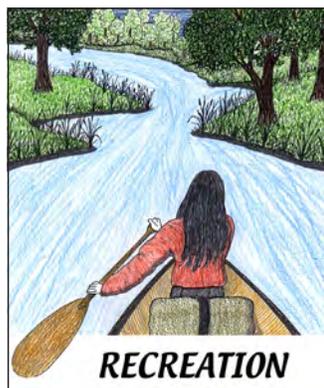


TREES

The
Values
Of

FOR TEENS



*Iowa's Trees
and Forests*



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Trees For Teens 2005

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TREES FOR TEENS

The Program

Trees For Kids/Teens is a tree education and planting program that targets Iowa's elementary and secondary school students. Its goals are to educate students about the values of trees and to encourage tree planting projects at schools or other public areas around the state of Iowa. In 2004 over 12,000 teachers and their students were involved with the *Trees For Kids/Teens* programs, planting over 100,000 trees.

This unique program is sponsored by the Iowa Department of Natural Resources (IDNR), the Iowa Nursery and Landscape Association (INLA), the Iowa Banker's Association (IBA), MidAmerican Energy, Aquila, Alliant Energy, Iowa State University Extension Forestry, the Iowa Tree Farm Committee, the USDA Forest Service, Trees Forever, the Iowa Society of American Foresters, Iowa Woodland Owners Association and the Iowa Conservation Education Council.

This teacher's packet of tree information and classroom activities is designed to complement science, reading, math, geography, computer skills, history and other subjects. Feel free to utilize any or all of the packet and/or to photocopy specific activities and lesson plans. Should you need more copies of the materials, please contact the IDNR at (515)281-4915 or download individual activities off the web at www.iowadnr.com/forestry.

The Trees

A landscape tree is available "free" to your class to plant in celebration of Iowa's Earth/Arbor Day in the spring of 2005. Contact Trees For Kids Coordinator **Megan Enneking** at (515)281-4915 or e-mail tfkids@dnr.state.ia.us (after May 15 contact John Walkowiak at john.walkowiak@dnr.state.ia.us), for the names of participating Iowa nurseries (INLA members) who will sell trees at reduced or wholesale costs to participating Trees For Kids teachers. Megan will also give you local funding source contacts from the Iowa Bankers Association (IBA) and local Tree Committees who will assist you in getting the remaining funds to pay for your trees. In the end, there is no cost to your school!

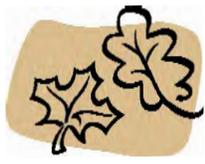
We suggest that you do the following in preparation for planting your tree. Discuss planting trees with your principal and grounds keeper, locate a site, and contact a local INLA nursery. Next, contact a funding source at your local IBA bank or Tree Committee and explain that you are working on a Trees For Kids project for Earth Week/Arbor Day 2005 that needs funding. When sponsors agree to fund the project, have the nursery bill the bank or committee directly for the tree. Once you have secured funding, make arrangements for delivery with the nursery and set a planting date. Now you're ready to plant a tree with your students!

2005

*Teaching Kids the
Value of Trees for 15
Years*



*To plant trees is to
give body and life to
one's dreams of a
better world.
~Russell Page*

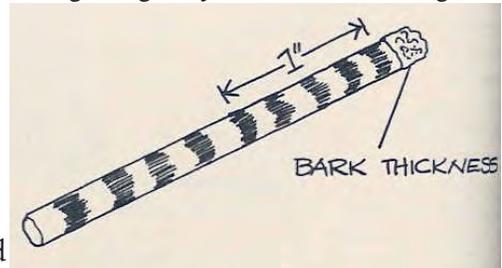


How Does a Forest Work?



The Life Cycle of Trees

Trees have life cycles, just like all living things do. They are born, grow, get injuries and disease, age and then they die. Just like humans, as trees go through their life cycle, their size and shape change, along with the role they play within the environment. In order for scientists to find out what a particular tree's life cycle has been like, they take a core sample. A core sample allows scientists to observe the growth rings in a tree that is still alive. A tree's growth rings can show things such as: the tree's growth, if it has been injured by drought, disease or fire, and the long time changes that have occurred within the tree's growing environment.



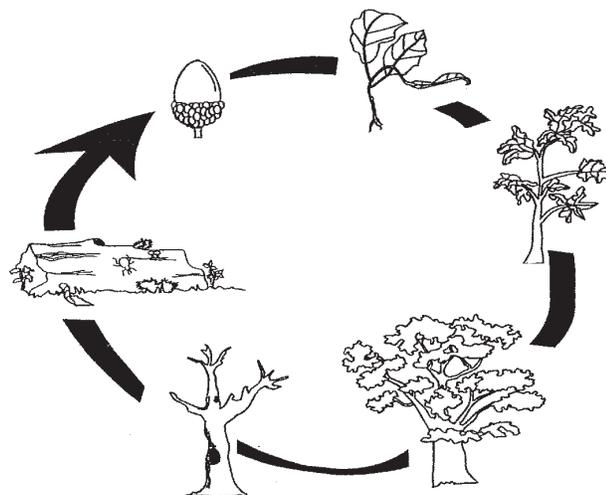
INCREMENT BORER-CORE SAMPLE
Used to remove a small core of the tree to count the rings which reveals the age of the tree.

The best way for a scientist to learn about the life cycle of trees is to watch them from the beginning. Most trees begin their life as seeds. These seeds have a long way to go from being a seed to developing into a tree. The forest environment doesn't always make it easy for seeds to survive. In order for a seed to grow into a seedling it must land in an area with favorable light, soil, temperature, moisture and nutrient conditions.

In order for this seedling to sprout and become a sapling, it must compete for sunlight, water, nutrients and other resources. Because the competition is so great, many saplings will not survive to maturity. To compensate for those saplings that will not make it, plants and trees produce far more seeds than will have even a chance at survival. Trees are considered to be mature when they can reproduce. The amount of time it takes for trees to become mature varies among species.

A seed may make it to maturity, however, that does not mean that it is in the clear. Trees, just like all living things, occasionally get injured and/or develop disease. When trees die, they fall and are then broken down by the decomposers of a forest such as insects, fungi, and bacteria. As trees decompose, they are transferring essential nutrients back into the soil to allow for future seeds to be able to prosper. This starts the tree lifecycle back in motion.

Can you label each step in the cycle?



Answers on answer page



Clean Water and Our Forests

Improving water quality is one of the main benefits trees provide. Streamside forests are vital to the protection of our streams and rivers. These forests protect the stream from nonpoint source pollution (NPS) which is water pollution that cannot be traced to a specific source.

Streamside forests can:

1. Improve the quality of water by removing the effects of pollutants in runoff.
2. Increase the biological diversity and productivity of stream communities by improving habitat and adding to the organic food base.

Streamside forests act as filters, transformers, sinks and sources:

Filter: The streamside forest is a filter because it removes sediment and sediment-attached phosphorus. The vegetation found in a forest catches the sediments before it can reach the water. Also, the soil in a forest is very porous and acts as a sponge, soaking up pollutants.

Transformer: The streamside forest is a transformer because it transforms nitrate to nitrogen gas and toxic chemicals such as pesticides are converted to non-toxic forms.

Sinks: The streamside forest acts as a sink by storing nutrients. Nutrients are picked up by plants and stored in plant tissue.

Source: The streamside forest provides a source of energy for aquatic life in the form of dissolved carbon compounds. As much as 75% of the organic food base may be supplied by these compounds, such as fruit, limbs leaves and insects that fall from the forest canopy.

By cutting down trees for agricultural purposes and urban expansion, we are negatively affecting the quality of our water. Many streams are unfit for humans to drink and even unfit for industrial use and recreational use. Shellfish and finfish production also goes down. These problems are found to be caused by contamination from nutrients, animal waste and pollutants from agriculture and urban runoff.

Establishment of new forests and maintenance of existing forests can protect and improve the quality of water before it reaches our faucet. This natural filtering or cleaning of water is accomplished a number of ways:

- The roots of woody plants such as trees and shrubs, and the deep roots of prairie grasses help stabilize streambanks. Bank stabilization reduces the amount of soil (sediment) that is lost into streams and rivers.
- The presence of woody stems above ground can slow down flood waters along streams and rivers, allowing it to be absorbed through the soil which is full of rich organic matter, reducing the amount of erosion and damage caused by these events.
- During the plant process called transpiration, trees and other vegetation utilize large amounts of water. This water contains dissolved nutrients and chemicals that are taken up by the plant. It is estimated that the vegetation can utilize thousands of gallons of water per acre each day. This drying of the soil allows it to absorb more water during runoff and flood situations, reducing the amount of material reaching streams and rivers.
- The uptake of water and nutrients by roots is improved by a specialized relationship with soil fungi called mycorrhizae. This is a symbiotic relationship (both organisms benefit) in which the tree supplies carbohydrates to the fungi, and the fungi allow the tree to be more efficient in absorbing water and nutrients.
- Tree canopy interception by leaves and branches reduce the speed and amount of rainfall hitting the ground surface. This reduces runoff and makes soil run off minimal.



