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# A Tree Is More Than A Street Name

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Cement and brick buildings. Asphalt streets. Factories, houses and apartments. Noise and pollution. Cars, trucks and buses. People. These are images of an urban environment. They are valid perceptions of students who live, play and work in the city which was built by modern society as a testimony to human progress and technological development. Yet the picture is incomplete.

A practiced, more aware eye would also see patches of lawn, backyard gardens, flowers along walkways and shrubs softening corners of homes. Besides conscious planting, there are weeds struggling in sidewalk cracks, clumps of grass next to trodden paths and vines reaching for sunlight; the evidence of nature reclaiming its place of ownership. And trees—kite catchers in spring, shade producers in summer, with colorful and work making leaves in autumn, and branches bare as reminders of winter's cold—are more than street names. The trees, whose branches bend to allow children to swing and whose roots present obstacles for bicycles, are an existing part of the urban environment often ignored by the city child after the climbing stage. A heritage is suggested by the names "Charter Oak" and "Elm City"; they give us a sense of history and can connect us with the people of the past. By noting the role of trees today, we can become aware of their importance in our future development and economic growth. With this understanding, trees can 'be more than a few city street names.

The general purpose of this unit is to make students more aware of trees as a great American natural resource. As inner city students living on a coastal plain surrounded by urban development, I want them to realize that the forest of this land helped to shape the city and continues to do so. Knowledge of the role of trees in the past and of their value in the present is important because the forest serves us all, even those who never go there.

This unit is designed for use at the eighth grade level and will allow for discussion of the forest beyond the existing textbook coverage. It provides a mixing of history, science and value concerns as related to this natural resource which supplements the curriculum. Subsequent lesson plans will present step by step student activities that will connect the textbook as a resource to independent observation, investigation and skill building.

The unit's narrative will concern itself with three general aspects: 1) the role of the forest in early American history (Connecticut and New England), 2) a scientific aspect dealing with conservation, energy and identification, and 3) the value of trees in terms of products, career potential and as a natural counterpoint to

our manmade environment,

## Trees and Our Past

Stepping back in time, we can see the newcomers as they gather to hear Rev. John Davenport. It is the second day in the new colony. From under a large, rugged oak, Davenport begins his sermon on “Temptations in the Wilderness”. It is April 25, 1628; we are near what will be College and George Streets. Looking away from the gathering, we can see this “New World”, full of promise, abundance, a natural treasure.

As climbed over the Connecticut hills and through the valleys, they would find a land covered with trees except where the marshes abut the Sound and in the meadows along the rivers. The forest is part of the Central Hardwood Forest that extends from the prairies west of the Mississippi River to the Atlantic coastal area and from the Northern Forest nearly to the Gulf of Mexico, divided only by the Appalachian Mountain range which has the northern evergreens. Among the many tree species in this Central Hardwood Forest of Connecticut the settlers found pine, hemlock, cedar, oak, elm, hickory, birch, chestnut, ash, sassafras, witchhazel, maple, tulip, sycamore, tamarack, butternut, willow, beech, cherry, basswood, dogwood and hornbeam.

This great variety of trees astonished our early settlers, who were accustomed to only about a hundred in their European world. Today our country has over a thousand different tree species. At first, the colonists named trees after those they had known in Europe, but soon ran out *of* names. Thus, they made up new ones or borrowed Indian names. The European settlers would take full advantage of Connecticut’s primeval forest, its variety and abundance.

But the first people in our region, probably over 12,000 years ago, viewed, heard, felt and smelled a very different environment; their successors would experience yet others and each group of people would adapt in their own way to the different environments. About 8,000 years ago the forest was dominated by oak and hemlock with a climate warmer and drier than today’s. As more plants grow because of the warming trend, people shifted from hunting and fishing to gathering and eventually to agriculture. Woodland Indian women and children collected blueberries in birch bark containers. Many berries were dried and saved for the winter. As time passed and the population increased, artifacts became more varied. Tools for woodworking appeared. Milling stones were used and pottery appeared for storing acorns and hickory nuts. The forest began to fill in with laurels, viburnums and rich ground covers.

By the time of Christ, all of the trees we see today were present. The Indians began to influence their environment. Fire, for example, was used, probably to clear land, drive animals, improve visibility and destroy vermin. Because of fire, the oaks, hickories and chestnuts became dominate while the hemlocks and maples declined because of their sensitivity to fire. The Woodland Indians also planted to supplement their diet and thus further controlled their environment.

However, it was the forest that provided many products for the Indians and they were so wise in their use. The large white ash which has a straight trunk free of knots was used by the Indians for stressed items like snowshoes and for basket splints. Some Indians used the extracts from the ash for relieving itching, treating fever and rattlesnake bites. As its sap is inflammable, the ash can be used freshly cut as firewood. To the Eastern Woodland Indians, the acorns from the white oak were a staple food. Less bitter than those of other

oaks, they were a source of carbohydrates. A bland meal was made by grinding and leaching out the tannic acid by boiling. The Indians gathered baskets of acorns to be used for cakes, soups or as bread meal. The Iroquois used the acorns for treating diarrhea and cuts. Also the oak provided them with a rot-resistant material and, like the ash, it was used for basket splints.

Also within the dense forest the maples, silver, red, sugar and some black, were plentiful because of their large seed crops. Like other trees, their buds and twigs provided food for the white tail deer and other animals that were important to the Woodland Indians. In late winter the sugar maple was tapped by them for syrup, sugar and flavorings which enhanced their food.

Sassafras means “green twig” and long before we used it for root beer the Indians brewed parts of the tree for various medicinal uses. They boiled the roots to treat fever; young sprouts were used to make an eyewash. The leaves were steeped to make a tea and the dried leaves were crumbled to be used as a seasoning. Sassafras is still used in creole cooking. It became an item of colonial export as it was highly valued in England and on the continent. Besides our root beer, today, tea and a perfumed soap are prepared from sassafras roots.

The forest which was owned in common by the Indian tribes, provided the wood for fires needed for warmth and cooking; it gave building materials for their “long houses” and for the dugout boats made from trees hollowed out by burning. The Indian was a skillful woodsman; indeed, his livelihood depended on his knowledge of the forest. The forest helped sustain life and the Indian returned the gift with his reverence and love for the woods. The deep, dark forest was sinister and terrifying to the first colonists, but to the Woodland Indians, it was home.

