More than trees: An interdisciplinary, literature-based unit, emphasizing drama and hands-on activities

Tracee Joanne Vickery

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MORE THAN TREES: AN INTERDISCIPLINARY, LITERATURE-BASED UNIT, EMPHASIZING DRAMA AND HANDS-ON ACTIVITIES

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education: Environmental Option

by
Tracee Joanne Vickery

June 1996
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May 2, 1996
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ABSTRACT

Abstract concepts and ideas are difficult for children to comprehend. Many young children are not developmentally ready to learn about concepts and ideas they cannot physically visualize, see, or touch. This guide was developed to provide a hands-on, interdisciplinary curriculum, based on children's literature for grades four through six. It is a resource for teachers incorporating environmental education into their regular curriculum, revolving around a common theme, trees. The corresponding lessons and activities for each book provide motivation, emphasizing drama and activity-based learning, to enhance student understanding and appreciation of trees and also the life in, on, and around trees.
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INTRODUCTION

This project not only teaches the knowledge of trees, but also motivates and encourages environmentally friendly attitudes. It is centered around a tree theme creating an interdisciplinary, literature-based unit, emphasizing drama and activity-based learning for grades four through six. Each lesson is introduced with a children's literature book and activities which extend student learning from comprehension of the story to interrelated environmental activities adapted from readily available environmental curriculum guides.

The Science Framework for California Public Schools Kindergarten Through Grade Twelve (California Department of Education, 1990) emphasized helping children see the joy of science by teaching common themes. Conservation, recycling, and learning the diversity of living things should begin in first grade and be reinforced throughout all grade levels. For grades four through six, important additional concepts discussed are interrelationships and the flow of energy. These concepts, along with others, should be taught in a meaningful way that will make learning fun.

While teaching environmental education, it is important for students to experience hands-on learning and outdoor experiences. The California State Science Framework (California Department of Education, 1990, p. 160) recommended that “40% of the total time spent learning science should be on activity-based lessons.” Focusing on a unit on trees is practical due to the general accessibility students have to actually observe the subject in their home, school, and community environments.
According to Iozzi, "Environmental education is effective in producing positive environmental values-- but only if programs and methods designed specifically to accomplish those objectives are used" (1989, p. 8). By working in cooperative groups, performing hands-on activities, and participating in outdoor, environmental-action projects, this unit is designed to motivate and encourage positive values.
REVIEW OF LITERATURE

This project is centered around a tree theme creating an interdisciplinary, literature-based unit, emphasizing drama and activity-based learning. The literature reviewed is supportive of these teaching styles. In addition, this review shows how environmental education is a natural subject area to motive and encourage learning through real-life materials and situations. Environmental education is also a subject easily implemented into one’s regular teaching schedule.

Defining Environmental Education

Environmental education programs began in the 1960s as environmental deterioration became a concern (Klein & Merritt, 1994). Environmental education is defined as “aimed at producing a citizenry that is knowledgeable concerning the bio-physical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution” (Stapp, 1969, p. 31).

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) Conference in 1975 created the following goals and principles to be used to guide the field of environmental education and accompany its definition: “(a) to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas; (b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the
environment; and (c) to create new patterns of behavior of individuals, groups, and society as a whole towards the environment “ (Wilke, 1993, p. 35).

At a second meeting, two years later, UNESCO created 12 more principles to further define and focus the field of environmental education. According to UNESCO, environmental education should: (a) consider the environment in its totality; (b) be a continuous lifelong process; (c) be interdisciplinary in its approach; (d) examine major environmental issues from local, national, regional, and international points of view; (e) focus on current and potential environmental situations; (f) promote the value and necessity of local, national, and international cooperation; (g) consider environmental aspects in plans for development and growth; (h) enable learners to have a role in planning their learning experiences; (i) relate environmental sensitivity, knowledge, problem-solving skills and values clarification; (j) help learners discover the symptoms and real causes of environmental problems; (k) emphasize the complexity of environmental problems; and (l) utilize diverse learning environments and a broad array of educational approaches to teaching/learning about, and from, the environment (Wilke, 1993, p. 35).

**Defining Constructivism**

In environmental education students learn about the natural and built environment and demonstrate their skills of investigation, evaluation, decision making, and environmental action through group interaction and real-life
experiences. This is accomplished best with a constructivist approach (Klein & Merritt, 1994).

Constructivist theory, as defined by Klein and Merritt (1994), requires students to actively acquire knowledge by physically and mentally reacting to experiences and interactions. This approach is based on the idea that learning is a social process and knowledge is acquired through the individual's interpretations of the world he/she is experiencing.

A constructivist lesson or unit has four components. It is usually introduced with a real life problem for students to investigate. Learning is facilitated by the teacher with a student-centered focus. The final step is authentic assessment, where students demonstrate their progress showing an understanding of the actual strategies taught, or presenting a project or report as an end result of the learning.

In a constructivist approach, learning should revolve around experimentation, investigation, observations, discussions, interactions among peers, and group work. By working in groups students develop better listening and communication skills and further their understanding of the topic they are studying. Small group interaction is usually required for students to derive and process the information.

Teachers are responsible for organizing workable groups, modeling appropriate skills for cooperative learning, developing lessons for group learning, monitoring the groups, providing help and focus, and designing authentic assessments to measure the learning created in this environment.
One example of authentic assessment is a checklist. A teacher may use a checklist to evaluate students as they work in their groups. Another form of assessment is a portfolio. Students can choose their best work to be collected in portfolios. Klein and Merritt (1994, p. 16) stated that, “Authentic assessment, in a constructivist’s learning environment pairs the student and teacher as a team that examines the new knowledge and habits of mind.”

**Attitude, Behavior, and Motivation**

Student motivation is a problem in many classrooms. Therefore, teachers need strategies to help reduce student boredom and inspire learning. Hootstein (1994, p. 475) claimed that learning must be interesting and relevant, and therefore, “of value.” He also stated that enjoyment and involvement are the most common feeling needed to produce interest (Hootstein, 1994, p. 478). The instructional methods used in constructivist learning theory are suggested for use to make learning active, enjoyable, and realistic.

Creating interest in environmental action projects is a means teachers can use to build student motivation. Awareness usually alters behavior, and therefore developers of environmental action programs consider attitude and behavior research important when developing environmental action programs. Through participation in such action projects, student learn that they can make a difference in their environment by letter writing, community clean-up projects, tree planting ceremonies, etc.. “It has long been recognized that the root of
environmental problems is human behavior" (Newhouse, 1990, p. 26).

Newhouse (1990), determined four areas to be changed or addressed for environmentally responsible behavior to develop. These areas include sense of responsibility, knowledge, attitude, and locus of control. A person's sense of responsibility is based on social norms which may cause or prevent one from acting in a particular way. Newhouse (1990, p. 27) gave the following anecdote as an example, "I may have a negative feeling about wasting food, but social norms prevent me from standing up in a banquet room and telling everyone to take only what they can eat!" There is a positive correlation between one's sense of duty and environmentally responsible behavior.

According to Newhouse (1990), knowledge is the basic requirement one must possess in order to know what he/she can do to protect the environment. This knowledge is assumed to influence attitude and, therefore, effect behavior. Newhouse defined attitude as a continuous positive or negative belief or feeling about people, objects, or issues. Direct experience over simple exposure is necessary in order to promote a change in attitude. Newhouse (1990, p. 31) concluded that: "The job of the educator is to ensure that everyone has all the tools necessary to make responsible environmental decisions." The "tools" she refers to are real-life experiences and techniques such as modeling, direct contact, and appropriate knowledge, in order to give students the chance to make future moral decisions about the environment themselves.
An individual's ability to cause change in his/her environment through behavior is one's locus of control. People with an external locus of control tend to believe that change occurs by chance, or is beyond their power of control, such as, parents, the government, or God. However, having an internal locus of control leads one to believe that his/her actions are likely to cause change. People who have internal locus of control have been reported more likely to participate in environmental action projects because of a stronger sense of their their ability to make a difference in their neighborhood, community, or world (Newhouse, 1990).

People in authority, such as parents and teachers, can naturally influence the promotion of an individual's internal locus of control. Allowing children to share their feelings, make their own decisions, and discuss differences of opinions at home or in the classroom are several suggestions to develop internal locus of control. These are also the common methods used when teaching environmental education in a constructivist approach to learning (Newhouse, 1990).

Research shows that values towards the wilderness are developed early in life and continue to be reinforce throughout one's lifetime (Newhouse, 1990). Children who showed an appreciation for animal and wildlife knowledge, had a higher tendency to come from family or school environments that also supported this learning.

The early elementary years may be the most influential in an individual's education. It's Elementary (1992), by the California Department of
Education, affirmed this statement by explaining:

The years from kindergarten through grade six are a time of uninhibited wonder, enthusiasm for learning, and breathtakingly rapid growth. The social, emotional, physical, and intellectual identities children construct for themselves during this period go a long way toward determining the subsequent trajectories of their lives. (p. xi)

In order to teach environmental education, researchers also have found that environmental attitudes and values should begin before kindergarten and regularly be reinforced and developed as students progress through grade school to high school (Lozzi, 1989). From the same research, it was found that once positive attitudes and values were acquired, they appeared to be long lasting.

Classroom Environment and Cooperative Learning:

The environment needed for constructivist teaching to take place must differ from the traditional teacher led classroom where students sat in rows taking copious notes from the teacher’s lecture. Teachers are now recommended to arrange students in small learning groups in order to develop a cooperative, rather than a competitive, environment. In the cooperative environment, a teacher needs to create a supportive classroom atmosphere where students feel free to communicate their ideas. A teacher needs to foster positive student-teacher communications as she facilitates the groups' cooperative learning and nourishes success and high achievement.
Lessons should give direct experience through a variety of instructional tasks, such as theatrics and environmental action projects. In addition the teacher should also create an attractive classroom environment promoting learning. (Riggins, 1986).

Research has shown a positive correlation between cooperative learning and student self-esteem and achievement (Riggins, 1986). Cooperative learning allows students to take charge of their own learning. This makes students take on more responsibility towards accomplishing their goals, increase their standard of performance and levels of achievement, and accelerate their learning pace. This is especially beneficial in a multi-leveled classroom, creating positive interactions between the lower-ability and the higher-ability students.

The feeling of success also plays a large role in this style of education. Studies show that students having lower than a 40 percent success rate, or are unsuccessful more than 60 percent of the time, have a negative learning relationship toward the given task (Riggins, 1986). Students are more highly motivated when they take charge and responsibility toward their group’s accomplishments in reaching set performance goals, rather than simply being directed by the teacher.

Anderson and Young (1994) showed a similar measure of low motivation is found in the middle grades in science. Therefore, it is important for elementary teachers to stimulate student motivation in science and set a precedent for future grades. These reports show that there are two learning
types: learning focused and ability focused. The learning, or task focused, students tend to be interested in the actual learning. They are students who are linking the new information to prior knowledge. The ability-focused students look for competition, working to get done, rather than finding meaning. Through thematic teaching the link and connection for meaning is natural. Therefore, both types of students benefit.

According to a study by Cheng (1994) on classroom environment, there is also a correlation between the classroom's physical environment, the teacher's power, and students' performance. This correlation was seen in the psychological environmental factor which included perceptions and feelings about social relationships between students and teachers. It was found that teaching innovative methodology and establishing a relationship with students that is friendly, trusting, and respectful will positively affect classroom climate and student performance. The student attitude toward the teacher and the student attitude toward the school has a positive correlation to student performance. This is important to consider because there is a relationship that must be established between a teacher and his/her students before special activities, such as environmental action projects or theatrical teaching can be accomplished. Within a creative, socially interactive teaching style, the teacher will capture an attentive audience. Therefore, students can gain a greater understanding of the subject being taught through this fun, motivating teaching style.
The research by Cheng stated that social interactions showed positive results in students that:

(a) were attentive to class activities and participated in discussion, (b) had good social relationships with each other, (c) behaved in an orderly and polite manner, and (d) competed with each other for achievement and recognition (1994, p.234).

Cheng’s research showed positive results in teachers that:

(a) were supportive and task oriented, (b) established rule clarity, (c) organized class assignments and activities, (d) attempted to use new teaching techniques, and (e) encouraged creative thinking in the students. Clearly, in effective classrooms, students did not experience homework overload and did not intend to drop out (1994, p. 234).

Cheng (1994) stated that, in the past, most teachers were only concerned with how to best teach knowledge in books and not concerned with their role with the students. His study supports this belief that teachers can change the social and physical environment in the classroom and improve student performance by the above means of motivation.

Teachers are capable of improving student performance. They are responsible for capturing the interest of their students with new and creative ideas. The teacher must also be a motivating factor in his/her classroom. A teacher needs to let the students know that the classroom is a “safe” place to discuss and openly question the subjects being taught. Once this is
established, motivating learning styles, such as cooperative groups, theatrics, and action projects, should be possible. The teacher can theatrically present a lesson, maintaining correct behavior, and raise the motivational level, as found in Cheng’s study. The “safety” will be there and the students should feel that it is acceptable to join in with this creative teaching. Before long, students may also be presenting in similar ways and a new classroom environment will be set.

Thematic or Interdisciplinary Teaching

According to recent reports, United States students ranked only eighth out of 15 countries in science achievement and by ninth grade, ranked fifteenth. This report stated that, “Only 5 out of 10 students think that much of what they learn in science class is useful in everyday life” (Crawley, Barufalsi, & Salyer, 1994, p. 240).

One way to show students the usefulness of science is to teach it with thematic connections to other subject areas, all relating to a common theme. If the chosen theme is energy, students would read and write about energy, compute energy math problems, and study the history of energy. The use of real-life materials, situations, and exploration into the natural environment are other possibilities. The Science Framework for California Public Schools, Kindergarten Through Grade Twelve (1990) supported this by stating:

Scientific literacy could receive a considerable boost if science were used as a vehicle to enhance reading, mathematics, and the arts. The use of
science to teach other fields has been shown to be quite successful in many exemplary elementary science programs. Science reading should be encouraged and integrated in the overall curriculum (p. 161).

Integration through themes is also noted in the California English-Language Arts Model Curriculum Guide (California Department of Education, 1988, p. 24). It stated that, "No matter what subject matter is being taught, effective teachers are aware that the English-language arts are used in all areas of the curriculum and that the nature of the language arts demands on learners is in many ways unique to each area." It continued to say that teachers must determine the correct level of integration needed between the subjects and plan programs accordingly.

