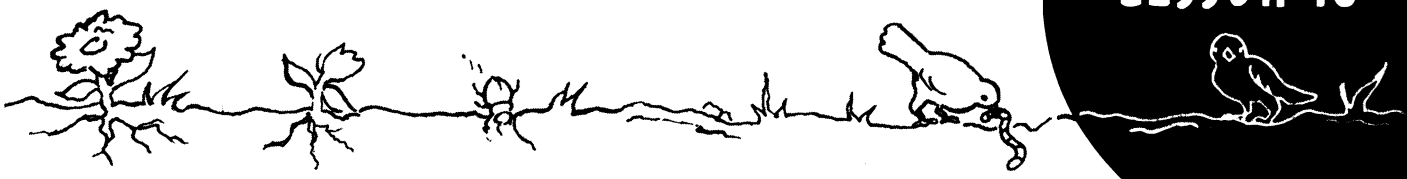
LESSON 10



Going, Going, Gone?

Lesson Description

Students simulate rain and wind to observe the effects of water erosion and wind erosion on soil.

Subjects

Art, Language Arts, Mathematics, Science, Social Studies

Time

Prep: 30 minutes
Activities: 1 ½–1 ¾ hours (not including Extensions)

Teacher Background

Erosion is the loosening and movement of the solid material on the land surface by water *runoff*, wind, ice, and landslides. Wherever water flows or wind blows over unprotected soil, erosion is the result. Even on land protected by plants, some degree of natural erosion will occur. Soil continuously forms from *parent material* and *organic matter*, but soil erosion outpaces soil formation. The *sediment* that results from *water erosion* can cause water *pollution*. *Wind erosion* pollutes the air and reduces air quality.

When America's early settlers arrived in the area that is now the Plains States, they plowed the prairie grass to plant crops, not realizing that the native grasses held the soil in place. The exposed, plowed soil became vulnerable to the prairies' *droughts*, battering winds, and rain. Storms whipped up the dust, stripping the plowed earth of precious *fertile* soil, and destroying millions of agricultural acres. Thousands of farm and ranch families were forced to abandon their ruined land during the Dust Bowl droughts of the 1930s.

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Topic: the Dust Bowl
Go to: *www.scilinks.org*
Code: DIG10

Student Objectives

Students will be able to:

- define erosion;
- demonstrate soil erosion using models of fields;
- explain where eroded soil goes and what its effects are; and
- determine how to protect land from soil erosion.

Materials

For the Class

- Color photos showing erosion
- Three small aluminum cake pans
- Dry soil (see page x)
- Dry soil with grass left on top
- Dry soil containing grass and plants roots and stems
- Three index cards
- Marker
- Three clear trash bags
- Hair dryer or mini fan
- Scissors
- Three measuring cups (at least 500 milliliters)
- Watering can
- Water
- Broom and dust pan
- Bucket

Tons of dry, powdery soils were carried thousands of miles by wind. Huge dust clouds were blown to the East Coast from as far west as Montana.

Soil erosion can never be stopped—it can only be controlled. In the lesson that follows, students learn about the effects of wind and water on bare soil, on soil covered by crop residue, and on soil protected by grass. Students analyze the results of erosion demonstrations to explore ways that *conservationists* treat the land to minimize soil erosion.

Learning Cycle

Perception: 15 minutes

Prep Find color photographs of erosion in Earth science and environmental science textbooks or encyclopedias, or cut out photographs from calendars or magazines such as *National Geographic, Audubon, Outside, Sierra Club, Journal of Soil and Water Conservation,* etc. If possible, find pictures showing the same land before and after soil erosion occurred.

1 Review the value of soil and discuss why soil is important to environmental health. (Answer: soil is the medium in which our food is grown and is the space where we build our towns and cities; soil provides habitat for animals, shelters plant roots, and gives animals and some plants critical nutrients for survival.)

2 Direct student's attention to the erosion photos. Help students understand how soil erodes from agricultural and urban areas through water and wind movement.

Exploration: 30 minutes

Prep Use scissors to notch a "v" in a short side of each cake pan (see Figure 10.1 on the next page). Prepare models of fields by filling one cake pan with bare soil (to represent a plowed field with no protection from vegetation), another pan with soil and loose plant material (to represent an agricultural field with crop residue left for protection), and the third pan with a patch of soil and firmly-rooted grass (to represent a pasture or meadow). Use a marker and index card to label pans "plowed field," "field with crop residue," and "meadow."