The European settlers would move against the determined steps of survivors and make this land their home as well. The toolmaker with his ringing axe and crosscut saw will mark the wilderness. Chip by chip, the trees will be felled; year after year, the bark will be girdled. The forest will be cleared and the corn planted.

In New Haven in 1640, beams for homes were a penny a foot, hewn square. By the late 1700’s, water-powered sawmills would rip the trees to lumber. Poplar, oak, ash and hickory, a wood for every need, for building, tools and wagons; for furnishings, maple, cherry and walnut were available. For fence rails, gun stocks, wood for every purpose from cradles to coffins. By necessity, wood was used for every fashioned article of living. Even so, most of the trees were burned because the land was needed for crops. Surrounded by trees, the settlers found a world rich in wood which would direct their lives.

The immediate problems that faced the early settlers were obtaining *food,* clothing, shelter and tools. Soon the settlers came to rely upon the resources that the forest could supply. The forest abounded with animals for food and it supplied food for their hogs, horses, cattle and sheep. The scarcity of clothing was solved in part by use of animal skins and furs. The woods provided wild fruits, nuts and food flavorings. Mulberries were used by some settlers in place of raisins. Berries and nuts were easily found and the presence of these necessities allowed the pioneers to become established.

New England architecture used wood as its building material despite the available quantities of stone. Only twelve houses of stone or brick were built in New England before 1700. The English builders were acquainted with wood and lime for mortar was scarce. Thus with the oak, chestnut, pine and other trees, they built their brace-frame homes, many of which still stand today. Inside the houses, dinner was served on treen ware. Walnut, maple and sycamore was made into tables, chairs and wainscot; cedar was used for chests, cupboards and baskets.

The majority of colonists were farmers who cleared the land, but the forest's products were an integral part of their daily lives. Wagons, tool handles, fence posts, carts and sleds, all were fashioned from wood. A black dye was made from the walnut; sugar from the maple sap and berries of bay and myrtle for making candles, were obtained free the forest. Medicinal herbs, leaves and roots for teas, spruce beer, elderberry wine, hardened blisters (galls) on oak trees caused by insects for making ink, products from seemingly unlimited resources. Likewise the forest colonists with water and wood as sources of power for energy. Permanent settlement would have been almost impossible without the materials and products which the forest provided.

A strong man could clear three acres of land a year, cutting, allowing to dry over the winter and burning the trees in the spring. Most Connecticut farmers had to clear in What trees were not kept, they took to a miller who made them into boards and beams. As more land was cleared and towns grew, those who needed timber went to hilly upland areas to cut. The rivers made it easy to float the logs downstream to sew mills. Lumbering became a good winter job for farmers who began to cut when the snow fell and helped with log drives in the spring. By 1700, almost every river in Connecticut had an annual log drive.

As the demand for bigger and newer houses and furniture in the towns grew, coupled with an increased need for building materials to trade with England and the West Indies, the first business in America was born. The forest formed the basis for the major colonial industries of: lumber products, shipbuilding, naval stores and potash.

In 1620, the year the Mayflower sailed from England, the Virginia Company met to decide if the Virginia colony was prosperous enough to continue as a business investment. Because of the increasing number of forest products being produced in Virginia, their report was favorable. Lumbering became important in every colony and the leading colonial industry. The demand for wood was large and widespread. Oak and pine provided shingles, boards and barrel staves; sweet gum, maple, walnut furnished wood for gunstocks, desks, chairs and tables; cedar was used in making caskets, door and window sills and in drawers and chests. The cooperage industry produced over 300,000 various barrels each year as containers for rum, naval stores and other items. The first exports from Jamestown and later from staves and cedar logs.

An allied industry was sawmilling. The first mill was built in 1635, in New Hampshire. The early mills used water power and farmers ran them often as a sideline until Millers established themselves. Within time, almost every town would have one or more sawmills. By 1750, New England was exporting lumber products worth 135,000 English pounds annually.

Yet there was more profit in shipbuilding. England's increasing merchant marine and navy brought mare demands for ships timbers, casts, yardarms, etc. The tall pines and spruces were marked by royal woodsmen to be cut as mast's for the King's navy. Cutting them without permission brought a heavy fine. The white pine, which is the largest northeastern tree, grows straight. It was easy to cut and shape and therefore was of great value for ships' masts. The wood of oak was soaked so that it could be bent into curved shaped to make ship's ribs. With the forest close to the coastline, ships could be built in America cheaper than in England. By the end of the colonial period, at least one third of all ships under English flag were built in the colonies. Added to that number, New Englanders could boast of 2,000 fishing boats, built and owned here.

Shipyards, large and small, sprang up in the colonial ports and other related industries also grew because of the forest. The production of naval stores—tar, pitch, resin and turpentine-became a leading industry in the Southern colonies. The knots of the long leaf pine were roasted in kilns and the hot tar drained off into barrels. By distilling the tar, turpentine which was needed for paint could be produced. From the residue of the distilling, pitch was made to be used for waterproofing. These ships' stores derived from Southern forests are

still important for international trade.

Ash, birch, oak and ether hardwoods were burned to ashes which were then boiled. The residue that remained was called “pott ash.” Potash was used in the colonies for soap-making, glass making and bleaching. The farmer in clearing his land could make some money by selling the potash which was easier to transport than lumber. By 1766, New England was exporting 14,000 barrels of potash.

The role of the forest was enormous in the settling of America. It gave rise to industries as a raw material and as energy for forges and kilns allowed people to produce other product as well. Its firewood gave personal warmth, light and fuel by which to cook over. The wood helped form the tools and necessities of the home and its structure. The home of William Leete in Guilford, a governor of the New Haven colony, still stands on land that he cleared. His land is still farmed for its trees today, giving it the distinction of the oldest continuously owned property in the American Tree Farm system.

The story of people is found in our forest from that charter of independence hidden in the cavity of a white oak in the 1680’s to a boy learning to whittle in the 1980’s. The whisper of pines in the wind can make us stop to remember the importance of trees over the span of time.