"Riparian Forest Buffers." Maryland Department of Natural Resources. 14 Feb. 2005 <<http://www.dnr.state.md.us/forests/publications/buffers.html>>
"Iowa's Forests and Water Quality." Iowa Department of Natural Resources. July 2003. <<http://www.iowadnr.com/forestry/>>

Woodlands For Wildlife

Before the settlement of the European-Americans in the early 1800's, Iowa was comprised of 7 million acres of forested land. In the present day, only 2.7 million acres of forest remains. However, of this forest land, over 90% of it is privately owned. This means the majority of Iowa's forests are owned by people like your parents and grandparents.

There are many reasons to protect Iowa's forests, including preserving the beautiful scenery the forest provides and the jobs it creates to benefit the economy. Possibly one of the most important reasons to protect Iowa's forests is to protect the wildlife that live in these forests. What are the values of Iowa's forest woodlands to our native wildlife?



Values of Trees and Forests to Iowa's Wildlife:

1.) Shelter: With the typical Iowa winter of subzero temperatures and strong northerly winds, trees, especially conifers, provide critical winter cover for many of Iowa's game and non-game species. If densely planted, conifer trees act as "Wildlife Hotels" by greatly reducing wind chill temperatures and allowing wildlife to conserve body heat.



2) Protection: Conifers, among other plants and trees, provide cover for wildlife hiding from predators. Conifers ideally suited to Iowa's growing conditions include red cedar, white pine, red pine, jack pine, norway spruce and white spruce.

3) Food: Broadleaf shrubs and small trees with dense low hanging branches also provide winter cover for wildlife and provide winter food sources. Shrubs and small trees such as serviceberry, the dogwoods, chokecherry, wild plum, elderberry, arrowwood, nannyberry, buttonbush and highbush cranberry are excellent choices for Iowa wildlife. As the snow becomes deeper and blows into drifts, upright woody vegetation continues to provide winter food, browse and cover which is often critical to wildlife winter survival.



4) Safe & Healthy Environment: By maintaining the woodlands within the forests, you are also limiting soil erosion and protecting watersheds. Woodlands reduce run-off by intercepting and softening the impact of falling rain. Also the root systems of the trees stabilize soils. Streamside woodlands protect rivers and streams by absorbing excess nutrients in runoff, thereby reducing pollution in the stream and cooling water temperatures.

"Introduction to wildlife management." Iowa Wildlife Management: Iowa Association of Naturalists, 1995.



TREES Make our Cities Safer

There are many differences that exist when comparing city life to that of rural living. Cities are more crowded, noisy and bustling. Among one of the biggest and most troubling of the differences is the difference in crime rate. Numerous studies have produced statistics that show the amount of violence within a large city is substantially greater than the violence in rural areas.

Two professors, W.C. Sullivan and Frances E. Kuo, set out to determine why violence in cities is so much more prevalent. The pair decided to start by examining a public housing development called Robert Taylor Homes in Chicago. It is the largest public housing development in the entire world. The development includes twenty-eight 16 story buildings. As you can probably imagine, with all this concrete, the presence of trees and nature is scarce. However, there are a few buildings that are surrounded by trees.



*Robert Taylor
Section with trees*

The professors decided that in order to discover whether or not trees played a role in the prevalence of violence, they would study the people in the buildings that had access to trees and compare them to the people who didn't have access to trees.

The results were startling.



*Robert Taylor
Section with OUT trees*

RESULTS:

- People gathered in common spaces that contained trees significantly more often than those spaces without trees.
- Adults, children and adults supervising children all preferred the space with trees.
- Residents who live near trees have significantly less violence.
- Of 200 residents interviewed, 14% said they had hit their children in the past year. Only 3% of residents in areas with trees admitted to hitting their children.
- Also, 22% of women from non-green areas said they had engaged in violence in the last year. Only 13% of women from green or planted areas said the same thing.

CONCLUSION:

Sullivan and Kuo concluded that the presence of trees provides people a setting where they can build relationships with others, which creates less violence.

What are they saying?



“I think that through this research I have become convinced that trees are really an important part of a supportive, humane environment. Without vegetation, people are very different human beings.” -Dr. Frances Kuo



“We’re finding trees produce settings in which neighbors get to know each other better and violence is reduced.”
-Dr. William Sullivan

Schiller, Lucy A., Shortess, John. “Chicago, The Forest Where we Live.” Louisiana Public Broadcasting. 1997. 31 Jan. 2005. <http://www.lpb.org/programs/forest/chicago.html>.

Iowa's

Black Gold



One of Iowa's most valuable natural resources is the black walnut tree. The black walnut is famous world-wide for its rich chocolate brown color, quality, strength, durability and workability. The black walnut is abundant throughout the Midwest, but is especially prevalent in Iowa. Researchers found that 2 out of every 100 trees in the state of Iowa is a black walnut.

The black walnut is used for things such as: fine furniture, gun stocks, bowls and veneer. Veneer is a thin sheet of wood that can be glued to another piece of wood of lesser value, so that the wood can be purchased cheaper, while appearing to be of higher quality. Not only is the black walnut used in commercial products, it is also valuable for its edible nuts, food for wildlife, aesthetic beauty and its role in protecting the soil and water around it.



Black Walnut Tree

Fun Facts

- In the mid-1980's it was reported that someone paid \$90,000 for a single log of the black walnut tree.
- Walnuts are a major source of food for wildlife such as squirrels, white-tailed deer, and woodpeckers.
- There is a chemical called 'juglans' in the roots of the black walnut that can actually slow down or completely stop the growth of other plants and trees. It is said that the chemical is so strong that it can still affect the growth of other plants and trees even after the black walnut has been removed.
- The nuts of the black walnut tree are used in cooking baked goods and also ice cream.
- The shells of the black walnut can be used: to clean jet engines, as filler in dynamite, filter in smokestacks and agent for insecticides.

"Black Walnut." Ohio's Trees. Ohio Department of Natural Resources. 19 Jan. 2005 <<http://www.ohiodnr.com/forestry/Education/ohiotrees/walnutblack.htm>>

UNUSUAL PRODUCTS OF THE FORESTS

AROMATICS: This includes the essential oils that are extracted from plant leaves, flowers, seeds, bark, roots and the rinds of some fruits. These oils are used in cooking, potpourri, cosmetics and massage oils. Some oils are also used in insect repellent. Native red cedar oils are in demand for products such as potpourri, perfume and cleaning solvents.



BERRIES AND WILD FRUIT: Fruits and berries are a delicious product of the forest. Two of the most well known berries found in the forests are the chokecherry and black cherry. Buffaloberry, gooseberries, currants, strawberries, blackberries, elderberry and raspberries are also some of the more common berries that can be found in the forests. Some other fruits that can be found in the forests include: mayapples, pawpaws, persimmons, crabapples, Oregon grape, and different types of wild plum.



CHARCOAL: Charcoal is a fuel product that is used today mainly for restaurant and home cooking. Before modern day manufacturing came about, charcoal was produced almost exclusively in the forest in brick kilns and ovens. It is still the number one way people in developing countries cook their food.



COOKING WOOD, SMOKE WOOD AND FLAVOR WOOD: A forest's wood is valuable on many levels. Besides its obvious uses, wood is used for special purposes. Some woods such as the alder, apple, cherry, pecan and hickory, are used in cooking as natural flavor enhancers. Smoke wood refers to sawdust from the wood that is used in smoking food.



DECORATIVE WOOD: Certain types of wood are especially valuable because they are used in products for decoration. For example, only special types of wood such as basswood are used in the making of musical instruments. Other native woods such as oak, walnut, maple and cherry are used in making jewelry boxes, tabletops, gun stocks, table and floor lamps, table legs, candleholders, ashtrays, bowls, cutting boards, plaques, planters, birdhouses, carved animals, matchbox holders, ornaments and letter openers.



MEDICINE AND PHARMACEUTICALS: Forest botanicals are plants that are used for their therapeutic properties, flavor and scent. A subset of botanicals are herbs which are used in the making of teas and oils. Ginseng, another common botanical of the forest, is used as a nutritional supplement and an ingredient in skin crèmes. Ginseng is believed to improve circulation, increase energy and lessen the effects of aging. The bark of the white oak is used as a pharmaceutical to treat burns and mouth sores. There are hundreds of native plants that are used in medicine.



