

Water Resources and Plant Survival

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Grades 4-5

Vetted by Riverside County Office of Education-STEM

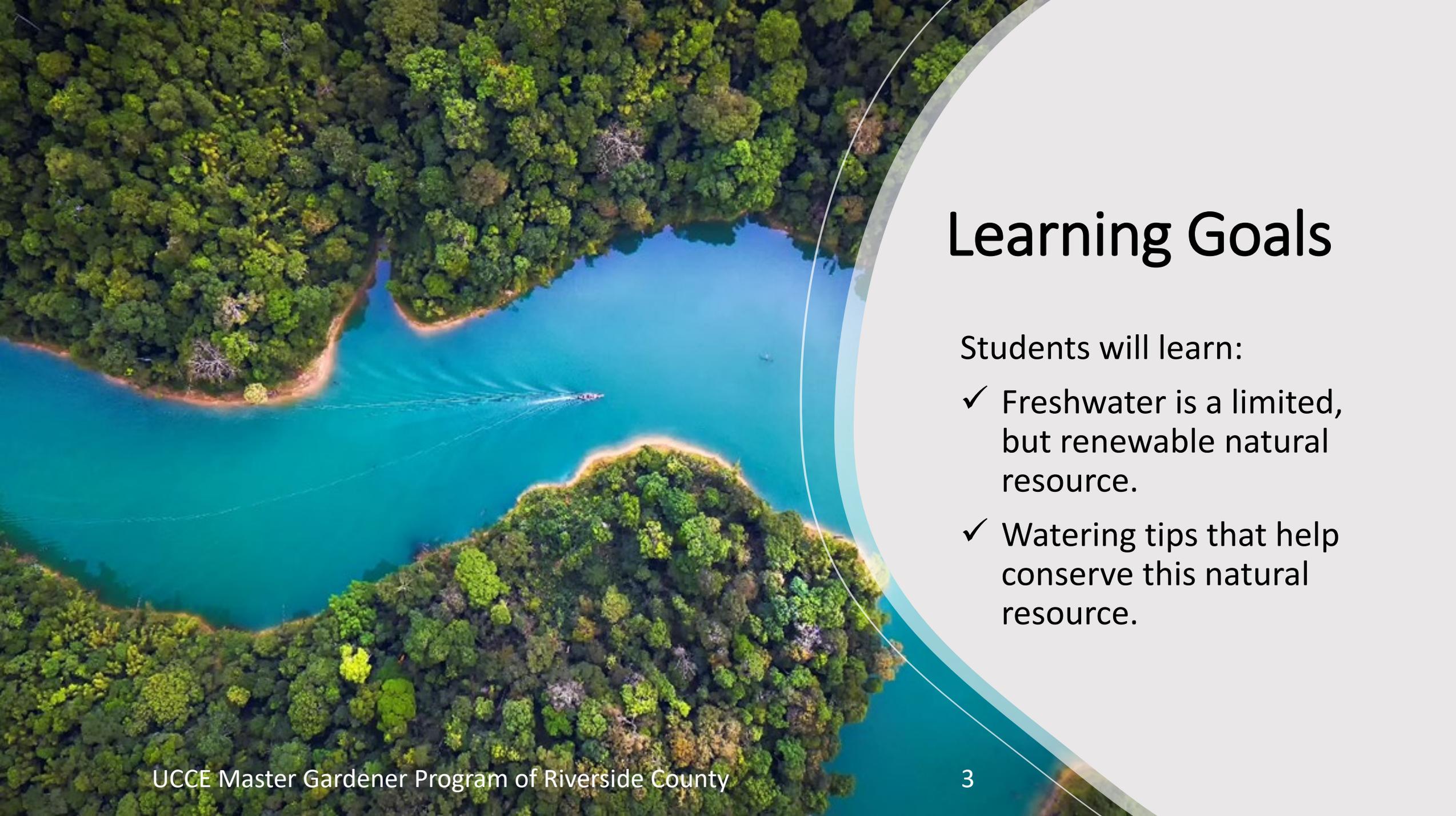
UCCE Master Gardener Program of Riverside County



Why Is This Important?

“Every living thing on Earth needs water to survive, but more than 100,000 species, including our own, need a special kind of water that can only be found in certain places and is in very rare supply: **freshwater.**”

*From [Freshwater Ecosystem](#) ;
National Geographic*



Learning Goals

Students will learn:

- ✓ Freshwater is a limited, but renewable natural resource.
- ✓ Watering tips that help conserve this natural resource.

Anchor Phenomena: Water-The Source of Life





Develop a Model To Describe the Phenomena

Draw a diagram demonstrating the phenomena of freshwater as a natural resource including both observable and unobservable details.

- Label all important parts of the diagram.
- Use arrows to show how all parts interact.
- Write an explanation describing freshwater as a natural resource.



