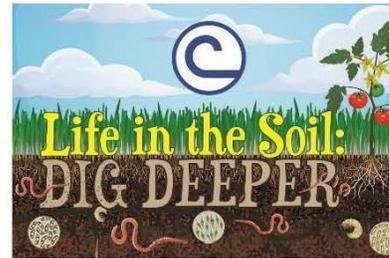


Level 1 Grades K-1st

Soil is Alive!

WE ALL  
NEED  
SOIL!!!

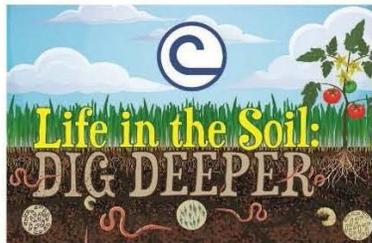


Level 2 Grades 2-3

I'll be  
Soil Hero!

HEALTHY SOIL =  
HEALTHY PLANTS =  
HEALTHY FOOD =  
Healthy you

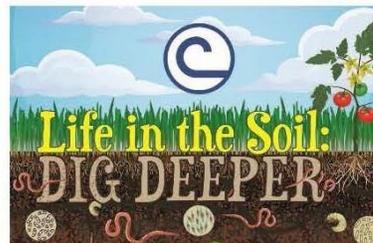
## EDUCATORS GUIDE



Level 3 Grades 4-5

Where Does  
Soil Come From?

Soil Matters!



Level 4 Grade 6 & Up

I ❤️ SOIL

SOIL+WATER=CLOTHING,  
FOOD & MORE!



National Association of  
Conservation Districts (NACD)  
509 Capitol Court NE  
Washington, DC 20002-4937  
P: (202) 547-NACD (6223)

E-mail: [stewardship@nacdn.net](mailto:stewardship@nacdn.net)  
Web: [www.nacdn.net/general-resources/stewardship-and-education-materials/2019-life-in-the-soil-dig-deeper/](http://www.nacdn.net/general-resources/stewardship-and-education-materials/2019-life-in-the-soil-dig-deeper/)  
NACD Marketplace: [www.nacdstore.org](http://www.nacdstore.org)

Teresa D. Southerland— NACD Text & Activity Writer

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### Stewardship program educator's guide online version

You can download this PDF  
educators guide from the NACD  
website.

[www.nacdn.net/general-resources/stewardship-and-education-materials/2019-life-in-the-soil-dig-deeper/](http://www.nacdn.net/general-resources/stewardship-and-education-materials/2019-life-in-the-soil-dig-deeper/)

The online version of this booklet will  
be updated as needed to bring you  
the most current information.

Visit the NACD Marketplace to  
download "Life in the Soil: Dig  
Deeper" materials.  
[www.nacdstore.org](http://www.nacdstore.org)

### Special thanks to "Life in the Soil: Dig Deeper" reviewers

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Riverside, CA

**Debbie Ruff**, Livingston County Soil & Water Conservation District,  
Pontiac, Illinois

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**Toby Rodgers**, USDA-NRCS—WA

*And the many educators in the development and reviewers  
of the materials.*

Please submit information to share with others on your successful stewardship programs or conservation education activities.

[stewardship@nacdn.net](mailto:stewardship@nacdn.net)

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## NACD Stewardship and Education Committee 2017-2019

### Members

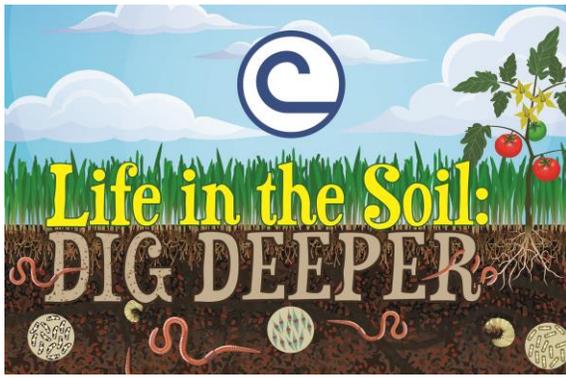
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Stewardship and Education  
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South Central Region  
Representative



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National Association of Conservation Districts

Conservation districts are local units of government established under state law to carry out natural resource management programs at the local level.

NACD's mission is to serve conservation districts by providing national leadership and a unified voice for natural resource conservation. The association was founded on the philosophy that conservation decisions should be made at the local level with technical and funding assistance from federal, state and local governments and the private sector. As the national voice for all conservation districts, NACD supports voluntary, incentive-driven natural resource conservation programs that benefit all citizens.

NACD maintains relationships with organizations and government agencies; publishes information about districts; works with leaders in agriculture, conservation, environment, education, industry, religion and other fields; and provides services to its districts. NACD is financed primarily through the voluntary contributions of its member districts and state associations.

The association's philosophy is that conservation decisions should be made by local people with technical and funding assistance from federal, state and local governments and the private sector. The association's programs and activities aim to advance the resource conservation cause of local districts and the millions of cooperating landowners and land managers they serve.

Visit [www.nacdnet.org](http://www.nacdnet.org) for additional information.  
To find your local district contact information, go to

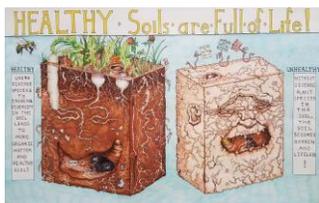
<http://www.nacdnet.org/general-resources/conservation-district-directory/>

### STEWARDSHIP WEEK INFORMATION

NACD has sponsored Stewardship Week since 1955. 2019 marks the 64th year to celebrate NACD Stewardship Week.