Literature Based Learning

It's Elementary (California Department of Education, 1992, p. 4) reported that the language arts curriculum should be based around "compelling literary works." It continued to say that through literature, children gain significant content that develop to their abilities of language in listening, speaking, writing, and reading. Students will be able to further develop this understanding of content and connect it with meaning from all areas. It's Elementary also encouraged teachers of beginning readers and writers to create a, "rich environment, steeped in authentic language and stimulating stories that vitally connect with what the children already know and are curious about" (p. 4).
The English-Language Arts Model Curriculum Guide, Kindergarten Through Grade Eight (California Department of Education, 1988, p. 5) stated that “Teachers use literature as a base for integrating instruction in the language arts and as a means for helping students improve their skills in thinking, listening, speaking, reading, and writing.” It continued to state that literature “opens windows on the world” (p. 5). Students learn from literature that people are similar in some ways throughout the world, yet different in others. They also learn that problems and their solutions are also sometimes universal and others may be shaped by culture.

The English-Language Arts Curriculum Guide also explained that educators need to become aware and begin to plan programs that are based on the “centrality of English-language arts in the curriculum... No matter what subject matter is being taught, effective teachers are aware that the English-language arts are used in all areas of the curriculum” (California Department of Education, 1988, p. 24).

Interpretation and Drama

It’s Elementary stated that, “Arts instruction in the early grades affirms the natural joy children find in experiencing themselves - in paint, in song, in dance, and in dramatic presentation” (1992, p. 19). Furthermore, The California Visual and Performing Arts Framework (California Department of Education, 1989, p. 19) stated, “Students are interested in drama, and, when given the opportunity to participate in theatrical activity, respond with vigor and
dedication. It is a powerful subject for enriching the entire curriculum." The quote continued to state that schools, with a developed and integrated program in the arts for all students, will create a positive attitude toward learning and coming to school. This is an attitude that students will carry throughout their education.

An article by O’Neil (1989) stated, “Of the many teaching strategies which are likely to promote dialogue, the approach which has the greatest potential, and yet is the least often used, is drama in education--where teacher and students co-create fictional roles and contexts, in order to explore and reflect on some issue, concept, relationship or event” (p. 147). This article listed several comparisons of teaching curriculum to theatrical events. One comparison explained that curriculum events resemble street theater because they both need to be accomplished with “daring and dazzle”: to hold the attention of people who may be thinking of other things. Yet, curriculum should not allow for any spectators; all should be in “active participation” (p.151).

O’Neil's article continued to explain how drama in education is a model for authentic dialogue in the classroom. The use of drama and teaching in a role of another character could help change the classroom from a place where “something happens” to where there is “authentic dialogue” between the teacher and the students (O’Neil, 1989, p.156). “When a teacher works in role it is an act of conscious self-presentation, but one which invites the watchers--the students--to respond actively, to join in, to oppose or transform what is
happening. The teacher-in-role unites the student, trades on their feeling of ambivalence and vulnerability and focuses their attention (p. 156).

Teacher, Actor, and Interpreter

Tauber, Mester, and Buckwald (1993) compared acting strategies to teaching. They explained that teachers are always on stage. If the teacher is unable to hold his/her students’ attention, little learning will take place. Therefore, effective teachers “come alive” when they teach using dramatizing devices (p. 21).

Continuing the comparison, teachers need to know their lines, or content of the lesson. By pausing, teachers can also emphasize points in a lesson. Body language can raise the intensity of the subject being taught. A teacher should be able to walk, sit, or stand anywhere in the classroom as he/she makes use of the entire “stage.” This makes the lesson more exciting as the students have to follow a moving target (Tauber, Mester, & Buckwald, 1993, p. 22-23).

Similar to comic relief in theater, humor and laughter in the classroom help students feel less intimidated. They are more likely to take a risk and participate if the intensity level is not as high as during a more serious period (Tauber, Mester, & Buckwald, 1993, p. 24-25).

Play acting is another way to capture students’ attention. According to Tauber, Mester, and Buckwald, “stepping into the shoes of another person--
more suited to teach the subject matter” is a way to show confidence in teaching (1993, p. 25).

A final idea is for teachers to occasionally add suspense and surprise into teaching. One such way, is to get to know one’s students and going out of the way to say something personal to surprise them. The authors of this article concluded that inspiring teachers will hold their students’ attention in the same manner as good actors will keep grasp attention from their audience (Tauber, Mester, & Buckwald, 1993, p. 26).

Teachers are also interpreters, or guides, sharing the natural world with interested persons. They can always discover more ways to interpret understanding to their students. The following is a list of some common interpretive techniques that can easily be brought into the classroom (Regnier, Gross, & Zimmerman, 1992, p. 21-32).

Props or Realia: These can be almost any familiar object which might help to bring connections between the natural world and the concept being taught. Colors, senses, people, and historical artifacts can all be used to help demonstrate just how many shades of green leaves can be found, or what the sap of a maple tree really smells like.

Body language: Change the pitch and tone of your voice. Use gestures, body language, or imitate and recreate sounds and different voices. Create humorous situations, walk differently, move around, stand on top of a desk. Feel free to add props and change your posture.

Be original: Change your character and be someone else of more relevance to the subject. Tell
a story, use mental pictures and take your students on an imaginary field trip back in time, use puppetry, or bring in live animals.

Involve your students in the story or act: They may be the sound effects or participate in a game that emphasizes the concepts being taught. An interpreter should appear spontaneous; yet, must know their background information, be prepared, and have fun.

Teachers can choose what is comfortable for them and appropriate for their students. As a teacher experiments with these techniques, he/she will become more comfortable.
GOALS AND OBJECTIVES

The goal of this project was to develop an educational unit which would enable fourth, fifth, and sixth grade students to understand the importance of trees in our environment. The emphasis is on valuing trees and the life in, on, and around trees. The objectives used to reach this goal were to survey relevant literature, develop thematic lesson plans based on the chosen literature, adapt active-learning activities from popular environmental curriculum guides to correspond to the literature activities, field test the lessons with several age-appropriate classes, and have other teachers review the completed unit.

Each lesson has different objectives according to the topics being taught. These are some examples: preservation of the rain forests, life cycle of trees, tree rings, trees as natural resources, and desert trees. Each objective will also address a skill in at least one other subject area.
DESIGN OF PROJECT

More Than Trees is an interdisciplinary, literature-based unit, emphasizing drama and hands-on activities for grades four through six. This unit is based on ten popular children’s literature books: The Giving Tree by Shel Silverstein (1964), The Grandpa Tree by Mike Donahue (1988), The Other Way to Listen by Byrd Baylor (1978), Just a Dream by Chris Van Allsburg (1990), The Lorax by Dr. Seuss (1971), Tree in the Trail by Holling Clancy Holling (1970), One Green Mesquite Tree by Gisela Jernigan (1988), Once There Was a Tree by Natalia Romanova (1985), The People Who Hugged the Trees by Deborah Lee Rose (1990), and The Great Kapok Tree by Lynne Cherry (1990). The activities incorporate hands-on, cooperative learning groups, with both indoor and outdoor activities. Activity ideas came from a variety of curriculum guides such as Ranger Rick's Nature Scope: Trees Are Terrific (National Wildlife Federation, 1990), Project Learning Tree (American Forest Foundation, 1993), and Project WILD (Western Regional Environmental Education Council, 1993).

After completing this unit, students will have communicated verbally in discussions and dramatic presentations, in writing, and in art. Students also will have become environmental problem solvers as they reasoned the issues involved in preserving and protecting trees and forests around them.

Evaluation is in the form of authentic assessment. Charts and grading rubrics are provided at the end of the unit for group, portfolio, writing, and project assessment.
Also in this unit on trees, is the opportunity for teachers to create their own tree costume and teach by interpretation. To motivate and stimulate a greater interest in the unit, teachers may try dressing up as a tree to present an opening lesson. After reading the background information included in the unit, teachers could teach as a talking tree. The class could choose to go outside and explore the other life which also inhabits the same environment as the tree. This will not only be educational and motivational for students, but teachers will also enjoy it. Teachers will be amazed at the attention received as a talking tree. Throughout the unit, there are opportunities for students to also dress-up and act out tree plays, simulations, and puppet shows.
IMPLICATIONS FOR EDUCATORS

This curricular program can be implemented into a regular curriculum. The unit can be taught thematically by reading a different book and completing its activities each day. It could also be taught as a thematic unit within one curricular area, such as language arts or science, breaking each concept into its separate lessons to be completed in an hour teaching block each day.

The unit will enable students to develop awareness of, knowledge about, understanding of, and sensitivity towards trees as they engage in activities where they demonstrate actions of caring, "environmentally-friendly" citizens. This curriculum includes active learning, hands-on activities, and cooperative grouping. Students will begin to think globally, but can act locally by writing letters, working on school action projects, creating plays to protect land in the rain forest, or simply expanding their understanding of the natural world around them.

It is important to begin teaching this environmental education unit about trees for the following reasons: (a) it is motivating for students working in cooperative groups, with a variety of learning styles, and using interdisciplinary applications; (b) subject areas are connected, making learning relevant, meaningful, and most of all, fun; and (c) students gain personal satisfaction from participation in group action projects.

Teaching environmental education also shows a correlation with the decrease in the high school dropout rate. In an article by Stoner (1990), she began by stating that the standard instruction teaching styles have not proven
successful in teaching at-risk students. She reported on the outcome of 26 teachers who implemented environmental education into their regular curriculum. The lessons came from two very popular curriculum guides in environmental education: Project Learning Tree (American Forest Foundation, 1993) and Project WILD (Western Regional Environmental Education Council, 1993). The outcomes, based on written teacher evaluation, showed that environmental education fits the need of all students, including those at-risk. Therefore, environmental education not only will benefit our students in environmental literacy, but may also help reduce the dropout rate. Environmental education empowers students with a personal feeling that they can make a difference in their environment.

This unit can be used to begin teaching environmental education in almost any fourth through sixth grade classroom. Lesson are easily adaptable for grades above or below the suggested levels. By using this unit, a teacher will become familiar with the resources available and be prepared to begin integrating environmental education into their own curriculum. Also students will be motivated to learn how they can further help their environment.
APPENDIX: MORE THAN TREES UNIT
INTRODUCTION
Why Teach About Trees?

What is a tree? Is it simply a tall, woody plant that shades humans from the hot, summer sun? To many people, that is a tree's sole purpose. However, the more one knows and learns about trees, the more amazing and spectacular they appear.

Trees are special plants that generally grow at least 15 feet tall and have one dominant trunk (Braus, 1992). Unlike most plants, a tree trunk is covered with hard, woody bark for protection from insects and diseases. The branches of different trees produce various shaped leaves, such as flat, broad leaves that fall each winter or the waxy needles of an evergreen.

Trees help to define the major ecological land biomes of the world. The different types of trees that grow in an area are interrelated to the species of wildlife inhabiting that environment. All things in nature are interdependent and, therefore, cannot exist as we know it without trees. Trees produce the oxygen needed for human and wildlife survival. In turn, many trees rely on animals to transfer and fertilize their seeds. This relationship results in an interwoven life cycle between plant and animal life moving through a cyclical pattern: growth, death, decay, and rebirth. Even an old, fallen tree is home to many insects and fungi.

A tree can be a habitat to a variety of insects, birds, and small rodents. A small oak forest may be home to more than 4,000 species of birds, insects, and plants (Champion, 1989). Forests provide habitats for more wildlife species than any other biosphere (Miller, 1994). They also provide food, wood, fibers, energy, medicines, raw materials, and many other resources for humans. In the search for these materials, biologically-diverse forest ecosystems need to be maintained and protected.

The importance of protecting and maintaining the world's trees and forests can be understood once one looks at the history of human interactions and use of the forest. "Since agriculture began about 10,000 years ago, human activities have reduced the Earth's forest cover by at least one-third, to about 34% of the world's land area" (Miller, 1994, p. 132). According to Miller, 90%-95% old-growth forests in the United States have been cleared away since 1620. At the current rate of deforestation, one-fourth of the Earth's species could become extinct by the mid-twenty-first century (Miller & Tangley, 1991).
The damaging effects to the land and endangerment of many species of wildlife are just two of the world-wide controversial issues surrounding deforestation. The loss of trees and forests, combined with continued mismanagement, creates concern for our planet's future, as this once abundant natural resource is depleted. Some positive examples of maintaining trees are planting one's own trees, tree farms, selective harvesting, and reforestation. Our trees are a symbol of all life: past, present, and future.

BACKGROUND INFORMATION

TREE FACTS

WILDLIFE AND TREES:

1. A small oak forest can provide homes for more than 4,000 species of insects, birds, and plants.

2. The most species are found in tropical forests: 41,000 species of insects were found in a small section of a forest in Peru. However, two thirds of Central American rain forests have been cleared in the last 30 years.

3. In comparison to a deciduous forest, which can support six to ten species of birds, a conifer forest will support three times more.

4. Native trees support more life than do trees brought from other countries:
   a. In Russia, a native larch is home to 44 species of insects. However, in Britain, as a non-native introduction, it supports only 17.
   b. In Britain, a native willow supports 266 insect species. However, in Russia, as a non-native introduction, only 147 species are found.

5. Many bird species are dependent on trees for food. Twelve species of small birds can be supported by the North American aspen and willow. Some examples are:
   a. Hummingbirds feed on nectar.
   b. Flycatchers catch butterflies and other flying insects.
   c. Bluebirds search for food from the branches, dropping to the ground to catch large insects.
   d. Wrens search for food in bushes.
   e. Sparrows search for small seeds.
   f. American robins catch worms and beetles on the ground.
6. Naturally growing conifer forests support more wildlife than those specially planted by humans to provide wood. Many of these plantations are planted too close together and only contain trees of the same age.
   a. Trees that are the same age are relatively the same height. These tall trees will block out light so it becomes difficult for plants to grow.
   b. Being so close, a thick layer of needles collect on the ground stopping plant growth.
   c. Without bushes and plants, there is little food for insects.
   d. Fallen trees provide wood. They are taken by humans rather than left for the natural process of decomposition by insects, fungi, and mosses which would create a fertile forest soil.