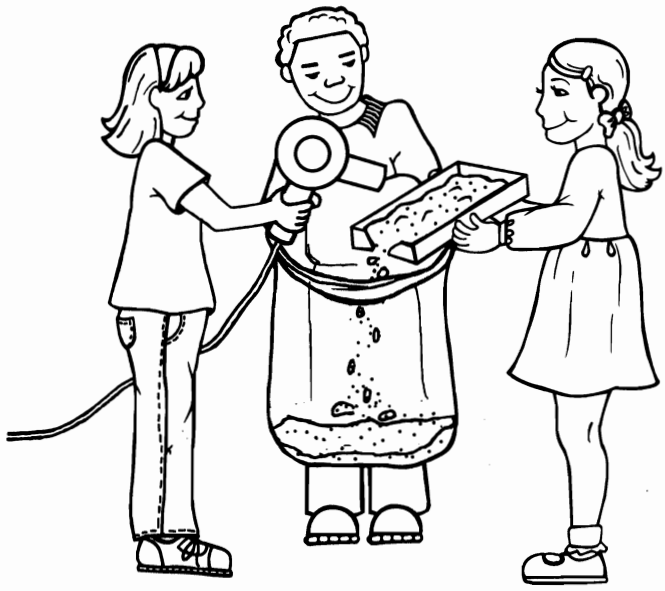
1. If your students have visited a farm or garden, discuss the kind of fields they've seen.
2. Ask students how the three cake pans are models for three different fields.
3. Explain that this experiment will simulate the effects of the weather and seasons on soil in those types of fields. Ask students to predict what will happen when "wind" blows across each "field." Have students give reasons for their predictions.
4. Distribute Student Handout 10A. Older students can fill in the first and second columns of the handout. Younger students can draw pictures of their predictions instead of writing sentences about what will happen, or make predictions for just one of the fields.
5. Select one student to hold a garbage bag open, and select another student to hold a pan and tilt it lengthwise over the garbage bag. Explain that tilting the pan models a sloped field.
6. Select one student to be the wind blower, or do it yourself. That student will hold the hair dryer

Materials Cont'd.

For Each Student Group

- Drawing paper
- Crayons, colored pencils, or markers
- Student Handouts 10A, 10B, and 10C

Figure 10.1. Simulating wind erosion on a field.



about 20 centimeters from the upper end of the pan, directing the blowing air down toward the garbage bag for 15–30 seconds (see Figure 10.1).

7 Repeat for each type of field.

8 Have the class gather around the garbage bags to see the results. The garbage bag under the "plowed field" should contain the most soil, while the bag under the "meadow" should contain the least soil. The bag under the "field with crop residue" should contain a medium amount of soil. Were student predictions accurate?

9 Discuss what these results mean. Help students understand that the grass in the meadow protects the soil from wind, while bare soil without any vegetation is exposed to wind and therefore the most vulnerable to soil erosion.

10 Students should complete Student Handout 10A by drawing pictures or writing sentences about what they observed.

11 Clean up spilled soil. Save pans for the Application section.

Application: 30 minutes

Prep Use the three pans from the Exploration section.

1 Challenge students to predict what "rain" will do to the three "fields."

2 Distribute Student Handout 10B and ask students to draw what they predict will collect in each measuring cup. You may wish younger learners to make a prediction for just one pan, or to draw only what they see happen during the demonstration.

3 Select one student to tilt a pan—notch side down—as in the Exploration section. Select one student to hold the measuring cup just below the notch to catch the runoff.

4 Select a student or use the watering can yourself to "rain" onto the pan.

5 Repeat for each pan.

6 Allow the contents of the cups to settle. Help students read the marks on the cups to measure how much soil was lost from each pan. Measure the soil that has settled in the bottom of the cups, not the water or the organic matter that may float to the top.

7 Discuss the results of the demonstration. Guide students to understand that bare soil without any vegetation erodes the most, while soil with some vegetation remaining erodes the least, since plant roots hold soil in place.

8 Hold up the cup containing the most soil sediment and ask for ideas about where this sediment goes. (Answer: soil sediment may cover crops at the bottom of slopes, may be deposited in road ditches, may fill in lakes and swimming areas, may spoil fish, bird, and aquatic plant habitats, and may contaminate drinking water supply.)

9 Clean up the demonstration area. Collect all soil, water, and plant material in the bucket, then dispose of the waste material outside.

