

## Unit 3

### Unit 3 objectives

In this unit, students will

- understand how water is used in different economic sectors;
- investigate patterns in water use and consumption, and relate them to precipitation patterns;
- analyze agricultural practices in the U.S. in the context of water resource management; and
- identify local and regional challenges in water management and formulate potential solutions to these problems.

### Finding web resources

See the Saguaro Project web page for a list and explanation of the Internet resources mentioned here.

<http://saguaro.geo.arizona.edu/ewr/>

# Instructions and resources

In this unit, students explore relationships between water use and precipitation across the U.S. By investigating both local and regional water use for different economic sectors (domestic, agricultural, power, etc.), students gain an understanding of the critical importance of this resource and the complex issues that are involved in managing it.

## 3.1 – Water in your world (Engage)

This activity is designed to make students think about the role of water in their everyday life. By generating a list and categorizing the ways in which water is used in their home and community, students develop a sense of the importance of this resource. The activity involves students interviewing family, neighbors, and friends, so the instructions must be given to the students several days before the day scheduled for class discussion.

As an extension to this activity, you may want students to bring in a copy of a recent water bill to examine how water use varies with family size, yard size, or season. As an ongoing project, students may wish to conduct a water conservation experiment at home to determine how much water (and money) could be saved by applying various conservation measures in their home. You might also have students keep journals noting ways they have seen water wasted and use these to conduct a class discussion of potential conservation measures.

## 3.2 – Water for many uses (Explore)

Students use ArcView to investigate patterns of water use in the United States. They compare water use at both a regional and state level using absolute and per capita water use data. Students then study the different economic sectors in which water is used (domestic, industrial, agricultural, etc.) in different regions of the United States. Using information on the power and agriculture water use sectors, they compare geographic patterns of water use and consumption.

As an extension to this activity, students can investigate the source of their local water supply and the primary uses in their community using web sites sponsored by the U.S. Geological Survey as well as municipal and private water providers.

## 3.3 – Water at work (Explain)

This reading provides students with an in-depth explanation of water use sectors—domestic, commercial, industrial, agricultural, mining, and power. The students are also introduced to the issues regarding conservation and sustainability of our water resources.

Students may wish to further explore water use using Internet sites that provide information and photos illustrating how water is used in the power and agriculture sectors. The Bureau of Reclamation and

Hydroelectric.com sites illustrate how power is generated and provide an extensive list of resources and photographs. The USDA, Irrigation Association, and California Polytechnic University's Irrigation Training and Research Center web sites provide information about irrigation research, photographs, and links to other resources.

### ***3.4 – Feeding a nation (Elaborate)***

Students use ArcView to examine the relationship between precipitation and agricultural products and practices, and identify the primary source of irrigation water at the county level in the United States. Students investigate crops irrigated using water from the High Plains aquifer, and calculate the aquifer's volume and rates of recharge and withdrawal to estimate its productive lifetime. By demonstrating the importance of water to the food supply, this activity illustrates to students that, although water is a renewable resource, renewal is a complex process and proper management of this resource is critical to our everyday life.

In addition to the agriculture and irrigation web sites listed for Activity 3.3, students can learn about aquifers and ground water-related issues by visiting the sites of the National Groundwater Association, the Groundwater Foundation, and Groundwater.com.

### ***3.5 – Meeting the challenge (Evaluate)***

Students use information learned in previous activities to discuss regional and local issues of water quality and quantity. Students evaluate how these issues impact them personally and formulate recommendations to address some of the regional and local challenges. Students may request access to the ArcView project files to retrieve specific information to include in their recommendations.

If you have not already done so, this is an excellent time have students research the source of their drinking water and to identify local issues regarding water availability and quality. Students can visit the web sites of the United States Geological Survey, the Environmental Protection Agency, and your local water provider to obtain this information.