7. A forest is more than just trees. It is a community of plant and animal life which follows an endless cycle of growth, decay, life and death. Trees and wildlife are dependent upon each other for their survival:
   - United States forests supply habitat for more than 80% of our country’s wildlife.
     - Birds feed on insects which can destroy trees.
     - Squirrels feed on acorns and other seeds and thus help to scatter the seeds throughout the forest.
     - Insects carry pollen from flower to flower fertilizing the plants while collecting the necessary food for their survival.
     - Many insects in the larval stage feed upon the wood of trees, sometimes destroying them. Other insects eat dead bark, which causes decay, enriching the soil.
     - Leaving snags (standing dead trees) and fallen timber (boles) maintains a diverse wildlife habitat, which eventually is recycled as nutrients.
     - While searching for food, earthworms help dig passages in the soil which allow air and water to pass through the earth and increase plant growth.
     - The food cycle starts with plants, which create their own food in a process called photosynthesis. Next, herbivores, plant eaters, feed on the plants. Then carnivores, meat eaters, eat the herbivores and smaller carnivores. Completing the cycle, decomposing bacteria break down the dead material to replenish the soil, enabling new plants and trees to grow.
     - Therefore, the food cycle of the forest begins and ends in the soil. The trees and plants take in water and other
nutrients from the soil where their roots help to keep the soil from being washed away.

8. We can protect species diversity by protecting the earth’s ecosystems that serve as their habitats. Since the introduction of agriculture, about 10,000 years ago, human activities have reduced forests by one-third to approximately 34% of the world’s land area.

9. Approximately 22% of the commercial forest area in the United States is located within 156 national forests. Most of these forests functions as:
   a. Grazing lands for over 3 million cattle and sheep each year.
   b. Multi-million-dollar mining operations, have networks of roads eight times longer than the U.S. interstate highway system, and receive the more recreational visits than any other public federal lands.

10. No nation has set aside as much of its land for public use, enjoyment, and wildlife as the United States. Approximately 42% of the United States is designated as the following:
    a. The 156 forests and grasslands in the National Forest System.
    b. National Resource Lands provide a supply of energy and strategic minerals and preserve rangelands for livestock grazing.
    c. The 503 National Wildlife Refuges that designate 24% of their land as wilderness.
    d. The 359 national recreation areas in the National Park System, 50 are major parks, and 309 include recreation areas, monuments, memorials, battle fields, historic sites, parkways, trails, rivers, seashores, and lakeshores.
    e. The National Wilderness Preservation System includes 474 roadless areas within the national parks, national wildlife refuges, and national forests.

If forests and wilderness are so important to wildlife and so popular for people to visit, what can be done to sustain our forests?

Adapted from: *Trees of Life: Saving Tropical Forests and Their Biological Wealth* by Miller and Tangley. and "The Life of the Forest" by Champion International Corporation.
THE GIVING TREE
Shel Silverstein

Silverstein, Shel. (1964) The Giving Tree
Harper and Row
Primary/Intermediate
picture book

This is a story of a boy as he grows up and takes all the tree has to offer
until there is nothing left of the tree but a stump. When the boy grows into an
old man, all he wants is a place to sit and rest. The tree offers its stump for the
man to rest on and both are happy.

Environmental Topic: Management of Our Natural Resources

Environmental Concepts:
1.) Trees supply both beauty and necessary resources.
2.) Natural resources are not always renewable.

Discussion Questions:
1.) To whom did the tree give its gifts?
2.) Name some of the activities and games the boy played with the tree?
3.) What makes the tree happy?
4.) Should the boy have carved his initials into the tree?
5.) Have you ever taken anything from a tree?
6.) As the boy got older how did he use the tree?
7.) What was left of the tree for the old man at the end of the story?
8.) Was the tree really happy? Why or why not?

Part 1: Science/ Language Arts

Objectives: Students will be able to discuss uses for trees and write their
own version of The Giving Tree which will reflect their understanding of how
trees benefit humans.

Materials: Materials needed: Overhead or chalkboard; collect 15 items made
from trees: pencil, suntan lotion, cork, gum, cardboard, toothpick, newspaper,
candy bar with almonds, vanilla flavoring, apple, can of paint, tissue paper,
rubber gloves, plastic comb or brush, wooden chair or other piece of furniture,
magazine, baseball, rayon cloth, etc..)
Procedure.
1.) Read the following excerpt from The Giving Tree. Tell the class, “Today we
are going to be discussing trees and how they benefit humankind.”
Once there was a tree....
and she loved a little boy.
And every day the boy would come
and he would gather her leaves
and make them into crowns and play king of the forest.
He would climb up her trunk
and swing from her branches
and eat apples.
And they would play hide-and-go seek.
And when he was tired, he would sleep in her shade.
And the boy loved the tree...
very much
And the tree was happy.

2.) Ask the class to, “Think of examples from the story and any other uses of
trees you are aware of.” Write ideas on the board. (Accept all answers.)

3.) Set out items made from trees on desk tops around the classroom. Have
student groups predict whether or not each item is made from trees. Make a
chart on the board to list student responses.

4.) Discuss results: all items were made from trees. Ask: “Do humans benefit
from trees? What do you think the effects are on the trees, forest, or
environment, now that these items have been made for our use?

5.) Writing: Using the activity as background information, have students write
their own stories of the Giving Tree. Have students include benefits such as
some of the boy’s personal wants and needs from the tree as he grows older.

6.) Finish reading The Giving Tree by Shel Silverstein and ask the discussion
questions and have students read their stories aloud.)

7.) Students should finish their stories and share in class.
Part 2: Science

Objectives: Students will gain knowledge of the necessity of trees (benefits and dangers of cutting them down) as they read trees facts; observe life in, on, and near trees; and organize data.

Materials:
1.) Overhead transparency with the following passage.

Next time you're near a tree, look around more carefully. You'll be surprised how much there is to see. Near a tree, life is everywhere: above your head, below your feet, all around you. And the fascination that it holds is limited only by the time and curiosity for wonder that you bring to it.

A forest is more than just trees. It is a community of plants and animals which follow an endless cycle of growth, decay, life, and death. Trees and wildlife are dependent upon each other for their survival:

U.S. forests supply habitat for more than 80% of our country's wildlife.
- Birds feed on insects which can destroy trees.
- Squirrels, feeding on acorns and other seeds, help to scatter seeds throughout the forest.
- Insects carry pollen from flower to flower which fertilizes flowers and enables new plants to grow.
- Many insects in the larval stage feed upon the bark of trees, sometimes destroying them. Other insects eat dead wood, thus helping to break down trees to become part of the soil.
- Snags (standing dead trees) and fallen timber (boles) maintain diverse wildlife habitats.

2.) Copy the Tree Comparison Matrix for each student

Procedure:
1.) Read the overhead as a class.

2.) Have volunteers come to the front of the class to read the facts from the index cards

3.) Students will go out into the yard in search of life in or near trees. Put students into groups of four. Have them assign one person as the recorder who will need paper and pencil.

4.) Explain to students that they are groups of scientists in search of evidence
of life existing in, on, or near trees. This evidence may include viewing animals (such as a bird or an insect), footprints, animal homes (nests, holes in bark), etc. When evidence is found, have the recorder note what the group discovered (description), and where it was found (in, on, or near the tree).

5.) After 15 minutes have groups come together to explain all they discovered.

Ask if any groups noticed evidence of human life near or on trees, such as broken branches, knife carvings, etc..

6.) After students return to class, discuss their results. (List on board or overhead.) Have students complete graphic organizer: Benefits/Dangers of Cutting Down Trees.

**Part 3: Extension/Concluding Activities: Art/Drama**

The Giving Tree Skit

Characters:
- Narrator
- Tree
- Stump
- Little boy
- Young Man
- Settled Man
- Middle-aged man
- Old Man
- other: (directors, producers, screen writers, designers, stage crew-scenery, props, sound effects, and lighting)

Props:
- Apples
- Crown of leaves
- carvings to stick on the tree
- removable branches and leaves
- Moustache, beard, cane, baseball hat (other typical props symbolic for the different ages.)
- Book: The Giving Tree
- Optional: (Background scenery, sound effects, lighting)
Skit:
The narrator tells the story while the tree (two people: tree and stump) is standing on stage. The little boy and the tree are acting out the story. They talk whenever the conversation is written in the book.

1.) Assign jobs according to the following definitions for movie making: Students will work cooperatively in turning this short skit into a movie. Allow creativity as students make their roles as realistic as possible. Students may want to add scenes from their stories as different acts or titles. When scenes are ready, have students present their skit as a play to other classes, or videotape and share it as a movie. Bring in some popcorn to eat as they enjoy watching their creation.

Assign jobs according to the following definitions for movie making:

**Producer:** A producer picks a story to turn into a movie. He/she puts together the team to make the movie, and makes sure that the movie turns out well. He/she also casts the roles, chooses the props, sets up rehearsal times, and arranges for use of video cameras or other technology available.

**Director:** A director controls the filming of a movie. He/she works directly with the screenwriter, actors, camera operators, and designers. He/she may need to ask actors to read a line differently, or to stand rather than sit, and so on.

**Screenwriters:** A screenwriter writes the script which the director turns into a movie. He/she works with the actors and director to improve the script as they rehearse.

**Actors:** Perform the roles.

**Designers:** Design the costumes and other necessary props and scenery.

**Stage crew:** Work with designers to create the perfect setting for the production. This includes gathering props, creating the correct lighting and sound effects.

Discussion on the experience:

- What do you think are some challenges faced by a real producer?
- What skills does a producer need for his/her job?
- Why does a director need to understand acting, writing, and camera work?
- What other skills does a good director need?
- Does hearing actors read a script help you to improve the script?
- What makes a scene exciting? Boring? Funny?
# Tree Comparison Matrix

<table>
<thead>
<tr>
<th>Animals</th>
<th>Benefits of Living Trees</th>
<th>Dangers of Cutting Down Trees</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Plants</td>
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<tr>
<td>People</td>
<td></td>
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</tr>
</tbody>
</table>
Walter thinks his friend's birthday gift is stupid. Why would anyone want a tree? But, he dreams of the future and soon his ideas change. Maybe our future isn't as safe as he thought.


Environmental Concepts:
1.) People's choices to reduce, reuse, and recycle will make a difference in the future.
2.) Trash does not just disappear. Therefore, waste management is important.
3.) People need to protect and preserve what is naturally beautiful.
4.) People should be aware of their effect to the environment as they use industrial machines and other energy sources.

Discussion Questions:
1.) Describe Walter at the beginning of the book. Have you ever felt like Walter? Can recycling seem like a bother?
2.) Describe Walter at the end of the book. (Or compare and contrast Walter from the beginning of the book to the end.)
3.) What type of company did the loggers work for? Why did this have an effect on Walter?
4.) To what type of company did the smoke stacks belong? Why did this have an effect on Walter?
5.) The men on the boat were overjoyed. Would you be if your were a fisherman and had caught your second fish for the week? Why or why not?
6.) In the last scene Walter thinks he has now gone to the past because he sees a push lawn mower and clean clothing on a clothes line. Is he in the past? Explain.
7.) Have you ever felt like Walter in the beginning of the story?
8.) What changes do you think Walter will make in his actions?
9.) What are some changes you can make to help the environment?
10.) Can the pollution from one person make a difference?
11.) Can the changes of one person make a difference? How?
12.) How would you feel if you got a tree for your birthday?
13.) Can one tree really make a difference? Explain.

Objectives: Students will become familiar with the the varying rates of decay from common objects found in a landfill as they are introduced to solid waste management.

Students will become aware of the unpleasantness of litter.
Students will generate ways to reduce wastes.

Materials: Just a Dream, plain 8 1/2" x 11" drawing paper, crayons, lined writing paper, Enduring Litter(copied for everyone), Litter(traffic ticket, cotton rag, rope, wool sock, bamboo pipe, painted wooden stake, tin can, aluminum can, plastic 6-pack cover, glass bottle), medium box, magazines, recycled items (see suggested items in part 3), 8 small trash bags, soap (for dirty hands)

Part 1: Just a Dream: Language Arts

Procedure:
1.) Read the storybook Just a Dream by Chris Van Allsburg and ask the above discussion questions:

2.) Have students draw and color a picture of their favorite place in nature. Collect the pictures to return them the next day for part 2: “What Can We Do?” (Take the pictures home with you and glue small cut up pieces of trash onto their drawings. Return student drawings to their desktop prior to their arrival.)

Part 2: “What Can We Do?”: Language Art/ Social Studies

Procedure:
1.) Observe students’ reactions. Discuss how they felt and why they felt that way. Have each student write for 20 minutes about: “What I think about Litter” staple it to appropriate picture and display together as a bulletin board.

2.) Ask, “Is it possible that your special place could look like that in the future (just like Walter’s neighborhood did) if humans do not take action in controlling waste pollution?

3.) What do you think you could do to let people know about this problem?

4.) How can people help to keep our environment safe and healthy? Brainstorm ideas on large butcher paper. Accept all answers. This information is needed in part 3.
5.) One student answer will be to recycle (if not, help to generate this response). Ask for 10 students to volunteer to come to the front of the class. Hand each of them an item from the “Enduring Litter” page (see last page of this section). Ask the students to arrange themselves in chronological order according to how long it would take each of those objects to decay if dropped alongside the road. (You may need to give some background information on decay, decomposition, and biodegradable objects before you do this.) Students will speculate and come up with a decision as a group. Meanwhile, give students at their seats the handout with the names of the objects, the correct order, and the time description for decomposition. The students at their seats read their handout aloud and the group at front rearranges themselves accordingly.

6.) Ask, “Were any of you surprised at the amount of time it would take for these objects to turn back into soil? If it takes this long to ‘get rid of’ our trash, is it important to reduce, reuse and recycle?”

Part 3: The “Magic Recycle Box”

Procedure:
1.) Have students cut out pictures from magazines of objects that could be recycled. Allow students to glue these pictures onto a medium sized box. Cut a flap at the top of each end.

2.) When the box is covered, the teacher secretly puts items that are made from recycled materials inside the box. Playing the magician, the teacher then puts into the box an item that can be recycled, and shakes the box and pulls out a recycled item that could have been made from it. Discuss some background information (written below) as you share each object. (Have fun with this. Use something for a magic wand, wear a top hat...)

Suggested items:
- Aluminum cans and glass bottles....same form they went in.
  (Science background--The process to recycle includes very high temperatures so that bacteria are killed.)

