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ABSTRACT

This unit on natural resources is one in a series of three prepared for use in the classroom. An interdisciplinary approach encompassing mathematics, science, and social studies is utilized in these environmental units. This material is designed for middle grades and above. Many of the activities are open-ended with each activity in this unit emphasizing the use of our natural resources. The unit is divided into mini-units dealing with forests, soil and minerals, water, and wildlife. For some of the mini-units student worksheets are provided which can be easily duplicated. Thought questions are presented to facilitate logical thinking based on skills and knowledge of mathematics, science, and social studies. Role-playing situations are included to stimulate the students' imaginations. (JP)

ENVIRONMENTAL EDUCATION

INSTRUCTIONAL UNIT

NATURAL RESOURCES

Department of Public Instruction / North Carolina Department of Public Education

This unit on *NATURAL RESOURCES* is one in a series of three prepared for use in classrooms in North Carolina. The other two units are on *POPULATION* and *POLLUTION*. An interdisciplinary approach encompassing mathematics, science, and social studies is utilized in these environmental units.

This material is designed for middle grades and above. Many of the activities are open-ended. The depth to which students become involved in the utilization of this unit is determined by factors such as grade level, interest of students, and relevance of the material to courses into which it is integrated. The unit is not designed to replace mathematics, science, and social studies; rather, it is hoped that skills previously mastered in these areas will be employed in this unit.

Teachers are encouraged to use discretion in the use of this unit. Some may wish to use it over a period of a few days. Others may wish to expand the activities at the suggestions of students and work with it for several weeks.

The first edition of this unit was written by F. W. Stanley, mathematics teacher, Shelby Jr. High School, Shelby, N. C.; Beverly Crotts, social studies teacher, Trinity Sr. High School, Trinity, N. C.; and Patsy Bohlen, science teacher, Page Sr. High School, Greensboro, N. C. Assistance in writing the three units was provided by the Divisions of Science, Mathematics, and Social Studies of the N. C. Department of Public Instruction. After revision, this final edition of the unit was published.

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NATURAL RESOURCES

Objectives

1. To increase the awareness that we have abused our natural resources.

2. To create an awareness of steps that are being taken to conserve our natural resources.

3. To create an awareness of additional steps that need to be taken to conserve our natural resources.

This unit is divided into mini-units dealing with forests, soil and minerals, water, and wildlife. Each mini-unit is divided into categories called "Tell It Like It Was," "Tell It Like It Is," and "Tell It Like It's Got To Be." The teacher may use these mini-units collectively or independently, as no set pattern or sequence is mandatory.

Activities and other suggestions for the teacher are:

- given throughout the unit
- flexible, providing for individual differences and for various age levels
- usable either as class assignments or as individual or group work.

In some of the mini-units, student worksheets are provided, which can be easily duplicated.

Thought questions are presented in a way to create logical thinking based on skills and knowledge of mathematics, science, and social studies. Role-playing situations are included to stimulate the imagination of students. Many of the questions are open-ended, providing students with alternative solutions. It is hoped students will be able to recognize the many-sided issues involved in conserving our natural resources.

FORESTS
(teacher)

Forest conservation refers to the wise use of this valuable resource. It is no longer appropriate simply to assess the value of forests at the present as compared to the past. In addition, students need to be directed into visualizing the future as well.

It should be assumed that man has a rightful place in nature's scheme of things. More than any other element in nature, he has contributed greatly to a rapid depletion of our natural resources. However, it is not the intent of this program to condemn man for his negligence to nature's plans. In making mistakes, he has exhibited one of his truly distinguishing characteristics. The purpose of this investigation is not to blame, but to demonstrate that we must undo, forgive, and forget.

A suggestion for introducing the "Tell It Like It Was" segment is to use a "You Are There" format. A sample interview follows. Of course, if the class has sufficient background and/or initiative, you may prefer that they originate their own script. The script that follows is a radio-type program which could be taped.

"Tell It Like It Was"
"You Were There"
(students)

Walter: "It is an ordinary November morning here at Plymouth Colony in 1621. The pilgrims landed a little over one year ago and have survived their first winter. It is just like any November morning in 1621, except, you are there! We switch you now to Roger Mire, our Plymouth Colony chief correspondent. Come in Roger. (Pause) I say, come in, Roger."

Roger: "Good morning, Walter. This is Roger Mire speaking to you from the business district of the Plymouth Colony. We have with us this morning one of the leaders of the colony, Mr. William Bradford. Mr. Bradford, we thank you for letting us be with you today."

Brad: "We are glad to have you with us. I'd like for you to meet one of our younger colonists, Mary."

Mary: "Tick, tock goes the clock
While you do the Plymouth rock!
Minutes turn into hours
April showers bring May flowers
Doing the Plymouth rock."

Roger: "That was cool, Mary. Mr. Bradford, that was a nice little girl."

Brad: "At times, usually she's quite contrary. What would you like to see first? The gardens, the houses, or the boats?"

Roger: "I think the gardens will do fine for a start."

Brad: "Come with me." (Sound: walking feet)

Roger: "We're coming upon a rather large cleared field in which I can see many things growing. Tell me, Mr. Bradford, how does your garden grow?"

Brad: "I'll ask Mary. Mary, Mary, quite contrary, how does your garden grow?"

Mary: "With corn and beans and pump-keens all in a row!"

Roger: "Thank you, Mary. Let me ask you, Mr. Bradford, did it not require much work to clear this field?"

"You Were There" (Continued)

Brad: "Not at all. You see, this is one reason we picked this spot. There used to be an Indian village here."

Roger: "So you didn't have to cut any trees?"

Brad: "Goodness no. No trees were cut."

Roger: "Well, thank you, Mr. Bradford and Mary. We switch you now back to Action Control."

Walter: "Thank you, Roger Mire. I thought it was interesting to hear that the colony is located on the site of an Indian village. Perhaps we can find out later where or why the Indians moved out, but right now, it's to Robert Coast with an "on-the-spot" report of housing in Plymouth. Robert?"

Robert: "Good morning, Walter. Walter, I have with me Whatza Matter, another colonist. Mr. Matter, describe these houses for our audience."

Matter: "Thank you, Robert. Rustic is what I'd call'em. They are made with young saplings placed vertically."

Robert: "This is a surprise. I was expecting the more familiar log cabin."

Matter: "We don't know how to build them."

Walter: "Excuse me, Mr. Matter and Robert, the colonists will not learn to build log cabins until later when the Swedish people arrive."

Robert: "Thanks for the info, Walt. I note that several young trees are used for each unit."

Matter: "Yes, sir, it does take quite a few for a house, but they are small and we've got an unlimited supply.

Robert: "I notice the furniture is rustic, too."

Matter: "It's so rustic that when my bulldog sits on the couch, he goes 'ruff'."

Robert: "Thank you, Mr. Matter, and now to Action Control."

Walter: "Thanks for that report, Robert, and now to Daniel Prefer for a special report. Daniel."

"You Were There" (Continued)

Sound: (fire) (crinkle cellophane)

Daniel: "Walter, I'm here in the forest where a group of colonists are attempting to extinguish a freak forest fire. It seems lightning struck here and set the forest on fire. I see a ranger standing by and I'll try to get him to the mike. Pardon me, sir, I see by your hat that you are a ranger. (Louder) Pardon me, Mr. Ranger-- (Louder) Pardon me, Mr. Ranger."

Sound: (growl) (running feet)

Daniel: "Oops! It's a bear. I'll leave you alone, Ranger. Be back later, Walter."

Walter: "I do hope Daniel doesn't get hurt. We'll try to return to him later. But now in Action Control, we have Eric Severwalk with a commentary on this latest event."

Eric: "Thank you, Walter, I'm sorry that our fire expert, Buck Bridge, could not be here today to show us a simulation of what's really happening. But I believe, Walter, that there is no real danger. Historically, this is one of nature's ways of preserving the forests--some trees burn creating an opening. The residue or ashes enrich the soil and soon we have new trees better than the old ones."

Walter: "Thank you for those warm words, Eric."

Eric: "Walter?"

Walter: "Go ahead, Eric."

Eric: "I wanted to mention our Action Control's latest computer predictions on the outcome of the forests. Americans will never conquer the wilderness without the ax and rifle. Of the two, it will be the ax that is considered the greatest enemy of the Indians. The ax will level the forests and destroy the hunting grounds thus preparing the way for the plow of the farmer. The ax will have many uses: as a plane to smooth wood, as a hammer or a chisel, as a substitute for a knife, and with its handle notched, as a ruler. But it is when the ax is hefted in the pioneer's hands and when his feet are planted solidly on the ground to tackle a giant tree, that the man and tool become one machine for progress."

"*You Were There*" (Continued)

Walter: "May I add, Eric, progress it will be, for we do seem to have an endless supply of trees. So this has been an ordinary day in November 1621 at Plymouth Rock. Ordinary in every way, except, you were there."

FORESTS
(teacher)

QUESTIONS:

1. Why do you think early Americans were not concerned with replanting trees?

   Answer: This is truly an open-ended question. Some of the reasons you may anticipate are:

   - There seemed to be no end to the trees.
   - They needed cleared land for farming.
   - They were too busy existing to see any need to consider the future uses of the forests.

2. Why do you think the ax would be a greater enemy than the rifle?

   Answer: The ax leveled forests, chasing off the game and hence life-supporting food.

3. Why do you think that Indians moved from the Plymouth Rock site?

   Answer: Many tribes, particularly in the northeast, were seminomadic. That is, they followed the game as it migrated. It may have been that the source of meat, clothing, and shelter had moved on.

GROUP OR INDIVIDUAL ACTIVITIES:

1. Have the class suggest ways in which:
   - man uses trees (This list should be easy to obtain.)
   - nature uses trees
     a. to make fossil fuels
     b. to balance carbon dioxide in air
     c. to prevent erosion
     d. to provide shelter for wildlife
     e. to hold water in the ground
2. Draw a map showing American forests in 1620 and in 1970.
3. Prepare a report on forest conservation practices.
4. Build a model of a Plymouth Colony house.
5. Prepare a bulletin board display showing how early North Carolinians used wood.
6. Build a model of a log cabin.
7. Invite local forest ranger to visit class.
8. Take a field trip to a forest.
9. Bring in samples of different types of wood and investigate different uses. (Why cedar chests, why oak floors, why balsa model planes?)
10. Study different forest types--southern, northern, middle hardwoods--what tree type dominates each?

"Tell It Like It Is"
(teacher)

ACTIVITY I: HOW DO WE USE FORESTS?

- Have the class think individually to produce a list of as many uses of forest products as possible. You may want to begin a master list, allowing students time to research additional uses.

  Here are some uses: houses, floors, windows, doors, pencils, boats, fuel, rayon, newsprint, plywood, masonite, toothpicks, furniture, maple syrup, turpentine, crutches, splints, matches, toys, shutters, roofs, tool handles, ladders, picture frames, insulation, fences, piers, trellises, signs, crates, towels, lacquer, rosin, medicines, dyes, (gasp!)
  Can you think of more?

  Note: Let the interest and ability level of your class guide you in determining the length of your list.

- A poster or bulletin board with pictures illustrating uses might prove to be an interesting activity for a small group of students.

  ACTIVITY I has established how we use wood. The uses of wood are a justification for some abuses of this natural resource. ACTIVITY II will establish other "consumers" of wood.

ACTIVITY II: OTHER CONSUMERS OF WOOD

- Allow students time to think of other consumers of wood. Prepare a master list of their responses. The following are things you can expect:

  a. fire
  b. insects
  c. disease
  d. animals
  e. storms
  f. wasteful lumbering practices

  If they are not forthcoming, they may be elicited by some well-stated questions.

  You may divide the class into groups to research how each of these consumes wood and in what quantity.

  Notes:

  a. Most forest fires are caused by people, either accidentally or intentionally.

ACTIVITY II: OTHER CONSUMERS OF WOOD (Notes continued)

b. Some fires are caused by lightning. (In some western states, experiments are being conducted to prevent fires by lightning by removing lightning. Super cooled clouds, which cause lightning when they rise, are being seeded with silver iodide crystals to cause the cloud to "rain out.")

c. Diseases take a toll, sometimes quite extensively.

d. Certain animals damage trees by eating the bark.

e. Certain insects cause severe damage (gypsy moth, pine bark beetle).

f. Storms cause loss of some trees. Saplings are frequently broken by ice storms.

g. Certain lumbering operations waste young trees. (Contrast selective cutting and clear cutting.)

ACTIVITY III: LIFE WITHOUT TREES

. Have a discussion of what things would look like with no trees.

a. What items would man miss?

b. What would become of the millions of people who depend on trees for their living?

. Have students make verbalizations or descriptive drawings of what the world would be like if there were no more trees.

Note: Students should be encouraged to consider the economic and aesthetic results.

ACTIVITY IV: WHERE ARE OUR TREES?

. Have students do research:

. on our national forests

. about state and other nonfederal public forests

. on industrially owned forests

. on farm woodland private holdings

. on forestry as a vocation

Notes:

a. The fact that national forests are not a new idea should be emphasized.

b. Our national forests encompass 180,000,000 acres.

c. National forests have been in existence since 1799.

ACTIVITY IV: WHERE ARE OUR TREES? (Notes continued)

d. Objectives of national forests:
   - to produce timber for public use
   - to protect watersheds
   - to provide for public pleasure and recreation

e. Many states have state forests with similar objectives.

f. Industries own millions of acres of forests. (The industrial aim is to produce a successful financial operation. Therefore, some owners burn and cut trees wastefully.)

g. 60% of nongovernmental forest land is in small private holdings. About ½ of these holdings are approximately 40 acres each.

h. The first School of Forestry in the United States was in the mountains of western North Carolina.

"Tell It Like It Is"
PROBLEMS
(students)

1. National forests contain about 1/6 of the commercial woodland. The national forests contain 180,000,000 acres.
   - How many acres of commercial woodland are there?
2. 60% of the commercial acreage is in small private holdings.
   - Small holdings contain how many acres?
3. One-half of the small-holding acreage is in holdings of about 40 acres each.
   - About how many such small holdings are there?
4. In a single year, about 1/20 of the commercial forests burn.
   - About how many acres burn in a single year?

"Tell It Like It Is"
ANSWERS TO FOREST PROBLEMS
(teacher)

1. 1/6 of commercial woodland is 180,000,000 acres. (Let W = woodland.)

$1/6 \times W = 180,000,000$
$W = 180,000,000 \times 6$
$W = 1,080,000,000$ — 1,080,000,000 acres

2. 60% of commercial acreage (1,080,000,000) is in small holdings.

$60\% \times 1,080,000,000 =$ — 648,000,000 acres

3. ½ of 648,000,000 acres is in 40-acre tracts.

½ x 648,000,000 = 324,000,000 acres are in 40-acre tracts.

$324,000,000 \div 40 =$ — 8,100,000 40-acre tracts

4. 1/20 of 1,080,000,000 burn. (Let B = burn.)

$1/20 \times 1,080,000,000 = B$
$54,000,000 = B$ — 54,000,000 acres

"Tell It Like It's Got To Be"
(teacher)

ACTIVITY I:

Have students do research to find out some of the measures that are being taken to save our forests. (This may take some time.)

Notes:

- Public forest personnel are practicing conservation by selectively cutting and replanting trees.
- Commercial tree farms are employing conservation practices as opposed to a "lump sum" sale of timber.
- More and more industries are beginning to use conservation practices and are profiting thereby.
- Unused land is being returned to forests. This results more from a commercial than from an ecological motive.
- More and more emphasis on care with fires in forests is evident.
- Constant work on quick reporting and containment of forest fires is being done.
- Research is being done to contain harmful insects and diseases.
- Research is being done to create hybrid trees that will mature more rapidly.
- Experimentation is being done on treating wood so that it will last longer.
- More complete use of harvested trees is being practiced.
- Can you or your class find others?

ACTIVITY II:

Questions for discussion (written or oral):

a. After our investigations, how do you feel about the future of our forests? Why?

b. What do you think are some (if any) things that may work against conservation practices?

c. Do you think laws should be enacted to force industrial foresters to practice conservation? Why?

d. What are some things you as an individual can do to help preserve our forests?

e. Should laws be enacted prohibiting the use of natural trees as nongrowing Christmas trees? Why?

Forest fires are often spot-located by a process of triangulation. That is, the fire is spotted from three towers and is located by direction. Where these lines of sight intersect is the location of the fire.

Draw a chart locating the forest fire using the following reports:

Station	Direction
I	45°
II	315°
III	180°

WILDLIFE

"Tell It Like It Was"
(teacher and students)

Trees--as far as the eye could see. That's what greeted the first settlers to North America, and in those forests there was wildlife: bears, wild boar, deer, fish, birds of all kinds. It seemed like an endless supply of food for man to harvest. At one time, mountain lions, bears, and bobcats were common in the east. Fish were abundant in the streams. Migrating birds clouded the skies during part of the year. There did not seem to be a limit to the numbers and kinds of wildlife that nature could offer.

Take a look at what North Carolina was like 300 years ago through some of the suggested activities and others devised by students or the teacher. Try to imagine what it must have been like to come from Europe at that time, arriving in a land of seemingly unlimited resources.