Looking at our trees today, we can enjoy the flowering of the dogwood ( *Corpus Florida* ) as those before Us did. This well known ornamental, native to the eastern and central states, produces large blossoms in spring, bright red fall leaves and small fat winter buds and berries. The name, dogwood, possibly “daggerwood” indicating that it was a wood used to skewer meats over open fires. The Indians made a quinine substitute from its bark and a tea to reduce fever. They also used the spit ends of small branches as toothbrushes. handles, hay forks and sled runners from the wood; later the textile industry used it for shuttles and spools. Often seen reaching to the sun *from* under taller trees, the dogwood is a protected species in most states, yet its wood is still used for woodcut blocks, jeweler’s blocks and mallet heads.

Many of our medicine cabinets possess a bottle of witch hazel. The healing properties were discovered by the Indians who may have been attracted to this shrub by its golden blossoms which appear in November after its leaves have fallen. cut the flowers and twigs, boiled them and applied the cuts, bruises and muscle strains. Witch hazel ( *Hamamelis virginiana* ) grows as a shrub but may reach thirty feet in height; it is found in many parts of Connecticut where the climate and soil suit its growth. In 1860, an Essex druggist, Elmer Whittemore, began to produce witch hazel for commercial use. Others joined the business, and in 1866, a Baptist minister, Rev. Thomas associated with the group. As others dropped out, Dickinson kept the business going and expanded it. After the witch hazel branches are The steam goes into a separator and condenser, after which it becomes the astringent. The alcohol content of witch hazel serves as a preservative without which it would sour. Eight and a half pounds of brush are needed to make a gallon of witch hazel. Today the E.E. Dickinson Company of Essex is still operated and is the largest distiller in the country. Witch hazel can be used as a aftershave lotion, a beauty aid, for muscular stiffness, to treat scratches, insect bites, poison ivy and for rinsing hair after shampooing.

On our kitchen shelves, we may find a jar of pure maple syrup. The large sugar maple tree which covers northeastern half of our country as far south as Louisiana produces maple sugar and syrup. They are produced from boiling down the tree’s sap; one tree can produce less than three pounds of sugar a year. Just as the colonists, we can sweeten apple sauce, flavor baked beans and cereals, pour it on toast and pancakes or on anything else for desired sweetness, even ice cream. The wood of the maple provides for products from flooring to musical instruments and bowling pins. The contorted grain of the sugar maple often is called curly maple or bird’s eye and is valued for furniture and in cabinet making.

One particular tree product has a special meaning to Connecticut, but in name only. The nutmeg is a spice used in cooking stews, baking and on eggnog. It is *the seed* of a tree grown in the East and West Indies and in Brazil. Nutmegs were not grown in Connecticut but colonial peddlers carved fake to match and sold them as the real spice. This forgery was practiced in other colonies but was so widespread in Connecticut that we earned the nickname “Nutmeg State”.

Looking back over three hundred years, we can view the benefit gained from our forests. Many of our forested land remains and continues to offer its promise as our most versatile natural treasure.

## Forest and Nature

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The forest of North America were generously supplied to the early settlers and builders of our nation; there was no need to conserve them. Always just beyond their settlements, to the west lay vast forests still to be harvested. But as the pioneers and northward, they used the resources, wasted them and thought little of the consequences. The practical frontier farmer learned that sugar maple and walnut meant rich loam, prized as cropland. Trees would be left at the ends of plowed for the horses to rest in shade. was lost with the arrival of the European colonists who replaced it with farms and pastures.

Concern for conservation began in the 1870’s. Our national parks system was created by President Grant in 1672 when Yellowstone was made the world’s first national park, From Theodore Roosevelt, who appointed a National Conservation Commission and set aside 148 million acres as forest reserves, every President until possibly Reagan has taken an active interest in conservation. The U.S. Forest Service, the first conservation bureau in the government, _ a created in 1905, in order to care for our public forests; in 1916, Congress created the National Park Service. Our national forest today consist of 183 million acres or an area greater than the states of New York, Pennsylvania, Massachusetts and California. However, this public forest reserve makes up only 17 percent of the forest in our nation.

Our total forest area would cover all the states east of the Mississippi River with 120 million acres left over. Besides the U.S. Government, state and local governments own ten percent of the forests; timber companies own thirteen percent and private individuals own the remaining forest or 60 percent, that is about 400 million acres. So much forest! About one-third of our nation is forest. Another third is used for grazing land. Cropland makes up 23 percent with the remaining land used as recreation, urban centers and as wilderness. There seems to be such a quantity of available land for our growing needs. By this century’s end, the need. for cities (1%) and recreation land (2%) will double. Where will the land come from?

The question of balancing the forest with urban growth and the question of planning for recreation for urban dwellers must be considered. One view simply states that each acre should be given over to its highest and best use in economic terms. As former Governor Reagan stated, “If you’ve seen one redwood, you’ve seen them all.” (p. 177, *Living in the Environment* by G. Tyler Miller, Jr.) Materials, it seems, should serve our needs; forests are renewable and the land must be used for human development and gain However, to regenerate the forest, it takes from 30 to 200 years depending on the species and the environment. To be a renewable resource, the forest must be harvested and managed wisely.

For the strict conservationist, the land maintained for its ecological balance. Keep the hand of mankind out and leave the land alone. In 1964, Congress passed the Wilderness Act and since then more than 21 million

acres have been set aside as wilderness. This acreage is found in 41 states and 80 percent is within the National Forests. Access is by foot, horse or boat only and nothing can be planted or harvested. However, conservation according to Gifford Pinchot, the first Chief of the Forest Service, had a larger meaning. He the foresighted utilization, preservation, and/or renewal of forests, waters, lands, and minerals, for the greatest good of the greatest number for the longest time." ("Green America", American Forest Institute, 1980).

This definition raises the issue of multiple use of the land, implying some preservation with controlled use. This economic-ecological view was translated into federal law—the Multiple Use Sustained Yield Act of 1960. As the National Forest is of economic value to the nation, the products people need must be balanced with recreation interests, wildlife needs and watershed concerns. The economic timber value is supposed to be balanced against the others with assurances that the cleared land will be replanted for the future. This position can be easily accepted by many urbanites because they are removed from our great forest. Unfortunately, those insulated *from* the land, per se, can develop an attitude of "plenty more out there".