- Newspaper....recycled paper or a cereal box if the inside is gray/brown.
  (Science background--Paper can become paper but it has a different texture and color than bleached white paper due to the mixture of post-consumer paper included with virgin pulp in the recycled paper.)
Plastic....Carpet or plastic outdoor furniture or doghouse (use a picture). (Science background--Plastic cannot be used for plastic drink bottles because the recycling process for plastic does not get the material hot enough to kill bacteria.)

Leaves...a bag of soil. (Science background--This could be a quick introduction to a possible composting lesson. As leaves, food waste, and lawn clippings are allowed to decay they will eventually return nutrients to the soil for new plants to grow.)

3.) Referring back to the brainstorm list of "What can we do " ideas, say, "We can try to help create a healthier and safer environment around our school, home, and community. Recycling is just one way to do this. Yesterday you came up with many excellent ways we can begin, but those solutions are not magic. They will require some work by us. Let's start our action by helping to keep our school clean. If everyone creates a sign with their ideas from yesterday we can post these around school to help make other students aware of our problems and keep our school a special place for all of us now and in the future."

Part 4 Extensions: Physical Education/Mathematics

1.) The Great Garbage Hunt: How much trash or recyclables can we find on our playground and field? Students have fifteen minutes to see which team can find the most trash on the field.

2.) Trash Count: Students count the number of pieces of trash or recyclables each group found during the P.E. activity. They add up all the data, charting it on a graph. Then they figure out how much trash and recyclables would we have on our field in one week, one month, and one year? Discuss: Why is it so important for us to keep our school clean? (Make sure students wash their hands thoroughly after this activity.)
Enduring Litter

TRAFFIC TICKET
2-4 weeks

COTTON RAG
1-5 months

ROPE
3-14 months

WOOL SOCK
1 year

BAMBOO POLE
1-3 years

PAINTED WOODEN STAKE
13 years

TIN CAN
100 years

ALUMINUM CAN
200-500 years

PLASTIC 6-PACK COVER
450 years

GLASS BOTTLE
undetermined

Source: Book of Litter 2
THE LORAX
Dr. Seuss

Dr. Seuss. (1971) The Lorax
Random House
All levels
Picture book/fantasy

The Lorax is a creature who speaks for the Truffula Trees that are disappearing. The Once-ler and his family are greedily making a fortune from these trees. As the Once-ler uses more and more trees, the effects on the environment are shown. The story ends with the last Truffula seed offered to the reader. The reader is then asked what he/she will do.

Environmental Topic: Endangered plant species

Environmental Concepts:
1.) People can make a positive or negative effect on their environment.
2.) The natural environment does not belong to just a few individuals. Everyone and everything is affected by our actions.
3.) Many of the world's natural resources are not renewable.
4.) Humans have caused many species to become extinct.

Discussion Questions:
1.) Who was the Once-ler?
2.) What did he make with the Truffula tuft?
3.) What was a Thneed used for?
4.) What was the Lorax?
5.) Why was it there?
6.) Who was affected when the trees were all hacked to the ground and there was not enough Truffula Fruit to go around? What happened to them?
7.) What words describe how the Once-ler was acting as he enlarged his factory: bigger, and bigger, and bigger?
8.) Why could the Swomee-Swans no longer sing a note?
9.) What happened to the ponds where the Humming-Fish hummed?
10.) How did you feel when the last Truffula Tree was cut down?
11.) Would you like to live in this town? Why or why not?
12.) Describe the difference between the town when there were Truffula trees verses when they were all gone.
13.) Why was the Lorax lifted and taken somewhere from the far end of town where the Grickle-grass grows?
14.) What did the word UNLESS mean that the Lorax left?
15.) At the end of the story what did the Once-ler say everyone needs?
16.) What was his advice for the boy to do with the last Truffula seed?
17.) If he did this who did the Once-ler say might come back?

Objective: Students will determine their use of the Truffula seed by writing and illustrating what they would do with the last Truffula seed, including three supporting reasons from the story.

Materials: The Lorax by Dr. Seuss. Pencil, paper, crayons, a seed, a glass container labeled “The Last Truffula Seed.”

Lesson 1: Language Arts

Procedure:
1. Read the story to the students and ask discussion questions.

2. Show the class the seed (placed in the container to show how special it is). Brainstorm all the possibilities that the class could do with the seed. List their ideas on an overhead, chalk board, or large piece of butcher paper. Leave this up as students write and illustrate their ideas.

3. Review the three paragraph essay. Paragraph 1: Introduction, introduce book and summarize story. Paragraph 2: Body, discuss what you would do with the last seed and why? Paragraph 3: Conclusion, what have you learned from reading this story?

Extensions: Language Arts/Science

1.) Create a puppet show of The Lorax. See the following pages for sample puppets and script.

2.) Plant the seed. Learn about caring for the seed as it grows. Keep a science journal with observations as the tree grows. See the following pages for tree planting tips.

Have students copy the following information onto the first page of a science journal:

Journal Observations
(Include dates, time, title, qualitative and quantitative observations)
1.) Qualitative: Observations using the five senses (sight, smell, touch, taste, sound).
2.) **Quantitative:** Observations using measurement or numbers.

Have students number the following observations according to the correct type of observation:  
- size  
- number  
- texture  
- measurement  
- color  
- shape  
- smell  
- sound
The Lorax
Dr. Seuss

Characters:
   Narrator
   The Lorax
   The Once-ler
   The Boy
   Truffula Trees (5)
   Bar-ba-Loots (2)
   Swomee Swans
   Humming Fish

Narrator: Read the first and third paragraphs of the book. (A colorful background scenery should appear behind the narrator or on the stage.)

Boy: What was the Lorax? And why was it here? And why was it lifted and taken somewhere?

Once-ler: A long time back when I first came to this land, the grass was still green, and the pond was still wet, and the clouds were still clean. And...I first saw the Truffula Trees.

(Truffula trees come on stage)

   The tree tufts were wonderful, much softer than silk. I knew then what I’d do. I built a shop. Then I chopped down a tree with one chop (chop down one tree). Then with the tuft, I knitted a Thneed. At that instant the Lorax appeared.

Lorax: Mister! I am the Lorax and I speak for the trees, for they have no tongues. What is that thing you’ve make of my Truffula tuft?

Once-ler: Look, Lorax, I’ve only chopped one tree. I’m doing no harm. I’m making something quite useful, that everyone needs.

Lorax: I repeat. I speak for the trees!

Once-ler: I’m busy. Please leave. I must build a factory to make more Thneeds. (Chop down two more trees.)

Narrator: The Lorax left and wasn’t seen for quite a while. But, one day he
came back. (To show time passing, the background scenery should be changed to the new polluted setting with the huge factory in the background of smoggy skies)

**Lorax:** (The Bar-ba-loots appear on stage with the Lorax) I am the Lorax and I speak for the trees. But I'm also in charge of the Bar-ba-loots, who eat Truffula fruits. Thanks to your hacking down trees there aren't enough Truffula fruits. Now they have to try to find food somewhere else.

**Bar-ba-loots:** Without the Truffula Fruit we have to leave our homes and and the life we are used to living here in the land of the The Truffula Trees.

**Once-ler:** I'm sorry, but business is business, and business must grow. (Chop down one more tree. There should be only one left after this.)

**(Lorax and Bar-ba-loots leave sadly)**

**Narrator:** The Lorax returned once again. (Lorax comes on stage with Swans and Fish)

**Lorax:** (Coughing) I am the Lorax. Once-ler! You are making such smogulus smoke! My Swomee Swans can't sing a note!

**Swomee Swans:** (Try to sing a few notes, but end up coughing) No one can sing with such smog in their throats!

**Lorax:** So I'm sending them off. Where they will go, I do not really know!

**(Swans fly off stage)**

**Lorax:** What's more, Mr. Once-ler, you're dumping your leftover factory goo into the pond where the Humming-fish hummed!

**Humming-Fish:** (Trying to hum, but end up gasping for air.) No more can we hum, for our gills are all gummed!

**Lorax:** So I'm sending them off. I hear Lake Erie isn't so dreary!

**(Fish swim off stage.)**

**Once-ler:** (Yelling) Listen here, Lorax! I have my rights, and I'm telling you I intend to go on doing just what I do! Infact, I'm planning on biggering and
biggering, turning trees into Thneeds, which EVERYONE, EVERYONE needs!

**Narrator:** At that very moment they heard a loud whack. (Thump on a desk!) Then they heard the tree fall. (Chop down last tree.) The very last Truffula Tree of them all! Now all that was left beneath the smoggy sky was a big empty factory, the Lorax, and the Once-ler.

**Once-ler:** (Talking to the boy again.) The Lorax said nothing, just lifted himself by the seat of his pants and left this place without leaving a trace. All the Lorax left in this mess was a sign that said UNLESS. (Hold up the sign.) What that meant, I just couldn’t guess! That was long, long ago. But all I’ve done since then is worry with all my heart. But now, now that you’re here, the word of the Lorax seems perfectly clear. UNLESS someone like you cares a whole lot, nothing is going to get better. It’s not! SO catch! (Throw the seed to the boy.) It’s the last Truffula seed. You’re in charge of the last of the Truffula seeds. And Truffula trees are what everyone needs!
Tree Planting Hints

You're in charge of the last of the Truffula Seeds

And Truffula Trees are what everyone needs.

Plant a new Truffula. Treat it with Care.

Give it clean water. And feed it fresh air.

Grow a forest. Protect it from axes that hack.

Then the Lorax and all of his friends may come back.

- The Lorax

Students work in teams to:

1.) Choose the site (preferably a semi sun/shade, eroded area.)
2.) Dig a hole with trowels.
   • Dig the hole so the roots can spread out.
   • While digging the hole, be sure to put top soil in one pile and sub soil in another pile.
3.) Plant a small sapling. (A suggestion for removing small trees from containers: roll the container back and forth in your hands to loosen the tree roots. Then the tree should slide easily out of the container.)
4.) Cover the hole.
   • Put the tree into the hole with the rich top soil in the bottom of the hole and cover with the sub-soil.
5.) Make a circle of small rocks around the tree so other people will not step on the tree.
6.) Water the soil.
   • Water the tree well.
   • The first year is the hardest on a tree. They need to receive a lot of water.

Adapted from The Orange County Outdoor Science School
Puppets

Be creative and imaginative with puppetry. Allow students to use a variety of materials: construction paper, tissue paper, pipe cleaners, yarn, googly eyes, scraps of material, sequins, etc. The more movable parts, the more fun the puppet will be. Here are several different types of puppets that students can choose from.

1.) Paper bag puppets: This is common, but always fun. If you have never made one before, all one needs is a lunch bag, some construction paper, and imagination. Put your hand inside the bag and use the folded bottom as the puppet's mouth.

2.) Stick puppets: These are two-dimensional puppets. Draw a large picture of your character and glue it onto a tongue depressor or popsicle stick. To manipulate the puppets, hold them so that your hands are just below the edge of a table. When they are moved, the puppets will seem to be walking alone by themselves.

Three-dimensional stick puppets are also possible. Try using paper towel rolls or toilet paper rolls. The tubes can be used either vertically (for people, trees, rockets, etc.) or horizontally (for animals, cars, or other creatures). Pompoms also make nice body parts that can be easily glued down on a stick and turned into a puppet character.

3.) Sock Puppets: These are more durable puppets. Students will place the sock on the hand they do not usually use and glue eyes, ears, arms, etc. onto the sock. Mouth piece is important in creating a nice sock puppet. Make sure to do this with your hand in the puppet. See illustration below for how to position your hand and the mouth piece.
4.) Finger Puppets: For this style of puppet it is important to have some stiff cardboard or tagboard. Cut two holes at the end of a piece of stiff cardboard. The piece should be in the shape of a rectangle with the corners rounded. Paste a head, face, arms and clothing on the cardboard. The two holes at the bottom of the puppet are for the fingers. These become the legs of the puppet.

Glove-Finger puppet: Find an old glove. Cut the finger off of it. Decorate it as one of your characters. Slip it onto your finger and let the story begin. Velcro or snaps allow for movable characters to be placed on the same glove. Sew the snap or velcro to the back of a pom pom or felt puppet so that the puppet can be attached and removed easily.

5.) Pop-up Puppets: For those shy characters, this type of puppet has a place ready to hide. Using a paper cup (or similar container) cut a hole in the bottom for a stick to go through. Create a stick puppet that can fit into the cup and pop out when it is ready.

6.) Construction paper puppets: Using a 12" x 9" piece of construction paper fold it in half and cut and arch across the top. Glue the sides together and decorate, drawing the character and adding other details.

Or, fold the paper vertically into thirds. Fold it horizontally in half. Then fold the open top layer back to the center fold. Flip it over and fold the remaining piece back. See steps below. The fingers go inside the folds to open and close your puppet's mouth. Add a face and a body.
The Top Ten Tips for the Puppeteer

1.) Practice with your puppet. The goal of a puppeteer is to make the audience feel as if the puppet is alive on stage.

2.) The puppet’s head is usually the most important part because the face is the focal point of all its activity. Make sure to hold the face so that the audience can see the eyes.

3.) The best ways to hold a puppet are over your head or in front of your face. But remember, if you are speaking, do not let your voice get muffled behind your puppet.

4.) Exaggerate the puppet’s movement. A happy or excited puppet should bounce around the stage. A sad puppet might jump nervously backwards when another character approaches. Practice other personalities and behaviors with your puppet.

5.) Develop character voices. Again, exaggeration is important. Use any body movements possible with your puppet to help emphasize its character.

6.) Make sure your finger, wrist, and arm movements are clear and meaningful.

7.) Freeze your puppet when other puppets are speaking so you do not distract from their parts.

8.) Important words and phrases always need emphasis with body movements.

9.) Keep practicing to make your characters convincing. This means to know your puppet’s script so you do not stumble on its lines.

10.) Have fun as you preform with your puppet. Create props and background scenery for your puppet show. Remember, it is natural for a puppet to use its mouth to handle props.
All levels
Picture book

When a man, with the intent of chopping down a great Kapok tree in the
Amazon rain forest, stops to rest several animals and a native boy speak to
him. His decision, in the end, portrays the interdependence of all living things
on our earth.

Environmental Topics: Loss of habitat, endangerment of the rain forest,
and endangered species.

Environmental Concepts:
1.) Every tree is important to life in the rain forest.
2.) What happens in the future depends on what we do today.