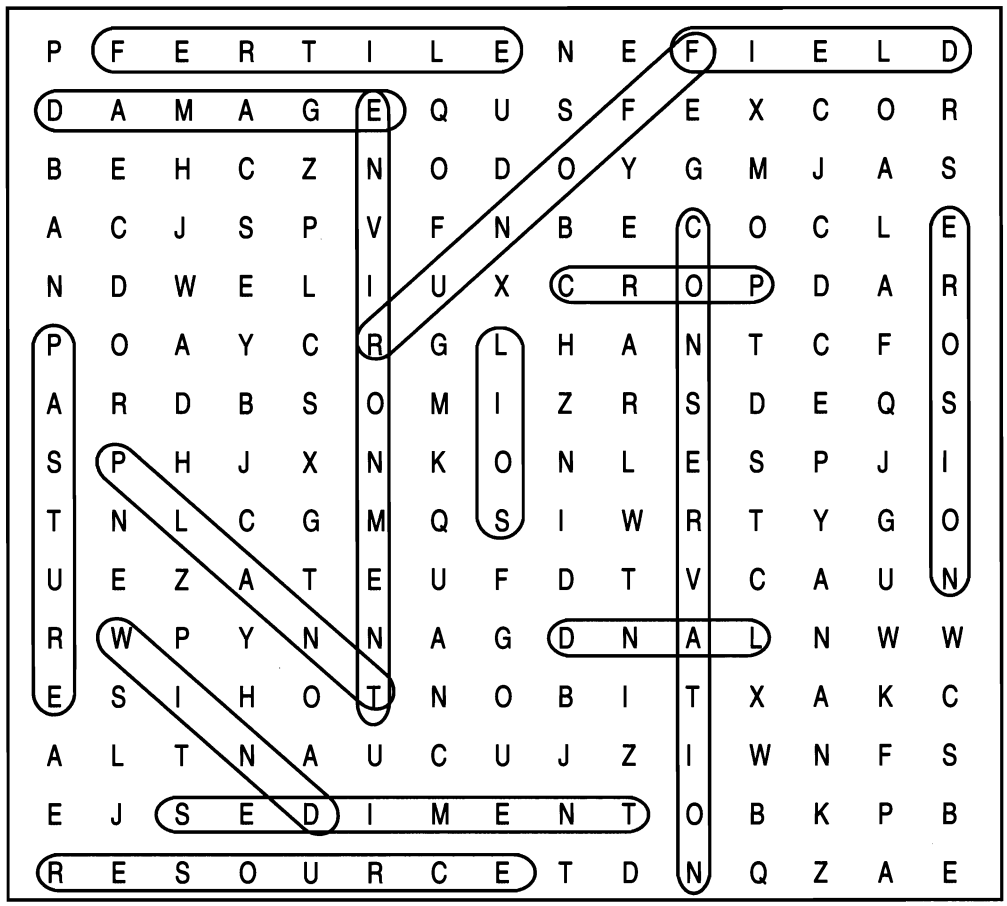
Evaluation: 15 minutes

To review the terms and concepts in this lesson, students can work on the word-find puzzle on Student Handout 10C. To make this more challenging for older students, don't provide a vocabulary list at the bottom of the page but instead provide clues about the word. Students fill in the blank with the correct word and then look for it in the word find. Answers to the puzzle are given in Figure 10.2.

Extensions: 15 minutes–1 hour each

- Take a conservation walk around your school yard to look for signs of erosion.
- Invite a conservationist to talk to the class about soil erosion. The conservationist may show students an area that has undergone corrective treatment, and explain the erosion treatment and its effects. If you need guidance, contact a soil conservationist at the Natural Resources Conservation Service (see Appendix B). In Lesson 11, students learn more about soil scientists and conservationists.

Figure 10.2. Answers to word-find puzzle.



Student 10A Handout

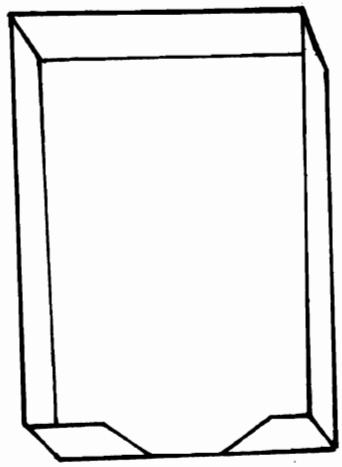
Name: _____

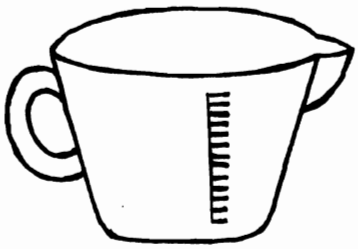
	Field Description	Prediction	Observation	Were You Correct?
1				
2				
3				

