

# *The Nature of Groundwater*

Financial Support From:

# What We Do:



## Education

Developing and providing teacher professional development that deepens water-related content knowledge and impacts educational practice.

## Outreach

Delivering direct student and community outreach that inspires students through relevant, water-focused experiences.

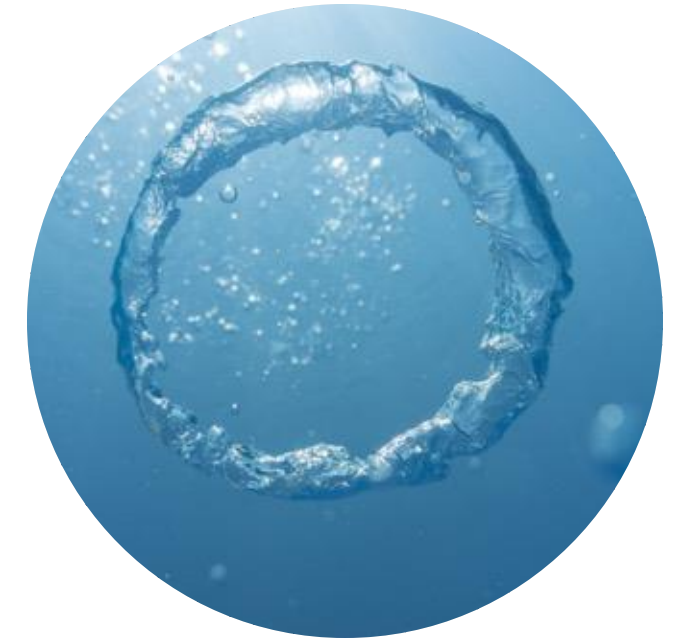
## Connection

Using our expertise as educators to connect community water stewards and the K-12 education system.

**“Feel something. Learn something. Do something.”**

## Water Cycle

Students track the movement of water molecules through the Arizona landscape reflecting the morphing, flowing, cyclical nature of water. The form and function of water varies depending on the molecules' position in the cycle. Students (and adults) reflect on how they fit into the closed circuit and the implications of human impact.



## Groundwater

Students manipulate groundwater models to interpret the connection between groundwater recharge and discharge. Precipitation flowing through the watershed percolates into the ground and well-pumped groundwater affects the levels of surface water. Making water-wise choices and adopting water conservation practices helps lower the risk of overdraft and subsidence. Students reflect on how they might use/misuse groundwater.

## Watershed

Students gather insights into the features of a watershed, exchanges between the elements, and the effects of human impact. Water flowing through our resident watershed(s) supports all life in the region. Students reflect on how their behaviors may help or hinder watershed health.

## Water Sustainability

Students synthesize their water cycle, groundwater, and watershed reflections by connecting the challenges facing Arizonans to mindful, sustainable, and practical personal choices. Program participants commit to water conservation!

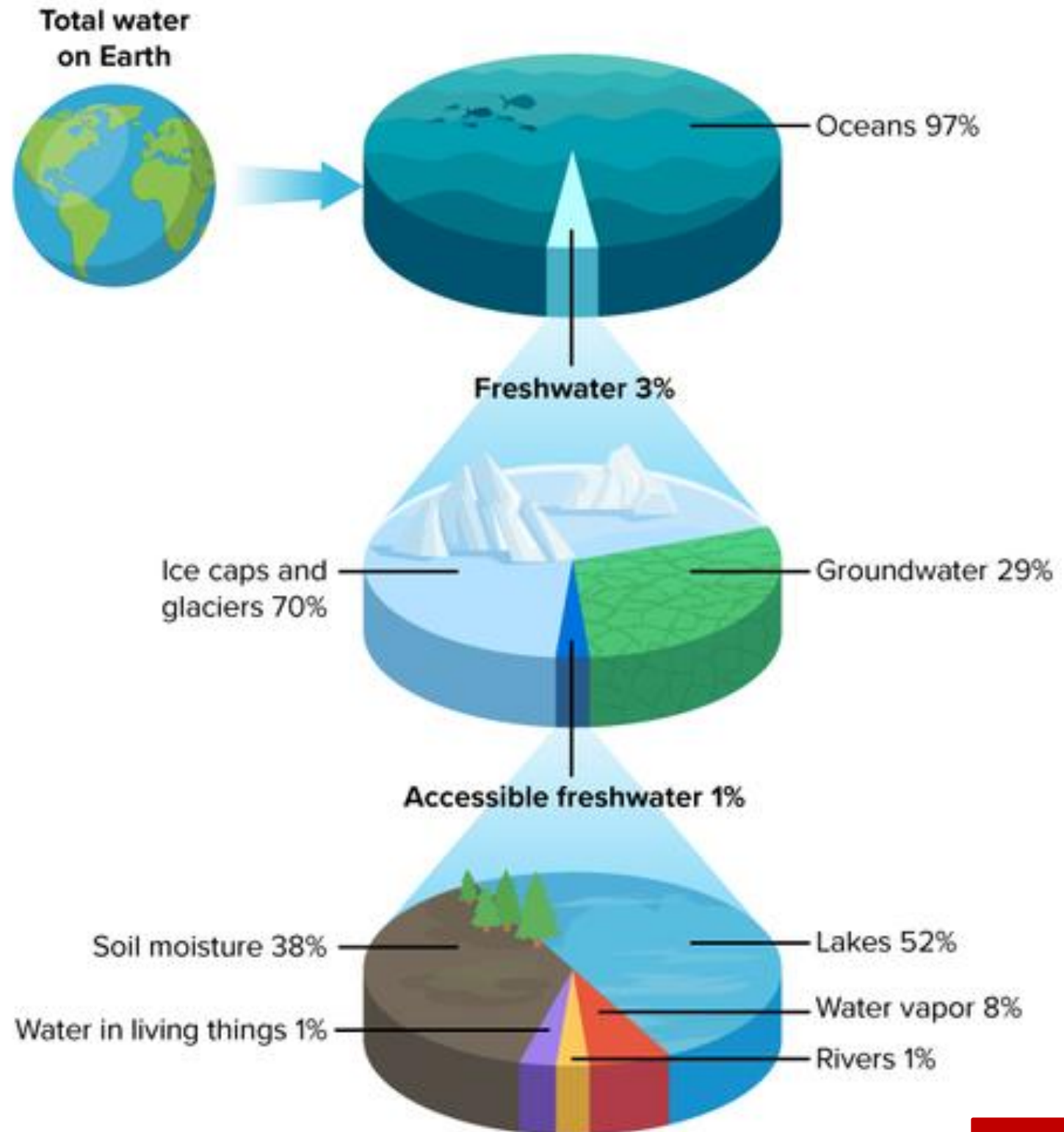
# Today we want to explore:

- What is the nature of our relationship with groundwater?
- Is this relationship built to last?

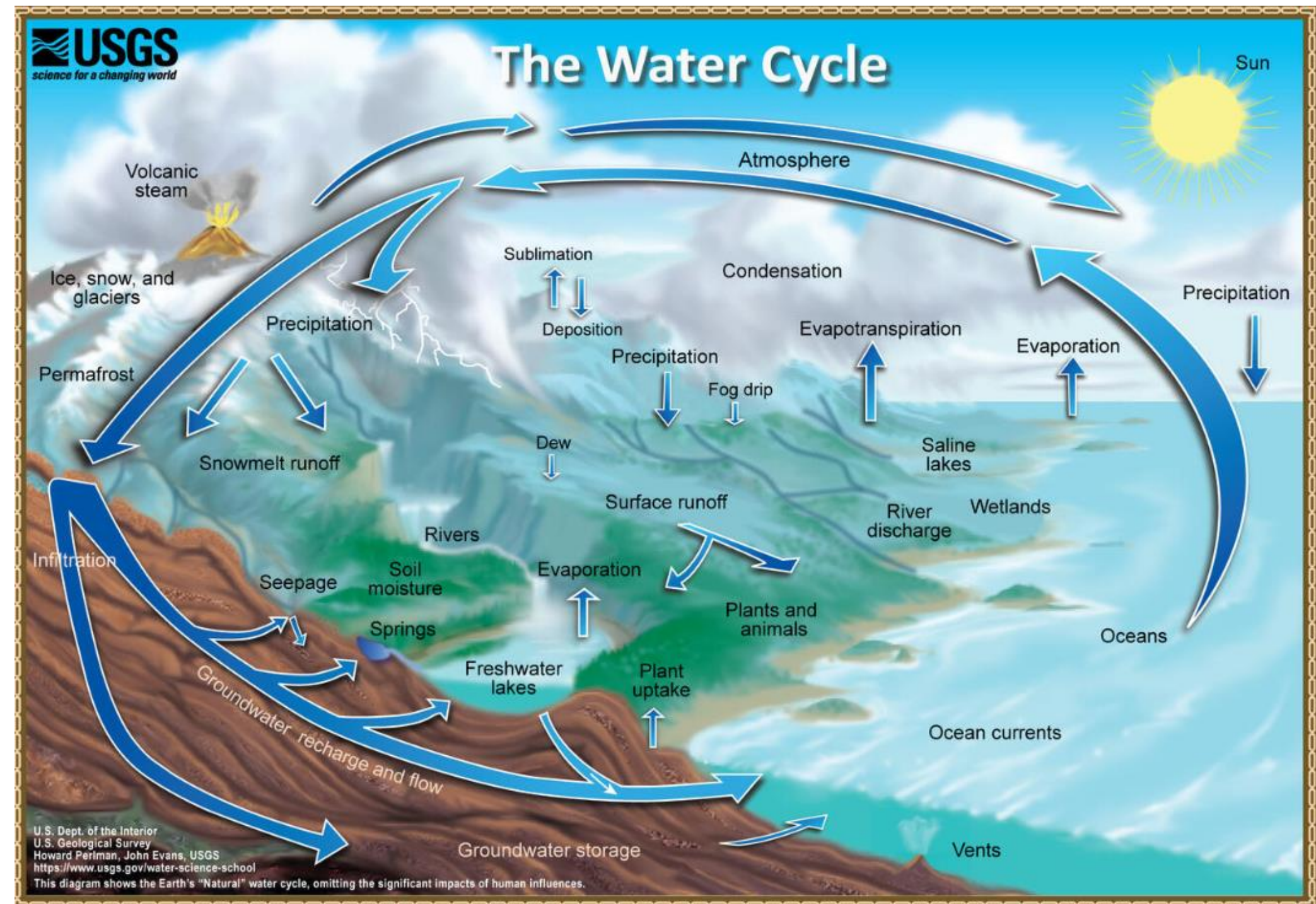
## *The Nature of Groundwater*



# Water is essential for all life on Earth to exist, so it truly connects us all.

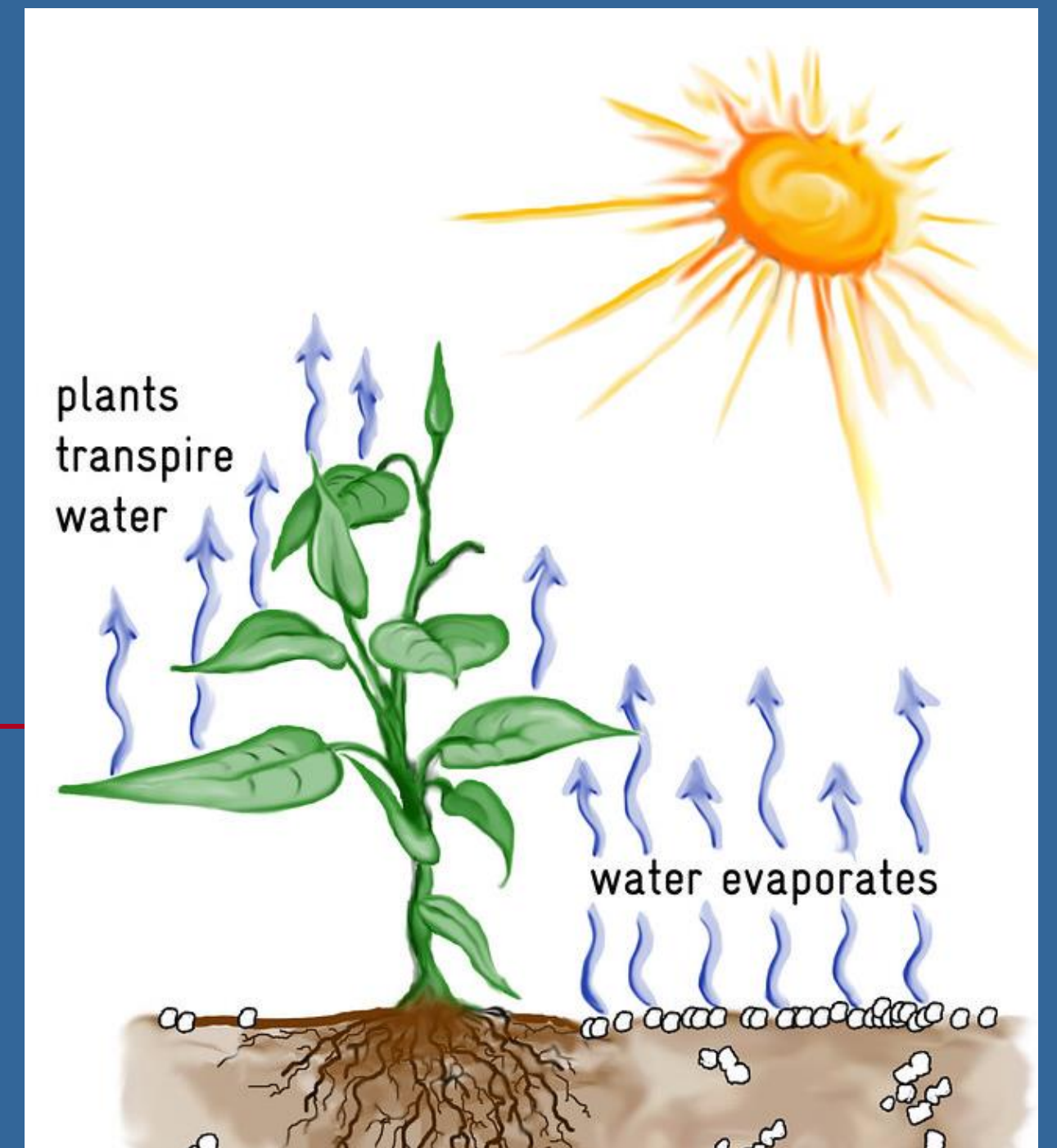


# The Water we have on Earth, is ALL we have!

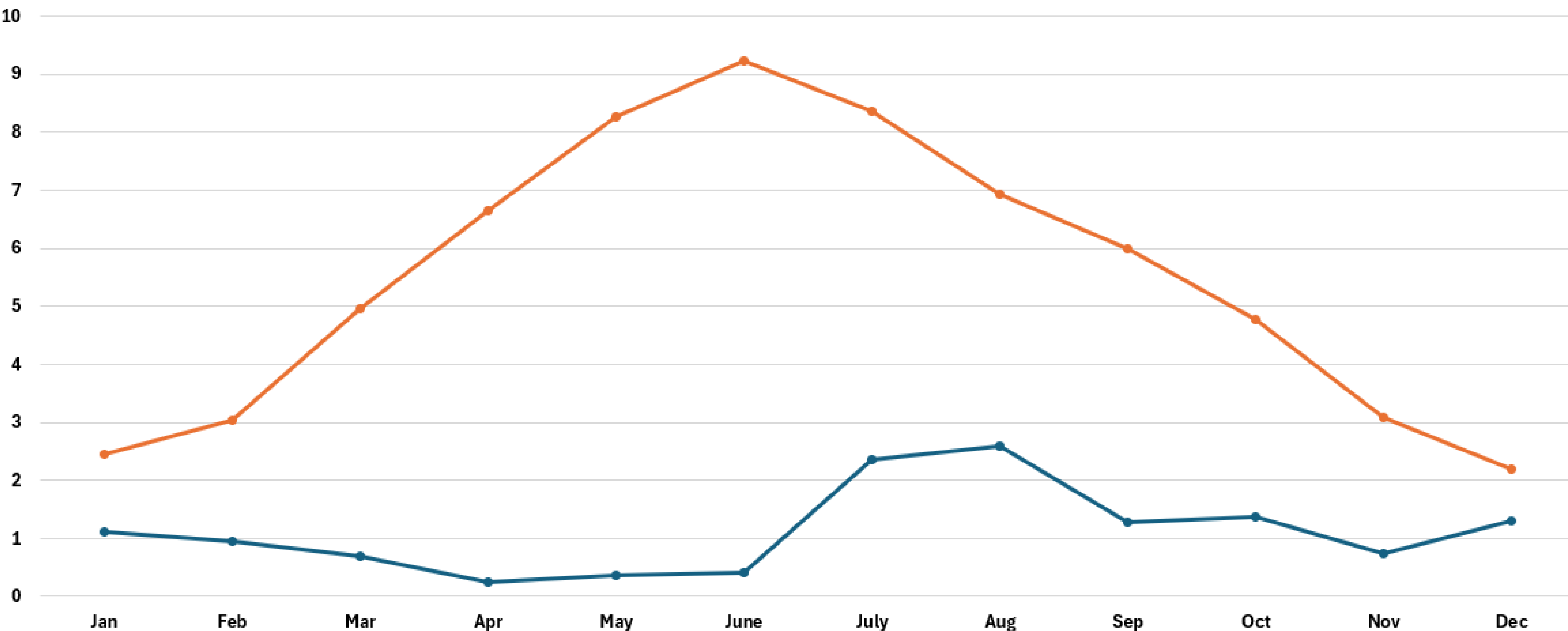


# What is evapotranspiration?

- What is evaporation?
- What is transpiration?
- What form is water changing from and into during each process?

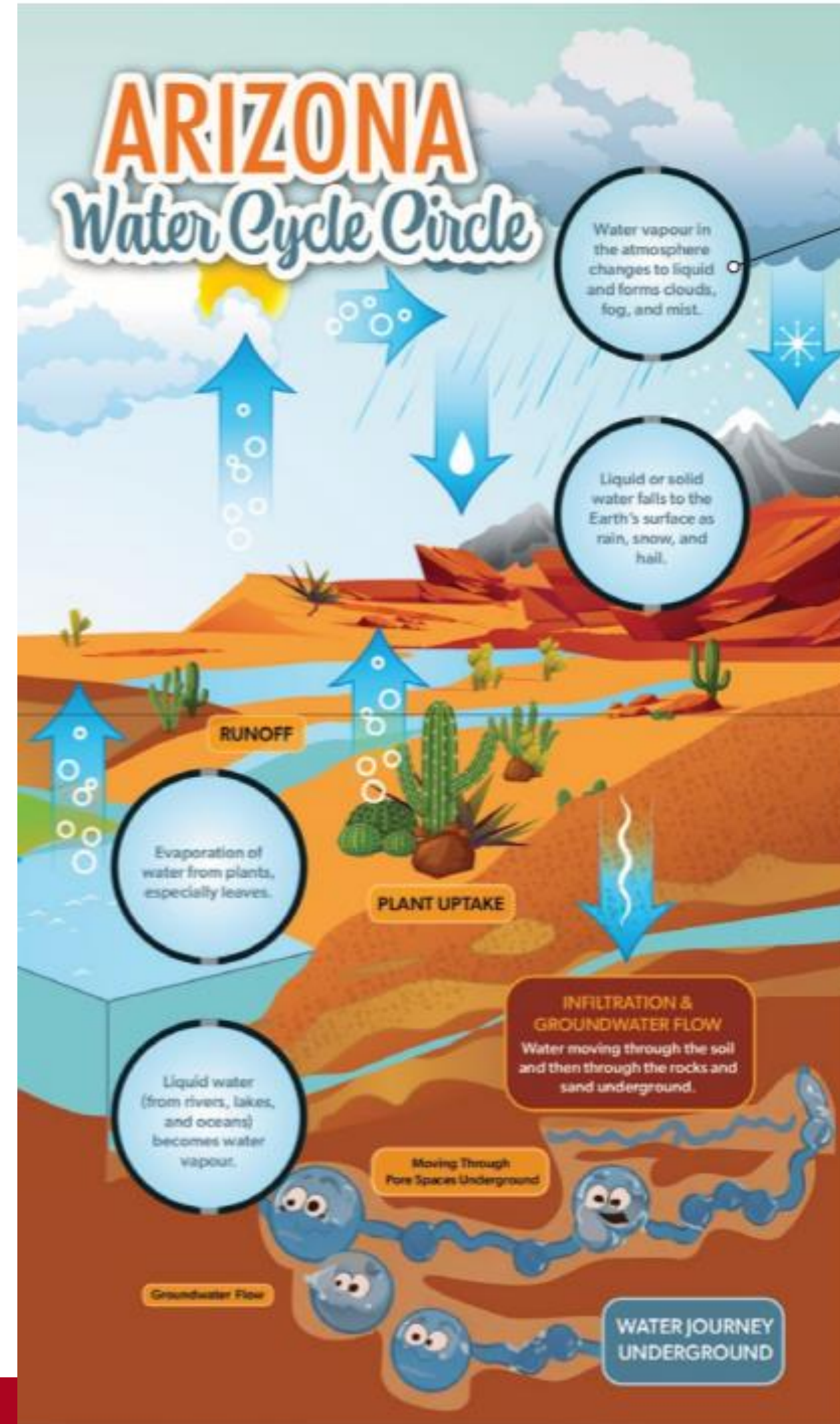


# Wilcox Precipitation vs Evapotranspiration



—●— Wilcox Average Monthly Rainfall Inches

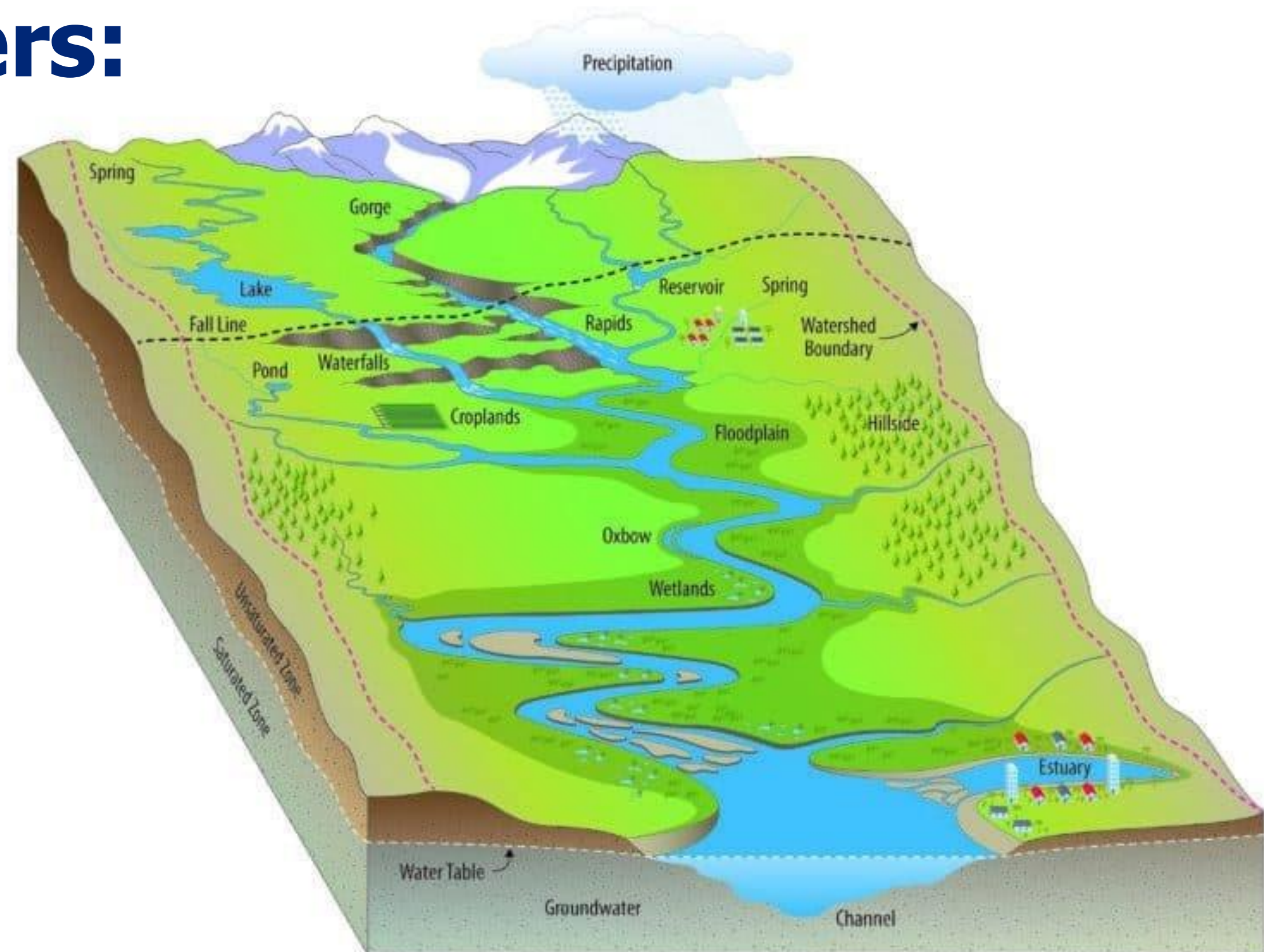
—●— Wilcox Average Monthly Evapotranspiration



# WATERSHEDS

## Watershed Wonders:

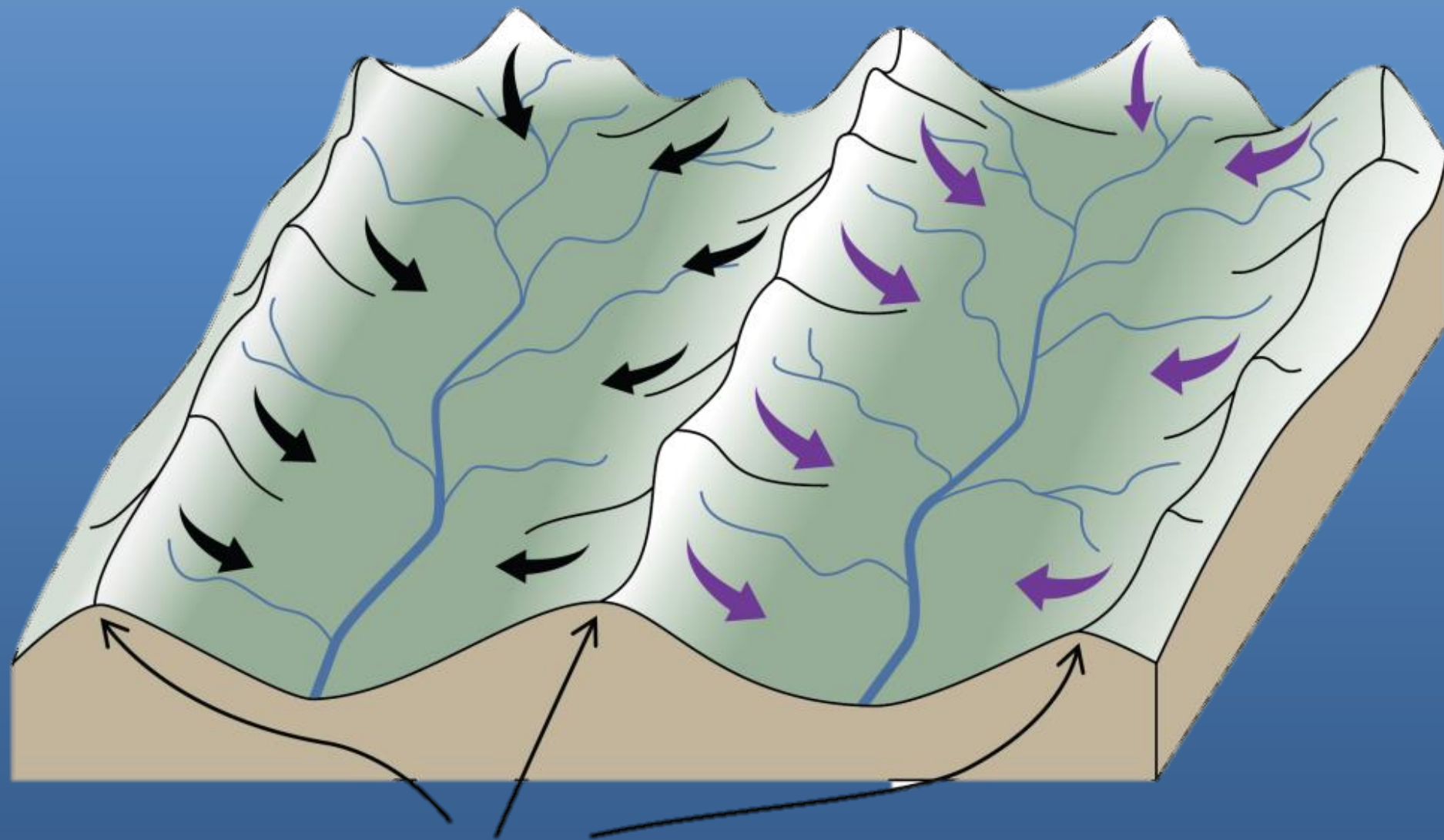
1. You probably know what city and street you live in, but do you know which watershed you live in?
2. What exactly is a watershed, and why should you care about it?