Lesson One: Freshwater is a Valuable Natural Resource

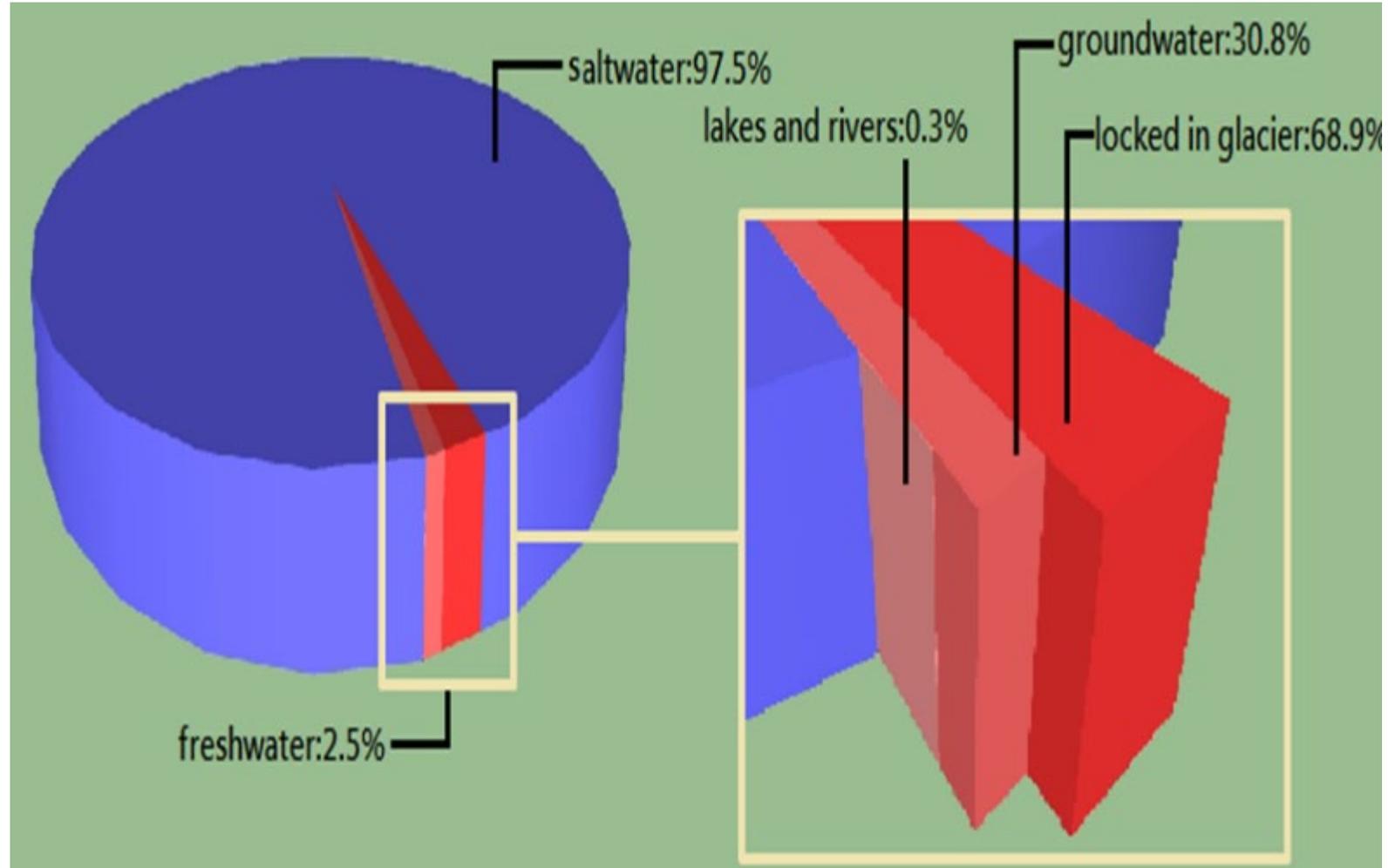
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Earth is called the “Water Planet”

Approximately three-fourths of Earth’s surface is covered in water.

Study the graphic carefully.

- What comprises the greatest amount of water?
- What percent is freshwater?
- Where is most freshwater located?



How Do Scientists Define Saltwater and Freshwater?

Salinity is a scientific term. Scientists use it to tell how much salt there is in water. Salinity is measured by the amount of sodium chloride (salt) found in 1,000 **grams** of water.

- The oceans and seas **contain 3 to 5% salt** and are considered salty
- Glaciers, lakes, rivers, and **aquifers** (groundwater) contain **less than 1% salt** and are considered fresh water.



Most Plant and Animal Species are Adapted to Survive Using One Type of Water



Humans and Land/Freshwater Animals

- If a human, or land/freshwater animal drinks salty water, their cells are taking in both water and salt.
- While a very small amount of salt can be safely ingested, the salt content in seawater is much higher than what can be processed by the body. This can cause [dehydration](#) and eventually death!

Plants Growing in Soil

- When saltwater enters the soil, the plant tries to absorb it throughout its roots like freshwater.
- However, saltwater does not allow for the movement of water through the plant tissues. The water is so dense, that the salt solution draws water out of the plant, dehydrating and eventually killing it!

Freshwater is a Natural Resource That is the Result of the Water Cycle

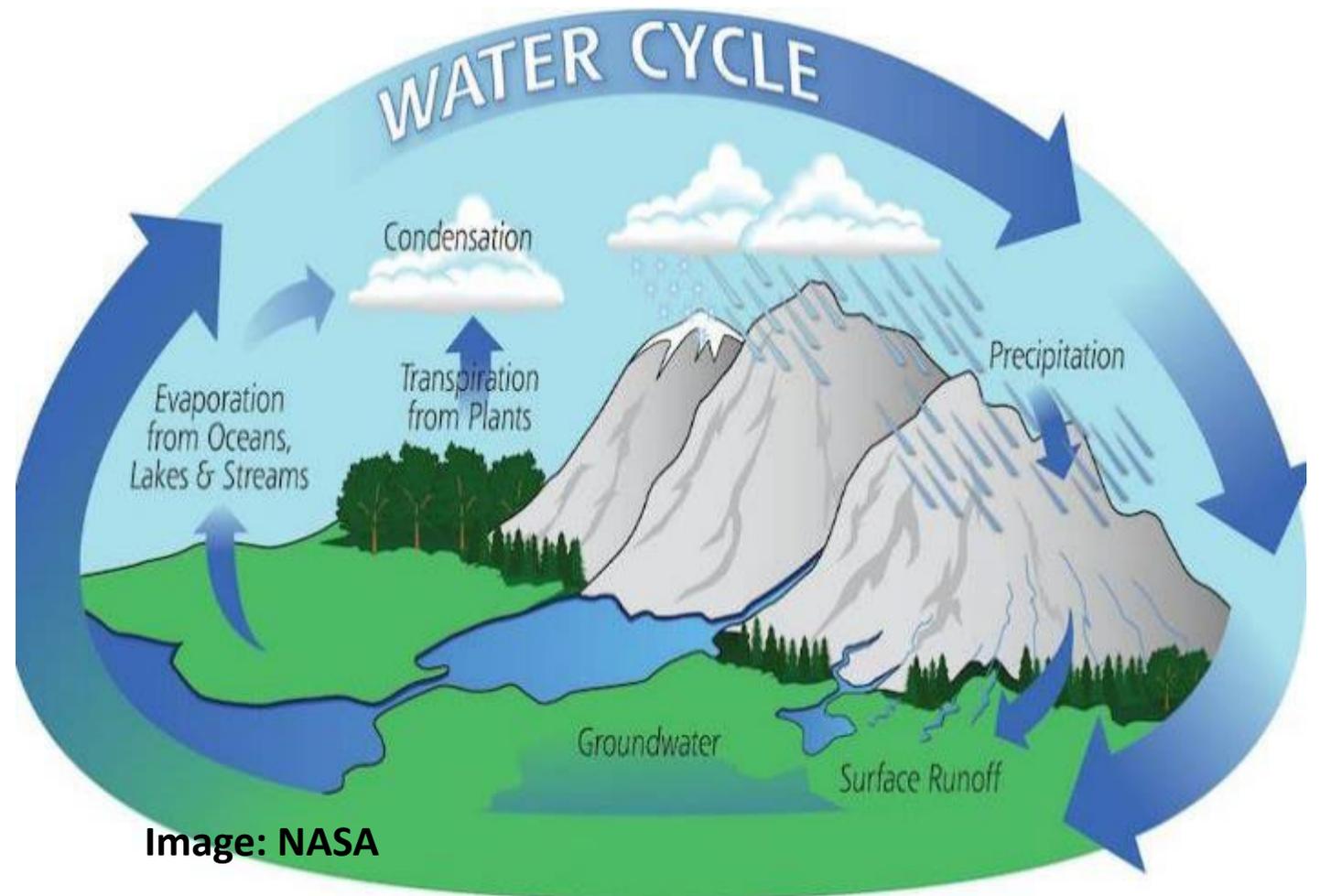
It is a renewable natural resource because it is replenished overtime by the process of the water cycle.

Study this image carefully.

- What *step* in this cycle delivers water to Earth's surface?

Do you think:

- The *same amount* of water is delivered everywhere on the planet?
- A given area receives the same amount of water *every year*?

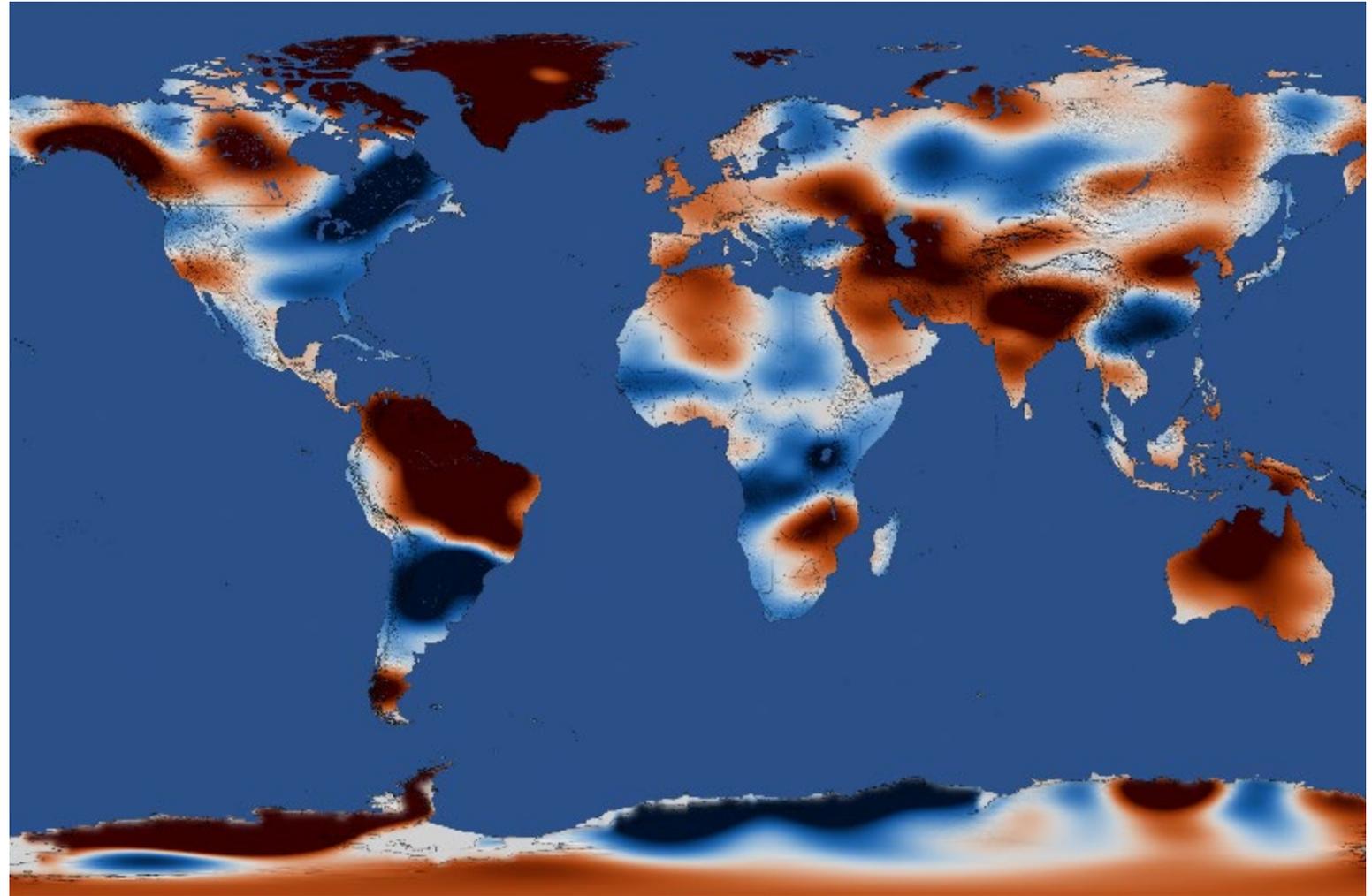


Freshwater Distribution

It is a natural resource that is plentiful in some areas of the world and scarcer in others.

[NASA 's Scientific Visualization Studio](#) image shows changes in freshwater around the world based on 15 years of satellite data.

- Blue indicates above average levels of freshwater.
- Brown and orange indicate below average levels of freshwater.



