

How Our Food Moves Water Around the Planet

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GRACE Communications Foundation

A non-profit dedicated to creating a more sustainable food system.

GRACE wanted to raise awareness about how people in the United States use water throughout their day, so we developed the tools and information on the Water Footprint Calculator site.

Introductions

- How and where do you teach?
- What topics are most pertinent to you?
 - water scarcity?
 - water/agriculture issues?
 - water pollution?
 - something else?
- What topics are most pertinent to your students?

Today's Agenda

1:30 to 4:00 pm

- Activity - Pop Quiz
- Activity - Water Footprint Calculator
- Presentation
 - How do we use water?
 - What is a water footprint?
- The WFC Website
- Activity - Virtual Water Flip Cards
- Break (5 minutes)
- Presentation
 - How are food and water connected?
- Activity - What is the water footprint of your food?
- Q&A/Survey

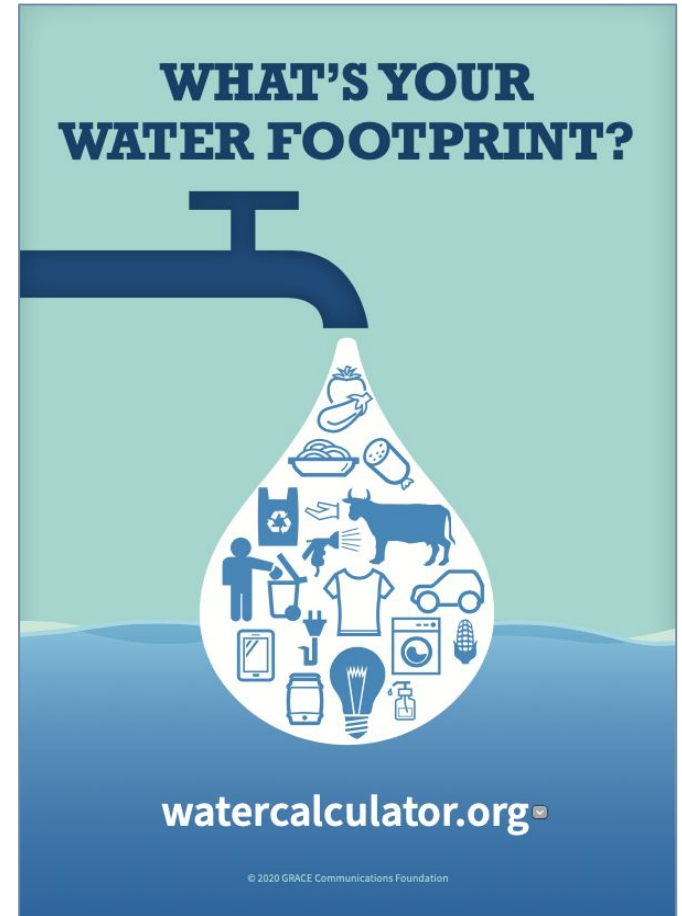
Pop Quiz

What's the average daily water footprint for an American, for all uses?

- a) 100 gallons per day
- b) 650 gallons per day
- c) 1,800 gallons per day
- d) 4,100 gallons per day

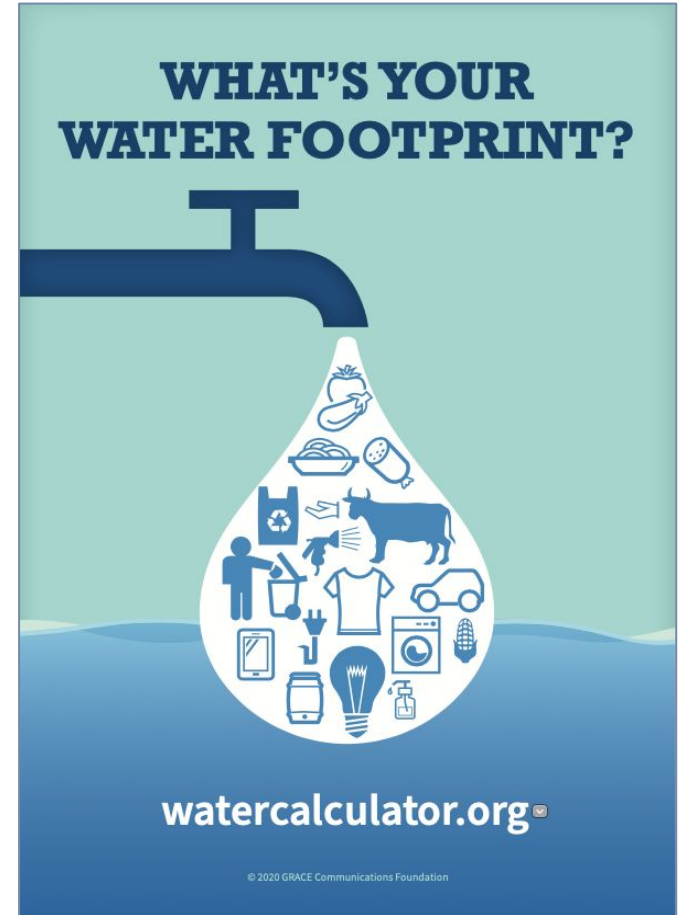
Water Footprint Calculator

GO TO:
watercalculator.org
or
calculadoradeagua.org



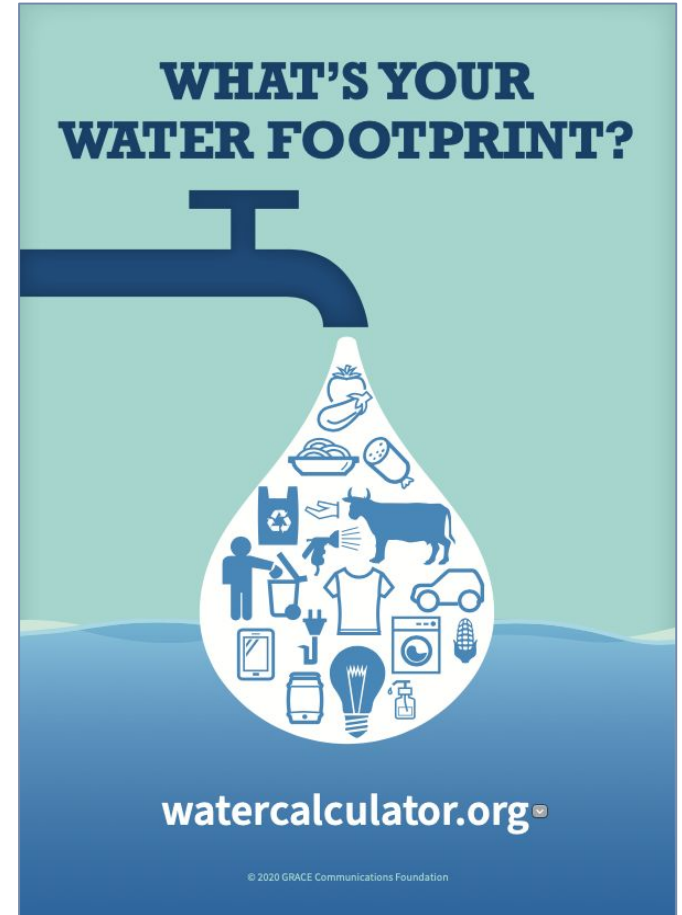
Water Footprint Calculator Results

- Scroll down to the bar chart and spreadsheet.
- Share your results if you're comfortable.
- Was anything surprising to you?



Water Footprint Calculator Results

- How does the direct water use compare to the indirect water use?
- Do you see how the bulk of your water use likely comes from your diet and shopping habits?



What is a Water Footprint?

- A method to account for and analyze the ways humans use, overuse and generally depend on water.
- Determined by the volume of water consumed, evaporated and polluted to make a product or conduct a service.



What is the Water Footprint Calculator?

The **Water Footprint Calculator** is a tool that helps users find their personal daily water footprints.



What is a Personal Water Footprint?

Your personal water footprint includes:

- The water you use from a tap.
- The “virtual water” used to produce the food you eat, the products you buy and the energy you use - this makes up most of your water footprint.



Is there more to water than the water cycle?

- Teaching about water sometimes means teaching about the water cycle and sometimes water pollution and conservation - it can be limited.
- Water education incorporates hydrology and aquatic biology, natural resource management and climate science and even social sciences and the arts.
- Educators who want to go beyond the water cycle might not know where to start.
- In order for students to understand why water issues and water conservation matter, they first have to understand how and why they use water.

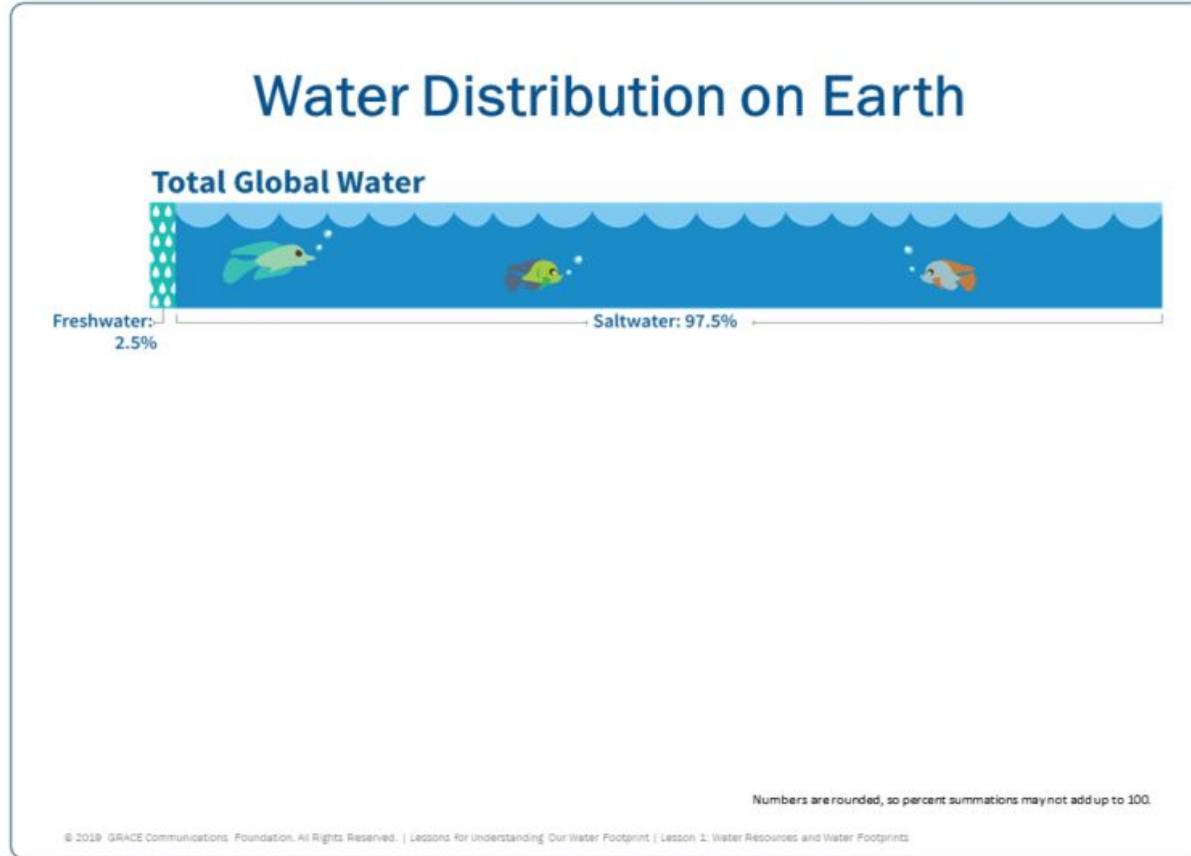
The Many Ways We Use Water

How many water uses can you identify in this illustration?

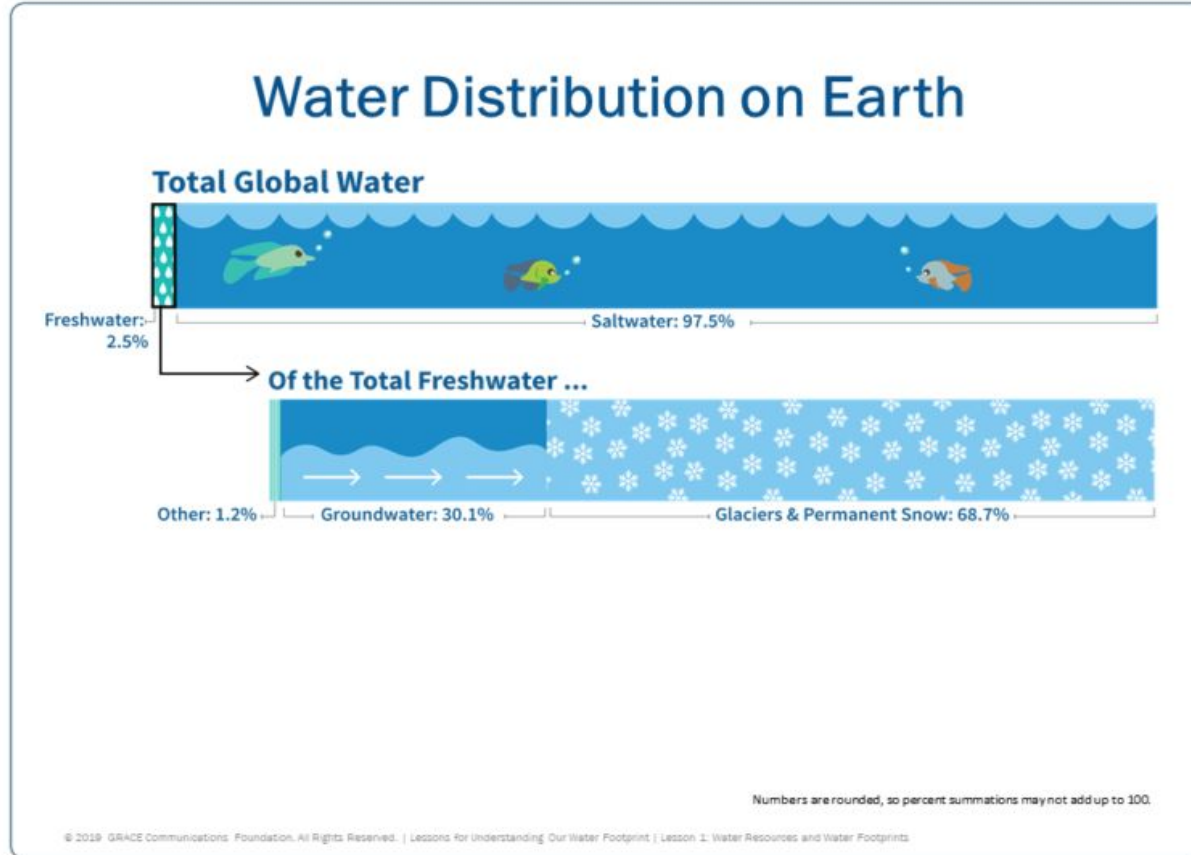
We want students to learn that the ways they use water in different parts of their life is important because there is increasing strain on water resources.



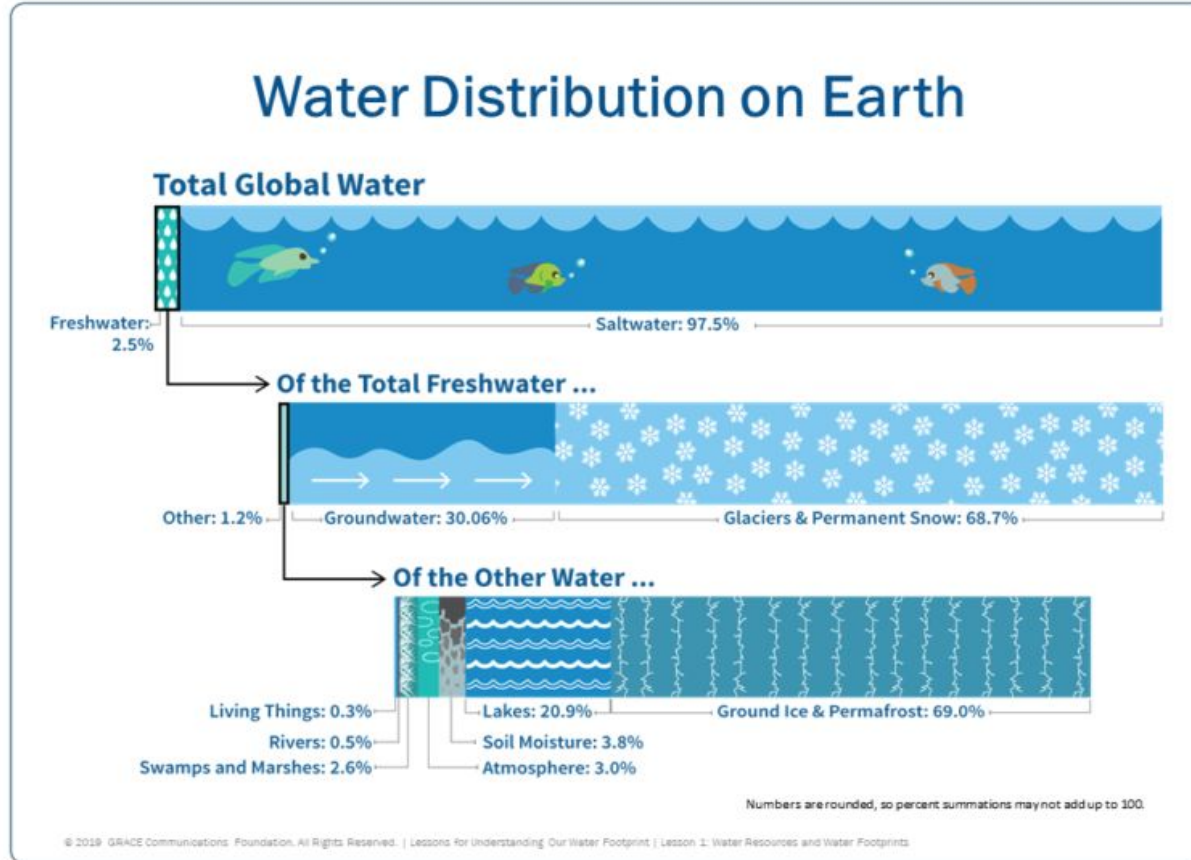
Water is Finite: How is it Distributed on the Planet?



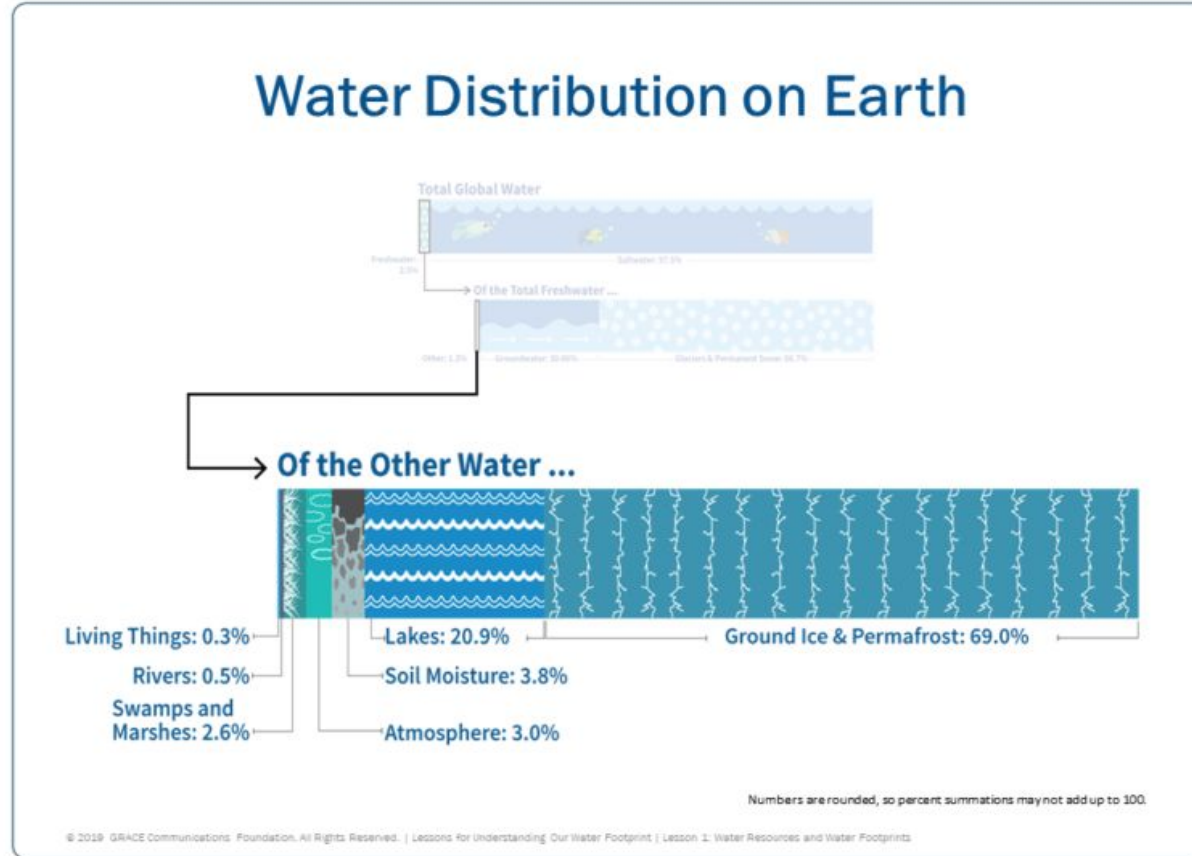
Water is Finite: How is it Distributed on the Planet?



Water is Finite: How is it Distributed on the Planet?



Water is Finite: How is it Distributed on the Planet?