# WATERSHED: *Watersheds Work*

---

## What is a Watershed?



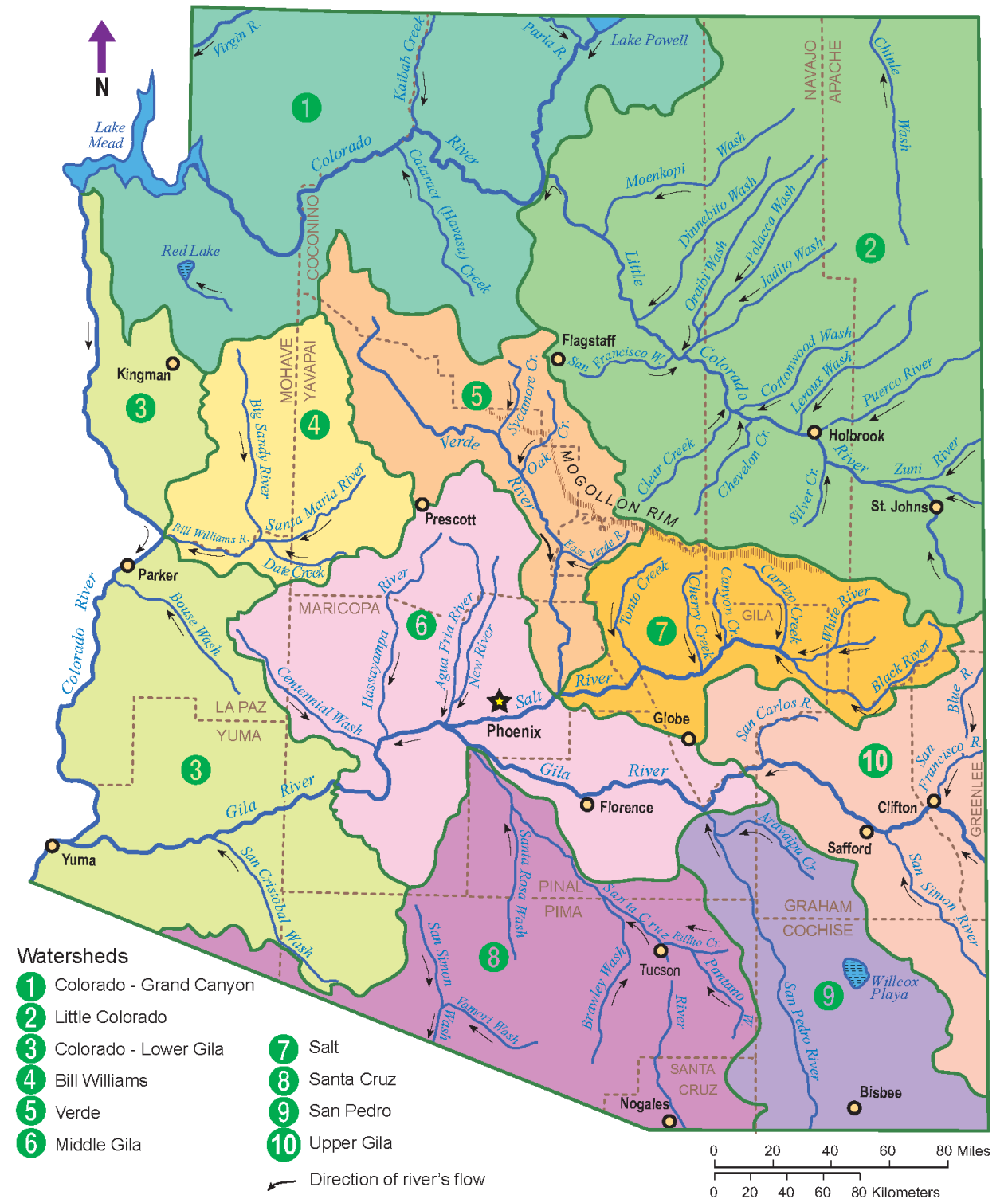
A watershed is:  
a land area that  
**DRAINS** to the  
low points.

# WATERSHED: Watersheds Work

What are we managing when we talk about watershed management?

The land and water in that area.

Arizona's Watersheds



# Drought or deluge, rainfall in Arizona tends to be **EXTREME.**

- We tend to either have too little, or too much when it comes to precipitation here.



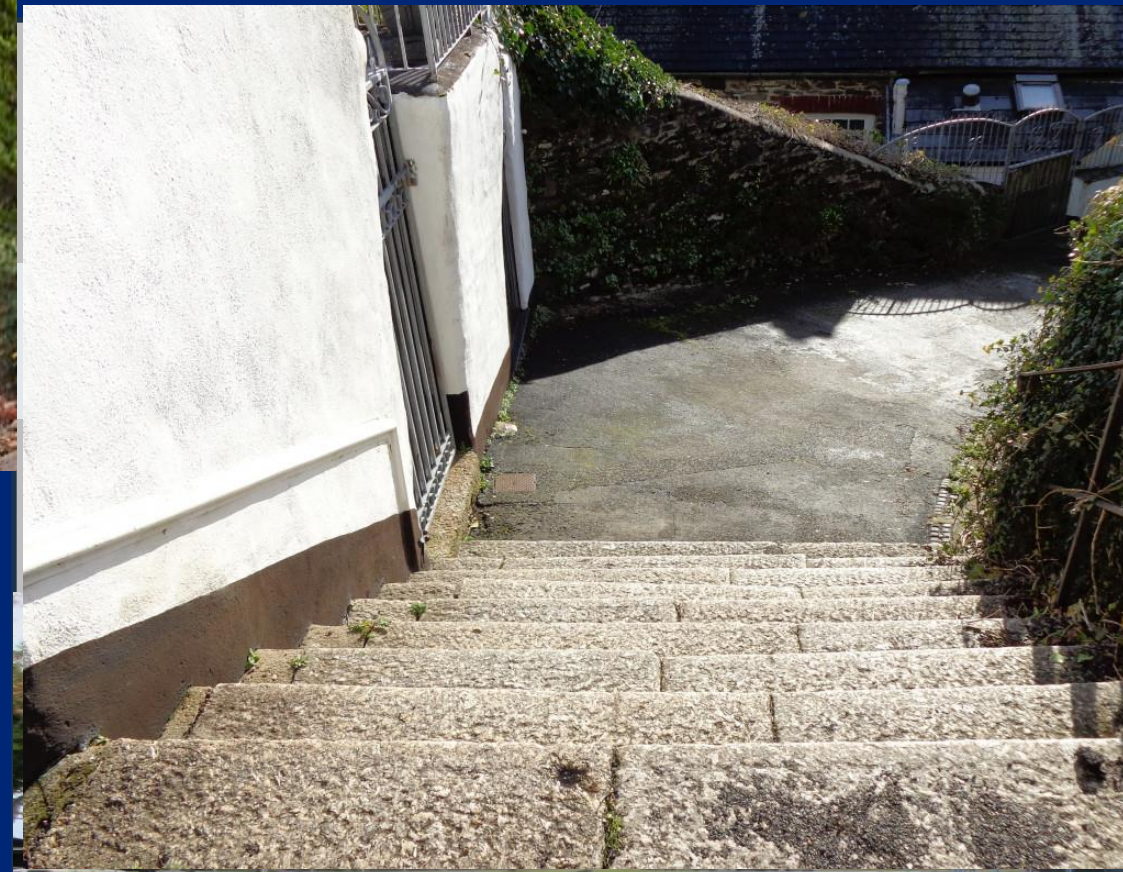
## Follow the Flow

- When rain falls or when snow melts, does the water just sit there? Or does it move? Why?
- We know some of it may percolate down through earth materials into the ground, but most of it flows downhill as what?

Runoff is important as it keeps our rivers, lakes and groundwater flowing. But...

# PERMEABLE

Water can sink in or percolate into the earth materials, where plants can use it, or it keeps traveling further down to reach groundwater (infiltration).



# IMPERMEABLE

Water cannot penetrate or percolate, but rather pools or runs off the surface. These are also called impervious surfaces.

# Watershed: Human Impacts

---

**In our city centers and neighborhoods  
what happens to that runoff?**



Rain  
becomes  
storm  
water!



# What makes storm water a bad thing?



**SOIL – SEDIMENTS – ROAD SALT – VEHICLE SPILLS – FERTILIZERS – PET WASTE  
– HEATED WATER – GREASE – TRASH – DETERGENT – SOLVENTS**



THE UNIVERSITY  
OF ARIZONA

# Where does storm water go?



To our rivers,  
lakes, and  
natural  
environment.



# Watersheds



Now we know changes we make to the land affect the water and pollution within our watersheds.

- This means those changes also affect the water in the water cycle and groundwater.
- Can we reduce the flow of runoff and contaminants?

## Water Movement Between Earth Systems

---

- How and why does water move between Earth materials?
- What are some of the consequences of water movement (cause and effect)?

