

Lesson A2–5

Understanding the Importance of Managing Soil, Water, and Waste

Unit A. Mechanical Systems and Technology

Problem Area 2. Soil and Environmental Technology Systems

Lesson 5. Understanding the Importance of Managing Soil, Water, and Waste

New Mexico Content Standard:

Pathway Strand: Natural Resources and Environmental Systems

Standard: I: Recognize importance of resource and human interrelations to conduct management activities in natural habitats.

Benchmark: I-A: Identify resource management components to establish relationships in natural resource systems.

Performance Standard: 1. Identify natural resources. 2. Identify organizations and agencies involved in resource management. 3. Identify impacts by humans on natural resources. 4. Describe ecosystem relationships.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain the importance of managing soil.
2. Explain the importance of managing water.
3. Explain the importance of managing waste.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Porter, Lynn, et al. *Environmental Science and Technology*, Second Edition. Danville, Illinois: Interstate Publishers, Inc., 2003. (Chapter 14)

Other Resources. The following resources will be useful to students and teachers:

Conserving Soil. League City, Texas: National Association of Conservation Districts, 1990. (Unit II)

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparency from attached master

Terms. The following terms are presented in this lesson (shown in bold italics):

Degradation
Domestic wastewater
Freshwater
Grey water
Hazardous waste
Irrigation
Sewage
Solid waste
Spent water
Stewardship
Wastewater

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students to describe the responsibilities of a store manager. Ask them what would happen if the manager did not do these tasks. Most likely the business would fail. The same is true with our environmental resources. We are the managers and we have certain responsibilities that we must do.

Summary of Content and Teaching Strategies

Objective 1: Explain the importance of managing soil.

Anticipated Problem: Why is managing soil important?

- I. There are many philosophic and economic reasons for managing soil and minimizing its degradation. **Degradation** is lowering the quality of soil. The soil is no longer as productive or useful as it once was. The reasons for soil management can be categorized into several groups. Some of them are:
 - A. Humanitarian Reasons—These reasons concern human welfare and social reform, in particular providing an adequate supply of nutritious food for the hungry. The United States has traditionally been the largest contributor of food aid to developing nations. Food constitutes about 30 percent of all our foreign aid. Providing enough for exports, food aid, and domestic use requires high soil productivity.
 - B. Economic Reasons—Economic reasons concern expenses incurred on the farm to produce food, the costs of goods of the consumer, and exports. The U.S. is the world's leading exporter of agricultural products. Maintaining high levels of exports will help match trade deficits to foreign countries and help strengthen our economy.
 - C. Stewardship Reasons—**Stewardship** refers to our responsibility to manage natural resources to assure an adequate supply for future generations. Stewardship involves the practices of wise use, conservation, and preservation.
 - D. Environmental Reasons—Soils should also be conserved for environmental reasons. It is a societal benefit to have a clean environment with adequate supplies of pure drinking water, clean air, productive soils, and recreational areas.
 - E. Aesthetic Reasons—This final category concerns maintaining the environment as a beautiful site to experience. Most people would like to avoid unsightly scars and bare, eroded soils on the landscape.

A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the importance of managing soil. Conserving Soil is recommended.

Objective 2: Explain the importance of managing water.

Anticipated Problem: Why is managing water important?

- II. Water has many uses. It plays an important role in many aspects of human life. Several areas in which water exerts an influence are:
 - A. Life processes—Water is essential for living organisms in carrying out the functions of life. Plants use water in major life processes such as photosynthesis and temperature regulation through transpiration. Animals use water in metabolism and in body fluids. Humans need water to stay alive. The human body is 65 percent water, with blood and

plasma being 92 percent water, and muscle tissue being 80 percent water. The body maintains a certain water content; death results if more than 20 percent of the water is lost. If not enough water is supplied naturally, a crop producer may have to irrigate land. **Irrigation** is the addition of water by mechanical means.