HONEY, MUSHROOMS, NUTS AND SYRUP: Honey is found in the forest and produced by honey bees that gather nectar from flowers. Honey is sold by itself and as an alternative to sugar in other products. Mushrooms are a fungi found in the forest. Mushrooms are used primarily as a food source, but are now being used in medical research as well. Nuts are a dry fruit with a kernel or seed that is enclosed in a shell. Nuts are used primarily as a source of food or flavor and can be found in candies, baked goods, and ice cream. It is a wonderful source of protein. The nut is also used in cleaning abrasives and added to chemical products found in glue and paint.



Thomas, Margaret G., Schumann, David R. Income Opportunities in Special Forest Products. Washington D.C.: USDA, 1993.

Planting and Caring for New and Existing Trees

Shade and Landscape Tree Selection:

Each year millions of trees are planted throughout Iowa. Many of these trees will be planted in urban communities. There are a few basic guidelines that should be considered to help insure a successful planting, including planning/site selection, species selection, and proper planting.

Planning/Species Selection:

- Consider where the above and below ground utilities are located (i.e. electric wires, phone and television cables, sewer and water pipes). Call Iowa One Call at 1-800-292-8989 at least two days before you start digging to find the exact location of underground utilities.
- Examine the soils in the selected site to make sure they match the tree species you will be considering. Does the soil stay wet or saturated for an extended period of time after rains? Or does the soil seem dry and somewhat sandy? Is this a high traffic area such as a playground that will have compacted, poorly drained soils?
- Pick a species that will fit in the site selected. The site should be a minimum of 40 feet away from electrical power lines and light poles, and 20 to 30 feet away from buildings for large shade trees.
- Consider low-growing trees for planting areas that are closer to power lines and light poles. Utility companies recommend keeping the vegetation at least 10 feet away from existing lines. Keep in mind that most power lines are 30 to 35 feet above the ground.
- Avoid planting low-growing trees near signs, street corners, and other areas where they could block people's view. Is the planting site in full sun, partial sun, or full shade?

Proper Planting:

- Dig the planting hole 2 to 3 times wider and no deeper than the root ball.
- Do not plant the tree too deep or too shallow, the root collar, (swelling where the trunk meets the roots), should be at or slightly above ground level.
- Lower the tree by the root ball, (not the trunk), carefully into the hole to avoid damaging the trunk or root system.
- Remove the twine and plastic labels from the branches and trunk, and at least the top one-third of the burlap and wire from the root ball. If the tree is container grown, remove it from the container.
- Fill the hole with the original soil, and do not use amendments such as moss or potting soil.
- Gently settle the soil in around the roots by hand when filling the hole, making sure that air pockets are not created.
- Slowly water the area to remove any air pockets that remain. Consider mulching around the tree with wood chips to keep the site moist.
- Add organic mulch around the tree being sure that the mulch is not piled up against the tree trunk. The mulch depth should be four to six inches deep and out as far as the branches spread.

"He who plants a tree, plants a hope."

-Lucy Larcom



"To be able to walk under the branches of a tree that you have planted is really to feel you have arrived with your garden."

-Mirabel Osler

What Tree Is Right for Your School?

Trees in the schoolyard provide beauty and shade, and can serve as visual screens. Unfortunately, it can be difficult to get a shade tree established in the tough growing conditions of schoolyards. The soils in the schoolyard are often poorly drained and compacted, making it difficult for a shade tree to survive and thrive.

Not all sites are appropriate for trees. Before planting, envision how the mature tree will fit into the site. **Will it interfere with buildings, utilities, sidewalks, playground equipment, or block the view of traffic near corners? Will the tree selected produce maintenance problems due to unwanted fruit or messy leaf litter?** Selecting a durable tree that best fits the planting site can reduce these problems.

During the planning, match the soil drainage on the property to the tree, making sure that the tree will not outgrow the site. Diversify the species of trees you are planting to maximize the protection against diseases, insects, and environmental stresses. Proper planting and post planting care will help insure a healthy tree. Below is a list of trees and their growing requirements. Use this list to help determine what species is right for your school grounds.

Shade, Low-growing, and Landscape Trees:

Species	Life span	Growth rate	Shade tolerance	*Soil drainage	Height (ft)
Alder, Black	short	fast	intolerant	mp, mw, well	40-60
Ash, Black	short	fast	intolerant	poor, mp	40-50
Ash, Green	long	fast	intolerant	mp, mw, well	50-60
Ash, White	long	medium	intermediate	mp, mw, well	50-80
Aspen, Bigtooth	short	fast	very intolerant	mp, mw	20-40
Aspen, Quaking	short	fast	intolerant	mp, mw, well	40-50
Basswood, Amer.	long	medium	tolerant	mw, well	60-80
Boxelder	short	fast	very intolerant	poor-well	15-20
Cedar White	long	medium	tolerant	poor-well	40-60
Cherry, Black	long	medium	intermediate	mw, well	50-60
Cherry, Choke	long	medium	intermediate	poor-well	20-30
Coffeetree, Kent.	long	medium	intermediate	mp, mw	60-75
Cottonwood	short	fast	intermediate	poor-well	50-75
Hackberry	long	medium	intolerant	mp, mw, well	40-60
Hawthorn	short	slow	intolerant	mw, well	15-30
Hickory, Shagbark	long	slow	intermediate	mp, mw, well	60-80
Larch, European	long	medium	intermediate	mp, mw, well	40-80
Locust, Honey	short	fast	intolerant	mw, well	50-70
Maple, Amur	long	medium	intermediate	mw, well	15-20
Maple, Red	long	medium	intermediate	poor-well	40-60
Maple, Silver	short	fast	intermediate	poor-well	50-70
Maple, Sugar	long	slow	intolerant	mw, well	60-75
Mulberry, Red	short	fast	intolerant	poor, mp, mw	40-50
Oak, Bur	long	slow	intermediate	mp, mw, well	70-80
Oak, Pin	long	medium	intermediate	poor, mp, mw	60-70
Oak, Red & Black	long	medium	intermediate	mw, well	60-75
Oak, Shingle	long	slow	intolerant	mp, mw, well	50-60
Oak, Swamp White	long	fast	very intolerant	poor, mp, mw	50-60
Oak, White	long	slow	intermediate	mw, well	50-80
Pine, Jack	short	medium	very intolerant	poor, mp, mw	35-50
Pine, Red	long	medium	intermediate	mw, well	60-80
Pine, White	long	medium	intolerant	well	50-80
Poplar, White & Hybrid	short	fast	intolerant	mw, well	50-80
Red Cedar, Eastern	long	slow	very tolerant	mp, mw, well	40-50
Spruce, Blue	long	slow	intermediate	poor-well	30-60
Spruce, Norway	long	medium	tolerant	poor-well	40-60
Sumac, Smooth	short	fast	intolerant	poor-well	9-15
Spruce, White	long	slow	tolerant	mp, mw, well	40-60
Sycamore	long	fast	intermediate	poor-well	70-100
Walnut, Black	long	fast	intolerant	mw, well	50-75
Willow, Austree	short	fast	very intolerant	poor-well	30-50
Willow, Black	short	fast	very intolerant	poor, mp	30-50

*Poor, Moderately Poor, Moderately Well, and Well. Shade intolerant trees require full sunlight, intermediate trees can handle some shade, and shade tolerant trees can handle low, partial, or full sunlight. A short-lived tree has an average life span of less than 65 years of age. Trees with a long life span averages more than 70 years of age. As always, there are exceptions to these general rules.

Language of the Forest

Acre- An area of land that contains 43,560 square feet.

Annual Ring-The growth layer of 1 year, as viewed on the cross section of a stem, branch or root.

Benefit- A good and/or service produced as a result of having implemented an investment alternative. A benefit must have some human use or value to be included in financial analysis.

Bole- The main trunk of the tree.

Canopy- The layer of vegetation in a forest made up of tree crowns or tree tops.

Conservation- The protection, improvement, and wise use of natural resources to assure the attainment of their highest economic and/or social values.

Crown-The branches and foliage of a tree.

DBH- The diameter of a tree at breast height (4 ½ feet above the ground.)

Ecosystem-An interacting system of plants, animals, microorganisms, soil, and climate.

Endangered Species – Plant or animal whose existence is at risk through all or a significant part of its living range.

Even-Aged Forest- A group of trees whose ages are the same or very close to each other.

Forest- A plant community in which the dominant vegetation is trees and other woody plants.

Forester – A person college trained in the art and science of growing trees and forests.

Forestry- The science, art and practice of managing trees and forests and their associated resources for human benefit.

Habitat-The local environment in which a plant or animal lives.

Hardwood- A term used to describe broadleaf, usually deciduous, trees such as oak, maple, ash and elm. The term does not necessarily refer to the hardness of the wood.

Logger – A person whose profession is cutting trees for lumber and other wood products.

Nonindustrial Private Forestland- forestland owned by farmers, other individuals and corporations.

Photosynthesis- A chemical reaction that takes place in green plants in which carbon dioxide, water and sunlight combine to produce sugar and oxygen.

