

# SOILS DAY

## First Grade – Rahr Memorial School Forest

### ENDURING UNDERSTANDING

Every type of soil has unique characteristics. Looking carefully at soil or sod can reveal components and organisms that could go unnoticed.

### ASSESSMENT

Students will be able to demonstrate their understanding by predicting how different types of soil will react to rain, defining erosion, identifying the names of different soil types (along with their size and texture), and by describing different soil layers and components.

### WISCONSIN'S MODEL ACADEMIC STANDARDS

For mathematics: E.4.1, E.4.5

For science: C.4.2, C.4.4, D.4.1

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### CLASS OUTLINE

- I. Set-up
- II. Sample schedule
- III. Introduction
- IV. Percolation tests
- V. Erosion
- VI. Sifting
- VII. Soils hike
- VIII. Hike to beach – land observations and rock collection
- IX. Sod study and story
- X. Conclusion
- XI. Clean-up

Safety

Optional/ Rainy Day Activities

Additional Information

Resources

School Forest map

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### MATERIALS

#### Percolation Tests

- 2-liter bottle with bottom cut out
- clay
- sand
- sod
- gravel
- water
- empty buckets
- can and cups
- small white board
- dry-erase markers
- eraser

#### Erosion

- erosion photos
- baking sheets
- flour
- spoon
- baby bottle with water
- erosion trays
- chalkboard
- chalk
- sand
- gravel
- sod
- clay
- watering can
- water
- metal trays
- empty bucket

#### Sifting

- sifters (#2, 3, and 4)
- large bowls (many)
- cups/large spoons
- sand
- gravel
- limestone
- magnifying glasses
- chalk board
- chalk

#### Soils hike

- soil borers
- small white board
- dry-erase markers
- eraser

#### Sod study and story

- sod
- large bowls
- chalkboard
- chalk
- magnifying glasses
- plastic spoons
- Dig Hole, Soft Mole storybook

## CLASS PROCEDURES

### I. Set-up

After scheduling a date with the School Forest secretary, teachers are responsible for filling out and turning in a field trip request form. Teachers may also schedule a time when the School Forest coordinator can meet with them at school to discuss the visit. Teachers will be asked to teach or co-teach one of the activities while the student groups rotate through the sections during the day. The School Forest coordinator may also be available to teach at one of the stations during the day. Preparation time will be needed to review the activity.

All of the materials needed for the activities can be set-up at the School Forest. Teachers should contact the School Forest coordinator with material needs. Teachers will need to bring a few items from school: the School Forest keys, first aid kits, emergency contact information, extra clothing, and any additional activities they feel necessary for the class. Students will need to bring a bag lunch (with a drink and nothing that needs a microwave) and adequate clothing for the day.

### II. Sample Schedule:

9:00	Depart from School	12:20- 1:10	Large group A: hike to beach
9:30	Arrive at School Forest		Large group B: sod study and story
9:30 – 9:50	Welcome and Introduction	1:15 – 2:05	Large group A: sod study and story
9:50 – 10:15	rotation 1		Large group B: hike to beach
10:20 – 10:45	rotation 2	2:10 – 2:25	Conclusion
10:50 – 11:15	rotation 3	2:30	Depart from School Forest
11:20 – 11:45	rotation 4	3:00	Arrive at school
11:45- 12:20	Lunch		

### III. Introduction

Every living thing on earth depends on soil in one way or another. Plants grow in soil, animals eat plants, and decomposers live in the soil. Today students will become scientists. We will predict and experiment with different types of soil like sand, gravel, clay, limestone, and sod. We will also study rocks and go on a couple of hikes. When you leave the School Forest today, you will know more about soil than some adults!

### IV. Percolation tests

Water travels through different types of soil at different speeds. This is due in part to the physical properties of the soil. During this class, students will predict and experiment with the percolation rate of different types of soil.