Education is a critical element of the conservation effort at the local, state and national levels. Educating youth ensures that the next generation will be wise stewards of America's natural resources. Helping today's adults and youth understand the need for effective conservation practices builds on the conservation legacy. Through NACD's Stewardship and Education efforts, we help districts and communities extend the reach of their education programs.

Stewardship Week, celebrated annually between the last Sunday in April and the first Sunday in May, reminds us of our individual responsibilities to care for the natural resources upon which we all depend.



#### NACD/Auxiliary POSTER CONTEST

2019 Poster Contest Theme  
**Life in the Soil: Dig Deeper**

You can find a Promotional PowerPoint and all the forms and rules online and ideas for the 2019 theme at: <http://www.nacdnet.org/general-resources/stewardship-and-education-materials/contests/>

Each state will have their own timeline and rules.

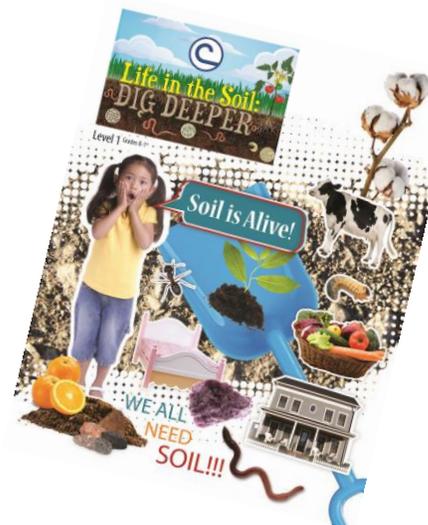
#### NACD/Auxiliary PHOTOGRAPHY CONTEST

Entries are due December 1st of each year.  
Youth & Adult Categories  
Photo entry contest form and rules can be found online at:

<http://www.nacdnet.org/general-resources/stewardship-and-education-materials/contests/>



## Level 1-Grades K-1 Life in the Soil: Dig Deeper



### Booklet Objectives

Students will:

- Familiarize themselves with the ways they interact with soil on a daily basis.
- Differentiate between living and nonliving components of soil.
- Realize the connection between soil and items such as food, furniture, etc.
- Explain the role of parent materials in soil formation.
- Recognize that soils can be many different colors due to rock and mineral content.

### Next Generation Science Standards

#### Disciplinary Core Ideas

#### PHYSICAL SCIENCES

PS3B: Conservation of Energy and Energy Transfer

#### LIFE SCIENCES

LS1A: Structure and Function

LS1B: Growth and Development of Organisms

LS1C: Organization for Matter and Energy Flow in Organisms

LS1D: Information Processing

LS3A: Inheritance of Traits

#### EARTH AND SPACE SCIENCES

ESS2D: Weather and Climate

ESS2E: Biogeology

### Vocabulary Words



Filter — soil is a porous material and as water passes through it impurities can be removed.

Mineral — naturally occurring substance that is not made of animal or vegetable matter and must be ingested by animals and/or plants in order to remain healthy.

Parent materials — the geologic material from which soil horizons form.

Soil — The top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter and living organisms such as bacteria and fungi.

## Soil, Soil Everywhere

### Activity Objectives

Students will:

- Use the senses of sight, smell and touch in their observation of soil.
- Relate different soil types to parent materials.
- Discuss the correlation between their daily lives and soil.
- Name individual letters of the alphabet.

### Materials

- one or more containers of soil
- bag to hold letters of alphabet
- individual alphabet letters (provided with this activity—see page 21-23 of this guide)
- small popsicle sticks
- tape

### Discussion

Define “soil” for students; the top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter and living organisms such as bacteria and fungi. Discuss with students the fact that many different soil types exist due in part to soil parent materials; the geologic material from which soil horizons form. Talk about how they interact with soil on a daily basis (see examples included with activity).

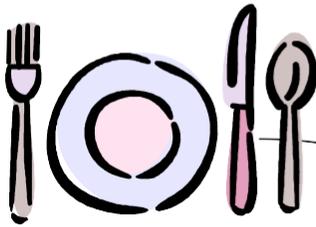
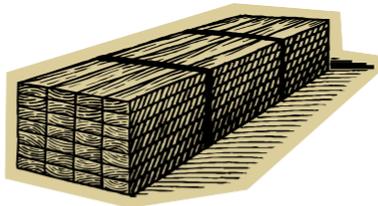
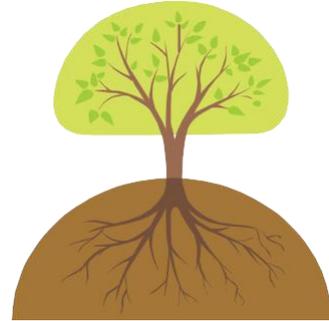
### Instructions

1. Place one or more containers of soil on a table in the front of the class room.
2. Allow students to come forward in small groups to observe, touch, and smell the soil.
3. Invite student comment and discussion on soil texture, color and smell. Point out to students that there can be many types of soils and that the soil in their yards, parks and neighborhoods may look, smell, and feel different due on part to parent materials.
4. Place individual letters of the alphabet into a bag or other container. Allow each student to draw out one letter.
5. Instruct the students to name the letter they picked, and name one thing related to soil that starts with that letter (examples provided page 23 of this guide). All classroom members should be invited to help each student complete this task. Once each letter is named and related to soil student can tape the letter to a popsicle stick and insert it into the container of soil located at the front of the classroom.



