



Exploring Our Growing Need for Water

In this **two-day** lesson, students will be introduced to several water sustainability issues, including access to clean freshwater, groundwater depletion, agricultural water use, and water waste.

On Day 1, students will explore groundwater and how the depletion of groundwater can cause land subsidence in regions like California's Central Valley. Students will also learn about how agricultural water use for different crops compares to the amount of water required for raising animals on farms and ranches.

On Day 2, students will read some of the [Blue Planet Network's Stories of Water](#) to learn about how different people around the world struggle to have access to clean water and some of the ways they have addressed this issue. They will also explore their own water use habits and ways they can reduce water waste in their home using a water calculator from the [Alliance for Water Efficiency](#) and a leaky faucet calculator from the [U.S. Geological Survey's Water Science School](#).

This lesson is one in a series of activities that introduce students to design thinking through the lens of exploring global water issues and the strengths and weaknesses of various solutions to these issues. Use this lesson independently or within the **Flipside Science Fresh Solutions: Water Use and Conservation** unit.

Grade levels: 6-8

Essential questions

1. What are some water sustainability issues we are facing around the world?
2. What controls whether or not people have access to clean freshwater?
3. What is water waste? When or how is water wasted?
4. What can happen when we pump too much water out of the ground?

Objectives

Students will

1. Discover some of the water sustainability issues people are currently dealing with around the world, like water waste, access to clean freshwater, agricultural water use, and the depletion of groundwater.
2. Connect with real stories and data to learn more about the people and places where these water sustainability issues are present.

Grade levels: 6-8

Total activity time: 2 hours over two days

Materials needed:

- Computer
- Projector
- Flipside Science video
- Computer lab
- Our Growing Need for Water Journal
- Calculators
- Sand, broccoli, almonds, strawberries, weight, milk jugs (optional)





Terms for students

- **Sustainability:** the ability of a system to last or endure; meeting current human needs without endangering our descendants
- **Aquifer:** an underground layer of rock, sand, or gravel where water can be stored within cracks or pores

Materials needed

- Computer with Internet access
- Projector
- **Flipside Science video: *How Do We Meet the Growing Need for Water?***
- A computer lab with at least one computer for every 2 students (for Day 2 only)
- ***Our Growing Need for Water Journal*** (1 per student)
- Calculators
- 1-3 glass jars filled with sand saturated with water
- 4 heads of broccoli (optional)
- 2 small bags of almonds (~ 1 handful is enough) (optional- omit these if you have students with nut allergies in your class)
- 2 small bowls of strawberries (optional)
- 1-lb weight (optional)
- 2 empty clean gallon plastic milk jugs (optional)

Activity Procedure

Total Activity Time: 2 hours over two days

DAY 1

Activity prep

1. Print out one ***Our Growing Need for Water Journal*** per student
2. Set up stations around your classroom with the following materials:
 - **Agricultural Water Use Station:** calculators; *optional:* 1 empty gallon plastic milk jug, 1 small bag





of almonds, 2 heads of broccoli, 1 small bowl of strawberries, 1-lb weight

- **Groundwater Supply Station:** 1 glass jar filled with sand saturated with water

Part I: Introduction to water use and sustainability issues (15 min.)

1. Introduce your students to water sustainability and environmental issues by showing them the **Flipside Science: How Do We Meet the Growing Need for Water?** video.
2. Ask for volunteers to talk about one or two things they learned from the video, and make a list of these things on the board. Explain that the youth in the video are talking about some important environmental and sustainability issues related to water. Check that students have an understanding of what 'sustainability' means.
3. Replay the video for students a second time.
4. Working in pairs, students will dive deeper into two of the water sustainability and environmental issues introduced in the video (they will explore the other two issues during the following class period or hour).

Part II: Exploring examples (30 min.)

1. Divide students as appropriate among the stations so small groups can explore the materials up close. It may be best to have students pair up with a single thinking buddy as they complete their journal.
2. Give students 15 minutes at each station, and then have them switch.
3. After students have completed the two activities, bring everyone back together as a class.

Part III: Day 1 reflection (15 min.)

1. Ask students to share some of their thoughts from the agricultural water use station activity.
 - a. *How does the amount of water it takes to grow broccoli compare to strawberries? (On an area of land the size of a football field: 81,000 gallons of water for 15,000 heads of broccoli, 1.1 million gallons of water for 1 million almonds, 200,000 gallons of water for 500,000 strawberries)*
 - b. *How does the amount of water needed to raise farm animals compare to the water needed to grow fruits and vegetables? Why is so much more water needed to raise animals?*
 - c. *What other factors might come into play when making your decision about what to produce on your farm? (my total area of land, my annual availability of water, market prices for each product, my personal preferences (e.g. pigs are smelly!), how long it takes to raise animals vs. plants, etc.)*
2. Ask students to share some of their thoughts from the groundwater supply station activity.
 - a. *Why is the amount of groundwater in many parts of California decreasing? Where is the groundwater going?*
 - b. *Groundwater is often depleted more quickly during drought years compared to wet years. Why*





might this be?

- c. *What are some negative impacts of pumping too much groundwater? Why would land sinking be bad for buildings or houses? How might groundwater depletion impact ecosystems in rivers and streams?*

Teacher tip: *If you are not able to devote two days to all of the Journal activities, you can assign the remaining activities as homework!*

DAY 2

Activity prep

Students will continue to work through the two remaining activities their Journals: Wasted Water and Who Gets Clean Freshwater? These activities require students to have access to computers with Internet connections.

Part I: Exploring examples, continued (30 min.)

Book the computer lab for a full class period, and have students work in pairs to complete the rest of their journal. Leave 15-20 minutes at the end of the class period for reflection and discussion.

Part II: Day 2 reflection (30 min.)

1. Ask students to share some of their thoughts from the two web activities.
 - a. *What are ways that you use water at home? Do you think you waste any water at home (use more than you could if you changed your behavior)?*
 - b. *What are some other sources of water waste at home?*
 - c. *What determines whether or not people have access to clean water? What are the challenges that different people deal with to get clean water?*
 - d. *Are any of the challenges you read or heard about in the stories present in your city or community that you know of?*
2. **Individual quiet writing reflection:** Have students consider all four of the water sustainability and environmental issues that they explored over the past two days. Ask them to consider if they feel impacted by any of these issues. If so, which ones? How are they impacted? Do they know anyone else directly impacted by the same or different issues? Are there any easy solutions to these kinds of issues?

Next steps

Challenge your students to brainstorm solutions to some of our global water issues in the next activity in this **Flipside Science** unit, **Rapid Brainstorming: How Can We Conserve Our Water Resources?**





Fresh Solutions: Water Use and Conservation



Your Hidden Water Footprint:
Defining a Problem to Find a Solution



Sustainable Water Solutions:
Weighing the Pros and Cons



Exploring Our Growing Need for Water



Fresh Solutions:
Design Thinking Challenge



Rapid Brainstorming:
How Can We Conserve Our Water
Resources?

About Flipside Science

Flipside Science is a youth-powered series that tackles complex environmental topics and empowers viewers to make a difference. This engaging and upbeat collection of videos, hosted by Academy youth, explores how local communities are addressing environmental problems with solutions ranging from vertical farming to greywater recycling.

Head to [Flipside Science](#) to find the complete list of videos and activities in this series.

Next Generation Science Standards (6-8)

MS-ESS3.C: Human Impacts on Earth Systems: Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

California's Environmental Principles and Concepts

- **Principle I:** The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services. As a basis for understanding this principle:
 - **Concept a:** Students need to know that the goods produced by natural systems are essential to human life and to the functioning of our economies and cultures.
- **Principle II:** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies. As a basis for understanding this principle:
 - **Concept a:** Students need to know that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems.





- **Concept c:** Students need to know that the expansion and operation of human communities influences the geographic extent, composition, biological diversity, and viability of natural systems.
- **Principle IV:** The exchange of matter between natural systems and human societies affects the long-term functioning of both. As a basis for understanding this principle:
 - **Concept a:** Students need to know that the effects of human activities on natural systems are directly related to the quantities of resources consumed and to the quantity and characteristics of the resulting byproducts.
 - **Concept c:** Students need to know that the capacity of natural systems to adjust to human-caused alterations depends on the nature of the system as well as the scope, scale, and duration of the activity and the nature of its byproducts.
- **Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes. As a basis for understanding this principle:
 - **Concept a:** Students need to know the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions.

Additional resources

- [Santa Clara Valley Water District: Where does our water come from? Groundwater](#)
- [San Francisco Public Utilities Commission: Our Water: Many Users, Many Uses!](#)
- [San Francisco Public Utilities Commission: Let's Save Water! Every Drop Matters](#)
- [California Academy of Sciences Science News article: Monitoring the Drought from Space](#)
- [The Water Education Foundation: Project Wet](#)
- [Blue Planet Network: Improving the Impact of Water and Sanitation Projects Worldwide](#)
- [U.S. Geological Survey's Water Science School: Leaky faucet calculator](#)
- [Alliance for Water Efficiency home water use calculator](#)