Student 10B Handout

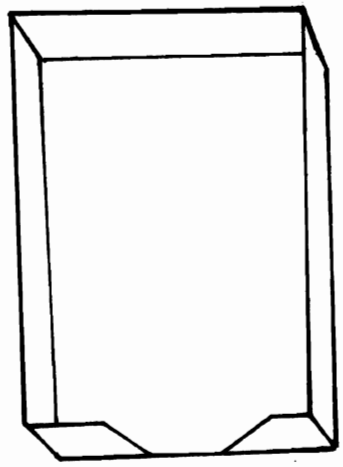
Name: _____

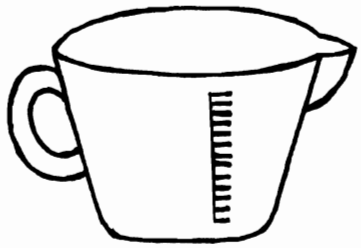
Field 1



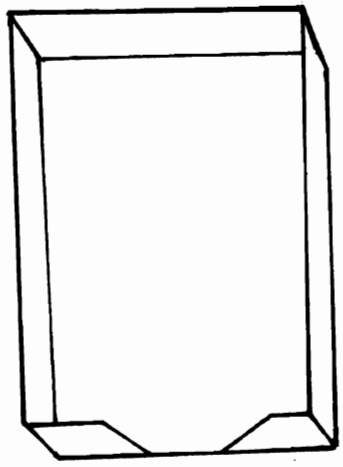


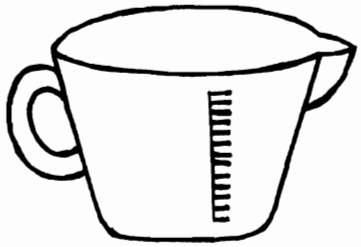
Field 2





Field 3





_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Student 10C Handout

Name: _____

P	F	E	R	T	I	L	E	N	E	F	I	E	L	D
D	A	M	A	G	E	Q	U	S	F	E	X	C	O	R
B	E	H	C	Z	N	O	D	O	Y	G	M	J	A	S
A	C	J	S	P	V	F	N	B	E	C	O	C	L	E
N	D	W	E	L	I	U	X	C	R	O	P	D	A	R
P	O	A	Y	C	R	G	L	H	A	N	T	C	F	O
A	R	D	B	S	O	M	I	Z	R	S	D	E	Q	S
S	P	H	J	X	N	K	O	N	L	E	S	P	J	I
T	N	L	C	G	M	Q	S	I	W	R	T	Y	G	O
U	E	Z	A	T	E	U	F	D	T	V	C	A	U	N
R	W	P	Y	N	N	A	G	D	N	A	L	N	W	W
E	S	I	H	O	T	N	O	B	I	T	X	A	K	C
A	L	T	N	A	U	C	U	J	Z	I	W	N	F	S
E	J	S	E	D	I	M	E	N	T	O	B	K	P	B
R	E	S	O	U	R	C	E	T	D	N	Q	Z	A	E

Find the following words related to soil erosion:

conservation
damage
crop
environment
erosion
fertile
field
land
pasture
plant
resource
runoff
soil
water
wind

LESSON 11

Soil Scientists

Lesson Description

Students learn how people in the community work to conserve natural resources.

Subjects

Art, Language Arts, Science, Social Studies

Teacher Background

This lesson shows students what *soil scientists* and other *conservationists* do. This lesson may be more meaningful to students if you invite professional conservationists to the classroom. If possible, follow class discussions by a trip to an outdoor conservation site.

Opportunities in *resource conservation* are numerous because no single science can accomplish the great task of conserving our nation's *natural resources*. Moreover, such environmental issues are now global concerns. "Think globally, act locally" has become the common call of people from many nations who are working or volunteering to protect the Earth.

Conservationists enhance the productivity, safety, and beauty of our world. The many types of conservation professionals include agronomists, botanists, cartographers, ecologists, economists, engineers, foresters, geologists, hydrologists, plant materials specialists, public affairs officers, recreation managers, soil scientists, and wildlife biologists.

Time

Prep: 30 minutes
Activities: 1 ¼–2 ¼ hours (not including Extensions)

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Topic: erosion
Go to: *www.scilinks.org*
Code: DIG11

Student Objectives

Students will be able to:

- identify what soil scientists do; and
- learn about resource conservation activities.

A visit from a soil scientist would be especially beneficial for the class to review the many kinds and uses of soil described in previous lessons (see Appendix B for information on contacting a soil scientist). Soil scientists inspect each soil horizon's slope, texture, color, structure, boundaries, thickness, and degree of erosion. To make accurate predictions of soil behavior, the soil scientist must learn all of the characteristics of a particular soil, because it is the unique combination of qualities that controls behavior. After collecting data, the soil scientist plots each sample site, identifies soil types, and outlines soils on aerial photos of the land. The finished work is a *soil survey* that helps farmers, ranchers, highway engineers, land use planners, homebuyers, and others decide how to use the land wisely.