# Soil, Soil Everywhere

Draw a line to connect the three pictures that go together.



Trace the words and the sentence.

bed      wood      tree

milk      cow      grass

plate      food      farmer

We use soil every day.

## Level 2 Grades 2-3 Life in the Soil: Dig Deeper

### Booklet Objectives

Students will:

- Identify the connection between the five senses and the comfort of their living environment.
- Recognize that many living organisms make their home in soil.
- Realize the connection between soil and their daily activities.
- Acknowledge that healthy soil is directly related to their own healthy lifestyles.
- Identify ways to conserve and improve soil health.



### Next Generation Science Standards

#### Disciplinary Core Ideas

#### PHYSICAL SCIENCES

PS1A: Structure and Properties of Matter

#### LIFE SCIENCES

LS1B: Growth and Development of Organisms

LS2A: Interdependent Relationships in Ecosystems

LS2C: Ecosystems Dynamics, Functioning and Resilience

LS3A: Inheritance of Traits

LS4C: Adaptation



### Vocabulary Words

Compost—decayed organic matter that can be used to enrich soil.

Decompose—to break down organic matter from a complex to a simpler form.

Mineral—an inorganic substance that occurs naturally in rocks and soil that is needed by animals and plants in order to remain healthy.

Natural Resources—resources produced by nature. Usable resources that are not manmade.

Organic Matter—decaying plant or animal material. Organic matter improves soil health.

Organism—a living thing, such as a plant, animal, or bacterium.

Photosynthesis—a process by which green plants use energy from the sun to turn carbon dioxide and water into carbohydrates and oxygen.

Soil—the top layer covering most of the Earth's land surface, consisting of the unconsolidated products of rock erosion and organic decay, along with living organisms such as bacteria, fungi and insects.

## Life in One Square Inch

### Activity Objectives

Students will:

- Realize the role of observation in the scientific process.
- Use a ruler to make precise measurements.
- Closely observe a soil sample.
- Record and discuss observations.

### Materials

- one index card per student
- one ruler per student
- one pair scissors per student
- one toothpick per student
- one magnifying glass per student
- one “Life in One Square Inch” activity sheet per student



### Discussion

Discuss with students how important observation is in the scientific process. It is the first step used by many scientists and researchers every day. Inform students that they will be observing a small sample of soil. Discuss the day’s weather and how it may relate to soil temperature and texture, for example; hot/cold, damp/dry, etc.

Make students aware that THOUSANDS of living organisms can be found in one square inch of soil! Challenge them to find as many signs of life as possible.

### Instructions

1. Instruct students to use their rulers to draw a one inch square in the center of their index card.
2. Demonstrate for students how to fold the card in half with the fold in the center of the square and cut along the line they have drawn to end up with a one inch square cut out.
3. Option 1: Take students outside and instruct them to place their index card on top of soil and observe it closely. Record observations on “Life in One Square Inch” activity sheet.  
Option 2: Provide soil samples for students to observe in the classroom. Insure that the soil is from a garden, yard, etc. Potting soil or other packaged soil will not have the quantity of observable living organisms as that obtained directly from a natural environment. Record observations on “Life in One Square Inch” activity sheet.
4. Explain to students that after they have observed the soil and recorded their findings they can use a toothpick to gently look just below the surface of the soil within their observation window.
5. Follow up with a class discussion, first in groups, then with the entire class on student observations. Generate a list of living organisms observed in the soil.



# Life in One Square Inch

## INSTRUCTIONS

1. Using your ruler draw a square one inch in diameter in the center of your index card.
2. Fold the card in half and cut on the line you have drawn so that you have a one inch square opening in your index card. This open square is your **observation window**.

Place your **observation window** on soil and take a close look.

What are the first three things you see?




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How many different colors can you see in the soil? \_\_\_\_\_

What is the texture of the soil like? Are the soil particles very small and fine like powder?

Are they like sand? Do you see any small pieces of rock?

Describe the texture of the soil.



**Draw what you see in the box.**

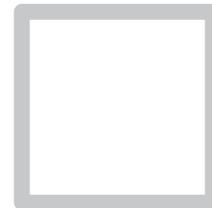
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Hold a magnifying glass over your **observation window**.

What are three new things that you could not see without the magnifying glass?

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How many living organisms can you see? \_\_\_\_\_

**Draw one of the living organisms you see in the box.**



Are there any roots from grasses or other plants living in the soil?

Gently explore the soil with a toothpick.

How is the soil different below the surface?



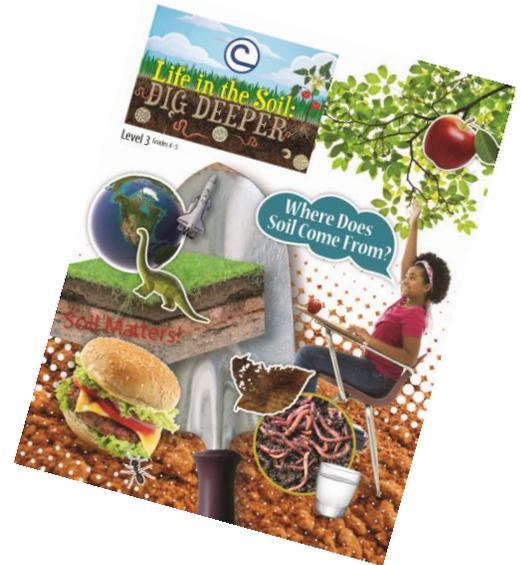
## Level 3 Grades 4-5

### Life in the Soil: Dig Deeper

#### Booklet Objectives

Students will:

- Recognize that millions of organisms are living in the soil around them.
- Relate classifications of soil organisms to their function within the soil.
- Appreciate the benefit of soil and soil organisms to humans.
- Identify the structure and function of soil horizons.
- Investigate soil survey map to determine local soil types.
- Comprehend the factors involved in soil formation.