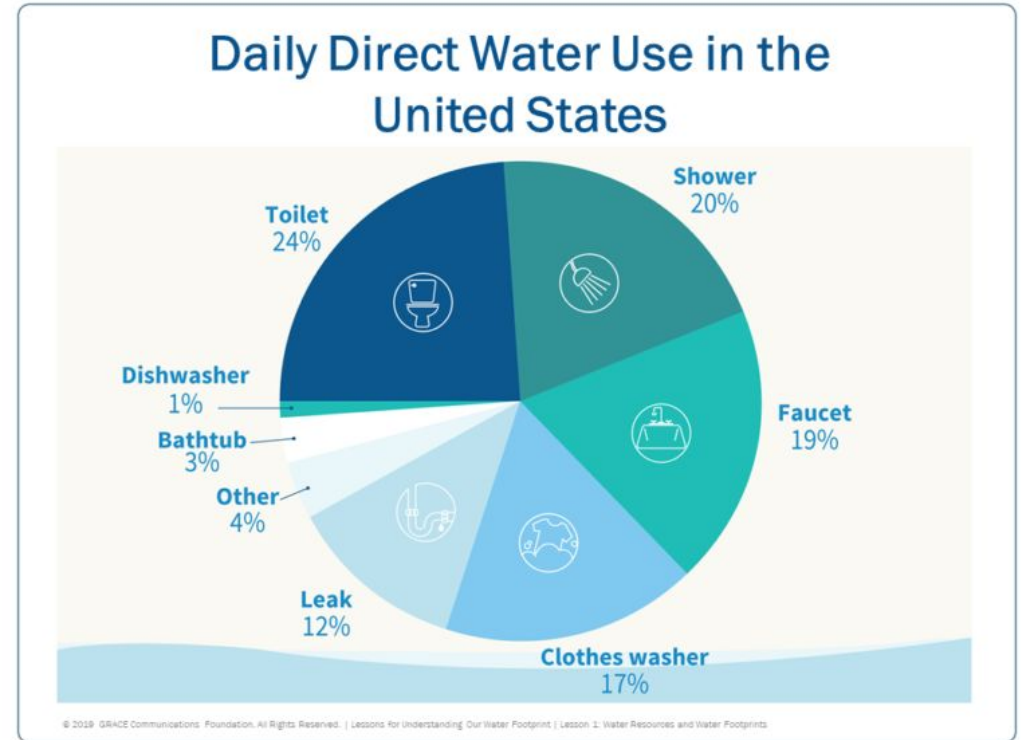
How Do We Use Water?



How Do We Use Water?

A breakdown of our indoor water use in the United States reveals where we use the most water.

Are you surprised by these results?

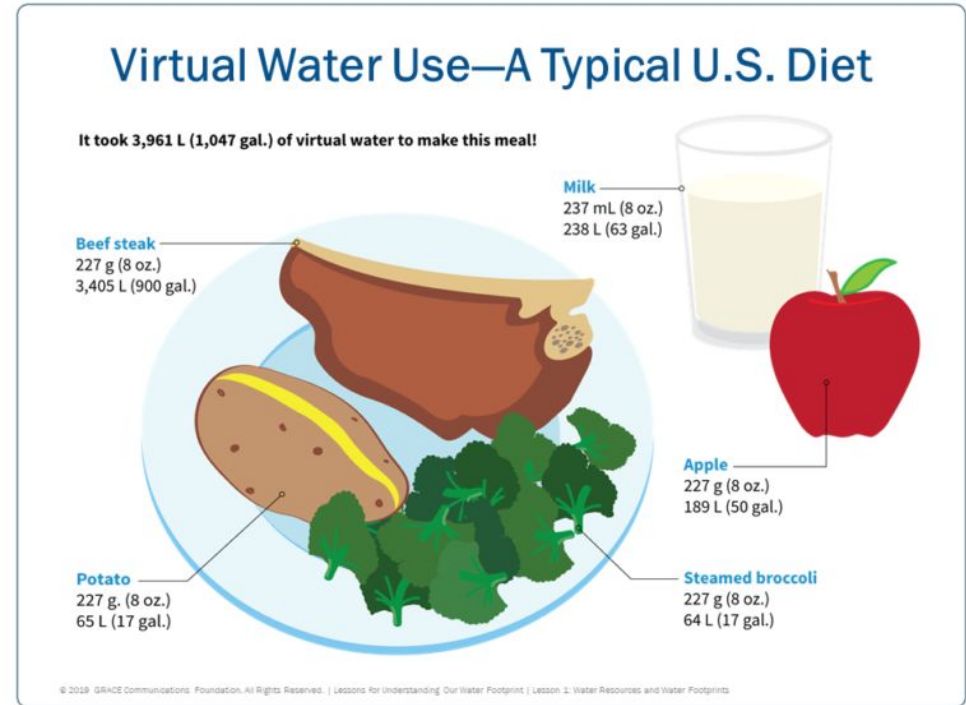


What is “Virtual” Water Use?

Indirect or **virtual water** is the water “hidden” in the products, services and processes you buy and use every day for crop irrigation, power production and consumer goods manufacturing.

US-agricultural water use is one of the biggest, because most animals are fed grain and other feed types from irrigated crops.

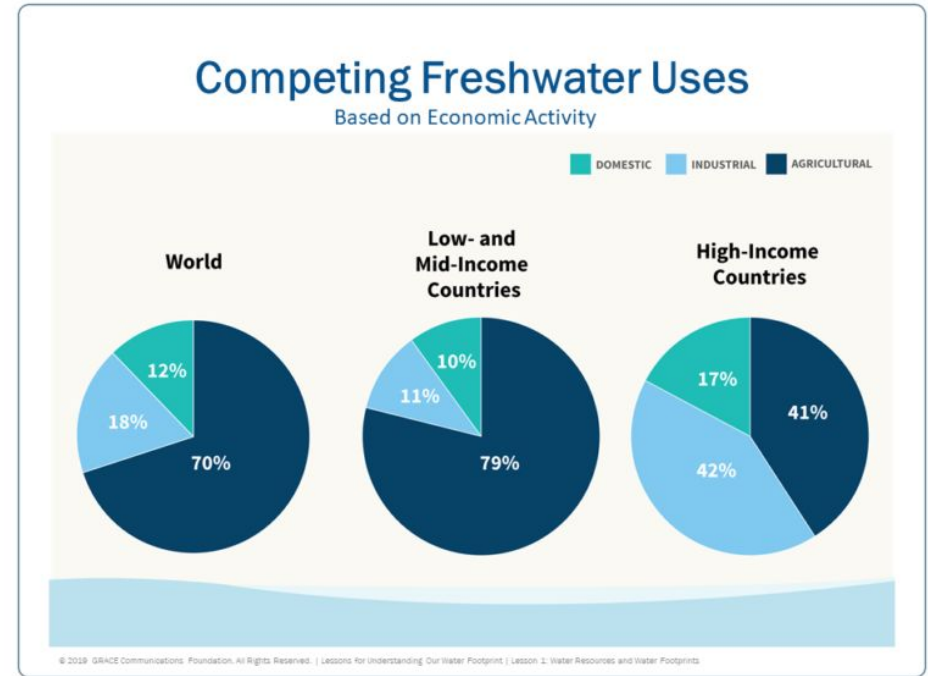
Your diet is the biggest indicator of what your personal water footprint will be, especially if you eat animal products.



Categories of Water Use

Three main purposes:

Domestic
Agricultural
Industrial



Categories of Water Use

In the United States we use water in the following ways:

- Public supply and domestic use;
- Industrial uses: thermoelectric power production, manufacturing and mining;
- Agricultural uses: irrigation, livestock production and aquaculture.

Categories of Water Use in the United States



Worldwide Water Use

The worldwide rate of water use has increased at twice the population growth rate.

This is leading to instances of water insecurity.

