

INTRODUCTION TO NATURAL RESOURCES

What Are Natural Resources?

A good working definition of Natural Resources requires defining the two words, natural and resources, separately and combining those definitions. “Natural” can be defined as something present or produced, in nature. “Resource” can be defined as that which is useful and for which there is an available supply. By combining these two definitions, “natural resources” can be defined as something present in, or produced by, nature with an available supply that can be drawn upon when needed. Natural resources also can be categorized as earth materials and as all life forms. Those natural resources include air, water, soils, natural vegetation, and all rocks and minerals.

Who Uses Natural Resources?

People use natural resources. Every aspect of life requires that we use natural resources. When one gets up in the morning and eats breakfast, one is using natural resources. The electricity that turned on the lights, the water in the shower, and the food that is on the table came from natural resources. All day long we use natural resources. Sometimes they are used in other ways, such as enjoying one’s surroundings by visiting a state or national park or forest.

Alabama’s Natural Resources

Alabama is fortunate in that it has an abundance of many natural resources. Farmers use the soil to produce many products, such as cotton, potatoes, tomatoes, and peanuts. On some areas of land, trees are grown to produce wood to build houses and to make paper for many purposes. In recent years, oil (a product that we use every day) has been found, and drilled, for in Mobile Bay. Across the state, people use water to produce electricity (hydroelectric dams) and to fish for food and sport. As one can see, Alabama has an abundance of natural resources, BUT we must manage them correctly so that they will last for generations to come.

Conserving Our Natural Resources for Future Generations

It is important for Alabamians to pay close attention to the ways they manage natural resources. There are many public and private organizations that work to assure that our natural resources are adequately maintained, but, in the end, it is up to the individual citizen to do his or her part. Whether it is by picking up trash, recycling, planting trees, or volunteering with an environmental organization, everyone makes a difference, and everyone must help to insure that generations to come have the necessary natural resources.

OBJECTIVE:

Students will be able to:

Explain the importance of the state's water resources.

BACKGROUND:

Water is an important resource in Alabama. The state ranks seventh nationally in the number of rivers and streams that flow year round (perennial); 14th nationally in the acreage of ponds, lakes, and reservoirs; and 24th nationally in the acres of freshwater wetlands. Alabama has navigable rivers, fishing ponds, estuaries, wetlands, and even 50 miles of Gulf Coast shoreline. Thousands of tourists come to Alabama every year to enjoy the warm summers at the beach with swimming, sailing, and jet skiing. On rivers and lakes, fishermen and canoers also appreciate the beauty of the waterways.

Water is important to Alabama for more reasons than just recreation. Water sustains life. Farmers use it to irrigate their crops and to sustain their livestock. It is used to transport materials up and down the rivers, and all humans must have it to drink. Sixty-two percent of Alabama's 4.5 million people drink water from lakes and streams. Thirty-eight percent of drinking water comes from wells. Water also plays an important role in generating electricity. Alabama has 21 hydroelectric power production dams.

The Clean Vessel Act of 1992 protects these waters. It provides funds for the construction, renovation, operation, and maintenance of boat sewage pumpout stations and waste reception facilities to improve water quality. It also provides educational programs to help the public understand the importance of keeping water clean and to show what people can do to make a difference.

Wonder Water is a game students may play after studying about Alabama's water resources. The "Wonder Water: Alabama Water Facts" sheet has all the information used in the game.

VOCABULARY:

navigable, basin, perennial, intermittent, ditch, canal, reservoir, wetlands, estuary, average, streamflow, hydroelectric, wastewater, pumpout station

ADVANCE PREPARATION:

1. Gather needed materials for activity.
2. Divide students into teams of four.

PROCEDURE:

Setting the Stage

Begin this activity with a discussion about Alabama's water resources. Topics for discussion may include uses, such as energy and transportation, and importance to humans and animals. Use "Wonder Water: Alabama Water Facts" as a resource.

Grades:

6-8

Subject:

Science, geography

Time Needed:

One class period to play, one class period or more to talk about Alabama's water

Materials:

bells (1 per team)
eye droppers (1 per team)
water
cups (1 per team)

Activity

1. Divide the class into teams of four.
2. The teacher will ask a question. The team may come up with the answer together, or the first person in line may answer. The first team to ring the bell has the first opportunity to answer. If incorrect, the second team may answer.
3. The person with the correct answer fills the eye dropper with water and carries it to the cup marked with a fill line.
4. The game is over when one team fills up its cup to the line.

Note: Use the water on class plants or outdoor plants after the activity.

EVALUATION:

If answered as a team, the teacher may give a written quiz. If the game is done with the individual students answering, that may serve to evaluate their knowledge.

EXTENSIONS:

1. Invite someone to speak to the class whose career is water related.
2. Have students research a particular river and its importance to the people who live by it.

ORIGINAL DEVELOPMENT RESOURCES:

Alabama Department of Environmental Management, P.O. Box 301463, Montgomery, AL 36130,
www.adem.state.al.us

Arelllo, G. *Alabama: the river state*. 1998. Nature Press. Published through the Alabama Office of Water Resources and the Alabama Department of Economics and Community Affairs.

www.nowandforeveralabama.org The web site for the interactive, educational division of the Alabama Nature Conservancy.

ADDITIONAL RESOURCES:

Young, B.M. Hall, J.C. & Middleton, R. (2009) *Headwaters: A Journey on Alabama Rivers*

The Nature Conservancy: Alabama - Protecting the 5th Most Biologically Diverse State in the U.S.

WONDER WATER

Alabama Water Facts

Alabama has:

- 14 river basins
- 77,274 total miles of rivers and streams
- 47,072 miles of perennial rivers and streams (7th nationally)
- 30,170 miles of intermittent streams
- 32 miles of ditches and canals
- 43 lakes, reservoirs, and ponds (excluding farm ponds)
- 469,653 acres of ponds, lakes, and reservoirs (14th nationally)
- 3,600,000 acres of freshwater wetlands (24th nationally)
- 27,600 acres of coastal wetlands
- 610 square miles of estuaries
- 50 miles of Gulf Coast shoreline and beaches

1. The average annual rainfall in Alabama ranges from 48 to 68 inches with only 22 inches draining from the land to form the state's rivers and streams.
2. The average streamflow of all streams entering this state is 60,341 cubic feet per second (38,980 million gallons per day) while the average streamflow of streams leaving the state is 134,793 cubic feet per second (87,076 million gallons per day).
3. Sixty-three percent of all streamflow (drainage) in Alabama flows into Mobile Bay.
4. Sixty-two percent of Alabama's 4.5 million people drink water obtained from lakes and streams. Thirty-eight percent drink water from wells.
5. Alabama has 21 hydroelectric power production dams.
6. Alabama has 17 state parks that provide recreational use of Alabama's waters.
7. A drop of water entering Alabama from other states may be reused up to 25 times before leaving the state.
8. Alabama has more miles of navigable streams (1,438 miles) than any other state. Seven of the 14 river basins have navigable rivers.
9. Alabama's navigable rivers must be nine feet deep and 100 to 300 feet wide before use by barges is possible.
10. Locks are structures at dams that allow raising or lowering of barges and other watercraft from one level to another. Each time a lock is operated, 15 to 45 million gallons are needed.
11. More than 230,000 licensed boats use Alabama's water plus other smaller boats such as canoes and kayaks.
12. Fishing is important in Alabama and popular in the state's 38 major lakes and 23 fishing lakes.
13. There are 275 towns and cities that discharge 435 million gallons of treated wastewater per day to Alabama's rivers and streams.
14. There are 548 industries that discharge 8,168 million gallons of treated wastewater per day to the state's rivers and streams.
15. President George Bush established the Clean Vessel Act of 1992 to improve water quality.
16. The Clean Vessel Act provides funds for the construction, renovation, operation, and maintenance of boat sewage pumpout stations and waste reception facilities, as well as education programs, to improve water quality.

WONDER WATER

Alabama Water Trivia Questions

1. Define the Clean Vessel Act. **(A five-year grant to fund states for the construction, renovation, operation, and maintenance of pumpout stations and waste reception facilities to improve water quality; also provides funds for public education.)**
2. Alabama ranks 18th in the nation with the number of registered boats. How many? **(over 250,000)**
3. Number of Alabama river basins. **(14)**
4. Total number of miles of rivers and streams found in Alabama. **(77,274)**
5. Name at least five uses for Alabama's water. **(shellfish harvesting, recreation, fishing, irrigation, power production, drinking)**
6. Alabama ranks seventh nationally for 47,072 miles of this. **(perennial rivers and streams)**
7. Alabama ranks first in the nation in navigable _____ **(streams).**
8. Number of miles of intermittent streams in Alabama. **(30,170 miles)**
9. Alabama has 32 miles of ditches and _____ **(canals).**
10. There are this many lakes, reservoirs, and ponds excluding farm ponds. **(43)**
11. With 469,653 acres of ponds, lakes, and reservoirs, how does Alabama rank nationally? **(14th)**
12. Number of acres of freshwater wetlands. **(3,600,000)**
13. Alabama ranks 24th in the nation with its 3,600,000 acres of freshwater _____ **(wetlands).**
14. Number of Alabama acres of coastal wetlands. **(27,600)**
15. Estuaries cover this many square miles in Alabama. **(610)**
16. The length of Gulf Coast shorelines and beaches within Alabama. **(50 miles)**
17. What is the average annual rainfall range in Alabama? **(48-68 inches)**
18. Twenty-two inches of rain drain annually from Alabama land to form these. **(rivers and streams)**
19. The average streamflow of all streams entering Alabama equals how many gallons per day? **(38,980 million gallons)**
20. The average streamflow of all streams leaving Alabama equals how many gallons per day? **(87,076 million gallons per day)**
21. Sixty-three percent of all stream flow in Alabama flows into here. **(Mobile Bay)**
22. Of the four and a half million residents of Alabama, what percentage get their drinking water from lakes and streams? **(62 percent)**
23. What percentage of Alabamians get their drinking water from wells? **(38 percent)**
24. How many hydroelectric power production dams does Alabama have? **(21)**
25. How many of Alabama's state parks provide recreational use of her waters? **(17)**
26. How many times could one drop of water entering Alabama from another state be reused before leaving the state? **(25 times)**
27. Fishing is popular in Alabama and occurs in the state's ____ **(38)** major lakes and ____ **(23)** fishing lakes.
28. _____ **(Locks)** are structures at dams that allow raising or lowering of barges and other watercraft from one level to another.
29. Each time a lock is operated, how many gallons of water are needed? **(15 to 45 million)**

OBJECTIVES:

Students will be able to:

1. Become familiar with Alabama's aquatic resources.
2. Locate the major reservoirs of Alabama as well as the specific river basins.
3. Locate the areas of the state with the highest concentrations of wetlands.