#### Next Generation Science Standards

##### Disciplinary Core Ideas

##### PHYSICAL SCIENCES

PS1A: Structure and Properties of Matter

PS2B: Types of Interactions

PS3D: Energy in Chemical Processes and Everyday Life

##### EARTH AND SPACE SCIENCES

ESS2A: Earth Materials and

Systems ESS2E: Biogeology

ESS3A: Natural Resources

ESS3C: Human Impacts on Earth Systems

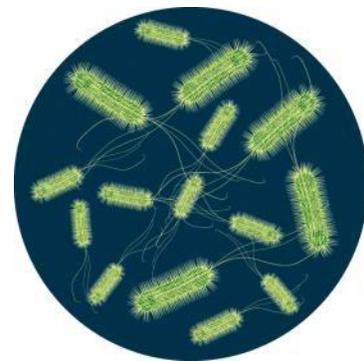
##### LIFE SCIENCES

LS1A: Structure and Function

LS1C: Organization for Matter and Energy Flow in Organisms

LS2A: Interdependent Relationships in Ecosystems

LS2B: Cycles of Matter and Energy Transfer in Ecosystems



#### Vocabulary Words

Arthropod—an invertebrate with jointed limbs, a segmented body, and an exoskeleton.

Bacteria—single celled microorganism without membrane-enclosed organs.

Fungi—organisms with nuclei that are not mobile and live as parasites.

Mineral—naturally occurring substance that is not made of animal or vegetable matter and must be ingested by animals and/or plants in order to remain healthy.

Nematode—a worm with a non-segmented body protected by a tough outer skin.

Protozoa—a single-celled organism that can move and feeds on organic compounds of nitrogen and carbon.

Topography—the mapping of the features on the surface of an area of land such as mountains, rivers, etc.

## Hey Teacher! We Shrank Ourselves!

### Activity Objectives

Students will:

- Describe the function of specific soil organisms.
- Analyze the relationships between living organisms within the soil environment.
- Identify the benefits to humans and each other of soil organisms.
- Evaluate a soil food web.



### Materials

- one copy of “Life in the Soil: Dig Deeper” Level 3 per student or group of 3-6 students.
- “Hey Teacher! We Shrank Ourselves” worksheet for each student
- a single teaspoon of soil

### Discussion

Discuss with students the multitude of living organisms in the soil beneath their feet. Review the beneficial functions of the organisms discussed in “Life in the Soil: Dig Deeper” Level 3 as well as any other interesting soil organisms your class has studied.

Make the connection between living organisms and food webs. A food web illustrates how nutrition and energy is transferred among the living organisms in an ecosystem. A food web may include several food chains that interact with each other. Draw/ illustrate a soil food web as your classroom discussion unfolds.

### Instructions

1. Distribute copies of the “Hey Teacher! We Shrank Ourselves” worksheet. Inform students that during this activity they will imagine themselves “shrunk” to the size of a soil organism. For the purpose of this activity they can choose to be one of the following: BACTERIA, FUNGI, PROTOZOA, NEMATODE, ARTHROPOD or EARTHWORM.
2. If students are working in groups each member of the group should choose a different soil organism to be “shrunk” to.
3. As students progress to question number “5” on the worksheet present them with the teaspoon of soil so that they will be better able to imagine how miniscule some of the organisms living in the soil are. Discuss with them the fact that up to 100 billion organisms can be living in that one teaspoon of soil!
4. As an extension activity soil organisms found in specific ecosystems, such as swamps or deserts, could be evaluated.

# Hey Teacher! We Shrank Ourselves!

1. Decide which of the following you would like to be for this activity and circle it:

**BACTERIA    FUNGI    PROTOZOA    NEMATODE    ARTHROPOD    EARTHWORM**

2. Draw a picture of your “new” self in the box.

3. Describe your function as a soil organism.

\_\_\_\_\_

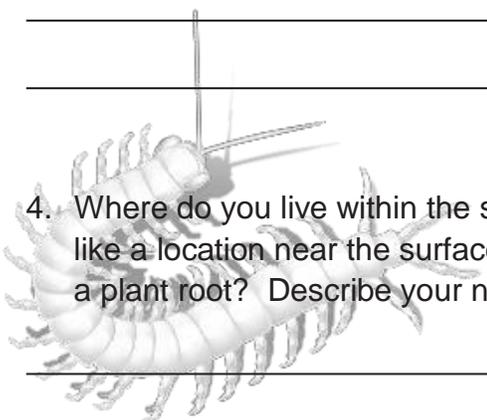
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



4. Where do you live within the soil? Do you move around or do you stay in one place? Do you like a location near the surface or do you prefer living a little deeper, maybe you like dwelling on a plant root? Describe your new home. \_



5. There is an active food web in the soil. Life in the soil can be a world of eat or be eaten! Are you a hungry parasite like fungi who has to lay traps for food since you don't move around much or a speedy bacteria trying to outrun a protozoa? Since just **ONE TEASPOON** of soil can hold between **100 million** and **1 billion** bacteria and other organisms... who do you need to watch out for? What other living organism in the soil might enjoy having you for an afternoon snack?