In New England, there are plenty; 80 percent is forested, ranging from 90 percent of Maine to 60 percent of Rhode Island. Spruce and northern hardwoods grow in the north; there is a mix of firs and hardwoods in Vermont, New Hampshire, southern Maine and in eastern Massachusetts. Southern New England has mixed hardwoods and pine; pitch pine and oak grows OD Cape Cod. There are twenty-seven major tree species in our region. This forest has changed over the centuries; it has been *highly* used, abandoned, yet recovered. This forest serves 12 million New Englanders and visitors who use it for recreation. More importantly, it helps sustain our quality of life. Our trees act as watersheds to absorb, hold and release water thus preserving the soil and life systems. The trees produce oxygen, absorb heat, some air pollutants and noise. Habitats are provided for a diverse wildlife and many forms of vegetation. The forest's products are found all around us and our trees continue to provide a source of beauty and pleasure.

However the New England forest potential in terms of products, services and beauty because of a lack of regional planning and public awareness. A large part of the problem stems from the fragmentation of ownership. New England forest is divided among a half million people with most possessing less than 100 acres. These small tracts mix-managed due to lack of information, careless logging and increasing property taxes which result in a decrease of value as forest. With a decline of farms, the lands are being sold to non-farmers who subdivide and change the landscape. The changes could bring our region to the point where it presents a less attractive picture for tourists. Also, as the forest is cleared, the watershed is changed. water supply, quality and flood control thus become problems to be considered. Full utilization of the forests with proper management could mean new jobs and preservation of our quality of life. The state of Connecticut only owns 180,534 acres of parks and forest; seventy-five percent of our forest is in private hands. *The* productivity of our forest is a shared responsibility by those who own and manage forestlands and by the public whose support should be based on knowledge.

Then what is a tree? It is a It has a main stem or trunk, crowned by leafy branches and usually attains a height of at least eight feet. Like all living organisms, a tree requires food, water and light.

The growing parts of a tree are the tips of its roots, the leaves and a layer of cells inside the bark called the cambium which makes new wood. Next to the *cambium.* layer is the sapwood which carries sap from roots to leaves. At the center, there is heartwood which is inactive but gives strength to the tree. Water travels from the roots into the leaves where it is combined with carbon dioxide from the air. The energy of light changes these into food which is carried from the leaves back to the branches, trunk and roots through the inner bark. The tree's life can be read after harvest from its rings; in middle climate areas, one ring is added for each year

of growth.

In the United States, over a thousand species of trees grout They can be generally divided into woods or broad-leaved and narrow-leaved trees. The trees most people call “evergreens” and lumbermen call “softwoods” have leaves like needles. The pine for example, has tough needles, weatherproofed with wax and stay green through the winter; thus they are referred to as evergreens. The seeds are carried in cones which gives them another name, “coniferous” meaning cone bearers. The seeds fall when the cone opens and since they are not encased in a protective covering, they are called “gymnosperms” *which* means naked seeds. Evergreens grow generally symmetrical with a straight trunk and branches coming out at right angles. At the top of the trunk is the “terminal bud” that does all the growing, adding height each year. The wood has a simple cell structure and it is softer and lighter than broad-leaved trees.

The broad-leaved trees require a during winter, when moisture is sealed in snow or frozen ground, they shed their leaves and seal themselves in. The name “deciduous”, given to these trees, means “to fall.” In warmer climates, the leaves of some species stay on all year but are replaced yearly. Their seeds are protected or encased, like the apple tree or the nut in an acorn. These trees are called “angiosperms” meaning “Vessel seeds.” The broad-leaved tree’s growth is complex; the trunk may grow directions. Branches increase the splitting, growing out and upward at the same time. The broad-leaved trees are called “hardwoods” yet some such as aspen and basswood have a soft wood.

The trees of America are grouped in forest regions and they differ according to climate and elevations. Different trees have made themselves at home in different areas and no one forest is the same as the others. The forest is a family trees, plant and animal species that are part of a larger ecological system which maintains a continuous flow of energy and nutrients necessary for its life. In the forest ecosystem, plants capture the sun’s energy, use it for growth and even when dead, the decay releases nutrients for reuse. Animals further enhance the energy flow, building complex food chains; all based on plant energy.

The forest ecosystem is an interplay of strategies and its diversity make it resilient to change. As plants and trees differ, their roles in the ecosystem vary. Wild cherry and tulip trees may grow in forests with beech and maple; they differ from those because of the amount of sun required for producing sugar by The beech and maple have found their place in the ecosystem as late or early comers to forest development or succession. They are quick to occupy forest sites cleared by fire, wind or man. The beech and maple require low light intensity and can grow in the shade of other trees. The complex interaction of climate, soil, diversity of species, temperatures, light, dormancy in deciduous trees, the kind and distribution of other living species are all part of the forest ecosystem’s strategies to survive. Solar energy drives the forest ecosystem through photosynthesis by which organic compounds and living protoplasm are formed from carbon dioxide and water. The balance in nature, cycles and preserves itself; the forest stores energy from the sun and fires part of the food change that supports all animal life on the earth. The forest is complex yet it appears so simple that it can be taken for granted.

As the forest uses energy to stay alive and support the ecosphere, it in turn, has been a provider of energy. The use of wood as an energy source is as old as mankind. Even today, one and a half billion people in developing nations get at least 90 percent of their energy needs from wood and charcoal. Yet another billion more people depend on firewood as fuel for cooking and heating to supply 50 percent of their needs ( *Bio Science* , April 1981). For more than a third of the world’s population, the real energy crisis is the search for firewood to cook their food. Despite thirty percent of our earth being covered by about 9,884 million acres of forest, there is a growing worldwide fuel wood shortage.

In New England, we tend to view the energy crisis as a petroleum shortage. As costs of imported fuel rise, some people have turned back to the forests to supply their needs. What would be the pressures on Connecticut's forests? First, if all Connecticut householders used only wood *by which* to stay warm, we would have enough for four to five years. That would mean using every stick and branch in the state and dividing it equally. Then, we would wait until the forest grew back; wait for years. Instead of cutting all the trees, we could cut only what would grow back each year. This would provide 800,000 cords a year. *This* would give Connecticut's 800,000 households one cord each year; unfortunately each house needs three or more cords a winter. Using the forest as fuel on a large scale would affect the raw supply for other uses. Much of our state's maple and oak goes to furniture makers, for shipping pallets and as piano parts. The high value of commercial use increases competition for wood, even wood waste, and just to burn our timber is to burn our choices. full choices must be made regarding productivity, management, land use, ecology and alternative energy sources, Being aware of the forest's heritage, we must learn to use it and be willing to pass it on.