BACKGROUND:

Alabama's environment spans from the Gulf of Mexico to the Appalachian Mountains. This beautiful state contains a vast and varied network of rivers and streams. There are approximately 47,072 miles of rivers and streams that flow year round (perennial) with an additional 30,170 miles of intermittent streams. The largest of the river basins, the Mobile River Basin, has the sixth largest area of all river basins in the U.S. and is the fourth largest in the amount of water that flows down it to the Gulf of Mexico. The Mobile River Basin may be the largest in the state, but it is not the only one. In fact, the Mobile River Basin is comprised of the Alabama, the Cahaba, the Tombigbee, the Black Warrior, the Tallapoosa, and the Coosa River basins. In addition to these, the Tennessee, the Choctawhatchee, the Chattahoochee, the Escatawpa, the Chipola, and the Perdido-Escambia River basins also drain water from the state's surface area of 51,609 square miles.

Within each river basin, there usually is a series of reservoirs except for the Cahaba River, which is the longest free-flowing river remaining in Alabama. The following table lists the largest reservoirs for each respective basin:

Alabama	Black Warrior	Chattahoochee	Coosa	Perdido-Escambia	Tallapoosa	Tennessee	Tombigbee
Claiborne	Warrior	Water F. George	Jordan	Point A	Martin	Pickwick	Coffeeville
Millers Ferry	Tuscaloosa	Lake Harding	Mitchell	Gantt	P.L. Harris	Wilson	Demopolis
Jones Bluff	Holt	West Point	Lay			Wheeler	Gainsville
William Dannelly	Bankhead		Logan Martin			Guntersville	Aliceville
	Lewis Smith		Neely Henry				
			Weiss				

All the reservoirs were either created for the purposes of hydroelectric power generation, flood control, or navigation. On a smaller scale, many counties have constructed dams for the purposes of establishing county fishing lakes. Municipalities have also created public water supplies by backing up water with dams. In a few instances, these man-made lakes are quite large in size. Lake Tuscaloosa and Lake Purdy are examples.

All of Alabama's water sources are used for some form of recreation. This includes fishing, skiing, boating activities, or camping. Each type of recreational choice results in pollution being formed in these areas. Because Alabama has such abundant water resources that are being used for recreation, pollution is abundant also. This is even more enhanced by the boats that serve as permanent homes for some of Alabama's citizens as well as the great number of recreational boats that are used almost year round. The types of pollutants include litter, garbage, oils, paints, cleaners, and sewage. Over time, the pollutants take their toll on the

Grades:

6-8

Subjects:

Geography, Science

Time Needed:

One 50-minute class period

Materials:

Legacy's "Water Resources" poster, maps (Hydrologic Units and Subwatersheds of Alabama 1994) container names of reservoirs from table for each group of students stopwatch other river/reservoir maps, e.g. highway map

environment. Most fishing and boating occurs on and around the reservoirs in Alabama.

VOCABULARY:

non-point source pollution; reservoir

PROCEDURE:

1. Provide small groups of two or three students a map of rivers, reservoirs, and basins.
2. Have students pull reservoir names from a bag and quickly mark the maps by placing names in the correct locations. (This should occur in each group at the same time.) They should develop a chart that identifies reservoirs and basins where they are found.
3. Or, another technique to measure familiarization is to call out all the reservoir names in random order and have the students write down the name with the corresponding basin.
4. Discuss non-point source pollution impact on the reservoirs.
5. Students should infer areas with the greatest amount of wetlands. They should defend their choices.

EVALUATION:

1. The students will be judged on the most correct answers or the fastest time for the most correct answers.

EXTENSION:

1. Have the students research the pros and cons of reservoirs. Then have the students research the Alabama-Georgia water wars and determine the significance of the reservoirs in this legal action. NOTE: Alabama and Georgia currently are involved in water rights discussions because Georgia wants to divert water from a river before it enters the north end of Alabama. Georgia wants to build a reservoir and capture the water for use.
2. Have students research the environmental impact on these reservoirs from recreational pollution and other non-point source pollution.

NOTE: This activity can be used with watershed management simulator.

ORIGINAL DEVELOPMENT RESOURCES:

www.alabamarivers.org - website of the Alabama Rivers Alliance and good source of information about watershed management and the tri-state water wars.

Arelllo, G. *Alabama: the river state*. 1998. Nature Press. A good source for maps and Alabama river information.

ADDITIONAL RESOURCES:

Young, B.M. Hall, J.C. & Middleton, R. (2009) *Headwaters: A Journey on Alabama Rivers*

OBJECTIVE:

Students will be able to:

Describe an endangered species and list reasons for its decline.

BACKGROUND:

Alabama has an abundance of wildlife and plants. In comparison to other states, Alabama has a high number of threatened and endangered plants and animals. In fact, it is believed that Alabama is first in the nation in the total number of species facing extinction or extirpation. For this reason, it is important for students to learn ways that these natural resources can be saved.

VOCABULARY:

endangered, extirpated

PROCEDURE:

1. Before beginning this activity, choose endangered animals or plants to study. The students should research these plants or animals and learn why they are endangered. Information can be obtained from Alabama Natural Heritage, State Lands Division (see directory).
2. Using the local newspaper, discuss what the paper looks like and how it is formatted.
3. Discuss how different kinds of features (articles) appear in various sections. Students should compare and contrast these.
4. Design a class newspaper written from an animal's or plant's point of view.
5. Let students choose a section—front page, comics, life and leisure, sports—and discuss what kind of articles would be in each. Discuss what else would be in the section besides articles such as advertisements, obituaries.
6. Encourage the students to write an article, ad, or comic from an animal's or plant's point of view. There must be something factual in each piece.
7. Each group will have to write headlines for articles and assist in the layout of the newspaper.

EVALUATION:

The finished product will be the evaluative instrument. Each student should demonstrate an understanding of the endangered animal or plant when writing the article for the newspaper.

EXTENSION:

Study other endangered animals and plants.

ORIGINAL DEVELOPMENT RESOURCES:

State Lands Division, North Union Street, Montgomery, AL 36130, 334-242-3484,
ww.dcnr.state.al/lands.htm

www.pfmt.org/wildlife/endangered - web site includes endangered species by Alabama counties section

Grades:

6-8

Subjects:

Interdisciplinary, Communication

Time Needed:

60 minutes

Materials:

newspaper
large sheets of paper to make the newspaper
glue
scissors
small sheets of paper
crayons
markers

Alabama Natural Heritage Program, 1090 South Donahue Drive Auburn University, AL 36849. 334-844-5017 <http://www.natureserve.org>

The Nature Conservancy of Alabama, www.nowandforeveralabama.org

ADDITIONAL RESOURCES:

The Nature Conservancy: Alabama - Protecting the 5th Most Biologically Diverse State in the U.S.

OBJECTIVES:

Students will be able to:

1. Identify areas of their homes that need to be made more energy efficient by using a student-made energy loser detector.
2. Chart areas needing insulation.

BACKGROUND:

Take a walk through your house, especially past windows and doors. Do you feel a draft? Lie down on the floor. Do you feel cold air? If your house is like most houses in America, it loses heat through doors, windows, walls, cracks—even through electrical outlets and switches. We waste hundreds of dollars each year literally trying to heat or cool the inside. But more important are the environmental consequences because not only does wasting energy cost money, but it also promotes air pollution, acid rain, and global warming. We must learn to educate and insulate if we are truly to make a difference!

VOCABULARY:

insulation, energy efficient, raft, energy saving

ADVANCE PREPARATION:

1. Gather printed materials from a home repair store that discuss insulation for the windows, doors, and other parts of the house. Get enough copies for each student, if possible.
2. Have demo of energy-loser detector to show students how to make this (to make this just tape a strip of Saran Wrap to a straw). Hold straw horizontal to area of possible energy loss. If air is being lost, the Saran Wrap will move.

PROCEDURE:

Setting the Stage

Talk with students about the importance of saving energy. Ask them what they do around their homes to save energy.

Activity

1. Give each student or each group copies of materials collected from the home repair store.
2. Have each student make an “energy loser detector.”
3. In groups, have each student make a chart listing areas in the home to check for energy loss and whether or not they need insulating. Specify room and specific area such as kitchen windows, doors, outlets.

Follow-Up

1. Have students present their charts and findings.
2. Have students determine what type of insulation to use in each situation.

EXTENSION:

Have students check school classroom for energy loss and needed insulation.

Grades:

6-8

Subjects:

Science, Math, Social Studies

Time Needed:

50 minutes plus homework

Materials:

straws

Saran Wrap

brochures about home insulation

ORIGINAL DEVELOPMENT RESOURCES:

MacEachern, D. (1990). *Save our planet*. Dell Publishing.

The recyclers handbook. (1990). Berkeley, CA: The Earth Works Group.

OBJECTIVES:

Students will be able to:

1. Use field guides to identify plants.
2. Determine if the plants are exotic or native to Alabama.
3. Determine the impact of exotics.

BACKGROUND:

Most nature trails are well labeled, and some students have a working knowledge of many trees and shrubs. The purposes of this activity are to teach the use of field guides and to extend the students' knowledge base to include whether the plant is native to Alabama or is exotic. "Exotics" are species introduced by people to an area often with negative consequences for the native species. This activity can easily be integrated with social studies by exploring how human cultures change their environments. What are the pros and cons of those changes?

All plants evolve with natural growth checks that help keep plant populations in balance, "checks" such as fungus, bacteria and ordinary plant diseases; fish and other animals; climate; geology, etc. all play their part in Nature's balancing act. In a balanced ecosystem, variety reigns. In a balanced ecosystem, there is a biodiversity of plants, growing and evolving.

However, when a *non-native* plant, a species that evolved someplace else, is introduced into new areas, it usually does not have its natural growth checks. So, often enough, the non-native plant is able to grow wildly, quickly covering, smothering and replacing the plants that were naturally there in the first place. The non-native plant may form an *exotic monoculture* (where no other plants grow).

VOCABULARY:

native, exotic, non-native, exotic monoculture, ecosystem

ADVANCE PREPARATION:

Collect plant samples for the first class period.

PROCEDURE:

First Class Period

1. Give each group a field guide(s) and several samples to key out or identify. Have them record the scientific and common name, description, habitat, and range of each plant. Label as native to Alabama or exotic.
2. Exchange plant samples with another group and repeat the process until all plants are identified.
3. Compare and discuss information about each plant.
4. Students should research the impacts of exotic plants and identify the ways that each was introduced.

Second Class Period

1. Assign each group three specific sections of the school campus in which to work. Assign them ten minutes to key and record plants in their areas.
2. Give a signal (blow whistle) to move to their second section and then to their third section.

Grades:

6–8

Subjects:

Social Studies, Science

Time Needed:

Two consecutive class periods

Materials:

field guides for native trees and native shrubs
samples of local plants to identify
references to explore introduced (exotic) plants

3. Return to the classroom and compile a list in two columns of school yard plants that are native to Alabama or exotic.

Conclusion

1. Discuss with students why exotic plants are not desirable for an area and the negative consequences for an ecosystem.
2. Have students think of some well-publicized examples of exotic plants (for example, kudzu in Alabama) and some problems they caused.

EVALUATION:

Group test using field guide(s) to key plants and record for each plant: name, description, habitat, range, native, or exotic.

EXTENSIONS:

1. Invite a local botanist or horticulturist (from your local college or nursery or one possibly employed by your city) to verify the findings of the class.
2. Instruct students to develop a presentation with visual aids about the plants in the community.

ORIGINAL DEVELOPMENT RESOURCES:

The Audubon Society Field Guide to North American Trees, New York, NY: Alfred A. Knopf, Inc.

Alabama Forestry Association, 555 Alabama Street, Montgomery, AL 36104-4395, 334-265-8733, www.alaforestry.org

Peterson Field Guide

Trees and Shrubs in the Heart of Dixie - Blanch Dean

University arboretums and herbariums

Alabama Natural Heritage Program, Department of Conservation and Natural Resources

A Walk Through Alabama, a slide presentation by Alvin Diamond, Troy State University, Center for Environmental Research and Service, www.troyst.edu

OBJECTIVE:

Students will be able to:
Describe habitats where animals and plants are found.

BACKGROUND:

Alabama forests provide habitats for plants and animals. An example of a habitat is as close as your backyard, park, a portion of your school's property, or a neighboring stream.

VOCABULARY:

habitat, adaptation

PROCEDURE:

1. Have students choose an area and study it. In some habitats, they may wish to set up plots of given dimensions for observation. Have students make close observations and record them. A magnifying lens would be helpful.
2. These questions are to be answered based on the students' observations:
 - What species live there now? (animals? plants? insects?)
 - What sources of food, water, and shelter are there for the various species?
 - If carrying out this activity over time, how does this habitat change with different seasons?
 - How are the plants and animals adapted to their habitat?
 - What could be done to improve the area as a habitat?
3. Have students make a plan to improve the habitat and carry it out. Have them consider how improvements might adversely affect some creatures or their habitats. Removing dead wood and limbs is not always a good idea.
4. If the students cannot implement their plan, what resources do they need; or who can do it for them? For example, a little more water may improve the habitat for plants. Who can assist in obtaining more water for the site? How will they water the site? How often? What do they expect to happen with these changes in the habitat?
5. How would the types of species change if a pond were on the school grounds?

EVALUATION:

Verbally share the information recorded with other students, and compare and contrast the information.

EXTENSIONS:

1. Encourage students to use these procedures to study other habitats they may visit during their vacations and out-of-town visits.
2. Invite a forester, wildlife biologist, soil scientist, or other natural resource professional into the classroom to discuss habitat improvement, canopy layers, light intensity, soil pH.
3. Have students research various habitats in Alabama such as forests and streams.

Grades:

6-8

Subjects:

Science, Geography

Time Needed:

One and one-half class periods (This activity may be carried out over a school year.)

Materials:

small area (a local park, school yard, or even a window box terrarium)

ORIGINAL DEVELOPMENT RESOURCES:

American Forests Global Relief. Used with permission. www.americanforests.org

Alabama Forestry Association, www.alaforestry.org

OBJECTIVES:

Students will be able to:

1. Compare a list of communication factors that interfere with resolution of controversial issues.
2. Summarize key aspects of the Red-Cockaded Woodpecker, its habitat needs, and the reason it is an endangered species.
3. Demonstrate cooperative learning by working in small groups to apply effective communication skills.

BACKGROUND:

The Red-Cockaded Woodpecker (*Picoides borealis*) is an endangered species that resides in Alabama and other Southeastern states. Like a number of other endangered species, the Red-Cockaded Woodpecker has become the subject of controversy due to conflict between commercial interests and environmental interests over the need for laws to protect endangered species.

The Red-Cockaded Woodpecker is an endangered species requiring a certain kind of forest habitat to survive. Unfortunately, this habitat is also in demand by industry as a source for wood products. To save the Red-Cockaded Woodpecker from extinction, the government is considering whether to implement new, strictly enforced regulations to prohibit timber cutting in forest areas where the Red-Cockaded Woodpecker lives.

This activity involves a simulated discussion to resolve the Red-Cockaded Woodpecker controversy. The simulation requires students to work in small groups where each student will role-play one of five roles, as described in the attachment. A primary function of the simulation is to demonstrate how careless language and the use of “flash-words” (words that elicit conditional emotional reactions) can hamper communication.

VOCABULARY:

endangered species, ecosystem, biodiversity, habitat

PROCEDURE:

1. Divide the class into groups of 5, so that within each group there will be one student for each of the five roles for this activity. (If you have a group with more than 5 students, Mr. Wright, the scientist, is a role that can be doubled.) Provide the appropriate role description to each player, taking care not to let any player see another’s role description. Allow a few minutes for players to read quietly and become familiar with the roles they are to assume. Ask each to identify the “flash-words” used in their role descriptions.
2. Explain that each group is to take 10-15 minutes to discuss the questions of government protection for the Red-Cockaded Woodpecker and to reach group consensus about whether or not to support new regulations prohibiting timbering activity near a Red-Cockaded Woodpecker habitat. Emphasize that each student is to participate/discuss according to the role he or she has been assigned, even if the student does not personally agree with the behavior or position of the respective role. (Remember that since they are unaware of each other’s role descriptions, they will not know of the built-in obstacles to reaching group consensus.)
3. Select a group that is having a good exchange/debate with all players effectively maintaining assigned roles. Arrange the class to allow clear observation of this selected group (for example, other students can

Grades:

6-8

Subjects:

Social Studies, Science

Time Needed:

Two hours

Materials:

the video and teacher’s guide for
Discovering Alabama: Red-Cockaded Woodpecker
blackboard or flip easel

move to form an observation circle around the selected group). Have the selected group continue discussion/debate long enough to allow all 5 players to portray their respective roles.

4. End the group discussion and invite the class to share observations about how the group was handling communication (not about what was correct or incorrect, logical or illogical). For example, an observer might report, “Mr. Green would not let Mr. Dollar finish anything he began to say,” or “Dr. Wright uses a lot of words that people might have trouble following,” or “Mr. Waffle talks very loudly,” or “The group is not making progress to address the task it was assigned.”
5. Explain that people often hold views that are based on feelings or perceptions rather than facts, and that this often gives rise to controversy before cooperative problem solving can occur. Conduct a brainstorming session to list things that influence our feelings and perceptions (examples include peer affiliations, cultural traditions, television, misinformation, self-image).
6. Ask the class to participate in a genuine discussion of the Red-Cockaded Woodpecker issue without having a simulated role to play. Make a list of questions and concerns about which they would like more information in order to help reach consensus in the group.
7. Show the video *Discovering Alabama: Red-Cockaded Woodpecker*.
8. After the video, reassemble students in their small groups and distribute copies of the activity/information sheet located on the last page of the supplementary Teacher’s Guide for the video.
9. Have students try once again to reach consensus about government efforts to protect the Red-Cockaded Woodpecker. This time they are to make a genuine effort to reach consensus (no simulated roles this time) and are free to develop new ideas/solutions that might resolve the Red-Cockaded Woodpecker controversy in a way that helps provide society’s need for wood products while also protecting the habitat for this endangered species.

EVALUATION:

Each group of students will prepare a written report and present their ideas for resolving the Red-Cockaded Woodpecker controversy. They should include some discussion of how the wood demand will continue to be met; how Red-Cockaded Woodpecker habitat requirements will be met; and how landowners, environmentalists, scientists, and the public might be involved in protection efforts.

EXTENSIONS:

See extensions and community connections of the Teacher’s Guide for the video *Discovering Alabama: Red-Cockaded Woodpecker*.

ORIGINAL DEVELOPMENT RESOURCES:

The video *Discovering Alabama: Red-Cockaded Woodpecker* and its supplementary teacher’s guide, available from the Discovering Alabama, Alabama Museum of Natural History, University of Alabama, Tuscaloosa, AL 35487 (205) 348-7550.

**MR. DOLLAR
PRESIDENT
CUT THE TREES, INC.**

Mr. Dollar is adamantly opposed to enforced protection for the Red-Cockaded Woodpecker and its habitat. He believes that such protection is a lock-up of valuable resources and will cost jobs and hurt the economy. He feels that the most basic American values are the rights of private property owners, the free enterprise system, and a market-based economy unconstrained by government meddling. He believes that environmental laws are excessive and that government protection for the Red-Cockaded Woodpecker is just one more unnecessary constraint against landowners who seek a reasonable profit from their investment. He regards environmentalists as tree huggers and extremists whose views are based on emotions. He believes that many animals—for example, the dinosaurs—become extinct due to the normal course of change on Earth. He often refers to the RCW as the Red-Cockaded Woodpecker and asks what good is it if you can't use it? He feels very strongly about this issue and will not agree to any kind of enforced protection for the Red-Cockaded Woodpecker.

**MR. GREEN
PRESIDENT
SAVE THE TREES SOCIETY**

Mr. Green is adamantly opposed to any logging on lands where the Red-Cockaded Woodpecker lives or might be able to live. He believes that forest industry owners are timber beasts who don't care about the ecology. He is especially incensed at the logging practice known as clear cutting and feels that timber profiteers are destroying the virgin forests and wiping out the native biodiversity. He thinks that man is just one part of the larger community of life in which all things are connected and that if we continue to harm the environment, soon we will become endangered species, too. He feels very strongly about this and will not accept anything less than the strongest laws against cutting trees on lands suitable for the Red-Cockaded Woodpecker.

**DR. WRIGHT
RESEARCH SCIENTIST
U.S. DEPARTMENT OF FISH AND WOODPECKERS, LABORATORY OF BIODIVERSITY
AND ECOSYSTEM RESEARCH**

Dr. Wright is concerned that a species protection policy should be based on science rather than the political aims of interest groups. He maintains that the specific habitat requirements of *Picooides borealis* may be variable depending upon certain parameters that are only partially quantifiable. He believes there is no way that laymen (including industry executives and environmentalists) can comprehend the implications of the data generated by control and experimental sites when comparing for understory, midstory, perimeter, and other aspects of population viability. He is very cautious about ideas or viewpoints other than his own, is impatient with the unscientific approach of others, and frequently asserts the significance of utilizing professional expertise in such matters.

MR. WAFFLE
LOCAL CONGRESSMAN

Mr. Waffle believes that the most important concern is serving the public; that people want economic growth; that litter is very unsightly; and that we can have both jobs and a clean environment. He thinks we need balance. He is pleased with providing leadership for expanding growth of the industry in his area and proud of environmental improvements attained during his term—especially proud that he was able to get funds for several new roads and sewer lines. He wants to do all he can for the public interest on this matter.

MR. STORY
REPORTER
THE SENSATIONALIST DAILY NEWS

Mr. Story wants to know Mr. Dollar's opinion of why people should be opposed to Mr. Green's organization. He wants to know Mr. Green's opinion about how devastating Mr. Dollar's company has been to the environment. Mr. Story wants to hear how loggers are raping the old growth forest and how environmentalists are costing jobs. Mr. Story thinks it is interesting that a rare bird he has never seen is causing a public outcry. He is curious about what the Red-Cockaded Woodpecker looks like and whether others have actually seen one but has little interest in analysis of the issue. However, he is very insistent on getting pertinent dates, locations, and the correct spelling of each person's name and affiliation. He also wants to know about rumors that funds for Mr. Waffle's recent sewer project were awarded to a construction firm owned by Mr. Waffle's wife.

OBJECTIVES:

Students will be able to:

1. Create an energy diary.
2. Analyze their diary entries, and plan changes
3. Compare different brands and models of appliances.
4. Discuss and present a point of view concerning community, state, and national energy concerns.

BACKGROUND:

Before students can be persuaded to change their behavior toward energy use, they must understand the ways they personally use energy. They need to understand that everyone uses energy and contributes to various pollution emissions. Once they identify their own use of energy and understand why non-renewable energy must be conserved, they can apply conservation to their own lives. Families can save energy by buying energy-efficient appliances. Appliances, such as refrigerators, air conditioners, and dishwashers, are required to have labels showing yearly energy use. New automobiles are required to be rated according to fuel consumption. Wallboards and insulation types for homes have energy-efficiency ratings.

VOCABULARY:

pollution emissions, kilowatt, kilowatt hour (kwh), conservation, externalities, energy

PROCEDURE:

1. Have students identify ways in which their activities contribute to pollution emissions by keeping an energy diary. Students should record for one week the appliances used (lights, television, microwave, car) and the amount of time spent using them. Remind students to include energy used for refrigerators, air conditioners, and water heaters.
2. Once they have recorded their energy use, students should examine:
 - Ways they could save energy.
 - Their willingness to make changes to save energy.
 - The impact of these changes on pollution emissions.
3. Have students choose an appliance and compare the operating, purchase, and installation costs of different brands and models. Students should present to the class. Compare a new, energy-efficient appliance with an older, inefficient model. How much energy will the most efficient appliance save? What are the operating costs of the appliance?
4. Have students list energy-saving activities that are used at the community, state, and national levels.
5. Have a class discussion in which each student expresses a point of view about energy and energy conservation.
6. Have students discuss what their community is doing to conserve energy?
7. Have students discuss whether their city has a public transportation system and whether and how it saves energy?
8. What are national programs doing to conserve energy or promote conservation? (Check out government regulations for fuel efficiency standards, alternative energy research, and energy council.) The U.S. Department of Energy and the state's energy office also are good sources for this information.

Grades:

6-8

Subjects:

Math, Environmental Science, Civics

Time Needed:

Variable: involves individual, out-of-class research and class discussion

Materials:

diary
information about appliance brands
(costs, energy requirements, etc.)
found on labels of new appliances
and new vehicles

EVALUATION:

1. Review student diaries.
2. Review student lists of energy-saving activities.
3. Evaluate behavioral changes planned by the students.

EXTENSIONS:

1. Have students publish a newsletter with their findings in the format of a consumer report.
2. List and discuss benefits versus energy costs. This could be an appropriate time to introduce students to the concept of externalities. (The time-cost of a product must include all indirect cost of producing and using the product.)

ORIGINAL DEVELOPMENT RESOURCES:

Adapted from *Growing Greener Cities Education Guide*, used with permission.

Environmental Protection Agency Greenlights Program.

U.S. Department of Energy. www.energy.gov

Consumer Reports. Appliance and vehicle energy ratings.

OBJECTIVE:

Students will be able to:

Demonstrate processes for drinking water purification by the use of settling and filtration processes.

BACKGROUND:

Suspended solids are a common contaminant in surface sources of untreated (raw) drinking water. Suspended materials must be removed to make water suitable for consumption or potable. Two common methods of removing suspended materials are filtration and precipitation. Water treatment plants use chemicals such as alum to cause particles to clump together and settle out faster.

VOCABULARY:

settling process, potable water, purify, treatment plants, alum

PROCEDURE:

Students should:

1. Fill a jar with water, and then place a teaspoon of soil in the jar. Mix the soil and water well and let the mixture stand for a few minutes. This mixture represents raw drinking water at a treatment plant. The soil will eventually settle to the bottom of the jar.
2. Fill another jar (number 2) with water; mix in one teaspoonful of soil and a teaspoonful of alum. This step demonstrates how an added chemical, alum in this case, speeds up the settling process.
3. Place a filter in the funnel. Place the funnel in the third jar and carefully pour into the funnel only the water, trying not to pour in much of the dirt and alum that settled out in jar 2. The water filters through, leaving behind any additional suspended materials (soil) on the filter, illustrating further a method for drinking water treatment (precipitation followed by filtering).
4. Write down what was observed in the procedure.
5. Research the local drinking water treatment plant process and draw diagrams illustrating the steps in the process including additional steps such as fluoridation and chlorination.

EVALUATION:

Students should be able to explain the settling process, specifically how a settling basin works. In this evaluation, they should contrast what happened in the first, second, and third jars and know why.

EXTENSION:

Arrange for a field trip to a water treatment plant or a speaker to visit the class.

ORIGINAL DEVELOPMENT RESOURCES:

Tennessee Valley Authority

Grades:

6-8

Subject:

Science

Time Needed:

One class period

Materials:

three jars
powdered alum
filter paper
1 cup of soil
funnel
spoon

Notes

OBJECTIVES:

Students will be able to:

1. Describe an urban forest.
2. Explain an urban forest's contribution to their lives.

BACKGROUND:

Until you really know the condition of your urban forest and the environment in which it exists, you cannot take appropriate action to improve it.

In 1991 American Forests conducted a survey of 20 major city forests. It found the average life of a city tree to be just 32 years, much shorter than that of a tree in a rural forest. The survey also revealed that many cities remove more trees than they plant. Regular tree care is needed to help improve the tree condition and life span of urban forests. In addition, by planting more trees in the cities, we can help fill those empty spaces along our streets.

By exploring Alabama's urban forests, students will learn about their local environment, its health, and what can be done to improve it.

VOCABULARY:

urban area, rural, urban forest

PROCEDURE:

1. Ask students, as individuals or in small groups, to write scripts for use on a tour of neighborhood trees to be conducted by the students for an audience such as another class or an outside group. The neighborhood might be local residential area, a downtown area, a park or arboretum, or simply the school grounds.
2. The students must think about the audience for whom they are developing this tour. What are the knowledge and skill levels of those taking the tour? Do your tourists have a scientific interest, or do they just think trees are pretty? Remind students to be conscious of the safety concerns when someone is taking the tour. Students also should keep in mind the attention span of younger children. Encourage them to think about the ways people learn—by seeing, doing, or listening. Trial runs for the class can be useful before finalizing the script. The tour should include the following information and the “Tree Tour Worksheet” could be used as a guide:
 - Each tree's location.
 - Each tree's common name and scientific name.
 - Each tree's growing cycle. (Describe when the tree sheds its leaves.)
 - A description including some details about leaves, flowers, fruits, seeds. (or one unique feature of a tree that will help someone remember it—a sycamore has peeling bark, a ginkgo loses all its fan-shaped leaves in a single day or two).
 - The relationship of the tree to other organisms, including people.
 - Who takes care of the tree?
 - Can you see any animals, birds, or insect inhabitants? What evidence exists?
 - Each tree's size and general health. What are the signs of a healthy or unhealthy tree?
 - How old do you think the tree is? If the tree is on public property, who makes decisions concerning the tree?

Grades:

6-8

Subjects:

Science, Social Studies

Time Needed:

Two to three 40-minute class periods

Materials:

a tree identification guide
copies of the Tree Tour worksheet

- Have students research the value of this tree, or trees of this type, including historic, environmental, social, and economic.

EVALUATION:

1. Quality of the tour script and ability of students to conduct the tour could be evaluated.
2. The class can have a thorough discussion regarding the ten major points outlined above. The Tree Tour handout can be used, making sure that all questions are answered.
3. Students also could collect leaves from trees on the tour or take photographs and make a tree scrapbook.

EXTENSIONS:

1. Encourage students to make their tours lively and interesting. They might want to tape-record music to go along with their tour information, tell an historical anecdote about the area, or bring along a magnifying glass for looking close-up at features and inhabitants of the tree.
2. Have students complete the “Tree-mendous Alabama Crossword Puzzle” (attached).

ORIGINAL DEVELOPMENT RESOURCES:

Adapted from *Growing Greener Cities Education Guide*, used with permission.

100 Forest Trees of Alabama. Available at www.alabamaforestinfo.org

Alabama Forests. 1998. Video part of *Discovering Alabama* series. Available at www.discoveringalabama.com

Alabama Forest Facts. www.alaforestry.org

Tree Tour Worksheet

Tree Tour Stop #:

Location:

Common Name:

Description: (Leaves? Flowers? Fruit? Seeds? Any animal, bird, and insect inhabitants? Anything unusual about this tree? Include size, approximate age, growing cycle, and general health.)

What is the tree's relationship to other organisms, including people?

Who takes care of this tree?

What is the tree's future?

What values are provided by this tree?

On the back of this page, make a sketch of the tree and/or its leaves. A leaf rubbing from the tree could be made or the leaf could be attached to the back of this page.

Tree-Mendous Alabama Crossword Puzzle

Word Bank

ASH	CEDAR	PINE
BEECH	DOGWOOD	REDBUD
BIRCH	ELM	SASSAFRAS
BUCKEYE	HICKORY	SWEETGUM
CHERRY	LOCUST	SYCAMORE
COTTONWOOD	MAPLE	WALNUT
CYPRESS	OAK	WILLOW

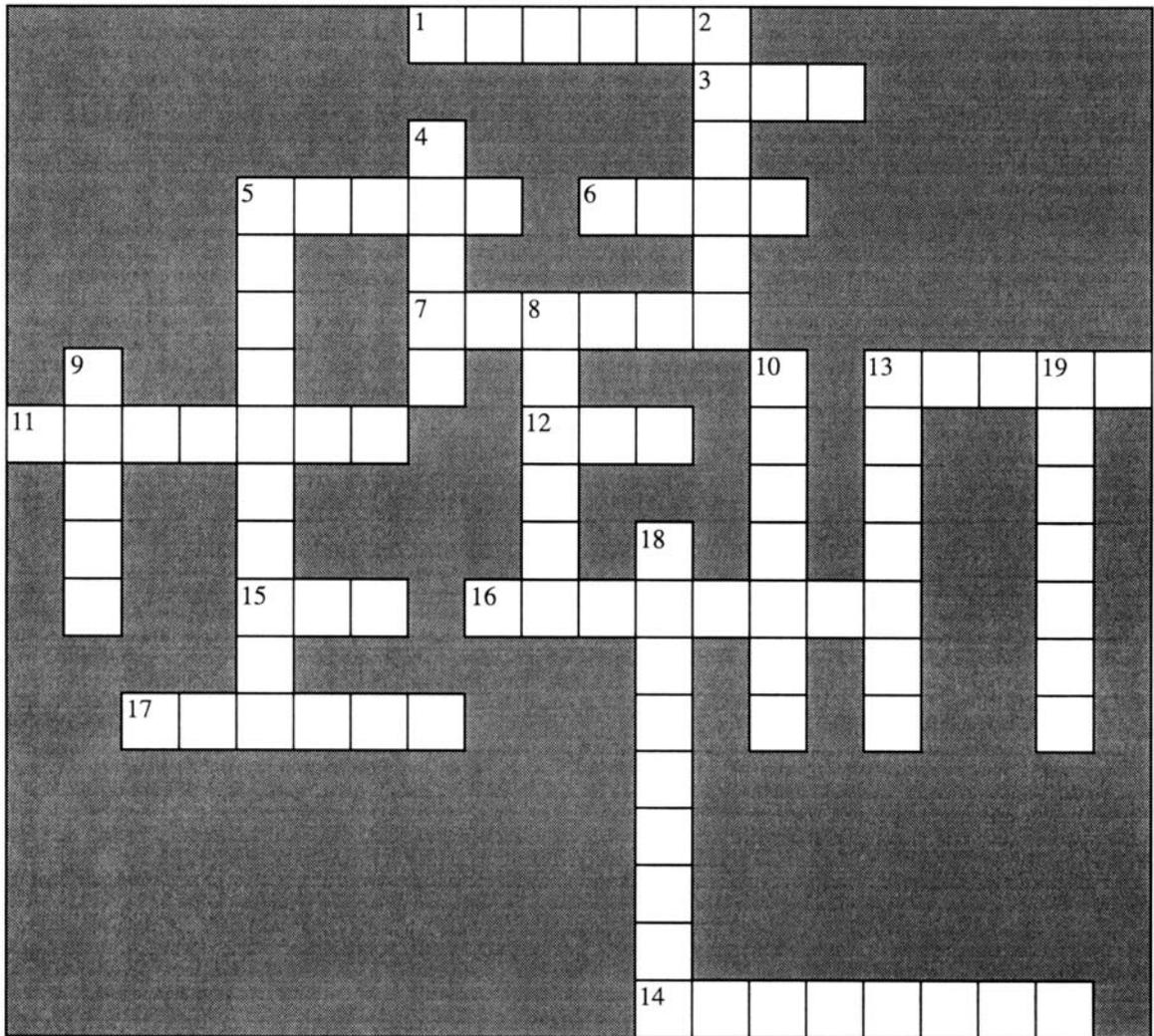
Across

1. One variety “cries.” If you chew on the bark, it will act as aspirin to kill pain.
3. Rhymes with “rash.”
5. This wood has a distinctive color and odor; it is used for chests and closets.
6. Produces cones; the southern variety is the state tree of Alabama.
7. Shares its name with an insect; it is used to make fence posts, tool hankles, and some furniture.
11. _____ dickory dock; prefers to grow in uplands soil; makes great tool hankles and fencing.
12. Tall shade tree; used to make chairs and barrels.
13. Rhymes with “leech;” used to make hankles and fuel.
14. This tree’s gum is not sour; it is found in every county of Alabama.
15. Produces acorns; more than 50 varieties are used for fuel and furniture.
17. Named for the color of its buds that appear in early spring.