"Like It Was" - A Short Skit
(students)

This skit gives you a chance to use some imagination to show what it must have been like to be an animal in the 1600's. It is brief, but will, hopefully, provide enough ideas so that you can write your own skit.

Since the area was not heavily settled, the wildlife have not felt any pressure from man's use of the land.

The scene: A forest in North Carolina around 1630. The deer and bear are discussing the large pond that was built by the beavers this summer.

Bear: "I don't know when I've seen such a large pond. That beaver is an expert dam builder."

Deer: "Why do they go to so much trouble to flood the land and then put their house right in the middle?"

Beaver: (pops up at the water's edge) "Allow me to answer that question. You see, by building my house in the middle of this pond, I've created my entrance underwater and I am, therefore, protected."

Deer: "Protected? From whom?"

Beaver: "Are you kidding me? From bobcats, mountain lions, wolverines, critters like that."

Bear: "Besides, I like this pond. It creates great fishing for me."

Beaver: "Well, I must go now, plenty to do as this dam and house are in constant need of repair."

Bear: "Come on, deer, I know a great place to browse."

(They go off through the forest in search of berries and tender leaves. Before long, they hear a terrible growling, snorting noise.)

Wild Boar: "Halt! Who goes there?"

Bear: "Oh, brother, there he goes again. He has the worst disposition of any animal in the forest."

Wild Boar: "I heard that!"

Deer: "Uh-oh!"

Wild Boar: "If you had a face like mine, you'd have a bad disposition too."

"Like It Was" - (Continued)

Bear: "Look at it this way, you've got a very distinctive quality. I'll bet someday you'll be remembered for those tusks."

Wild Boar: "Hurrumph! I never quite thought of it that way." (He sees his reflection in pond.) "Famous you say....mmmm." (walks off)

Bear: (shouting) "Besides, there's more than enough room for all of us in this forest!!!!!"

Deer: "Come on. Let's find those berries."

(As they approach the edge of the forest, they come across a berry patch. A tired looking pigeon is feeding there.)

Pigeon: "Oh! What yummy berries. I haven't seen any since....Oh, I'd really like to forget that."

(Bear and deer approach)

Deer: "Forget what? Gee, you looked pooped. Sit down for awhile and take a load off your wings."

Pigeon: (with fear) "Cages....metal bands on my legs....dodging bullets and those, oh...." (falls over)

Bear: "He's dizzy. Must have been a long flight."

Pigeon: "You'd fly an 8-hour day, too, to get away from those crazy two-legged creatures."

Bear: "Do you mean redskins? They don't usually bother us."

Pigeon: "No. These two-legged varmits are pale and they have this crazy desire to put all of us pigeons in cages, when they're not shooting us. I hear tell we taste good."

Deer: "Well, there aren't any of those two-legged varmits here. You'll be safe. So will all of us. We have plenty of space and food. This is a good place to live."

Bear: "Yeah. Rest awhile. You're in no danger here."

"Tell It Like It Was"
(teacher)

HAVE STUDENTS:

. Make a model of a beaver pond and lodge.

Note: Explain the effect the beaver colony would have on the other wildlife in the forest.

. Collect pictures and information about the state's wildlife and make a display, scrapbook, or bulletin board.

. Make a collection of wildlife tracks using plaster of paris.

Note: A Boy Scout Handbook would be helpful.

. Find out which animals are no longer found in North Carolina that were once common. Why did they become extinct?

. Take a wildlife hike.

Notes: A wildlife specialist from a nature museum or college might be willing to conduct such a tour.

Be sure to take field guides, binoculars, and hand lens.

. Invite the local wildlife protector to speak to the class.

"Tell It Like It Is"
(students)

After almost 300 years in the land of plenty, we have come close to exhausting the bountiful wildlife we once thought of as endless. Animals are gone that will never be seen in this state again. Some will never be seen anywhere. Many of the great forests were cut first to make pasture and farmland. Now they are being cut for cities and highways. No demand seemed too great for our paradise to meet--until now.

. How has our land changed in the past 300 years?

Sample Interview:

Fudd: "This is your roving reporter, Roger Fudd, with weekly news on the environment. This week we bring you the program from North Carolina where we're taking a look at their wildlife problem. There have been rumors of discontent among the animals. Maybe we can interview someone. Say, we are in luck. Here comes someone now---
Pardon me, sir. Haven't we met before? I seem to recognize the distinctive black mask and ringed bushy tail....Aren't you a raccoon?"

Raccoon: "Yes, indeed."

Fudd: "Well, Mr. Raccoon, I need some information about the standard of living for the wildlife in this area."

Raccoon: "In a word, UGH!"

Fudd: "UGH? Sir, could you be more specific? Tell me about the housing conditions."

Raccoon: "What housing? Every time I move to a nice neighborhood that's sure to be out of the reach of urban expansion---BZZZZZZZZ! A chain saw levels my home."

Fudd: "Well, timber <u>is necessary</u> for expansion."

Raccoon: "That's easy for you to say. It's not your house they're chopping down. With you humans, it's always ME, ME, ME! No one ever thinks of the animals anymore. Do you have any idea how hard it is to tunnel through concrete, or build a nest on a TV antenna?"

Sample Interview: (Continued)

Fudd: "No, can't say I've ever done that. Thank you for your time, sir. I see you're packing to move again."

Raccoon: "Yes, out to the wide-open spaces, for a while anyway. Goodbye."

Fudd: "Goodbye and good luck."
(As Fudd roves down the road, he hears a loud bang, as if from a gun. He moves closer. A hunter is shooting at everything that moves.)

Fudd: "Is it deer season already?"

Hunter: "No, I'm just getting in a little target practice. I plan to take my limit this year."

Fudd: "In deer?"

Hunter: "Yes, and bear, trout, pheasants, doves, squirrels, everything!!!!"

Fudd: "Everything?"

Hunter: "Sure, they're just animals. Besides, there will be more next year--"
(His voice trails off as he moves on.)
(Fudd ambles on down the road until he sees a sign. Squinting, he reads out loud....)

Fudd: "Sanitary landf....no, City Dump." (He says as he gets closer.)
(As he approaches, he sees a rat and opossum sifting through the garbage. They appear to be searching for something.)

Opossum: "This is a terrible way to make a living."

Rat: "Yeah. I got 20 mouths to feed already and the missus is expecting 15 more next week."

Opossum: "When there isn't enough food in the forest, I always end up here, much as I dislike the idea."

Fudd: "What seems to be the problem, fellas?"

Rat: "Not as much of our regular food supply is available, so we have to resort to this disgusting practice. We're lucky to be able to eat anything. Many animals just starve."

Fudd: "Well, our time is over for this broadcast. You have certainly opened my eyes. Maybe others will listen. Signing off for WILD-TV, where life is a thing to preserve."

"Tell It Like It Is"
(teacher)

HAVE STUDENTS:

- Think of ways in which wildlife have been harmed or destroyed in the environment, following the report of the roving reporter.

- Devise ways to correct these problems.

- Make a picture collection of DOR (dead on road) wildlife.

- Find out what important services each of the following (who have bad reputations, but are actually helpful to man) provides:
    a. Cooper's hawk
    b. bluejay
    c. coyote
    d. grey fox
    e. great horned owl
    f. king snake
    g. bat

QUESTIONS:

- Why are fish ladders constructed?

- Why is collecting bird eggs a poor hobby?

"Tell It Like It's Got To Be"
(teacher and students)

The year is 2002. The place is North Carolina. People have come a long way since the environmental scare of the 60's and 70's. It was finally realized that something had to be done to save the wildlife, if there was going to be animals for future grandchildren to see.

There is no skit for this section because what the future will be like is left completely up to one's imagination. In the suggested activities listed below, there are some ideas that a skit might revolve around:

- What will the future hold for wildlife?
- Will the animals who survive all end up in zoos?
- Will there be any new restrictions on killing endangered species?
- Will pollution be halted, or will it continue to destroy more species of fish and migratory birds every year?

"Tell It Like It's Got To Be"
(teacher and students)

QUESTIONS:

1. What are the state and local laws that regulate killing of wildlife in your area?

2. What changes need to be made in these laws to bring them up-to-date?

3. What method does your county have to take care of unwanted pets? Do any improvements need to be made?

   Note: Unwanted pets have always presented a large problem, especially when they are turned loose in the countryside. The local Humane Society is a valuable source for information on this problem.

GROUP OR INDIVIDUAL ACTIVITIES:

1. After researching and gaining an understanding of existing laws, students could rewrite the laws to make them more up-to-date. These suggestions could then be sent to legislators, city councilmen, town managers, or mayors.

2. Write and present a skit showing attitudes regarding wildlife conservation of the future.

   It could be a spoof of "You Are There," a dialogue between some animals, or some would-be hunters bemoaning the lack of wildlife or strict regulations regarding hunting and fishing.