The Ogallala Aquifer is a good example of this.



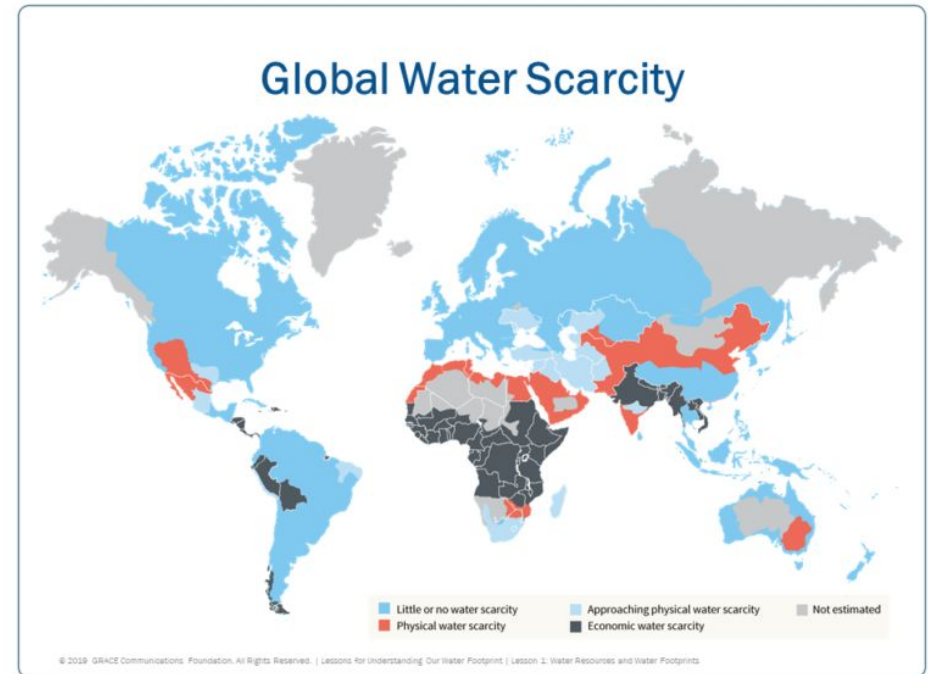
What is Water Security?

United Nations Definition of Water Security

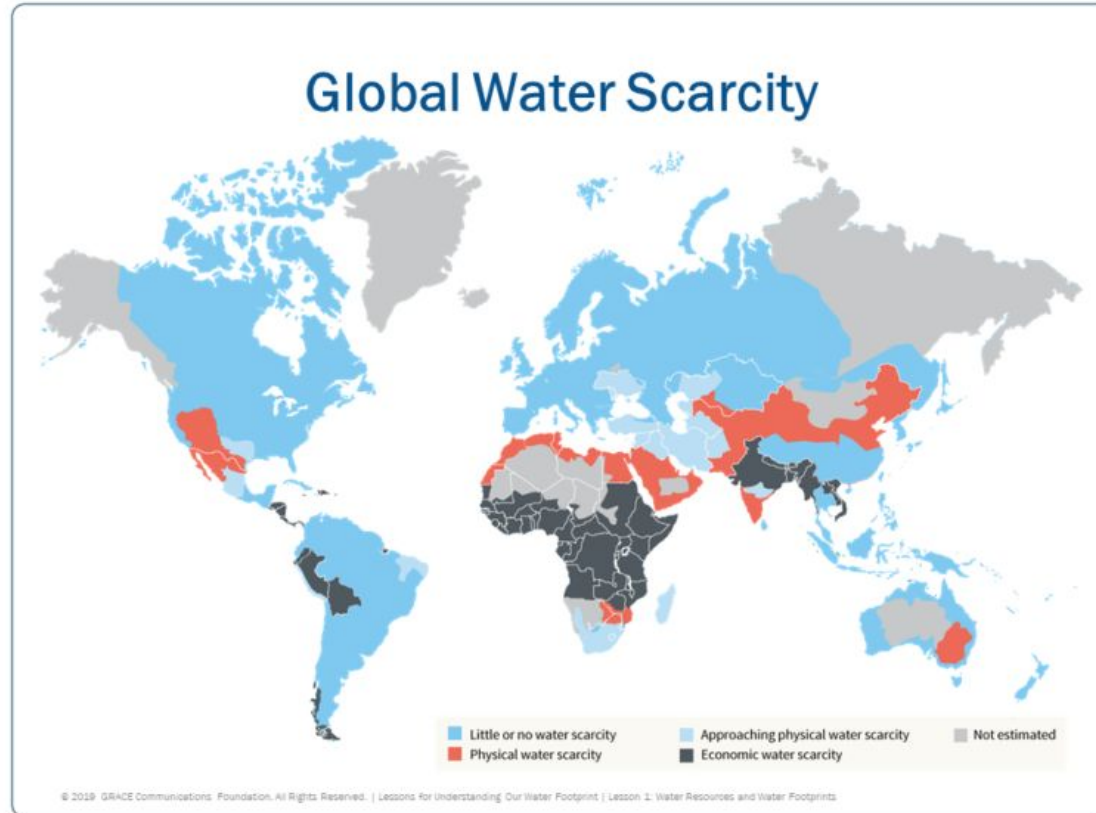
“The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters and for preserving ecosystems in a climate of peace and political stability.”

What is Water Security?

Water Security means everyone has enough water to meet their needs sustainably.



What is Water Security?



Climate Change and Water Resources

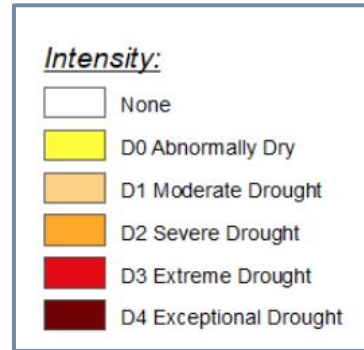
Any place can have a drought -
climate change is making them longer
and more intense.



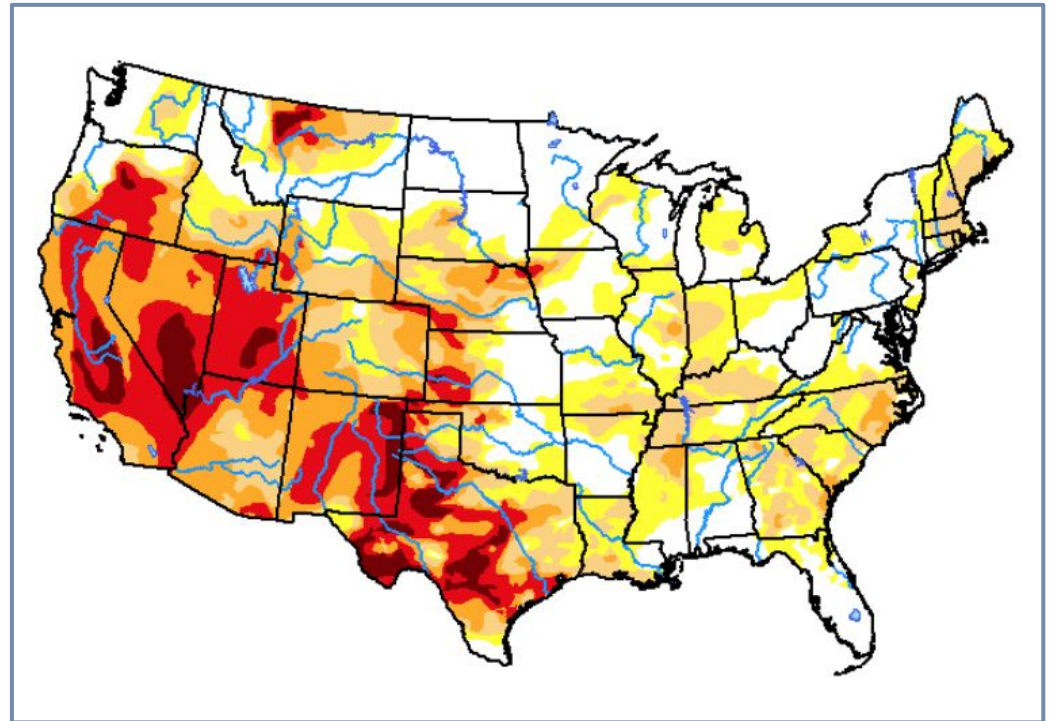
Climate Change and Water Resources

US Drought Monitor [<https://droughtmonitor.unl.edu/>]

