

Water Shortage: Activities to Understand Facts

The following activities help students understand—in visual and statistical terms—some of the global facts about water security. The activities are modular; use the ones that meet your students' needs and fit with your time allocation best.

Fact 1: <1% of Earth's water is can be used by humans

Activity: Visualization

Time required: 10 minutes

Materials:

Empty gallon container

Shot glass or small clear measuring cup

A little over one ounce of a colorful liquid (soda or water with food dye)

Eyedropper or Petri dish

A selection of empty containers or glasses, for example:

Half-gallon container

Two-liter soda bottle

Quart container

One-liter soda bottle

Pint-sized container or pint glass

Small, empty glass

Procedure:

- 1) Line up the containers—except the eyedropper or Petri dish—from large to small so all students can see
- 2) Explain that if the gallon represented all the water on earth, how much of it is fresh water for people to use?
- 3) The students who selected the shot glass are correct—sort of.
- 4) Remove about 1/3 or roughly 1 teaspoon of water in the shot glass by using an eyedropper or pouring it into the Petri dish. The water that remains in the shot glass represents fresh water that cannot be accessed—it's too deep in the ground or it's frozen. The liquid in the eyedropper or Petri dish represents fresh, accessible water that humans can use. Compare it to the volume of a gallon.

Fact 2: A lot of people already do not have access to fresh water—and it will get worse very quickly

Activity: Visualization

Time required: 15-20 minutes

Procedure:

- 1) Divide the class into six groups as equally as possible. Ask each group to gather so everyone can see the distinct groups.
- 2) Have one of the groups sit down. State to the class that in 2010 one out of six people do not have access to clean water, which equals more than one billion people worldwide.
- 3) Ask another two groups to sit down. Explain that by 2025 half of the countries worldwide will face water stress or outright shortages.
- 4) And ask them to estimate how many groups they think will have clean usable water in 2050.
- 5) Ask another group—plus half the members of the remaining group—to sit down. In 2050, if the world’s water crisis continues as it is and conservation activities are not used, that 75% of the world’s population will not have access to clean usable water and could be affected by water scarcity.
- 6) Ask students to envision where they will be in 40 years, and ask them to think about a world wherein 75% of humans are deprived the water they need.

Fact 3: Americans use a lot of water, compared to the rest of the world

Activity: Multiplication, algebra, and statistical comparison

Time required: 20-30 minutes

Materials:

Water usage worksheet (or average water consumption numbers only, and ask students to set up the math formulas)

Calculator (optional)

Paper, ruler, and pen(s) or a spreadsheet program like Excel

Action	How often each day?		Average water Consumption	Total
Shower/bathe			x 25.0 gallons	
Wash hands			x 0.2 gallons	
Flush toilet			x 5.0 gallons	
Brush teeth			x 0.2 gallons	
Drink liquids			x 0.1 gallons	
Cook			x 0.25 gallons	
Wash dishes			x 15.0 gallons	
	How often each week?			
Wash laundry		(÷ 7)	x 40.0 gallons	
Wash car		(÷ 7)	x 15.0 gallons	

Other			x	gallons	
				Total:	

Procedure:

- 1) Ask each student to fill out a water usage worksheet. You can decide whether they use paper, calculators, or a spreadsheet program. Whichever format, make sure the students understand the logic of setting up the mathematical equations. For more advanced students, only give them the usage numbers and ask them to set up the formulas.
- 2) Have students call out their total consumption one by one. Ask students to calculate the class average.
- 3) The average American users 82 gallons of water per day. How does the class compare?
- 4) Explain that people in Asia use 8 gallons of water per day on average, and that people in Sub-Saharan Africa use only 4 gallons per day on average.
- 5) Ask students to create a chart with their findings so they can communicate the information visually. (They can create pie charts, bar graphs, or other forms of visual presentation.)

Extension for schools with international partners:

- 1) After students do the activity above, ask them to hypothesize the average consumption of their partner school(s). What evidence or arguments did they use to formulate their hypothesis (existing statistics, geographical location, earlier narrative evidence, etc.)?
- 2) Ask students to design and draft a research project. They should consider how to ask the questions; for example, do they need to convert gallons to metric liters? If they are using another language for communication, what vocabulary or grammatical help do they need? Will this be a paper survey, or can they design an online survey to collect data?
- 3) Students should communicate with their partner school and collect data.
- 4) When data arrives, how does it compare with their hypothesis? Ask students to discuss why their argument was correct, and what factors might have skewed it.
- 5) Add partner school(s) to their visual chart.