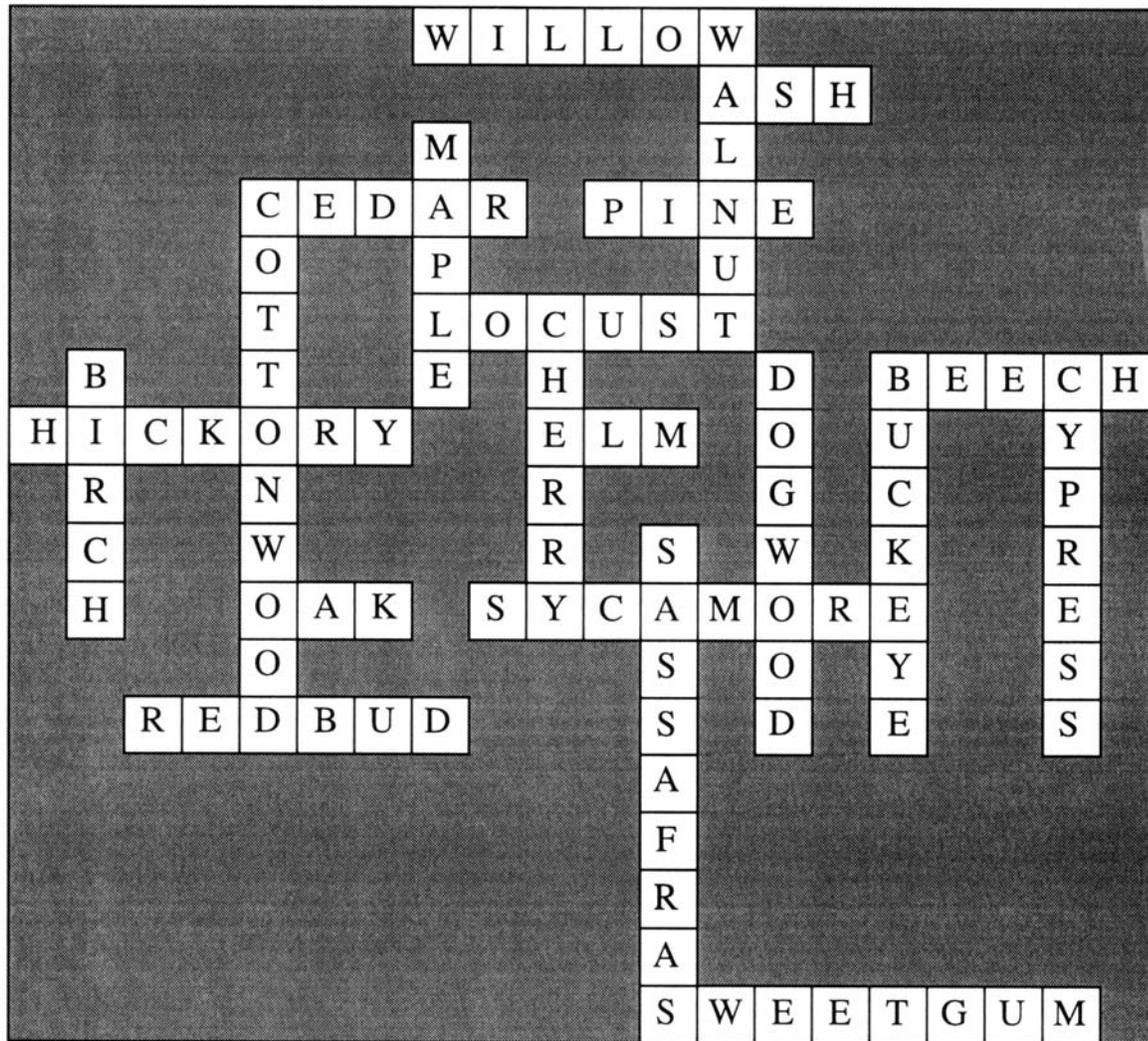
Down

2. Nut tree; dark wood used for furniture.
4. One variety produces sap for syrup when trapped in the spring.
5. One variety produces cottony seeds in summer; used for lumber and pulp.
8. Produces small red fruits; wood used for furniture.
9. Bark used by Indians for canoes; used to make baskets and furniture.
10. Spring flowering tree with white and pink blossoms; wood is used for tool handles and engraving.
13. This tree’s eye can’t see; wood is used to make artificial limbs, wooden ware, and pulp.
16. This is a fruit tree of the fig family; its name has more not less in its name.
18. Its roots boil down to a tea; other uses are fence posts and yields an oil.
19. Grows well in swamps; used for fences and interior/exterior finishing.

Tree-Mendous Alabama Crossword Puzzle



Tree-Mendous Alabama Crossword Puzzle (Answers)



What's Growing Under My Feet?

OBJECTIVE:

Students will be able to:

1. Identify common flowering plants located on, or near, the school grounds.

BACKGROUND:

One of the beautiful things in this state are the wildflowers. There is an abundance of them growing on the roadways, in pastures, and along the banks of streams. Some of the more common ones are wild ginger, pawpaw, clematis, wild honeysuckle, common blue violet, and wild roses.

VOCABULARY:

poison ivy (oak), sumac, wild ginger, pawpaw, clematis, wild honeysuckle, common blue violet, wild rose

PROCEDURE:

1. Give students plastic collecting bags. (Grocery bags work fine.) When you take the students outside, caution them about what not to collect and actually show them such poisonous plants as poison ivy and poison sumac. Also caution students not to collect any rare, threatened, or endangered plants in the area.
2. Take students out to the school grounds and to the closest river or stream. Most students don't realize the assortment of plants under their feet. All green things run together. Upon close examination, students realize that there are many different plants.
3. Small plants, including roots and flowers or fruit, should be placed in plastic bags and should be brought back to the classroom. Plastic bags keep plants from wilting. Place plants between pieces of newspaper, alternating with cut pieces of cardboard. (See directions on how to make a plant press.) The top and bottom should be covered with a thin piece of plywood cut the same size as a folded newspaper. Tie all together with a rope or string. Place the press in a warm place to dry the plants. When plants are dry, place them in photo albums with peelup pages or use a hot glue gun to attach the specimens to a stiff piece of paper or cardboard. Labels can be placed under peeled-up pages or written on the paper or cardboard. Labels should contain the following information:
 - Common name of plant; Scientific name
 - Place collected; Habitat description (upland woods, stream bank, wet area, etc.)
 - Date collected
 - Student's name

Grades:

6-8

Subjects:

Biology, Botany

Time Needed:

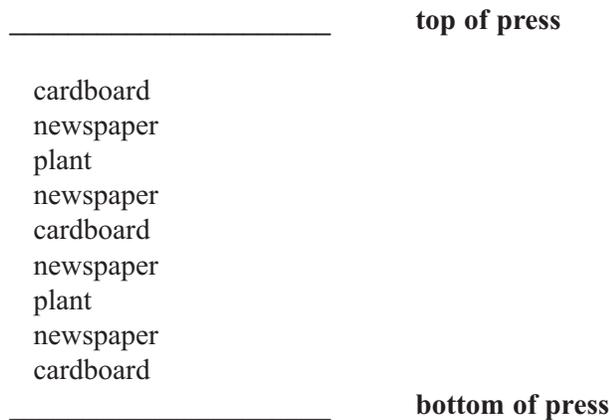
30 minutes per week for two months

Materials:

plant identification books
homemade plant presses
newspapers
plastic bags
small shovel or spoon to dig up the plants

DIRECTIONS FOR CONSTRUCTION OF A PLANT PRESS:

You can purchase an inexpensive press or simply cut two squares of plywood and secure them with string or canvas belts. Layer corrugated cardboard and newspaper alternately and “sandwich the plants” within a few sheets of the newspaper.



EVALUATION:

Use collections as a quiz. Use common flowers, such as dandelion or clover, for the quiz.

EXTENSIONS:

1. Find the scientific names of the plants collected.
2. Instead of wildflowers with roots, students could collect and press leaves of trees.
3. Students also could collect plants at different times of the year and could compare spring flowers with fall flowers.
4. Students also could compare seeds or fruit from the plants they collected.
5. Students could create a school herbarium.
6. Research rare, threatened, and endangered species in the area.
7. Create a photo herbarium instead of collecting actual specimens.

ORIGINAL DEVELOPMENT RESOURCES:

Alabama Wildflower Society - Found at: <http://alwildflowers.org/>

Dean, Blanche et al. *Wildflowers of Alabama and adjoining states*. 1973. University of Alabama Press: Tuscaloosa, AL

Midgley, J.W. *Alabama Wildflowers*. 2003.

“Plants of Alabama.” Legacy, Inc. P.O. Box 3813, Montgomery, AL 36109, www.legacyenvd.org, 1-800-240-5115.

OBJECTIVES:

Students will be able to:

1. Describe some economic and environmental benefits of trees.
2. Discuss how trees or tree-related products fit into the students' lives.

BACKGROUND:

Trees have many values. These include:

Environmental values

Clean water—The hairlike root fibers of trees help filter ground water, trapping nutrients and pollutants that could contaminate it.

Soil protection and nourishment—Tree roots hold soil in place so it cannot easily be swept away by wind or water; the decaying of dead tree parts returns nutrients to the soil.

Storm water control—Leaves and branches slow the movement of rain to the ground, allowing it to soak in slowly. Without trees and other vegetation, heavy rains can wash soil into streams and rivers, making them more shallow and prone to overflow.

Air quality—Trees provide oxygen and use carbon dioxide. They also intercept particulates, such as dust and pollen, with their leaves.

Mineral and nutrient cycling—Through growth, transpiration, and death, trees cycle and use minerals and nutrients from the air, water, and soil (mostly from the soil).

Climate control—Trees moderate temperatures by working as natural barriers to wind, snow, rain, and solar rays. Through evapotranspiration, trees add moisture and cool the air.

Habitat for wildlife—Trees and forests provide homes for many different species of animals. Some plants need trees for structural support.