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

\_\_\_\_\_

Fill in the blanks with words found in the puzzle above. Circle the words as you find them. Words can run forward, backward, up, down or diagonally.

Most bacteria are \_\_\_\_\_. They can convert organic matter into energy for other soil organisms to use.

\_\_\_\_\_ like to eat bacteria! They also release \_\_\_\_\_ into soil for plants to use.

Nematodes help control disease and make \_\_\_\_\_ available to other organisms.

Arthropods don't have a \_\_\_\_\_ but they still manage to aerate the soil and shred organic matter!

\_\_\_\_\_ recycle nutrients and improve the soil as they burrow through.

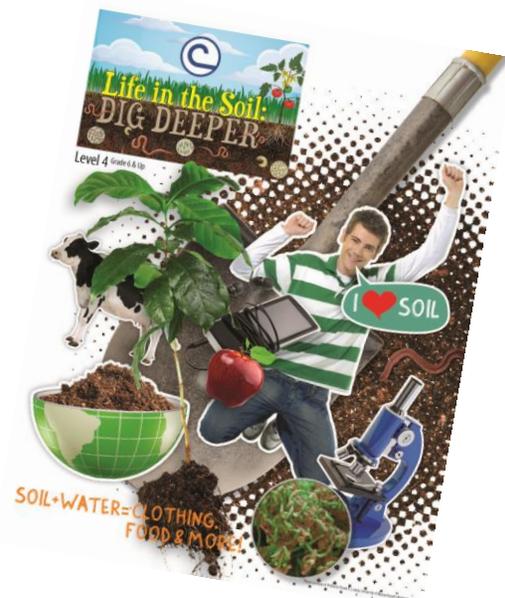
## Level 4 Grades 6+

### Life in the Soil: Dig Deeper

#### Booklet Objectives

Students will:

- Explain the role of soil microbes.
- Distinguish the difference between types of soil microbes.
- Recognize the involvement of soil in most aspects of daily life.
- Comprehend the value of healthy soil.
- Identify the structure and function of soil profiles.
- Summarize the usefulness of a soil profile as a tool to determine soil fertility.
- Describe the horizons within a soil profile.



#### Next Generation Science Standards

##### Disciplinary Core Ideas

##### PHYSICAL SCIENCES

MS-PS1: Matter and its Interactions

##### EARTH AND SPACE SCIENCES

MS-ESS2 Earth's Systems

MS-ESS3 Earth and Human Activity

##### LIFE SCIENCES

MS-LS1 From Molecules to Organisms: Structures and Processes

MS-LS2 Ecosystems: Interactions, Energy, and Dynamics



#### Vocabulary Words

Actinomycetes - a rod-shaped or filamentous bacterium belonging to a large group that includes some that cause diseases and some that are the sources of antibiotics

Aluminum - a metallic chemical element in the boron group that can be used in the manufacture of construction materials, antiperspirants and corrosion resistant materials.

Aquifer - a layer of permeable rock, sand, or gravel through which ground water flows, containing enough water to supply wells and springs.

Bacillus thuringiensis - a Gram-positive, soil-dwelling bacterium, commonly used as a biological pesticide.

Coltan—a metallic ore that is mined out of the soil and is then refined into a heat-resistant powder.

Geobacter - an anaerobic respiration bacterial species which have capabilities that make them useful in bioremediation.

Microbe - a microscopic organism.

Motherboard - the main circuit board of a computer.

Organic - derived from living things.

Soil horizon - distinct layer of soil having similar properties such as color, texture and permeability.

Soil Profile—a vertical section through the soil which reveals its layers (horizons).

## Digging Deeper and Building Better

### Activity Objectives

Students will:

- Utilize a soil survey to investigate local soils.
- Identify and describe soils found in the county in which they live.
- Recognize the connection between soil types and land use.
- Choose a suitable development project based on soil type.

### Materials

- Printed soil survey or access to the internet for the purpose of soil survey research.
- “Digging Deeper and Building Better” student worksheets (pg. 17)
- Poster board and misc. art supplies for each group of 3-5 students.

### Discussion

- ◇ There are more than 70,000 types of soil on Planet Earth. The type of soil is very important when decisions are made in regards to land development.
- ◇ Review some of the ways we use soil in our everyday lives and discuss with students the value of making the right decisions in regards to land development.
- ◇ Discuss the properties of soil as it relates to land development, for example;
  - suitability for crops or other agricultural pursuits
  - presence of bedrock that could hinder excavation
  - permeability for proper septic systems and waste management
  - stability issues for structures and/or foundations
  - possible slope, erosion or flooding hazards.
- ◇ Describe the function of a soil survey: A soil survey is a report on the soils of an area. The soil survey has maps with soil boundaries and photos, descriptions, and tables of soil properties and features. Soil surveys are used by farmers, real estate agents, land use planners, engineers and others who desire information about the soil resource.
- ◇ Contact your local Soil and Water Conservation District or USDA Natural Resources Conservation Service (NRCS) office for information on the soils in your county and a possible classroom presentation and/or printed soil survey information or allow students to research soil types in their area by utilizing the Natural Resources Conservation Service website at: or <http://websoilsurvey.nrcs.usda.gov/> or [http://soils.usda.gov/survey/online\\_surveys/](http://soils.usda.gov/survey/online_surveys/)

### Instructions

1. Do an internet search for undeveloped land located in or near the county in which your school is located for students to “develop”.
2. Divide students into groups and assign them the task of investigating the characteristics of the soils found in their assigned area through printed materials available at your county’s conservation district office <http://www.nacdnet.org/general-resources/conservation-district-directory/> or through a soil survey via the internet. <http://websoilsurvey.nrcs.usda.gov/> or [http://soils.usda.gov/survey/online\\_surveys/](http://soils.usda.gov/survey/online_surveys/)
3. Inform the students that their individual groups will be given the opportunity to develop the land for the benefit of the community and that they will present a proposal for the project they choose. Possible development projects; farm and/or ranch, theme park, sports stadium, factory, residential housing, city park and pool, or a shopping mall.
4. Each group of students should complete the “Digging Deeper & Building Better” worksheets and use poster board to prepare a “presentation” of their project proposal.
5. Each group is to present their project proposal to the class. After all proposals have been presented, invite class discussion and finish with a class vote on the project most beneficial to the community.



# Digging Deeper and Building Better

A soil survey is a report on the soils of an area. The soil survey has maps with soil boundaries and photos, descriptions, and tables of soil properties and features. Soil surveys are used by farmers, real estate agents, land use planners, engineers and others who desire information about the soil resource.

**Natural Resources Conservation Service (NRCS)**

What is the location of the undeveloped land you are investigating?

\_\_\_\_\_

A soil **series** is a group of soils with similar characteristics. A **series** is usually named after the town, or geographic feature, where a soil scientist first saw the soil.

According to the soil map or soil survey name one soil that can be found at this location: \_\_\_\_\_

**Choose, as a group, one of the following development projects:**

- farm and/or ranch
- theme park
- sports stadium
- factory
- residential housing
- city park and pool
- shopping mall

How was this soil formed?

\_\_\_\_\_

List three characteristics of this soil:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

KEEPING SOIL CHARACTERISTICS IN MIND, what development project has your group chosen for the undeveloped land you are investigating?

\_\_\_\_\_

List four reasons you feel this is the best development for this particular location and soil type:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

How will your community benefit from this development project?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Draw a picture of what the site will look like once it has been developed.



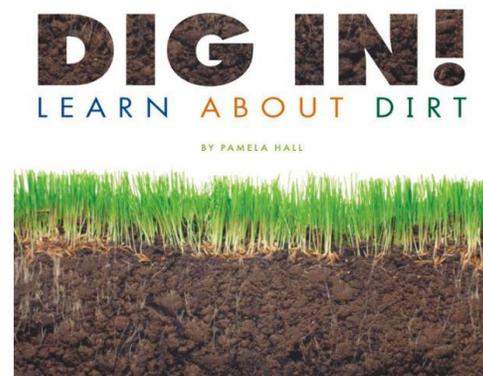
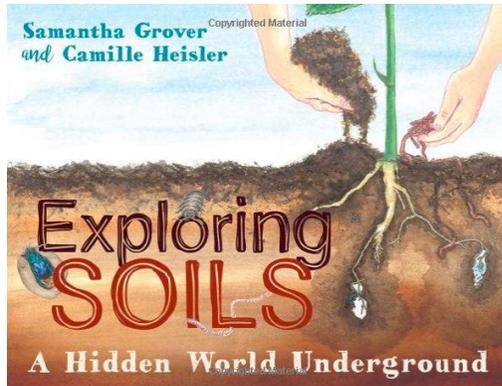
# Literature Connections

These are just a few of the wonderful books on the topic of soils. Be sure to add these to your library list at your school or local library. Ask guest readers to come into your school and read one of these books on soil and share an activity. Books about natural resources are a great addition to any personal, school or public library.

<u>Book Name</u>	<u>Age Range</u>	<u>ISBN</u>	<u>Author</u>
Dirt: The Scoop on Soil	Gr K-4	1404800123	Natalie M. Rosinsky
A Harvest of Color: Growing a Vegetable Garden		978-1929927319	Melanie Eclare
A Log's Life		978-1416934837	Wendy Pfeffer
From Garbage to Compost	4 – 7	978-1512412994	Lisa Owings
Dirt Don't Hurt	4 - 7	978-1480817166	Vikki Franklin
Dig In!: Learn about Dirt	4 and up	978-1602535077	Pamela Hall
A Place to Grow		978-1931969079	Stephanie Bloom
An Earthworm's Life	Age 4-8	978-0516265353	John Himmelman
Life in a Bucket of Soil	Age 4-8	978-0486410579	Alvin Silverstein, Virginia Silverstein
Dirt: Jump Into Science	Age 4-8	978-0792282044	Steve Tomecek
How We Use Soil	Gr 4-8	978-1410906069	Carol Ballard
Is Soil All the Same? (Down & Dirty)	Age 5 and up	978-1627248365	Ellen Lawrence
Earthworms Life	Age 5 and up	978-0516265353	John Himmelman
Curious About Worms (Smithsonian)	Age 6 and up	978-1486305001	Samantha Grover
Exploring Soils: A Hidden World	Age 6 and up	978-0451533692	Kate Waters
Life in the Soil	Age 7 and up	978-1410301246	John Farndon
How Groundhog's Garden Grew		978-0439560658	Lynne Cherry
What's in the Soil?	Age 7 and up	978-1474706087	Martha E H Rustad
Juniors Soil	Age 7 and up	978-1410303110	Elaine Pascoe
Different Kids of Soil	Age 8 and up	978-0778754138	Molly Aloian
Under the Microscope : Earth's Tiniest	Age 8 and up	978-1541940208	Baby professor
Experiments with Soil	Age 8 and up	978-1432953690	Christine Taylor-Butler
Lily's Garden		978-0761326533	Deborah Kogan Ray
Wonder Waste: A Book on Composting	Age 9-12	978-8179936528	Tirna Ray
A Handful of Dirt	Age 9-12	978-0802786982	Raymond Bial



# Literature Connections



<b><u>Book Name</u></b>	<b><u>Age Range</u></b>	<b><u>ISBN</u></b>	<b><u>Author</u></b>
Soil	Gr K-4	736809546	Adele D. Richardson
Materials Soil	Age 4 and up	978-1432916329	Cassie Mayer
Microlife that lives in Soil	Age 4 and up	978-1410918512	Steve Parker
Jump into Science: Dirt	Age 4 and up	978-1426300899	Steve Tomecek
From Soil to Garden	Age 4 and up	978-1512413021	Mari Schuh
Toil in the Soil	Age 4 and up	978-0761318071	Michelle Myers Lackner
Soil Basics	Age 4 and up	978-1429671101	Mari Schuh
Using Soil	Age 5 and up	978-1403493217	Sharon Katz Cooper
The Amazing Dirt Book	Age 6 and up	978-0201550962	Paulette Bourgeois
Soil	Age 7 and up	978-0822566229	Sally Walker
Explore Soil!: With 25 Great Projects	Age 7 and up	978-1619302952	Kathleen M. Reilly
Soil and Water	Age 8 and up	978-0766027350	Robert Gardner
Micro Life In Soil	Age 8 and up	978-0778754152	Natalie Hyde
Super Cool Science Experiments: Soil	Age 8 and up	978-1602795266	Vickie Franchino
Super Soils	Age 8 and up	978-1604537475	Christine Petersen
Rocks and Soil	Age 8 and up	978-1499431537	Peter Riley
You Wouldn't Want to Live Without	Age 8 and up	978-0531224380	Ian Graham
Soil (True Books: Natural Resources)	Age 9-12	978-0516293684	Christin Ditchfield
The World Beneath Our Feet: A Guide to Life in the Soil	Age 9-12	978-0195139907	James B. Nardi



# Resources



## Nutrients for Life Foundation

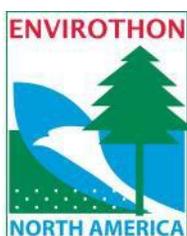
<https://www.nutrientsforlife.org/>

**For Teachers (Curriculum)**

**For Students (Games)**

**For Everyone (Information)**

**For Communities (Programs)**



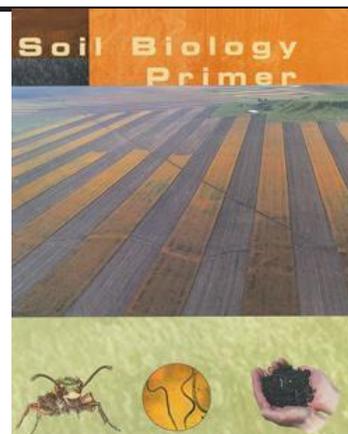
**North  
American  
Envirothon**

<http://www.envirothon.org/>

<http://www.envirothon.org/the-competition/curriculum-guidelines>

The Soil Biology Primer an introduction to the living component of soil and how it contributes to agricultural productivity and air and water quality. The Primer includes chapters describing the soil food web and its relationship to soil health and chapters about soil bacteria, fungi, protozoa, nematodes, arthropods, and earthworms.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/biology/>



## USDA—NRCS

### Natural Resources

### Conservation Service

### Unlock the Secrets – Soil Health

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/>



## IL USDA—NRCS

**Claude—Scoop on soil computer game.**

**Lesson plans and more**

<http://urbanext.illinois.edu/soil/>

**Dr. Dirt's K-12 Resources &**

**Activities**

Variety of soils demonstrations and activities

<http://www.doctordirt.org/>

## Coloring pages

**I heart Soil** — Soil Science Society of America

<https://www.soils.org/files/iys/iys-colorbook-for-web.pdf>

**The Adventures of Sammy Soil**

[https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs144p2\\_002325.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_002325.pdf)

## Bureau of Land Management

**Soils for Kids**

<http://www.blm.gov/nstc/soil/Kids/>

**Discovery Channel**

**The Dirt on soil**

<http://school.discoveryeducation.com/schooladventures/soil/>

# Resources



## Soil Science Society of America

### Lessons and Activities

<http://soils4teachers.org/lessons-and-activities>

### Quotes about soil

<http://soils4teachers.org/quotes>

### Soil Glossary

<http://soils4teachers.org/glossary>

### Ask a Soil Scientist

<http://www.soils4teachers.org/ask>

### Soil Career Poster & 12 soil order poster

<http://www.soils4teachers.org/>



## DIG IT—The Secrets of Soil exhibit education materials Smithsonian - National Museum of Natural History—

<http://forces.si.edu/soils>

### **Sample of topic covered:**

Media Library—Videos and interactives

What is soil?

Chip off the old block

Soil Formation

Matters of Life and Death

Wise Choices

A World of Soils

Educators—Activity sheets and more!

## **Education Outreach Programs**

*(Many of these programs have a state contact)*

### **Project Learning Tree**

(requires workshop for activity guide)

PLT has a variety of soils activities to use for field days, classrooms or to a soils workshop that can be duplicated across the country to complement the DIG IT soils exhibit.

