

Home School Series: 3 - 5

April: Soil, It's Alive!

- Start Up:** (5-10 min) Soil, invertebrate pictures or posters, rock & soil samples
Berlese Funnel setup.
- Welcome/Introduction:** 1 min. Staff/Volunteer Names
Today's Topic-Soil
Question: What can we learn about what's living in the soil?
- Opener:** 10 min. **Soil Organism Mix Up**-Tape a picture of soil or fallen log invertebrates, mushrooms, etc., to each student's back as they arrive.
Students describe the organisms to each other and try to guess what is on their back.
Give students 10 min. to describe and guess, then let them take a look and discuss the organisms and their function.
Descriptions of each organism can be copied onto the back of each card.
- Background/Exploration:** 30 min. Ask the students how soil forms.
Review the rock cycle (show a diagram).
Soil forms from the erosion of minerals and rock with addition of organic matter.
Ask students to come up with examples of inorganic and organic soil components.
(inorganic=rock, water; organic=dead animals & plants)
- Soil-** There are many different kinds of soil.
Soil is made of minerals, air, water, and organic matter (humus).
Typical breakdown-45% mineral, 25% air, 25% water, 5% organic matter
Three main components of soil are clay, silt, and sand.
See *6 & Up Soil Conservation* for particle size comparison table.
- Soil Formation-**In nature soil organisms, air, temperature, and moisture interact to decompose organic matter (dead plants/animals). The process of decomposition releases nutrients that growing plants can use. The inorganic portion of soil comes from freezing, wind erosion, water erosion, and chemical interactions. The kind of soil depends on what kind of parent material eroded, the length of time it has weathered, the topography, the vegetation cover, and changes due to human activity.
Ask the students how long they think it takes for soil to form.
- ♣ In general, soil erodes from parent material (rock) 1 cm/250 to 2,500 years.
 - ♣ The **prairie ecosystem** makes one inch of soil every 500 years. It builds up from dead plant roots and other organic matter.
 - ♣ **Woodland** soils are not rich and black, are much thinner and build up even more slowly.
- Prairie soil has been called "black gold" because of its richness and high organic content.
- Activity:** **Soil search**-Encourage students to look at and compare various soil samples using magnifying glasses. Note color, texture, & amount of organic material. Feel sand, silt, & clay. Share background on the types of soils at your location with the students.
- Many living organisms, from large (woodchucks) to small (shrews) to microscopic live in soil. Soil is its own ecosystem-it teems with life! (Show soil illustration-IAN).
Microbes live off of the organic matter in soil and help recycle/decompose it.

Activity: **Berlese Funnel** (Sisson, *Ranger Rick*)-Shake out the jar under the funnel onto white paper and examine what creatures you find. Any differences between spring/fall creatures?

Prepare to go Outside: Restroom break.
10 min. Apply: Sunscreen, Bug Repellent (if necessary)
Bring: Water bottles, hats, jackets (if necessary), clipboard/clip
Trail Rules (see The First Program).
What we will do/What to look for-Take soil samples, explore log ecosystem
Predictions-What soil organisms will we find?

OUTDOOR EXPLORATION: Hike to several different areas and take soil samples. Compare them.
1 hour, 40 min. Compare prairie soil to woodland soil.
Compare burned/unburned portions of a prairie if possible.

Activity: **Log Scavenger Hunt** (*IA Supplement to Project Learning Tree*)-
Help students overturn several fallen logs and explore and observe/compare the flora and fauna.
♣ Explain producers, consumers, & scavengers.
♣ Have the students categorize the creatures found under the logs.
♣ Ask them to construct a food web using these creatures.

Game: **Food Web**-Designate a central “sun” as a base.
10 min. Divide students into groups of producers, consumers, & scavengers/decomposers.
Let students choose which organism they would like to be.
♣ At the signal, consumers tag producers, scavengers tag consumers & producers.
♣ Eaten producers can return to the “sun” to rejoin the game.
♣ Eaten consumers can be tagged by returning producers to rejoin the game.

Look for examples of soil erosion.

- ♣ Soil erosion affects farmers, surface water, plants & animals, and us.
- ♣ When eroded soil gets into water it makes it cloudy or turbid.
- ♣ Soil is our most valuable asset, but also the #1 pollutant in Iowa.
- ♣ Soil erosion problems include: water becoming undrinkable, fields more susceptible to drought after losing topsoil, need for more fertilizers, roadbed damage & ditches filling up, & recreation area dredging.

Closing: Discuss the abundant life teeming within soil and the importance of good soil conservation.

Send Off: Goodbye!
Next Month-Cultures of the Creek

Take Home: Parent Outline
At-home activities

Vocabulary

Invertebrate, rock cycle, organic, inorganic, decompose, parent material, Berlese funnel, producer, consumer, scavenger, decomposer, invader, erosion, mineral, humus, clay, silt, sand, food web

Background and Activity References for Naturalists and Parents

www.iadnr.com Department of Natural Resources. Information on environmental quality & issues.
www.nrcs.usda.gov Natural Resource Conservation Service. Soil conservation information.

USDA-NRCS Publications: Challenging Careers in the NRCS
Backyard Conservation
In Partnership with People and a Healthy Land
Conquest of the Land Through 7,000 Years (Agricultural History)

- An Iowa Supplement to Project Learning Tree: K - 8*. 1993. Iowa Department of Natural Resources, Des Moines. Pp.69-70 Fallen log investigation worksheet & field guide to critters
- Cornell, Joseph. 1979. *Sharing Nature With Children*. Dawn Publications, Nevada City, CA.
- Dig In! Hands-On Soil Investigations*. 2001. Ed. Beth Daniels. National Science Teachers Association, Arlington, VA. General soil information and activities; Pp. 44-45 Arable Land apple demo; pp. 93-100 soil erosion background and activities; Pictures of soil creatures
- Home School EE Program Series: Year 1*. 2005. Indian Creek Nature Center, Cedar Rapids, IA. P. 117 Mini Composters
- Iowa's Biological Communities*. 1993. Iowa Association of Naturalists Booklet Series. ISU Press, Ames, IA. *Iowa Biological Communities (IAN-201)* P. 9 Soil section illustration-good Take Home
- Iowa Environmental Issues Series*. 1998. Iowa Association of Naturalists Booklet Series. ISU Press, Ames, IA. (IAN-101—107)
Iowa Water Pollution (IAN-103) Pp. 6-7 Erosion and siltation; pp. 15-19 low-input farming
Iowa Agricultural Practices and the Environment (IAN-104) Soil as a pollutant and solutions
<http://www.extension.iastate.edu/pubs/wi>.
- Iowa Physical Environment Series*. 1999. Iowa Association of Naturalists Booklet Series. ISU Press, Ames, IA. *Iowa Soils (IAN-703)* <http://www.extension.iastate.edu/pubs/wi>.
Background P. 3 relative sizes clay, silt, sand particles; p. 15 Iowa soil loss illustration; p. 18 conservation practices chart
- Food, Land & People*. 1998. Project Food, Land & People, Chandler, AZ.
P. 111 From Apple Cores to Healthy Soil-composting information; p. 118 Nutrient Cycle graphic
- Lines on the Land*. 1991. Soil Conservation Service-USDA, Des Moines, IA. Video and guide
- Project Bluestem: A Curriculum on Prairies and Savannas*. 1995. Walnut Creek National Wildlife Refuge and Prairie Learning Center. P. 290-293 Iowa's Rich Heritage-Take Home activities
- Project Learning Tree: Environmental Education Pre K - 8 Activity Guide*. Fourth Ed. 1996. American Forest Foundation, Washington, D.C..
Pp. 148-50 Food webs; pp. 252-257 Soil background & activities
- Project Learning Tree: Secondary Environmental Education Program-The Changing Forest: Forest Ecology*. 1996. American Forest Foundation, Washington, D.C.. P. 31 soil profile diagram
- Ranger Rick Naturescope: Incredible Insects*. 1989. National Wildlife Federation, Washington, D.C.
Pp. 58-59 insect traps, nets, & cages (Berlese funnel)
- Sisson, Edith A. 1987. *Nature with Children of All Ages*. The Massachusetts Audubon Society-Prentice Hall Press, New York. P. 53 Invertebrates, including Berlese Funnel
- Teaching Soil & Water Conservation: A Classroom & Field Guide*. 1986. Soil Conservation Service-USDA, Washington, D.C. Program Aid #34; (check ISU Extension)
Pp. 12-15 Crop cover & soil loss (erosion) demos

Extensions/Alternate Activities/Rainy Day

Mini-Composters (see *HS-1: 3-5 Soil & Water Conservation*)-Learn about compost as soil improver.

Discuss problems and methods of soil conservation. Show pictures (*Lines on the Land*).

Explain **Isopods** (sowbugs, pillbugs) during your log hunt. They are crustaceans, like lobsters, crabs, & shrimp, they are not insects.

Soil Erosion/Loss Prevention- Briefly describe the Dust Bowl of the 30's.

Modern farming techniques can minimize soil loss by leaving crop cover on fields, plowing less frequently, plowing/planting rows that follow the land's contours, building terraces, using filter strips, and not farming sensitive soils.

Erosion can't be stopped, but it can be controlled/minimized.

Leaving some crop cover after the growing season is done helps prevent soil loss.

Soil can be made healthier/richer or regenerated by composting

(see *HS-1: 6-8 Where Does It Go?*).

Soil erosion in urban areas & construction sites is also a concern, as this runoff also pollutes water.

Supplies:

Soil related pictures/posters
Rock cycle poster
Soil samples-clay, silt, sand
Soil samples-prairie, wetland, woodland
Rock/parent material samples
Soil invertebrate pictures/posters
Collected soil samples
Soil organism pics for mix up
Tape

Soil corer
Magnifying glasses
White paper
Log hunt field guides
Soil & leaf litter for funnel
Berlese Funnel-
Jar
Coffee can
Funnel
Piece of screen

Advance

Copy and enlarge soil organism pictures

Preparation:

Preparation: (*Dig In! Iowa Supplement to Project Learning Tree*).

Collect some soil samples for students to observe and compare.

Collect some leaf litter and topsoil. Put into a Berlese funnel and put in under a low-voltage light overnight.