Web Quest: Water in Texas

GRADE LEVEL 6th-8th

Overview

Did you use water today? If you brushed your teeth, used a toilet, took a shower, ate a meal, or even breathed the air chances are very good that water was involved. We use water in almost everything we do, and for most of the things we do that involve water, there is nothing we could use as a substitute.

In this activity, you will investigate who uses water in Texas and how much they use through a Web Quest. Water is a limited, precious resource essential to almost everything we do. Will we have adequate water resources in the future?

Many people in Texas don't realize how much water is used every day and for what purpose or activity. If we don't have an accurate picture of how water is used, we can't make a successful plan to conserve water.

You will investigate water use in Texas and make recommendations on how to use water efficiently and wisely.

Task

It takes thoughtful planning to make sure that when you turn on the faucet, water comes out. Texans rely on both groundwater from aquifers and surface water from rivers and reservoirs to provide enough water for everyone to drink. Water is also needed for almost anything else you could think of, and accounting for that water to ensure it will continue to flow for future generations of Texans requires a comprehensive water plan.

You are part of a team hired by the State of Texas to make a water plan that ensures adequate water resources for all Texans. You will be assigned to represent a planning region, and your task is to recommend and present measures that will help reduce water consumption by 10 percent. Your team will need to look at a lot of different water user groups, competing interests and different points of view in order to come up with a plan that gives everyone enough water now and in the future. You will share your research with others on your team to develop a comprehensive plan, and you will need data to support your plan.

Because water is a finite resource and the population of Texas continues to grow, comprehensive planning is required to ensure that no Texan runs out of water. While working toward a solution, think creatively; original ideas are encouraged.

Process

Creating a long term plan to ensure Texas has enough water is a complex process. In 1997, Senate Bill 1 created a regional water planning process in Texas. Texas is broken into 16 regional water planning groups, and each group develops a water plan for their region. The Texas Water Development Board coordinates the regional water planning process and incorporates the regional plans into a State Water Plan that is updated every five years. The current (2012) statewide plan, all previous statewide plans, and the regional water plans developed by each of the 16 regional planning groups are all available at www.twdb.texas.gov/waterplanning.

As citizens, you play an important role in providing feedback to water planners. You will work in teams to come up with a plan that ensures Texans will have enough water today and into the future.

Water planning groups use different models in the water planning process to estimate statewide water availability. Models incorporate numerous types of scientific data on factors such as long term climate conditions, soil moisture, groundwater recharge rates, surface water evaporation, reservoir levels, and much more. Models are also used to determine necessary "environmental flows": these represent the amount of water required by aquatic species living in Texas rivers, bays, and estuaries.

Consider these questions before splitting into groups:

What other data would be useful in accounting for all the water in Texas?

Why do we use models to think about water planning, and how do we use these models?

How many different water user groups or uses for water can you list?

Teams will consist of four members. Each team will represent a specific regional water planning area in Texas. See the map on TWDB's Maps web page. Information can also be found on the previously mentioned water planning page.

Each team member will select one of the following roles to play. Choose the four roles that figure most prominently into the economy **of your assigned region**.

Team Member	Water Use	Guiding Interest
Farmer	Irrigation	Adequate water to irrigate crops
Mayor	Municipal	Adequate water for residential (homes) and commercial (restaurants, schools, hospitals) uses
Manufacturer	Industrial	Enough water to run factories, manufacturing facilities, and other businesses
Power plant engineer	Electric Utility Generating Facility	Enough water to generate electricity for the town
Rancher	Livestock	Adequate water to raise livestock such as cattle, poultry, sheep, and hogs
Mining Operator	Mining	Adequate water to extract and process oil and various minerals
Biologist	Environmental	Enough water in the rivers and estuaries to provide habitat for aquatic ecosystems

Spend a little time investigating your region before selecting your roles. (This is a Web Quest after all.) Some regions will have plenty of water for all users and purposes; others will be quite 'dry'. Some regions have lots of agriculture; others will have more mining or municipalities.

Each category of water user will have a different capacity to conserve water without inhibiting their ability to make a living. For instance, in order for a farmer to conserve water they might switch to more water efficient crops or irrigation methods. That way, they could use less water without affecting their yields. A rancher, on the other hand, might have to raise fewer animals in order to use less water. That could have a negative impact on the rancher's livelihood.

