

WEEK OF RESOURCEFULNESS CLASSROOM ACTIVITY**TOPIC**

How Much Water Does It Take?

KEY LEARNING OBJECTIVES

Students will be able to:

- **Discover** that water is used in many ways in the production of goods that we consume and use every day
- **Compare** various products according to their water consumption and examine where the hidden costs of water are in manufacturing and agriculture.

OVERVIEW:

In this activity, students will be introduced to the idea that it takes water—in many cases, A LOT OF WATER—to make many of the products that we buy and use or consume every day. Often the amount of water and the way that it is used in production and manufacturing is unexpected and hidden from the consumer. Students will be given a digital survey (google form or online poll) that asks them to rank 6–8 common products according to the amount of water that is required to make it. The teacher will show students the results of the poll and have a brief discussion on how and why students chose to rank them as they did. Next, students will get into small groups and each group will be assigned one of these products to focus on for a mini-research project. Each group will be given the task of discovering how much water is used to manufacture their product and where the water is used in manufacturing. After a 10-15-minute online research and collaboration time, student groups will each briefly report their findings to the class. Results of the research and the previous student poll will be compared and reactions to the results will be shared as a whole group.

CONNECTION TO THE ENERGY-WATER NEXUS

- Agriculture and manufacturing are among the largest consumers of water
- Choices we make about what we eat and goods we purchase can have a positive impact on the amount of water needed and used in production.

NATIONAL STANDARDS

Science

[Next Generation Science Standards](#)

[MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics](#)

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

[MS-ESS3-4 Earth and Human Activity](#)

Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

BACKGROUND INFO

When we think of using water in our daily lives, we usually would think about taking a shower, washing our hands, and doing dishes or laundry—direct usage of water. However, what many people don't realize is how much water, coined "virtual water" is used to produce and manufacture the things that we use or consume on any given day. When using the consumption of meat (beef, chicken, pork) as an example, most people would identify the water that livestock drinks as water used but would not immediately think about the water used to grow and irrigate the grain for the livestock or the water used in processing the meat. Knowledge of the shocking hidden water costs of products may just cause us to rethink some of the choices that we make about what we buy and consume and help us be better stewards of our precious water resources.

KEY VOCABULARY

- Water footprint
- Virtual water

MATERIALS

- "How Much Water Does it Take?" Research Sheet
- Devices with internet access (at least 1 per group)

TEACHER PREPARATION

- Teacher will need to create a poll for students that will allow them to rank various products according to how much water they think is used in the manufacturing or production of each.

The poll or survey can be created using free websites such as Poll Everywhere (www.polleverywhere.com) or Google Forms (www.forms.google.com) that can provide instant results of the poll.

PROCEDURE

1. The teacher should begin by displaying or asking students the following question: What is the most water-intensive activity in the U.S.? (This could be written on the front board or displayed on an overhead screen.) Ask student to share their ideas with the class.
2. Show the following short video clip that introduces students to the idea that there is a high water cost for the food items they eat every day.
<https://www.youtube.com/watch?v=n-kAv5xOwEo>. After viewing, ask students to share anything in the video that surprised them, or their feelings about this information.
3. Introduce the term “virtual water” to students and explain that term refers to the water used to produce food, make energy, and manufacture consumer products. This is a part of a “water footprint,” which is an assessment of both direct and virtual water patterns. Guide students to the **Resourcefulness: An Introduction to the Water-Energy Nexus app** <http://stem.guide/water-footprint/> on their devices. Instruct students to read about blue, green, black, and gray water, and brainstorm ideas about where these types of virtual water would be used in the production of the foods discussed in the video. Students can share their ideas with the class if time allows.
4. Explain to students that food is not the only thing we use every day that takes massive amounts of water to produce. Ask them to take a short online poll where they will rank various products according to which ones they think would require the most water to manufacture and which ones would require the least.
5. Products that can be included on the poll include blue jeans, a smartphone, a car, a sheet of paper, a cotton t-shirt, a cup of coffee, a plastic water bottle, a dozen eggs, and a pair of leather shoes. After students have ranked the products, reveal the results of the poll to the class. Ask students to share why they ranked things as they did, or if they agree with the results.
6. Next, ask students to get into small groups of 2–4. Assign each group one of the products from the poll and provide each group a copy of the “How Much Water Does it Take?” Research Sheet. Ask students to use their devices to see if they can determine how much water is used and where it is used in the production of their good. Give student groups 10–15 minutes to complete their research.
7. When the time for research is complete, ask student groups to share their findings with the class.
8. When all group’s reports are complete, the research sheets can be hung on the front board or other wall space in order of water use to create a visual display of the results. Ask students for their reactions of the results and how it compared to what they thought in the pre-research poll.

EXTENSION

As an extension of this lesson, students could calculate water that would be saved if they made decisions to decrease the consumption of their product. For example, if the average cup of coffee costs 35 gallons of water to produce, students can calculate the water that could be saved if a person (themselves or their parents perhaps) cut back their coffee to one cup per day, or one cup per week. They could add this to their research sheets or create a PSA poster or ad that informs the reader how much water could be saved by making choice to consume less of these products.

SOURCES

<https://www.watercalculator.org/water-use/the-hidden-water-in-everyday-products/>

<https://www.the71percent.org/industrial-water-usage/>

<https://water.usgs.gov/edu/wateruse-total.html>

<https://water.usgs.gov/edu/activity-watercontent.php>

<https://www.watercalculator.org/footprints/what-is-a-water-footprint/>

Resourcefulness App: stem.guide

Name of product:

Sketch of product:

Amount of water it takes to produce it:

Direct water is used for:

Virtual water is used for:

Ways we can reduce the water footprint of this product: