

Soil Science

TABLE OF CONTENTS

ABOUT DELTA SCIENCE MODULES

Program Introduction	iii
Teacher’s Guide	iv
Delta Science Readers	vi
Equipment and Materials Kit	vii
Scope and Sequence	viii
Assessment Features	ix
Process Skills	x
Communicating About Science	xi
Integrating the Curriculum	xii
Meeting the Standards	xiii
What We Believe	xiv

SOIL SCIENCE OVERVIEW

About Soil Science	1
Overview Charts	
Hands-on Activities	2
Delta Science Reader	4
Science Background	5
Materials List	7

HANDS-ON ACTIVITIES

Activity Summary	9
Schedule	10
Preparing for the Activities	
Classroom Management	11
Advance Preparation	11
Materials Management	12
Activities	
1. A First Look at Soil	15
2. Soil Particle Layering	21
3. Comparing Soil Samples	29
4. The Components of Soil	37

5. Weathering Makes Soil	45
6. Models of Weathering	51
7. Different Types of Soil	59
8. Plants Depend on Soil	69
9. Earthworms and Soil	81
10. Plants Conserve Soil	91
11. Soil Pollution	99
12. Soil Erosion	107

Assessment

Activities 1–12	115
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Glossary

.	121
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DELTA SCIENCE READER

Overview	123
Before Reading	124
Guide the Reading	125
After Reading	130

TEACHER RESOURCES

Unit Test: Teacher Information	133
References and Resources	135
Science Safety	137
Standards Correlations	139

COPYMASTERS

Student Activity Sheets	
Assessment Activity Sheets	
Assessment Summary Chart	
School-Home Connection	
Unit Test	



About **Soil Science**

DeltaScienceModules, THIRD EDITION

Students take to the schoolyard with trowels in hand. Several weeks later, they are familiar with sampling techniques and soil components, weathering and erosion, minerals and nutrients, and more. Students separate soil into particle layers and classify soil types according to estimated proportions. Once they understand what soil is, they find out how it is made by modeling weathering by plants and water. Next, students observe how earthworms mix and enrich soil. They discover that nutrient-rich soil helps plants grow, and plants, in turn, help soil resist erosion. Grass gardens, pollution detectors, worm farms, and erosion models offer strong hands-on experiences.

In the Delta Science Reader *Soil Science*, students read about the composition and characteristics of different types of soil. They learn about the effects of weathering and erosion in producing and changing soil. They find out about ways that people both harm and protect this vital natural resource. Students also read about soil scientists and their work. Finally, students learn how earthworms keep soils rich and productive.

Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
1 A First Look at Soil <i>page 15</i>	<ul style="list-style-type: none"> • use a magnifier to examine soil • compare three different samples of soil on the school grounds • infer that soil characteristics differ from place to place
2 Soil Particle Layering <i>page 21</i>	<ul style="list-style-type: none"> • collect and observe a sample of soil • observe that air is present in soil • create soil layering within a soil sample • classify soil particles according to size
3 Comparing Soil Samples <i>page 29</i>	<ul style="list-style-type: none"> • speculate as to whether three soil samples are made up of the same components • create soil layering with the samples • compare the profiles of different samples of soil
4 The Components of Soil <i>page 37</i>	<ul style="list-style-type: none"> • examine and identify the individual components of soil • compare the components of soil • infer that all soil is a mixture of these components
5 Weathering Makes Soil <i>page 45</i>	<ul style="list-style-type: none"> • demonstrate that rocks can be broken down into small particles • compare particles from two different kinds of rocks • operationally define <i>weathering</i>
6 Models of Weathering <i>page 51</i>	<ul style="list-style-type: none"> • model two types of physical weathering • relate their observations to weathering in nature • search the school yard for signs of weathering
7 Different Types of Soil <i>page 59</i>	<ul style="list-style-type: none"> • identify the main component of three different soil samples • label each sample as a specific soil type • discuss why different types of soil exist • discover which soil types are best for plants
8 Plants Depend on Soil <i>page 69</i>	<ul style="list-style-type: none"> • compare and contrast the growth of grass in soil and in sand • create a food web that includes soil • demonstrate the dependence of animals and plants upon soil
9 Earthworms and Soil <i>page 81</i>	<ul style="list-style-type: none"> • set up an earthworm farm • observe earthworm activity over a period of time • examine the mixing of different layers of soil by the earthworms • discuss how earthworms help create healthy soil
10 Plants Conserve Soil <i>page 91</i>	<ul style="list-style-type: none"> • experiment with the flow of water on planted and unplanted soils • compare the amount of erosion in each case • infer that roots hold soil together and help prevent erosion
11 Soil Pollution <i>page 99</i>	<ul style="list-style-type: none"> • give examples of various kinds of pollution • compare water that has passed through polluted soil and nonpolluted soil • discuss the importance of preventing soil pollution
12 Soil Erosion <i>page 107</i>	<ul style="list-style-type: none"> • create a soil erosion model • operationally define <i>erosion</i> • discuss wind and water as agents of erosion • find ways to reduce soil erosion
Assessment <i>page 115</i>	<ul style="list-style-type: none"> • See page 115.