1. Make predictions about rate of water flow through different soil types.
2. Test predictions using an inverted two-liter bottle, with the bottom removed. The teacher will do the testing due to the messiness of the experiment. Use extra buckets below the bottle to catch the water after it goes through the soil.
3. Place an amount of the soil in the bottle. Discuss what the students think will happen when it “rains” on the soil.
4. Pour water into the bottle slowly and watch to see what happens as it passes through the soil.
5. Discuss where water goes in the soil. It goes into the air pockets that are found between the soil particles. If water is already in the air pockets (like with the clay), the “rain” has no where to go and therefore travels through the soil very slowly.
6. Complete the percolation tests with sod, gravel, sand, and clay. The clay should be the slowest. Do NOT discard the clay when you are done with it. Please put it back

into the clay bucket. When doing the sod test, first test a loose piece of sod then push down on the sod (compact the soil) and test again. Does compacting the soil change the outcome?

7. Ask the students to relate their findings to the other stations they have participated in.

## V. Sifting

During this activity, students will make predictions and test the size particles that make up various types of soil.

1. Students make predictions about the sizes of the soils.
2. Have students use the sifters to sort through the soils
3. Start with the largest sifter (#2) and then take what went through and move down the line one sifter at a time to the smallest sifter (#4).
4. Note the various colors, shapes, and sizes.
5. Examine samples with magnifying glasses.
6. Dump materials back into the original bucket before starting another type of soil.
7. Repeat the sifting with gravel, sand, and limestone. Compare results.

## VI. Soils hike

While on this hike, students should learn how soil looks and feels in different areas. They should begin to notice why soil is different and what factors are involved.

1. Hike down the driveway and across the road to the hemlock forest.
2. Use soil borers to examine the soil in different areas:
  - close to the road, where there are many trees in the understory
  - in the hemlock forest, where there is not many small trees
  - close to the swamp, where it is wetter
3. Compare the different soils. Compare the soil color. Is the soil very wet or is it dry? Compare the texture of the soil, is it sandy or more like clay? Are there any roots? Soil is different depending on where you are. Certain tree species prefer certain soil types and soil moisture. Notice how there is little decomposing matter in the hemlock forest vs. a forest that has more of an understory... more small trees below the big trees. Organic matter (decomposing matter) will make the soil a darker color. Relate the findings of the hike to other stations.
4. Have the students jump up and down in the different areas... is the ground bouncy or very solid? Why do you think it is this way?
5. Hike back to buildings and return soil borers.

## VII. Erosion

Discuss what erosion means with the students (see the additional information section of this lesson plan). Show the students the photos of land that has been shaped or changed by erosion. Ask the students to identify what may have caused the erosion in the photos: wind, waves, rain, gravity, human, or animal activity. Now you will be performing two different experiments to learn more about erosion.

### Splash Experiment

The goal of this activity is to discover the power of raindrops falling on loose soil.

1. Set the cookie sheet on the ground and place (about 3) spoon full of flour in a mound in the center of the sheet
2. Predict what will happen to the mound of flour when a drop of water hits it.
3. Now have a student hold the bottle at waist height, tip the bottle, and gently squeeze out a drop of water onto the flour.
4. What happens to the flour?

5. Let the students take turns adding drops of water and watching to see how far the flour scatters. Test at different falling heights.
6. What are the effects of raindrops falling from the sky onto loose soil? Onto pebbles? Onto a rock?

#### Erosion Trays

Compare rates of water flow through different soil types.

1. Ask a student to make a pile/dam of soil near the top of the tray (start with gravel and move down the line, ending with clay).
2. Have students make predictions.
3. Pour a pre-measured amount of water above the soil on the tray.
4. Observe the rate of water flow.  
Is it fast? Slower? Does much soil run down the tray with the water or does it stay in one place? Why does the water move through the soil like this?
5. Follow the same procedure with the sod, sand, and then clay. Use the clay last because water should not move through it at all. Do NOT discard the clay. Please put it back into the clay bucket.
6. When you are finished, please run water down trays and dump all material that was eroded into the extra bucket off to the side.

Please clean-up the station before the next group. The trays should be rinsed off. Dirty water can be discarded outside in the forest.