July 5, 2022

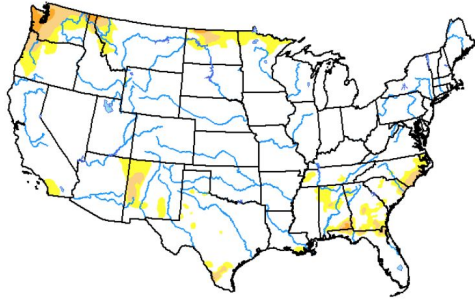


The US Drought Monitor is not a weather forecast map. It is a backwards look - a weekly assessment of drought conditions, based on how much precipitation did or didn't fall.

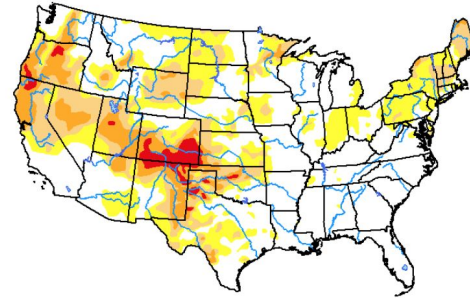


Climate Change and Water Resources

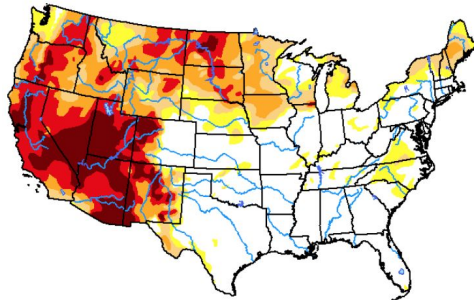
July 2, 2019



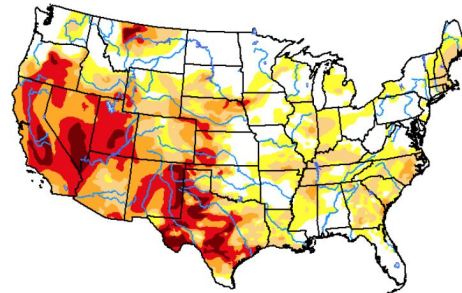
July 7, 2020



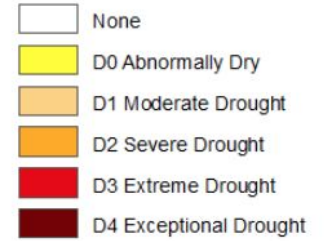
July 6, 2021



July 5, 2022



Intensity:



Water Footprint Resources for Educators

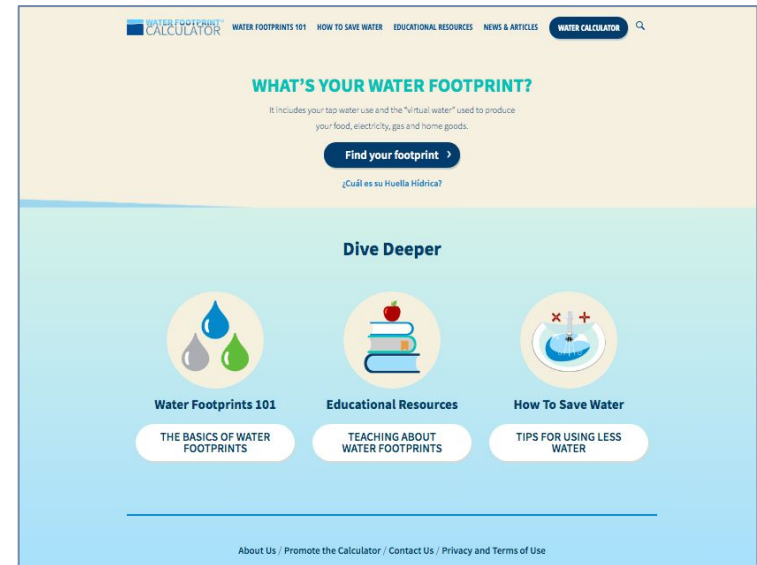
The **Water Footprint Calculator** site provides educators and students with clear, engaging and free resources that help teach about water use in the US and abroad.

We offer tools, informational materials, water-saving tips and links to cutting edge research on water use.



Water Footprint Resources for Educators

- **Tools:**
 - **The Water Footprint Calculator**
 - **The Water Footprint of Food Guide**
 - **The Water Footprint of Food Quiz**
- **Lesson Plans:** standards-aligned lessons for middle- and high-school.
- **Educator Resources:** materials that help educators teach students about water use and how to save water.
- **Student Info:** information on careers in water protection, as well as research and reports.



Water Footprint Lesson Plans

Three middle- and three high-school science lessons that can be adapted up to the undergraduate level or down to elementary-school level (grades 6 to 16).

Standards alignments:

- Texas Essential Knowledge and Skills (TEKS);
- Common Core State Standards (CCSS) for ELA/Literacy and Mathematics;
- Next Generation Science Standards (NGSS); and
- Cloud Education for Sustainability (EFS) Standards & Performance Indicators.

**FREE
WATER FOOTPRINT
LESSON PLANS**

School Water Audit: Virtual Water Use

One way to reduce a water footprint is to take a closer look at the operations of a large business, identify areas that can be made more sustainable, and then take action. What's the closed business for you? Your school, of course! Auditing your school gives you an opportunity to gather concrete data on school operations that impact the environment, and then use that data to make changes that promote more sustainable practices. For this activity, you will work in the same or similar teams that you used to create your Texas State Water Awareness Campaign. The worksheet for the School Water Audit groups. A separate worksheet is available for groups doing the Indoor and Outdoor Water Audits.

If you have been introduced	You will have to auditing
Indoor water	School Water Audit: Indoor Water Use
Outdoor water	School Water Audit: Outdoor Water Use
Food	School Virtual Water Audit: Food Footprinting
Electricity	School Virtual Water Audit: Energy Use
Buying habits	School Virtual Water Audit: Electronics Purchasing

Notes/Links

Your students will work with your team to find out how either food purchasing, energy use, or electronics purchasing impacts your school's water footprint. (Note: Because the self-run team-based portions, we are suggesting that the buying habits be added last, if necessary, for example. They can focus on school laptops/computers or light bulb purchases.) Your mission is to audit water how much of that water is needed in any category to support your purchase. To do this, you'll need to learn more about school, electricity, and electronics used at or by the school (such as how much they need how often they are purchased, what alternatives are available to reduce virtual water consumption, etc.).

