Midtown, Kansas  
Summer 1964

Dear Conservation Workshop Members,

On a recent field trip our fourth grade science class noticed gullies in some fields, muddy streams, and litter along the roadside. We are concerned about the waste and careless use of our water, soil, plants, and wildlife. These observations have aroused our interest in conservation. Could you supply us with any information on conservation of natural resources which would be usable in our class?

Sincerely,

Mary Jones

(Fourth Grade Teacher)
The Kansas School Naturalist

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The Kansas School Naturalist is sent upon request, free of charge, to Kansas teachers, school board members and administrators, librarians, conservationists, youth leaders, and other adults interested in nature education. Back numbers are sent free as long as the supply lasts, except Vol. 5, No. 3, Poisonous Snakes of Kansas. Copies of this issue may be obtained for 25 cents each postpaid. Send orders to The Kansas School Naturalist, Department of Biology, Kansas State Teachers College, Emporia, Kansas.

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Dear Miss Jones,

Thank you for your letter. It will be of help to you and it themselves.

Our natural resources must be conserved if we expect to have forests, and wildlife reserves that you may wish to use in the future. Consider the forests, and wildlife reserves that you may wish to use in the future. Consider

How important is the food to eat, clothes to wear, and flowers to enjoy?

ALL LIFE DEP

EATS DRINKS

WEARS

PLANTS

(Courtesy "The Open Spaces Movement")

ANIM
Dear Miss Jones,

Thank you for your letter. We hope this informal answer will be of help to you and that your class will be able to read it themselves.

Our natural resources are priceless possessions. All must be conserved if we expect to receive benefits from them now and in the future. Conservation means the wise and proper use of our natural resources. We will consider soil, water, grasslands, forests, and wildlife resources in this letter. There are others that you may wish to read about later, as minerals, air, and human resources. The first resource we will consider is soil.

How important is the soil? Without soil you would not have food to eat, clothes to wear, wood to build a house, or grass and flowers to enjoy.

All life depends on fertile soil.

Plants couldn't exist without fertile soil —

(From "Farm Conservation"
Animals couldn't exist without plants)
The chart shows you that: 1. plants need soil; 2. animals need plants; 3. plants need water; and 4. we need all of them. It is important for every one of us to learn all we can about soil and how to take care of it.

The pioneers cut trees and plowed grasslands to plant food crops. The rich prairie soil provided crop after crop with plentiful minerals. As the crops were harvested the minerals were taken from the soil. Slowly the soil’s fertility declined. Plowing furrows up and down the slopes made channels down which water ran. The run-off water cut deep gullies and carried the rich topsoil into streams and eventually into the ocean. In areas of high rainfall, exposed soil was slowly leached of its valuable minerals and organic matter, too. After the soil was no longer productive, the pioneers moved further westward and found new lands to plow.

Today the farmer may secure the help of trained technicians from the Soil Conservation Service. The soil conservationists recommend proper soil management plans for the farm. By following these plans the farmer can use the different kinds of land on his farm to the best advantage. Here is what he can do:

1. FERTILIZE—to replace chemicals, plant man's living
2. PLANT VEGETATIVE COVER to make the soil porous by planting grass
3. ROTATE CROPS—to provide a succession of different crops
4. FARM ON THE CONTOUR to farm slowly by constructing terraces on the slopes
5. BUILD TERRACES—to slow the run-off water by building grass in them
6. CONSTRUCT GRASS WATERSHEDS to hold run-off water and to help the soil retain water
7. BUILD PONDS AND RESERVOIRS to supply water and to help prevent and future

Erosion destroys soil and man's living
1. FERTILIZE—to replace lost soil nutrients by adding chemicals, plant material, or manure to the soil.
2. PLANT VEGETATIVE COVER—to prevent erosion and to keep the soil porous by maintaining plant growth on the land.
3. ROTATE CROPS—to preserve soil fertility by planting a succession of different crops.
4. FARM ON THE CONTOUR—to prevent erosion of soil from slopes by plowing and cultivating around the hill.
5. BUILD TERRACES—to move excess water from the fields slowly by constructing ridges around hills or across slopes.
6. CONSTRUCT GRASS WATERWAYS—to provide channels for run-off water by building broad ditches and planting grass in them.
7. BUILD PONDS AND RESERVOIRS—to collect and store run-off water and to hold it on the land for flood prevention and future use.
WATER

Water is man's friend, but it can also be one of his worst enemies. Clean water under control is valuable in homes, factories, and farms. Polluted or flood waters cause economic losses and are a hazard to the health of man and wildlife.

There are two things we must do to conserve water:

(1) Control water run-off.

(2) Stop polluting our streams and reservoirs.

Let us show you what happens when we do not hold the raindrops where they fall. The falling raindrops act as little bombs striking the exposed soil and breaking it into tiny particles. The particles remain suspended within the water as it flows down hill. When this muddy water collects so fast that streams and rivers cannot hold it, a flood spreads over the land. Animals drown. Houses and cars are swept away. Crops are destroyed by the silt and water. This water is wasted.

The land area that slopes and drains into a stream is called a watershed. Reservoirs are built in the watersheds to collect run-off water for use by man and to prevent floods in the land below. Roots, stems, and leaves of growing plants catch and hold some of the water. This moisture sinks into the ground where part of it is used by plants, and some sinks deeper into the soil where it is stored underground reservoirs. The underground water supplies wells and provides some water for creeks and rivers. This source of water often keeps water flowing in creeks and rivers during periods of drought.

Reservoirs to conserve water for water supplies. Contour crops, and building dams decrease water by reducing surface run-off. Excessive amounts of sunlight and oxygen to live in. Diluted water is expensive. Diluted water is expensive.

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the soil where it is stored in underground reservoirs. This underground water supplies wells and provides some water for creeks and rivers. This source of water often keeps water flowing in creeks and rivers during periods of drought. Farmers are using ponds and reservoirs to conserve water. Cities often depend on reservoirs for water supplies. Contour farming, terracing, planting cover crops, and building dams decrease the amount of silt in stream water by reducing surface run-off.

Excessive amounts of silt, sewage, and chemicals in water kill desirable species of aquatic plants and animals which need sunlight and oxygen to live and reproduce. Purification of poll
sulated water is expensive. Cities and industries can help keep streams and reservoirs pure by using modern waste treatment pro-
cesses. We can help prevent water pollution by burning or bury-
ing our trash and garbage instead of dumping it into streams.

People have not always had to think of conserving water.
When the pioneers settled our land, the clean streams and wells provided a constant supply of clear water. Industrial uses, agricultural uses and the needs of an increasing population have reduced our water supplies in some areas and polluted it in others. These needs are increasing rapidly.

The United States Government is building dams on rivers which hold back flood waters. The lakes formed by these dams supply water for irrigation and power for electricity. People are using these lakes for swimming, boating, skiing, and fishing. Lakes provide resting and feeding places for water birds during migration. The land around the lakes provides a place for camping, picnicking, and nature study as well as a habitat for wildlife.

**GRASS**

Grass is an important resource of our country. The grasses and wildflowers of the prairies are hardy native plants which can withstand adverse conditions such as drought, extreme temperature changes, fire, and grazing.

Let us see how grasses our valuable soil and keep where it will be most useful. Thousands of little roots in the soil and act as a sponge hold water. This thick grassAfter each growing season, into organic humus and leaves and other plants are composted for our use.

Early in the settlement abused. Many acres of many have remained as grassland, parts of the prairie to the grazing destroys the value of woody plants to invade. soil to wind and water erosion that one-half of the area by livestock without deteriorating the quality of the rangeland.

Remember, a good rule

Range managers recomm 1. Plant grass on land ed.
Let us see how grasses hold our valuable soil and keep water where it will be most useful. Thousands of little roots tie down the soil and act as a sponge to hold water. This thick green carpet prevents wind erosion too.

After each growing season, the grass, leaves, and stems decompose into organic humus and leave the soil richer. Part of the grasses and other plants are converted by livestock into meat and milk for our use.

