Painting with Soil

A lesson based on the book, The Soil Neighborhood, by Dan Yunk and Steve Swaffar.

America's food supply is safe, affordable and abundant but misunderstood by the public. Kansas Farm Bureau seeks to improve consumer knowledge of the importance of farming and ranching through the *Kailey's Ag Adventure Series*, of which this book is a part.

Background Information:

After reading The Soil Neighborhood, students should have a greater understanding of the importance of soil in their lives and the role it plays in food and livestock production.

Soils are an important and vital natural resource. Soil is the reservoir on which most life on earth depends, as the primary source of food, feed, forage, fiber and pharmaceuticals. It can also serve as a naturally beautiful background with its colorful landscapes.

This lesson will use the natural color and texture of soils to allow students to create their own beautiful landscapes.

Lesson Objectives

Students will:

- Understand the importance of soil and obtain a greater appreciation of soil in their lives.
- Distinguish between different types of soils and their properties.
- Create colorful artwork using a variety of soil pigments as their paint medium.

Materials Needed

Different colors of soil (dried in air)
Hammer/Mallet
Mortar and pestle (rubber-tipped)
Paper cups (4 oz.)
Paint brushes (different kinds and sizes)
Artistic acrylic (clear gloss medium)
Sponges and rags
Water color paper
Masking tape

Level: K-2nd

Subjects/Standards:
Subject: Science

Standard: Engineering Design

Benchmark: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Indicators: Ask questions based on observations to find more information about the natural and/or designed world(s).

Activity Description:
Students will observe differences in soil color, then use the soils as a painting medium on a soil painting card template.

PREPARE AHEAD:

1. Gather soils of various colors.

2. Place each dried soil sample on a piece of paper and crush into pieces with hammer or mallet.

3. Place some of the crushed soil into a mortar. Use a rubber-tipped pestle to crush the soil into a fine powder. Repeat to crush all of the different colored soils.

4. Place the different soils in paper cups -- notice the colors and textures.

PROCEDURE

Before the students start their painting project with the soils, have them compare the colors of the soils to the soils represented on the "Twelve Orders" poster (example provided). Let them try to decide what type of soils each one is. Discuss with them the characteristics of each kind of soil, using the poster as a reference.

1. Print **Soil Painting Card template** (provided) onto watercolor paper if possible, and hand out for each student. Have students fold their card in half and then put their name on the back on the line provided.

2. With masking tape, have students carefully tape paper edges to table or board. This is done so that the art work stay put while painting.

3. Pour small amounts of artist acrylic in small paper cups. Add small amounts of soil and mix together. If possible have each different color of soil paint for every student, or divide the students up into small groups to share.

4. Experiment with depth of color and mixing the different soils.

5. Allow students to start painting their cards. Have them use different sizes and kinds of paint brushes, sponges, and rags to create different textures. Experiment and have fun.

6. When the students are done painting, carefully lift up the tape and transport the cards to a side table or window seal out of the way so that they dry thoroughly. Tape the cards down again so they will dry flat.

7. When the art work is dry, you may have students apply another layer of soil paint to add more contrast and darker colors (time permitting).

8. Once the cards are completely dried, give back to students to take home and enjoy.

ESTIMATED TEACHING TIME: 1-2 HOURS
(Includes drying time)

NEW VOCABULARY:

SOIL- The unconsolidated mineral or organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

DIRT- Dirt is what gets on clothes or under fingernails. It is also soil that has lost the characteristics that give it the ability to support life – it is "dead."

MATERIALS NEEDED:

The Soil Neighborhood
Soil (dried in air)
Hammer/Mallet
Mortar and pestle (rubber-tipped)
Paper cups (4 oz.)
Paint brushes (different kinds and sizes)
Artistic acrylic (clear gloss medium)
Sponges and rags
Water color paper
Masking tape

PREPARE AHEAD:

Collect different colors of soil and prepare them for a painting medium (directions listed).

Print off a colored copy of the "Twelve Orders" poster, and/or order a free poster (directions on next page).

Print out the Soil Painting Card template for each student.