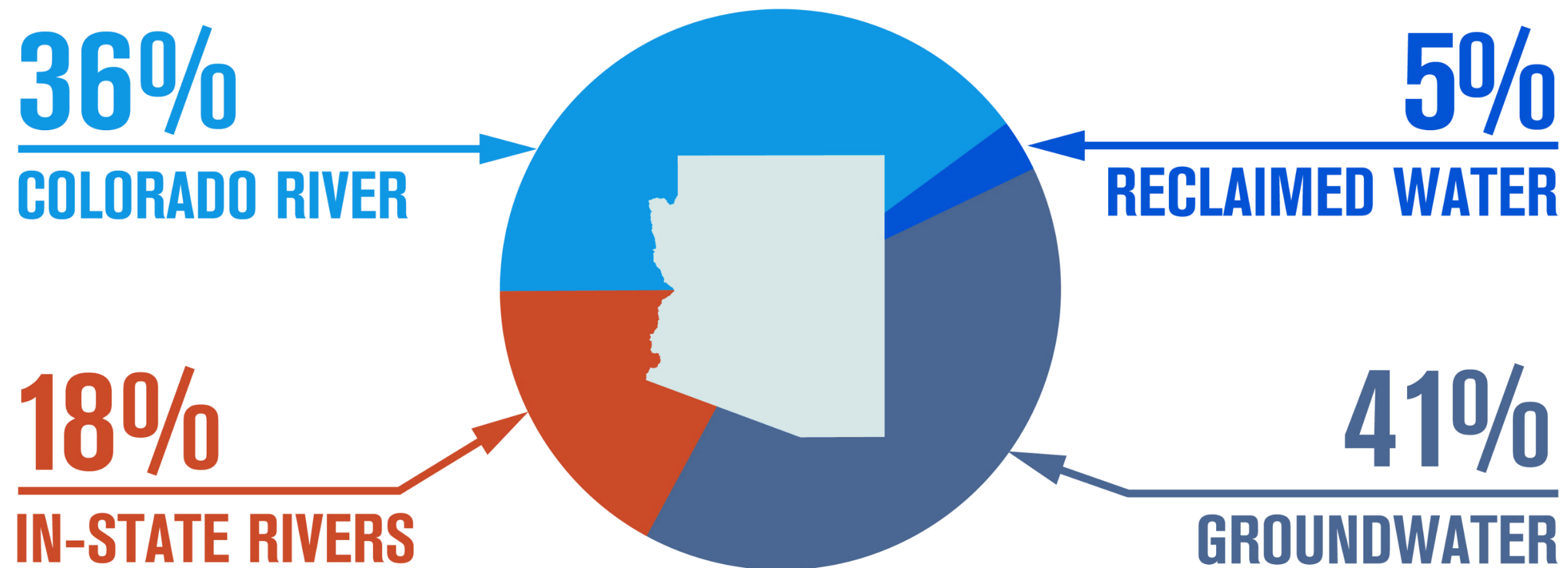
# Ground shattering outcomes!

## How does water move and why?

- Does the water get soaked up or did it move around the pieces of gravel/sand?
- Which earth materials did water move through the fastest? Why?
- What do we call ground surfaces that allow water to penetrate rather than run off?
- When water is underground what do you think it is called?

# GROUNDWATER & SUSTAINABILITY

## ARIZONA'S WATER SUPPLY



SOURCE: ADWR, 2020

How important is groundwater to Arizona?

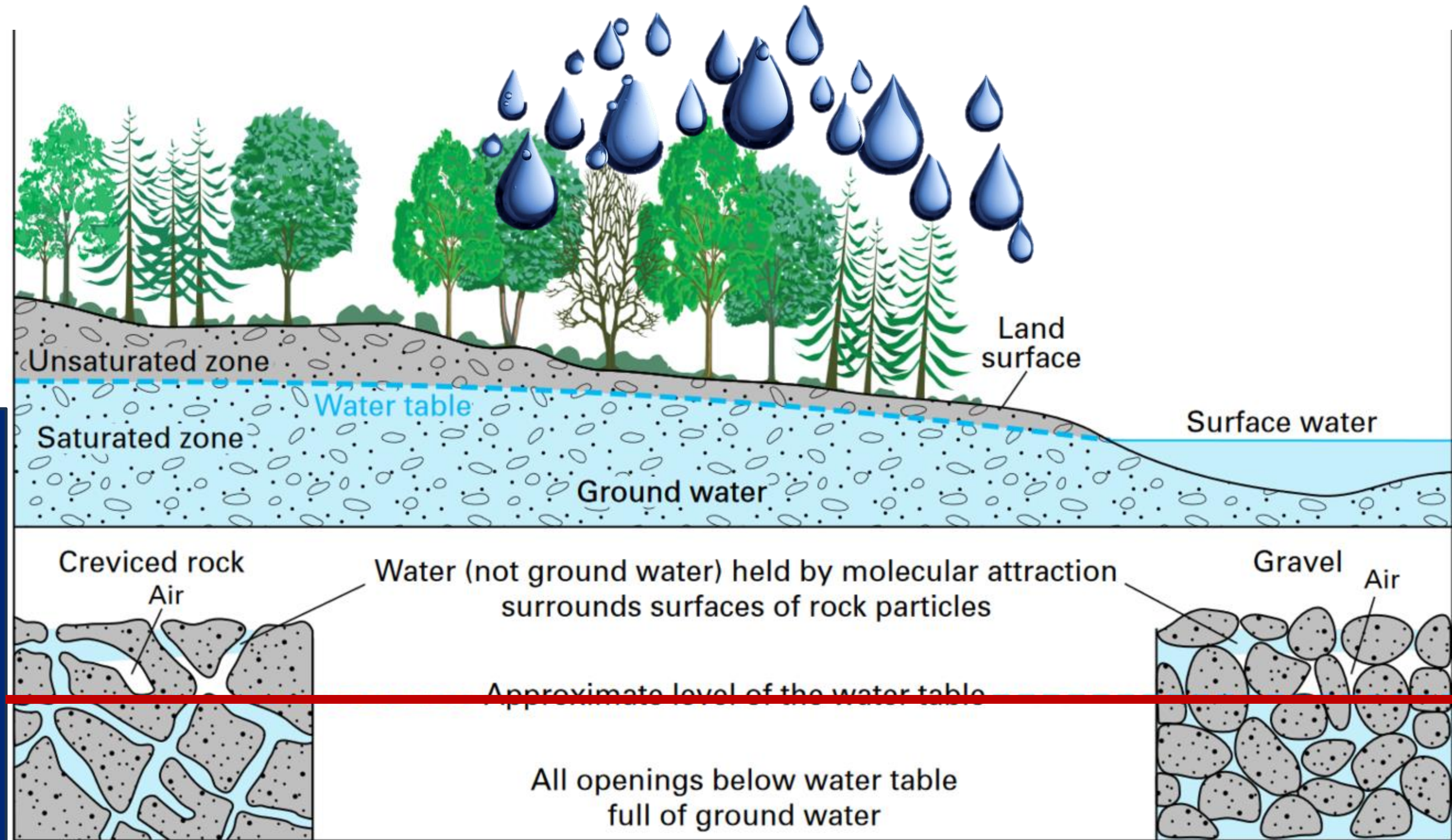


THE UNIVERSITY OF ARIZONA

# Let's Dig In!

## Pore Spaces

Groundwater moves between the spaces and pores and is pulled down due to gravity. The bigger the spaces between the materials, the faster or easier the water can move around it.



## Aquifer

An area where significant groundwater is present. Groundwater flows between layers of earth materials.