Video: [Show Me the Water](#)



Check For Understanding

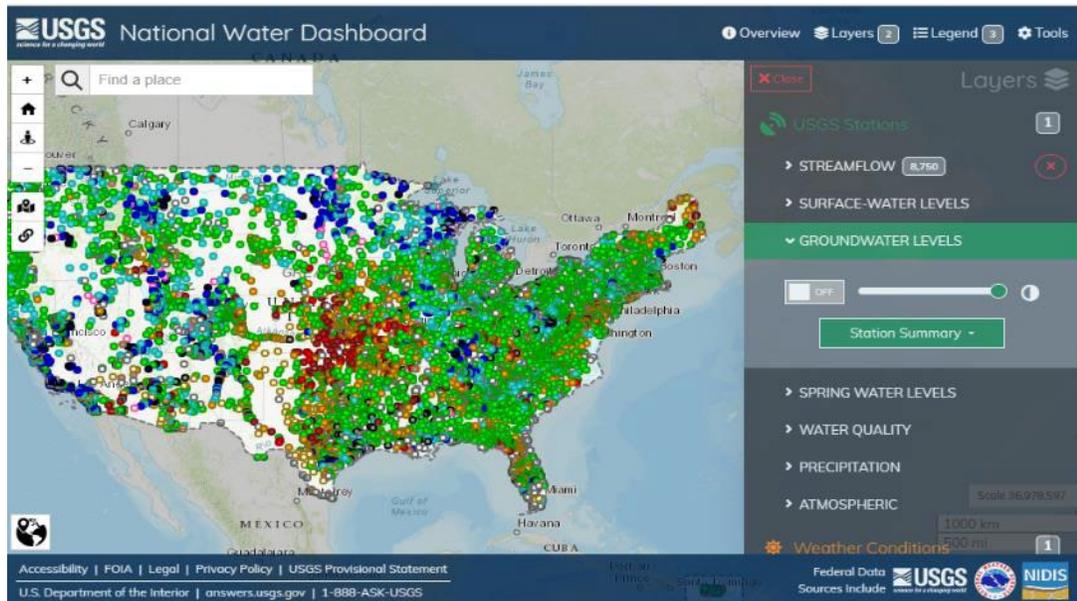
- What is the percent of freshwater on Earth?
- Where is most freshwater located?
- Why can't land plants absorb saltwater?
- Explain why freshwater is a renewable natural resource.
- Is freshwater available to humans and plants everywhere it is needed?



Phenomena in the Garden: [USGS Water Data](#) Freshwater Measurements Where You Live!

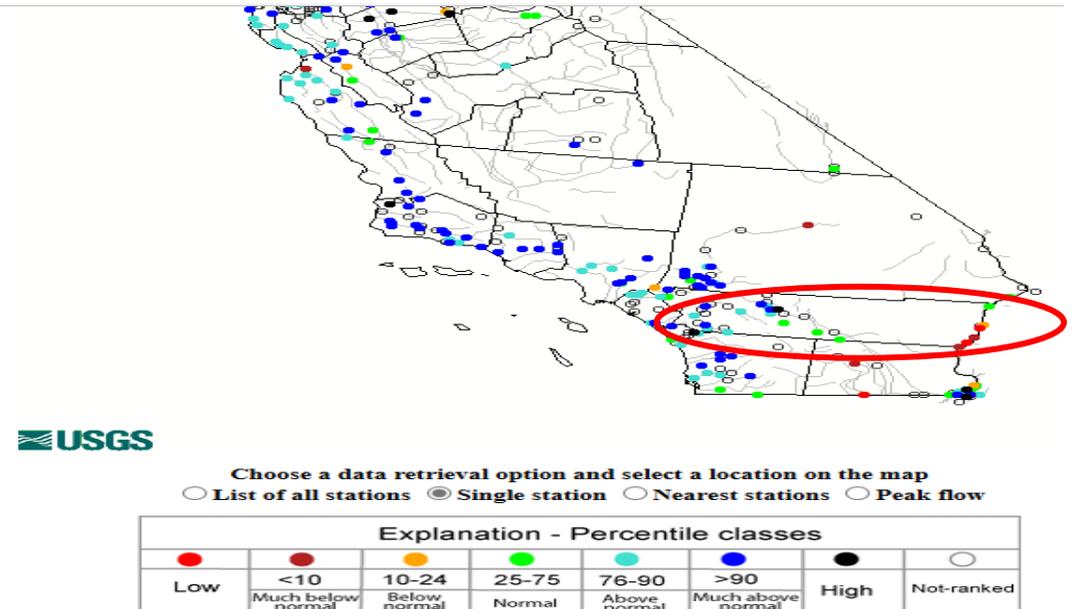
1. Click on your state

This will show color-coded dots indicating current measured freshwater streamflow across the state.



2. Click on your county

This will show you current freshwater streamflow compared to streamflow over time in the area you live.





Develop a Model To Describe the Phenomena

Revise your diagram demonstrating the phenomena of fresh water as a natural resource including both observable and unobservable details.

- Label all important parts of the diagram.
- Use arrows to show how all parts interact.
- Write an explanation describing freshwater as a natural resource.