Materials

For the Class

- Magazine photos of conservationists, scientists, farmers, etc.
- Poster paper or bulletin board
- Tape, glue, or pushpins

For Each Student Group

- Drawing paper
- Crayons, colored pencils, or markers
- Writing paper
- Pencil

Learning Cycle

Perception: 15 minutes

1 Discuss natural resources and resource conservation. Ask students for examples of natural resources and discuss why the resources are important.

2 Discuss the activities of conservationists, especially soil scientists.

Exploration: 15–30 minutes

Prep Cut out magazine photos of people working in conservation or on the land: conservationists, soil scientists, farmers, ranchers, wildlife biologists, botanists, engineers, ecologists, rangers, foresters, etc. Create a poster or bulletin board and label each picture.

1. Discuss the photos and the activities represented, and why they're important for the environment.
2. Ask students to think about these activities. Which activities would students personally like to do best?
3. Have students draw themselves involved in their favorite conservation activity. Ask students to add a caption describing what they're doing.
4. Create a conservation bulletin board with drawings from the class.

Application: 30 minutes–1 hour

Invite a farmer, soil scientist, or a conservationist to visit the classroom. Encourage students to prepare questions about the individual's activities. The resources list in Appendix B has more information on agencies and organizations involved in conservation.

Take younger learners on a field trip to a farm, nursery, or gardening center. You could also invite a gardener to come to class to give a demonstration on how to take care of a plant.

Evaluation: 15–30 minutes

Ask students to write thank-you notes to the visiting conservationist. In the letter, students should summarize some of the most important and interesting facts they learned from the visit and ask any other questions they might still have.

Extensions: 30 minutes–2 hours each

- Take a field trip to a conservation site. On a field trip to visit a soil scientist, for example, students can accompany the scientist to roadside cuts and pits to study soil.
- Encourage students to dress up as their favorite conservationists. Let students role play their part for the others to guess. This could be a special activity for parents' day.
- If appropriate for your class, students can research or write about a conservation activity.

LESSON 12

An Outdoor Learning Center

Lesson Description

With adults' help, students inventory the school site, develop plans, then create a garden. This will raise awareness among students, teachers, and parents about the natural environment and about using the school site for hands-on learning.

Subjects

Art, Language Arts, Mathematics, Science, Social Studies

Teacher Background

This lesson provides students and teachers with an ongoing opportunity for hands-on environmental education and *resource conservation.*

A readily accessible resource for teaching is the school site. An outdoor learning center (OLC) on the school site offers educators and students an exciting place to observe nature's happenings through the seasons. Right outside the classroom, the school site offers many opportunities to publicize conservation in the neighborhood by improving students' knowledge about and concern for the natural world. By implementing an OLC on the school site, the teacher can maximize teachable moments relating to the environment and *natural resources.*

Time

Prep: 2 hours minimum
Activities: 4 ½–10 hours (not including Extensions)

If your school or neighborhood already has an OLC, skip ahead to the "OLC Activities" section below.

Enlisting Assistance

Begin the planning process as early as possible. It is important to secure the school administration's permission and obtain support from the school's maintenance staff for your project. If you teach young children, find a teacher of older grades who shares your interest in the project. This teacher's students and yours can become teammates or buddies for the school project. Remember to start small: the project has a greater chance to succeed if original goals are modest and leave opportunity for growth. As members of the school community see the success of this first step, they may provide support for an OLC for the entire school.

If your school site project has the space and has been well planned, it may be easily adaptable for additional outdoor learning activities in continuing school years. If this idea is approved by the administration, you may tell students, parents, and other teachers that this project will be the first step in establishing an OLC on the school site—a place to do hands-on activities, learn about the environment, and participate with actual resource conservation projects. Remember that you are dealing with natural as well as human influences. Be prepared to explain limitations of the OLC, such as temperature, moisture, insects, wind, limited space, or the wrong soil. Learning from this year's activities can help create a more successful OLC next year.

There are many ways to solicit the equipment needed to create and maintain your OLC. Team up with a high-school agricultural program and share supplies.

Apply for a grant with a local or national gardening or environmental education association. Ask a landscape firm, local business, or government agency to donate tools (see the resources list in Appendix B).

Creating an OLC Garden

A common and effective school site activity is establishing a garden, which is an environment that students can manipulate. Students' planning, planting, and caring lead to the excitement of harvesting the rewards of their efforts. You can establish a vegetable or flower garden almost anywhere: in a large or small space, on a flat area or on a slope, in the shade or in full sunlight, on the school roof, or on a narrow strip of land between a parking area and the school building. Whichever area is used, the OLC garden will provide a venue for short- and long-term environmental learning.

