Red Butte Garden
THE UNIVERSITY OF UTAH

Conserving Water in the Desert

Lesson 7: Bottled Water or Tap?

Enduring Understanding

Removing water from underground aquifers can have long-term environmental impacts on surface ecosystems that may or may not be readily visible.

Essential Question

What are some of the environmental (and economic) effects of removing water from its local aquifers and transporting it to other areas?

Lesson Plan

Materials

- BB Book: *The Water Hole* by Graeme Base

Procedure

Warm-up

Read *The Water Hole* by Graeme Base.

Discuss the importance of the hole to the animals that use it by posing questions to the students:

Describe this habitat.
What would happen if the water hole dried up?
Who else might want access to the hole?
How does the water hole impact the organisms in this habitat?

Activity #1: Bottled Water or Tap?

Materials

- BB Water Testing Strips
- Five different brands of bottled water, and tap water from your school
- Small paper cups (3-4 oz.)

Using the water testing kit, students will run various tests as described on the Student Worksheet Bottled Water or Tap? on different brands of bottled and tap water to determine which water they choose to drink.

- Using the Student Worksheet, have each student make predictions about the outcomes.
- Create a key to the bottled waters and the tap water (i.e. A = Kroger Bottled Water; B = Arrowhead Bottled Water).
- Label each small paper cup with a letter that corresponds to the appropriate bottle, so the tasting tests are blind. Students will then taste each water sample and run the tests on them.
- They will record their findings on the Student Worksheet, and fill out the Reasoning section and Communication section.

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BOTANY BINS

Name: _____ Date: _____

Student STEM Practices Worksheet

Lesson 7: Bottled Water or Tap, 3rd – 8th grade

Objectives
Using the water testing kit, you will run various tests on different bottled waters and tap water to determine which water you would choose to drink.

The teacher will have a key to the different bottled waters and the tap water. You will label each of 5 cups with the letters A-E. She will pour water from the different bottles into your cups for you to test and rate for taste. Follow the directions on the water testing kit.

After you have completed the water tests and the Reasoning section of the worksheet, your teacher will reveal the identity of each of the bottles.

1. Gathering Data:

Questions I have: _____

_____

My Prediction: _____

_____

Tests of Various Waters

	Describe taste	Minerals (hardness)	Iron	Nitrates	pH	Chlorine
A						
B						
C						
D						
E						

2. Reasoning: Analyze your data and explain your findings.

Was there a significant difference among the different waters you sampled? Which water would you choose to drink? Why?

3. Communicating your findings. Write your discussion and conclusions here.

After the identity of the water in each of the bottles has been revealed by your teacher, find a partner and discuss which water you would choose and why. Did your choice change?

What factors are you basing your decision on?

How important is taste?

Activity #2: Carbon Footprint

- BB *Utah's Uncertain Water Future* video

Have students watch the video, *Utah's Uncertain Water Future*. Discuss the video, especially the part of the video dealing with the sinkhole. Students will then research the environmental effects created by the extraction and the bottling of drinking water on a community as well as on the environment as a whole.

Have them compare the carbon footprint and cost of both bottled water and tap water. The footprint should follow the bottle from its manufacture to the extraction of water, its transportation, the labeling and marketing and then to the market for consumption.

Then have them fill out the remaining two sections of the Student Worksheet Carbon Footprint.

[Conclusion and question for discussion: If the water tests in Activity #1 have no measurable differences between the bottled water and the municipal water, does it make sense to buy bottled water after learning about the negative effects on the ecosystems where the water was mined?]

Students will make a choice of whether they would choose tap or bottled water. Lead a discussion to help them explore other alternatives, such as filters, carrying a refillable bpa-free water container to fill at public water sources, using drinking fountains and lobbying for additional fountains and water filling stations at public places.

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Name: _____ Date: _____

Student STEM Practices Worksheet

Lesson 7: Carbon Footprint, 3rd – 8th Grade

Objectives
You will research the "carbon footprint" of bottled water vs. municipal water and then draw conclusions about the choice of water that has the least impact on the environment. You will explore the environmental effects created by the extraction and the bottling of drinking water on a community as well as on the environment as a whole.

Research and compare the carbon footprint and cost of both bottled water and tap water. Follow the bottle from its source of extraction or source, its transportation, the bottling, labeling and marketing, and finally to the consumer.

1. Gathering Data:

Questions I have: _____

_____

Research sites/literature: _____

_____

_____

_____

_____

_____

_____

2. Reasoning:

Analyze your data and explain your findings. After compiling your research, write a short summary of the cost and "carbon footprint" of bottled water compared to municipal tap water. Did you find any significant differences in the quality of the municipal water and the bottled waters?

3. Communicating your findings.

Discuss your reasoning with a partner, and alternatives to using bottled water. Some examples are using filters, carrying a refillable bpa-free water container to fill at public water sources, using drinking fountains, or lobbying for additional fountains and water filling stations at public places.

Activity #3: Ecosystems

Impact on Surface Ecosystems:

Students will create a presentation with graphics demonstrating the difference (before and after photos or drawings) of areas where water has been "mined" for export from its location. They may include the following:

- Aquifers and lakes or ponds being drained.
- The changes in the plant life.
- Subsequent effects on the wildlife and microorganisms in the ecosystem.
- Legacy Highway (research studies of wildlife and the effects of paving some of the wetlands there.) See Lesson #4 for impacts of citizens groups on the highway.
- Information from *Utah's Uncertain Water Future* video.

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Student STEM Practices Worksheet

Lesson 7: Ecosystems, 3rd – 6th grade

Objectives
Working in pairs, you will create a presentation showing what happens in an area where water has been mined for export, including before and after photos where these are available online. Also, include drawings and descriptions your team creates from your research.

1. Gathering Data:

Questions I have: _____

_____

Research Websites: _____

_____

_____

2. Reasoning:

Choose one of the mined areas and describe what happened when the water was mined. You can look at aquifers, lakes or ponds that have been drained. Describe the changes to the plant life, and the effects on the wildlife and microorganisms in the ecosystem.

3. Communicating Your Findings: You may draw a picture.

Report your findings to the class. You may use a poster, an oral report, a Power Point presentation or other means to describe the changes you researched.