Waterfalls

- Clipboard
- Interviewing questions (see sample questions)
- Pencil or pen
- Thinking cap/decide
- Notepad/notes
- Relevant administrative data, such as food purchasing reports, or food energy bills, or school water purchasing data.

WATER FOOTPRINT CALCULATOR

DOWNLOAD NOW

Water Footprint Lesson Plans

Lesson Plans:

- **Lesson 1: Water Resources and Water Footprints**
- **Lesson 2: My Water Footprint**
- **Lesson 3: The Value of a Water Footprint**

FREE WATER FOOTPRINT LESSON PLANS

School Water Audit: Virtual Water Use

One way to reduce water footprint on a large scale is to take a closer look at the operations of a large business, identify areas that can be made more sustainable, and then take action. What's the closed business for you? For school, of course. Auditing your school gives you an opportunity to gather concrete data on school operations that impact the environment, and then use that data to inform strategies that promote more sustainable practices. For this activity, you will work in the same marketing teams that you used to create your House of Water Awareness Campaign. The worksheet for the School Water Audit groups. A separate worksheet is available for groups doing the In-school and Out-of-school Water Audit.

If you have been introduced	You will have to do it yourself
Indoor water	School Water Audit: Indoor Water Use
Outdoor water	School Water Audit: Outdoor Water Use
Food	School Virtual Water Audit: Food Footprinting
Electricity	School Virtual Water Audit: Energy Use
Dwelling habits	School Virtual Water Audit: Electronics Purchasing

Introduction
Your mission is to work with your team to find out how either food purchasing, energy use, or electronics purchasing impacts your school's water footprint (WF). Water footprint is the total freshwater footprint, not just drinking water. Because the school has many partners, we are suggesting that the buying habits have water footprint, non-agricultural categories, and energy use. For the purposes of this audit, the Electricity footprint will be added to categories as necessary. For example, they can focus on school laptops/computers or light bulbs purchases. Your mission is to audit water how much water is needed in any category to support purchases. To do this, you'll need to learn more about school food, electricity, and electronics used at or by the school (such as food, how much they use, how often they are purchased, what alternatives are available to reduce virtual water consumption, etc.).

Waterfalls

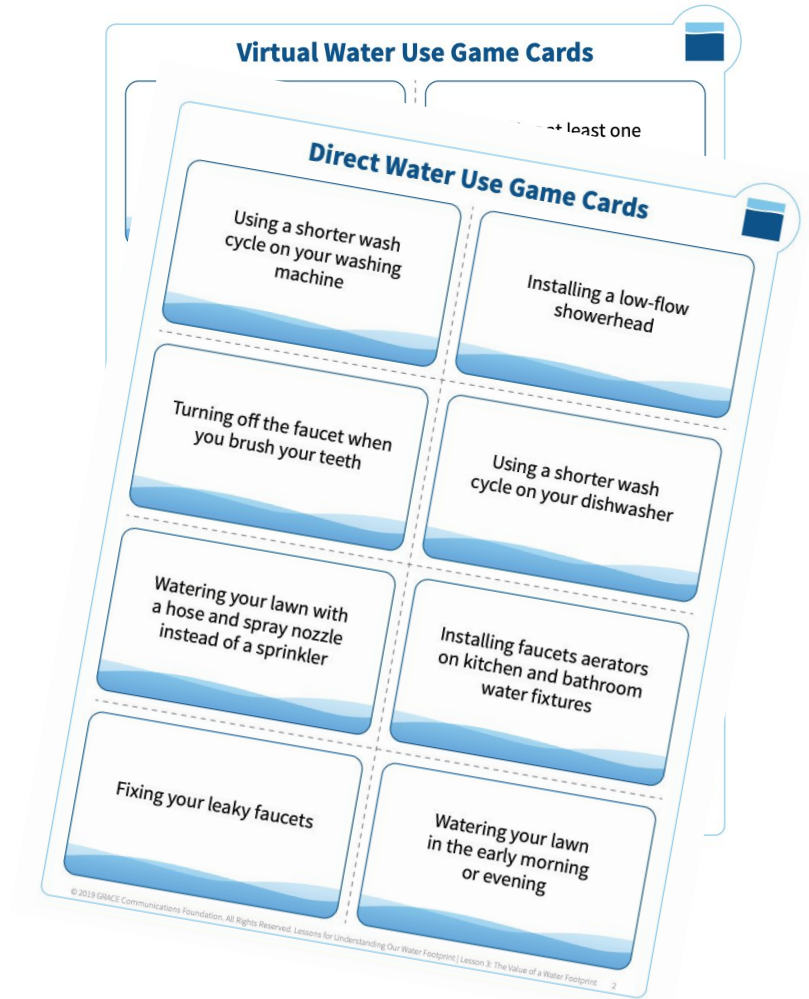
- Clipboard
- Interviewing questions (see sample questions)
- Phone or pen
- Thinking cap device
- Recording device
- Relevant administrative data, such as food purchasing reports, or food energy bills, or electronics purchasing data

WATERFOOTPRINT CALCULATOR

DOWNLOAD NOW

Water Footprint Lesson Plans

Activity: Water Use Flash Game Cards



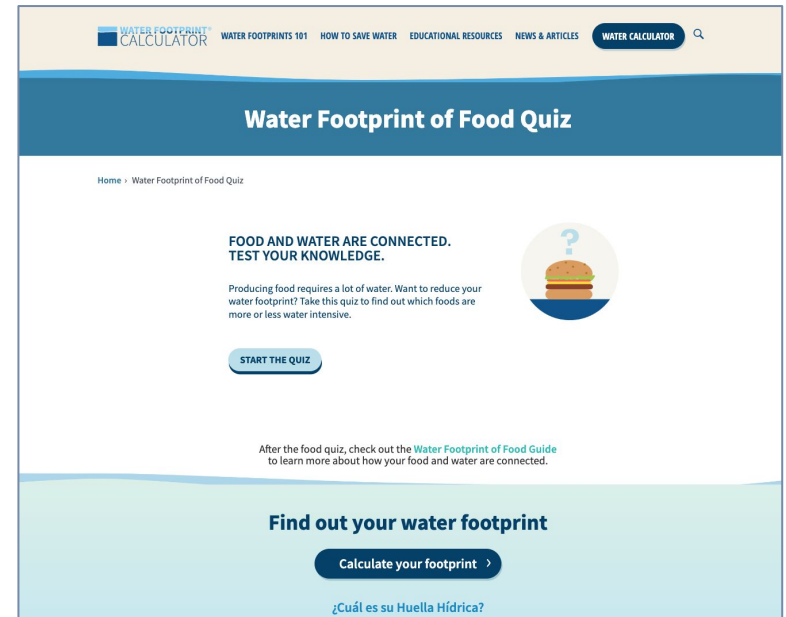
Break time



Wetlands Overlook Park, North Beach, MD

How are Water And Food Connected?

Activity: [The Water Footprint of Food Quiz](#)
(call out your answers)



The screenshot shows the 'Water Footprint of Food Quiz' page on the Water Footprint Calculator website. The page features a navigation bar with links for 'WATER FOOTPRINT CALCULATOR', 'WATER FOOTPRINTS 101', 'HOW TO SAVE WATER', 'EDUCATIONAL RESOURCES', 'NEWS & ARTICLES', and 'WATER CALCULATOR'. The main heading is 'Water Footprint of Food Quiz'. Below the heading, there is a breadcrumb trail: 'Home > Water Footprint of Food Quiz'. The main content area includes the text 'FOOD AND WATER ARE CONNECTED. TEST YOUR KNOWLEDGE.' and a subheading 'Producing food requires a lot of water. Want to reduce your water footprint? Take this quiz to find out which foods are more or less water intensive.' To the right of this text is an icon of a burger with a question mark above it. Below the text is a 'START THE QUIZ' button. At the bottom of the main content area, there is a link to 'Water Footprint of Food Guide' with the text 'After the food quiz, check out the Water Footprint of Food Guide to learn more about how your food and water are connected.' The footer of the page contains the text 'Find out your water footprint' and a 'Calculate your footprint >' button, followed by the Spanish text '¿Cuál es su Huella Hídrica?'.