To create a garden, first analyze the site. Students should observe and record the site's physical and environmental characteristics. This class survey will provide a starting point and will show the changes that take place over time. Document modifications to the OLC garden to provide a compete record. After the site has been analyzed, discuss planting, maintaining, and harvesting a garden. The class can then decide on the type of flowers or vegetables to grow, design the garden layout, and plant.

Materials

Actual materials required for this activity will depend on the needs identified through the inventory and planning. A soil survey will determine the soil type of the school site and help you select the correct vegetation. Use native plant species whenever possible, since they tend to require less water, weeding, and fertilizer

than exotic species. Be sure that none of the plants are invasive, especially if your site is near any natural areas. You can obtain this information from local soil and water conservation agencies (see the resources list in Appendix B).

This activity offers a valuable opportunity to stress safety with your students. Emphasize the correct way to use and treat tools. For days when your class will be working outside, ask students to wear pants and shirts with long sleeves to avoid insect bites and irritating plants. Teach students what poisonous plants look like and how to avoid such plants. It will help to find out in advance which students have insect and plant allergies, and take necessary precautions.

OLC Activities

The activity, observation, and records of an OLC should be continual, and should demonstrate interrelationships between humans and the rest of the natural world. Activities should be inquiry-based and lead to the resolution of issues.

The following suggestions for OLC activities focus on *conservation*, *beautification*, and wildlife *habitat* improvement:

- Adopt a section of the OLC, a playground, or a nearby stream. Remove all trash and keep the area clean.
- Plant trees or shrubs that shelter the school site from the wind.
- Plant flowers, trees, or grasses to stop soil erosion.
- Invite birds to your area by adding birdhouses near shrubs or trees that provide protection from predators and by choosing plants that provide food and shelter (see Figure 12.1).

Figure 12.1. Plants that provide food for wildlife.

Trees	Shrubs	Flowers
Oak	Viburnum	Cosmos
Black Walnut	Blueberry	Impatiens
Crabapple	Dogwood	Marigold
Maple	Lilac	Zinnia
Pine	Sumac	Phlox
Spruce	Pfitzer Juniper	Trumpetvine
Desert Willow	Ocotillo	Desert Baileya
California Buckeye	Desert Hackberry	California Poppy

Some of these plants may not be appropriate for your region. Avoid using non-native plant species.

- Create a butterfly garden by using plants and flowers that attract butterflies.
- Order vegetation native to your area and plant a natural landscape.
- Plant grass and trees that are valuable for shade, nesting, beauty, and that vary in color, texture, and shape.
- Adopt a special tree and note seasonal changes, animals that live in the tree, and outstanding characteristics of the tree using photos, drawings, and writing.
- Identify rocks or boulders on the site. Investigate the types of materials used to build the school and compare materials to the rocks on the site.
- Examine a rotting log to observe fungi, moss, and insects.

Student Objectives

Students will be able to:

- design and build an OLC garden;
- justify the importance of their school-site conservation activities; and
- explain some of the activities or events in the OLC garden.

- Record temperature, wind, or precipitation over time, and then graph the data.

You might begin by having students classify the environmental events that take place on the school site on a regular and seasonal basis. Students can pass records to succeeding classes to build an environmental history of the site. Over time, students might chart differences in rainfall, snowfall, temperature, growth and death of plants, or erosion. Older students could research the history of the school site. By analyzing history and environmental events through tables, graphs, and written logs, students will become more aware of the school site environment.

Materials

For the Class

- Posterboard
- Marker
- Local soil survey
- Plastic transparencies
- Overhead markers
- Gardening tools (e.g., hoes, rakes, spades)
- Work gloves
- Plants, trees, and shrubs
- Hose
- Camera (optional)

For Each Student Group

- Diagram of the school site
- Pencil
- Writing paper
- Drawing paper

Learning Cycle

Perception: 30 minutes–1 hour

1 Introduce students to the idea of an OLC.

2 Begin planning the project by brainstorming ideas for a garden. Let students lead by providing ideas and making notes on the board. What are the students' desires and concerns for the garden? Encourage students to discuss their ideas about planning and placement, and illustrate those ideas on the board and record them.

Exploration: 30 minutes–2 hours

Prep Sketch a simple diagram of the school site.

1. Take the class outside to map the school site. Distribute diagrams of the school site and have students record the physical characteristics of the site. For instance, you might ask students to map areas of bare soil, direct sunlight, vegetation, pavement, and buildings, and compare the slope of the ground in various places. To save time, you can assign each student group to map one characteristic of the site. Then transfer all the maps to clear transparencies and overlay the maps for an overview of the school site.

