADA)
521 North Okemos Road
Mason, MI 48854
phone: 517-676-2290
fax: 517-676-7011

Global Releaf of Michigan
1000 North Main
Ann Arbor, MI 48104-1039
phone: 1-800-642-7353, or 313-662-6350

Michigan State University
Forestry (Extension) Department
126 Natural Resources Building
East Lansing, MI 48824-1222
phone: 517-353-0094
fax: 517-432-1143
internet: http://www.msue.msu.edu/

Michigan Forestry and Park Association
(Local ISA Chapter)
PO Box 27043
Lansing, MI 48912-4519
phone: 517-482-5530

Michigan Association of Consulting Foresters
3409 Scenic Drive
North Muskegon, MI 49445
phone: 616-766-2711

Project WILD
Michigan State University
10 Agriculture Hall
East Lansing, MI 48824
phone: 517-355-1712

Local or Area-Specific

Greening of Detroit (Detroit Only)
Whittier Towers
415 Burns Drive
Detroit, MI 48214
phone: 313-821-8733
fax: 313-821-8787
internet: http://www.ole.net/~greening/

West Michigan Environmental Action Council
1432 Wealthy SE
Grand Rapids, MI 49506
phone: 616-451-3051
fax: 616-451-3454
email: wmeacl@iserv.net

The Dow Gardens
1018 West Main Street
Midland, MI 48640
phone: 1-800-362-4874
fax: 517-631-0675
email: djchapman@aol.com
internet: http://www.michigan.org/mi/dowgardens/

Frederik Meijer Gardens
3411 Bradford NE
Grand Rapids, MI 49525
phone: 616-957-1580
fax: 616-957-5792
internet: http://www.meijergardens.org

County Cooperative Extension Agents
County Soil Conservation Districts
Local Beautification Commissions
Local Public Utilities
City Forestry Departments
Local Service Organizations (Rotary, Scouts, etc.)
Local Arbor Societies
Local Garden Clubs
National Resource Conservation Service

Reference Books

Barnes, Burton V. & Warren H. Wagner, Jr. *Michigan Trees: A Guide to the Trees of Michigan and the Great Lakes Region.* Ann Arbor: The University of Michigan Press. 1981.

Eastman, John. *The Book of Forest & Thicket: Trees, Shrubs, and Wildflowers of Eastern North America.* Harrisburg, PA: Stackpole Books. 1992

Elias, Thomas S. *Field Guide to North American Trees.* Danbury, CT: Grolier Book Clubs, Inc. 1989.

Friends of Tree City USA Bulletins. Set of forty pamphlets. Nebraska City, NE: The National Arbor Day Foundation.

Lipkis, Andy. *The Simple Act of Planting A Tree: A Citizen Foresters Guide to healing Your Neighborhood, Your City, and Your World.* Los Angeles: Jeremy P. Tracer, Inc. 1990.

Moll, Gary & Stanley Young. *Growing Greener Cities: A Tree Planting Handbook.* Los Angeles: Living Planet Press. 1992.

Smith, Norman F. *Trees of Michigan & the Upper Great Lakes.* 6th Edition. Lansing, MI: Thunder Bay Press. 1995.

Watson, Gary W. *Selecting & Planting Trees.* Lisle, Illinois; The Morton Arboretum. 1990.

Various tree planting brochures. Lansing MI: Michigan DNR, Forest Management Division.

Childrens Books

Arnosky, J. *Crinkleroot's guide to knowing the trees.* New York: Bradbury Press. 1992.

Florian, D. *Discovering trees.* New York: Macmillan Publishing Company. 1986.

Geisel, Theodore (Dr. Seuss). *The Lorax.* Random House. 1971.

Hiscock, B. *The big tree.* New York: Macmillan Publishing Company. 1991.

Laives, B. *Tree trunk traffic.* New York: E. P. Dutton. 1989.

Sabin, F. *Wonders of the forest.* Mahwah, New Jersey: Troll Associates. 1982.

Schultz, Charels M. *It's Arbor Day Charlie Brown.* Random House. 1977.