How are Water And Food Connected?

The Water Footprint of Food is Big!

United States:

- Agricultural water withdrawals: 42%¹
- Agricultural freshwater consumption: 80% to 90%²

The connection between water and our food is vital - crops need rain water or irrigation (much of which is groundwater) to survive and produce. Some of those crops are minimally processed and then sold as whole foods. Many crops are heavily processed and then sold as new food items.

Many grain crops become animal feed. In the US, corn and alfalfa hay — both of which are heavily irrigated — are the primary ingredient in livestock feed.

1. [USGS “Irrigation Water Use”](#)
2. [USGS “Monitoring Consumptive Water Use for Global Crop Production”](#)

How are Water And Food Connected?

Blue, Green and Grey Water Footprints

A water footprint is measured in terms of the volume of water consumed, evaporated and polluted, and is calculated in three parts:

Blue Water Footprint: The amount of surface water and groundwater required (evaporated or used directly) to produce an item.

Green Water Footprint: The amount of rainwater required (evaporated or used directly) to make an item.

Grey Water Footprint: The amount of freshwater required to dilute the wastewater generated in manufacturing, in order to maintain water quality , as determined by state and local standards.

How are Water And Food Connected?

Virtual Water Moves Water Around the World

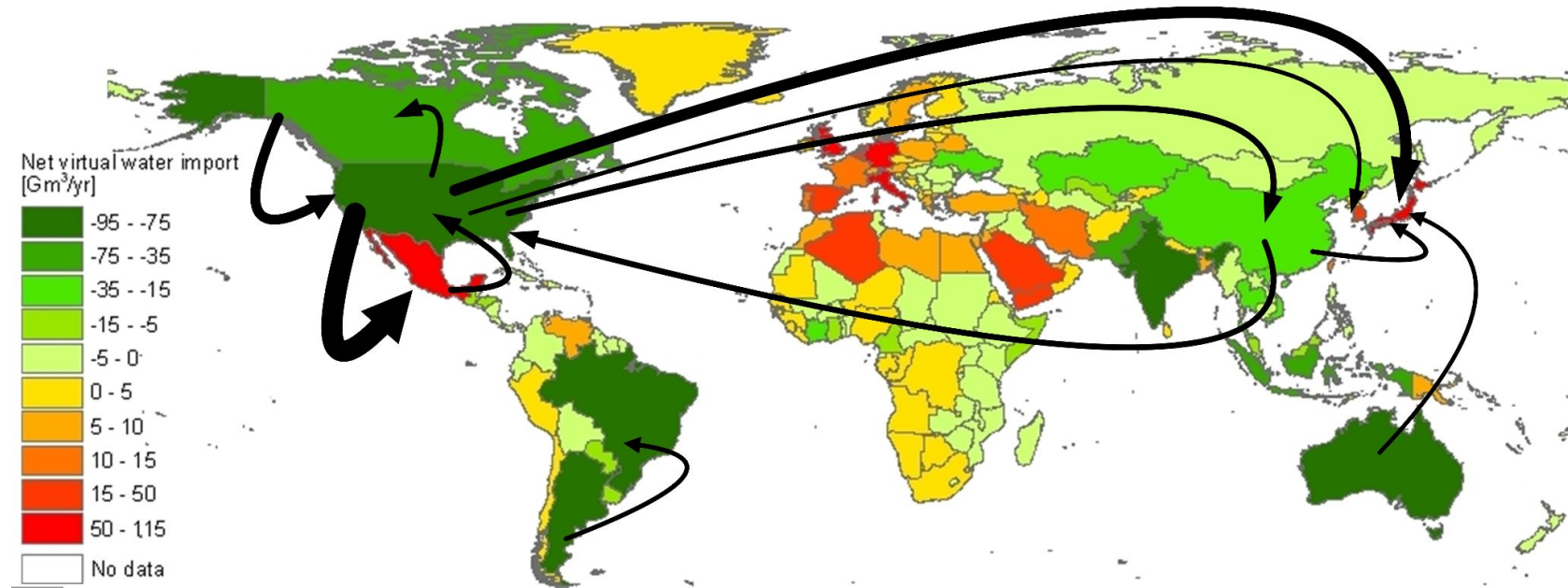
Virtual water in food is part of the “**hidden**” water in the products, services and processes people buy and use every day. While it’s unseen by the end user, that virtual water has been consumed throughout the entire process of creating that product or service.

“As food and other products are traded internationally, their water footprint follows them in the form of virtual water. This allows us to link the water footprint of production to the water footprint of consumption, wherever they occur. [...] Virtual water flows help us see how the water resources in one country are used to support consumption in another country.”

Water Footprint Network

How are Water And Food Connected?

Virtual Water Moves Water Around the World



Virtual water balance per country and direction of gross virtual water flows related to trade in agricultural and industrial products over the period 1996–2005. Only the biggest gross flows (>15 Gm³/yr) are shown. From [Hoekstra and Mekonnen, \(2011\)](#).

How are Water And Food Connected?

The Water Footprint of Food Guide

The screenshot shows the 'Water Footprint of Food Guide' website. At the top, there is a navigation bar with links for 'WATER FOOTPRINT CALCULATOR', 'WATER FOOTPRINTS 101', 'HOW TO SAVE WATER', 'EDUCATIONAL RESOURCES', 'NEWS & ARTICLES', and 'WATER CALCULATOR'. Below this is a blue header with the title 'Water Footprint of Food Guide'. The main content area features a sub-header 'The Water Footprint of Food Guide' and a brief explanation: 'How and where your food is produced, whether it's rainfed or irrigated, and how much pollution it creates, determines if the water footprint is small (S), medium (M) or large (L)'. Below the text are search and filter controls: 'SEARCH:', 'SORT BY FOOTPRINT', 'CATEGORY', and 'RESET'. The main content is a grid of eight food items, each with a small image, a title, a serving size, and water footprint data in gallons and liters, along with a 'LEARN MORE' button.

Food Item	Serving Size	Gallons per serving	Liters per serving
Chocolate	4 ounces	516	1953
Almonds	4 ounces	483	1828
Beef	4 ounces	463	1752
Cashews	4 ounces	427	1616
Pistachios	4 ounces	341	1290
Hazelnuts	4 ounces	316	1196
Lamb and mutton	4 ounces	313	1184
Walnuts	4 ounces	279	1056

How Are Water and Food Connected?

Activity: [Three Foods \(Lesson Plan 2, Page 5\)](#)



FREE WATER FOOTPRINT LESSON PLANS

School Water Audit: Virtual Water Use

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Materials

- Clipboard
- Interviewing questions (see sample questions)
- Pens or pens
- Timing stopwatch
- Recording device
- Relevant administrative data, such as food purchasing reports, or food energy bills, or electronics purchasing data

**DOWNLOAD
NOW**

Wrap Up

- How will you incorporate these ideas into your instructions?
- What additional information do you need to help your students better understand their own water use and food choices and how it contributes to societal water use?
- Survey

Thank you!

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