Discussion Questions:
1.) What was the significance of the Kapok tree to the boa constrictor?
2.) The bee says, “All living things depend on one another.” What does that
mean?
3.) What did the monkeys fear would happen to the rain forest as the man
would come back to chop down another tree, and another, and another?
4.) Who does the toucan fear will come and set fires to clear the underbrush as
soon as the forest disappears?
5.) How does cutting down one tree affect the jaguar from finding his dinner?
6.) What do trees produce that is vital to all life?
7.) Explain this statement: “What happens tomorrow depends upon what you
do today.”
8.) Do you think the rain forest is beautiful?
9.) What was the little Yanomamo boy’s hope when the man awoke?

Objectives: Students will research an endangered species (plant or animal)
and give an oral report to share an understanding of the effects of loss of
habitat in the rain forest. Students will create a mask and a sign to carry while
participating in a “Save the Endangered Species Parade” and skit.

Materials: Endangered species names and pictures (see the following
pages), Endangered species rhyme, research materials, paper mache materials (flour, tinfoil, newspaper, containers), and poster boards.

Procedure:

Part 1: Language Arts: Research

1.) Copy endangered species names and pictures and cut them out. Let students draw their species for research out of a hat.

2.) Students must research their species, finding out facts related to the species’ habitat, its food, general description, and most importantly, why it is endangered.

3.) They will create a poster with a large picture of their species and a title, “Save the __________.” Students should include the reason the species is endangered on this poster.

4.) Discuss what makes a good speech? Students should suggest the following (if not, give them hints.)
   - Look at your audience.
   - Speak loud and clear.
   - Do not talk too fast.
   - Stand tall.
   - Do not move around too much to distract your audience.
   - Practice your speech.
   - Do not just read from your notes.

5.) Set a date and time for speeches.

6.) After a student gives a speech have students respond to their speeches giving three ways the student could have improved his/her speech and end with three positive comments about the student’s speech. Teacher should end with his/her own positive comments. (This is good constructive criticism and reinforces what students have learned about public speaking.)

Part 2: Art: Making a Paper Mache Mask

Procedure:

1.) Students carefully press a piece of tinfoil onto their face to create a three dimensional mold of their face. (Be careful. The tinfoil can tear easily.) Then, place newspaper inside the mold to give it some structure.
2.) Students tear newspaper into one inch wide strips approximately 12 inches long.

3.) Make up the paper mache paste. One bowl for five or six students should be enough. To make the paste, fill the bowl half way with flour and add water until you have a thick, liquid paste. Dip the newspaper into the paste and pull the newspaper between two fingers to remove excess paste. There should be a thin layer of paste left on the newspaper which will harden into the shape when it dries.

4.) Students should cover their tinfoil mask with one or two layers to start, making sure the newspaper is laid down smoothly, covering the tinfoil completely. Do not apply more than two layers or the tinfoil will cave in.

5.) Set the masks outside, if it is sunny. Let them dry several hours.

6.) Use extra newspaper, styrofoam balls, cups, of any other material to form ears, noses, horns, etc. for each species. Tape the molds to the mask with masking tape. Allow students to apply several more layers of paper mache to make a thicker coating which will dry into a firmly shaped mask.

7.) When students are satisfied with the shape of their mask allow them to paint them realistically, adding yarn or any other material which would make their mask look realistic.

Part 3: Preforming Art: Parade and Skit

Procedure:
1.) Arrange a time to preform a quick skit for another classroom. (This is an alphabet skit for a kindergarten or first grade classroom.)

2.) Students need to memorize their parts of the rhyme and create a quick routine to act out their species when it is mentioned.

3.) Practice as a class for several days. Have students make or bring props that may add to their parts.

4.) On the day of the skit, parade through the school, holding up their signs (posted on sticks) and chanting “Save the endangered species!”

5.) Preform the skit for the class and allow a question and answer time for the younger students to find out about these endangered species and the older
students to share their expertise. (You may want to video tape this and show it to them later.)

**Extensions: Language Arts**

1.) Students can work with the primary classroom they preformed for to help them create an alphabet book on their skit. Each page will include a letter and the rhyme. They can help the students write and glue the correct picture of the animal on each page. (Use the page included for the animal pictures.)

2.) Students can create their own rhymes about their endangered species using the facts from their research and illustrate it as a book.

3.) The class can work together to find out about other endangered species and create a new rhyme or book accordingly.

4.) Read the book *A Walk in the Rain Forest* by Kristin Joy and use that as a model for a new class book on endangered species in another environment.
Welcome to Mr./Mrs. _____________'s Class' Endangered Species Skit.

We are here to spread the word,
That these species stories should be heard.
Our world's plants and animals
Are slowly disappearing.
As humans take over their land,
Please help and lend your hand,
To the many endangered species
From around the world:

A is for Aye-Aye, with its strange little hands.
B is for Butterfly, from faraway lands.
C is for Cactus, as prickly as can be.
D is for Dugoung, a big beast of the sea.
E is for Eagle, with strong talons and beak.
F is for Ferret, so slender and sleek.
G is for Gavial, it has quite a snout.
H is for Hyena, it can bark, growl, and shout.
I is for Indri, with eyes big and bright.
J is for Jaguar, this cat hunts at night.
K is for Kakapo, this strange parrot can glide.
L is for Leopard, it has spots on its hide.
M is for Mandrill, its colors are bright.
N is for Numbat, its brown-and-white striped.
O is for Orchid, a plant that's quite rare.
P is for Pitcher Plant, fly trappers with hair.
Q is for Quetzal, green, crimson, and blue.
R is for Rhea, it can run faster than you.
S is for Snail, this king lives in dead leaves.
T is for Turtle, this one swims in the seas.
U is for Urial, it's a sheep, not a goat.
V is for Vicuna, it has a fuzzy, thick coat.
W is for Whale, this sea mammal breaths air.
Y is for Yak, it has long, shaggy hair.
Z is for Zebra, it's last on the list.

Now the rhyme's over-
Which letter was missed?

Adapted from Ranger Rick's NatureScope. Endangered Species: Wild & Rare.
This is a story of the life cycle of a tree, from its beginning as a sapling to its decomposition into the forest floor. Then it becomes home to plants and animals.

**Environmental Topics:** Life cycle of a tree, food chains, and trees as habitats.

**Environmental Concepts:**
1. A tree follows a cycle from a sapling as it grows and to its demise and decomposes on the forest floor.
2. An old tree is a home for many animals, and food for flowers and other animals.

**Discussion Questions:**
1.) What is a baby tree called?
2.) What does a sapling need to grow big and strong?
3.) What does the adult tree drop to the ground which produces new trees?
4.) How do the tallest trees of the forest help protect the smaller trees?
5.) Why does the grandpa tree fall to the ground?
6.) What happens to the grandpa tree after it falls?
7.) Why does the story end with another bird flying by, dropping its seed to catch a moth?

**Objectives:** Students will be able to practice reading with drama and expression as they participate in a reader’s theater and learn about the life cycle of a tree.

**Materials:** The Grandpa Tree Reader’s Theater script (copied for the class), tape recorder, and tape.

**Lesson:** Language Arts/Performing Arts:

**Procedure:**
1.) Discuss drama and expression when reading a part.
Exclamation points: loudness, excitement, or surprise.
Question marks: Raise one's voice higher, signifying a question.
Feel the part and emphasize according to character: change tone of
voice from happy to sad when necessary. Change your voice for
characterization: Squeaky for a mouse or deep for a man.

2.) Choose students to read the parts of the story.
3.) Turn on the tape recorder and begin reader's theater.
4.) Choose new characters and reread the script. This time more feeling
should be added due to familiarity and understanding of the script.
5.) Repeat a third time if students are still interested.
6.) Play the tape and note differences in expression throughout each
performance. Discuss as a class.

Extensions: Language Arts/Performing Arts/Science

1.) Have students rewrite the script as a children's book. They can give their
books to primary students learning to read to practice reading with the tape
they made during reader's theater.

2.) Perform the story as a play or puppet show. Video tape it with along with
any other productions you made. You may want to divide parts for all plays
included in this unit and do them simultaneously. All students will have parts.
Then they can perform for each other.

3.) Make a food chain. Cut strips of construction paper and hook them
together to form a chain. On each link have students glue a picture of a plant or
animal that lives in the forest and finds its food amongst the trees. (Make a
copy of the following page for students to cut and color the plants and animals
for their chains.)

4.) Play Build a Tree. This activity will teach children the parts of a tree as they
act out their functions and movements. (See the following pages.)
Build A Tree

Build your tree in the order of the parts listed. Use the chart below to help tell how many people you should use according to the number of students in your class.

<table>
<thead>
<tr>
<th>Group Size:</th>
<th>16</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heartwood</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Taproot</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lateral Roots</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Sapwood</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Cambium/Phloem</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Bark</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Tree diseases</td>
<td>remaining students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(To choose parts, you may want to write each part on a slip of paper and have students draw their part out of a hat.)

Heartwood

Choose a tall or strong looking student to be the heartwood of the tree. Tell this person, “Your job is to hold the tree tall and strong. All the rest of the tree hangs on you. The branches, the growing wood, the bark, and the leaves all depend on you to hold them up. You keep the tree upright during windstorms, snowstorms, and all sorts of awful weather.” (Move the student gently back and forth by his/her shoulders, as if being blown by the wind.) “You used to be alive, bringing water and food up and down the thousands of little tubes in your wood, but long ago you became clogged up with resin and pitch. You are not really alive any more. In fact, some people call you the deadwood.

Taproot

Choose another strong looking student to be the taproot. “I’d like you to kneel down right at the base of the heartwood. You are called the taproot. You anchor the tree firmly into the ground. You sink yourself through the soil layer, through the clay or sand, and all the way down to the rock itself in order to anchor yourself to the earth. When the fiercest storms come, you keep the tree from being blown over by the raging winds. So, imagine yourself sinking down into the ground about 30 feet.

Lateral Roots

Choose the lateral roots. (Children with long hair can demonstrate the root hairs extending out to the soil.) These students will lie down on their backs with their feet up against the trunk and their bodies extending away from the tree. “You are the lateral roots of the tree. Most trees have hundreds of lateral roots which stretch out from the trunk in all directions for long distances,
sometimes hundreds of feet. The roots from a single redwood tree can cover an entire acre of land. You also help hold the tree up. Some trees, like redwoods, do not have taproots. They grow in groups and help hold each other up by intertwining their thousands of lateral roots. The roots of trees help hold the soil in place so it does not wash away in the winter or wind. Growing from all the lateral roots and from the taproot are the root hairs. (Kneel down by one student with long hair and spread it out around her head.) The tree sends out hundreds of miles of root hairs into every area of the soil to suck up the water for the tree. So when I say ‘slurp’ all of you go like this: (Make a loud slurping sound). Now, let’s hear you.

Sapwood

Have the students who will become the sapwood join hands and make a ring around the heartwood, facing inward, and being careful not to step on the roots. “You are the part of the tree we call the sapwood. You draw water up from the roots and lift it high into the tree to the branches and leaves. Your are the best pump in the world. In your tiny tubes, water sometimes surges upward at two hundred miles an hour. After the roots slurp up the water from the ground, your job is to bring the water up the tree. When I say ‘Bring the water up!’ you say. ‘Whoooo!’ and raise your arms into the air. Let’s practice.” Have the roots slurp and follow immediately with “bring the water up!”

Cambium/Phloem Layer

Have the group of cambium/phloem students form a circle around the sapwood facing inward. They should stretch their arms upward and outward so that they intersect each other’s arms at the wrists, leaving their hands free to flutter like leaves. “You are the most vital, part alive on the tree. Every year you grow a new layer of wood on the inside and a new layer of bark on the outside of the tree. You also carry the food into the roots for storage in the roots during the winter. This food is made from sunlight, water, and oxygen in the leaves during a process called photosynthesis. When I say ‘Make food,’ you rustle your leaves into the sun and say ‘We make new food.’ When I say ‘Bring the food down,’ you say ‘Whooo!’ as you bend your knees and drop your body down to the ground.” Practice all sounds and motions, starting with the roots, then the sapwood, and then the cambium/phloem layer.

Bark

Have students acting as the bark face outward to protect the tree. “Your job is to protect the tree. What kinds of things do you protect the tree from?” (Suggest fire, insects, diseases, and children with pocket knives, if they do not.) To protect the tree you may move in a circle around the tree working together to shield it. Stand tall to fight out deadly diseases, or squat low to protect your lower parts from other hazards. Your job is to block all harm form reaching the vital parts of the tree.
**Bark Beetles/Diseases**

The teacher can act out this part or choose one or more students to do this. As the tree is acting out their parts and chanting their chants, walk away a moment, and return fluttering your wings and scowling as a bark beetle. Run around the tree waving your antennae and trying to penetrate through the bark as it tries to protect the tree. After this is demonstrated it can be turned into a tag game. Several students are given cards that include things that harm a tree (drought, fungus, insects, bark beetles, polluted water supply, ground fire, smog, etc.). They are given a time limit to see if they can tag an inner layer of the tree (giving them their cards). If the tree has more than half of the effects, it will die. With just a few, it will be weak, but will soon recover and the game may be repeated with new students chosen as the causes of disease. Close the activity by reviewing the tree parts and the causes of disease.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Effect/Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>Needles brown and fall away./Drought is endemic to the western United States.</td>
</tr>
<tr>
<td>Fungus (Snow melt)</td>
<td>Brown and spotted needles that die after a year./Fungi infects needles during winter when they are under snow and needles remain on the trees after the snow melts.</td>
</tr>
<tr>
<td>Insects/bark beetle</td>
<td>Death for any tree that has been circumnavigated at the bottom of the plant./Beetles bore through the bark of the tree and lay their eggs in the cambrium. The larvae then eat the cambrium and destroy that year’s growth.</td>
</tr>
<tr>
<td>Polluted water supply</td>
<td>Reduces the trees resistance to disease and poison.</td>
</tr>
<tr>
<td>Ground fire</td>
<td>Death for young trees and for species that do not have very thick bark./The lower bark and wood becomes scorched.</td>
</tr>
<tr>
<td>Smog</td>
<td>Premature defoliation and reduced resistance to bark beetles and disease./Particles reduce photosynthesis and are sometimes toxic.</td>
</tr>
<tr>
<td>High water table (overwatering)</td>
<td>The roots rot./The tree will grow “water mold” fungi.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Role/Similarities to us?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heartwood</td>
<td>Contains the tree’s waste matter, excess resin and tannen. It also provides structure to the tree./It is essentially dead layers of old sapwood./Heartwood is like our bones and bowels.</td>
</tr>
</tbody>
</table>
Phloem

Draws water form roots up throughout the tree at speeds of up to one hundred mph.