## Forest and Futures

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The image of the forest often appears as a romantic scene on a postcard, stately trees, serene, timeless and unchanging. This picture is appealing but it is incorrect. For the forest is a dynamic, ever-changing place where the struggle for survival continues cycles of growth and regrowth. Trees are essential to our civilization. Not just helpful and enjoyable, but necessary. Look around and think what life today might be without wood.

Many of our buildings are wooden construction and frequently we use wood decoratively as paneling or trim. We function in a world of wooden objects—cabinetry, shelving, furniture, workbenches and containers. Timber provides twenty percent of America's nonfuel that we welcome, paper packaging, paper cartons, boxes, photographic film, and books, newspapers, labels, instructions, bubble-gum cards—made from wood. Each of us uses an average of 560 pounds of paper every year. Our forest provides 5000 different building products, more than 100,000 kinds of paper products and many more miscellaneous wood products. "Knock on wood" that there are such wood products as clothespins, hockey sticks and tissues in our lives.

The Department of Commerce, in 1977, estimated that the number of industries connected with wood products exceeded 33,000. More than 6,000 companies manufacture paper and allied products from wood fiber. About two-thirds of all wood is cellulose, woody, tube-like fibers; the rest is lignin, a tough substance which holds the cells together. From the cellulose, paper, cellophane, and by various chemical processes, plastics, lacquers, alcohol, imitation leather, food proteins, etc. are produced. Lignin is used to make plastic for electrical equipment, combs and utensil handles. Our involvement with wood has resulted in experimenting with lignocellulosic resources as raw materials for chemical feedstocks. (Glasser, Wolfgang G. *Forest Products Journal* , March, 1981). Lumber production waste—bark, sawdust, shavings, etc.—are being used as fuel by the mills, being sold for agricultural use or for paper making. Our forest products industry has a total annual product value of over 68 billion dollars.

The forest and their product industries provide employment for many people in a range of jobs. This resource can provide an opportunity to discuss outdoor careers in general. Students usually enjoy being in the open and given their feeling of being "cooped up" in school, examination of outdoor careers, at least with their imagination, might be beneficial. Awareness of outdoor occupations, especially for urban students, may expand future choices and goals. Besides a list of outdoor jobs which can be obtained from the Department of Labor's *Occupational Outlook Handbook* , two concepts should be covered—differences and disadvantages.

Careers that take workers outdoors differ considerably. Some require a great deal of physical activity, while others call for only a little. Certain jobs deal with nature, soil, plants or animals, while others involve work on things. The job locations can vary from cities to isolated forests and so can the time spent completing the job. Educational and training requirements will differ accordingly. Without a high school diploma, outdoor jobs may be found in construction, the post office, merchant marine, on farms and in resort areas. Craft workers such as carpenters and masons need training through an apprenticeship program. With a high school degree, work may be found in city service departments, and in many other industries—transportation, maintenance and utilities among them. College degree careers, often combine field activities and indoor work; the jobs include civil engineers, life scientists, forest managers and various supervisors in industry.

The question that students should seriously consider is “How much do I really like being outside?” A crisp, clear autumn day or a warm spring morning are one thought. However, people who work outdoors need to cope with nature in all forms, temperatures reaching the 90’s as well as sleet and snow. Because of the weather, work may be delayed and pay may be lost as a result. The building trades, for example, are highly seasonal and the economy can make work intermittent.

It is hard for people to realize that trees do not grow by themselves in cities. Keeping trees alive must be our job in urban settings. Nature affects the trees with viruses, bacteria and insects. But people with their road salts, paving roots, lawnmower scars, auto pollution and vandal carvings, can easily kill the trees. Many cities do not replace trees that fall because of cost and other budget restrictions. In fact, park departments are often the first to suffer funding cuts. Indeed forty-four percent of all U.S. cities have no organized tree program in existence. Apathy dates back to 1784 when insurance companies would not insure *homes* with trees in front.

Tree growers are breeding trees that can better stand urban stress; however price and availability are ranked over survival rate by city planters. Urban foresters are forced to choose trees of one type only although they are acceptable for urban settings. Imagine street after street with identical trees planted. If the chestnut tree had been the only U.S. tree, the blight that broke out in New York’s Brooklyn Botanical Garden with the importation of some oriental plants in 1904, would have left us treeless today. Because of the diversity of the forest, the disappearance of the chestnut is not noticed today. The mulberry tree upon which silk worms fed, allowed Connecticut to produce more silk than any other state until the blight of 1848. As the mulberry trees disappeared, so did the industry. The American elm which was hardy, tolerant of climate changes and soil variety, lived long and thus became a favorite tree for towns and cities to plant. Its demise left city centers barren because of the Dutch elm disease, accidentally brought from Europe on logs. Therefore, different varieties should be used; safety lies in diversity.

Planting trees according to survival ability first and cost next is most desirable and matching tree type to soil conditions is another consideration. Planting larger trees, ones that “look” like trees make people conscious of their presence and hopefully more careful. The idea of mixed plantings on city streets, using shorter tree species makes possible a tree in front of every house. At the same time, different species allow visual contrast and once life-cycles are established, removal of some will not disrupt the over-all affect, Urban dwellers share the benefits of their city trees and must accept responsibility for their environment.

The urban dweller can relate to that hot July day when the cool shade of a large tree can be a luxury. The cooling is caused by evaporation; the tree gives off about a hundred gallons of water from its leaves a day. With the cool air under the tree and the warm air around it, the air moves upward making a breeze. This combined effect of evaporation and air movement can make the shade of a tree almost 20° F cooler than beyond the foliage.

Students can relate their outdoors experience—as caddies, newspaper carriers or from recreation—in order to access the possibility of an outdoor occupation. For those with the interest, talent and qualifications, an outdoor career is available.