Process Skills	Vocabulary	Delta Science Reader
observe, compare, communicate, infer	soil	pages 2–3
observe, compare, classify	clay, coarse, fine, mineral particles, organic matter, particle, sand, silt	pages 2–3, 7–8
hypothesize, predict, compare		pages 2–3
observe, compare, infer	components, humus, oak leaf mold	pages 7–8
compare, observe, experiment, define based on observations	sandstone, shale, weathering	pages 4–6
make and use models, infer	expand	pages 4–6
observe, classify, communicate		pages 7–8
compare; collect, record, display, or interpret data; infer	fertile, food web, nutrients	pages 10–12
observe, communicate	bristles, castings, clitellum, decomposer, earthworm	pages 14–15
experiment, compare, infer	planted soil, unplanted soil	pages 10–12
use variables, compare, communicate	pollutant, pollution	pages 10–12
make and use models, define based on observations, communicate, hypothesize	agent of erosion, contour, contour plowing, erosion	pages 9, 10–11

See the following page for the Delta Science Reader Overview Chart.

Overview Chart for Delta Science Reader

Soil Science

Selections	Vocabulary	Related Activity
Think About...		
What Is Soil? <i>page 2</i>	bedrock, decay, humus, minerals, soil, subsoil, topsoil	Activities 1, 2, 3
How Does Soil Form? <i>page 4</i>	glacier, weathering <i>optional: decomposer</i>	Activities 5, 6
How Are Soils Different? <i>page 7</i>	clay, loam, property, sand, silt, texture	Activities 4, 7
What Is Erosion? <i>page 9</i>	erosion	Activity 12
Soil Is a Resource <i>page 10</i>	composting, conserve, contour plowing, natural resource, strip cropping	Activities 8, 10, 11
People in Science		
• Soil Scientists <i>page 13</i>		
Did You Know?		
• About Worms and Soil <i>page 14</i>	castings, earthworms	Activity 9

See pages 123–131 for teaching suggestions for the Delta Science Reader.

ACTIVITY SUMMARY

In this Delta Science Module, students are introduced to the world beneath their feet, the world of soil.

ACTIVITY 1 Students are introduced to soil. With a magnifier and with the naked eye, they examine various types of soil found around the school yard, and compare them. They learn that different kinds of soil can be found in different places.

ACTIVITY 2 Students experiment with another soil sample. By shaking the soil in a tube with water and allowing it to settle, they are able to observe the different layers that make up soil. They also observe that air is present in soil and classify the various particles in the soil.

ACTIVITY 3 Students look at the layering of several soil samples. They collect samples of soil, create and compare layers in their tubes, and infer that even though all soil has layers, the depth of the layers varies from one soil to another.

ACTIVITY 4 Students use magnifiers and a zoom magnifier to examine, identify, and compare the different components that make up soil. While observing the physical characteristics of each of the soil components, they speculate as to how each of them, and soil, is formed.

ACTIVITY 5 Students experiment with rocks being broken into small pieces by rubbing two rocks together. They observe the particles, which become an integral part of soil, and relate this to the weathering of rocks in nature.

ACTIVITY 6 Students model how plants and water can cause weathering in nature. They freeze water in a cup with a top on; this bursts the cup and shows the strength of freezing water. The students also place lima beans in a cup of water with a top on; as the beans swell with the water they absorb, the cup bursts, showing the force that growing plants can have.

Students relate what they have observed to the natural world and tour the school yard for examples of weathering.

ACTIVITY 7 Students use the tube layering method to identify the main component in each of three soil samples, then identify each sample as a specific soil type. They also discuss why different types of soil exist, and discover which types are best for plant growth.

ACTIVITY 8 Students demonstrate the dependency of plants and animals on soil. They compare the ability of grass to grow in soil and in sand. They create a model and observe how plants and animals depend on soil. During a discussion, they relate their observations to the real world.

ACTIVITY 9 Students observe the activity of earthworms, including how the worms mix the soil, over a period of time. Students learn how earthworms enrich soil and discuss earthworms' contribution to creating healthy soil.

ACTIVITY 10 Students plant grass in soil. They explore soil erosion and observe that unplanted soil is less resistant to erosion than planted soil. They observe how the roots hold the soil together and infer that plants help prevent erosion.

ACTIVITY 11 Students create a model to compare water that has passed through polluted soil and nonpolluted soil. They discuss the various kinds of pollution and infer the effects on plants and animals, including humans.

ACTIVITY 12 Students experiment and observe soil erosion caused by wind and water. They create a soil erosion model, which they test with the agents of water and wind. They model contour plowing and discuss what can be done to help prevent erosion.