2. After students have created their maps, suggest to students how you will use this information to create a successful garden. Discuss how students' project ideas will work with the school site's available space. Adjust the plan, as ideas are accepted. This organizing session allows students to communicate, plan, and be responsible for the development of their own school site project.

3. To actively involve older students in the planning process, hold a contest to select the best plans for the garden. Divide students into groups of two or three and ask groups to draw up plans and materials lists of their ideas about what the garden should look like. A panel of teachers, administrators, maintenance staff, and older students choose the top three plans. The class then votes for its favorite plan out of the top three.

4. Using the class's suggestions, draw a plan of the garden on posterboard.

5 When the project has been finalized, type or print all relevant information and create the formal plan for the school site project.

Application: 3–6 hours

Prep Planning, organizing materials, getting permissions, and involving parents, students and school staff will take several hours. Be sure the adults don't take over the project; this should be a fun and exciting time for student discovery. Also, remember that there is no deadline—this project may never be finished. Ideally, the excitement generated by the school site project will encourage duplicate efforts in the school community and the community at large, starting with home gardens or other beautification activities.

1 Take the class outside and demonstrate the proper use of gardening tools.

2 Split students into small groups or pair students with older teammates/buddies.

3 Assign group roles and responsibilities. Some teams can begin planting while other groups sketch or list more ideas for the garden.

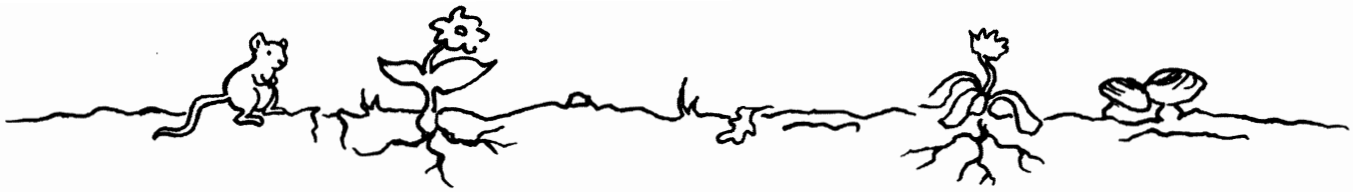
4 Every student should have the opportunity to do some type of gardening activity—raking, planting, etc. Such active participation gives students a sense of ownership for the program, and helps them develop a sense of belonging and personal satisfaction.

Evaluation: 30 minutes–1 hour

Evaluation should be an on-going process as the school site project is developed, and includes formal follow-up with students, parents, and other school staff. The students should be allowed to express suggestions for the next phase of the school site project.

Extensions: 30 minutes each, minimum

- Read a story from the Resources section (Appendix B) about planting a garden.
- As a class, discuss ideas for expanding the current school site project, develop a plan, and present it to the school administration.
- If an OLC is not possible at your school, identify and label the vegetation currently growing on your school campus. Students could also observe wildlife on your school grounds or in a nearby park.
- Students can grow vegetables or flowers in a garden, using stakes to identify each plant. Choose plants that will produce results before the school year ends.
- If you grow produce in your school garden, try these ideas:
  - ❒ Invite a parent to prepare some of the produce grown in the garden.
  - ❒ Give produce to the school cafeteria to use in a meal for students.



- ❒ Donate produce to a homeless shelter or soup kitchen.
- ❒ Allow students to divide and take home any produce or flowers.

- Each student can pick a plant in the garden and measure and graph its growth over time. Students could also draw the plant in various stages of growth, or through the seasons.
- Establish a nature trail on or near your school site.
- Take a field trip to a farm or a garden center to see how "big" gardens are planted and cared for, or invite a farmer or garden center employee to class to share expertise, experience, and perhaps some plant materials or tools with students.

APPENDIX A

Glossary

aeration = the process by which soil is supplied with air, such as when a farmer or gardener tills the soil

beautify/beautification = to make something (such as land) more attractive

bedrock = solid rock that underlies the soil; also called *parent material*

burrow = a deep, narrow tunnel in soil made by worms and other animals

castings = nutrient-rich worm excrement

clay = the smallest particle of soil, less than 0.002 millimeters in diameter

clayey soil = very fine soil; lumpy if wet but hard if dry

conserve/conservation = the wise use of natural resources to prevent damage, pollution, and waste, therefore extending the life of the resources for use by future generations. Scientists who work to protect natural resources are called *conservationists.*

cross section = a piece of something cut open so that the inside is visible

decomposition = biological and chemical breakdown of nutrients from dead plants and animals, including bacteria, fungi, and other microorganisms. Worms are *decomposers.*

desert = arid region with sparse vegetation and less than 25 centimeters of precipitation per year.

dirt = soil out of place in the human world; a pejorative use of "soil."