Taproot

Anchors the tree in the ground. Not every tree has a taproot.

Lateral Roots

Reach out and drink./The mouth.

Bark

Defends the tree from disease./ The outer bark is like our skin.

Xylem

Brings food from leaves down through the tree./ Digestion.

Adapted from several versions of Joseph Cornell's "Build a tree"
Readers’ Theater
The Grandpa Tree
Based on Mike Donahue’s Book

Narrator: A father and his son were hiking along a wooded trail. The little boy was being carried on his father's shoulders, when they stopped to look at the remains of an old tree that was surrounded by wildflowers.

Little Boy: Daddy, how did that tree get that way?

Father: A tree, just like us, follows a life cycle. We are born as babies, and we grow from a young child into an adult. A tree begins as a seed, and grows from a small sapling to a tall woody tree.

Little Boy: Oh look! I see a baby tree, growing over by those wildflowers. But where do the seeds come from?

Father: Mommies and Daddies have little girls and boys, like you. Trees, with the help of insects, wind, and other natural occurrences, spread their pollen and produce seeds that get scattered all over the forest floor.

Little Boy: But, Daddy, why did this tree fall to the ground?

Father: No one, and no thing, can live forever. But, look carefully, and notice all the life around it.

Little Boy: Hey, look at that, Dad! (He points to the sky.)

Flying Bird: Squawk! I don’t need this little seed. There is a moth below near the trees.

Fluttering Moth: I think I’ll land on that bright green leaf for lunch.

Father: You just witnessed part of a food chain. The leaf supplied the moth with its energy for life, and the moth became food for the bird. The bird will eventually become food for a larger animal and the chain will continue.

Little boy: (Pointing.) I saw it! The bird dropped a seed and it fell by the dead tree! Do you think it will grow, Dad?

Narrator: The boy and his father left as the rains came, which eventually allowed the seed to grow.
Tree: I'm alive! (Stretching) I love to reach towards the summer sun and stretch my branches bigger as the sun allows me to grow stronger!

Fall: (Making blowing, windy sounds.)

Tree: Who are you?

Fall: Dear little sapling, I am Fall. Summer is now over. You will enjoy spending all day with me now. I will blow breezes to toss dry leaves onto your branches. You can shake until the leaves fall again into the wind.

Tree: Burr! I'm getting very cold now. Fall, where are you?

Snow: I'm Snow, a friend of Winter. I fall and fall, and get deeper and deeper until you are completely covered with my sparkling white crystals.

Narrator: Seasons came and went. Years went by, and the little tree grew into a big tree.

Squirrels: (Several students speak at once.) We enjoy playing in your branches, young tree.

Birds: (Several more students speak together.) Your needles supply us with materials to build our nests so our baby birds can sing their first songs.

Narrator: The little boy, now a man, returns hiking with his little girl on his shoulders.

Little Boy (Now with a adult man's voice.): This was one of your grandfather's and my favorite places in nature. Here he taught me about the life cycle of a tree.

Little Girl: Will you teach me something about trees, Daddy?

Adult Boy: This tree was a sapling and grew into a big tree just as I grew from a boy to an adult.

Little Girl: Look at all these pine cones, Daddy. Can I take one home?

Adult Boy: Do you see the seeds inside those pine cones. If an animal comes by and releases those seeds, new, baby trees will begin to grow and stretch their tiny branches to the sun.
Narrator: The big tree grew until he was the biggest tree in all the forest.

Big Tree: Don't worry, my little saplings, I will wrestle with the fierce winter winds, slow them down, and make them play gently with all of you baby trees below. As the snow piles high on my boughs, only little handfuls will be able to rest gently on your young, small branches.

Summer: I'm here to bring my heat to your long branches.

Adult Tree: My branches will reach out with shade for all my tender, young trees.

Narrator: The tree grew older.

Squirrels: Thank you, old tree. Your baby trees have grown up and now we have more branches to play on.

Birds: And more branches to build our nests and where our baby birds can sing their first songs.

Narrator: The little girl returns hiking to her favorite place in the forest to collect some more pine cones with her twin boys.

Twin #1: Mommy, Mommy, look at all these pine cones!

Twin #2: Mommy, Mommy, look at all these new, baby trees!

Mom: Those baby trees came from pine cones just like those on the ground. Those tall trees dropped these pine cones so they too can grow into baby trees and stretch their tiny, green branches toward the sun.

Narrator: The branches of the old grandpa tree were no longer needed by the young trees. What they needed now was room to grow.

Grandpa Tree: I will drop my great branches to the ground, making room for my younger trees to grow until they are the greatest trees in all the forest.

Narrator: One winter day the old, old grandpa tree began to rock and creak in the wind. He called to all the younger trees.

Grandpa Tree: Once I was the greatest tree in all the forest, just as you are now. My branches were big and strong. They could wrestle with the fiercest of
the winter winds, hold up under the heaviest snow, and block the hottest sun. You were the baby trees then, and I watched you grow. As your branches grew strong and needed more room, mine dropped to the ground. Now I am needed on the ground, to be a home for rabbits, and food for flowers. So, my children, remember the youth. As they need room to grow, leave them a world where their branches can spread as freely and greatly as yours do now.

**Narrator:** At that moment a great wind swept through the forest. CRASH-- the great grandpa tree fell to the ground.

**Mother Rabbit:** This old, fallen tree looks like a perfect place for building a home.

**Baby Rabbits:** This old trunk is fun to play on!

**Ants:** What a great place to begin bitting and chewing a doorstep for a new home! Our sawdust can fall down to the forest floor.

**Flowers:** We’re alive! Thanks to that old grandpa tree whose sawdust mixed with the soil, creating nutrients for us to grow! We will surround it with beautiful colors forever!

**Narrator:** More rabbits played on his trunk and more ants dropped sawdust from their doorsteps. The old grandpa tree became just a brown streak on the ground.

Then, one day, when the twins were older and had children of their own, they came and hiked to their favorite place in nature, with their children on their shoulders.

**Child #1:** Look, Dad, at the bird chasing the moth.

**Child #2:** Did you see the seed fall out of his mouth and over by the remains of that old fallen tree?

**Narrator:** Landing in the brown streak of the grandpa tree, the seed was ready to grow. The rains came. Soon the little, green branches were stretching toward the sun.
The Other Way to Listen
Byrd Baylor

Picture book
Intermediate

When one learns the other way to listen, he/she will see things they have never seen before. This book is the story of one boy's experience learning how to listen to nature. It guides the reader along with the boy to learn this new way to listen.

Environmental Topic: Appreciating and observing nature

Environmental Concepts:
1.) Respect and learn from nature.
2.) Enjoying nature should not take effort, but come naturally.

Discussion Questions:
1.) What advice does the old man give to the boy?
2.) What did the old man start with when learning how to listen?
3.) What kind of tree did he observe?
4.) What three things must one do to hear a natural object's voice?
5.) What did the boy do to hear the hills?
6.) What did the boy find just before he heard the hills?
7.) Describe the singing he heard?
8.) What is the boy really listening for?

Objectives: Students will have several opportunities to observe and listen to nature by participating in class nature walks to collect nature samples, write a cinquain poem, and create a plaster cast.

Part 1: Language Arts/Science/Art

Procedure:
1.) Read the story and discuss the questions.

2.) Take a nature walk around your campus. Set the rules that students cannot talk. They must look and listen to the nature only. They need to collect three different leaves or parts of plants on their walk. Tell them not collect the same
thing as the person in front of them and to respect nature being careful not to leave plants stripped of their natural beauty.

3.) Find a nice shady area to sit in a large circle. (Remind the students to stay silent.) “Now close your eyes. Raise your hands up above your heads. Put one finger up every time you hear a natural sound.”

4.) Have students share what they heard. Discuss any other observations from their hike.

5.) Guide students in writing a cinquain poem.
   a.) Think of a title that would summarize everything you heard, felt, and saw today on our nature hike. Write that word down in the center of your paper. Capitalizing it as a title. (This word is usually a noun.)

   b.) Think of two words that describe what you saw. Write those two words on the next line below your title and separate them with a comma. Remember to always capitalize the first word. (These will be two adjectives.)

   c.) Think of three action words describing what you saw or a phrase with three words about an action you heard or saw. (Usually these will be verbs ending in “ing.”) If it is a list of separate verbs, separate them with commas. Make sure to capitalize the first word.

   d.) Think of four words or a phrase with four words telling how you feel about what you saw.

   e.) For the last line of your cinquain poem, think of a one word summary of what you did or saw today. (This is usually a noun renaming the title.)

6.) Give the students time now to use the chlorophyll, sap, or other pigments from the plants they collected to draw a nature picture around their poems. (Share your collection of flowers and plants for more variety.) All students need to do is rub the petal or leaves on their paper to act like a crayon.

Lesson 2: Science/Art/Language Arts

Procedure:
1.) Teach the class about leaf types:
   Simple Leaf: Leaves that grow singly from a twig.
Compound leaf: A leaf that is divided into leaflets.

Vein structure
Parallel: Leaves having veins that run straight up and down the plant.

Palmate: Veins that spread outward, similar to the veins in the palm of your hand.

Pinnate. Veins that run diagonally from the center of the leaf. These are either opposite veined or alternating.

2.) For homework, instruct all students to practice listening to nature as they search for examples of the different leaf types. They may also bring in any other small natural objects they find. (Encourage respect for the plants. Suggest that students bring only a small sandwich sized bag of samples.)

3.) The following day take another nature walk, noticing all the different leaf types around your campus. (Allow students without leaves to collect some now.)

4.) Return to class and make plaster casts of their leaves.
   a.) Mix plaster in bowls to a smooth consistency.
   b.) Pour the plaster into the lids of the containers.
   c.) Press leaves partially into the plaster, but do not cover them with plaster. (Students should arrange their leaves nicely, trying to show a sample of each type of leaf. Other nature samples may be added also. For best results, place the vein side down.)
   d.) Allow the plaster to set until it appears hard, but is not dried through. (Approximately 15-30 minutes depending on the consistency of the paste.)
   e.) Carefully peel leaves off of the plaster cast and allow the casts to dry overnight.
   f.) While casts dry, have students write a descriptive paragraph about their casts, explaining the different leaf types.
Extensions: Science/Art

1.) Send students out in groups to make bark rubbings. This is another way to notice the many unique characteristics of trees. (To make a rubbing: students place a piece of plain white paper over the tree and color directly on it with a crayon, creating the pattern of the bark.)

2.) Using the left-over leaves students collected, make leaf rubbings. (To make a leaf rubbing: students arrange leaves underneath a piece of plain white paper and color directly over the leaves with crayon, creating the pattern of the leaves.) Have students label the different types of leaves in their rubbings. Encourage student creativity to create different pictures out of their rubbings. (Mount these onto black paper and put them up as a bulletin board.)
ONCE THERE WAS A TREE
Natalia Romanova


This story shows all the uses of a tree in the forest, even after it has been struck by lightning.

Environmental Topic: Animal Habitat

Environmental Concepts:
1.) Trees are important to animal habitat at all stages of their life cycles.
2.) A tree grows for all: other plants, wildlife, and humans.

Discussion Questions:
1.) What natural occurrence happened to the old tree at the beginning of the story?
2.) What was the next thing that happened to the broken tree?
3.) What did the bark beetle do when it saw the stump?
4.) What happened to the bark beetles eggs?
5.) What insect came and cleared out tunnels in the stump?
6.) What did the bear use the stump for?
7.) What did the tree provide for the titmouse, the frog, and the earthworm?
8.) When the man came, what did the book say he thought he owned?
9.) Who do you think really owns the tree stump? Why?

Objectives: After completing an art project and participating in an activity called “Oh, Deer,” students will be able to explain how trees are important to wildlife.

Materials: Copy the pages, “Under Cover” for the art project.

Lesson: Art/Physical Education/Science:

Procedures:
1.) Discuss the ways the animals in their color page use trees.
   - A place to rest: Birds use the tree as both a place to rest and a perch to look and listen for their prey below.
A place to nest: Birds are not the only animals that use the branches for a place to rest; look for squirrels there too.

A place for food: Squirrels, along with many other animals find many different nuts, seeds, and fruits high in the tree tops.

A place to hide: Many animals are camouflaged, adapted by special colorations to blend in with the tree for protection from predators. There are some insects that resemble leaves, thorns, or bark for protection.

A place to lay eggs and grow: Many insects lay their eggs in the wood underneath the bark. Here their eggs will hatch and their larva chew through the wood for nutrients as they grow.

A place to nest within the bark: Many birds will chisel out holes in the trees to nest. After the birds abandon their nests, other forest animals, such as honey bees, flying squirrels, and other birds will take over their nests or tree cavity.

A place for fungi: Many fungi live beneath the bark, while other types are easily seen.

A place to feed: Many insects and fungi spend their lives underground feeding from the base of the tree on its sap and roots. The fungi helps the tree in a "symbiotic relationship," absorbing nutrients from the soil and then passing them on to the tree.

A place to burrow: As these creatures create their tunnels through the soil, they loosen the soil, making it easier for the tree's roots to grow and absorb oxygen.

2.) Give the students time to color and assemble the two pages. To create the "peek-a-boo" effect, place page A on top of page B and staple, tape, or glue them together.

3.) Have students write a paragraph on the back explaining why a tree is important to wildlife

4.) When students are finished play "Oh Deer," a habitat game:

"We have just read a book showing how a tree is an important part of an animal's habitat. To better understand the meaning of habitats we are going to play a quick game. Explain Habitat: The place an animal lives consisting of food, water, shelter, and space. Explain the following rules. Then take students out to an open area to play the game.

One fourth of the students are deer (or other forest animals) and the other three fourths are habitat. The students acting as habitat individually choose to be food, water, shelter, or space at the start of each round. (Create hand signals to show what they are. Hold
hands on their stomach for food, hands above their heads in a triangle for shelter, arms out for space, and hands cupped to their mouths for water.) The deer decide which part of the habitat they will be seeking. To show what they need, they will use the same signs as the habitat. Habitat and animals line up facing each other (about thirty feet away). They turn around, and on the count of three, turn back holding up their signs. The animals run to the habitat. They must be the first ones to pair up with the habitat they need, or they fail to find their necessary need for survival. Those finding habitat are healthy and reproduce by bringing their captured habitat with them to become animals. Those unsuccessful, die, decompose, and become habitat for the next round.