Some jobs within the forest itself are the forest engineer who plans out roads, surveys and makes maps or the cat-skinner who operates a skidder which drags logs to loading areas. Foresters, wardens, high-climbers, fallers and crane operators are all specialists performing important functions within the forest. Without going into the forest, people can have careers dealing with trees; for example, nurseryman, landscape architect or arborist. The wood products and lumber industries provide many more unthought of occupations; over a million people work in the solid wood products industry directly. Knowledge of the role of growers, harvesters and users can raise our appreciation of trees in terms of economical value and as consumers, we should become more aware of the essential place trees have regarding our quality of life.

Those early Connecticut hills that the early settlers traveled over have been changed; they and their successors marked the environment and their influence is *highly* visible today. of the forest held true for them and continues today, delivering raw materials worth about 3.5 billion dollars, millions of jobs, single family homes, of which 80 percent are wooden, and thousands of products from medicines to toys. (“Green America” American Forest Institute, 1976). The forest has helped to shape, build and sustain our urban centers Packaging and containers allow for systems to distribute products to population centers. From watersheds that nourish our cities and basic shelter to breakfast cereals, the forest continues to support urban existence.

Interestingly there are 70 million acres of forest spread out in bits and pieces in our American cities. Trees are recognized by most people as an asset to the city. New Haveners planted a single row of buttonwood and elm trees around the public square, the Green, in 1759. But it was James Hillhouse, a great promoter of New Haven and public servant, who will always be remembered as the one who planted the elms and laid out Grove Street Cemetery. As early as 1790, the city proposed to preserve its older trees for shade and ornament. Hillhouse and David Austin worked on planting the numerous elm trees which earned the name of “The Elm City” for New Haven in the post-Civil War era. During this period, the canker worms in the 1870’s and then were damaged by the English sparrows, newly introduced by Mayor Henry Lewis. The elm leaf beetle increased the damage towards the century’s end and finally the Dutch elm disease began to kill the city’s great elms. In 1909, a campaign to save the elms and to beautify the city was conducted by George D. Seymour. His efforts resulted in the appointment of a superintendent of trees, George A. Cromie, in March 1911. Under Cromie’s direction, old damaged trees were removed and 10,000 new ones were planted between 1911 and 1921 including maples, sycamores, lindens and of course, elms.

Trees can be considered as energy savers with conscious and suburban dwellers. A deciduous tree on the south side of a house will provide shade in summer. When winter comes, the bare branches will admit the warming *sun. A.* row of conifers on the north and west sides of the house will serve as a winter windbreaker. By planting low growing evergreens next to the foundation, a wall of natural insulation is formed. Proper plantings can help the cost of cooling and heating, thus saving money and the use of other energy forms.

Urban dwellers in viewing their trees should appreciate more fully the extremely wide range of benefits that flow from our forests—its products as well as its environment—and of their own urban trees. Our urban parks are a place of recreation and provide a moment away from the glass and masonry of the city. The trees along our streets can inspire us to remember that the tree is a symbol of our heritage, not the skyscraper. The beauty of our trees is a natural counterpoint to our urban, manmade environment. The more complex our cities become, the more removed we become from the influence of natural events and the more we tend to

seek out the natural world. Our forest, its trees, is a major element is our “web of life.”

## Perceptions

What is a forest? The answer will be described in terms of immediate interests and perceptions. To the logger, it may be a place to work. To the outdoor enthusiast, it is a place to hike, hunt, ski or just to get away. To an owner, it is an asset and to the manufacturer, it is a source of raw material. For most of us, it might be a combination of those things and more. For the urban student, it is important to recognize the timeless value of the forest and to be able to look around knowing that a tree is more than a street name.

## *A Tree is a Street Name*

*Rationale:*

The forest of our *nation are* an enormous and necessary natural resource to our future. There is a need to know the role that this resource has played in our history and to become aware of its continuing contribution in our lives. This series of concepts will help the eighth grade, urban student to realize how the forest shapes our lives.

*Major Concept:*

The urban student with expanded knowledge of forest resources can appreciate its heritage, learn to benefit from it and be willing to pass it on.

| | |
|---|---|
| Concept One. | *The settlement of colonial America was greatly aided by the abundant and diverse forest, discovered especially in New England.* |
| *Concept Two:* | *As America continues to use the land, the value of trees, economically and as an energy source, must be balanced with ecological considerations.* |
| *Concept Three:* | *Our forests provide opportunity for employment, inspiration and recreation; even within the city, trees constitute more than street names.* |

*Instructions:*

Each of the three concepts to be covered includes: performance objectives, learning activities, extended assignments and a follow up assignment. Read each concept and performance objective carefully. Then the student *is* to complete the learning activities and the follow up. Some of the work is to be done individually and some will be completed in groups.

The extended assignments may be chosen by the students individually or assigned by the instructor. The instructor decides when they will be due and when the individual project will be shared with the class.

Some of the activities can be assigned as homework and all students should be encouraged to complete at least one of the extended assignments for extra credit. It should be helpful to make a chart of the activities

and follow ups to serve as a checklist for student progress and grading.

A list of texts and their sections relative to the topic are found before the bibliography. Instructors may set concepts and be flexible according to the of the group in selecting activities.

Concept One: *The settlement of colonial America was greatly aided by the abundant and diverse forest discovered, especially in New England.*

*Performance Objectives:*

1. Students will become aware of their perceptions of what a forest is.
2. Students will learn the names of New England trees and illustrate U.S. forest belts.
3. Students will identify early American wood forest uses.
4. Students will research the colonial industries based upon the American forest.
5. Students will have be opportunity to conduct individual projects.

*Activities:*

1. On a sheet of paper, list some ideas (3 to 5) that come to mind when you hear the word "forest". Using some of your ideas, write a descriptive paragraph on "What is a forest?" Underline the main idea expressed in the paragraph. Share some of the main ideas and put some on the chalkboard for discussion.

2. On Paper, list all the names of trees that you can. Make a common class list, then decide which ones grow in Connecticut and can you describe them. Where do the others grow?