Early in the settlement of the prairies the grasslands were abused. Many acres of marginal land were plowed which should have remained as grassland. Large numbers of livestock grazed parts of the prairie to the bare earth. Today we know that over-grazing destroys the valuable forage plants and allows low-quality weedy plants to invade. The reduced grass cover exposes the soil to wind and water erosion. Range conservationists tell us that one-half of the annual volume of forage produced can be used by livestock without detrimentally affecting the plants and the quality of the rangeland.

Remember, a good rule is

Range managers recommend that ranchers and farmers--

1. Plant grass on land that has been overused or disturbed.
2. Plant grass waterways in drainage areas to stop erosion.
3. Keep numbers of livestock in balance with the amount of available grass on the range.
4. Preserve areas with natural plant cover for recreation and as a suitable home for animals.

**Trees**

The vast forests seemed inexhaustible to the early settlers. Millions of acres of trees were cut to supply markets at home and in foreign countries. The early loggers cared little for the future of forests they cut. There were always more trees a few miles away. The eastern and northern forests were cut first, then the pine forests of the South, and finally the lumbering industry moved westward. By the early years of the twentieth century much of the high quality lumber had been cut. It was obvious that something had to be done if our forests were to continue to supply us with wood for our expanding needs.

Through government action areas were set aside as national forests where trained biologists managed the forests scientifically. Methods of logging were developed that reduced waste of the forest trees during cutting and sawing operations. Private forest industries also began studies to determine ways of controlling diseases, destroying forest fires. Many cut-over forests are planted to replace them with young trees.

Our forests are managed so that trees are planted to replace the ones cut. Good management will insure that we will have forests for years to come. Today forests not only give us trees for building, hunting, camping, natural beauty, but also food and men to care for us.

There is no area of conservation more effective than wildlife conservation. All of the vast lands from Canada to Mexico where the animals lived had little or no control. The men who had the railroad were instruments of destruction. We developed many new species of animals and then the railroad brought them to an end.

At the beginning of the century America was disappearing rapidly. The American flora and fauna were vanishing. The early settlers wanted the lands for their own use, and the pioneers who followed them wanted the same. The forests were cut, the animals killed, and the prairies plowed. The men who worked to encourage the plant and animal life are being remembered today.
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Our forests are managed on a sustained yield basis. New 
trees are planted to replace those harvested. This kind of man-
agement will insure that we will have forests to supply our needs 

for years to come. Today forests have many uses. The forests 

not only give us trees for wood but also provide lands for fish-

ing, hunting, camping, nature study, and stable drainage areas.

WILDLIFE

There is no area of conservation with a longer history in 

America than wildlife conservation. During the period of the 

westward movement one could see millions of buffalo roaming the 

vast lands from Canada to Mexico. But to the pioneers conserva-
tion meant little. The market for meat and hides, the rifle, and 

the railroad were instrumental in reducing wildlife as species 
after species of wild animals and birds decreased in number or 
disappeared.

At the beginning of the twentieth century wildlife in North 

America was disappearing rapidly. A few farsighted men recog-
nized the importance of wildlife as a natural resource. These 

men worked to encourage the federal and state governments to en-
act laws and initiate programs to conserve wild animals. Conser-
vation projects included the establishment of refuges and sanctuaries, and the construction of game farms and fish hatcheries. Game laws were passed to regulate fishing and hunting seasons and set bag and creel limits.

![Factors that hold down wildlife populations.](image)

Wild game populations normally produce more individuals during the spring and summer than the habitat can support through the winter. Predators, starvation, and diseases may take part of this surplus but some of it may be harvested by man. This harvest is regulated by game laws.

Man-made laws alone cannot insure surpluses in animal populations if the amount and distribution of food, cover, and water are inadequate. Actually, the destruction of habitat is largely responsible for the decrease in wildlife numbers. When food is scarce fewer young are produced and these are often weak. Inadequate cover causes more losses to predators, death from exposure, and fewer good nest sites.

Much wildlife is dependent on small shrubs and grains waste areas of fields. The wildlife during cold winter

Now that we have disc

ervation, let us again state that population is putting inc resources. Several large enough pure water for home still claiming some of our rangelands still suffer receiving greater use by cro game animals in each hunt.