You may want to keep a record of the number of deer versus habitat each time, make a graph, and discuss the results after the game. To add variety and make the game more realistic, try limiting the availability of the habitat. The habitat may be told, for example, there is no shelter today because of a huge fire, animals seeking shelter will die, illustrating the effect of fire on animals.

Adapted from Project WILD

Extensions: Language Arts/Social Studies/Performing Arts/Art:

1.) Have students write letters to woodsmen who come and cut down trees, as in the story. Have them write letters from the perspective of the animals in the story. The animals should explain why the trees are important to them and why the woodsmen should not cut the trees down. You may want to discuss why the woodsman may be cutting down the trees, offering the students the opportunity to ask for a compromise when the woodsman comes to cut down trees. Refer to what was learned about natural resources in The Giving Tree lesson.

2.) Have students make commercials about the importance of protecting trees for animal habitat. Give them time to make props and practice. Video tape the commercials and play them for the class.
IN THE LEAVES

WALKINGSTICK

ROSE BREASTED GROSBEAK NESTLINGS

GRAY SQUIRREL

BENEATH THE BARK

HONEY BEE

HAIRY WOODPECKER NESTLINGS

BARK BEETLE TUNNELS

MYC

AROUND THE ROOTS

CHIPMUNK

EARTHWORMS

SHORT TAILED SHREW

RODENT

CACHE OF NUTS

HILLSPADE
In 1610 a cottonwood tree began to grow on the Great Plains. It was an important tree to the Indians, buffalo and white men who used it as a landmark.

**Environmental Topic:** Human interaction with nature and environment affects the growth of trees.

**Environmental Concepts:**
1. Humans should respect nature and nurture its growth. We leave permanent scars if we mistreat nature.
2. Tree rings show evidence of environmental changes and conditions over time.

**Discussion Questions:**
1. What did the Indian boy do to protect the tree from the buffalo?
2. What did one of the Indian boy's people want to use the sapling for?
3. What did the Indian boy give the young cottonwood tree credit for?
4. What did the Indian boy give to the tree for bringing him good luck?
5. What does the Indian boy's son give the Medicine Tree?
6. What sign made the Comanches decide that the hill where the tree grows would be a "Hill of Peace"?
7. Who were the next people after the Indians to pass on the story of the Tree-Of-Peace?
8. Who were the "white animals pulling the huge covered boxes" that the Indian boy saw? What did the tree do for them?
9. Why did the Indians stop chasing Jed and Buck?
10. The tree was renamed as the_______ because the pioneers used a hollowed out section to post letters for anyone going in their direction along the Santa Fe Trail.
11. As Buck and Jed visited the tree each coming year what did they notice was happening?
12. Did the tree still provide anything to the animals even after it died?
13. What had caused the most damage to the tree? What did Jed use its wood for?
14.) What was Jed surprised to find when he started to make the ox yoke out of the cottonwood?

15.) How was Jed able to know what date to burn into his yoke next to each curio?

16.) Why is Jed confident that the Indians still would not bother him after the tree was gone from the trail?

17.) What did all the Indian braves come to see at Bent's Fort?

18.) What problems did the wagons have to conquer in order to get to Santa Fe?

19.) Why were the people excited to see the wagons come into their new Mexican town?

20.) How does the story end at the end of the trail?

Objective: Students will be able to practice reading trees rings and interpreting what the environment was like during specific times of a tree's life. They will also create a tree ring drawing and label it with significance events in their lives.

Materials: Chart paper, copy enough sample tree ring pages for students to work as partners or small groups, one piece of blank drawing paper for each student.

Lesson: Language Arts/Social studies/Science:

Procedure:
1.) While reading the Tree in the Trail, create a chart of the tree's rings labeling them with the significant events in the life of the tree and important events in history. Begin with the dates from the diagram in chapter six of the story.

2.) Discuss tree rings:
   Each year a tree grows and adds a new growth ring to its trunk. The most recent growth is always on the outside of the trunk, just under the bark. The oldest ring, from the first year of its life, is always at the center of the trunk.
   Each ring of a tree shows how much the tree has grown during that year. A year with a lot of rain and mild temperatures, will allow the tree to grow a great deal. The growth ring for a good year will be thick. If it has been a hard year, with extreme temperatures or little rain, the tree will not grow much. The growth ring will be thin.
   Scientists that study tree rings are called Dendrochronologists. They use a process called coring to look at rings of a living tree without cutting it down. They drill into the center of the tree trunk with a special instrument which pulls out a small sample of with growth rings, about the size of a straw. They
count the rings to determine the trees age. Then the scientist cross-date and compare older trees with similar younger trees.

3.) Give each group of students the sample tree rings. Have them try to answer the following questions:

   How old is the tree?
   Which growth rings were added during a five year drought (time of little rain or snow)?
   How long ago was this drought?
   Which rings were added during a three year period of plentiful rain and sunshine? How long ago did this favorable time happen?

4.) Assign students to draw a diagram of their growth rings, as if they were a tree. Have them label important events with dates and explanations of significance of each time period. Students should consider spacing of the rings according to favorable and healthy times of their lives versus any difficult times which should show smaller rings. Check to make sure all students begin with their birth date at the inside ring.

**Extension: Science/Physical Education**

Play "Every Tree for Itself."

Cut approximately two 3"x3" squares of blue, yellow, and green construction paper per students.

In a large area, preferably outside, chose five or six students to scatter themselves out as if they were trees. Scatter the color cards around the "forest floor." The students should be given a 30 second time limit to collect as many of these cards as possible during this time. Tell them that they may reach with their arms and their legs as if they were roots helping them to collect all the vital nutrients needed to grow. One foot must remain planted in one area at all times, simulating the tree’s taproot. After 30 seconds discuss with the class that the blue cards represented water, the green nutrients, and the yellow sunlight. Students that did not receive enough (set a number according to results) would die. Unsuccessful students sit out and observe. The next round, for every successful tree, a new tree can grow. Also introduce several new species into the forest. Repeat the game. Discuss results. Continue adding more students each round until about half the class is a tree. (Do not enlarge the growing area.) Now, use fewer squares of blue to show a drought. Then use less yellow for lack of sunlight due to overcrowding and lack of
sunlight reaching the younger trees. Less nutrient squares could represent poor soil quality. Add some new nutrients and water squares marked with a red “x.” Do not tell the students what these represent. After the round, explain that anyone collecting a square with the “x” has collected polluted water or contaminated soil nutrients. They will die. Discuss observations as more and more trees were added and what happened when the pollution was introduced.

Adapted from Project Learning Tree.
Tree Growth Rings
This story is based on the folk tale of Rajasthan, India. Amrita Devi, centuries ago, inspired her entire community to protect their environment from the threat of their trees being cut down.

Environmental Topic: Environmental actions and the beauty of nature

Environmental Concepts:
1.) We, as humans have the ability to try to protect what is important to us.
2.) Trees give us beauty along with shade and protection.

Discussion Questions:
1.) Describe the setting of the story.
2.) Why did Amrita love the trees so much?
3.) What did she promise the trees she would do if they were ever in trouble?
4.) Why did Amrita feel safe even during the worst storm?
5.) What did Amrita tell her children about trees?
6.) What did she teach them to do to the trees?
7.) Why were the axemen instructed to cut down every tree they could find?
8.) Why did this bother Amrita so much?
9.) What did she do about this?
10.) What would you have done in this situation?
11.) What did the people do?
12.) What reasons did Amrita give the Maharajah that he should not cut down the trees?
13.) What happened when the Maharajah ordered his soldiers to cut the trees down?
14.) What was the only thing that protected the village from the desert storm destroying the well and the rest of the village?
15.) Because the people showed great courage and wisdom, what did the king decide to do?

Objectives: Students will brainstorm ideas to protect trees, and also all of Mother Earth. They will use these ideas to make a poster to hang up. This will
remind themselves, and others, of behaviors they can display to keep our environment beautiful.

**Materials.** 12” x18” inch white construction paper for everyone.

**Lesson: Social Studies/Science/Art:**

**Procedure:**
1. Brainstorm a list of ideas to help protect trees and other natural things on earth that we may be in danger of losing, or have damaged. Do this on a large piece of butcher paper so it can be saved.

2. Give each student a piece of the white construction paper. Have them trace their hand and part of their wrist in the center of the paper. From each finger draw branches. Attached to each branch, draw a leaf big enough to include some writing.

3. Title the bottom of the poster, “Give Mother Earth a Helping Hand.” Have students fill in the leaves with ideas from the class discussion and any others they may have.

4. Encourage students to be creative as they color their posters.

5. Have students hang up their posters where other students can read them.

**Extensions: Language Arts/Social Studies/Science/Performing Arts/Art:**

1. Read the book *Mother Earth* by Nancy Luenn and include any more ideas generated from that book to the class list of ways to help the earth.

2. Plan a project of help the earth. Have students generate ideas. As a class choose a project that would be possible to carry out. (Start a recycling program, plant some trees on campus, fund raise to buy more trash cans to reduce litter, or create an energy patrol of students that make sure lights are turned off.)

3. Make Commercials informing others what they can do to help the earth. Send the video to other classrooms.

4. Play “Hug a Tree.”
   Students go outside with partners. One partner is blindfolded and is led to a nearby tree. (Make sure to stress appropriate ways to lead someone
The "blind" student must hug the tree determining its size. Then use his/her other senses to create a mental picture of that tree. When the student is sure he/she really knows the tree, the partner leads him/her away. The final step is for the student to try to guess which tree he/she was at. Partners switch and repeat the process.
ONE GREEN MESQUITE TREE
Gisela Jernigan


This book takes children through the desert environment as they learn colors and numbers.

Environmental Topic: Desert plants and animals

Environmental Concept:
1.) There are many different plants and animals that live in the different environments of the world.
2.) Plants and animals have adaptations to survive specifically in their native environments.

Discussion Questions:
1.) What is a name of a tree that grows in the desert?
2.) What are some insects that live in the desert?
3.) What are some plants that live in the desert?
4.) What are some birds or other animals that live in the desert?
5.) What attracted the insects?
6.) Where did the birds nest?
7.) Where did the animals shelter themselves from the hot sun?
8.) How are these plants and animals adapted to live in this environment?
9.) Is there anything else you learned about the desert form this book?

Objective: Students will learn the six major land biomes of the world and show an understanding of one of these biomes by creating a number pop-up book similar to One Green Mesquite Tree.

Materials: Map of North America, research materials, and construction paper (9"x12").

Lesson: Science/Social Studies/ Language Arts/Art:
1.) Teach students about the earth’s major land biomes. Discuss where they are and give some examples of animals that may live in each area. Discuss
their adaptations for survival in that specific climate. Have students color each biome on their map of North America as you discuss it.

**Biomes:** Large areas throughout the world having specific climates and similar plants and animals.

**Tundra:** Found in Alaska, Canada, Greenland, and Northern United States. It lacks trees, has little rainfall, and very cold temperatures. It is known for permafrost, frozen layer of water in the soil. Some animals that live here are: arctic fox (thick fur, padded paws, small ears so less body heat escapes), ptarmigan (feathers turn white in the winter, but are brown in the summer), and caribou (migrate to warmer climates in the winter).

**Tiaga:** This is the largest biome. It is south of the tundra in North America and Canada. The climate is warmer than the tundra, with cool, dry winters. There is more rain than in the tundra, but less than in the deciduous forest. Some animals that live here are chipmunks, rabbits, bobcats, foxes, grizzly bears, elk, and moose.

**Deciduous Forest:** It is located in Central Canada, east of the Mississippi river, and along the Atlantic coast. It is warmer than taiga (41-80 degrees F). There is a lot of rain (115 cm a year). There are also many trees, shrubs, and plants in this biome. Deciduous means “falling off” or “shedding seasonally.” There are many broad, flat leaved trees in this biome, in contrast to the many evergreen trees that are found in the Tiaga. Some animals that live here are: white tailed deer (antlers, protective coloring), chipmunks (pouches for storing food, hibernates throughout the winter), gray squirrels (bushy tail for warmth and balance), raccoons (stripes, claws, climbs trees), red fox (fur color, underground dens), skunk (sprays), black bear (hibernates), hawk (excellent vision), and copperhead snake (poisonous venom).

**Grasslands:** They are located in the Midwestern United States and Canada. There is mostly grass, some small plants, and a few trees. There are warm, hot summers (77 degrees F) and cold winters (28 degrees F). There is an average rainfall to 75 cm a year. Some animals that live here are bison (live in herds), antelopes (live in herds), prairie dogs (bark to signal danger, live in colonies), grasshoppers (mouth for tearing, jaws for chewing, flies in swarms), and the mouse (mouth for gnawing, teeth grow constantly).

**Desert:** This biome gets the least amount of rainfall during the year (20 cm). Its average temperature is 86 degrees F in the summer and 68 degrees F in the winter. Some plants and animals that live here are cactus (long roots near the top of the soil, spines, waxy coat to reduce water loss), kit fox (coloring, burrows out of the heat), jackrabbit (coloring, large ears for ventilation), kangaroo rat (nocturnal, burrows), and the sidewinder (poisonous venom, fangs).
**Tropical Rain Forest:** These forests are located in South Florida, Southern Texas, Central America, Cuba, the West Indies, and the Caribbean. They get the most rainfall out of all the biomes (over 200 cm a year). The average temperature throughout the year is 79 degrees F. This biome also has the greatest diversity of plants and animals. Some examples of animals that live here are Macaws (color), fruit bats (mouths have long brush-like tongues to scrap out pulp and lips for sucking), Proboscis monkey (long arms, legs, fingers, toes, and tail for holding branches), rainbow boa (squeezing, largest snake), and the palm beetle (important to the food chain and decaying matter).

2.) Read One Green Mesquite Tree and ask discussion questions. Have each student choose the biome they would like to research for their number pop-up books. They must choose at least ten plants or animals to include in their books. They need to include a glossary on the last page of their book with a sentence describing what they learned about each plant or animal mentioned in their books. A bibliography should also be included.

3.) Have students write a rough draft of their number pop-up book and edit it for them.