Renewable Resource – A naturally occurring resource, such as trees, that is continually replenished through biological growth and reproduction.

Root Collar- The place on a tree stem at or slightly below the ground line where roots first appear. The stem usually is slightly swollen.

Rotation- The number of years required to establish and grow trees to a specified size, product or maturity.

Sawlog- A log large enough to produce a sawn product- usually at least 10 to 12 inches in diameter, 8 feet long, and solid.

Section – A parcel of land that contains 640 acres.

Seedling- A tree, usually defined as less than 1 inch in DBH that has grown from a seed.

Softwood – A coniferous tree, cone-bearing, usually evergreen, having needles or scale-like leaves. Common softwoods include pine, fir, spruce and cedars.

Stand- A group of trees occupying a given area and sufficiently uniform in species, composition, tree size distribution, stocking, and soil characteristics, so as to be distinguishable from the adjoining forest.

Succession- The process by which one plant community is gradually replaced by another.

Thinning- Cutting trees in an immature forest stand to reduce the stocking and concentrate growth on fewer, higher quality trees.

Tree- A woody plant having a well-defined stem.

Tree Farm- A privately owned woodland dedicated to the production of timber crops. It may be formally recognized by the Tree Farm program of the American Forest Council.

Uneven-Aged Forest- A forest or stand in which there are more than two age classes of trees present.

Woodland- A wooded area in which the trees are often small, short bowled, and open grown. This includes farm woodland, and wooded areas that are part of a farm.

Soils and Impacts on Tree Growth

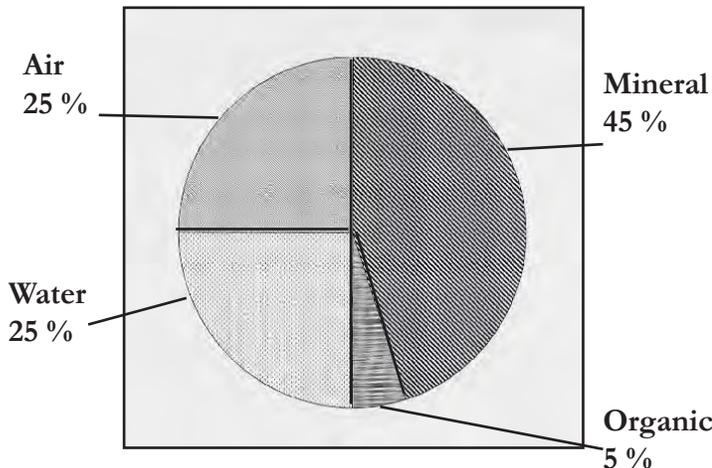
Interpreting Charts and Graphs

Human life is dependent on soils and to a certain extent, good soils are dependent upon human use and protection of the land. Great civilizations from Egyptians to Romans have almost invariably had good soil as one of their critical natural resources to grow food and fiber. Soil destruction associated with the cutting of timber in watersheds encourages erosion, topsoil loss and pollution of rivers and lakes.

Soil can be defined as a mixture of rocks, minerals and decayed organic matter. There are four main components of soil: minerals, organic materials, water and air. From Figure A, the optimum soil for tree growth contains 45% minerals, 5% organic, 25% air and 25% water. (Mineral and organic content stay constant unless erosion occurs.)

Optimum Soil Makeup

Figure A



See answer page for answers

Figure A

Soils are composed of particles that vary greatly in shape and size. There are three broad soil texture groups that foresters used to describe soils. They include: sand, loam and clay. Sandy soils are large in size and have a large amount of air space which allows rainfall to drain quickly. Clay soil particles are small in size and very close together making drainage slow. An ideal loam soil may be defined as a mixture of sand, silt and clay particles.

The common field method of determining the class of soil is by feel. By rubbing a wet or dry soil sample between your fingers, you can determine your soil class according to the chart below.

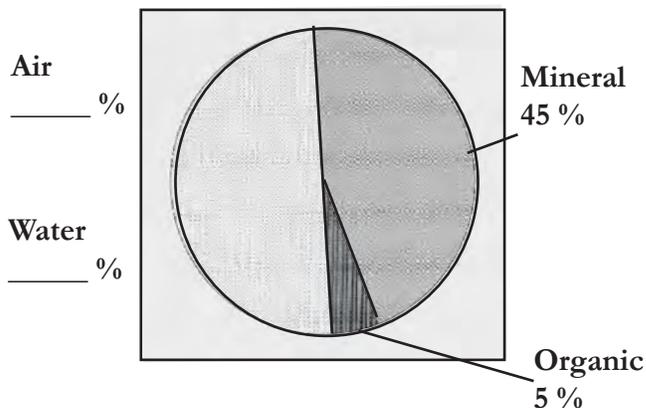
Soil Class	Soil Squeezed Dry	Soil Squeezed Wet	Trees that you can plant
Sand	Falls apart when squeezed	Forms a cast but crumbles	Pines, Spruce
Loam	Forms a worm-like cast that easily breaks	Forms a cast that can be handled	Walnut, Oak
Clay	Breaks into hard lumps	Will form a long, flexible playdough ribbon	Silver Maple, Swamp White Oak, Wycamore

Which soils allow the best tree growth?

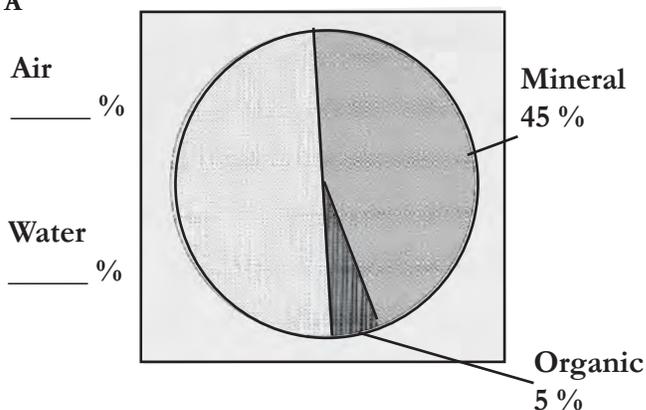
Which soils are present around the school building?

Which soils are found along flood plain forests?

Using your pencil, indicate below the effects flooding has on the percent of water and air in the soil. (i.e. does the amount of water increase or decrease during a flood?)



Using your pencil, indicate below the effects drought/no rain has on the percent of water and air in the soil. (i.e. does the amount of air increase or decrease in a drought?)



Preventing Streambank Erosion



Degraded Streambank



Streambank with Buffer



How it happens...

Viewed over the short span of a few years, a stream channel may appear to be quite stable. But, if you could watch it over a period of decades or centuries, you would find that it constantly shifts and meanders. This is a natural process by which the stream adjusts to changing conditions within its channel and watershed.

Even if you were to dig a straight channel for a stream, it would eventually be eroded into a winding pattern. This process begins as the current swings back and forth from one bank to the other. Soil, sand and gravel are washed away from the areas where the current is fastest and deposited where the water moves more slowly. Eventually, a series of winding curves develops. Each of these bends becomes longer and more sharply curved as more material is eroded (pulled) from one bank and deposited along the other. Wherever there is a bend in the stream, momentum causes the faster moving water to swing out of the center of the channel and erode sediment from the outside bank.

Most streambank erosion occurs during periods of high water. This is because the stream is flowing faster with all of the extra water, and the bank soil is submerged (under water) and saturated with water. Since streambank erosion is a natural process for any stream, it is important to remember that any attempt to control it is a continuous process, rather than only a one-time effort.



Prevention efforts...

There are several things people can do to help reduce or prevent erosion:

1. Don't farm the land within 20 feet of the stream or river bank.
2. Keep excessive weight away from the stream or river bank (including dead trees, debris and farm equipment)
3. Don't let livestock graze the stream or river banks.
4. Remove any fallen trees or debris from the stream or river channel if they are causing stream or river bank erosion problems.
5. Divert surface run-off or drainage away from areas where bank erosion is a problem.



Controlling erosion...

Once erosion becomes a problem, there are several methods you can use to control it. We recommend the following methods for Iowa streams:

- Reshape the stream or river bank to a more gradual slope by cutting back the existing stream bank (a minimum of one ft. tall for every 2 ft. in length).
- Install soil bioengineering such as willow posts or by covering banks with brush, or trees
- Fence out livestock.
- Plant grass, shrubs, rushes, sedges and trees that are native to the area and thrive in wet conditions.



Recommendations for a healthy riparian buffer strip...

- The general layout should consist of three zones. The first zone includes a 30 ft. wide strip of trees (4-5 rows) the second zone is a 12 ft. wide strip of shrubs (1-2 rows), and the third zone is a 24 ft. wide strip of native warm-season grass.
- This zonation design is important because the trees and shrubs provide perennial root systems and long-term nutrient storage close to the stream and the grasses provide the density to dissipate the energy of surface runoff from the adjacent cropland.
- Design can be modified by replacing the shrubs with more trees or replacing trees with shrubs. More grass can also replace the shrub rows. The width of the grass zone should not be less than 20 ft. wide.