Silverstein, Shel. *The Giving Tree.* Harper and Row. 1964.

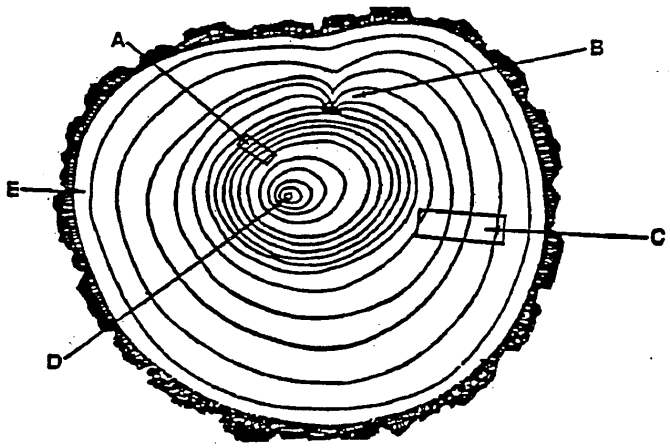
Thornhill, J. *A tree in the forest.* New York: Simon and Schuster Books for Young Readers. 1991.

Diary of a Tree

Each spring and summer a tree adds new layers of wood to its trunk. The wood formed in spring grows fast, and is light-colored because it is made up of large cells. In summer, the tree grows slower. The wood formed then is dark and has smaller cells. This dark wood makes the annual rings.

Annual rings are like pages in a diary. They can help us discover many clues about a tree's life. You can count the annual rings on a tree stump to discover how old the tree was when it was cut down. Rings can tell other stories about the tree, also. If rings grow close together, you can guess that the tree grew slowly. If the tree is shaded by trees around it or doesn't get enough water, it will grow slowly. Black sooty marks in the rings tell you the tree has survived a fire.

Try deciphering this tree cookie's "diary."



Time Will Tell

- During what year did this tree begin to grow? _____

  (Hint: pretend this tree was cut down this year. Count the dark rings from the outside toward the center to count backwards in time)

- Mark the ring that shows the year you were born.

- Count all the rings to find the age of this tree when it was cut.
  _____ years old

Match the letters with what happened to the tree

1. ____ The youngest wood of this tree is found here, next to the cambium beneath the bark.
2. ____ Many trees are growing around this tree and shading it. It can't grow as fast as it could in full sun.
3. ____ A fire sweeps through the forest and scars the tree. Over time, the scar is covered by new wood.
4. ____ The tree is born.
5. ____ The trees growing around this tree were cut, and this tree gets more sun so it grows faster.

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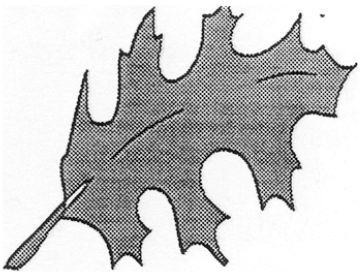
For more information about this publication, contact MDNR Forest Management Division, P.O. Box 30452, Lansing, MI 48909-7952.

This publication is available in alternative formats.

Though a tree grows ever so high, the falling leaves return to the root.

--Malay proverb



. . . trees are among my closest friends.

--Anne LaBastille

In a moment ashes are made, but a forest is a long time growing.

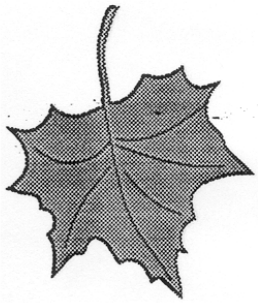
--Seneca, Naturales Quaestiones

People who will not sustain trees will soon live in a world which cannot sustain people.

--Bryce Nelson

It happens quietly. A maple seed blown here by a sudden, random wind sprouts beneath the bedroom wall, grows before I quite know how it grew, tops the eaves, seeking afternoon as well as morning sun, and fills my life.

--Barbara Meyn



Trees are sanctuaries. Whoever knows how to speak to them, whoever knows how to listen to them, can learn the truth.

--Herman Hesse