- B. Daily living—Water is used in daily living activities. The amount people use varies from one country to another. People in North America use more than in other countries, with those in the United States using more than in Canada. The average person uses 100 gallons each day for bathing, washing, cooking, and sending wastes from the home. Taking a bath uses 20–30 gallons. About 15 gallons are used to wash the dishes for a day.
- C. Climate—Water moderates the temperature of the earth. Because water has a high heat capacity, it can regulate and transfer heat. Cities near large bodies of water have climates moderated by the water. Extreme temperature changes are found in locations on land far away from water.
- D. Manufacturing—The making of steel, refining oil, producing paper, processing food, and many other activities in manufacturing require large amounts of water. More efficient manufacturing processes can reduce the amount of water required. Some paper mills use nearly 40,000 gallons of water to make a ton of paper.
- E. Transportation—Rivers, oceans, canals, and other bodies of water are used to transport raw products and manufactured materials. Rivers and canals often use barges guided by tug boats. In transportation, water is not used or changed into another form.
- F. Recreation—Swimming pools and water parks often require the use of scarce freshwater from wells or other sources. **Freshwater** is water that has little or no salt, with the salt content being less than 3.0 parts per thousand. Where possible, water is reconditioned and used in recreational facilities.

A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the importance of managing water. Chapter 14 in Environmental Science and Technology is recommended. Use TM: A2–5A to assist in the discussion of this topic.

Objective 3: Explain the importance of managing waste.

Anticipated Problem: Why is managing waste important?

- III. All processes that occur produce some kind of waste. It is important that means for managing the waste in an efficient and sanitary way are developed and conducted. There are several different kinds of wastes that are generated through a variety of activities. It is important to be able to identify them in order to know the proper management technique to follow. Some of the types of waste are:
 - A. Wastewater—**Wastewater** is used water that contains dissolved or suspended matter. It is produced by homes, factories, farms, and other places where water is used. Wastewater can damage the environment. Streams and lakes can be destroyed by wastewater. Factories and farms treat water before it is released to assure that it causes little or no dam-

age. Water released into a stream or lake should not appreciably change the natural conditions in the stream or lake. There are different kinds of wastewater. They are:

1. Spent water—**Spent water** is water that has been used and can no longer serve the purpose for which it was used because of contamination.
 2. Domestic wastewater—**Domestic wastewater** is the wastewater produced by humans in their daily lives.
 3. Grey water—**Grey water** is the water produced by bathing, cooking, and washing dishes and clothes.
 4. Sewage—**Sewage** is the wastewater produced by residential and commercial sources.
- B. Solid waste—**Solid waste** is garbage, refuse, sludge, and other discarded material. Solid wastes are non-liquid materials that do not dissolve in water or other solvents.
- C. Hazardous waste—**Hazardous waste** is waste that is potentially dangerous to human health or the environment. The materials may be solid, liquid, or vapor wastes.

A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the importance of managing wastes. Chapters 20 thru 22 in Environmental Science and Technology are recommended.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance, on the application activity. A sample written test is attached

Answers to Sample Test:

Part One: Matching

1 = f, 2 = g, 3 = c, 4 = h, 5 = a, 6 = b, 7 = d, = e

Part Two: Completion

1. food aid
2. waste

Part Three: Short Answer

Wastewater, solid waste, hazardous waste.

Test

Lesson A2–5: The Importance of Managing Soil, Water, and Waste

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | |
|----------------|----------------|--------------------|
| a. degradation | b. grey water | c. hazardous waste |
| d. sewage | e. solid waste | f. spent water |
| g. stewardship | h. wastewater | |

- _____ 1. Water that has been used and can no longer serve the purpose for which it was used because of contamination.
- _____ 2. Refers to our responsibility to manage natural resources to assure an adequate supply for future generations.
- _____ 3. Waste that is potentially dangerous to human health or the environment.
- _____ 4. Used water that contains dissolved or suspended matter.
- _____ 5. Lowering the quality of soil.
- _____ 6. The water produced by bathing, cooking, and washing dishes and clothes.
- _____ 7. Wastewater produced by residential and commercial sources.
- _____ 8. Garbage, refuse, sludge, and other discarded material.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. The United States has traditionally been the largest contributor of _____ to developing nations.
2. All process that occur produce some kind of _____.

Part Three: Short Answer

Instructions. Provide information to answer the following question.

What are the different types of wastes?

WATER CONTENT OF SELECTED ITEMS

Item	Water Content Percent
Human body	65
Earthworm	80
Rodent (mouse, rat, etc.)	65
Elephant	70
Potato	80
Tomato	95
Ear of roasting corn	70