The Values of our Trees and Forests

Word Search



W I L D L I F E C L E A N W A T E R
 O O P T L D C H A R C O A L F O O D
 M E R I E R O S I O N C O N T R O L
 A T O D B I O D E G R A D A B L E U
 A O P F I R E W O O D E S A L N L S
 B R E L A X A T I O N K R O E S U S
 I S R I N C O M E O N E R G T U M P
 O O T P A P E R I I F T Y S E S B R
 D L Y K R H E T R F N X E L I T E O
 I V V F U O A D U O O N B R F A R D
 V E A T N E T B C C E A U S A I G U
 E N L U R F E E M P L O Y M E N T C
 R T U C O S T Y C C T E C T I A M T
 S S E S I A T P Y T N I A H H B U S
 I R D O M U D C O O I B T N H L L H
 T F N I A E E D A E E O I Y A E C A
 Y T L E H R T O T V L Z N O D I H D
 H C B C O R K S E C U R I T Y E R E

Word Box

Beauty
Biodegradable
Biodiversity
Charcoal
Clean Air
Clean Water
Climate Control
Clothing
Cork
Employment
Erosion Control

Firewood
Food
Income
Lumber
Mulch
Nests
Noise Buffer
Oxygen
Paper
Products
Property Value

Protection
Recreation
Recyclable
Relaxation
Security
Shade
Soft Drinks
Solvents
Sustainable
Tourism
Wildlife

Crossword Continued.....

- 26. A volume measurement equivalent to a cube measuring 1 foot on each side or 1728 cubic inches.
- 28. A naturally occurring resource, such as trees, that is continually replenished through biological growth and reproduction.
- 31. A person who is college trained in the art and science of growing and caring for trees and forests.
- 33. A log large enough to produce a sawn product -usually solid, 10-12 inches in diameter and 8 feet long.
- 35. A cubic volume measure of firewood or pulpwood.
- 36. A term for a young plant, recently sprouted from the seed.
- 37. Thin sheets of wood (< 1/4") produced by slicing or peeling a log.
- 38. A chemical reaction in green plants that combines carbon dioxide and water to produce sugar.

DOWN

- 2. The growth layer of 1 year, as viewed on the cross section of a stem, branch or root.
- 4. The variety, complexity and abundance of species present and interacting in an ecosystem.
- 5. The process by which the forest is replaced or renewed by natural or artificial means.
- 6. A term used to describe a broadleaf, deciduous tree (such as oak, maple, ash or elm).
- 10. A group of trees occupying a given area and generally uniform in species, size, stocking, and soil characteristics, yet distinctly different from the adjoining forest.
- 11. A volume measure of lumber - equal to 1 foot wide by 1 foot long by 1 inch thick.
- 12. A person whose profession is cutting trees for lumber and other wood products.
- 15. The cutting and removal of final crop trees from the place that they were growing.
- 16. An area of land that contains 43,560 square feet.
- 18. A forest or stand of trees that are not significantly different in age.
- 20. The place on a tree stem at or slightly below the ground line where roots first appear; the stem is usually slightly swollen at this location.
- 21. Cutting trees in a young forest to allow space for the remaining trees to have more space to grow.
- 23. The process by which one plant community is gradually replaced by another.
- 24. The planned time interval between major harvesting operations.
- 25. A mathematically based table that estimates log volume based on log diameter (inside bark at the small end) and length.
- 27. A tree that is selected on the basis of type and quality, to be grown to maturity - to be removed only at the time of final harvest.
- 29. An interacting system of plants, animals, micro-organisms, soil and climate.
- 30. The number of years required to establish and grow trees to achieve a specific size, product or maturity.
- 32. A good and/or service that promotes well being.
- 34. The layer of vegetation in the forest made up of tree crowns.

“Learning” On The Web

Searching for Information on the Importance of Trees and Forests

Background

The internet or World Wide Web has become a tremendous source of information on many different topics related to the environment. Utilizing two different websites this activity will give students an opportunity to learn about the importance of using native trees and shrubs, and the many benefits of trees and forests.

Procedure

Have the students work in groups to answer the questions below by logging into the following homepages. Some of the answers will not jump right out at the students, which will encourage them to read and research for their needed information. Have a group discussion on the answers and general topics once the students have completed the sheet.

Section I. Why Plant Iowa Grown Native Trees?

Address: <http://www.iowatreeplanting.com>

Once on the site click on the article titled: “Why Plant Iowa Grown Native Trees?”

1) When planting trees and shrubs it is always best to utilize native seedlings from a locally _____ seed _____ because:

They are better _____ to Iowa’s _____ in weather and to Iowa _____ .

They provide superior _____ wildlife _____.

They are less likely to be _____ than non native plants.

They are more _____ to _____ and disease attacks.

They are a link to Iowa’s _____.



2) True or False It would be a good idea to plant bur oak seedlings that are grown from seed collected in Texas.

3) True or False Christmas trees are grown and harvested in Iowa.

4) An acre of forest on a summer day can transpire over _____ gallons of water. This cools the surrounding air by as much as _____ to _____ degrees. This cooling plus the shade on a house, can reduce air conditioning demands from _____ to _____ percent.

5) In the winter, windbreaks of _____ can reduce heat loss from _____ to _____ percent around farmsteads and rural residences.

Section II. The Forest Where Ashley Lives

Address: <http://www.extension.iastate.edu/Publications/PM1812.pdf>

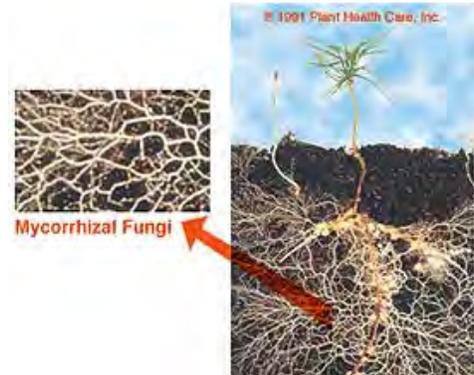
- 1) **True or False.** All of the trees found in a city or a town create a special kind of forest called a “city or town forest”.
- 2) Along with space, the gases oxygen and carbon dioxide, what are four other things that trees need to help them grow? _____, _____, _____, _____.
- 3) What tree part is the food-making factory? _____.
- 4) Tree roots _____ the tree in the ground, help _____ the soil, and absorb _____ and _____.
- 5) The trunk is the passageway where _____, _____, and nutrients move between the _____ and the _____.
- 6) A forest is a kind of ecosystem. Along with wetlands, swamps, deserts, and tundra’s name three other examples of ecosystems? _____, _____, _____.
- 7) Trees that drop their leaves in the fall are known as _____ trees.
- 8) Forests can provide homes for animals such as squirrels, _____, _____, owls, raccoons, _____, and beetles. Trees can also provide _____ for some animals.
- 9) Plantings of grasses, shrubs, and trees along streams and rivers are called “_____”. These “_____” can improve the _____ quality and provide homes for _____.
- 10) In a forest tree and other _____ roots _____ out some of the unwanted materials in the water as it moves through the _____. This helps clean the water we drink at home and school.
- 11) Trees from forest provide wood to make things like _____, _____, toilet paper, _____, baseball bats, _____, _____, paper bags, and many other things we use every day.
- 12) **True or False.** During a process called photosynthesis trees produce the invisible gas called oxygen which is needed by all living things to survive.
- 13) During the process of _____ tree leaves produce _____ sugars for tree _____ plus _____ for us. Energy from the _____ is what gets photosynthesis in the leaves started.

Are We Having *FUN*gi Yet?

A Scientific Study of FUNGI

Scientists have discovered that certain fungi grow on the roots of plants, to the benefit of both the fungi and the plant. The fungi absorb nutrients from the soil and provide them to the plant. In return, the plant provides nutrients to the fungi. This relationship is called mutually beneficial because both the plant and the fungi are benefiting from each other. The scientific name for this mutually beneficial relationship is mycorrhiza. This relationship works best when the organisms are all native to the area in which they are growing.

The scientists in the study were interested in the fungi that grow on the outside of tree roots, called ectomycorrhiza fungi. Ectomycorrhizal fungi can increase the uptake of phosphorus by plant roots and improve nitrogen uptake. They can decrease the susceptibility of the plant to disease and drought.



Introduction

Some soils are rocky and dry which makes it hard for new trees to grow. The competition between different types of plants and new trees is intense. They are both competing for moisture and nutrients. Some foresters will clear an area of competing plants by setting fires to burn the plants. However, this solution doesn't last long because the plants quickly grow back. The scientists in this study wanted to try a different way of reducing the competition for soil nutrients and moisture.