4.) Students are then ready to create their pop-up books. To make a pop-up book:
   a.) Fold the construction paper in half vertically.
   b.) Cut two slits about an inch long and an inch apart, in the fold.
   c.) Reopen the paper and push the cut section inward and refold the entire paper again. The next time you open it the cut should form a bench in which the number or picture can be glued to, allowing it to pop-out at the reader.
   d.) Glue another piece of construction paper onto the back of this page, but keep the pop-up section pulled forward away from this new paper.
   e.) Continue making one of these for each page in the book. Stack each pop-up page and glue in between them to create a book.
   f.) Write at the bottom of each page and color background scenery at the top part of each page, including a picture of the number of plants or animals mentioned in the story.

5.) Have students share their books with one another.

**Extensions: Language Art/Social studies/Performing Arts/Science:**

1.) Adopt a kindergarten class as reading buddies. Have students share their books with them.
2.) Play charades. Name a biome and have student groups work together to act out animals from that biome.

3.) Play plant and animal clue games. Give students each an index card. Have them think of an animal. List ten clues about the plant or animal. Start with a clue about the biome it is from. Then get more and more specific about its adaptations and other descriptions about the plant or animal.
ASSESSMENT IDEAS

In this unit students can be assessed by many different methods. These are just a few suggestions.

Observation: Use the “Teacher Observation Sheet of Group Behavior” as groups are independently working together and you can roam around and make your own observations. When the unit is over, have each student fill out the “How Did We Work Together?” page. Have them discuss their feelings and write an evaluation for each category as a group, stating how they can improve or what they did that worked well in that area. (The forms are included on the next two pages.)

Product evaluation: This includes a student’s written letter or a group’s final project or video taped presentation. A four point rubric is a simple way to determine the students success.

4 Points (A): Assignment is complete, neatly done, and shows exceptional understanding of the concepts being taught, effort, quality, or extra work.

3 Points (B): Assignment is complete, following all directions given, shows an good understanding of the concepts being taught.

2 Points (C): Assignment is not completed, but shows an attempt to follow directions and complete the assignment with some understanding of the concepts being taught.

1 Point (D): Student has done little work or has not followed directions correctly, showing a lack of understanding the concepts being taught.

Skills: There are many opportunities to give comprehension tests on the literature. Just write the discussion questions out in the form of a quiz and reproduce for all students. Create vocabulary quizzes from the tree and drama vocabulary given.

Verbal: Ask students the discussion questions after reading each story.

Drawing: There are many chances to draw charts and posters. Illustrating tree growth rings and environmental solutions are just two examples.

Self evaluation: Begin the unit giving the students ten minutes to list everything they know about trees. Save this, and at the end of the unit have students turn it to the back side and list everything they now know about trees. Allow them to list what they liked best about the unit to help you plan for the next year.
# Teacher Observation Sheet of Group Behavior

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<th>Team Members</th>
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<td><strong>Assists others</strong></td>
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<td><strong>Contributes ideas</strong></td>
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<td><strong>Speaks friendly</strong></td>
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<td><strong>Asks questions</strong></td>
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<td><strong>Encourages compliments praises</strong></td>
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<td><strong>Listens politely</strong></td>
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<td><strong>Stays on task</strong></td>
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<td><strong>Comments</strong></td>
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# How Did We Work Together?

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<tr>
<td><strong>Speak in a friendly manner</strong></td>
<td>1 2 3</td>
<td>1 2 3</td>
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<td></td>
<td>low</td>
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<tr>
<td></td>
<td>high</td>
<td>high</td>
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<tr>
<td><strong>Ask questions of one another</strong></td>
<td>1 2 3</td>
<td>1 2 3</td>
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<td></td>
<td>low</td>
<td>low</td>
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<tr>
<td></td>
<td>high</td>
<td>high</td>
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<tr>
<td><strong>Encourage, compliment, praise</strong></td>
<td>1 2 3</td>
<td>1 2 3</td>
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<td></td>
<td>low</td>
<td>low</td>
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<tr>
<td></td>
<td>high</td>
<td>high</td>
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<tr>
<td><strong>Listen politely</strong></td>
<td>1 2 3</td>
<td>1 2 3</td>
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<td></td>
<td>low</td>
<td>low</td>
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<td></td>
<td>high</td>
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<tr>
<td><strong>Stay on task</strong></td>
<td>1 2 3</td>
<td>1 2 3</td>
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<td></td>
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Creating A Tree Costume
The Talking Tree

Introducing Tracee Tree, the walking, talking tree. She is here to promote a healthy environment for people, plants, and wildlife as she teaches you about trees. Tracee Tree can sing songs about trees, tell tree tales, teach and talk about trees, and present tree games, crafts and activities.

Background information about Tracee Tree: Once, just only a tiny seed, Tracee Tree began to grow into a lovely tree as her heartwood began to take shape and form from some magical foam material. The first stage of growth consisted of creating a five foot cylinder of foam (3/8 inch twilight carpet foam—not conglomerate), cutting (with regular scissors) out two arm (branch) holes and a big knot hole for a face. Next the ranches (arms and extending branches) were attached (with contact cement) along with the roots at the bottom. Then the rough bark was attached for texture along with a screen to cover the knot hole. The final stage of growth consisted of painting the tree with regular enamel spray paint and attaching the leaves. (See next page for pattern ideas.)
Pattern for Making a Tree Costume

Glue along both ends and attach to create a funnel.

Added to create a wider bottom for the trunk.

These dimensions fit 5'4" 120 lbs or smaller. Enlarge pattern to fit larger sizes. Remember, the person wearing the costume must be able to slip inside. Velcro could be added along the seam, but it may pull apart as the person moves.

Glue arms to arm holes. Glue velcro and elastic underneath the arm, at the top and the bottom to wrap around the arm, rounding like a branch.

Cut knot hole for face opening. Create irregular bark pieces for texture. Add bottom roots and top branches to add length and height.
WHY CREATE CARPET FOAM CHARACTERS / PROPS?

-Interactive: involves your audience/students.
-Adds humor: makes learning fun and enjoyable.
-Attractive: creative and innovative.
-Theatrics: reaches out and grabs the audience’s attention.
-Personal and real to the audience.
-Teach in first person: live life through the eyes of the character and create emotion.
-Teach in third person with the foam costume as a prop.

HOW CAN YOU CREATE YOUR OWN FOAM COSTUMES/ PROPS?

1.) Create a pattern of your own, or use a sewing pattern and cut out the seam allowance.
2.) Purchase carpet foam and other supplies from the materials list on back.
3.) Cut out pattern pieces by tracing on the backside of the foam with a fine-tipped permanent marker.
4.) Cut with regular scissors
5.) Glue and velcro together (use good ventilation): Apply a generous amount of contact cement to both sides to be joined. Allow cement to become tacky (1-2 minutes). Pieces can be pulled apart if the glue was not tacky. A permanent bond will be created when glue is ready.
6.) Patterns can be made by creating a stencil. Paint and move the stencil as you go to create patterns. Example: make a feather pattern for a bird. Use fluorescent paint and present with a black light. You will appear to float.
7.) Add details: feathers, leavers, flowers, fur, sequins, buttons, glow sticks for lighted parts, etc.

SPECIAL INSTRUCTIONS:
Bevel edges for smoother texture to your costume. Cut edge at a 45 degree angle. Cut away the backing side, then apply contact cement inside the cut and glue it to itself.

Rounding will create great eyes or you can use Styrofoam balls or paper mache:

If you need more support, use insulation pipe in 1/3 inch, coat hanger wire, pine stop boards, or heavier carpet foam.
SUGGESTED RELATED ACTIVITIES:
See the following curriculum guides:

**Think Earth**
Education Development Specialists
5505 East Carson Street, Suite 250
Lakewood, CA 90713-3093

**Waste Wise**
The Aseptic Packing Council
1000 Potomac Street, N.W. Suite 401
Washington, DC 20007

**NaturesScope: Trees are Terrific**
National Wildlife Federation
1400 16 the Street, N.W.
Washington, DC 20036-2266

**NatureScope Pollution: Problems and Solutions**
National Wildlife Federation
1400 16 the Street, N.W.
Washington, D.C. 20036-2266

**The Simple Act of Planting a Tree**
Jeremy P. Tarcher, Inc.
5858 Wilshire Boulevard, Suite 200
Los Angeles, CA 90036

**1994 Teacher Resource Guide**
California Foundation for Agriculture in the Classroom
1601 Exposition Boulevard
Sacramento, CA 95815
(916) 924-4380

**Project Learning Tree**
American Forest Foundation
1111 19th Street, N. W., Suite 780
Washington, DC 20036

**Protecting Our Planet**
Good Apple
1204 Buchanan St., Box 299
Carthage, IL 62321-0299

What on Earth You Can Do With Kids
Good Apple
1204 Buchanan St., Box 299
Carthage, IL 62321-0299

Windows on Science (Video Laser Disc Program)
Life Science v. 1 "Know Your Niche" and "Rooting for Plants"
Anne Marie Laszok, Theodore T. May, and Elizabeth Paxton
Optical Data Corporation
Warren, NJ
1990

FOSS "Environments"
Britannica Science System 1992
Lawrence Hall of Science
Berkeley, CA 94720

Project WILD
5430 Grosvenor Lane
Bethesda, MD 20814

Sharing Nature With Children
Dawn Publications
14618 Tyler Foote Road
Nevada City, CA 95959

Sharing the Joy of Nature
Dawn Publications
14618 Tyler Foote Road
Nevada City, CA 95959
RELATED READINGS:

Sierra Club Books  
Intermediate  
Realistic fiction/ picture book  
A very specific habitat is explored--the time of year when the baobab tree in Africa leafs out. How certain birds, insects, snakes and even people make use of the baobab are shown. This would be a good book to use when studying biomes.

Baylor, Byrd. (1978). *The Other Way to Listen*  
Charles Scribner’s Sons  
Picture book  
Intermediate  
When one learns the other way to listen, he/she will see things they have never seen before. This book is the story of one boy’s experience learning how to listen to nature. It guides the reader along with the boy to learn this new way to listen.

Brenner, Barbara. (1994). *The Earth is Painted Green*  
Scholastic  
All ages  
Poetry  
This book is a collection of 100 poems about our planet. The poems, by many popular children’s authors, such as Shel Silverstein, will capture children’s appreciation in the categories of “Earth Green,” “Tree Green,” “First Green,” “Planting Green,” “Growing Green,” “Summer Green,” and “Forever Green.”

Scholastic Inc.  
Non-fiction  
Intermediate  
This is a quick and concise information book which answers children’s questions about why the earth’s trees are disappearing and what they can do to help protect them.

Cherry, Lynne. (1990). *The Great Kapok Tree*  
Harcourt Brace Jovanovich  
All levels
When a man, with the intent of chopping down a great kapok tree in the Amazon rain forest, stops to rest, several animals and a native boy speak to him. His decision, in the end, portrays the interdependence of all living things on our earth.

Donahue, Mike. (1988). The Grandpa Tree
Roberts Rinehart, Inc.
Picture book
Primary/ Intermediate
This is a story of the life cycle of a tree, from its beginning as a sapling to its decomposition into the forest floor.

Houghton Mifflin Company
Intermediate
Historical Fiction
In 1610, a cottonwood tree began to grow on the Great Plains. It was an important tree to the Indians, buffalo and white men who used it as a landmark.

Jernigan, Gisela. (1988). One Green Mesquite Tree
Harbinger House, Inc.
Picture book
Preschool - grade 1
This book takes children through the desert environment as they learn colors and numbers.

Scholastic Inc.
Non-fiction
Intermediate
This is one of Scholastic's Voyage of Discovery books on natural history. It is an interactive book with special transparencies that allow children to see what lives under the roots and under the bark of the trees. It has stickers and pages that allow one to feel the texture of different tree bark. This is a very complete book, teaching not only the science behind trees, but also history and people of the forest.

Jeunesse, Gallimard and Bourgoing, Pascale de. (1992). The Tree
Scholastic
Primary
Non-fiction/ information/ picture book
Young children see a chestnut seed sprout roots, grow into a tree, and more through the use of transparencies.

Scholastic
Primary
Non-fiction/ information book
Children can visit a rainforest and become aware of all the beauty that lives in this lush environment. Through the use of transparencies, this book comes alive with the life of the rainforest.

Aladdin Paperbacks
Poem
Primary/Intermediate
This book is one poem which introduces conservation of the our Mother Earth. We use her gifts, but are reminded that we must return them with respect and love.

Dawn Publications
Poem
Primary/Intermediate
This is an alphabet book in advanced format. It includes the story of an ant traveling through the rainforest. Factual information is given about the many interesting plants and animals this ant meets on its walk.

Reed-Jones, Carol. (1995). The Tree in the Ancient Forest
Dawn Publications
Poem
Primary/Intermediate
This book illustrates a repetitive song that many children may know. It is about the web of plants and animals which live around one old fir tree in the forest. The end of the book includes a summary of factual background information from the book.

Romanova, Natalia. (1985). Once There Was A Tree
A Puffin Pied Piper
Picture book
Primary/Intermediate
This story shows all the uses of a tree in the forest, even after it has been struck by lightning.

Roberts Rinehart, Inc.  
Intermediate  
Historical Fiction  
This story is based on the folk tale of Rajasthan, India. Amrita Devi, centuries ago, inspired her entire community to protect their environment from the threat of their trees being cut down.

Schneider, Bill. (1988). *The Tree Giants*  
Falcoln Press Publishing Co., Inc.  
Non-fiction  
Intermediate  
This book share many amazing facts about the largest trees on earth, the redwoods. This is an excellent example of a look at trees over time: ancient prehistoric time to modern days.

Dr. Seuss. (1971). *The Lorax*  
Random House  
All levels  
Picture book/fantasy  
The Lorax is a creature who speaks for the Truffula Trees that are disappearing. The Once-ler and his family are greedily making a fortune from these trees. As the Once-ler uses more and more trees, the effects on the environment are shown. The story ends with the last Truffula seed offered to the reader. The reader is then asked what he/she will do.

Silverstein, Shel. (1964). *The Giving Tree*  
Harper and Row  
Primary/Intermediate  
Picture book  
This is a story of a boy as he grows up and takes all the tree has to offer until there is nothing left of the tree but a stump. When the boy grows into an old man, all he wants is a place to sit and rest. The tree offers its stump for the boy to rest on and both are happy.

Van Allsburg, Chris. (1990). *Just a Dream*  
Houghton Mifflin Co.  
All ages  
Contemporary realistic fiction/ picture book/ poetry
Walter thinks his friend's birthday gift is stupid. Why would anyone want a tree? But he dreams of the future, and soon his ideas change.
REFERENCES