# GROUNDWATER & SUSTAINABILITY



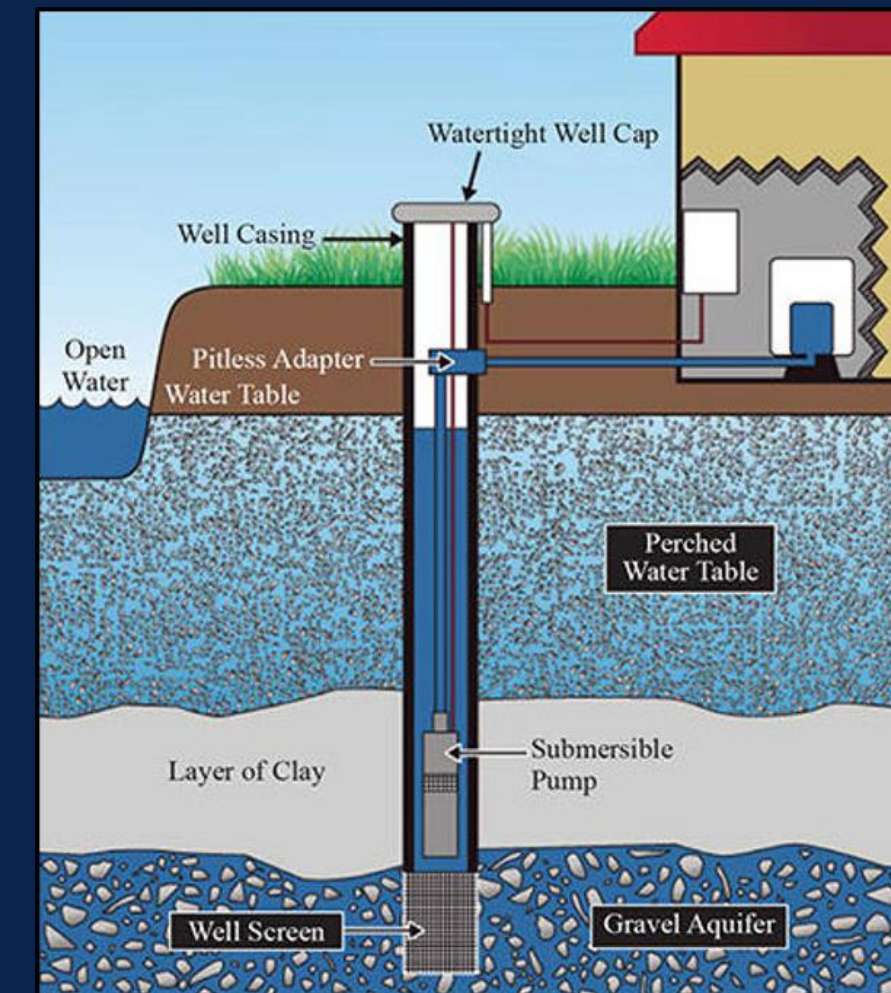
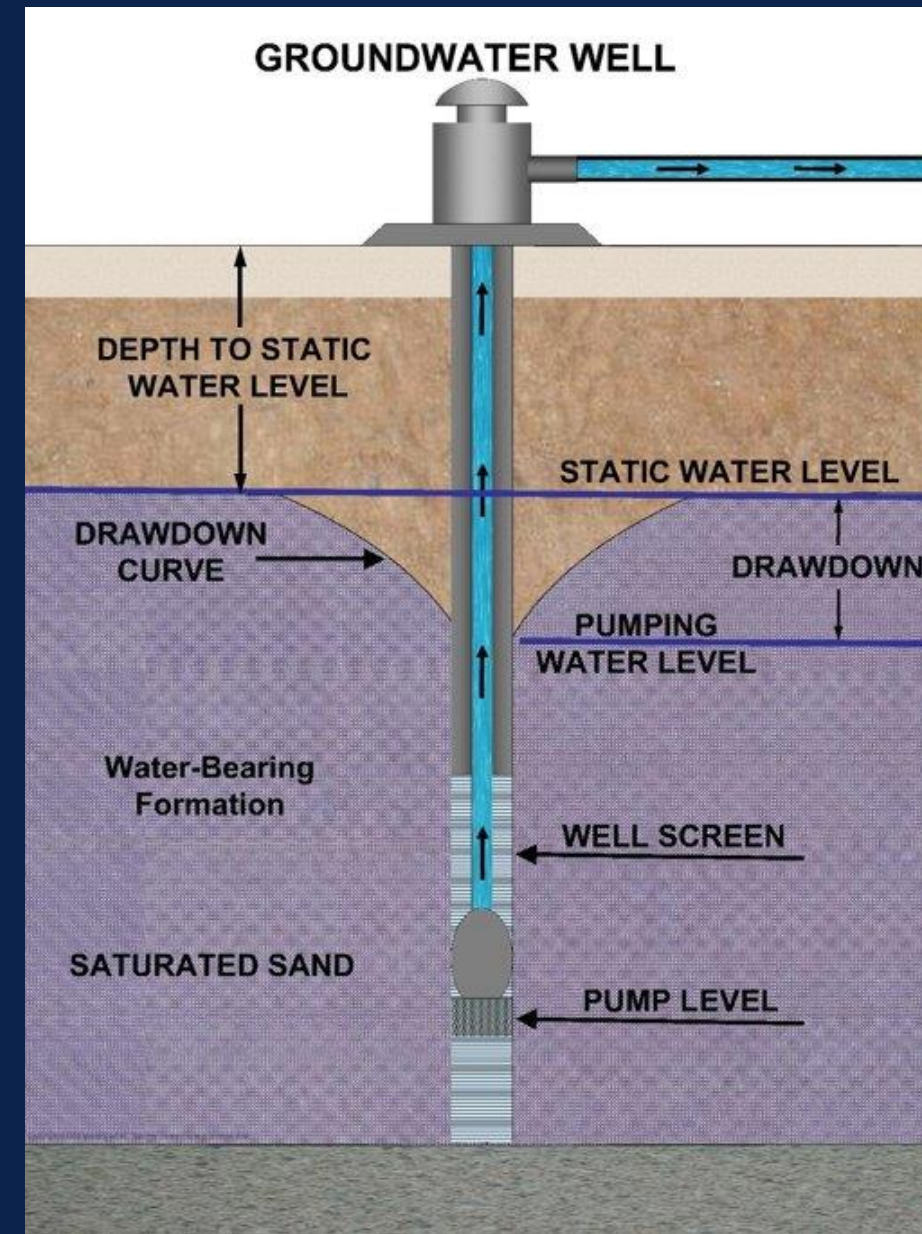
## Well, well, well, what do we have here?

- How do we access and use groundwater?
- Both individual landowners and city municipalities drill wells to access groundwater.