In order to do this the scientists applied two different types of chemicals. One chemical was applied directly to the soil to kill the plants. The other chemical was applied directly to the seedlings, before the seedlings were planted. This was done to kill the non-native fungi that might be growing on the seedlings' roots. The scientists hypothesized that if they new seedlings were cleared of nonnative fungi before being planted, the ectomycorrhiza fungi would grow on the young seedlings' roots which would help them to grow stronger and faster.



Reflection

- What problem are the scientists trying to solve?
- Why do you think ectomycorrhiza fungi are better for the seedlings than nonnative fungi?

Methods

The scientists applied one kind of chemical to the soil before planting the seedlings. This procedure is called fumigation and involves pouring a liquid chemical onto the ground, then covering the ground with plastic. The plastic keeps the chemical from escaping into the air.

•Why do you think that it is important to cover the ground with plastic? (Hint: think about your health and loss of chemicals from the ground.)

The scientists also applied a fungicide directly to some of the seedlings in the nursery before planting them outside. This was done to kill the fungi that grow on the seedlings' roots in the nursery. Some of the seedlings were planted in areas that had not been fumigated, so by applying the fungicide in the nursery, the scientists could figure out whether fumigation and/or the fungicide affects the seedlings growth. The seedlings were then measured every year for two years.



Reflection

- Why did the scientists plant some seedlings in areas that had not been fumigated?
- Do you think the ectomycorrhiza fungi were able to begin growing on the seedlings' roots? Why or why not?

Results

The scientists found that when they fumigated the soil in the spring, the seedlings grew more than when they fumigated in the fall. They also found that the seedlings not treated with fungicide grew larger than those that were treated with fungicide.

They found that the use of the fungicide resulted in a greater amount of ectomycorrhiza fungi growing on the seedlings' roots by the second year. Surprisingly, this discovery proved that more ectomycorrhiza fungi does not always mean that seedlings will grow larger.



Reflection

- If you wanted to grow the biggest seedlings, which treatment would you use, fumigation, fungicide or both?
- Why do you think the scientists were surprised to find that ectomycorrhiza fungi did not make the seedlings grow larger?

What did we learn from this?

If foresters want their seedlings to grow successfully and quickly, they should fumigate the soil in the spring before they plant the seedlings. Because soil fumigation is very expensive, it is only recommended for areas where seedlings have a lot of competition from other plants.

The State Tree of Iowa



The state of Iowa is represented in the form of many different symbols. Iowa has its own bird, rock, flower and even its own flag. However, the state tree of Iowa stands out because it represents the state's strength and history. The oak became the state tree of Iowa in 1961. There are as many as 600 various species of the oak, but only twelve of these can be found in Iowa.



The oak is a canopy tree and usually grows to be about 80 feet tall. Oaks are beneficial to Iowa because of their strong, hard wood that is used in flooring, furniture, barrels, construction and even shipbuilding. The oaks are also beneficial to the wildlife of Iowa because of their acorn production known as 'mast', which is used as a food source by animals such as squirrels, pheasants, wild turkey and white-tailed deer.

Iowa's species of oak include: white, bur, pin, swamp white, northern pin, black, red, chinkapin, dwarf chinkapin, shingle, blackjack, and post. These various species of oak can be grouped into two broad categories, either red or white.

White oak trees can be distinguished by their leaves which are white-green on the underside and by the lobes or edges of the leaves which are rounded. The wood of the white oak is light beige and appears almost white when freshly cut. Iowa's white oaks include: bur, swamp white, chinkapin, post, dwarf chinkapin and white oak. Although these species are all in the white oak group, there are many differences between them. The bur oak is very slow growing, long-living and can adapt to a wide range of soils. On the other hand the swamp oak only tolerates the moist low-lying locations along streams. The chinkapin oak is known as an excellent shade tree and the white oak is known for its valuable lumber production. White oaks have very dense wood used for barrels.

The red oak can be distinguished by the reddish-orange color of its wood. Also, the lobes or edges of red oak leaves are pointed. There are also six species of oak that fall into the category of Iowa's red oaks including: pin, shingle, Northern pin, black, blackjack and red oak. These species also have many differences. The pin oak is a bottomland species that tolerates wet and poorly drained acidic soils. In contrast, the blackjack oak tolerates dry upland soils. The red oak is a very valuable wood used for furniture, flooring and paneling.

Can You Tell the Difference?

Match the name and description of the leaf on the left with its correct picture on the right.

- A) The **Pin Oak** has leaves with three distinct, round bristle-tipped lobes. _____
- B) The **Chinkapin Oak** has leaves that are not lobed. They have very coarse teeth without bristle tips. _____
- C) The **White Oak** has leaves with rounded lobes. _____
- D) The **Post Oak** has rounded leaves with the largest lobes at the top and the two smaller lobes at the base of the leaf. _____
- E) The **Red Oak** has leaves with pointed edges. _____
- F) The **Shingle Oak** has leaves with NO lobes. _____
- G) The **Blackjack Oak** has pointed leaves with the largest lobes at the top and the two smaller lobes at the base. _____

1)



2)



3)



5)



4)



6)



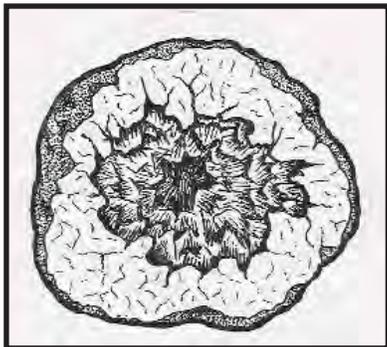
7)



Iowa's State Symbols

Did you know?.....

Iowa's State Rock is the
Geode



Most Iowa geodes contain large quartz crystals of various colors.

Iowa's State flower is the
**Wild Prairie
Rose**



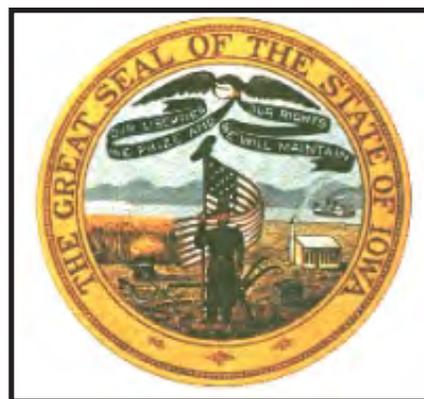
Wild Roses grow as a woody shrub in open woodlands, woodland edges, prairies and roadside ditches.

Iowa's State bird is the
**American
Goldfinch**



The goldfinch is a year-round resident of Iowa. It has distinct yellow and black feathers. It is a small bird with a wingspan of less than nine inches.

Iowa's State Seal looks like



The motto reads "Our liberties we prize and our rights we will maintain." The seal is represented on our state flag.

LEAD AN ENVIROTHON TEAM

...and win a free trip to Missouri



If you and your students enjoy the practical, hands-on outdoor activities in this *Trees For Teens* packet, you should get involved in *The Iowa Envirothon*.

The Iowa Envirothon is the state affiliate of North America's largest high school environmental education program. Envirothon encourages students to work as a team and use critical thinking skills as they integrate and apply knowledge and skills learned in biology, chemistry, earth science, botany, zoology, and other science disciplines. While some leaders simply use the Envirothon materials as a framework for their investigations, others use the Envirothon to increase the motivation and enhance the learning experiences of their students by participating in the Envirothon competition.

Each spring at regional competitions, five-member teams from around the state are challenged to answer questions in the areas of aquatic ecology, forests, prairies, wildlife and soils. High-scoring teams are invited to the state contest where outdoor field testing and an oral presentation increase the level of competition.

The Iowa State Envirothon Champions in 2005 will earn a trip to the national contest in Missouri where they join over 45 teams from the U.S. and Canada for a week of outdoor learning, competition and fun! The top teams win over \$30,000 in scholarships and Canon merchandise such as binoculars, cameras and printers for themselves and their schools.

Highlights of the Envirothon Program:

- 📌 **Free Material** including books, activity descriptions and resource information for team training
- 📌 **Access** to teacher/coach and team training sessions and workshops
- 📌 **Interaction** with working environmental science professionals
- 📌 **Incentives** for students-including the challenge of competition and the opportunity to win prizes including scholarships and a trip to compete at the national competition!

If you would like more information about the *Iowa Envirothon* feel free to contact:

**Hilary Johnson, Iowa Envirothon
Conservation Districts of Iowa
P.O. Box 801
1711 Osceola Ave-Suite 251
Chariton, IA 50049
(641) 774-4461
Fax: 641-774-5319
envirothon@cdiowa.org
www.cdiowa/envirothon.htm**

Before you can go to competitions, you have to begin preparing for regionals. The following are some of the subjects that will be covered in the program's competition.