Fact 4: Most of our water is used for food production

Activity:

Time required: 30 minutes intro, independent student work for one week, then 30 minutes for activity wrap-up.

Procedure:

Explain that most water is used for food production. To produce a pound of rice requires 229 gallons of water. To produce one pound of beef, however, requires

some 12,000 gallons of water.

For the activities in fact 3 and fact 4, ask students to make a plan to cut water consumption. Students should keep a daily journal, tracking real usage and writing down what behavioral changes they've undertaken to conserve water.

Make a chart for the class (or school!) to show how much water a few people were able to save. Discuss: does it matter? Put it in context: multiply it by 52 to show savings in a year. Divide it: How long can the water we save support someone who uses eight gallons of water per day?

Fact 5: Time spent getting water is time away from an education

Activity: Simulation in physical education class

Time required: 50 minutes

In this activity, students will simulate the worldwide average a human has to walk to access water—two miles—and encounter some of the difficulties people face.

Please gauge this activity based on student's physical abilities, surroundings and obstacles, and take precautionary measures.

Use Google Maps or similar to map out a course that equals about a mile in distance. (5280 feet = 1 mile). This is four times around a track, or 20 times around a typical school gymnasium. Make sure that students are within earshot approximately 40 minutes into this activity.

Materials:

Situation cards (print one sheet for every two students in your class)

- Bad news: the water source is dry. Turn around and go back one mile. Hope there will be water next time.
- Bad luck: contaminated water. Do 20 sit ups! (Your stomach feels terrible!) Pick up eight pounds, and then proceed for another mile.
- Rainfall. There's plenty of water. Take extra back with you to save for another day. Pick up twelve pounds and proceed for another mile.
- Pick up eight pounds, then proceed for another mile home. But wait--spill! Compensate by jogging $\frac{1}{2}$ mile to make up for the time it takes you to return to the well for more water.
- So far, so good. Pick up eight pounds and proceed for another mile.
- Clean water. Pick up eight pounds and proceed for another mile.

Enough eight-pound weights (or two four-pound weights) for 50% of the class
Enough twelve-pound weights (or two six-pound weights) for 20% of the class

Procedure:

- 1) Prep: Line up the weights, along with a pile of situation cards, shuffled, face down.

- 2) Explain that if we didn't have running water delivered into your homes, schools, and businesses, it takes a long time and a lot of water to get water. And the risks are high.
- 3) Start students walking/jogging for one mile. This is the average distance a typical human on earth must travel to reach fresh water.
- 4) When students have completed one mile, have them pick up a situation card and follow the instructions.
- 5) At the forty-minute mark, stop the activity. Debrief:
 - How many students have completed their challenge, with water? What were the obstacles for the others? Say this is a typical percentage of what the average human must go through—risks, challenges and all—to get water.
 - Tell students they had it easy. One gallon of water weighs about eight pounds. The average American uses 82 gallons of water per day. The average Asian uses 8 gallons of water per day. The average Sub-Saharan African uses 4 gallons of water per day. What are some factors that explain these disparities? (Weather, infrastructure, wealth, etc.)
- 1) Oftentimes, the people who fetch water do so for more than one person. How much time do you think it would take to get eight gallons of water for each member of your family? The task of fetching water often falls on young girls. Because of it, they often don't have time to go to school, thereby perpetuating many other social problems.

Fact 6: Threats to water security run deep—and high

Activity: Watch a documentary film

Time required: 20 minutes

In the Fact 2 activity, students are challenged to think about their lives in 40 years, and then think about the world at the time when only 50% of humans have access to fresh water.

In this documentary film, students will look back and see photographic evidence of one of Asia's greatest fresh water sources, namely the Himalayan glaciers, disappear before their eyes.

[Watch the documentary](#) (8 minutes), then discuss: "The Himalayan glaciers are Asia's water reservoirs."