

Glossary



Acid rain — the atmospheric reaction of water, sulfur dioxide, and nitrogen oxides from smoke stacks and vehicle exhausts that falls as acid precipitation.

Alkaline soil — a soil having a pH value greater than 7.0; opposite of acid soil.

Conservation tillage — any of several farming methods that provide for plant growth and weed control, while maintaining ground cover throughout the year and disturbing the soil as little as possible.

Contour farming — field operations — such as plowing, planting, cultivating, and harvesting on the contour, or at right angles to the natural slope — to reduce soil erosion, protect soil fertility, and conserve water.

Crop rotation — the growing of different crops in reoccurring sequence on the same land.

Decomposition — decay of organic matter facilitated by organisms, such as bacteria and fungi, known as decomposers.

Erosion — the loosening and movement of soil by wind, moving water, ice, and landslides.

Food chain — a series of plant and animal species in a community, each of which is related to the next as a source of food.

Ground cover — any plant producing a protective mat to prevent erosion.

Habitat — a place where plants and animals live, grow, and reproduce.

Humus — a part of the soil containing highly decomposed plant and animal material.

Loam — a soil with a high percentage of sand mixed with clay and organic matter.

Mulch — a ground cover, such as straw or leaves, which helps protect soil from erosion.

No-till — a conservation tillage practice that leaves the soil undisturbed prior to planting.

Nutrient — a substance that supplies nourishment for an organism to live.

Parent material — the mineral materials that break down to form soil.

Precipitation — rain, snow, and other forms of moisture that fall to earth.

Rill erosion — the removal of soil on slopes where the water runoff and soil accumulates into small channels.

Row crops — agricultural crops, such as corn and soybeans, that are grown in rows.

Sediment — soil deposited by water or wind.

Sheet erosion — the gradual wearing away of thin, uniform layers of soil.

Soil — a dynamic mixture of broken-down rocks, air, water, and plant and animal material.

Soil horizon — the layers in which soil naturally occurs, such as topsoil, subsoil, and bedrock.

Stripcropping — the practice of planting crops in strips, alternating row crops with plants that provide a good ground cover (i.e. clover), so as to lessen erosion.

Subsoil — the layer of soil beneath the topsoil.

Terracing — a soil conservation practice in which ridges or steps are built on a steep slope to slow down runoff and increase soil moisture.

Till — to plow or work the land in preparation for raising crops.

Weathering — the breaking down of rock into sediment by wind, water, and living things.

Windbreak — a barrier of trees or shrubs that protects people, livestock, and soil from exposure to winds.

PRAIRIE

BURROWING OWL (*Athene cucularia*)

Size: Head to tail—8-11 in. (20-28 cm); Wing-span—24 in. (61 cm).

Habitat: Grasslands, prairies, deserts, farms.

Range/Status: Southwest Canada and western U.S., south into Argentina; also found in Florida. Locally common. Migratory in the North.

Food/Feeding Habits: Eats mainly small rodents and insects. Hunts mostly in the early evening and at night, more rarely during the day. Sometimes hovers when hunting.

Did you know? Burrowing owls nest in the abandoned burrows of prairie dogs and other animals.

BLACK-TAILED PRAIRIE DOG

(*Cynomys ludovicianus*)

Size: Head and body—11-13 in. (28-33 cm); Tail—3-4 in. (7.6-10 cm); Weight—2-3 lbs. (0.9-1.4 kg).

Habitat: Dry, upland prairies. Lives in elaborate burrows.

Range/Status: Plains of the central U.S. from Montana to western Texas. Numbers greatly reduced due to poisoning programs and loss of habitat.

Food/Feeding Habits: Eats mainly grasses and broad-leaved plants.

Did you know? Prairie dog towns have many burrows. These towns also provide a home for rabbits, snakes, burrowing owls, and other animals.

DIFFERENTIAL GRASSHOPPER

(*Melanoplus differentialis*)

Size: 1-1.8 in. (2.8-4.6 cm), largest in genus.

Habitat: Grasslands and croplands.

Range/Status: Common throughout North America. This grasshopper is one of five species that are the most destructive to crops.

Food/Feeding Habits: Feeds on grasses and crops, eating up to 16 times its weight each day. If conditions are right, these insects will occasionally undergo dramatic population increases causing extensive crop damage.

Did you know? This grasshopper and its relatives lay their eggs in the soil in groups of 20 to 120 cemented together in a pod.

PASQUEFLOWER (*Anemone patens*)

Size: Stem—2-16 in. (5.1-41 cm); Flower diameter—1-1.5 in. (2.5-3.8 cm).

Habitat: Sandy hillsides and high meadows of the open prairie.

Distribution: The Great Plains from Texas to northwest Canada, through the Rocky Mountain Range and west to Washington.

Did you know? Although the pasqueflower is toxic, it was sometimes used by native Americans and early settlers to treat colds and fevers.

EASTERN DECIDUOUS FOREST

STRIPED SKUNK (*Mephitis mephitis*)

Size: Head and body—13-18 in. (33-46 cm); Tail—7-10 in. (18-25 cm); Weight—6-14 lbs. (2.7-6.4 kg). About the size of a house cat.

Habitat: Mixed woods, brushland, open prairie, and other areas. Makes dens in burrows, under buildings, and in rock or wood piles.

Range/Status: Common in Canada, U.S., and northern Mexico.

Food/Feeding Habits: Hunts at night. Omnivorous; eats rodents, insects, eggs, berries, and carrion.

Did you know? Owls that prey on skunks are generally unaffected by its spray.

STAR-NOSED MOLE (*Condylura cristata*)

Size: Head and body—4.5-5 in. (11-13 cm); Tail—3-3.5 in. (7.6-8.9 cm); Weight—1.2-2.8 oz. (34-79 g).

Habitat: Semiaquatic; burrows in damp ground often near lakes or streams.

Range/Status: Common in Great Lakes area, New England, and eastern Canada; rare in South.

Food/Feeding Habits: Detects food with 22 fleshy, fingerlike projections surrounding its nose; eats worms, insects, and some vegetable matter found both underground and in lakes and streams.

Did you know? A star-nosed mole can eat its weight in earthworms in a day. Deprived of food, it can starve to death in a matter of hours.

EARTHWORM (*Lumbricus* sp.)

Size: Up to 12 in. (30 cm) long.

Habitat: Moist soil.

Range/Status: Common throughout most of North America and the world.

Food/Feeding Habits: Feeds by swallowing soil and digesting decaying plant material, algae, and tiny soil animals out of it. Can also feed directly on organic material.

Did you know? The earthworms present in an acre of soil can turn over 11 to 20 tons of earth per year. In times of drought, earthworms can burrow down in the soil to depths of seven feet. Each of these amazing creatures has five hearts.

RED CHANTERELLE

(*Cantharellus cinnabarinus*)

Size: Cap diameter—0.4-1.6 in. (1.0-4.1 cm);

Stalk length—0.6-1.6 in. (1.5-4.1 cm).

Habitat: Moist areas in open woods.

Distribution: Eastern Canada to Florida; west to Indiana.

Did you know? The pigment in this fungus is the same that gives the pink flamingo its color. Fungi are decomposers; they help break down organic matter into soil.

SOUTHWEST DESERT

KIT FOX (*Vulpes macrotis*)

Size: Head and body—15-20 in. (38-51 cm); Tail—9-12 in. (23-30 cm); Weight—3-6 lbs. (1.4-2.7 kg).

Habitat: Open, sandy ground with desert vegetation. Dens in the side of a dune or mound.

Range/Status: Found throughout most of the North American deserts. Now rare because of indiscriminate poisoning and habitat disruption.

Food/Feeding Habits: Eats rodents, birds, lizards, and insects. Hunts mainly at night (nocturnal).

Did you know? The kit fox's ears are lined with fine hairs, which protect them from sandstorms.

GILA MONSTER (*Heloderma suspectum*)

Size: Length—18-24 in. (46-60 cm).

Habitat: Desert; frequently found on lower mountain slopes and canyon bottoms where it stays in burrows, thickets, and under rocks.

Range/Status: Locally common from extreme southwest Utah to south Sonora; extreme southern Nevada to southwest New Mexico.

Food/Feeding Habits: Eats small rodents, birds, eggs, and other lizards. Catches and then kills larger prey by chewing poison into wounds created by its powerful jaws.

Did you know? The gila monster is the only poisonous lizard found in the U.S.

DESERT TARANTULA

(*Aphonopelma chalcodes*)

Size: Body length—2-2.8 in. (5.1-7.1 cm);

Legspan up to 4 in. (10 cm).

Habitat: Burrows in desert soil.

Range/Status: Fairly common in Arizona, western New Mexico, southern California and northern Mexico.