Soil Information

Soil performs many critical functions in almost any ecosystem (whether a farm, forest, prairie, marsh, or suburban watershed). There are seven general roles that soils play:

1. Soils serve as media for growth of all kinds of plants.
2. Soils modify the atmosphere by emitting and absorbing gases (carbon dioxide, methane, water vapor and the like) and dust.
3. Soils provide habitat for animals that live in the soil (such as groundhogs and mice) to organisms (such as bacteria and fungi), that account for most of the living things on Earth.
4. Soils absorb, hold, release, alter and purify most of the water in terrestrial systems.
5. Soils process recycled nutrients, including carbon, so that living things can use them over and over again.
6. Soils serve as engineering media for construction of foundations, roadbeds, dams and buildings, and preserve or destroy artifacts of human endeavors.
7. Soils act as a living filter to clean water before it moves into an aquifer.

-Soil Science Society of America

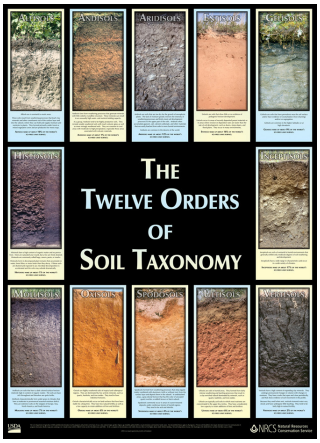
Orders of Soil Taxonomy

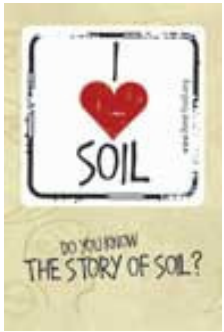
Gelisols - soils with permafrost within 2 m of the surface
Histosols - organic soils
Spodosols - acid forest soils with a subsurface accumulation of metal-humus complexes
Andisols - soils formed in volcanic ash
Oxisols - intensely weathered soils of tropical and subtropical environments
Vertisols - clayey soils with high shrink/swell capacity
Aridisols - $CaCO_3$-containing soils of arid environments with subsurface horizon development
Ultisols - strongly leached soils with a subsurface zone of clay accumulation and <35% base saturation
Mollisols - grassland soils with high base status
Alfisols - moderately leached soils with a subsurface zone of clay accumulation and >35% base saturation
Inceptisols - soils with weakly developed subsurface horizons
Entisols - soils with little or no morphological development

Teacher's Notes:

To order I Heart Soil Stickers:
http://www.iheartsoil.org/

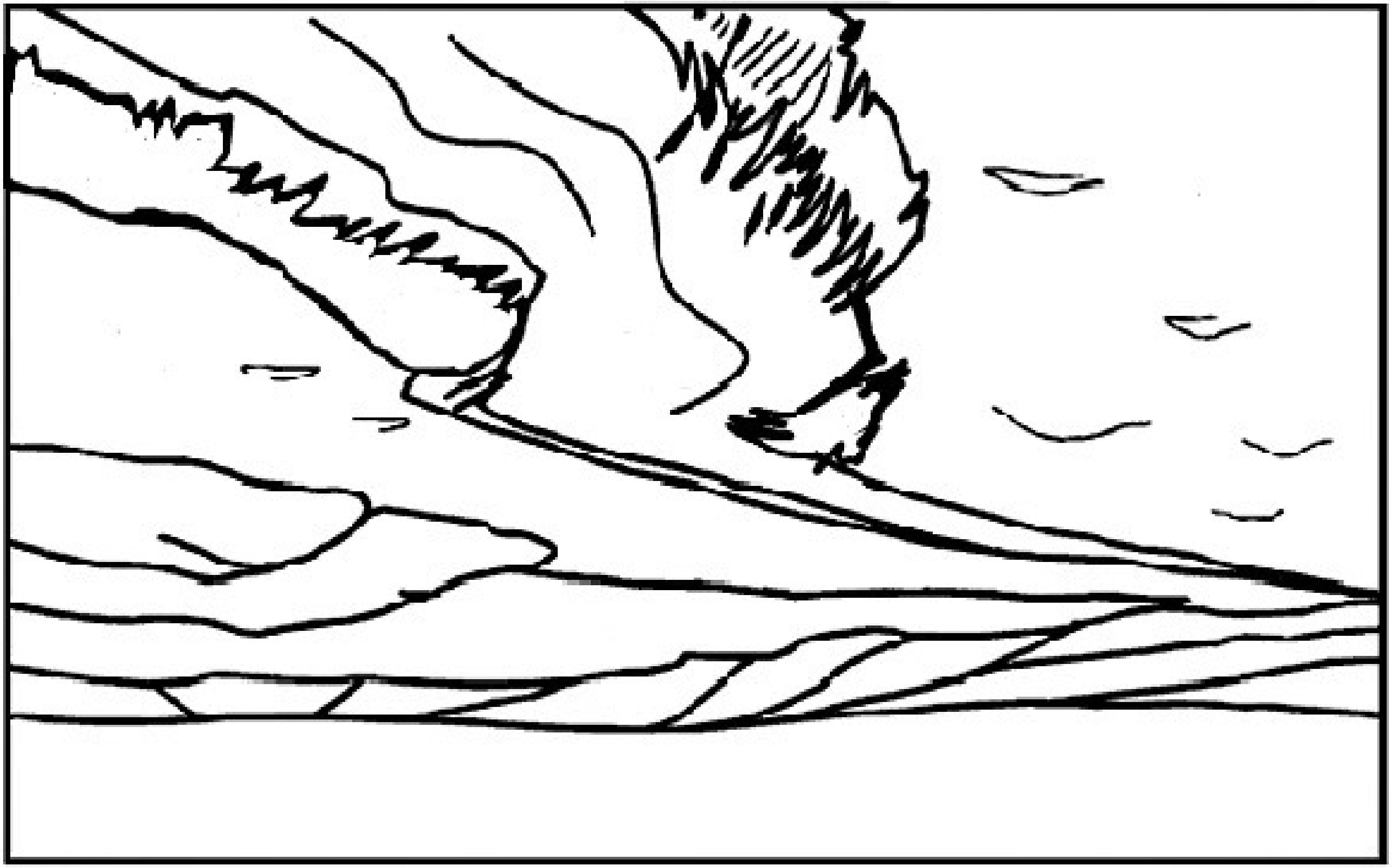
To order a free copy of the poster, go to the NRCS Distribution Center website at
http://nrcspad.sc.egov.usda.gov/DistributionCenter/
and search for "Twelve Orders".





Unique Fact

There are more living individual organisms in a tablespoon of soil than there are people on the earth.



Fold

Soil Painting

This card was created by ______________________________ .

Soils are an important and vital natural resource. Soil is the reservoir on which most life on earth depends, as the primary source of food, feed, forage, fiber and pharmaceuticals. It can also serve as a naturally beautiful background with its colorful landscapes.

The colors on this card are from the natural pigment and texture of soils present in Kansas.

Kansas Foundation for Agriculture in the Classroom

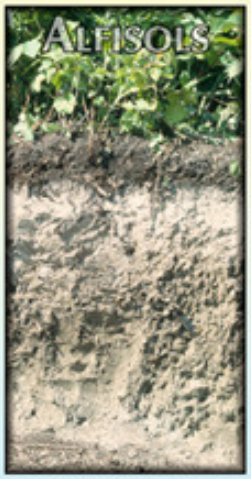
www.ksagclassroom.org

KANSAS FARM BUREAU
The Voice of Agriculture

www.kfb.org

The Twelve Orders of Soil Taxonomy

Alfisols



Alfisols are in semiarid to moist areas.

These soils result from weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil, where they can hold and supply moisture and nutrients to plants. They formed primarily under forest or mixed vegetative cover and are productive for most crops.

Alfisols make up about 10% of the world's ice-free land surface.

Andisols

Andisols form from weathering processes that generate minerals with little orderly crystalline structure. These minerals can result in an unusually high water- and nutrient-holding capacity.

