Know Your Watershed

Activity Book, pages 9-15

KEY CONCEPTS:

The total land area that contributes water to a particular drainage channel (wash, arroyo, or stream) is called its watershed. Central Arizona is part of the Salt River Watershed within the White Mountains northeast of Phoenix.

Melting winter snowpack flows downhill towards Phoenix and its surrounding cities. The incoming water is then diverted into canals that direct it to the cities to meet residents' water needs. Conditions that affect the land surface in the watershed impact both the quality and quantity of water flowing from the watershed or infiltrating the ground along the way.

CORRELATED ADE STANDARDS:

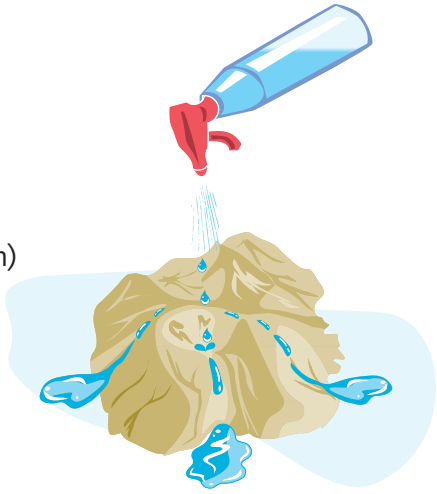
Science: SC06-S1C4-05, SC06-S4C3-02, SC06-S6C2-01, SC07-S1C4-05, SC08-S1C3-02, SC08-S1C4-05

Social Studies: SS06-S4C1-03, SS06-S4C2-01, SS06-S4C2-02, SS06-S4C5-02, SS06-S4C5-03, SS07-S4C1-03, SS07-S4C2-01, SS07-S4C5-01, SS07-S4C5-03, SS07-S4C5-04, SS07-S4C5-05, SS08-S4C1-03, SS08-S4C5-01, SS08-S4C5-03

ELA: *(NOTE: Reading Standards for Informational Text [RI] are incorporated throughout each section of* ***STORMWATER IN THE DESERT****.)*

Educational Technology: ET06-S1C1-01, ET06-S3C2-02, ET06-S3C2-04, ET07-S1C1-01, ET07-S3C2-02, ET07-S3C2-04, ET08-S1C1-01, ET08-S3C2-02, ET08-S3C2-04

TRY THIS **Build a Watershed (page 10)**



MATERIALS:

- Cookie sheets OR aluminum foil pans (8''x 8'' or larger, 1 per student or team)
- Sheets of heavy cardstock (2-3 per student or team) OR wax paper
- Water-filled spray bottle (1 per student or team)
- Tempera paint
- Towels or sponges for water clean-up

SUGGESTED PROCEDURES:

This activity allows students to experience how topography influences the downward movement of water. By building a ''watershed'' and ''raining'' water onto it, students see how water flows off ridges and down separate and distinct watersheds.

The activity may be done as a teacher demonstration if time and materials are limited. However, the concepts are best conveyed if students construct and rain on their own watersheds.

Have students work alone or in teams and follow the ''Build a Watershed'' directions on page 10 of their activity books. Encourage students to create realistic mountains and valleys. If time, consider having them research and recreate the general topography of the mountains that make up the Salt River Watershed.

Once their watersheds are ready, students squeeze a generous amount of tempera paint along the topmost ridgeline of their mountains. Then, they ''make it rain'' over the mountains as evenly as possible using the spray bottle. Give them time to experiment with their rainstorms. Have them consider the following questions with their experiments:

Can you see how your mountain ''sheds'' water?
Where is the water flowing? Along the high or low points on the slope?
How many watersheds did you create?
Does water run off some watersheds more quickly than others?
If so, what influences how fast the water flows?
Can you outline the different watersheds by following the ridgelines?
Do you think this is similar to what happens when it rains on our local mountains?

Have students assist in clean up. Afterwards, discuss:

We cleaned up our runoff water with towels and sponges.
What do you think happens when runoff from the Salt River Watershed flows towards Phoenix?

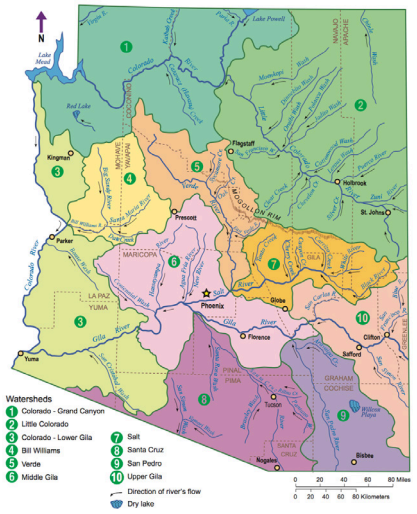
EXTENSIONS:

In lieu of a single ''mountain'', have students construct multiple mountains, connecting each with masking or clear tape along the ''valleys''. This will keep the mountains secure. Repeat the process and share observations. Identify the valleys and the formation of a river. How would students modify their original observations with the single mountain?

