

<b>Course</b>	Agricultural Science II
<b>Unit</b>	Soil Science
<b>Lesson</b>	Interpretations and Management of Soil
<b>Estimated Time</b>	Two 50-minute blocks

### Student Outcome

Identify ways to conserve and manage the soil.

### Learning Objectives

1. Explain how site characteristics and soil properties determine the need for artificial drainage.
2. Identify the soil properties which determine the suitability for irrigation.
3. Describe the management practices which are used to control erosion.

### 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/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. PowerPoint Slides
  - Ppt 1 – Types of Terraces
  - Ppt 2 – Cross Section: Steep Backslope Terrace
  - Ppt 3 – Cross Section: Broad-base Terrace
2. Activity Sheet
  - AS 1 – How Cover Crop Affects Soil Loss
2. Minor, Paul E. *Soil Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1995.
3. *Soil Science Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

#### Supplemental Information

1. Internet Sites
  - Soil and Water Publications. University of Missouri Extension. Accessed May 20, 2008, from <http://extension.missouri.edu/explore/agguides/soils/>.
  - Soil, Water, and Plant Characteristics Important to Irrigation. North Dakota State University Agriculture and University Extension. Accessed May 20, 2008, from <http://www.ag.ndsu.edu/pubs/ageng/irrigate/eb66w.htm>.

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2. Print

- ❑ Ashman, Mark R., and Geeta Puri. *Essential Soil Science: A Clear and Concise Introduction to Soil Science*. Malden, MA: Blackwell Publishing, 2002.
  - ❑ 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

Invite prominent farmers to visit the class to explain proper management of the soil.

## Communicate the Learning Objectives

1. Explain how site characteristics and soil properties determine the need for artificial drainage.
2. Identify the soil properties which determine the suitability for irrigation.
3. Describe the management practices which are used to control erosion.

Instructor Directions	Content Outline
<p><b>Objective 1</b></p> <p><i>Discuss the feasibility and cost of artificial drainage in your farming community. Discuss areas where drainage may be prohibited by wetland regulations. Discuss site characteristics and soil properties that indicate the need for surface drainage. Refer to Figure 12.1 in the student reference.</i></p>	<p><b>Explain how site characteristics and soil properties determine the need for artificial drainage.</b></p> <ol style="list-style-type: none"><li>1. Somewhat poorly drained, poorly drained, or very poorly drained soils that are nearly level with depressional spots<ol style="list-style-type: none"><li>a. Sites on which surface water stands for continuous periods of 8 hours or more</li></ol></li><li>2. Sloping soils below seepy spots<ol style="list-style-type: none"><li>a. Hillsides and foot slopes</li></ol></li></ol>
<p><b>Objective 2</b></p> <p><i>Have members of the class do a survey of the different systems of irrigation used in our community. Discuss cost figures for the systems mentioned. Ask students to name local areas they believe need irrigation. Discuss the suitability of irrigation for those areas. Refer to Table 12.1 in the student reference.</i></p>	<p><b>Identify the soil properties which determine the suitability for irrigation.</b></p> <ol style="list-style-type: none"><li>1. Evaluate these properties as an asset or a liability<ol style="list-style-type: none"><li>a. Surface texture</li><li>b. Slope</li><li>c. Available water capacity (AWC)</li><li>d. Depth to high water table</li><li>e. Permeability</li><li>f. Percent of rock fragments</li><li>g. Depth to bedrock</li></ol></li></ol>
<p><b>Objective 3</b></p> <p><i>Discuss the amount of topsoil lost to erosion each year. Discuss erosion control measures such as no-till, terraces, and contour farming. Show students PPT 1, PPT</i></p>	<p><b>Describe the management practices which are used to control erosion.</b></p> <ol style="list-style-type: none"><li>1. Tillage practices<ol style="list-style-type: none"><li>a. No-till</li><li>b. Conservation tillage</li></ol></li><li>2. Cropping Practices<ol style="list-style-type: none"><li>a. Contour planting</li></ol></li></ol>

Instructor Directions	Content Outline
<p>2, and Ppt 3. Have students complete AS 1.</p> <ul style="list-style-type: none"> <li>☐ Ppt 1 – Types of Terraces</li> <li>☐ Ppt 2 – Cross Section: Steep Backslope Terrace</li> <li>☐ Ppt 3 – Cross Section: Broad-base Terrace</li> <li>📄 AS 1 – How Cover Crop Affects Soil Loss</li> </ul>	<ul style="list-style-type: none"> <li>b. Contour strip cropping</li> <li>c. Grassed waterways</li> <li>d. Conservation cropping sequence</li> <li>3. Terraces can be either gradient or parallel <ul style="list-style-type: none"> <li>a. Broad-base terraces</li> <li>b. Narrow-base terraces</li> <li>c. Steep backslope terraces</li> </ul> </li> </ul>
<p><b>Application</b></p> <ul style="list-style-type: none"> <li>📄 AS 1 – How Cover Crop Affects Soil Loss</li> </ul>	<p>Answers to AS 1:</p> <ol style="list-style-type: none"> <li>1. Water rushed off the bare soil into the jar, taking soil with it. The jar will contain muddy water.</li> <li>2. The water that flows from the sod will be reasonably clear. It will take longer for the flow to start and it will continue longer.</li> <li>3. The experiment proves the importance of a cover crop.</li> </ol> <p>Other activities:</p> <ol style="list-style-type: none"> <li>1. Conduct field trips to observe irrigation practices.</li> <li>2. Invite an NRCS or Water Conservation District representative to speak to the class about ways a farmer can solicit assistance in developing a conservation plan.</li> <li>3. Show videos covering additional types of drainage and conservation. These are available through the Department of Conservation.</li> </ol>
<p><b>Closure/Summary</b></p>	<p>The first steps in evaluating soils involve learning how to identify horizons and site characteristics. The next steps examine the use and management of the soil. Management practices include the suitability of artificial drainage and irrigation, water erosion, evaluating the erosion hazard, conservation practices for erosion control, and hazards or limitations for cropping systems.</p>

Instructor Directions	Content Outline
Evaluation: Quiz	Answers: 1. a. How to identify horizons and site characteristics b. Examine the use and management of the soil 2. a. Texture b. Slope 3. a. Broad-base b. Narrow base c. Steep backslope 4. No-till 5. Contour strip cropping