As a group, Andisols tend to be highly productive soils. They include weakly weathered soils with much volcanic glass as well as more strongly weathered soils. They are common in cool areas with moderate to high precipitation, especially those areas associated with volcanic materials.

Andisols make up about 1% of the world's ice-free land surface.

Aridisols

Aridisols are soils that are too dry for the growth of mesophytic plants. The lack of moisture greatly restricts the intensity of weathering processes and limits most soil development processes to the upper part of the soils. Aridisols often accumulate gypsum, salt, calcium carbonate, and other materials that are easily leached from soils in more humid environments.

Aridisols are common in the deserts of the world.

Aridisols make up about 12% of the world's ice-free land surface.

Entisols

Entisols are soils that show little or no evidence of pedogenic horizon development.

Entisols occur in areas of recently deposited parent materials or in areas where erosion or deposition rates are faster than the rate of soil development; such as dunes, steep slopes, and flood plains. They occur in many environments.

Entisols make up about 16% of the world's ice-free land surface.

Gelisols

Gelisols are soils that have permafrost near the soil surface and/or have evidence of cryoturbation (frost churning) and/or ice segregation.

Gelisols are common in the higher latitudes or at high elevations.

Gelisols make up about 9% of the world's ice-free land surface.

Histosols

Histosols have a high content of organic matter and no permafrost. Most are saturated year round, but a few are freely drained. Histosols are commonly called bogs, moors, peats, or mucks.

Histosols form in decomposed plant remains that accumulate in water. Forest litter, or moss faster than they decay. If these soils are drained and exposed to air, microbial decomposition is accelerated and the soils may subside dramatically.

Histosols make up about 1% of the world's ice-free land surface.

Inceptisols

Inceptisols are soils of semiarid to humid environments that generally exhibit only moderate degrees of soil weathering and development.

Inceptisols have a wide range in characteristics and occur in a wide variety of climates.

Inceptisols make up about 17% of the world's ice-free land surface.

Mollisols

Mollisols are soils that have a dark colored surface horizon relatively high in content of organic matter. The soils are base rich throughout and therefore are quite fertile.

Mollisols characteristically form under grass in climates that have a moderate to pronounced seasonal moisture deficit. They are extensive soils on the steppes of Europe, Asia, North America, and South America.

Mollisols make up about 7% of the world's ice-free land surface.

Oxisols

Oxisols are highly weathered soils of tropical and subtropical regions. They are dominated by low activity minerals, such as quartz, kaolinite, and iron oxides. They tend to have indistinct horizons.

Oxisols characteristically occur on land surfaces that have been stable for a long time. They have low natural fertility as well as a low capacity to retain additions of lime and fertilizer.

Oxisols make up about 8% of the world's ice-free land surface.

Spodosols

Spodosols formed from weathering processes that strip organic matter combined with aluminum (with or without iron) from the surface layer and deposit them in the subsoil. In undisturbed areas, a gray eluvial horizon that has the color of uncoated quartz overlies a reddish brown or black subsoil.

Spodosols commonly occur in areas of coarse-textured deposits under coniferous forests of humid regions. They tend to be acid and infertile.

Spodosols make up about 4% of the world's ice-free land surface.

Ultisols

Ultisols are soils in humid areas. They formed from fairly intense weathering and leaching processes that result in a clay-enriched subsoil dominated by minerals, such as quartz, kaolinite, and iron oxides.

Ultisols are typically acid soils in which most nutrients are concentrated in the upper few inches. They have a moderately low capacity to retain additions of lime and fertilizer.

Ultisols make up about 8% of the world's ice-free land surface.

Vertisols

Vertisols have a high content of expanding clay minerals. They undergo pronounced changes in volume with changes in moisture. They have cracks that open and close periodically, and that show evidence of soil movement in the profile.

Because they swell when wet, vertisols transmit water very slowly and have undergone little leaching. They tend to be fairly high in natural fertility.

Vertisols make up about 2% of the world's ice-free land surface.

USDA

NRCS Natural Resources Conservation Service