

Course	Agricultural Science II
Unit	Soil Science
Lesson	Environmental Impact of Soil and Water Management
Estimated Time	50 minutes
Student Outcome	

Describe the environmental impact of soil and water management.

Learning Objectives

1. Identify the soil properties which affect leaching of pesticides and fertilizers.
2. Identify the soil properties which affect water runoff.
3. Identify the soil properties which affect site selection of water holding structures.
4. Identify the soil properties that are important for determining building sites.
5. Identify the soil properties that are important for on-site waste disposal.

Grade Level Expectations

SC/EC/1/C/09-11/a	SC/EC/1/C/09-11/b	SC/EC/1/D/09-11/a
SC/ES/1/B/09-11/a	SC/ES/2/A/09-11/a	SC/ES/2/A/09-11/b
SC/ES/3/A/09-11/c	SC/ES/3/A/09-11/e	SC/ES/3/A/09-11/g
SC/ST/1/B/09-11/a	SC/ST/1/C/09-11/a	SC/ST/3/B/09-11/a
SC/ST/3/B/09-11/b	SC/ST/3/B/09-11/c	SC/ST/3/D/09-11/a

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. Minor, Paul E. *Soil Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1995.
2. *Soil Science Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplemental Information

1. Internet Sites
 - Huddleston, J. H. *How Soil Properties Affect Groundwater Vulnerability to Pesticide Contamination*. Oregon State University Extension Service. Accessed May 21, 2008, from <http://www.pw.ucr.edu/textfiles/Soil%20Properties%20and%20Groundwater%20Contamination.pdf>.
 - Soil and Water Publications. University of Missouri Extension. Accessed May 21, 2008, from <http://extension.missouri.edu/explore/agguides/soils/>.
 - Soil Facts: Soils and Water Quality – How Soils Influence Water Quality. North Carolina State University Cooperative Extension Service. Accessed May 21, 2008, from <http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-01/>.
2. Print
 - Ashman, Mark R., and Geeta Puri. *Essential Soil Science: A Clear and Concise Introduction to Soil Science*. Malden, MA: Blackwell Publishing, 2002.

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- ❑ Brady, Nyle C., and Ray R. Weil. *The Nature and Properties of Soils*. 14th ed. Upper Saddle River, NJ: Prentice Hall, Inc., 2007.
 - ❑ Coyne, Mark S., and James A. Thompson. *Fundamental Soil Science*. Clifton Park, NY: Delmar CENGAGE Learning, 2005.
 - ❑ Donahue, Roy L., and Roy Hunter Follett. *Our Soils and Their Management*. Danville, IL: Interstate Publishers, Inc. 1990.
 - ❑ Plaster, J. Edward. *Soil Science and Management*. 2nd ed. Albany, NY: Delmar Publishers, Inc., 1992.
 - ❑ White, Robert E. *Principles and Practice of Soil Science: The Soil as a Natural Resource*. 4th ed. Malden, MA: Blackwell Publishing, 2005.
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Interest Approach

Discuss soil in your area. Ask the students to evaluate the environmental impact on soils as it relates to water management.

Communicate the Learning Objectives

1. Identify the soil properties which affect leaching of pesticides and fertilizers.
2. Identify the soil properties which affect water runoff.
3. Identify the soil properties which affect site selection of water holding structures.
4. Identify the soil properties that are important for determining building sites.
5. Identify the soil properties that are important for on-site waste disposal.

Instructor Directions	Content Outline
<p>Objective 1</p> <p><i>Discuss the effects of pesticide leaching onto your garden or crop.</i></p>	<p>Identify the soil properties which affect leaching of pesticides and fertilizers.</p> <ol style="list-style-type: none">1. Surface infiltration<ol style="list-style-type: none">a. Textureb. Permeabilityc. Restrictive layersd. Shrink-swell potential2. Permeability<ol style="list-style-type: none">a. Soil structureb. Particle size distributionc. Bulk densityd. Restrictive layers
<p>Objective 2</p> <p><i>Discuss how pesticides and fertilizers are carried off by water runoff. Discuss the importance of water quality and its effect on your health. Also discuss how reducing leaching and water runoff losses would improve the overall water quality.</i></p>	<p>Identify the soil properties which affect water runoff.</p> <ol style="list-style-type: none">1. Rate of runoff<ol style="list-style-type: none">a. Slopeb. Texture (surface layer)c. Permeabilityd. Restrictive layerse. Soil depthf. Shrink-swell potentialg. Internal drainage2. Erodibility<ol style="list-style-type: none">a. Particle size distributionb. Soil structurec. Permeability

Instructor Directions	Content Outline
<p>Objective 3</p> <p><i>Discuss the guidelines in selecting a site to construct a pond. Refer to Table 13.1 in the student reference.</i></p>	<p>Identify the soil properties which affect site selection of water holding structures.</p> <ol style="list-style-type: none"> 1. Low seepage potential in upper 60 inches <ol style="list-style-type: none"> a. Permeability b. Depth of bedrock c. Depth of highly permeable material 3. Percent slope
<p>Objective 4</p> <p><i>Discuss the soil features that will determine construction of dwellings with a basement. Refer to Table 13.2 and Table 13.3 in the student reference.</i></p>	<p>Identify the soil properties that are important for determining building sites.</p> <ol style="list-style-type: none"> 1. Depth to high water table 2. Flooding 3. Shrink-swell potential 4. Slope 5. Depth to bedrock 6. Rock fragments
<p>Objective 5</p> <p><i>Discuss regulations concerning the construction of a water disposal system. Ask the students what soil characteristics they would look for. Also mention any approval required by governing agencies. Refer to Figures 13.1 and 13.2 as well as Tables 13.4 and 13.5 in the student reference.</i></p>	<p>Identify the soil properties that are important for on-site waste disposal.</p> <ol style="list-style-type: none"> 1. Soil properties that affect absorption fields <ol style="list-style-type: none"> a. Permeability b. Depth to seasonal high water table c. Depth to bedrock or restrictive layer d. Slope e. Flooding f. Rock fragments greater than 3 inches to a depth of 40 inches 2. Soil properties that affect sewage lagoons <ol style="list-style-type: none"> a. Permeability b. Slope c. Flooding d. Seasonal high water table or internal drainage e. Depth to bedrock f. Rock fragments (percentage of cobbles and stones)
<p>Application</p>	<p>Other activities:</p> <p>Have a local planning and zoning official or health inspector speak to the class on soil and site characteristics they have encountered.</p>

Instructor Directions	Content Outline
Closure/Summary	<p>Pesticides and fertilizers can be lost from the soil by leaching and water runoff and can pollute underground and surface water supplies. Soil properties can be evaluated to determine the potential to transmit water-soluble contaminants and to determine potential water runoff. The soil properties that affect permeability and erodibility impact the environment and need to be evaluated when determining land usage.</p>
Evaluation: Quiz	<p>Answers:</p> <ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. High water table b. Flooding c. Shrink-swell potential d. Slope e. Depth of bedrock 2. <ol style="list-style-type: none"> a. Permeability b. Seasonal high water table c. Shallow soil d. Slope e. Flood plains or rock fragments 3. <ol style="list-style-type: none"> a. Soil texture b. Permeability c. Restrictive layers d. Soil depth e. Shrink-swell potential 4. <ol style="list-style-type: none"> a. Leaching b. Water runoff