

Lesson A3–5

Maintaining Watersheds

Unit A. Natural Resources

Problem Area 3. Water

Lesson 5. Maintaining Watersheds

New Mexico Content Standard:

Pathway Strand: Natural Resources and Environmental Systems

Standard: VII: Apply scientific principles to environmental services.

Benchmark: VII-D: Discuss properties, classifications and functions in order to understand watershed principles.

Performance Standard: 1. Identify properties of watersheds. 2. Explain watershed management. 3. Assess source water.

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

1. Define watershed.
2. Explain the importance of watersheds.
3. Identify the features of a watershed.
4. Explain how to manage a watershed.

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*. 2nd Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003. (Textbook and Activity Manual, Chapter 14)

Lee, Jasper. *Natural Resources and Environmental Technology*. Danville, Illinois: Interstate Publishers, Inc., 2000. (Textbook, Chapter 7)

Know Your Watershed. <http://www.ctic.purdue.edu/KYW/Brochures/GetToKnow.html>

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

Turk, Jonathan and Amos Turk. *Environmental Science*. 3rd Edition. New York: CBS College Publishing, 1984.

Arms, Karen. *Environmental Science*. New York: Holt, Rinehart and Winston, 1996.

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Copies of student lab sheets

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

Filter strips
Riparian areas
Terrain
Watershed
Watershed divide
Wetland

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.

Have community leaders present information on local watersheds to the class. Ask them to give the class information on how the watershed was developed, how it is managed, and who is responsible for maintaining it.

Summary of Content and Teaching Strategies

Objective 1: Define watershed.

Anticipated Problem: What is a watershed?

- I. A *watershed* is an area that provides runoff for a stream or reservoir. Any natural or man-made part of the landscape can be considered a watershed. Examples include farmland, forests, fields, and parking lots.
 - A. Watersheds drain downhill into bodies of water. If water in the watershed becomes polluted, the body of water it drains into will be polluted as well. Therefore, watershed management is important to help keep pollution to a minimum. This may include prohibiting activities such as disposing of wastes or building structures near watersheds.
 - B. Watershed sizes vary by location. Some watersheds may be large, like watersheds near rivers or estuaries. Other wetlands are smaller, like those near ponds and streams.

Use TM: A3–5A to show the students what a watershed may look like. Ask students to think of areas around their homes or the community that could be considered a watershed.

Objective 2: Explain the importance of watersheds.

Anticipated Problem: Why are watersheds important?

- II. Watersheds are important for many reasons.
 - A. Watersheds provide people with a healthy water supply and places for recreation.
 - B. Watersheds can be used to provide water for irrigation and local industry.
 - C. Wildlife depend on watersheds for places to live and nest.
 - D. People can live in watersheds.

Use TM: A3–5B to review the importance of watersheds. Have students make lists of other reasons why watersheds may be important. Think about specific watersheds in your area.

Objective 3: Identify the features of a watershed.

Anticipated Problem: What are the features of a watershed?

- III. Watershed features include size, boundary, terrain, soil type, and the features nearest the water.
 - A. Watershed sizes vary by location. Some watersheds may be large, like watersheds near rivers or estuaries. Other watersheds are smaller, like those near ponds and streams.
 - B. The boundaries of a watershed are marked by watershed divides. A *watershed divide* is a ridge or area of higher ground that forces water to drain towards or away from a watershed.

- C. The terrain of the watershed is also an important feature. **Terrain** refers to the topography or the outline of the surface of the land. Steeper terrain will result in faster drainage. Soil erosion and flooding may result from faster drainage.
- D. Soil type can also determine the rate of drainage in the watershed. Soils with high clay contents will drain more slowly which may result in more erosion and flooding. Soils with a high sand content will drain more quickly.
- E. Another feature of a watershed are the features nearest the water. The presence of filter strips, wildlife habitats, riparian areas, and wetlands can greatly affect the quality of the water in the watershed. **Filter strips** are grassy areas along the edge of the watershed that filter out sediment and other pollutants. Wildlife habitats include all plant and animal species that live within the watershed. **Riparian areas** are areas of vegetation near the source of water. **Wetlands** are areas that have water covering the ground.

Use TM: A3–5C to review the features of watersheds. Have students look at their lists from the previous objectives. Have them think about the features of the local wetlands they identified. Refer back to TM: A3–5A to identify the location of the watershed divide or boundary of a watershed.

Objective 4: Explain how to manage a watershed.

Anticipated Problem: How can watersheds be managed?

- IV. There are several steps in planning and managing a watershed. Following these steps will help to determine the success of the development of the watershed.
 - A. Before a watershed can be managed it must first be planned for and developed.
 1. Planning a watershed should first begin with the determination of the size and boundaries of the watershed. These will be determined by the soil and terrain of the area.
 2. Next, the uses of the watershed should be determined. This should include people and industry that will use the watershed and what they will use it for.
 3. The next step is to build partnerships with local people and businesses. They can help to find funding, divide work, and manage conflicts.
 4. After finding funding and getting the preliminary work done, the next step is to develop maps of the area, determine the goals of the area, and evaluate the quality of the water in the potential watershed.
 5. Another important aspect of planning a watershed is educating the local communities. Educational programs can help make people aware of the uses of the watershed, how to care for and protect the watershed, and the benefits of developing the watershed.
 6. Provide landowners in the area with technical and financial assistance in developing and maintaining the watershed.

7. The final step in planning and developing a watershed is to follow-up the project. Make sure that water quality monitoring is continued and the area is being managed appropriately. Also, continued education is important.
- B. Once a watershed has been planned and developed, it has to be managed. Following are a few steps that will help to successfully manage a watershed.
1. Make decisions about the watershed with the support of everyone involved. This should include the local partners and local community members.
 2. Obtain technical information about the watershed using high quality tests done in a precise manner. Use this information when making plans for the watershed.
 3. Develop education and assistance programs. Keeping the local community educated about the watershed will make management simpler. Keeping pollution and degradation to a minimum will be more cost effective than not.

Use TM: A3–5D to review the steps in planning a watershed. Use TM: A3–5E to review the steps in managing a watershed.

Review/Summary. To review and summarize the information in this lesson, have the students define the terms and answer the anticipated questions.

Application. To apply the objectives in this lesson, refer to Chapter 14 of the *Environmental Science and Technology Activity Manual*.

Evaluation. Use the following sample test to evaluate the students' comprehension of the objectives covered in this lesson.

Answers to Sample Test:

Part One: Matching

1 = a, 2 = c, 3 = b, 4 = d

Part Two: Completion

1. size, boundary, terrain, soil type, features
2. sand

Part Three: Short Answer

1. Watersheds are important for many reasons. Watersheds provide people with a healthy water supply and places for recreation. Watersheds can also be used to provide water for irrigation and local industry. Wildlife also depend on watersheds for places to live and nest. People can also live in watersheds.
2. A watershed divide is a ridge or area of higher ground that forces water to drain towards or away from a watershed.

Test

Lesson A3–5: Maintaining Watersheds

Part One: Matching

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

- | | |
|------------|-------------------|
| a. terrain | c. filter strips |
| b. wetland | d. riparian areas |

- _____ 1. Outline of the surface of the land, topography.
- _____ 2. Grassy areas along the edge of the watershed that filter out sediment and other pollutants.
- _____ 3. An area that has water covering the ground.
- _____ 4. Areas of vegetation near the source of water.