Each team member will explore resources to collect information and record their data. A summary of your individual research and a list of resources will be collected from each team member on the day of the presentation. Remember, the goal is to reduce water consumption, and your specific task is to recommend and present measures that will help reduce water consumption by 10 percent.

The information each team member collects will be compiled to create **one final group presentation**. Your team must present your findings in an oral presentation, and it must be supported by one of the following products:

- a PowerPoint or other multimedia presentation;
- a poster;
- summary tables;
- a report; or
- a web page.

Every presentation must also include graphs that represent your findings.

Each individual team member must answer the following questions that relate to their chosen role:

Farmer

- How much water per year is used for irrigating crops in your region?
- In what ways would a water shortage affect your business?
- Why would you be interested in reducing water use?
- What factors discourage you from reducing water use?
- What are your recommendations for conserving water used for irrigated agriculture?

Mayor

- How much water per year do municipalities use in your region?
- How will water use change as the population of your city grows?
- In what ways would a water shortage affect your city?
- What are your recommendations for conserving water used in municipalities?

Manufacturer

- How much water per year does industry use in your region?
- In what ways would a water shortage affect your business?
- What are your recommendations for conserving water used for industry?
- What would motivate you to conserve water?

Engineer

- How much water per year do steam-electric power plants need to operate in your region?
- In what ways would a water shortage affect your business?
- What are your recommendations for conserving water used for power generation?

Rancher

- How much water per year does livestock use in your region?
- In what ways would a water shortage affect your business?
- What are your recommendations for conserving water used for agriculture?
- Is water conservation as important from your perspective as from the farmer's perspective? Why or why not?

Mining Operator

- How much water per year does mining use in your region?
- In what ways would a water shortage affect your business?
- What are your recommendations for conserving water used for mining?

Wildlife or Aquatic Biologist

- In what ways does a healthy aquatic ecosystem benefit the health of people?
- In what ways are healthy aquatic ecosystems important to the Texas economy?
- In what ways would a water shortage affect local aquatic ecosystems?
- What are your recommendations for conserving water so there is enough for healthy ecosystems?

The basis for the answers to these questions can be found with the Texas Water Development Board's website (www.twdb.texas.gov). TWDB (for short) is a state agency headquartered in Austin. From the website:

> "To accomplish its goals of planning for the state's water resources and for providing affordable water and wastewater services, the TWDB provides water planning, data collection and dissemination, financial assistance and technical assistance services to the citizens of Texas."

Use the tabs at the top of the homepage to guide you. "Water Planning" is a good place to start.

You will need to explore:

- The 2012 State Water Plan;
- How much water can be saved by using different conservation strategies;
- Summary of water usage;
- Historical water usage data;
- Projected population of Texas by region;
- Projected water supplies and user demand;
- Projected impact of not having enough water;
- Projected water demands for individual groups;
- Water management strategies for individual user groups;
- Conservation brochure which explains water conservation strategies for irrigated agriculture;
- TWDB's Water Conservation Best Management Practices Guides; and

- Texas Parks and Wildlife Department (TPWD) to illustrate ecologically unique stream segments in Texas, the endangered and threatened wildlife species, the criteria used to designate stream segments as unique, and water needs of Texas wildlife

Remember, water planning is a complex and sometimes difficult process. Team members won't always agree on things. You will have to compromise, negotiate, and create a plan that addresses the needs of each water user while ensuring that all Texans in all regions have enough water.

Your goal is a 10 percent reduction in water usage in your region.

Evaluation

Your water plan will be graded using the Water in Texas Web Quest Rubric included with this activity.

Conclusion

You have researched some information about water needs in Texas, identified strategies to conserve water and made a recommendation with your ideas and suggestions. Consider these additional discussion questions:

- Do you think that we know all there is to know about water use and water conservation?
- Are there other ideas currently being researched to help people think about water conservation?
- Do you think that any of your ideas could be used in your community?
- Why do you think some people don't practice water conservation strategies?
- Why is it so hard to predict how much water can be saved by using different conservation strategies?
- As a Texan, why would you be interested in learning about water planning and water conservation?

Every place in Texas is part of a regional water planning group. If you are interested in finding out more about how water planning is handled in your area, visit www.twdb.texas.gov and wateriq.org.

Get involved in water where you live, and help plan for YOUR future.