Human Values

Aesthetics (beauty)—Trees beautify urban and community areas such as parks, streets, and school yards.

Recreation and physical health—Forests are great places for activities such as hiking, backpacking, skiing, hunting, and bird-watching.

Community spirit—Planting and caring for community trees can bring neighbors together to improve their environment and to build a sense of community and environmental stewardship.

Natural sources of medicines—Trees provide substances with medicinal values such as taxol extracted from the bark of the yew that is used in treating cancer.

Education—Forested areas offer many resources as outdoor classrooms.

Economy—Making room for trees in cities provides job opportunities and a healthier environment. The forest industry also provides jobs for many people, from loggers to cabinetmakers and home builders. Trees planted for energy conservation help consumers save money.

Forest products—More than 5000 products and by-products come from trees. They include wood products, paper products, sap products, and foods. We use them every day.

VOCABULARY:

evapotranspiration, lignin

Grades:

6-8

Subjects:

Ecology, Botany, Social Studies,
Economics, Fine Arts

Time Needed:

Two 40-minute class periods

Materials:

copies of "What Are Trees Used For?"
handout

PROCEDURE:

1. Ask students to suggest ways that trees or tree-related products fit into their own lives. Remind them of the natural environment, home, school, food, music, art, transportation, and recreation.
2. Have students read the “What Are Trees Used For?” handout.
3. Have students conduct a survey in their home, yard, garage, workshop, or the classroom of all the products that are found on the handout. List each and bring the list to class.
4. Students should identify environmental connections of forests or trees to climate.

EVALUATION:

1. Have students count the number of products from trees used by each one of them in order to determine who relies on trees the most.
2. Combine information or data about product use and have students develop graphs.
3. Have students discuss the cooling effect (air conditioning saved) by trees around a home and the importance of trees as windbreaks.

EXTENSIONS:

1. Have students make an art collage of the products discussed in “What Are Trees Used For?”
2. Invite a forester to discuss the economic and environmental roles of forestry in Alabama.

ORIGINAL DEVELOPMENT RESOURCES:

Adapted from *Growing Greener Cities Education Guide*.

Alabama Forest Facts. www.alaforestry.org

What Are Trees Used For?

The story of trees is incomplete without a list of some of the uses to which they are put. The forest and the products of the forest are often separate in the minds of people because once the tree is harvested its shape, has changed few people remember its previous form.

The tree may be used as solid wood, fibers, chemicals, lignin (nature's glue that holds fiber together) or fillers and bases for various day-to-day items. Here are a few things made using trees.

fuel	cider	linoleum
rayon	activated carbon	tires
cellophane	boat caulking	medicated hog feed
photographic film	typewriter stands	fish feed
newspaper	displays	soil additive
alcohol	desk pads	buckets
wax for carbon paper and polishes	baking cups	surveyor stakes
space craft reentry shields	bread wrapping	world globes
book paper	skis	atlases and maps
pencils	decorative paneling	poultry houses
telephone casings	wood house foundations	kennels
football helmets	gift boxes	seesaws
tools	candy boxes	novelties
piano keys	chocolate cups	taffy sticks
ping pong balls	industrial toweling	popstick sticks
fishing floats and tackle	price tags	bark dust
lacquer	tax forms	fire ladders
flashlight cases	beer cartons and labels	umbrella handles
washing machine impellers	restaurant doilies	snow fences
camera cases	garment bags	trellises
artificial snow	record covers	cement dispersant
toilet seats	award certificates	flooring
adhesives	waste receptacles	kitchen cabinets
leather tanning	masking tape	gunstocks
medicine	fiber tubes	school desks
poultry feed	shelf paper	darning eggs
artificial vanilla flavoring	vacuum bags	knife handles
vinegar	fly paper	golf club heads
cosmetics	gangplanks	bowling alley lanes
oil well drilling compounds	pontoons	grocery sacks
fertilizer	sewing machine tables	egg cartons
gummed tape	stirrups	milk containers
dust palliative for roads and ores	rafts	buttons
water treatment	glasses frames	ash tray bases
foundry cores	corks	magazines
adhesives in plaster	guitars	photographic slides
insecticides	name tags	trailers
oiler water treatment	parallel bars	bedspreads
ceramics	metronomes	draperies
sausage casings	tambourines	stadium seats
asbestos replacement	movies	trailers
fungicides	polo mallets	pool cues

cleaning compounds
disposable medical clothing
diapers
railroads
power poles
pallets
acetic acid
flagpoles
steering wheels
clocks
rakes
swings
charcoal
wine racks
rubber tires
foam rubber
anti-foaming agents
enamel and wood stain
particleboard
panel board
hard board
lumber
hi-fi cabinets and speakers
manure spreaders
trunks
carpenter vises
shovel handles
billboard poster
pipes
planters
observation towers
garden stakes
caskets
boot jacks
lobster floats
apartment houses
horse jumps
confetti
salad sets
tent poles

decoys
candlesticks
sticks
basketball courts
cribs
shade
toothpicks
humidor
art pens
easels
hammers
fence posts and fencing
shutters
fencing
insoles and heels in shoes
facial tissue
bath tissue
paper towels
hair spray
liquid nail polish
laxative
fruit and nuts
railroad crossing gates
cistern covers
riot sticks
crutches
cranberry scoops
rolling pins
mousetraps
lacrosse rackets
croquet balls and mallets
fine printing papers
elevator cabs
missile and radar domes
bookends oars and paddles
pipe racks
sandboxes
gun racks
salt and pepper shakers
yeast

cutting boards
puzzles
toys
birdhouse
creosote
turpentine
gum
shipyard timbers
docks
doors
mirror backs
cable reels
ceiling timbers
schools
signs
baseboards
molding
fireplaces
display cases
axe handles
broom handles
fruit crates
wagons
vegetable crates
canes
loading platforms
can lables
clothes racks
Venetian blinds
freight cars
arrows
aircraft propellers
shoe trees
lobster pots
roof gutter
hurdles
crepe paper
truck bodies
bridges
chairs and table

Why Do We Need Petroleum?

OBJECTIVES:

Students will be able to:

1. Give examples of petroleum products.
2. Define the advantages and disadvantages of petroleum's use.

BACKGROUND:

Petroleum literally means rock oil: oil that comes from rock. Petroleum is formed from organic matter (plants, animals, and microbes) that is buried deep below the Earth's surface by layer upon layer of sediment (sand, mud). Over long periods of time, the organic material is transformed by heat and pressure into crude oil. Petroleum is lighter than water. It moves upward through the ground water, which fills the tiny holes and crevices in the rocks, until it reaches an impermeable layer where the holes are too small for the droplets to pass through.

Oil wells are drilled as deep as six miles into the Earth to search for petroleum. These wells can cost millions of dollars to drill, yet drilling is done because petroleum is a valuable natural resource. Although the major use of petroleum is fuel (gasoline, jet fuel, heating oil), and petroleum and natural gas are often used to generate electricity, there are many other uses. Petroleum is used in our everyday lives. A majority of plastic is made from petroleum and is used almost everywhere: in cars, houses, toys, computers, clothing, etc. Asphalt used in road construction is a petroleum product as is the synthetic rubber in tires. Paraffin wax comes from petroleum as do some fertilizers, pesticides, herbicides, detergents, phonograph records, photographic film, furniture, packaging materials, surfboards, paints, and artificial fibers used in clothing, upholstery, and carpet backing. (See the included list for more examples.) Helium, sulfur, and other valuable materials are produced from oil wells along with petroleum itself. Millions of people around the world are employed to find or produce petroleum, ship and refine it, and manufacture and market the many products made from it.

There are problems with petroleum that may result from its use. In transporting oil, accidents can happen. Oil spills can kill plants and animals and spoil beaches. Spills may happen closer to home: people sometimes dump used oil from vehicle engines onto the ground or into open drains instead of taking it to a recycling center. This causes pollution. Plastic objects and containers are thrown away, but the plastic does not decay quickly. It stays around and sometimes may injure or kill wildlife; for example, plastic rings from "six packs" can choke birds and animals. An action as simple as cutting each of the rings with scissors before throwing it away could save animal lives! Plastic bottles thrown overboard from ships and boats wash up on beaches. Thoughtless disposal of plastic causes problems for us all. How can we use petroleum products more sensibly in our lives?

The burning of fossil fuels (gasoline, heating oil, kerosene, natural gas, and coal) produces the gas carbon dioxide (CO₂) as a by-product. Some scientists theorize that adding excess CO₂ to the atmosphere could cause global climate change (warming). Light energy from the sun is converted into heat energy on the Earth. Some of this heat is radiated back out into space. CO₂ in the atmosphere traps some of this heat energy on the Earth, thus contributing to global climate change (warming). If the burning of fossil fuels contributes to global climate change, the results could be catastrophic. If the temperature rose high enough, the glaciers and ice

Grades:

6-8

Subject:

Science

Time Needed:

15-30 minutes to discuss the uses of petroleum; up to one hour for students to write their essays or stories

Materials:

copies of activity sheet and illustrations for all students
colored pencils
marker
paint
paint brushes

caps could melt, raising the level of the oceans and flooding coastal cities like New York, Miami, and New Orleans.

Some scientists theorize that volcanic eruptions throw more gases and volatile chemicals into the atmosphere than humans could produce in three million years!

Some people would like to prevent the pollution that the use of petroleum products can cause by doing without petroleum altogether. Is this possible? What would it be like to live in a world without petroleum?