Lesson Two: Watering Tips To Conserve This Natural Resource

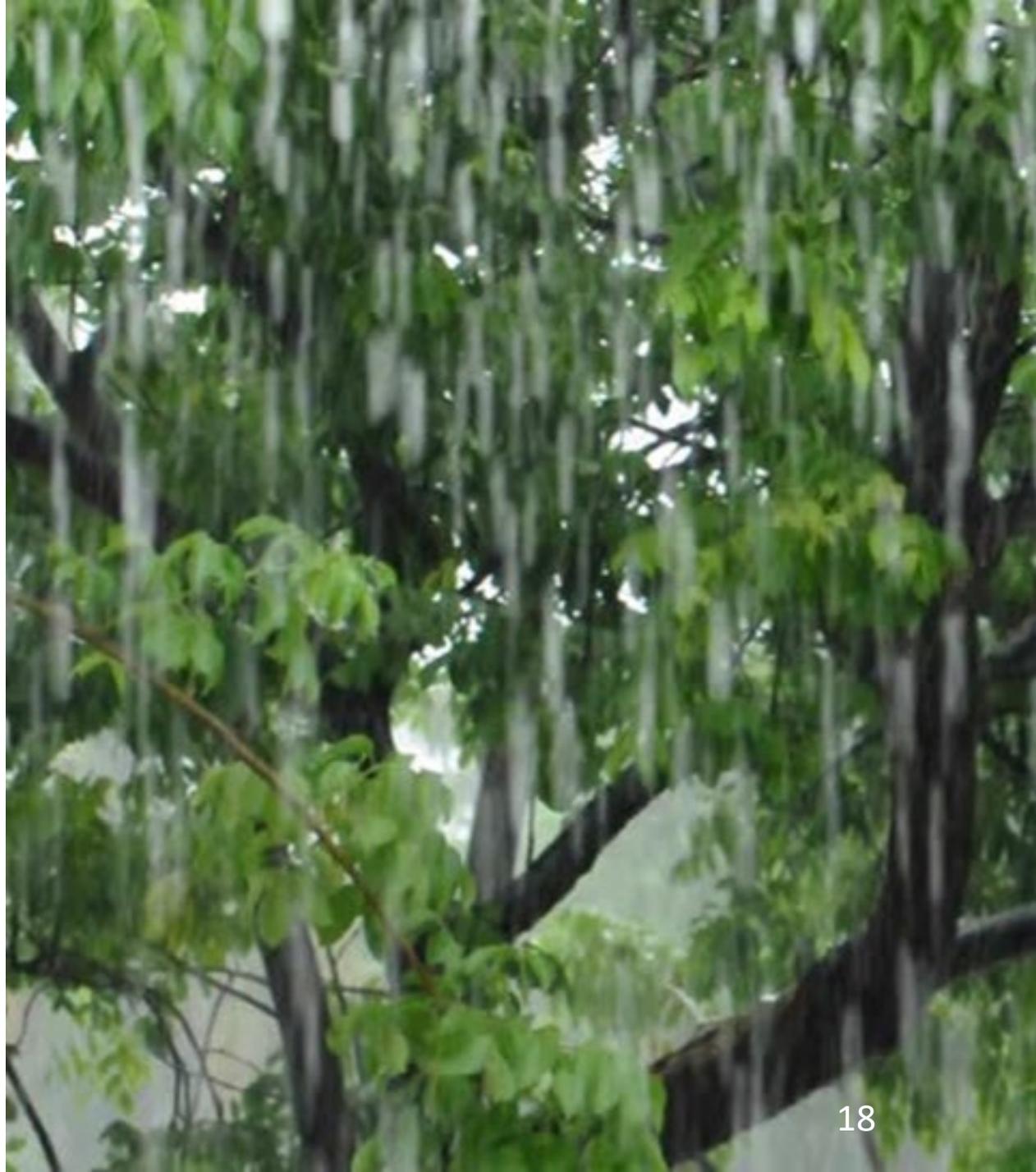


Which of these watering methods help to conserve our freshwater resources?

- **Precipitation**
Rain
- **Watering By Hand**
Hose
Watering Can
- **Irrigation**
Drip System
Sprinklers

Precipitation

- Precipitation in the form of rain helps to replenish freshwater supplies.
- Let nature do the watering for you *if* it rains long enough to sink into the soil and supply plant roots with water.