1. A tree species, such as cottonwood or oak require full sun and exposed mineral soil to reproduce naturally, these trees can be classified as?
2. The age and growth of trees can be measured by this tool?
3. What layer of woody cells is responsible for diameter growth in trees?
4. A clinometer is used by foresters to determine _____.
5. What is a board foot?
6. Explain how cutting trees benefits a forest.
7. Describe the primary function of a watershed.



Forestry Key Topics

Topics to study in the forestry portion include:

- ✓ Tree Identification
- ✓ Woodland Communities and their Management
- ✓ Types of Forests Found in Iowa
- ✓ Properties and Uses of Wood
- ✓ The Proper use of Equipment used by Foresters

TEST YOURSELF.....

Can you determine the basal area of a forest plot, use an increment borer and a biltmore stick to measure a stand of trees, identify tree species using a field guide, or develop and present a management plan for improving riparian habitat that reduces soil erosion and improves water quality?

Are all the Neotropical Birds *Disappearing?*

Neotropical birds are those that migrate in the fall to Central and South America. These birds fly thousands of miles and then return to North America the following spring. About 300 of the 650 bird species that nest in North America are neotropical birds such as: warblers, vireos, orioles, hummingbirds, swallows, swifts, shore bird and some birds of prey. Birds migrating through the United States use four main flyways, one of which goes through the central United States and the state of Iowa.

Can you Name the Neotropical Birds that Call Iowa Home?

Match the bird with the description by drawing a line between the two. Write the bird's name on the line below each picture.

1.) Bobolink – About 6 inches tall with a heavy bill. Mainly black and white in color, with some orange and yellow and narrow pointed tail feathers. Locally common in hayfields and migrate in fall in large flocks near marshes. Song is long, loud and bubbling.

2.) Ruby Throated Hummingbird – The smallest bird in North America at about 3 inches. Have long slender bills adapted for reaching deep into tubular flowers. Wing beat is so rapid it produces a humming sound. Feeds while hovering and can fly backwards. Adult male has a bright red throat.

3.) Black and White Warbler – About 4 inches tall, black and white in color with slender straight pointed bills. They are common in deciduous forests and edges feeding along tree trunks and larger branches.

4.) Chimney Swift – About 7 inches tall, black and white in color. Their wings, built for speed, are long, stiff, and slender. They beat their wings alternately unlike swallows. During migration they roost by the hundreds in tall chimneys.

5.) Broad winged hawk – About 13 inches tall with a 33 inch broad wing span. Reddish tan in color with a broad fanned tail. They hunt from perches and spring into action to catch large insects, mice or small reptile.

6.) Scarlet tanager – About 6 inches tall. They are brilliant colored birds. The males are red bodied with black wings and tails and thick, swollen beaks. They are common in deciduous forests.



Sources of Bird Identification located in most public and school libraries:

A Golden Guide to Field Identification Birds of North America
 A Peterson Field Guide Series – A Field Guide to the Birds of Eastern and Central North America
 National Geographic Field Guide to the Birds of North America
 National Audubon Society Field Guide to North American Birds – Eastern Region.

Birds face many dangers due to the long distances they travel during migration. Many birds do not make it to their final destination. Some birds die from natural causes such as storms or predators. However, many birds die from man-made causes. For example, many birds die from running into obstacles including tall buildings with mirror-like glass, radio towers and power lines. Birds also die when the lands, such as forests, are broken up by farming, cities and even building shopping malls. This process of land-use change by humans impacts birds and is called habitat fragmentation.

Fragmentation breaks up the remaining forests into even smaller pieces. Populations of forest-dwelling birds like the wood thrush, rose-breasted grosbeak, yellow-billed and black-billed cuckoos, Tennessee warbler, worm-eating warbler and ovenbird have dropped because they do not have enough places to live. Fragmentation is like having a puzzle with lots of missing pieces. With some pieces missing, many birds are struggling to migrate and survive.

Fragmentation increases the chance of predation because it decreases the distance from the edge to the interior. It makes these birds nests more available to predators. Predators, like skunks and raccoons and egg-eating birds like crow, jays and grackles, prefer forest edges rather than forest interiors. When forests are fragmented with roads, houses and other development, predators have easier access to more nests. Fragmentation also gives easy access to brood parasites. A bird called the brown-headed cowbird lays its eggs in other birds nest. This leaves essentially no safe place for the deep forest birds to raise their young.

The effects of habitat loss and fragmentation:

- During migration, habitat loss and fragmentation cause birds to have few choices. This concentrates them into the few forest, grassland, or wetland areas that are left. While it is exciting to see thousands of birds in one area, it also leaves them open to disease, predators, or large dieoffs from storms or lack of food.
- During the breeding season, habitat loss and fragmentation mean few nesting areas and often mean that birds are vulnerable to predators and brood parasites.
- During the wintering season, it means fewer and fewer areas in which to find food and to roost.

Test your knowledge of habitat fragmentation. Fill in the blanks to make the sentence complete.

1. Habitat _____ is the breaking up of large blocks of habitat into smaller pieces.
2. _____ birds make up 300 out of 650 bird species that nest in the deciduous forests and prairies in the central and eastern United States.
3. The _____ lays its eggs in the nests of other birds, which has contributed to the decline of some bird populations.
4. _____ provide millions of dollars each year for habitat restoration through the purchase of hunting licenses and taxes they pay on firearms and ammunition.
5. Bird migration follows bird highways known as _____.
6. _____ is the movement of animals from one place to another.
7. During breeding season, _____ loss and fragmentation mean few nesting areas.
8. Loss of habitat mean that birds are vulnerable to _____ and brood parasites.
9. Millions of birds die each year from flying into _____ windows, because they see the reflection of the sky and trees and think they can fly through it.
10. Some states have more than 70 percent fewer _____ than they had 150 years ago.
11. While it is exciting to see thousands of birds in one area, it leaves the birds open to _____, predators or large die off from storms.
12. County roadside managers restore _____ vegetation to provide wildlife habitat.
13. _____ your yard with trees and shrubs and providing water sources invites birds.
14. Planting _____ is a great way to close old agricultural fields among forested areas to encourage more neotropical birds to nest.

What can you do?

- Check out the following websites to learn more about neotropical birds and migration:

<http://www.fws.gov>
<http://www.extension.iastate.edu/wildlife/>
<http://neotropicalbirds.org>
<http://www.audubon.org>
<http://www.iowabirds.org>
<http://www.lhas.org>

- Make a list of the changes that you think are needed for neotropical bird populations to increase in Iowa and share with conservation organizations, conservation leaders and elected officials.
- Find out more about the Partners in Flight Program by writing the National Fish and Wildlife Foundation at 1120 Connecticut Ave NW Washington DC 20036
- Encourage your parents and other Iowa taxpayers to make contributions through their State of Iowa Income Tax form to the Chickadee Checkoff to help Iowa's bird populations or visit www.iowadnr.com/wildlife/
- Work with your teacher and other students to landscape the areas around the school with native trees, shrubs and grasses to attract birds.
- Consider constructing bird nesting boxes.



A Sand County Almanac



Good Oak Activity

Objectives:

1. The student will explain various concepts of natural resources management through the reading *Good Oak* from *A Sand County Almanac* by Aldo Leopold.
2. The student will compare and contrast conservation and exploitation of natural resources through paraphrasing various selections from the reading.
3. The student will analyze the historical sequence of events pertaining to wildlife management.

Strategies:

1. Assign reading from any text that covers basic concepts in resource management.
2. Discuss the basic concepts of: survival of the fittest, balance of nature, carrying capacity, food chains/webs and the recycling of nutrients, history of conservation for wildlife, and ecological succession.
3. Assign the reading of *Good Oak* from *Sand County Almanac*.

Activities:

1. Divide the class into groups to do questions.
2. Hand out the question sheet and have each group answer the questions.
3. As a small group, have them discuss the questions and answers and prepare their final answer to present to the group.
4. Assist in tying the student answers into the basic concept from the text.

Evaluation/Key:

The students should be evaluated on their efforts in working in the group as well as on their final product. The main points to be included on each question are listed below.

1. Plant and tend a garden to understand where food really comes from. Split good oak wood yourself to appreciate the value of hard wood as well as the years of work by the tree.
2. Demonstrating the concept of survival of the fittest, plants survive by reproducing in great numbers since they cannot move to food/water. An oak will be girdled by rabbits until its bark grows thick enough to withstand the pressure from the rabbits in the winter.
3. We mourned the loss of the old tree, but knew that a dozen more stood on the sands and had already taken over the job of wood-making.
4. The oak tree made wood and reproduced, as it had intended, and did not care if the owner was an exploitationist or conservationist.
5. 1878- hunters outnumber deer, 1877- two brothers shot 210 blue-winged teal, 1875- four hunters killed 153 prairie chickens, 1873- Chicago firm purchased 600,000 prairie chickens, 1972- last wild turkey killed in Wisconsin, 1870- 6000 ducks killed by one hunter in a season. Exploitation of wildlife is the common theme--many laws regarding wildlife came into place in the late 1800's because of these types of activities.
6. It takes a saw, wedge, and ax to determine the oak's history. Saw- reveals each year one by one, wedge- exposes all years at once. Ax- works at an angle diagonal to the years of recent past.
7. Recycling of nutrients, food webs/food chains, and ecological succession (ecosystems may change, but they continue on).