Part Two: Completion

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

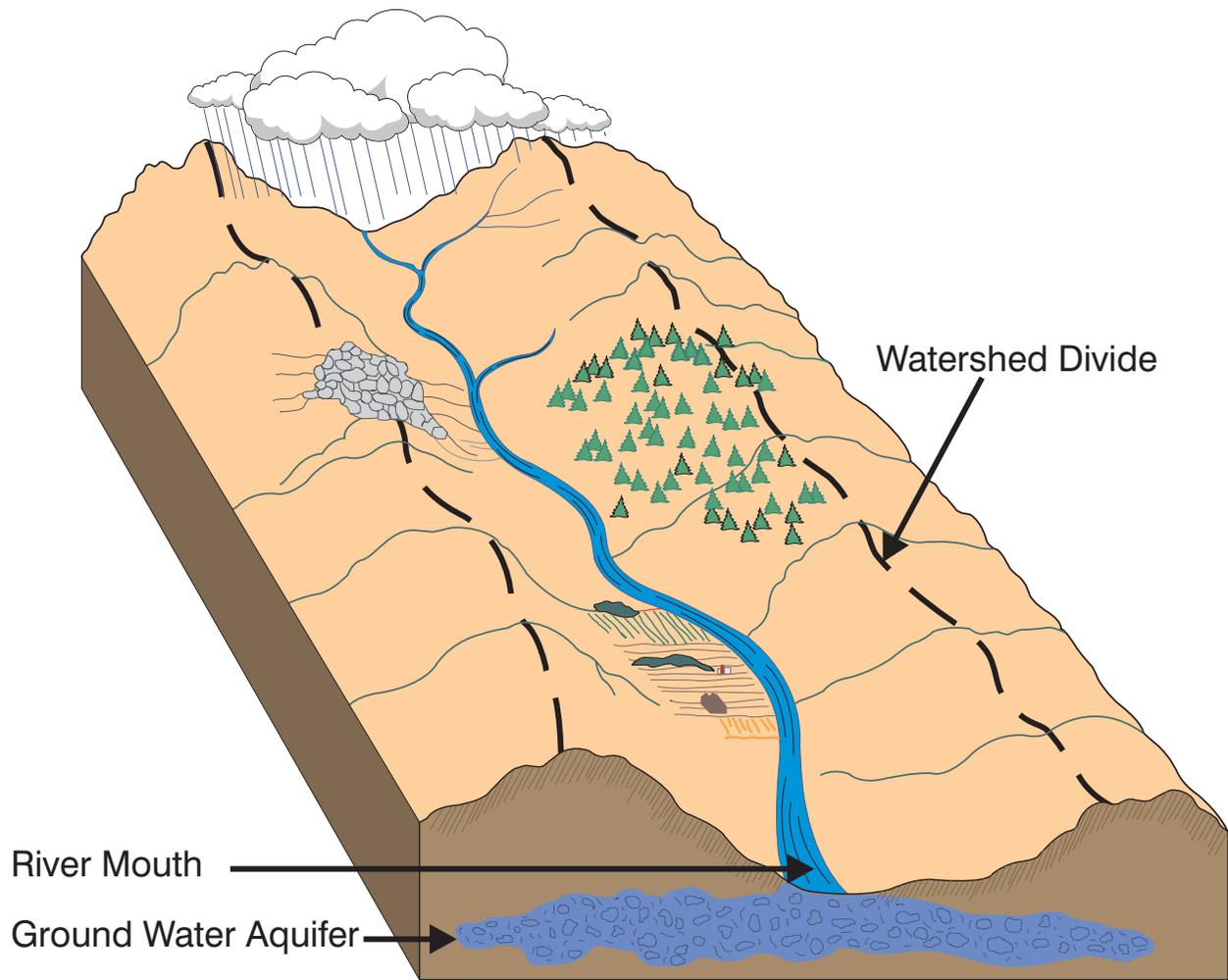
1. Watershed features include _____, _____, _____, _____, and the _____ nearest the water.
2. Soils with a high _____ content will drain more quickly.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. Explain three reasons why watersheds are important.
-
-
-
-
-
-
-
-
-
-
2. Define watershed divide.

A WATERSHED



(Courtesy, Interstate Publishers, Inc.)

IMPORTANCE OF WATERSHEDS

- ◆ **Healthy water supply**
- ◆ **Places for recreation**
- ◆ **Provide water for irrigation and local industry**
- ◆ **Wildlife depend on watersheds for places to live and nest**
- ◆ **People can live in watersheds**

WATERSHED FEATURES

- ◆ **Size**
- ◆ **Boundary**
- ◆ **Terrain**
- ◆ **Soil type**
- ◆ **Features nearest the water**

WATERSHED PLANNING

- ◆ **Determine the size and boundaries based on the soil and terrain**
- ◆ **Determine uses including who and what**
- ◆ **Build partnerships to help find funding, divide work, and manage conflicts**
- ◆ **Develop maps, determine goals, evaluate water quality**
- ◆ **Educate the community**
- ◆ **Provide landowners with assistance**
- ◆ **Follow up with testing and continued education**

WATERSHED MANAGEMENT

- ◆ **Involve everyone when making decisions**
- ◆ **Use technical information to make plans**
- ◆ **Develop educational and assistance programs**