Challenge students to create more complex and functional watershed models! Provide teams of students with guidelines for topographical features they must build into their model to eventually test and demonstrate to the class. Such features may include: minimum and maximum mountain heights; a quantity of mountains to build; a variety of slopes, mesas, boulders, sand or dirt, trees, grass; etc. Have students make predictions as to how these features affect water flow; test, make observations, and demonstrate to the class. Students should provide the class with a review of their features and where the water flowed. What did they predict correctly? What did NOT match their predictions? What design features could be engineered differently?

Introduce the concept of erosion using an aluminum pan, sand, dirt, gravel, and a water-filled spray bottle! Visit the Colorado Department of Public Health and Environment's stormwater lesson plan at https://www.colorado.gov/pacific/sites/default/files/WQ_Teacher-Resources.pdf (page II.2). Pollution concepts can be introduced using food colors.

Mapping the Watershed (pages 11-14)



MATERIALS:

- Colored pencils: red, green, blue, orange, purple

SUGGESTED PROCEDURES:

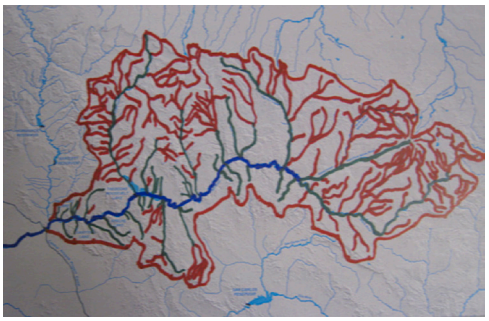
Using the *Arizona's Watersheds* colored map on page 11 and provided key in the activity book, discuss with students the following:

- Definition of a watershed (*total land area that drains precipitation towards a low point, such as a river, wash, or stream*)
- The number (10) and location of Arizona's watersheds *(all 10 watersheds are defined by color on the map and listed in the key)*
- Location of rivers and direction of flow *(refer to each river's arrows that indicate direction of flow)*
- Location of Phoenix *(starred)*
- Location of the Salt River and its direction of flow *(extending eastward from Phoenix; flows from the White Mountains downhill and to the west)*
- Where the Salt River originates and the name of its watershed *(originates at the confluence of the White and Black rivers in eastern Arizona; Salt River Watershed)*
- Location of the Mogollon Rim and summer monsoon moisture accumulating over it (*the Mogollon Rim forms the northern boundaries of the Verde and Salt River watersheds; flows downhill towards Phoenix)*
- Where do the monsoon rains flow to? *(northward into the Little Colorado Watershed, and southward into the Verde, Salt River, and Middle Gila watersheds)*

Before mapping the watershed (pages 12-13), it is highly recommended that the teacher construct a full sample of this exercise to display at the end of the mapping exercise.

Reproduce (scanning or photocopying) the map on page 12 of the student activity book. It has been formatted for best printing quality, but you may have to adjust your computer's or printer's settings for best output.

Using the map on page 12 and directions on page 13, have students map the Salt River Watershed. Allow ample time for students to follow each step. By the end of the exercise, the watershed map should appear similar to this:



Continue the mapping exercise by discussing together (or prompting students to discover individually or in teams) the in-depth questions on page 14 of the activity book. Have students refer to the *Arizona's Watersheds* map on page 11 and their Salt River Watershed map from page 12.

EXTENSIONS:

Further explore the statement, ‘‘Wherever you live, you live in a watershed.’’ Using what students have learned from the watershed activities, compare Arizona’s topography and resulting watersheds to other various regions of the United States. What types of topography are represented across the country (i.e., flat plains, rocky mountains, hills, mesas, etc.)? Discuss watershed function in these areas and if desired, provide opportunity for students to research and present their conclusions to the class.

In addition to the larger natural landforms, watersheds exist on smaller levels as well, such as rooftops, playgrounds, streets, home patio areas, parking lots, and city drainage structures. Observe one or more of these structures with the class and discuss where water would flow. How does basic watershed science function the same on these micro-levels compared to the larger natural landscapes? How do they differ?

Stormwater Cross Word Search (page 15)

MATERIALS: None

SUGGESTED PROCEDURES:

Students use crossword clues and the glossary to complete a crossword puzzle within a word search. Next, they search for stormwater-related words hidden in the word search.

EXTENSIONS:

Have students create a ‘‘Jeopardy’’-type game using the key vocabulary terms from the *Stormwater Cross Word Search*. Conduct a ‘‘game day’’ for students to rotate around the class to play the games.

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