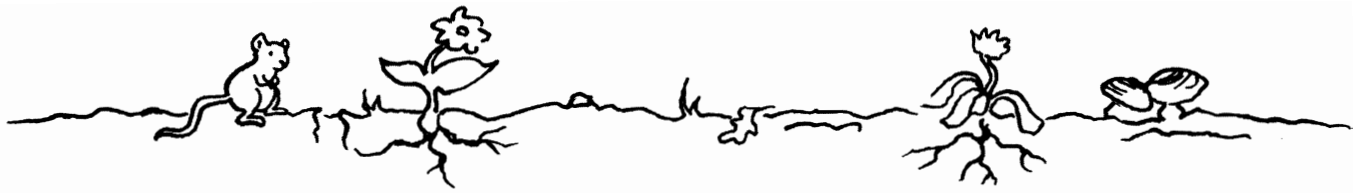
drought = a period of dryness that causes extensive damage to crops or prevents their successful growth

environment = the interaction of physical, chemical, and biotic factors (such as climate, soil, space, and living things) that affect an organism's ability to survive

erosion = loosening and movement of the solid material on the land surface by water *runoff*, wind, moving ice, and landslides. Erosion can also result from humans disturbing the soil.

fertile = capable of sustaining abundant plant growth, rich in nutrients

food = a substance that nourishes a living organism



food chain = a series of plant or animal species in a community, each of which is related to the next as a source of food; also called a food web.

forest = area covered with trees and woody plants

habitat = a place where plants and animals live, grow, and reproduce

humus = rich *organic matter* that results from the disintegration of dead animals, leaves, twigs, and fallen trees in the soil

landform = a natural feature of the land surface; characteristic of a *habitat.*

land use = the varied ways that public space is used, such as for residential property, businesses, government buildings, parks, or recreation areas

model = a simulation of a real-world scenario

mountain = area with high elevation, rock material, and steep slopes; a type of *landform*

natural resource = material found in nature and used by humans, such as trees, water, and oil

nutrient = raw material that provides food for organisms' (including humans') growth

organic matter = decomposed plant and animal material, found in and on soil, that provides nutrients for living organisms

parent material = the unconsolidated and more or less chemically weathered mineral or organic matter from which soil develops

photosynthesis = the formation of carbohydrates from carbon dioxide and water in the chlorophyll-containing tissues of plants exposed to light

planning commission = a group of people in a community who are responsible for planning how the land in the area will be used

pollution = a condition, caused by substances in Earth's air, water, and soil, that reduces the quality of the *environment* for life

pore spaces = small spaces between soil grains that are filled with air and water

prairie = rolling or level grasslands with few trees and medium rainfall

resource = something that an organism must obtain from its *environment* to survive. Resources for animals include food, air, water, and shelter.

resource conservation = the preservation and protection of Earth's *natural resources*

runoff = water from precipitation that is not absorbed but flows over the land, carrying *sediment* and other materials to streams, lakes, and other bodies of water

sand = the largest particle of soil, between 0.05 and 2.00 millimeters in diameter

sandy soil = soil with sandy particles (larger and grittier than *silty soil*)

scavenger = an animal that feeds on dead animal matter or refuse

sediment = earth material carried by water from eroding areas of the land. Sediment can clog rivers and streams, destroy wildlife habitat, and pollute water supplies.

silt = the medium-sized particle of soil, between 0.002 and 0.05 millimeters in diameter

silty soil = soil with a high content of silt-sized particles; generally darker and looser than *sandy* or *clayey soil.*

soil = the collective term for the natural bodies of earthy materials that cover much of the Earth's surface; a complex combination of mineral and organic materials

soil scientist = someone who studies the types and properties of soil

soil survey = a map of the soil types in a particular region; a science-based inventory of the distribution and properties of soils and factors affecting the soil environment. Soil surveys include predictions of soil behavior related to selected *land uses* in an urban, agricultural, or natural environment, and the impact of land uses on these environments.

texture = the characteristic proportion of *sand*, *silt*, and *clay* in a particular soil

water erosion = the detachment and movement of soil by water

weathering = the breakdown of rocks and sediment at or near the Earth's surface due to biological, chemical, or physical actions

wetlands = a transitional area between water and land that is saturated long enough to support very moist soils and plants that grow in water

wind erosion = the detachment and movement of soil by wind