VOCABULARY:

petroleum, fossil fuel, plastic, asphalt, carbon dioxide, global climate change, oil spills, environment, air pollution, water pollution, sediment, organic matter, crude oil

PROCEDURE:

1. Discuss the uses of petroleum products. Bring examples to the classroom, or ask the students to bring examples. Be sure that they understand how widespread petroleum products are in our society.
2. Discuss pollution related to the use of petroleum. Guide the students to an understanding that the use of petroleum has environmental consequences. Are there things they can do in their own lives to prevent or decrease these consequences?
3. The students' worksheets include two illustrations: a house containing common household items made with petroleum products and an identical house from which all items made with petroleum have been removed. Ask the students to draw in the second house non-petroleum replacements for the missing items. Are there always alternatives? They can use this part of the exercise to warm up for step 4. If time is short, either step 3 or 4 of the exercise could be eliminated.
4. Have the students creatively express their own ideas about how the world would be different if there were no petroleum products in it. If they seem to have some trouble getting started, make a few suggestions. Encourage them to draw or paint and to write essays, stories, or poems. If you want to focus the scope of the students' creativity, you could, for example, ask the students to think about what would be different in their house or their school if all petroleum products were removed. Suggest also that they propose substitutes for the missing petroleum products they think they would be unable to do without.

EVALUATION:

Examination of the student worksheets and evaluation of discussions should determine the level of students' assimilation and understanding of the lesson.

EXTENSIONS:

1. After the students finish the exercise, ask them to describe what the world would be like without petroleum. Hearing the other students' ideas will help them better understand the role of petroleum in their lives.
2. Another good thing to discuss at the end of the exercise is pollution. Are there petroleum products the students are willing to live without in order to prevent pollution? What ideas can the students suggest to deal with pollution problems related to the use of petroleum? Can we use petroleum more wisely?
3. Have the students research plastic recycling. Have them locate plastic recycling centers in the area.

ORIGINAL DEVELOPMENT RESOURCES:

The list of products made from petroleum is modified from the American Petroleum Institute's (API) "Petrochemical Products" list and from Laurie Sachtleben's article "Products from Petroleum," *Chevron World* magazine, Winter 1990.

Oil recycling information from Project ROSE

Products That Can Be Made From Petroleum

Ink	Heart valves	Crayons	Toys
Telephones	Dolls	Transparent tape	Antiseptics
Wading pools	Purses	Deodorant	Panty hose
Rubbing alcohol	Carpeting	Disposable diapers	Oil filters
Pajamas	Upholstery	Hearing aids	Car sound insulation
Dresses	Cassettes	Motorcycle helmets	Pillows
Clothes line	Shower doors	Soap dishes	Shoes
Refrigerator linings	Electrician's tape	Model cars	Folding doors
Floor wax	Sweaters	Sports car bodies	Tires
Dishwashing liquids	Unbreakable dishes	Toothbrushes	Combs
Toothpaste	Tents	Hair curlers	Lipstick
Ice cube trays	Electric blankets	Tennis rackets	Drinking cups
Aspirin	House paint	Roller skate wheels	Guitar strings
Ammonia	Eyeglasses	Ice chests	Life jackets
TV cabinets	Car battery cases	Insect repellent	Ice buckets
Fertilizers	Hair coloring	Toilet seats	Loud speakers
Movie film	Fishing boots	Candles	Water pipes
Shower curtains	VCR tapes	Credit cards	Permanent press clothes
Golf balls	Detergents	Sunglasses	Glue
Fishing rods	Linoleum	Plastic wood	Soft contact lenses
Dice	Trash bags	Hand lotion	Shampoo
Shaving cream	Safety glass	Awnings	Salad bowls
Plywood adhesive	Cameras	Anesthetics	Artificial turf
Artificial limbs	Bandages	Mops	False teeth
Beach umbrellas	Ballpoint pens	Boats	Nail polish
Golf bags	Paint brushes	Caulking	Balloons
Curtains	Vitamin capsules	Milk jugs	Putty
Garden hose	Skis	Tool racks	Slacks
Yarn	Insecticides	Fishing lures	Perfume
Shoe polish	Petroleum jelly	Faucet washers	Food preservatives
Antihistamines	Cortisone	Dyes	LP records
Vaporizers	Parachutes	Wire insulation	Roofing
Cold cream	Synthetic rubber	Roofing shingles	Rubber cement
Fan belts	Umbrellas	Paint rollers	Luggage

Why Do We Need Petroleum?

NAME: _____

Your teacher will discuss some uses of petroleum as well as some problems caused by the use of petroleum. Here are a few things you or your family come into contact with every day that are made from petroleum: gasoline, plastic (everything made from plastic comes from petroleum), artificial rubber, candle wax, fertilizer, detergents, photographic film, furniture, packaging materials, surfboards, paints, protective gloves, raincoats, and umbrellas. Petroleum is sometimes used to generate electricity. Helium, sulfur, and other valuable materials are produced from oil wells along with the petroleum itself. Millions of people around the world work to find and produce petroleum, ship and refine it, make things out of it, and sell those many products.

Instructions:

This activity sheet includes pictures of two houses. The houses are identical except everything made with petroleum has been taken out of the second one. On this picture, draw replacements *not* made with petroleum products for the missing items.

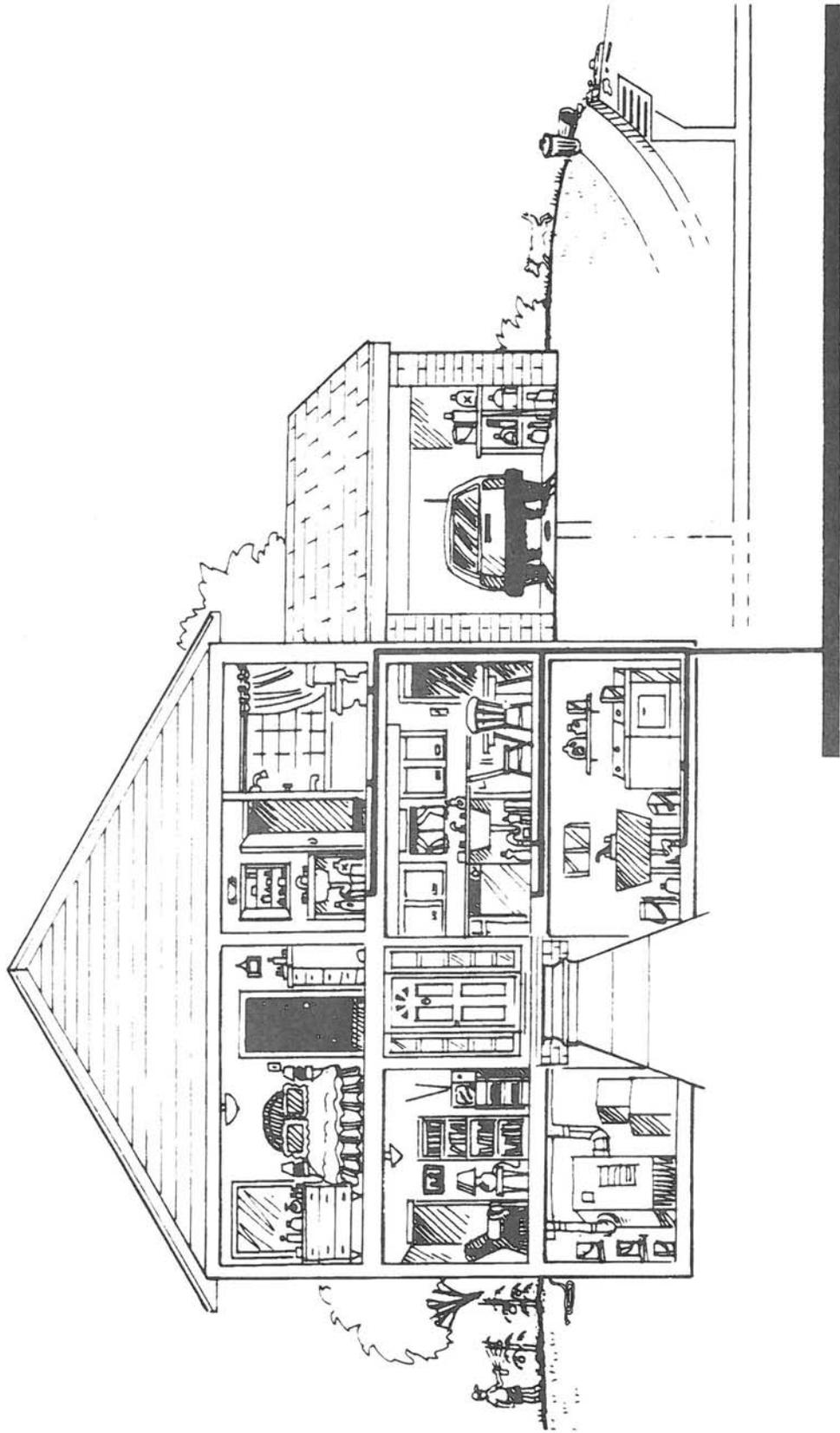
Is it hard to find petroleum-free replacements for some of these missing items?

Do we need to have all these things?

Use your imagination to think of a world without ANY petroleum in it. Would you like to live in such a world? What would you have to give up? What would be better? Write an essay, story, or poem or draw a picture illustrating this petroleum-free world you have imagined and what it would be like.

When you are done, share your ideas. Did some of your friends think of things you hadn't thought about? Have you changed your mind about whether or not you would like to live in a world without petroleum? Can we use the petroleum we have more wisely?

Uses of Petroleum



Uses of Petroleum