3. In order to insure protection of wildlife, there are many things a concerned individual can do. These could be individual or class projects. Some are suggested here. Can the class think of others?

   a. Provide food for animals, especially in the winter. A farmer can leave a small portion of his harvest of corn, oats, or soybeans for wild creatures. Berry patches should be left instead of cleared. Special fruit trees can be planted to attract birds.

      Note: Animals become dependent on feeding stations, especially in winter. Be sure to maintain them.

   b. Shelter can be provided by leaving land in its natural uncleared state when possible. Suitable substitutes would be leaving fence rows uncleared, planting shrubs, or providing birdhouses.

SONG: WILDLIFE, WILDLIFE
(to the tune of "Daisy, Daisy")

Wildlife, wildlife, where did the eagles go?
Where's the bobcats? That's what I'd like to know.
Forests are torn down for houses,
Slums are made for mouses,
The buck and doe and buffalo
Aren't found here anymore.

See that stream there, no one can drink from it.
Beavers once built there, bears once fished in it,
But man left it so polluted, the filth can't be diluted.
It's plain to see that you and me
Aren't welcome here anymore.

WATER
(teacher)

The task of creating a meaningful awareness of the need for water conservation in a society in which the liquid flows at the turn of a tap is a difficult one. To many people, the ideas of water conservation are ideological and the closest they approach realism is where saving money is concerned. This unit attempts to develop the need for water conservation in the framework of available usable water. The approach is intuitive and depends heavily on the student's logic.

The Need For Water

This activity may be done by individuals or small groups. Ample time should be allowed to permit the student's imaginative powers to "warm up."

- Have the students think of ways that man uses water. After the thinking time, list the uses on the chalkboard.

  Note: This list may well be imaginative! The objective is to encourage thinking.

- When the combined listing is made, allow some additional time for the students to rank the uses in order of necessity. You may have the students vote on the rankings.

  Note: The students should be encouraged to appreciate that the ranking is an arbitrary process in which each student's thoughts are equally weighted.

- From the rankings, make a "Top 10" (20, 25, etc.) chart showing the uses of water.

  Some responses that may be received include:

boating	drinking	putting out fires
washing	swimming	water fountains (decorative)
bathing	cooking	soft drinks
cooling	heating	irrigating

  Note: If a student should question another student's response, permit the latter to explain why he chose it.

- Ask the students to observe, during the rest of the day, how water is used to see if the list is complete.

Drawing Water

- Give each student enough drawing paper so he can draw pictures of each of the "Top 10" uses. Have the student identify the use he is illustrating by numbering the back of each picture.

  Note: You may wish to have each drawing done on half a piece of paper.

- Collect the drawings and shuffle them together. Hold the drawings in "flash card" manner before the class and have them guess the use. Then turn the drawing around so the class can confirm their guesses.

  Note: Save at least one drawing of each use for Different Kinds of Water.

Different Kinds of Water

- Prepare or allow students to prepare glasses of several kinds of water such as: tap water, ditch water, salt water, muddy water, oily water, etc.

- Label each glass.

  Example: Tap water may be labeled "drinking water."

  Note: The labeling should be appropriate for the class. The salt water may be labeled "ocean water," "salty," "saline," depending on which is meaningful to the class.

- Duplicate enough copies of a "Top 10" list for each student.

  Sample Sheet:

Use	Kind: Mine	Kind: Class
1. Drinking		
2. Cooking		
3. Swimming pool		
4. Swimming pond		
5. Boating		
6. Farming		
7. Fishing		
8. Fire fighting		
9. Washing		
10. Bathing		

- Distribute the sheets and permit students to examine the water as they wish. Then indicate the "minimum" quality of water for that usage.

  Note: The student uses the "Mine" column. The "Class" column can be completed by popular vote.

"Tell It Like It Was"
(teacher)

Discussion and Idea Swapping

- In this activity, depending on prior experiences, some "facts" may have to be introduced. If so, when possible, have a source book ready. (That is, unless you really know.)

  Note: This suggestion has a twofold purpose:

  a. To encourage students to use books to find information by your example.

  b. To show that a good teacher is human and doesn't need to know everything.

  Some questions for discussion:

  a. Where did the early settlers get their drinking water?

     Note: streams, springs, wells

  b. Would you like to drink from a stream today? Why or why not?

  c. Do you think there were pollutants in streams then?

     Note: Probably so, where animal waste and dead water animals were concerned. There may have been some mineral pollutants.

  d. How did the water in the streams become drinkable

     Notes:

     - Streams absorbed oxygen from the air.
     - Sunlight aided growth of green plants which added more oxygen.
     - Purifying bacteria used the oxygen to live and the bacteria broke down unstable waste products.
     - Larger solid wastes settled to the bottom to be eroded by rocks and sand.

  e. Where do we get our water today?

     Note: Depends on your local water source.

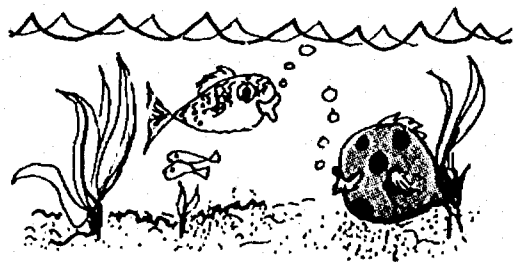
  f. Is it treated or do we drink it "raw?" Why?

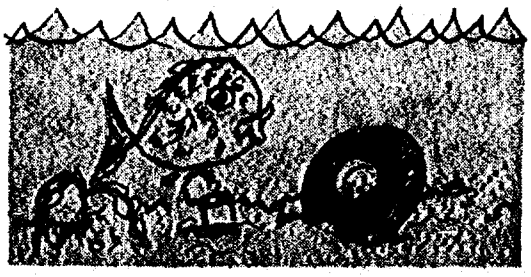
- At this juncture, you can depart for a study of water treatment if you wish.

- Suggest that the class draw a "then and now" picture showing the same stream unpolluted and polluted. You may wish to have some students make "top views" while others draw "cross sections."

Discussion and Idea Swapping (Continued)

Example:





THEN

Drinking
Swimming
Bathing
Putting out fires

Uses

NOW

~~Drinking~~
~~Swimming~~
~~Bathing~~
Putting out fires

Uses

"Tell It Like It Is"
(teacher)

ACTIVITY I: SUSPENDED MATTER IN WATER

To conduct this activity:

- Duplicate reaction sheet (page 30) for each student and distribute.
- Prepare a flat glass container of clear water and place it on the stage of an overhead projector. Add the following, one at a time, and stir after each addition:
    a. a spoonful of coffee grounds
    b. a spoonful of clay
    c. some detergent
    d. some used oil
- Suggest that the students "color in" the circles to indicate the darkening of the water.
- Have the students answer the 5 questions on the reaction sheet (p. 30).

  Note: These questions are designed for students' thoughts (opinions). The last 3 questions are open-ended.

Answers:

1. Murky water prevents sunlight from reaching green plants in a stream.
2. The plant does not give off oxygen for purifying bacteria or for aquatic life.
3. Probably for convenience. It is a nice way to get rid of noxious material because it floats away (to somebody else!).
4. Again it is a convenient means of disposal of waste. Treatment systems cost money.
5. Treatment systems cost money. New costs usually mean higher taxes!

REACTION SHEET
(students)

"Does Suspended Matter Affect the Clarity of Water?"

---

plain water

\+

coffee grounds

\+

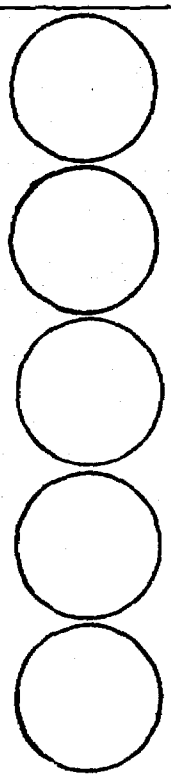
clay

\+

detergent

\+

oil



What do you think?

1. What effect does cutting off the clarity of water have on its natural purifying system?
2. Could this have any effect on fish and other aquatic life?
3. Why do people empty water-murking substances into ditches and streams?
4. Why do some industries dump water-murking substances into streams?
5. Why do some towns empty water-murking substances into streams?

ACTIVITY II: A DRINK OF WATER

. Suggest that the class keep a record of water used by students at school for a day.

Note: It will require the establishment of some standards of measurement.

. Select a couple (or more) students to determine each of the following re a "drink" of water.

Method I. If there are two fountains on the same hall in sight of each other, have one student go to each fountain. One should take a container with him. The other will take a drink. The water drinker signals when he turns the fountain on and begins to drink. He signals when he is finished. The "measurer" turns his fountain on at the first signal and off at the second signal. The water used is then measured.