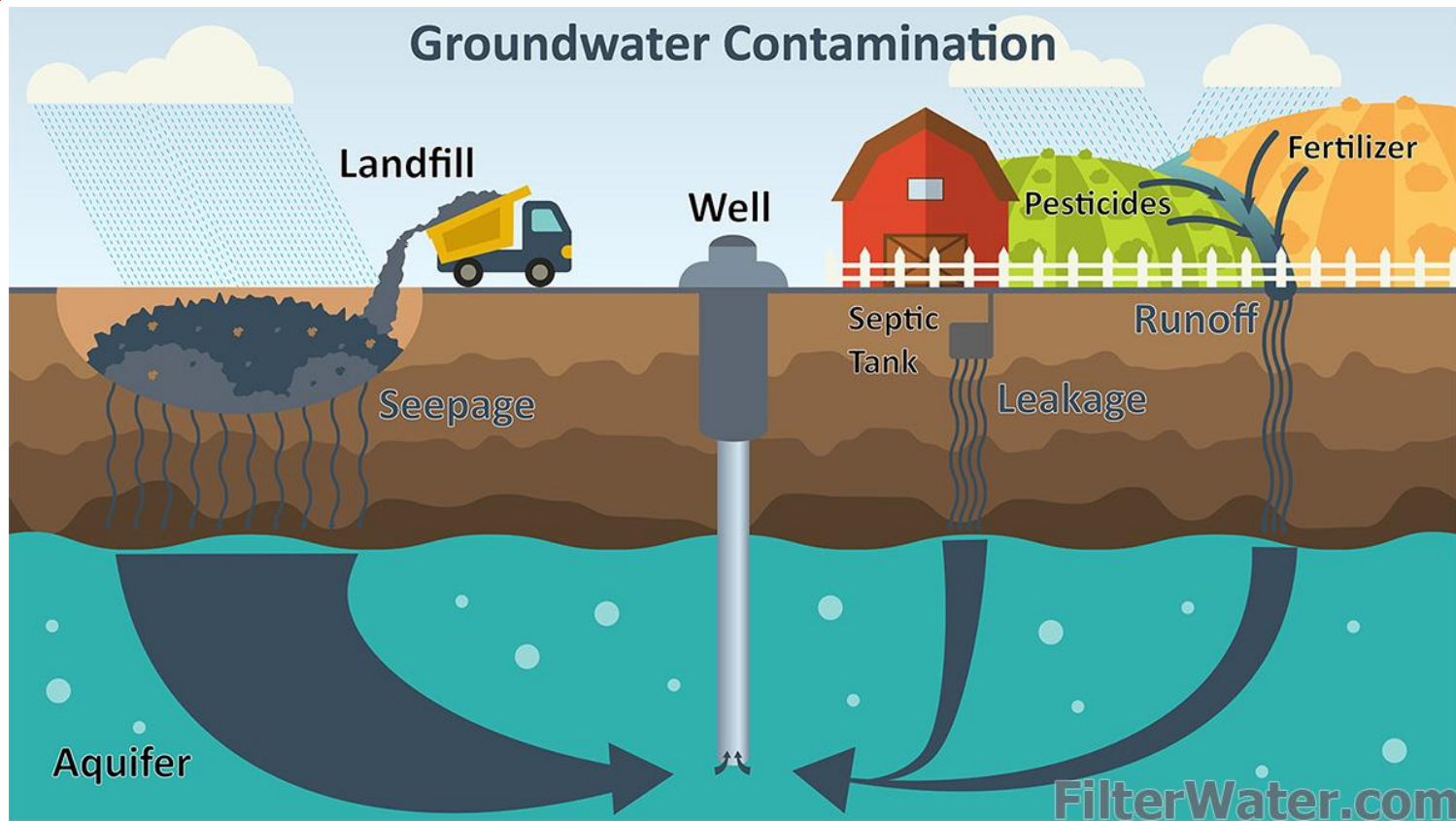
# GROUNDWATER & SUSTAINABILITY

## How do we pump it up and why?

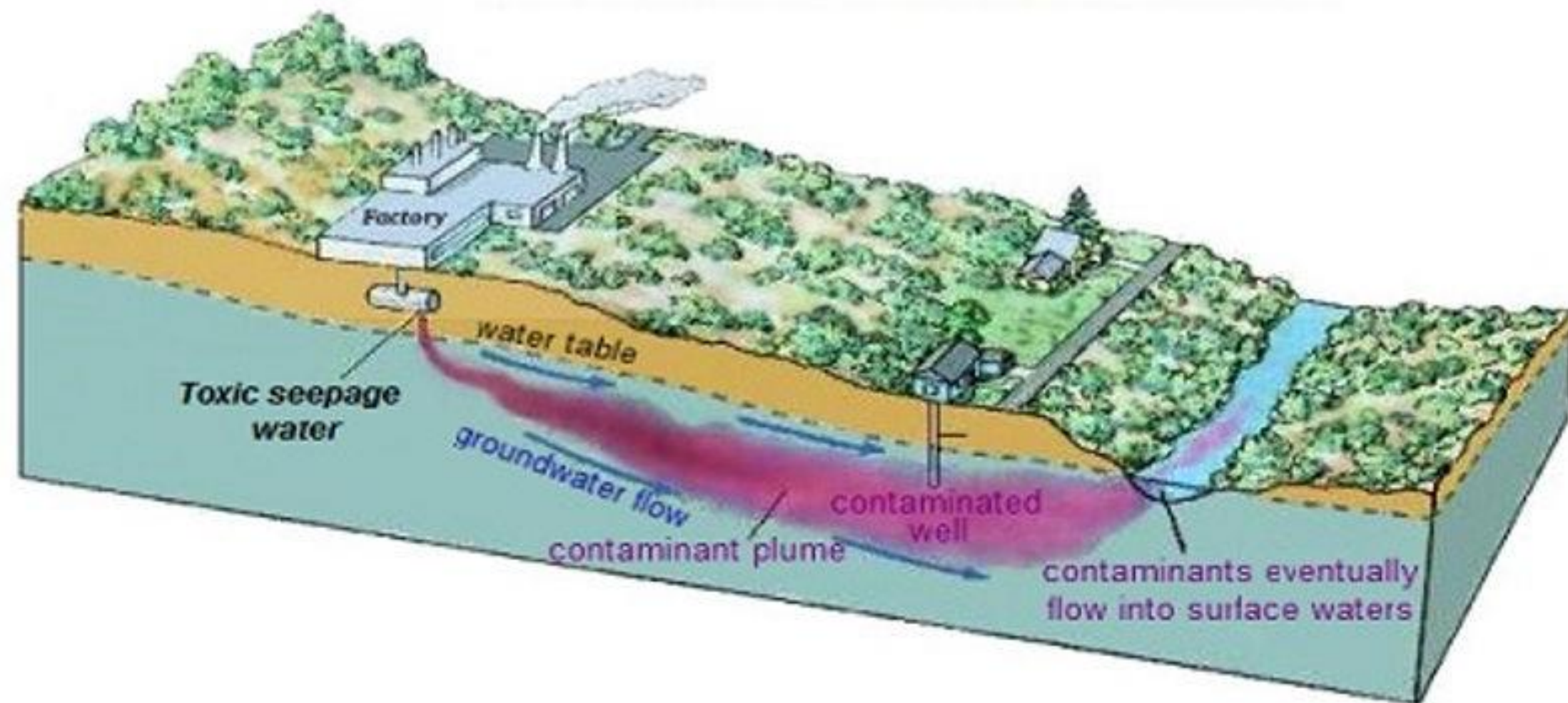
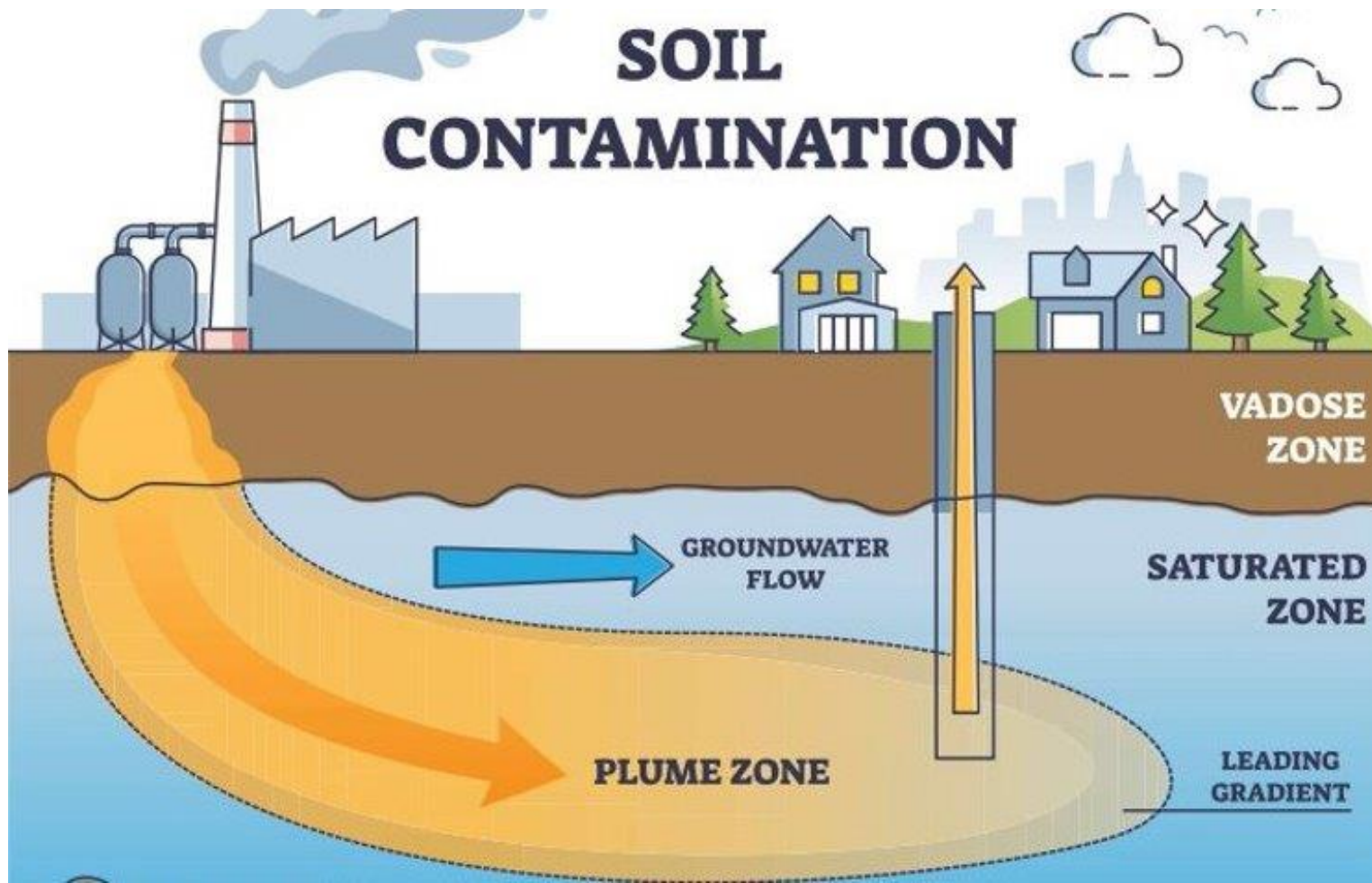
- We use it for drinking water, agriculture, and for pretty much everything else.
- Do different places have different amounts of groundwater? Do you think it is evenly distributed under Arizona?



# GROUNDWATER & POLLUTION

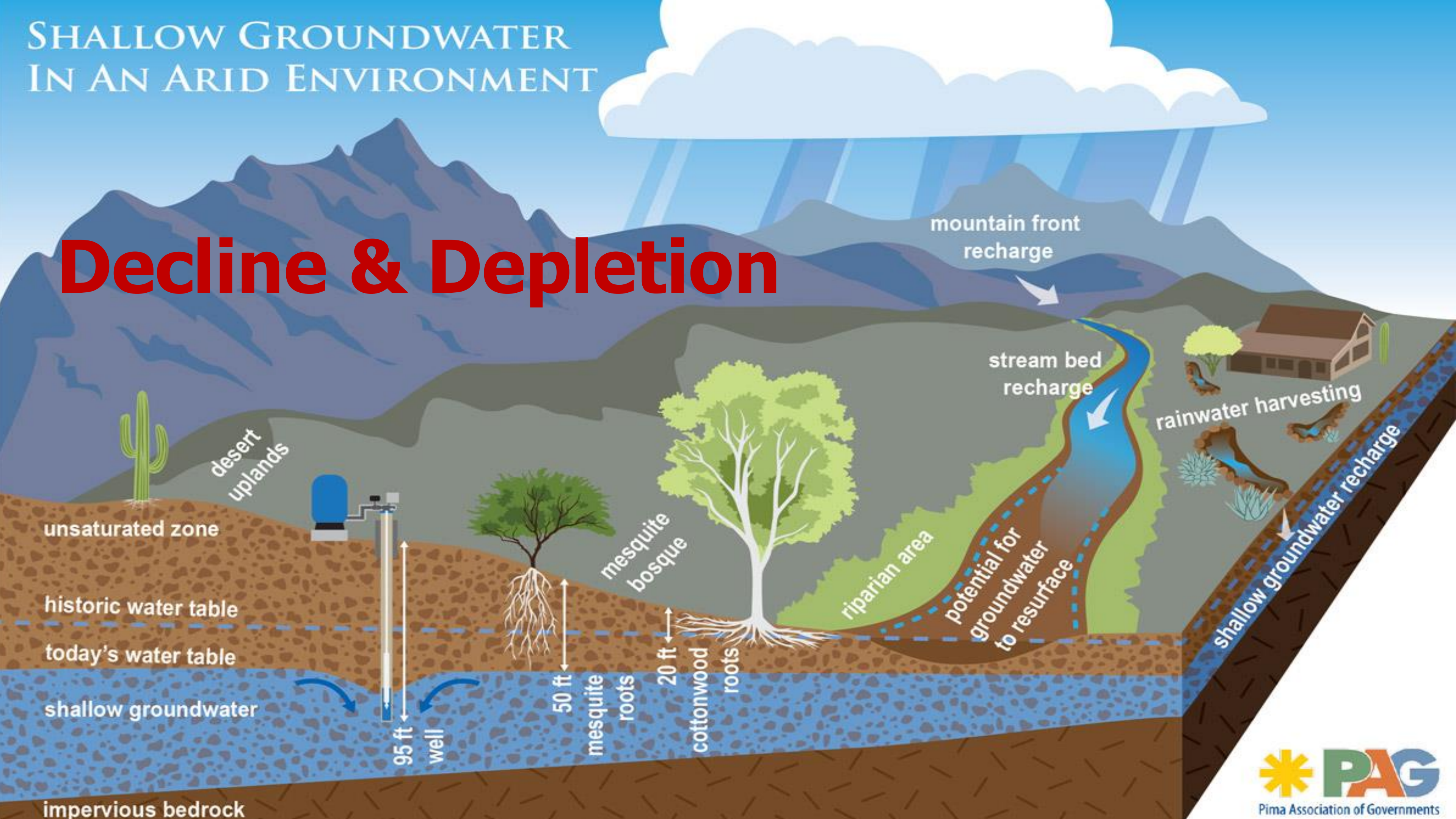


Does groundwater pollution stay in one place?