<http://www.plt.org>

### **Project WET** (requires workshop for activity guide)

There are a variety of soils activities that can be used for field days, classrooms and presentations.

<http://www.projectwet.org>

### **Leopold Education Project** (requires workshop)

The mission of the Leopold Education Project is to create an ecologically literate citizenry so that each individual might develop a personal land ethic.

<https://www.aldoleopold.org/teach-learn/leopold-education-project/>

## **Using Leopold in Teaching—handouts and study guides**

<http://www.aldoleopold.org/teach-learn>

### **Ag in the Classroom**

A grassroots program coordinated by the United States Department of Agriculture. Its goal is to help students gain a greater awareness of the role of agriculture in the economy and society, so that they may become citizens who support wise agricultural policies.

<http://www.agclassroom.org/>

### **GLOBE Project- Soil Section**

Learning Activities,  
Field Guides for Soil Investigations, Soil Glossary and data sheets for soil investigations

<http://www.globe.gov/web/elementary-globe/soils/learning-activities>

### **Food Land & People** (requires workshop)

Promotes approaches to learning to help people better understand the interrelationships among agriculture, the environment and people of the world.

<http://www.foodlandpeople.org/>

# Soil Everywhere Activity—Cards

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Alphabet to be printed and cut into individual cards for “Soil, Soil Everywhere” activity. Level 1



## Soil Everywhere Activity—Cards

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M

N

O

P

Q

R

S

T

U

V

W

X

# Soil Everywhere Activity—Cards

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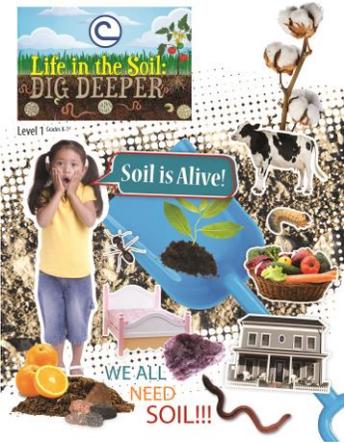


## Examples for “Soil, Soil Everywhere” activity.

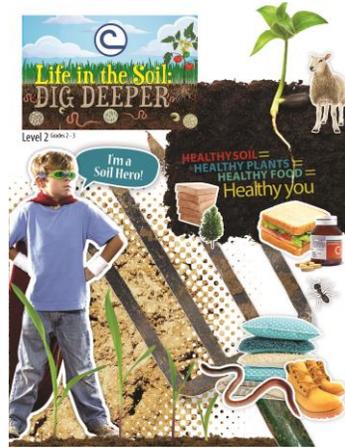
- A APPLE Apples grow on trees, trees grow in soil.
- B BED Beds can be made of wood that comes from trees that grow in soil.
- C CAT Cats like to climb trees that grow in soil.
- D DOOR Many doors are made of wood that comes from trees that grow in soil.
- E EARTH Earth's outer layer is soil.
- F FINCH A finch is a bird that eats seeds and fruit that grow in soil.
- G GRASS Grasses grow in soil.
- H HORSE Horses eat plants that grow in soil.
- I INSECT Many insects, like beetles, live in soil.
- J JEANS Many blue jeans are made from cotton, a plant that grows in soil.
- K KANGAROO Some kangaroos live in grasslands. Grasses grow in soil.
- L LIME A lime is a fruit that grows on trees that grow in soil.
- M MILK Milk comes from cows that eat plants that grow in soil.
- N NOSE We need oxygen to breathe. Oxygen is made by plants that grow in soil.
- O OATS Oats are good for breakfast! Oats come from plants that grow in soil.
- P PAPER Paper contains pulp that comes from trees that grow in soil.
- Q QUAIL A quail is a bird that likes to eat flower buds. Flowers grow in soil.
- R RABBIT Rabbits live in burrows they dig into the soil.
- S SCHOOL School buildings are built on soil.
- T TRACTOR Farmers use tractors to prepare soil for crops that we eat.
- U UNDERGROUND Many animals, like chipmunks and rabbits, like to live underground.
- V VINE Vines are plants that grow in soil.
- W WALNUT Walnuts are a nut that grows on trees that grow in soil.
- X XIAOSAURUS The xiaosaurus was dinosaur that lived a long time ago. It ate plants that grow in soil.
- Y YAM A yam is a sweet potato we can eat that grows in soil.

L  
i

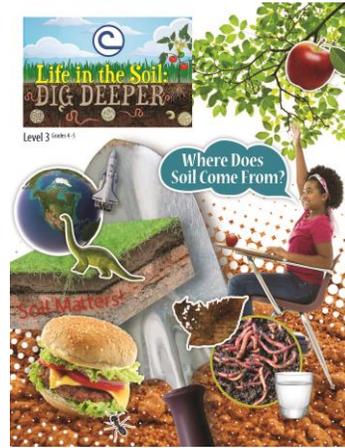
**“Life in the Soil: Dig Deeper” Education Materials at  
NACD Marketplace  
[www.nacdstore.org](http://www.nacdstore.org)**



**Level 1**



**Level 2**



**Level 3**



**Level 4**



**Placemat/Activity Sheet**



**Bookmark**



**Poster**

**National Association of Conservation Districts (NACD)  
509 Capitol Court, NE  
Washington, DC 20002-4937  
(202) 547-NACD (6223)**



National Association of  
Conservation Districts

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