Natural Resources Management

Understanding Concepts in Natural Resources through *A Sand County Almanac*, by Aldo Leopold

1. Aldo Leopold opens the section on *Good Oak* by stating the following, "There are two spiritual dangers on not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other is that heat that comes from the furnace." What does he mean by this and what are some examples that he uses to support this thought?
2. Leopold states that only one acorn in a thousand ever grew large enough to fight rabbits. What ecological principle does this support?
3. How does Leopold let us know that, even in the loss of a *Good Oak*, there is a balance in nature?
4. Leopold also states that an oak is no respecter of persons. What does he mean by this?
5. As Leopold moves us through the history of the oak tree, he lists some of the following dates: 1878, 1877, 1875, 1872, and 1870. What are the common themes for these years and how does it relate to what you know about ecological principles?
6. Explain what Leopold means as he states, "There is an allegory for historians in the diverse functions of the saw, wedge, and ax...The three tools are requisite to good oak and to good history."
7. What principle does Leopold concentrate on in the last paragraph of *Good Oak*?





Make your OWN Bird House



Making a bird house in your back yard not only gives you the pleasure of watching many beautiful birds flock to the feeder, it also helps birds find food when it is scarce. Experts say that Iowa's own state bird, the goldfinch, can remain in Iowa during the harsh winter partly due to birdfeeders. By making your own bird house, you can help out the goldfinch, along with many other species of birds during Iowa's harsh winter.

Design #1: Empty Milk Carton

- Get a half gallon or gallon size milk jug.
- First you must wash the carton out thoroughly. *(JUST use a SMALL amount of dishwashing detergent, other household products may be too strong for the birds.)* Let it air dry.
- When the container is completely dried out, seal the top closed by stapling it shut or securing the lid.
- Next, carefully cut a round hole in the carton with a utility knife.
- Make the hole about 3 inches in diameter. *(This is so that birds as big as a robin can enter with ease, but larger birds that will steal the food from smaller birds will be kept out.)*
- Now, make a smaller hole below the other hole. *(This will be used to insert a wooden dowel, or a perch, for the birds to land on.)*
- Feel free to cover the bird house with twigs, bark or anything you can think of to protect it from wear and tear.
- You can use a hanger to hang your bird house or simply tie it to a pole.
- Make sure that you use a pole that is thin and metal, or something similar. *(Wooden poles will allow squirrels and cats to climb up and eat the food, or the birds! The pole should be about 10 feet above the ground.)*



Design #2: Dried-Out Gourd

- Find a large gourd and hollow it out.
- A gourd is a large fruit with a hard shell that cannot be eaten. *(Same family as squash, melon, pumpkin).*
- Cut a hole, about 3 inches in diameter, the same as above, for the birds to enter. Remove the dried seeds and fibers so the gourd is hollow and then let it dry.
- Drill two 1/4-inch holes about 1 1/2 inches up from the bottom of the gourd for ventilation and drainage.
- Next, cut a small hole below the entrance to insert a dowel to be used as a perch. *(To add your own sense of style and creativity, you can paint or decorate the gourd as you chose.)*
- To hang the gourd, fasten a screw into the top. Then use wire to secure a hanger to the gourd.
- Tightly tie the wire around the screw, and then push the screw completely into the gourd. Next, tie the other end of the wire securely to the hanger.
- Hang the gourd on a high tree branch or metal pole. *(Remember it needs to be about 10 feet above ground.)*



Design #3: Wood Bird House

- Wood is the best material to use when building a bird house.
- Building a bird house out of wood takes TIME and PATIENCE.

Refer to Chart and Picture to construct a birdhouse to fit your favorite bird species!

Species	Floor of Cavity	Depth of Cavity	Entrance above floor	Diameter of entrance	Height above ground/ water
<i>(Dimensions in inches)</i>					
House Wren	4x4	6-8	4-6	1 - 1 1/4	4-10
Chickadee	4x4	9	7	1 1/8	4-15
Bluebird	4x4	8-12	6-10	1 1/2	3-6
Red-headed woodpecker	6x6	12	9	2	10-20
Barn owl	10x18	15-18	0-4	6	12-18
Wood duck	12x12	22	17	4	10-20
Barn swallow	6x6	6	4-6	2	8-12
Robin	6x8	8	6-8	2 1/4	6-15



Decker, Daniel J., Kelley, John W. Enhancement of Wildlife Habitat on Private Lands. "Nest Structures". New York: Cornell University.

The ANSWER Page



Word Search (page 15)



Neotropical birds (page 27)

Fill in the Blank:

- | | |
|-------------------------|------------------|
| 1. fragmentation | 9. mirror |
| 2. neotropical | 10. forests |
| 3. brown headed cowbird | 11. disease |
| 4. Hunters | 12. native |
| 5. Flyaways | 13. land-scaping |
| 6. migration | 14. trees |
| 7. habitat | |
| 8. predators | |

Can you name the Neo Tropical Birds that Iowa calls home? (page 26)

- | | |
|-------|-------|
| A.) 2 | D.) 4 |
| B.) 1 | E.) 5 |
| C.) 6 | F.) 3 |

The State Tree of Iowa (page 22)

- | | | | |
|------|------|------|------|
| A) 5 | B) 7 | C) 6 | D) 4 |
| E) 3 | F) 1 | G) 2 | |

Crossword (page 16)

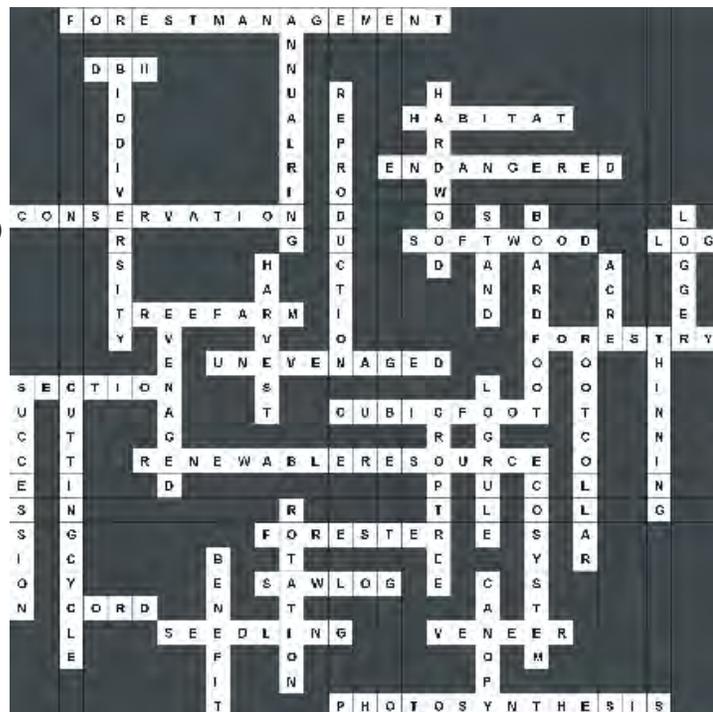
“Learning” on the Web: The Importance of Trees and Forests (page 18)

Section I: 1) adapted, source, adapted, extremes, planting sites, native, habitat, stressed, resistant, insect, natural heritage 2) False 3) True 4) 1600, 5, 15, 10, 43 5) conifers, 5, 40

Section II: 1) True 2) soil, sunlight, water, nutrients 3) crown 4) anchor, hold, water, nutrients 5) food, water, roots, crown 6) rivers, prairies, oceans 7) deciduous 8) birds, rabbits, butterflies, food 9) buffers, buffers, water, animals 10) plant, filter, ground 11) paper, books, houses, pencils, chairs 12) True 13) photosynthesis, simple, food, oxygen, sun

Interpreting Charts and Graphs (page 31)

In the case of a flood the percent of water would be 50% and air would be 0%, values will vary depending on severity of flood. In the case of a drought, the air would be 50% and the water would be 0%, values will vary depending on severity of drought.



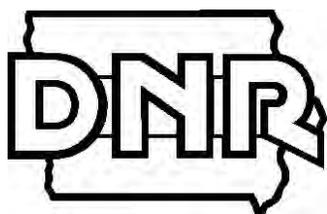
The Life Cycle of Trees: (page 4)

(answers from tip of arrow going clockwise)
seed, sprout, sapling, mature tree, dead tree, rotting log.

Thanks for caring about Iowa's Natural Resources!



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