Method II. Your researchers will need a stopwatch for this. When the drinker begins, the clock is started. When the drinker finishes, the watch is stopped. The time is noted.

A container is used to collect water from the fountain run for the same length of time, and then measured.

Note: To establish a more statistically valid measure of water per drink, have the experiment repeated by several "drinkers." The results are then averaged. Find the arithmetic mean of the samples.

Method III. Use *Method II* but instead of measuring drinks by students who know they are being measured, assign one or two students to "stake out" some fountains and measure the time of drinkers other than students in their own class.

. You may design a data sheet on which to record the results similar to the following:

Drinker	*Method I*	*Method II*	*Method III*
Totals		Ounces	Seconds

Average _____

ACTIVITY III: WASHING HANDS

This activity is to determine the "average" amount of water used to wash hands. The experimental methods are similar to those in ACTIVITY II. If the lavatory has spring-loaded faucets, the stopwatch method will be easier. Either method can be used. Once more, it is suggested that several samples be made. A data sheet similar to that for ACTIVITY II can be used.

ACTIVITY IV: TAKING A SHOWER

If your class is in a school which involves students in Physical Education, the students use water for showers.

Have students interview the boys' P.E. director and the girls' P.E. director to obtain the average amount of water used for one shower per person.

Note: No alternate experimental methods are given here owing to the variety of ways in which showering time is controlled. You may wish to obtain this information yourself.

ACTIVITY V: WASHING FACE

Conduct as in ACTIVITY III.

ACTIVITY VI: PUTTING IT TOGETHER

We have now obtained average amounts of water for: a drink of water, washing hands, washing face, and taking a shower.

Note: You may tell the class that some studies show that it requires 6 gallons to flush a toilet.

. Prepare, or have the class design, individual data sheets. A suggested form follows:

USE OF WATER

Drinking	Washing Hands	Washing Face	Showering	Flushing Toilet
111	11	1	1	~~1111~~

No.	Use	Water Per Use	Total Used
3	Drinking	(average)	_____
2	Washing hands	"	_____
1	Washing face	"	_____
1	Showering	"	_____
5	Flushing toilet	6 gal.	30 gal.

TOTAL WATER USED _____

. Suggest that each student keep his water use record for one day.

Note: It is suggested that you encourage honesty among the students by impressing upon them that they are responsible students.

It is further suggested that no names be required on the data sheets.

"Tell It Like It's Got To Be"
(teacher)

ACTIVITY I: AVERAGE IT OUT

- Have a group collect the data sheets on usage and compile a master report.

  Note: The master report should NOT show totals.

- Have the class complete the master report.

  a. Determine average: drink, hand washing, face washing, shower, toilet flushing.

     Note: Divide total by number of students.

  b. Determine the average daily usage.

  c. Discuss ways the average could be reduced.

ACTIVITY II: CONSERVE IT!

The objective of this discussion is to encourage students to reason why water conservation is needed. In light of the fact that the quantity of water on the earth remains fairly constant, it may be difficult to see a need. Although the quantity remains constant, the distribution of water varies considerably.

Examples:

- Almost all regions are subject to occasional periods of drought.
- The same region is subject to occasional periods of flooding.
- The action of winds may remove water vapor from an area in which water evaporated.
- Winds may bring in unusual amounts of vapor from some other area.

If the background of your class concerning atmosphere and water is not sufficient to provoke discussion of the variability of water available to a given area, they may be reminded of recent floods and recent droughts.

Economics can be considered as applied to cost of water.

"Tell It Like It Was, Is, and It's Got To Be"

(teacher and students)

Ole Man River!

- Using map of the U. S., determine how many of our major cities are located on or near rivers. Name the cities and rivers.
- Using historical maps, where did civilizations first develop throughout the world? Why are most of these near rivers or lakes?
- Locate a stream or river in your community. Where does the water come from? What do you notice about the stream environment?
- Pretend you had to start a new civilization. Predict how many people your local river or stream could support.

Streamflow Determination

Instructions for collecting and recording streamflow measurements:

a. Measure and mark a 100' distance along a straight section of your stream. If you can't find a 100' section, use 25' or 50'. Throw a stick (2 or 3 inches long) in the water above the upstream marker. Record the number of seconds it takes to float downstream between the markers. Record below. Now divide the 100' distance by the total seconds it took the stick to float between the stakes.

100 ft. distance ÷ _____ (total seconds to float 100') = _____ (number of feet stick floated each second) ft. per second

b. Find the average width of your section of the stream. Measure the width of the stream at three places within the 100' area. Divide the total by three to get the average width of the stream.

First measurement _____ feet
Second measurement _____ feet
Third measurement _____ feet
Total _____ feet ÷ 3 = _____ feet (average width)

c. Find the average depth of your section of the stream. Measure the depth of the stream in at least three places across the stream in a straight line. Divide the total by three to get the average depth of the stream.

First measurement _____ feet
Second measurement _____ feet
Third measurement _____ feet
Total _____ feet ÷ 3 = _____ feet (average depth)

Streamflow Determination (Continued)

d. Find the cubic feet of water per second. Multiply the average width, average depth, and the number of feet the stick floated each second.

_____ ft.	x	_____ ft.	x	_____	=	_____
Average width		Average depth		Number of feet per second		Cubic feet of water flowing per second

Note: A cubic foot of water is the water in a container 1' wide, 1' high, and 1' long, and contains 7.48 gallons.

In order to find out how many people could live from the water in this stream, complete the following calculations:

_____	x	7.48	=	_____
Streamflow in cubic ft. per second		Gallons in 1 cubic ft. of water		Gallons of water per second

_____	x	60	=	_____
Gallons per second		Seconds in min.		Gallons of water per minute

_____	x	1,440	=	_____	÷	150 gals.	=	_____
Gallons of water per minute		No. minutes in a day		Total gallons of water per day		Amount of water one person uses per day		Total no. people who could live from water in this stream

Questions and Discussions:

1. How many people in your community could live off the water in this stream?

2. What would happen to this environment if we piped all the water out of the stream at this point to your community?

3. If we were going to use this water, how much water should be left to flow downstream? Why?

4. Does this stream always have this amount of water in it? Why?

5. What are some problems you encountered during this task?

SOIL AND MINERAL CONSERVATION
(teacher)

For years man has taken his natural resources for granted. With land extending as far as one can see, why should anyone be concerned about the soil and its minerals? Let's listen as the soil explains what it was like 300 years ago, what it is like now, and how it's got to be.

Activities and suggestions are included to assist the teacher in providing the student with an increased awareness of these environmental problems through student involvement in ways of soil and mineral conservation.

"Tell It Like It Was"
(teacher and students)

Dear Take-It-For-Granted,

In the 1600's, when the Europeans came to explore me, I was beautiful and rich. I had everything a human being could want. That is, I had open meadows, dense forests, fertility, pure air, clean water, rich deposits of minerals and wildlife running everywhere. I was well-balanced and healthy. My topsoil was nine inches deep.

These people began to settle along my Atlantic Coast calling themselves the New England Colonies, the Middle Colonies, and the Southern Colonies. In New England, I had rivers and harbors, and was broken by small mountain chains. I was distributed in small and scattered parcels among these people. I was easy to clear and cultivate and these people used me to live. I supplied them with vegetables and grazing for livestock. They also turned to my clear, clean water for fish. They used my water to ship these fish to other people in the world.

In the Middle Colonies, I was somewhat mountainous with broad valleys and sandy plains. I was easily cultivated there also and was especially good for dairy farming; producing such crops as corn, wheat, and other grains. The animals living around my rivers were trapped, with furs providing a profitable trade. They cut down my trees, shipping them to other countries as lumber to build houses and for other purposes. Yes, I was beautiful to these people.

In the Southern Colonies, I supplied these people with rich, fertile land. With a plentiful rainfall and a long-growing season, I was especially suited for farming. There were two types of farming. One was the small subsistent farm and the other was the huge plantation. On the plantation, I was suitable for growing one or two main crops which could be sold. The two main crops were tobacco and rice. As the plantation farmer planted his crops in the same place each year, I began to wear out because the crops had taken away the nourishment from my soil. The farmer, to make up for wearing me out, cleared more of me and planted new land each year. As a result, the plantations in the South grew larger and larger. Along my rivers they built docks for shipping to trade with the Europeans. These people learned to use me and my resources for their advantage.

As time went on, man invented new machinery and new methods of transportation. With more need for me, due to increased population and industrialization, they began to explore, moving throughout my boundaries all the way to the Pacific Ocean. I was very good to man in his new conquests, supplying him with many minerals such as coal, petroleum, calcium, nitrogen, iron ore, and sulfur, as well as the fertile soil and grasslands. My resources were plentiful and were suitable for farming and industry. I was a paradise!

Plentifully,

Rich Soil

"Tell It Like It Was"
(teacher and students)

GROUP OR INDIVIDUAL ACTIVITIES:

1. Make a map or transparency of the U. S. showing the natural setting or geography. Include mountains, hills, plains, plateaus, and main waterways. Designate the early colonies of the 1600's on the map. Using the map, historical background of early colonization, and the information in the letter on page 38, discuss:

   . Why did the Europeans land along the Atlantic Coast?

   . What factors influenced them to settle in these areas?

   Suggestions:

   a. How did the forests influence their lives?

   * Note: Students may want to list as many uses of trees as they can think of before the discussion.

   b. How did they make use of the waterways?

   c. Where were the good harbors located?

   d. What other natural resources contributed to their livelihood?

   e. What is the importance of minerals in the soil?

   f. What part did nature play in determining their occupations?

   . Was there a diversity among the early colonies? If so, why?

2. Using a transparency overlay, show the mineral resources found in the 1600's and on another overlay, show the mineral resources found today. (Use symbols to represent these.)

   . Are the minerals still the same? If not, why?

   . What is happening to the mineral resources? Are they renewable?

   . Looking at the maps, give reasons for the westward expansion.

3. After students have done research, list on a chart the main crops raised in the early colonies and the type or types of soil necessary for their crops to grow.

   . What conclusions can be gathered about the soil?

   . Have the crops changed any today? Why?

GROUP OR INDIVIDUAL ACTIVITIES: (Continued)

4. Students may set up models of a subsistent farm and a plantation. Discuss the basic differences of the two.

   Suggestions:

   a. What was the main purpose of each?
   b. What was the difference in the amount of land involved?
   c. How did the manpower differ?
   d. What caused differences in expansion of land?
   e. What other resources differed (animals, lumber, etc.)?

5. Students may write a story or dialogue on the topics:

   . "The Early People Were Not Aware of Soil Conservation"

   . "How the People of Colonial America Misused the Soil"

"Tell It Like It Is"
(teacher and students)

Dear Unwise Users,

Look what they've done to my soil! These early settlers came to me when I was richly endowed with natural resources. My fertile soil and grasslands stretched as far as they could see and imagine. No one thought of using me wisely. No one bothered to plant young trees to take the place of those that were cut down. These people cleared my trees in the east and south to provide farmland. Settlers in the midwest plowed up my rolling grasslands and planted crop after crop. No cover crops were planted to protect my bare soil from the harsh winds and rains. They plowed my land in straight lines up and down hills. These rows became ditches for the rain to carry away my topsoil. These ditches became gullies and no one tried to correct my condition. Dust storms and floods came and destroyed even more of my fertile soil. Being overcome by erosion, my clean, clear rivers became muddy with my topsoil. Just look at me now--what a mess!

My mineral content is slowly being used up and cannot be replaced like my trees and field crops. My plants require a variety of minerals to grow. They need nitrogen, potassium, phosphorous, carbon, calcium, oxygen, hydrogen, sulfur, iron, and lime. When these are depleted, I will stop producing food for the people.

They tell me the economy needs my minerals also. Because of my gold and silver, towns grew up. Man developed machines and other technological uses from my mineral resources. "Ghost towns," now in the west, show what happens when my valuable minerals "run out."

In a little more than 300 years, these users have consumed my resources as though they were unlimited. I have very little topsoil left. With all these problems today, how can I fare tomorrow? I need advice and help. Please come to my rescue soon.

Desperately,

Worn Out Soil Resources

"Tell It Like It Is"
(teacher)

GROUP OR INDIVIDUAL ACTIVITIES:

1. Assign individual or group research on the following topics to be discussed in class:

   . "The many purposes minerals of the soil serve in our country."

   . "Why city people should be interested in soil and mineral conservation."

   . "What would happen if all our minerals were depleted."

2. Conduct a class survey of the parents' occupations. On a chart or other visual aid, show how these jobs relate to natural resources.

   Examples: . secretary--pencil, typewriter
   . salesman--gasoline, metals used in construction of car

3. Use fictitious newspaper headlines of disasters in the U. S. dealing with soil and mineral resources. Have students write an original news story telling what caused it and the effects.

   Examples: . "Thousands of Northward Flying Ducks Dying Because of Oil Floating on the James River"
   . "Farms Underwater--Flood of the Mississippi River"

4. Take a field trip. Go out in the community and take pictures of soil erosion. Make these pictures into slides for future use. Using the pictures, demonstrate the following:

   . Erosion caused by wind.

   . Erosion caused by water.

   . Evidence of man's contributions to wind and water erosion.

   . How soil erosion creates other environmental problems.

5. Make a display of rocks and minerals found in your community and in the state.

   Note: U. S. Steel will send a free kit with samples of iron ore, coke, limestone, steel rod, pig iron, including a filmstrip.

GROUP OR INDIVIDUAL ACTIVITIES: (Continued)

EXPERIMENTS

Experiment 1:

- Have one or two students go out on the grounds and collect three bags of soil. One is to be topsoil. The second one is to be filled with dirt directly below the topsoil, and the third with soil deeper than the second bag. All the soil is taken from the same place.
- Fill a separate pot with each of the three bags of soil. Label these according to bags of soil used.
- Plant a few flower seeds in each of the pots. Place the three pots so they will get the same amount of sunlight.

Discuss:

a. What was the rate of growth of each pot of flowers?
b. What was the general appearance of each pot of flowers?
c. Was there any considerable difference in the three pots?
d. What conclusions can be drawn concerning the type of soil used?
e. What would happen if proper fertilizers were added to the poorest soil? Try it.

Experiment 2:

Have students bring samples of rocks to school. Rub the rocks together to show how friction of rocks helps form soil.

Discuss:

a. Is it possible for nature to form soil?
b. How long would it take for the soil to form?
c. Can we rely on nature to replenish the soil?

Experiment 3:

- Collect two separate mounds of topsoil. Cover one mound with grass and leaves. Leave the other mound barren.
- Sprinkle water on each slope.
- When the two mounds have dried, turn an electric fan on them.

GROUP OR INDIVIDUAL ACTIVITIES: (Continued)

Experiment 3: (Continued)

Discuss:

a. Where were the greatest losses of soil and water found?

b. From which mound does the most soil blow?

c. What does the experiment demonstrate about soil erosion?

Experiment 4:

- Fill a large glass container half full of sand, clay, gravel, etc.
- Add enough water to make the entire mixture fluid.
- Shake the container for several minutes. Leave the container until the next day.

Discuss:

What happens when the container sets overnight?

Experiment 5:

- Remove both ends from a tin can. With a hammer, drive the can about 1" into the soil.
- Pour a premeasured amount of water into the can and time to see how long before it is absorbed.
- Repeat in different soil types.
- Repeat in dry spells and wet spells.
- What conclusions can you draw?

"Tell It Like It's Got To Be"
(teacher and students)

Dear Human Resources,

Thank you for all the steps you've taken in the conservation of my resources. I know you are using the policies of preservation and wise use which enables you to enjoy the benefits of my natural resources and yet preserve them for the future use of others. Even though your new inventions are being used to improve living conditions, they also are helping to conserve my resources for the future.

You have made federal and state governments, schools and universities, and farm groups aware of my problems. Your efforts are paying off. Farmers are now conserving my topsoil by using the methods of countour plowing, strip farming, grass waterways, terracing, windbreaks, grazing, and cover crops. By using these methods, you are helping preserve me for the future production of food. Also, you are using crop rotation to keep me fertile. Some of my land that is no longer fertile is being reclaimed through irrigation and drainage.

Business and industry are now searching for substitutes which take the place of any mineral resources.

Since these conservation practices can only be as good as the human resources make them, you are responsible for the future. I am in your hands. Please handle with care.

Hope-To-Be-Around,

Soil and Minerals

"Tell It Like It's Got To Be"
(teacher)

GROUP OR INDIVIDUAL ACTIVITIES:

1. Make models of clay, papier-mâché, and symbols, etc., to illustrate contour plowing, strip cropping, or other soil conservation techniques.

2. Hold an interested citizens meeting. Have students present cases of soil erosion and plans to correct these abuses.

   Note: Be sure students have first done research to make their plans factual and feasible.

3. Have a panel discussion.

   Example: "What have farm organizations and governmental agencies done about soil conservation? Is this sufficient for the future?"

4. Plan a skit.

   Example:

   - Some students could represent a group of farmers.
   - One student could represent an employee of the Soil Conservation Committee.
   - The employee tries to explain to the farmers what they should do to use their land more wisely.

   Note: Students are very original. Let them be creative here.