Other Watering Methods: By Hand

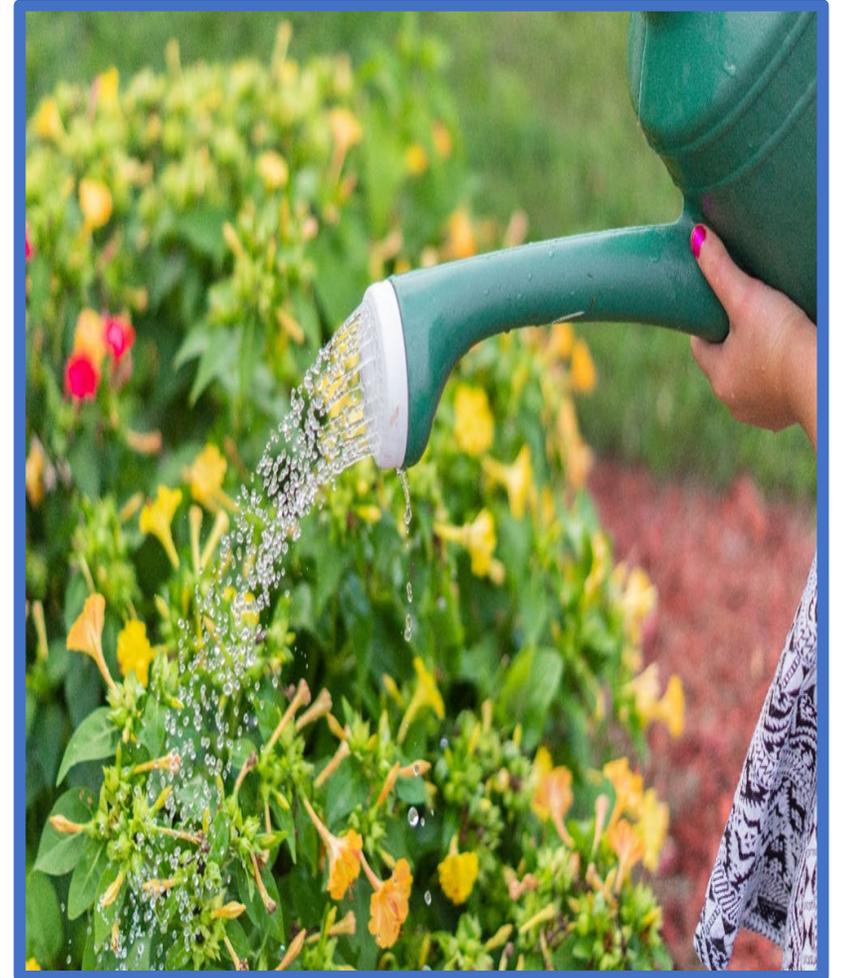
Watering Can
Hose

Pros:

- ✓ Both methods allow you to provide water directly to the area needed.
- ✓ You control the amount of water needed.

Cons:

- ✓ You may not always have the time to hand water your garden.
- ✓ You may forget you left on the water to the hose.
- ✓ Time consuming for larger gardens.



Other Watering Methods: Irrigation System

Sprinkler

Drip

Pros:

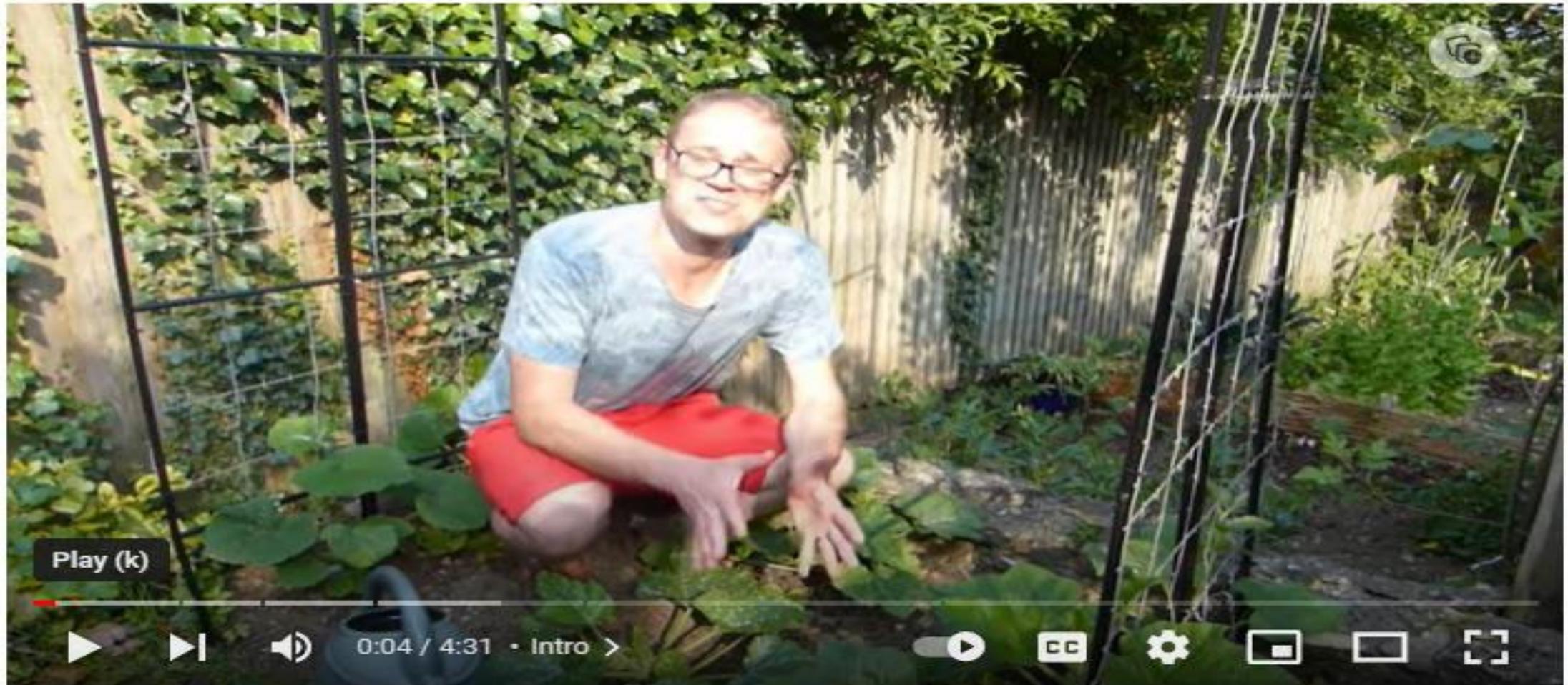
- ✓ Both methods can water a large area at one time.
- ✓ A timer can be installed so that plants are watered on a regular schedule. Some timers automatically shut off the watering system when it rains.