Food/Feeding Habits: Eats insects, lizards, and other small animals. Hunts at night.

Did you know? Tarantulas are docile creatures, but if provoked, will bite. The bite of a desert tarantula is no more venomous than a bee sting. They can also rub off tiny hairs from their abdomen that can cause eye and skin irritations.

STRAWBERRY CACTUS

(*Echinocereus enneacanthus* var. *stramineus*)

Size: Grows in dense clumps with many stems, often 3 feet (0.9 m) or more in diameter. Flower diameter—4-5 in. (10-13 cm).

Habitat: Desert; very dry, sandy or rocky hillsides, southern Texas.

Did you know? The fruits of this cactus have a strawberry-like flavor, thus the name strawberry cactus. They are often used to make jam.

FRESHWATER MARSH

SNAPPING TURTLE (*Chelydra serpentina*)

Size: Shell length—8-12 in. (20-30 cm); record length—18.5 in. (47 cm); Weight—10-35 lbs. (4.5-15.9 kg); can weigh up to 75 lbs. (34 kg).

Habitat: Any permanent body of fresh water. **Range/Status:** From southern Canada to Central America; Atlantic Ocean to the Rocky Mts.

Food/Feeding Habits: Omnivorous; eats carrion, plants, and a variety of aquatic animals. Young actively hunt, while adults often lie in ambush, buried in the mud in shallow water.

Did you know? Snapping turtles bury their eggs in soil or plant debris, such as muskrat lodges.

MUSKRAT (*Ondatra zibethica*)

Size: Head and body—10-14 in. (25-36 cm); Tail—8-11 in. (20-28 cm); Weight—2-4 lbs. (0.9-1.8 kg).

Habitat: Marshes, edges of ponds, lakes, streams; lives among cattails, rushes, water lilies, and in open water.

Range/Status: Common throughout most of North America, except the extreme Southeast and parts of Texas, California, and Nevada.

Food/Feeding Habits: Primarily eats aquatic vegetation, and sometimes clams, frogs, and fish.

Did you know? Muskrats build houses out of cattails and other marsh vegetation. They also may live in burrows with underwater entrances.

DRAGONFLY NYMPH (order—Odonata;

suborder—Anisoptera)

Size: Length—0.5-1.8 in. (1.3-4.5 cm) depending on the species.

Habitat: Most freshwater wetlands, living underwater in the silty bottom mud or on vegetation.

Range/Status: Common throughout much of North America, and many other parts of the world.

Food/Feeding Habits: Eats insects and other small creatures, including tadpoles and small fish. Important in controlling mosquito populations.

Did you know? The dragonfly nymph catches its prey by shooting out its extendable lower lip, which is armed with sharp, hooklike teeth or bristles.

CATTAILS (*Typha* sp.)

Size: Height—4-8 ft. (1.2-2.4 m).

Habitat: Brackish and freshwater marshes, shallow water, and borders of ponds and rivers.

Distribution: Newfoundland to Alaska, south throughout most of the U.S., and into Mexico.

Did you know? Every part of the cattail plant is edible, depending on the season. Cattails provide a home and a source of food for many different insects, birds, and mammals.

Earthword Puzzle (LA, S, SS)

Before giving your students the Earthword Puzzle, make sure they are familiar with the words in the glossary and the plants and animals on the 16-picture poster. The answers can be found on page 16 of the Educator's Guide.