5. Make a "movie" of drawings done by class members showing principles of soil conservation. This may be an individual project where one student may show the "movie" to the class, discussing and using his own drawings, or the teacher may ask the class to write an essay on soil conservation based on the movie formulated from the drawings of the entire class.

6. Prepare a radio broadcast for the class. Students will want to interview several farmers on, "The Dangers of Soil Erosion."

   Note: Be sure the questions are prepared in advance of the interviews. They may tape these interviews and prepare their broadcast from the tapes.

   Include such items as:

   - What are some effects of soil erosion?
   - Is it a serious problem in the community?
   - What is being done to correct it?

GROUP OR INDIVIDUAL ACTIVITIES: (Continued)

7. Students may conduct a poll to discover the attitudes of the school and community regarding soil conservation. Use a graph or chart to record the information gathered.

   Note: Be sure to include varying age levels and people in various professions and occupations.

   Discuss:

   a. What age level is most concerned with soil conservation?
   b. Are males or females more concerned?
   c. Who showed the most concern? Farmers? Students? Factory employees? Professionals, etc.?
   d. What conclusions may be drawn from this poll?
   e. How do you feel about the future of soil and mineral conservation?

8. Have students write a short skit or essay pretending it is year 2500.

   Example:

   - The title might be, "You Are There--Year 2500 A.D."
   - This would include how man would be getting along without many of the resources he has today.

9. Give individual or group research assignments on the following topics for class discussion:

"Contour Plowing"	"Cover Crops"
"Strip Farming"	"Crop Rotation"
"Grass Waterways"	"Irrigation and Drainage"
"Terracing"	"Windbreaks"
"Grazing"	

10. Invite a resource person from the community to speak to the class on soil and mineral conservation. Contact the Agricultural Agencies and Soil Conservation Commission.

11. As an overall project, let students design a symbol asking for the Conservation of Soil and Minerals.*

12. Take a field trip to a farm to observe different types of soil conservation practices.

13. Use a farmer as a resource person to speak on the use of fertilizers and crop rotation.

*This may be similar to Smoky the Bear on the prevention of forest fires.

"RAPPING" IT UP
(teacher)

As a concluding activity, conduct a "rap" session on the ecological state of the area (world, national, state, local) at present.

1. Compare and contrast this state with that of the "good old" ecological days before the rise of industry.

   Sample questions to provoke thought:

   - What conveniences do we have now that they didn't have in the "good old days?"
   - How has our getting these conveniences affected the present environment?
   - Is the "convenience" worth the "cost?"
   - How does our present standard of health compare with that of the "good old days?"
   - Is our present standard worth the cost?
   - Can you assign any reason for the fact that typhoid was a major cause of illness and death in the "good old days?"

2. Compare the public services of a small town of today with a small town in the "good old days."

   Sample questions to provoke thought:

   - What pollution problems can you imagine prevailed in the "good old days?"
   - How do you think they were handled?

3. Find a picture of roads in North Carolina around 1910-20. Compare them with roads of today.

   Sample questions to provoke thought:

   - How does building new roads affect the environment?
   - Is the difference worth the cost?

4. Visualize life in the year 2000.

   Sample questions to provoke thought:

   - What changes were made from today?
   - What was the cost to the environment?
   - What was the cost in dollars?

(students)

Read the following two articles. When you finish, answer the two questions provided.

1. HOW IT USED TO BE*

....We sputter against The Polluted Environment--as if it was invented in the age of the automobile. We compare our smoggy air not with the odor of horsedung and the plague of flies and the smell of garbage and human excrement which filled cities in the past, but with the honeysuckle perfumes of some nonexistent City Beautiful. We forget that even if the water in many cities today is not as spring-pure nor as palatable as we would like, for most of history the water of the cities (and of the countryside) was undrinkable. We reproach ourselves for the ills of disease and malnourishment, and forget that until recently enteritis and measles and whooping cough, diptheria and typhoid, were killing diseases of childhood, puerperal fever plagued mothers in child-birth, polio was a summer monster....

*Excerpted from Daniel J. Boorstin, "A Case of Hypochondria." NEWSWEEK, July 6, 1970.

2. AMERICA THE BEAUTIFUL*

O Hideous for crowded skies;
the airplane's seen to this,
Where once were mountain majesties,
now ugly highways twist!
America, America, I shed my tears for thee
Don't crown thy mess with more distress,
Why is it you can't see?

O Hideous for visions grim
that see beyond the years
Thine black and filthy cities rot;
proud eyes are filled with tears!
America, America, I shed my tears for thee
Don't crown thy mess with more distress,
Why is it you can't see?

Ken Harrison
Wyckoff, New Jersey

*Excerpted from a letter to the editor of NATIONAL WILDLIFE, February-March, 1970. Reprinted by permission of the publisher.

Is the environment of the U. S. in better or worse shape than it was in colonial times? Why do you believe this?

APPENDIX

Books

A WHALE FOR THE KILLING. Farley Mowat. Mass.: Little, Brown, & Company, 34 Beacon Street, Boston, Mass. 02106. 1972. ($6.95)

AN ECOLOGICAL APPROACH TO CONSERVATION. Russell L. Hamm and Larry Nason. Minnesota: Burgess Publishing Company, 426 South 6th Street, Minneapolis, Minnesota. 1964. (Hardback)

ENERGY, ECONOMIC GROWTH AND THE ENVIRONMENT. Sam H. Schurr, ed. Maryland: John Hopkins University.Press, Baltimore, Maryland 21218. 1972. 242 pages. ($10.00--cloth)

ENERGY IN THE UNITED STATES, (SOURCES, USES, AND POLICY ISSUES). Hans H. Landsberg and Sam H. Schurr. New York: Random House, 457 Madison Avenue, New York, N. Y. 10022. 1968. 242 pages. ($2.95)

ENVIRONMENTAL EDUCATION: CONCEPTS, ACTIVITIES, BIBLIOGRAPHY. Division of Science Education, Department of Public Instruction, Raleigh, N. C. 27611.

LET THEM LIVE: A WORLDWIDE SURVEY OF ANIMALS THREATENED WITH EXTINCTION. New York City: William Morrow & Company, Inc., 425 Park Avenue, New York, N. Y. 10016. 1972. 394 pages. ($9.95)

MODERN EARTH SCIENCE. William L. Ramsey and Raymond A. Burckley. New York: Holt, Rinehart, and Winston, Inc. 1965.

MUST THEY DIE? Faith McNutly. New York: Doubleday and Company, Inc., Garden City, N. Y. 11530. 1971. ($4.95)

NEW ENERGY TECHNOLOGY--SOME FACTS AND ASSESSMENTS. H. C. Hottel and J. B. Howard. Mass.: M.I.T. Press, Cambridge, Mass. 1971. ($2.95--paper)

SLAUGHTER THE ANIMALS--POISON THE EARTH. Jack Olsen. New York: Simon & Schuster, Inc., One West 39th Street, New York, N. Y. 10018. 1971. ($6.95)

THE EVERGLADES TODAY--ENDANGERED WILDERNESS. George Z. Sand. New York: Four Winds Press, 50 West 44th Street, New York, N. Y. 10036. 1972. 191 pages. ($5.65)

THE WORLD'S EXHAUST. Vivian Sorvall. Conn.: Pendulum Press, Inc., The Academic Bldg., Saw Mill Road, West Haven, Conn. 06516. 1971. 62 pages. ($0.95)

TOWARD A RATIONAL POWER POLICY: ENERGY, POLITICS, AND POLLUTION. Neil Fabricant and Robert M. Hallman. New York: George Brazillier, One Park Avenue, New York, N. Y. 10016. 1971. 292 pages + appendices. ($8.95--hard cover)

VANISHING WILDLIFE: THE MAMMALS FIGHT OVER THE WILDERNESS. New York: Life Educational Reprint Series, New York, N. Y. Time, Inc.

Films

"A Matter of Time." 27-minute, color. Conservation Foundation, 1250 Connecticut Avenue, N. W., Washington, D. C. 20036. Historical approach to environmental deterioration. Grades 7-9.

"Camping: A Key To Conservation." 23-minute. 1963. Catalog #NSC-1002. Indiana University, Audiovisual Center. A view of the widespread misuse of public recreational facilities by careless citizens. A thirteen-year old boy takes his first overnight trip and is discouraged by what he sees.

"Heritage of Splendor." 18-minute, color. 1963. Alfred Higgins Productions, 9100 Sunset Blvd., Los Angeles, California 90069. Designed to augment the need to conserve parks and recreational areas and keep them free from litter, this beautifully photographed film shows the importance of these natural resources for man. Grades 7-9.

"Power From Fusion." 30-minute, color. $16 rental from Contemporary/McGraw-Hill Films, 1221 Avenue of the Americas, New York City, N. Y. 10028. Best for audiences with a little background.