Today conservationists natural resources. Research efficient ways to use our wildlife. Long range plans and However, these plans will part to prevent waste of a must become informed and a natural resource use.

Conservation programs modern knowledge and techn
Much wildlife is dependent on the farmer for food and cover. Wildlife may be aided by leaving natural vegetation and by planting small shrubs and grains along fence rows, in corners, and in waste areas of fields. These will provide food and protection for wildlife during cold winters.

Now that we have discussed these five specific areas of conservation, let us again stress that the rapidly increasing human population is putting increased demands on our limited natural resources. Several large cities are having difficulty obtaining enough pure water for homes and industries. Soil erosion is still claiming some of our precious croplands. Forests and rangelands still suffer some abuses. Recreational lands are receiving greater use by crowded city dwellers. There are fewer game animals in each hunter’s bag.

Today conservationists are working to eliminating waste of our natural resources. Research workers are finding new and more efficient ways to use our soil, forests, rangelands, waters, and wildlife. Long range management plans are being put into effect. However, these plans will not succeed unless each of us does his part to prevent waste of soil, water, forests, and wildlife. We must become informed and act wisely in all decisions concerning natural resource use.

Conservation programs directed by trained personnel with modern knowledge and techniques which are supported by the Amer-
ican people can achieve the goal of natural resource conservation: to obtain from our resources the greatest amount of good, for the greatest number of people, for the greatest period of time.

We are including a list of things that you can do to learn more about our natural resources and to understand the need for conserving them.

1. Learn the conservation pledge.
2. Help prevent forest and grass fires.
3. Learn to care for pets and injured animals.
4. Plant a shrub or tree in your yard and care for it.
5. Construct a bulletin board or display on conservation.
6. Enter the soil-conservation poster contest sponsored by the soil conservation district in your county.
7. Help others learn about conservation.

Can you add other suggestions to this list?
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We hope this information
will be of help to you.

Sincerely,
Conservation Work-
shop Members

This issue of The Kansas School Naturalist was prepared by five teachers,
members of the 1964 Conservation Workshop, and two members of the faculty of
the Department of Biology of Kansas State Teachers College, Thomas Eddy and
Dr. Bernadette Menhusen. The workshop members were (from left to right)
Clara Belle Endesley, Junction City; Joann Holaday, Hoy; Eva Dold, Emporia;
Mable Doane, Hutchinson; and Dorothy Gibbons, Hutchinson. Most of the illus-
trations were drawn by Dr. Robert Boles, Assistant Professor of Biology, KSTC.
The copy was typed by Donna Naden, student assistant, KSTC.

SUGGESTED READING

Ashbaugh, Bryon L., and Muriel Beuschlein. 1960. Things to Do in Science
163 p.
Bathurst, Effie G., and Wilhelmina Hill. 1957. Conservation Experiences for
192 p.
Hamm, Russell L., and Larry Nason. 1964. An Ecological Approach to Conser-
Munzer, Martha, and Paul F. Brandwein. 1960. Teaching Science Through Conser-
502 p.
The 1965 Workshop in Conservation will again be conducted in two sections, from June 2 to June 18, and from June 21 to July 9, inclusive. As in the past several years, the Workshop will cover water, soil, grassland, wildlife conservation and conservation teaching.

There will be lectures, demonstrations, discussion groups, films, slides, field trips, projects, and individual and group reports. You may enroll for undergraduate or graduate credit.

The first section is open to any interested person; there are no prerequisites. Since the second section is devoted almost entirely to the production of teaching aids (e.g. preparation of copy for an issue of The Kansas School Naturalist), enrollment is limited to those who already have an established interest in conservation education and who have some teaching experience.

The sketch appearing at the bottom of page 3 was taken from Glimpses of Kansas Wildlife, a publication of the Kansas Forestry, Fish and Game Commission. The drawings appearing on pages 4 and 5 were reprinted through the courtesy of the National Wildlife Federation. The graph on page 12 was adapted from a graph appearing in Farmer’s Bulletin No. 2035, U. S. Department of Agriculture.

For other information write the director, Thomas A. Eddy, Department of Biology, KSTC, Emporia, Kansas.