Across

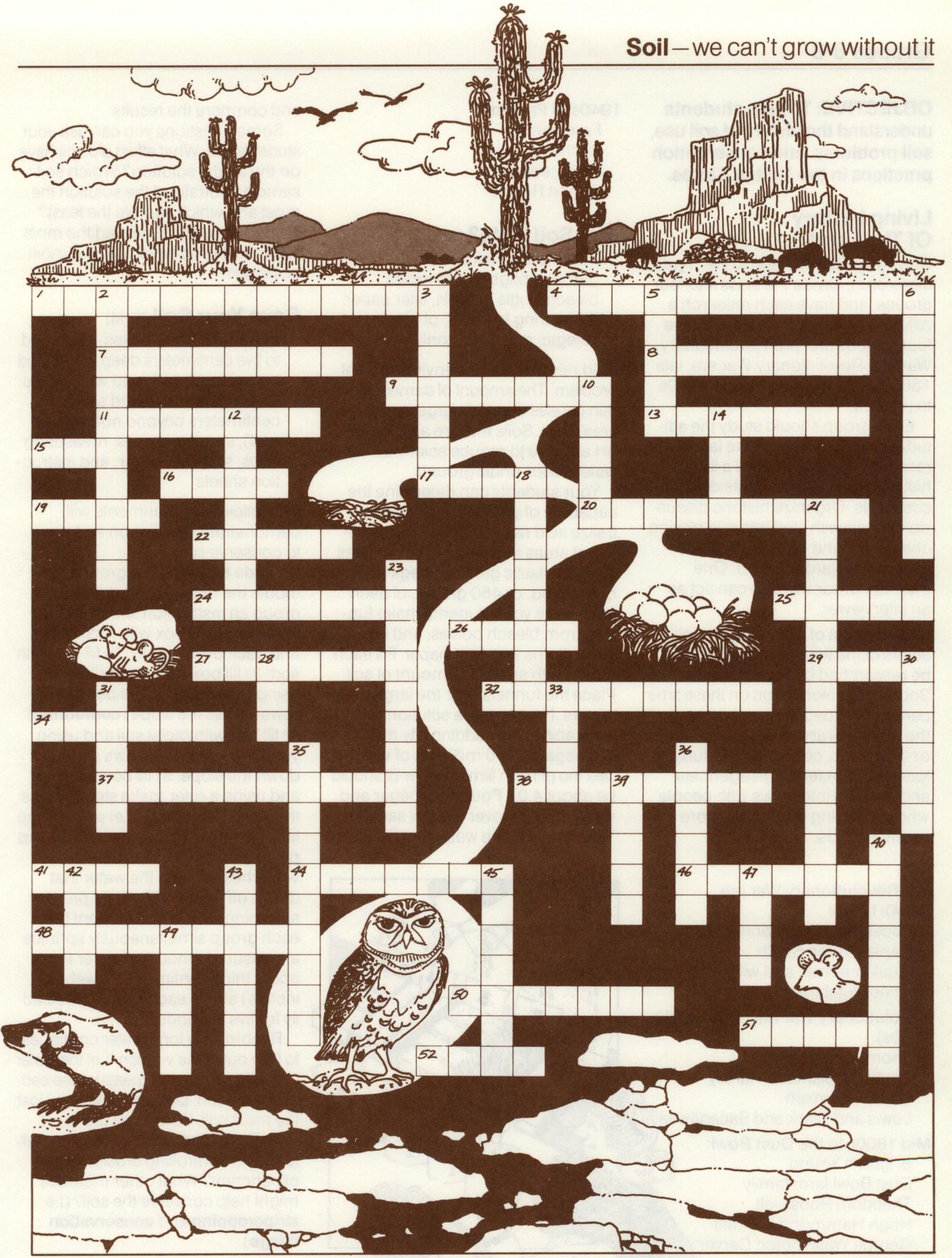
1. Rain, snow, and other forms of moisture that fall to earth are called _____.
4. _____ is the wise use of our natural resources.
7. Crop _____ refers to growing different crops in succession on the same land.
8. _____ is the wearing away of soil by wind, water, or some other means.
9. A _____ is a rodent that lives in the water, has glossy brown fur, a long, flattened, scaly tail, and webbed hind feet.
11. _____ is the place where a plant or animal grows or lives.
13. Many farmers _____ hilly land to prevent soil erosion.
15. Farmers usually plant corn in a _____.
16. Minute particles that are a component of many soils are called _____.
17. _____ is the solid part of the earth's surface not covered by water.
19. _____ is a crop grown by many farmers.
20. Farmers plant tree _____ to form windbreaks that help prevent erosion.
22. _____ soil types are often found in coastal areas.
24. Soil that contains a high quantity of humus is very _____.
25. _____ is a material such as straw that protects the surface of the soil from erosion.
26. _____ is a type of soil.
27. A _____ is a long period of unusually low rainfall resulting in parched ground.
29. The _____ Bowl refers to a period of time in the 1930s when drought, prairie winds, insect infestation, and poor management practices com-

- _____ bined to make farming nearly impossible.
32. No-till farming, stripcropping, and terracing help protect precious soil _____.
34. Rocks that break down to form soil are known as the _____ material.
37. Rocks can be _____ to help create soil.
38. A soil with a pH below seven is acidic; a soil with a pH above seven is _____.
41. Contour _____ing is done across the slope, rather than up and down it.
44. Prairie dog towns are made up of many individual _____.
46. Soil that is rich in _____ material is very fertile, and good for growing plants.
48. A _____ refers to the natural features, such as hills, lakes, streams, etc., that distinguish one part of the earth's surface from another.
50. _____ farming includes practices that help reduce erosion, protect soil fertility, and conserve water.
51. Mushrooms are the fruiting body of _____.
52. To _____ is to plow or work the land to make it ready for raising crops.