"Recycling." 21-minute, color. 1971. Order No. M-2118-X. National Medical Audiovisual Center (Annex), Station K, Atlanta, Georgia 30324. Efforts to recover and reuse waste.

"The Forever-Living Forests." 27-minute, color. Free. No. 13510. Association Films, Inc., 2227 Faulkner Road, N. E., Atlanta, Georgia 30324. A new and dramatic presentation of where and how redwoods grow, how they are managed as a forest crop, how redwood lumber is produced, and how it is put to use in industry, and for commercial, school, church, and residential structures.

"The Mighty Atom." 27-minute, color. $18 rental from Contemporary/McGraw-Hill Films (address above). A CBS Newsfilm about peaceful uses of the atom.

"Vanishing Birds." 11-minute, color. Pictura Film Corp., 29 East 10th Street, New York, N. Y. 10003. A report of the effect of civilization on some of our most beautiful birds. Grades 7-9.

Articles

"Automobile vs. Clean Air." TECHNOLOGY REVIEW, Vol. 73:3, January 1971, p. 21. Available from ACCESS. Ask for No. 18-71-01943.

AWARE Magazine reprints on energy: "Energy for Millennium Three," by Earl Cook; "Electric Generation and the Environment," by Chauncey Starr; "Electrogasdynamics--Direct Conversion May Be Feasible," by G. Fred Lee; "MHD-Magnetohydronamics, A Potential Power Generation Source," by Richard J. Rosa; "Solar Energy--The Possible Dream?," by A., B., and Majorie Petit Meinel; "Safety and Environmental Aspects of Nuclear Energy," by William Kerr; "The Geysers--Geothermal Generation," "Technological Possibilities for Future Power," by W. E. Shoupp; "Power From Nuclear Fusion: Problems and Promises," by William E. Drummond. Any three are available free to teachers for class use (up to 50 copies). Give school name and address and classes taught. Write to AWARE Magazine, 1202 South Park Street, Madison, Wisconsin 53715.

"Back from Extinction." TIME, Vol. 101:4, January 22, 1973, p. 75.

"Coping with Heated Waste Water Discharges from Steam-Electric Power Plants," by John Cairns, Jr. BIOSCIENCE, Vol. 22:7, July 1972, p. 411. Mixing zones, biological considerations, cooling methods.

"Energy and the Environment," by John M. Fowler. THE SCIENCE TEACHER, Vol. 39:9, December 1972, p. 10. Summary of seminar at NSTA Convention, 1972.

"Fuel of the Future." TIME, Vol. 100:11, September 11, 1972, p. 46.

"Gunfight at the D. C. Corral--Poisoning Policy is Wiping Out the Predators." Lewis Regenstein. ENVIRONMENTAL ACTION, Vol. 4:19, February 17, 1973, p. 11. Lists numbers of predators killed by poisons in the west.

"Pet Pollution." TIME, Vol. 101:5, January 29, 1973, p. 63.

"Pulling the Plug on the 'Energy Crisis'," by Wilson Clark. ENVIRONMENTAL ACTION, Vol. 4:17, January 20, 1973, p. 11. Includes alternatives.

"The Artificial Energy Crisis vs. Oil Imports." CONSERVATION NEWS, Vol. 38:4, February 15, 1973, p. 4.

"The Energy Crisis." NEWSWEEK, Vol. LXXXI, No. 4, January 22, 1973, p. 52.

"The Fur Industry: An Endangered Species?" Cathy Lerza. ENVIRONMENTAL ACTION, Vol. 4:15, December 9, 1972, p. 3.

"The Wankel Engine," by David Cole. SCIENTIFIC AMERICAN, Vol. 227:2, August 1972, p. 14. Operation and advantages. Contains bibliography.

"Vanishing Point," a regular feature in ENVIRONMENTAL QUALITY MAGAZINE:

a. May 1973 (Vol. IV:5): "The Prairie Dog"--Tom Garrett, p. 28.
b. April 1973 (Vol. IV:4): "The Kangaroo"--Marian Norman and Lewis Regenstein, p. 32.
c. March 1973 (Vol. IV:3): "The Mountain Lion"--Lewis Regenstein, p. 28.
d. November 1972 (Vol. III:8): "The Birds of Prey"--Richard Hilton, p. 16.
e. October 1972 (Vol. III:7): "The Last American Whaling Expedition"--James Robert Sorrell, p. 44.
f. September 1972 (Vol. III:6): "Wild Mustangs"--Michael Tennesen, p. 14.
g. August 1972 (Vol. III:5): "Tule Elk"--Beula Edmiston, p. 47.
h. July 1972 (Vol. III:4): "The Dolphins"--Sara H. Banks, p. 14.
i. May 1972 (Vol. III:3): "The Sea Otter"--Michael Tennesen, p. 9.

Games

"Extinction." 2-8 players populate the island of Darwinia with seven genetic variations, and prey on vulnerable species. $11.95. Sinauer Associates, Inc., 20 Second Street, Stamford, Conn. 06905.

"Frustration: A Wastewater Treatment Game." Clifford A. Gale. Send a self-addressed, stamped (16¢) envelope to Mr. Clifford A. Gale, Biology Dept., Cazerovia High School, Cazerovia, New York 13035.

"Indian Valley." Students put into practice some of the principles which professional forest managers employ. Students divide into teams, each representing a different interest in forest land use, and one represents a multiple-use committee. Teams decide what to do with the forest, and present plans to the committee. Game kit contains a map, set of directions for each team, sheets for scoring, and directions for the teacher. Free from the American Forest Institute, 1619 Massachusetts Avenue, N. W., Washington, D. C. 20036.

"Land Use." The game brings out the conflict between the desire to have quality housing and the desire to have natural resources. In developing land, participants discover concepts of cluster zoning, planned unit development, etc. $1.95. Education Ventures, 209 Court Street, Middleton, Conn. 06457.

"Land-Use Simulation." Students decide what to do with a one-square mile of country farmland, four miles from the city. Class divides into groups to prepare a plan for the land. One group is the Board of County Commissioners, who must make the decision based on the presentations by the other groups. Investigating Your Environment Series, U. S. Forest Service, Portland, Oregon.

"Mineral Resource Allocations." A simulation designed for class use grade 8 and up. Basic economics. How goods flow and are traded. Students represent countries and buy, sell, trade goods--especially mineral resources. In the process of revision and testing. For more information, contact the author: Mr. Eric Bauman, 1252 Haslett Road, Apartment C-22, East Lansing, Michigan 48823. Game was originally designed as a project in a college class on mineral resources. Has been used in junior high classrooms.

"Predator-Prey." Survival, food chains, food webs, and ecological balance. Each person tries to be the best predator possible and then traces the changes in the predator and prey populations under different circumstances. An Ecology Kit from Urban Systems, Inc., 11033 Mass. Avenue, Cambridge, Mass 02138. $6.00. All ages.

"Simulation: Peaceful Valley." Janet Woerner. Each student becomes a member of the community and decides his position on a new power plant. Free. Send self-addressed, STAMPED, envelope to ECOSOURCES, Freeland Community Schools, Freeland, Michigan 48623.

"Smog." Players assume the position of air pollution control manager in a growing town. They make decisions which affect their financial status, popularity, and the growth of the town. $10.00 plus $1.00 postage. The Head, Box 4762, Clinton, Iowa 52732.

"Winter Wildlife Ecology Game." Students are either one of two predator species or four prey species which are involved in a struggle for existence through the winter. Players move by means of dice and a spinner on a game board. Very good at stimulating the conditions for these animals during the winter. Written by Dr. R. Presnell, University of Wisconsin, Green Bay, Wisconsin.

Teaching Aids

Atomic Energy Commission booklets--"Atoms, Nature, and Man." (How man-made radiation affects the environment.); "Breeder Reactors;" "Nuclear Power Plants;" "Radioactive Wastes." Order from USAEC, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830. One to four booklets--24¢ each. Five to ninety-nine booklets--20¢ each.

"Endangered Species"--information leaflet on what extinction is, what is causing it, and what animals are endangered. One copy free from Educational Servicing Section, National Wildlife Federation, 1412 16th Street, N. W., Washington, D. C. 20036. Additional copies are $0.05 each.

"Endangered Species of the U. S." and "The Right to Exist." Available from the U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Washington, D. C.

"National Wildlife Federation 1973 EQ Index." A pamphlet available from the National Wildlife Federation (address above).

"The Doomsday Machine." An excellent poster on ecological effects of the car. 22" x 28" color. $1.50 plus 50¢ postage. Order from Environmental Education Group, 6731 Lurline Avenue, Canoga Park, Canada 91306. One of a series called, "Technology vs. the Environment."