#### VIII. Hike to beach

As you hike to the beach, stop on the hills and discuss how they got there (from a glacial lake that covered this area). Ask the students to notice the different types of soil along the trail. Once you are close to the lake, listen for the waves. Ask the students to predict what the shore is like by the sound of the waves hitting it. Does it sound like the waves are crashing into a large cliff or rolling onto a sandy beach? At the lake, review the safety guidelines expected. If desired by the teacher, students can collect a rock to take home or back to school. Examine the different rocks found at the beach. What color is most present? Are all the rocks the same? How was the sand on the beach made? Is the sand coarse or smooth?

#### IX. Sod Study

Use the provided bowls, magnifying glasses, and sod to examine what sod is and what lives in it.

1. What is sod?
2. Note the color of the sod. Smell the sod.
3. Try to find individual grains of sand.
4. Look for critters.
5. Feel the bits of organic matter or humus.
6. Examine the parts of the grass (dead and alive)... the roots, veins, texture.
7. Make a list of items found in the sod on the chalkboard.
8. When you are finished, please leave sod for the next group out on the table. There is extra sod in the bucket if you need to replace a piece or two.

When you are done exploring the sod read the story Dig Hole, Soft Mole to the students. Discuss what happens to the mole as it passes through the earth and what else might live underground. What types of areas does the mole pass through on its travels? How does the soil affect these different areas?

## X. Conclusion

We learned many things about soil today. We studied soil in the forest and at the beach and different types of soil up close. Ask the students to review what they learned about soil. Make predictions about where rain goes at the beach. How fast will the water travel through the soil? Imagine if all of the School Forest soil was clay. Describe how rocks are similar and different. How do humans affect the soil and, in turn, affect all of life? Explain two ways humans help soil to be healthy. And two ways humans harm soil.

## XI. Clean-up

- Return supplies to building
- Take garbage out to dumpster
- Close windows, shut off all lights, lock doors, shut driveway gate
- Give the School Forest coordinator feedback on how to make this trip better in the future.

## Safety

While at the School Forest, teachers should carry first aid kits. You can bring these from your school or use the ones at the School Forest. The first aid stations can be found in the Ehlert Lodge office and the upstairs of the Krejcarek Building. Please report any safety issues to the School Forest coordinator.

Students should be supervised at all times. If you decide to go off of the trails, go in a clear area where branches cannot swing back and hit someone. Be aware of the plants you are traveling around so as not to pass by thorn covered plants.

## Optional / Rainy Day Activities

### Rock Study

1. Students examine the rocks.
2. Take note of the colors, size, textures, designs/patterns, fossils, shape, etc.
3. Ask students to feel the rocks, rub them on the back of their hands.
4. Try the count the number of colors that can be found in a rock.
5. Group similar ones together (but please make sure that the ones in the boxes stay with their particular box). Why are they similar? Why are they different?
6. As a large group, write a list of descriptive words for the rocks.

## Additional Information

Erosion reading from [Hands-On Nature](#) found on following pages  
Soil Critter Chart from [Project Seasons](#) on following pages

## Resources

Lesser, Carolyn. [Dig Hole, Soft Mole](#). Harcourt Brace and Company, Sand Diego, California. 1996.  
Lindelbach, Jenepher and Lisa Purcell. [Hands-On Nature](#). Vermont Institute of Natural Science, Woodstock, Vermont. 2000.  
Parrella, Deborah. [Project Seasons](#). Shelburne Farms, Shelburne, Vermont. 1995

Lesson plan written by Curt Kittleson

Revised by Patty Brodeen, School Forest coordinator, December 2003, September 2004, July 2008

FIRST GRADE **SOILS DAY**  
At School Forest

Erosion Station (2012 Addition)

Build your own Erosion Experiment:

Materials: paint trays, plastic animals, cups/shovels, watering cans

For this activity the students can create their own erosion experiment.

Divide the class into small groups and give each group a set of supplies. Take the group out to the volleyball court. They can create their own hillside with the materials they find outdoors (add in a few plastic animals) and “make it rain.” Discuss things that the students should be looking for... does the water flow change the speed of the erosion? Are there some things that can be done to stop erosion from happening? Can you change aspects of the experiment to impact how fast erosion occurs? Tie the learning back to what was done with the large erosion trays.