Cons

- ✓ Sprinklers send a lot of water into the air which will evaporate before reaching soil.
- ✓ Drip irrigation can clog and must be checked regularly.



Video: [Watering Methods](#)





Check For Understanding

- Which watering method conserves the most water?
- What is a good reason for watering by hand?
- What is an argument for not watering by hand?
- What is a good reason for using an irrigation system?
- What is an argument for not using an irrigation system.
- Which watering method would you recommend? Justify your answer.

Phenomena in the Garden: Evaluate Your School's Water Systems



- **Tour** your school campus grounds.
- **Identify** the different watering systems used.
- **Record** your observations on the data sheet provided on the next slide.
- **Discuss:** Do you think these are the most efficient systems for growing plants while conserving water?

Observation of Watering Systems

	Watering Can	Hose	Sprinkler with Pop-Up Head	Sprinkler with Rotating Head	Drip Irrigation
Tally each example observed					
Record locations observed					



Develop a Final Model To Describe the Phenomena

Revise or draw a new diagram demonstrating the phenomena of freshwater as a natural resource including both observable and unobservable details.

- Label all important parts of the diagram.
- Use arrows to show how all parts interact.
- Write an explanation describing freshwater as a natural resource.

Extend Your Thinking: *Hydroponics*

Consider a Water-Conserving Garden Alternative



Plants need water to grow, but do they need soil?

- Hydroponics is a method for growing plants in water with added nutrients solution.
- This method **conserves** water because it is not being absorbed by and evaporating from soil.
- Learn more about this method at the [Master Gardener Website](#).

Next Generation Science Standards

4-ESS3.A: Natural Resources

Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.

5-ESS2.C: The Roles of Water in Earth's Surface Processes

Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

5-ESS3.C: Human Impacts on Earth Systems

Human activities in agriculture, industry and everyday life have had major effects on the land, vegetation, streams, ocean, air and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Next Generation Science Standards

Science and Engineering Practices

- Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)
- Develop a model using an example to describe a scientific principle. (5-ESS2-1)

Crosscutting Concepts

- Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1)
- A system can be described in terms of its components and their interactions. (5-ESS3-1)

Resources

- California Master Gardener Handbook, Pittenger; 2015
- [Aquifers and Groundwater](#); USGS
- [Can Humans Drink Oceanwater?](#); National Ocean Service, NOAA
- [Freshwater Access](#); National Geographic Society
- [Freshwater and the Water Cycle](#); USGS
- [Freshwater Ecosystems](#); National Geographic Society
- [How is Salinity Calculated?](#); Sciencing
- **Images:** Creative Commons; NASA; Stock; UCANR; USGS
- **Videos:** World Wildlife Foundation; NASA Goddard, GrowVeg

Master Gardeners

The University of California Cooperative Extension (UCCE) Master Gardener Program (MGP) is an educational program designed to teach and effectively extend information to address home gardening and non-commercial horticulture needs in California.

UCCE is the outreach arm of UC's division of Agriculture and Natural Resources (ANR). Master Gardener volunteers (MG volunteers) promote the application of basic environmentally appropriate horticultural practices through UCCE-organized educational programs that transfer research-based knowledge and information.



University of California

Agriculture and Natural Resources

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Gardening Questions?

Email the UCCE Master Gardeners of Riverside County

- Email Helpline: anrmgriverside@ucanr.edu
- School Gardens: mgschoolgardens@gmail.com

Website Resources

- [Riverside Master Gardeners Website](#)



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