3. Using a dictionary, copy a description of one of the following New England trees; include varieties of species mentioned and any drawings. (may be teacher assigned)

| | | | |
|---|---|---|---|
| Elm | Hickory | Hornbeam | Spruce |
| Oak | Tamarack | Aspen | Tupelo |
| Birch | Basswood | Hemlock | Tulip |
| Ash | Sycamore | Dogwood | Cherry |
| Pine | Chestnut | Maple | Sweetgum |
| Cedar | Sutternut | Willow | Walnut |

Also copy any information retarding the uses of the wood; be prepared to share your information.

4. On a large piece of paper or on a chalkboard, in the classroom, draw an outline of the U.S. Using colored chalk or crayons, locate the forest belts and make a key.

5 .Read in your textbook any information describing the Eastern Woodland Indians and their way of life.

6. List all the things that the wood. Find a picture in your textbook that might give you some ideas. Share your findings.
7. Discuss the ways that the forest might have been used by the colonists in early America. Did the any problems?
8. Copy the following headings:

Inside the home Tools Food Outside/the farm

List under them as many things as you can that early colonists in America obtained from the forest. Again check your textbook and its pictures for help. What would they have used, if the trees were not available'?
9. Colonial industries that resulted because of our forests included: lumbering, coopering, sawmilling, shipbuilding, naval stores and potash making. Divide into teams and research one of the industries. Report to the class at a future date.
10. Suggested be used and why?
a) For what things can wood/trees only be used and why?
b) What are some of the substitutes being used instead of wood today and why?

*Extended Assignments:*

1. Learn to identify five trees, trace their leaves and label them.
2. Investigate the making of root beer or the making of a bow and arrow by the Indians; describe it in a paragraph. Make an arrow!
3. Research early American house building and explain in a report the basic construction.
4. How did the early colonists clear land of the trees to plant crops? Research the methods and write a report.
5. Find a picture of an early sawmill and draw/copy it; label the machinery or explain in a paragraph how it worked.
6. Begin a collection of newspaper or magazine articles on conservation, land, forest or water. Place them in a scrapbook with a title page showing the title, author and source.
7. Investigate the uses of Witch Hazel and how it is made; write a report.
8. Find a picture of an early tool that was used on wood; draw it and explain how it was used and

what was it used to make.

*Follow Up Assessment for Concept One.*

Circle the word that does *not* match the first.

1. Cooper: barrels, staves, tar, container.
2. Naval masts, tar, turpentine.
3. Shipbuilding: clapboards, masts, white pine, yardarms.
4. N.E. forest: hemlock, oak, red maple, Giant Sequoia.
5. Indian wood products: snowshoes, baskets, maple sugar wheels
6. Colonial wood products: canisters, cradles, coffins, carts.
7. Tree uses: furniture, fences, fuel, clothing.
8. Wood building items: boards, shingles, beams, hinges.
9. Potash: soap-making, bleaching, food, boiled ashes.
10. Ct. products: nutmeg, Witch Hazel, Maple Syrup, fuelwood.

Concept Two: *As America continues to use the land, the value of trees, economically and as an energy source, must be balanced with ecological considerations.*

*Performance Objectives:*

1. Students will increase their knowledge of terms related to tree growth and types.

2. Students will debate the problem of land use and forest preservation.
3. Students will understand how photosynthesis works.
4. Students will become aware of the fuel value of firewood.
5. Students will have the opportunity to conduce individual projects.

*Activities:*

1. Using a dictionary, copy the definitions of the following terms:
conservation cropland ecology
wilderness habitat heritage
2. Place the following information on the chalkboard:
United States Land Use
32% forest 8% other (wilderness, desert, marshes)
23% cropland 2% recreational land
34% grazing land 1% cities
(source: G. Tyler Miller, Jr., *Living in the Environment* )
Discuss: By the year 2000, the needs for cities and recreational land will double. Where will it come from? What will be the What are the alternatives?
3. Arrange a debate using the following view points:
a) The land must be developed to its highest and best use to continue human progress; the land is for the taking!
b) The land must remain as it is in order to maintain the balance of nature which is necessary for all life; the land is to be preserved for the future!
Discuss alternatives to the points of view. May read the Federal Multiple Use Sustained Yield Act as mentioned in the unit's narrative section.
4. Problem: If the state of Connecticut owns 180,534 acres of forest yet 75% of our total forest is owned by private individuals, privately?
Moat Connecticut owners have less than 100 acres; think about the problem of management.
5. Using a dictionary or your textbook, copy definitions for the following terms:
coniferous bark photosynthesis
deciduous cambium cellulose
energy sapwood heartwood
6. Refer to handout I, top half. Bring of log into class and determine its age..
7. Using the list of trees from Activity 3, Concept one, identify the trees as being coniferous or deciduous.
8. Refer to handout I, bottom half.
9. Fuelwood to produce energy for industry and heat for homes is increasing in demand. The table below illustrates the fuel values of certain woods. Related questions follow.
Fuel Values/Efficiency

| Wood | Avg. Density Lbs./cord | BTU-million/cord |
|---|---|---|
| Shagbark hickory | 4400 | 30.8 |
| White oak | 4400 | 30.8 |
| Sugar maple | 4100 | 29.7 |
| Red oak | 3900 | 27.3 |
| White ash | 3700 | 25.9 |
| Paper birch | 3400 | 23.8 |
| Douglas fir | 2000 | 21.4 |
| White pine | 2200 | 15.8 |

(source: C.M. Summers, "The Conversion of Energy,
*Scientific American* , Sept., 1971), 151.)

Related questions: Circle the answer to make a correct statement.

1. Hickory produces (more, same, less) BTU's than birch.
2. White ash's density is (more, same, less) than maple.
3. White oak weighs (same, double, more) than pine.
4. Hiskory's BTU's are (same, double, more) than pine.
5. Greater fuel value is obtained by burning (fir, ash, oak).

For experts: One gallon of heating fuel equals 140,000 BTU's. How many gallons would be needed to equal one cord of shagbark hickery's BTUs.

10. The following is an excerpt by an anonymous English poet. Reproduce it on the chalkboard or on paper and complete the exercise that follows.

Beechwood fires are bright and clean
If the logs are kept a year.
Chestnut only good, they say,
If for long 'tis laid away.
But ash new or ash old
Is fit for queen with crown of gold.
Fills your eyes and makes you choke.
Apple wood will scent your room,
With an incense like perfume.
Oaken logs, if dry and old,
Keep away the winter's cold.
But ash wet or ash dry
A king shall warm his slippers by.