Down

2. Burrows left by _____ let water and air move more freely through the soil.
3. Forests, soil, wildlife, and minerals are a few of our _____ resources.
5. _____ erosion occurs when water removes thin layers of soil.
6. Soil _____ are needed for plant growth.

10. _____ and shrubs are planted as windbreaks.
12. Many farmers use conservation _____ methods to reduce erosion and energy use.
14. _____ erosion occurs when minute streams of water remove soil.
18. Farmland needs good water _____ to grow abundant crops.
21. A _____ _____ is a group of plants producing a protective mat on the soil surface.
23. A _____ is a soil-dwelling animal with many legs.
28. A burrowing _____ makes its nest in abandoned prairie dog burrows.
30. A snapping _____ is found in freshwater marshes.
31. Farmers grow many food _____.
33. A _____ horizon is a layer of naturally occurring soil, nearly parallel to the land surface.
35. _____ are living barriers of trees and shrubs designed to protect people, soil, and livestock from exposure to winds.
36. The _____ _____ is a desert predator with big ears.
39. _____ of land are lost from productive farms due to erosion.
40. Alkaline soil can neutralize _____ _____, as water trickles through it.
42. _____ is soil composed mainly of clay and sand.
43. Grass is one of the favorite foods of _____ dogs.
45. _____ is the layer of soil beneath the topsoil.
47. Crops _____ well when proper conservation practices are used.
49. A striped _____ protects itself with its offensive odor.



OBJECTIVE: To help students understand the history of soil use, soil problems, and conservation practices in the United States.

Living History Of The Land (SS, LA)

Bring the history of land to life in your classroom. Divide the class into four groups, and have each research a different historical time period. The four periods are: pre-Revolutionary War era; Revolutionary War era; late 1800s to the Dust Bowl; and 1940s to present.

Each group should study the attitudes of people toward the land. The research will culminate in a living history day where students dress in costumes. Organize historic discussion panels with students role-playing characters and expressing their attitudes toward the land. One member of each group can act as an interviewer.

Below is a list of representative characters of the time periods who can be researched by your students. Sources for information on these time periods and people may be found at the public library, historical societies or museums, conservation clubs, local soil conservation agencies, and through interviews with people who were living during the more recent periods.

Pre-Revolutionary War era (1600-1700):

- Pocahontas and John Rolfe
- Captain John Smith
- Quaker farmer and wife
- Anne Hutchinson

Revolutionary War era (1700-early 1800s):

- Thomas Jefferson
- Southern plantation family
- Chief Tecumseh
- Lewis and Clark and Sacagawea

Mid 1800s to the Dust Bowl:

- Brigham Young
- Dust Bowl farm family
- Theodore Roosevelt
- Hugh Hammond Bennett
- George Washington Carver

1940s to Present:

- Farm family
- Rachel Carson
- Aldo Leopold
- Robert Rodale

Can Soil Help? (S)

Materials: small plastic garbage bags, soil samples, bleach-bottle funnels, filter paper, measuring beakers, pH paper, vinegar, and large containers

Acid rain is a serious environmental problem. The amount of damage acid rain causes depends largely upon an area's soil. Soils that are alkaline in pH are able to reduce acidity as rain-water seeps underground.

Your students can determine the capability of your local soil to neutralize acid rain. Choose several different areas and collect soil samples in small plastic garbage bags (about one pound, or 450 grams, of each soil). Have your students make funnels from bleach bottles, and line the bottoms with filter paper. Fill each funnel with an equal amount of soil. Place the funnels over the large containers. Next, make a solution similar to acid rain by adding fifty milliliters of vinegar to 150 milliliters of water. Test the pH with litmus paper (it should be about 4.0). Pour the vinegar and water solution over the soil samples. Test the pH of the water that filters

and compare the results.

Some questions you can ask your students are: What effect did soil have on the acidic solution? Which soil sample neutralized the solution the most and which sample the least? Can you tell which soil had the most alkaline pH and which soil the most acidic pH?

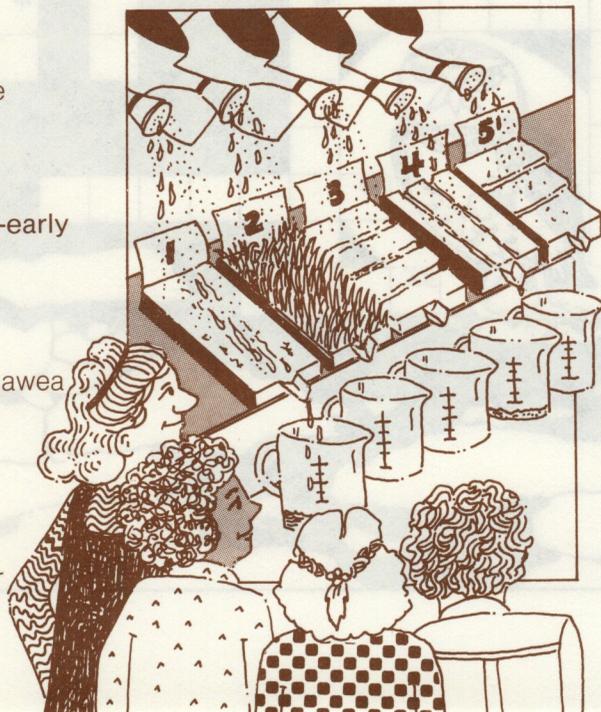
Save Your Soil (S, M)

Materials: Shoe boxes—trimmed to five centimeters deep, v-notched on one end, and lined with plastic (plastic should extend several centimeters beyond notched end); sprinkling cans; measuring cups; sod; soil; water; and instruction sheets

The following experiments will demonstrate soil erosion and ways to conserve soil.

Divide the class into groups, distribute the materials, and give each group an instruction sheet. Instructions are: 1) fill box with moist soil and pack down tightly; 2) fill box with sod; 3) fill box with moist soil and using your finger make packed furrows across the slope (**contouring**); 4) fill box with moist soil and using your finger make furrows up and down the slope (**terracing**). Let each group line up their boxes on an incline, and place measuring cups beneath the v-notches to catch the water that drains off (close enough to prevent splashing). Have one student from each group simultaneously sprinkle a measured amount of water from about thirty centimeters (twelve inches) above each box. Pour steadily for five seconds.

Record how long water continues to flow out of the v-notch. Let the water in the jars settle and measure the sediment in each. Discuss which box lost the most soil. Which lost the most water? Which methods were most effective in controlling erosion in this experiment? What other methods might help conserve the soil? (i.e. **strip cropping** and **conservation tillage**).



Soil—we can't grow without it

Habitat Helpers (S, A)

Beautify your school grounds or classroom, help prevent erosion, and make your students aware of wildlife by doing some of the following projects:

- Look for evidence of erosion around downspouts, storm sewer outlets, and edges of playgrounds. Suggest ways to correct these problems.
- Plant flowers such as cosmos, zinnias, or catnip to attract butterflies, or plant flowers that produce seeds the birds can eat, such as sunflowers, portulaca, or petunia.
- Make birdfeeders and birdhouses from recycled materials. Place the feeders and houses around your schoolyard. (See the Ranger Rick Reprint, "Recycle for the Birds." A kit including this reprint can be ordered from NWF for \$1.00. Order #79258).
- Survey your schoolyard for good habitat. Improve it by adding water, berry-bearing shrubs, brushpiles or birdhouses, food, and shelter.

If you'd like more information about attracting wildlife to your school grounds or classroom, as well as details about the National Wildlife Federation's new **Gardening With Wildlife Kit**, write to:

National Wildlife Federation
Department WB9
1412 Sixteenth Street, NW
Washington, DC 20036

Resource Bibliography

Soil Sources

National Association of Conservation Districts (NACD) produces a variety of educational publications and audiovisual materials on soil and water conservation. For publications and films brochure, contact: NACD Servicing Department, P.O. Box 855, League City, TX 77573.

The Soil Conservation Society of America (SCSA) has a variety of environmental education materials concerning many aspects of conservation. For a publications list, write: Soil Conservation Society of America, 7515 Northwest Ankeny Road, Ankeny, IA 50021.

USDA Soil Conservation Service (SCS) publishes environmental education materials on soil and water conservation. Contact your local SCS office or write: Educational Relations, USDA Soil Conservation Service, P.O. Box 2890, Washington, DC 20013.

Books

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- *Fradin, Dennis B. *Farming*. Chicago: Childrens Press, 1983. Grades 2-3.
- George, Jean Craighead. *One Day in the Desert*. New York: Thomas Y. Crowell, 1983. Grades 1-4.
- *Goldin, Augusta. *Where Does Your Garden Grow?* New York: Thomas Y. Crowell, 1967. Grades 1-4.
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- Swayne, Dick, and Peter Savage. *I am a Farmer*. New York: Harper and Row, 1978. Grades K-3.
- *Udall, Stewart L. *The Quiet Crisis*. New York: Holt, Rinehart, and Winston, 1963. Adult.
- *White, William, Jr. *An Earthworm is Born*. Sterling Nature Series. New York: Sterling Publishing Co., Inc., 1975. Grades 7-9.

* Out of print, but may be available from your local library.

Teacher's Guides

- Acid Rain Education Kit. National Wildlife Federation, 1982. \$1.00. Order #79678. Grades 4-12.
- Busch, Phyllis S. *The Urban Environment*. Chicago, IL: J. G. Ferguson Publishing Co., 1975. Grades K-3.
- Conserving Soil. U.S. Department of Agriculture Soil Conservation Service, P.O. Box, 2890, Washington, DC 20013. Grades 6-9.
- Kennedy, Carolyn L. *Exploring Wildlife Communities with Children*. New York: Girl Scouts of the U.S.A., 830 Third Ave., NY, NY 10022, 1981. Grades 2-6.
- Russell, Helen Ross. *Ten-Minute Field Trips*. Chicago, IL: J. G. Ferguson Publishing Co., 1973. Grades 2-7.
- Soil and Water Conservation. Irvina, TX: Boy Scouts of America, 1980. Grades 7-12.
- 4-H Plant and Soil Science Project Series. National 4-H Council, 7100 Connecticut Ave., Chevy Chase, MD 20815. Grades 4-7.

Periodicals

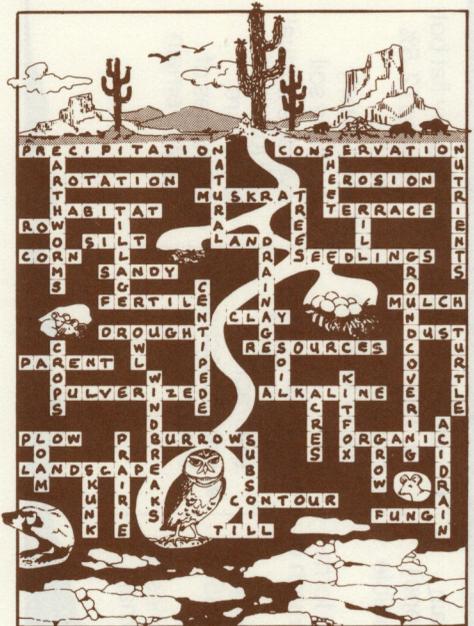
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- Sampson, R. Neil. "Soil Conservation." *Sierra*, November/December 1983, pp. 40-43.
- "Soil-We Can't Grow Without It." *National Wildlife*, February/March 1985, pp. 6-14.
- Steinhart, Peter. "The Edge Gets Thinner." *Audubon*, November 1983, pp. 95-126.

Audiovisual Programs

- The following four films can be ordered from your local film library or the NACD Servicing Dept., P.O. Box 855, League City, TX 77573.
- Land Use: A Moral Dilemma**. Maplewood Production. Carbondale, IL, 1967. 35 min. Grades 9-12, Adult.
- On American Soil**. Conservation Foundation, 1983. 28 min. Grades 9-12, Adult.
- We Are of the Soil**. Iowa State University. Iowa Dept. of Conservation, U.S. Soil Conservation Service, 1978. 23 min. Grades 9-12, Adult.
- Wildlife and the Farm**. Remington Farms, 1978. 30 min. Grades 7-12, Adult.
- Soil Conservation Video Game**. Agri-Education, Inc., Box 66, 815 Shakespeare, Stratford, IA 50249. \$35. Grades 10-12, Adult.
- Soil—we can't grow without it**. National Wildlife Federation, 1985. 15 min. slide/tape \$26.95; filmstrip \$24.95. Grades 4-12, Adult.

Earthword Puzzle Answers



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