Reprinted by permission from *Heating With Wood* , 1974 by Larry Gay, published by Garden Way Publishing Company.

Put the name of the wood in the first column, as identified by the poem. Then supply another rhyming word in the last column.

_____ - dry, by,
_____ -s moke, choke,
_____ - say, away,
_____ - room, perfume,
_____ - cold, old,

Also: How many woods are mentioned? _____ What wood would you burn? _____ Why?

*Extended Assignments:*

1. Learn to identify five *more* trees, trace their leaves and label.
2. Read about and write a biography about Gifford Pinchot or John Muir.
3. Take some photographs of different trees (6 to 12); mount them, label the names and tell where each is located.
4. Make a photo essay (6 to 12) of one tree illustrating perspectives.
5. Using your science book, read about food chains. Draw an illustration that shoes how it works.
6. Locate and copy a poem about trees; mount it for display. Or write your own poem about trees, leaves or the forest.
7. Make a mural showing the different kinds of trees *in* the N.E. forest.

*Follow Up Assessment for Concept Two.*

Circle the word that is out of place in the groupings.

1. Tree: sapwood, cambium, bark, deciduous.
2. Tree: coniferous, deciduous, softwood, evergreen.
3. Photosynthesis: sun, water, CO2, ecology.
4. Land: forest, conservation, cropland, wilderness.
5. Energy: wood, sun, fuel, oil.

Word-wood-problems.

6. If a Douglas fir is 25 feet tall a half feet every year, how tall will it be when you graduate from high school?
7. If the forest covers 32% *of the* United States and grazing landcovers 34%, how much is left for other uses7
8. Our U.S. National Forest has 183 million acres or 17% of the forest and state/local governments own 10% more. What percent is owned by private individuals or timber companies?
9. If a person needed five cords a year of fuel wood for their home, how many cords would be needed by 800,000 people each year?
10. If you planted 520 seedling pine trees on one acre, how many could you plant on five and a half acres?

| | |
|---|---|
| Concept Three: | *Our forests provide opportunity for employment, and recreation; even city, trees constitute more than street names.* |

*Performance Objectives:*

1. Students will become aware of the great variety of wood uses and products.

2. Students will increase their knowledge of outdoor occupations.

3. Students will appreciate the role of trees in an urban setting.

4. Students will have opportunity to conduct individual projects.

*Activities:*

1. Read Ogden Nash's poem, "Song of the Open Road." Discuss its meaning and accuracy.
2. "Knock on wood!"
a) Students are to make a list of items made from wood that are found within their classroom on a sheet of paper.
b) On the same paper, students are to list items made from wood that are found within their house.
Have the students share their lists. Have them imagine their lives without the wooden items.
3. An a class or individually, continue to add to the lists, things made from wood that are seen outside the school.
Or
Make a list of wood products that are used in various sports, hobbies or in house construction.
Or
Make a list of ways that trees in cities can provide recreation.
4. Did you know?
The term "cord" is used to measure pulpwood or logs; it measures 4 feet high, 4 feet wide and 8 feet long. A railroad car can carry about 30 cords and a tractor trailer truck can carry 9 to 10 cords which could produce enough pulpwood to make 86,400 grocery bags.

| | |
|---|---|
| Problem: | If you used 4 grocery bags a day, all year long, how many years would it take to use up all 86,400 bags? Now old would you be then? |

The term "boardfeet" is used to measure sawtimber like plywood and lumber; it measures 1 foot by 1 foot by 1 inch thick which equals one boardfoot. An average truck can carry enough boardfeet to build a single frame house.

Problem: Now many boardfeet are in a sheet of plywood that is 4’ x 8’ x 1/4”?

5. Using a dictionary, copy the job descriptions for the following:

Arborist Nurseryman Forester

Logger Landscaper Ranger

6. Divide the students into teams; have them list all the kinds of jobs that are done mainly outdoors. Set a time limit. Then add to the lists, jobs that are in anyway connected with trees, wood or products of wood. Set a time limit.

Now have the students, as individuals, pick three occupations that they might be interested in and write the names across the middle of a sheet of paper. Above the job name, list its advantages; below the job name, list its disadvantages.

Allow sharing the jobs selected and discuss the advantages and disadvantages.

7. Identify and make a list of trees and shrubs around your home or that are found on the school property. Draw an outline map of the property placing in the building, trees and shrubbery.

Put some of the drawings on the chalkboard and discuss the placements in terms of visual affect, noise buffers, support for animal life and as aids to energy conservation.

8. As a group or individually, choose a tree in the neighborhood and make a drawing of it. On the back, describe in sentences a) how the trunk grows, b) how the branches divide, c) describe its bark, leaves and its color, d) measure its trunk’s diameter. Identify the tree and note any damage by insects, disease or by humans.

9. a list of how trees that grew in cities are damaged. Share your list. Discuss what could be done to prevent damage. Then, as a group, your make believe task is to select trees to plant in your neighborhood, park or streets; make a list of the reasons that would be important for aelecttraea to be planted. Imagine a city without trees!

10. Compile a list of streets in your city that have the names of trees. Use the city directory in the library, your phone book or a city map.

*Extended Assignments:*

1. From the woodshop or a lumber yard, make a collection of wood sizes used in building; take their true measurements.
2. Investigate the Hitchcock chair and write a description about it and the company, supply a drawing.
3. Research how paper is made and write a report on the process.
4. Investigate the harvesting of trees and write a report describing the various equipment used.
5. Make a collection of pine cones and needles. Identify them.
6. Write an article about conservation for the school newspaper.
7. Research James Hillhouse and his contribution to the “Elm City”. and write a report.

*Follow Up Assessment for Concept Three.*

Write a biography of a tree. Give it a name, an address and physical description; trace its growth and growing problems. Mention people it has met, played with, helped and what was its purpose in life. Decide its death and that result.

Handout 1, for Concept Two, Activity 6 and 8.

***Activity 6***
(figure available in print format)

Copy the illustration of the cross section of the tree trunk.

***Activity 8***
(figure available in print format)

This is how a tree grows. The burning of wood, combustion, is the reverse of photosynthesis.

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