# SHALLOW GROUNDWATER IN AN ARID ENVIRONMENT

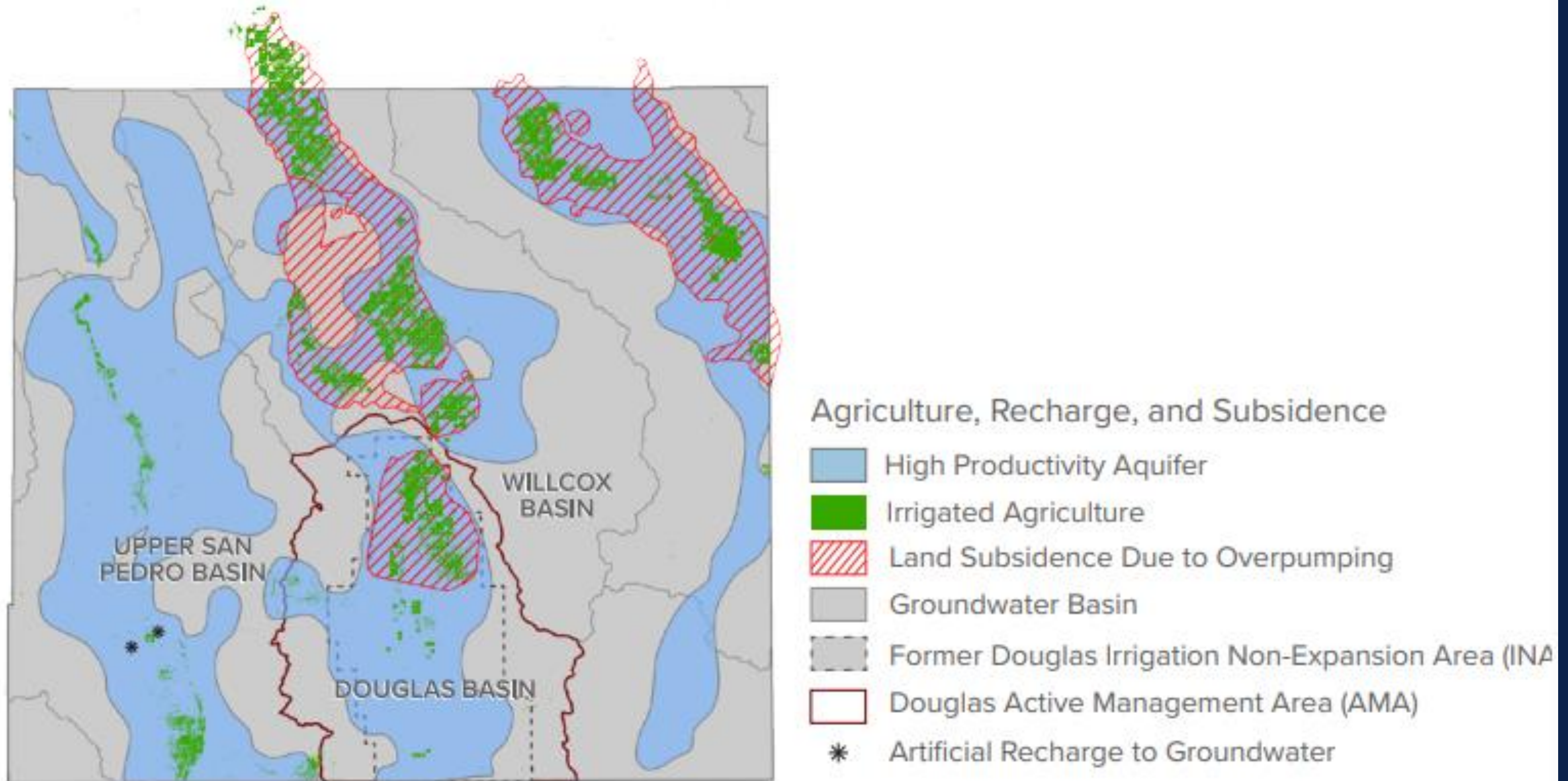
## Decline & Depletion



# Sink Holes, Fissures & Land Subsidence, Oh My!



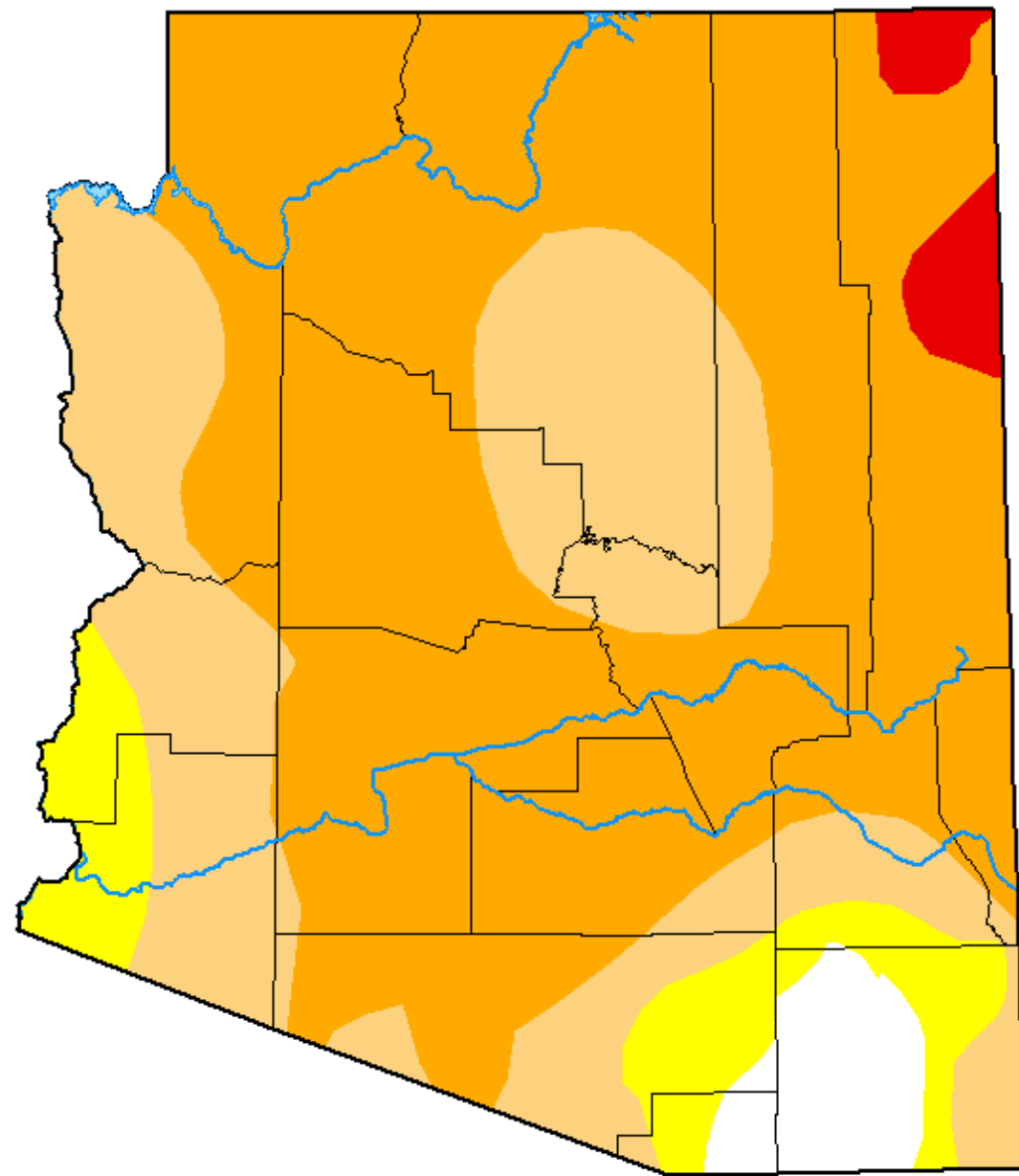
# Land Subsidence in Cochise County



*Agriculture, recharge, and subsidence in Cochise County (ADWR, USDA 2022).*

# Drought

## U.S. Drought Monitor Arizona



**May 19, 2026**  
(Released Thursday, May 21, 2026)  
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	3.54	96.46	89.35	62.33	2.14	0.00
<b>Last Week</b> 05-12-2026	3.54	96.46	86.86	48.89	0.00	0.00
<b>3 Months Ago</b> 02-17-2026	31.98	68.02	34.36	6.18	0.00	0.00
<b>Start of Calendar Year</b> 01-06-2026	27.93	72.07	47.69	13.76	1.03	0.00
<b>Start of Water Year</b> 09-30-2025	0.00	100.00	100.00	79.21	25.06	1.49
<b>One Year Ago</b> 05-20-2025	0.00	100.00	99.34	82.18	60.75	6.14

**Intensity:**



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

**Author:**

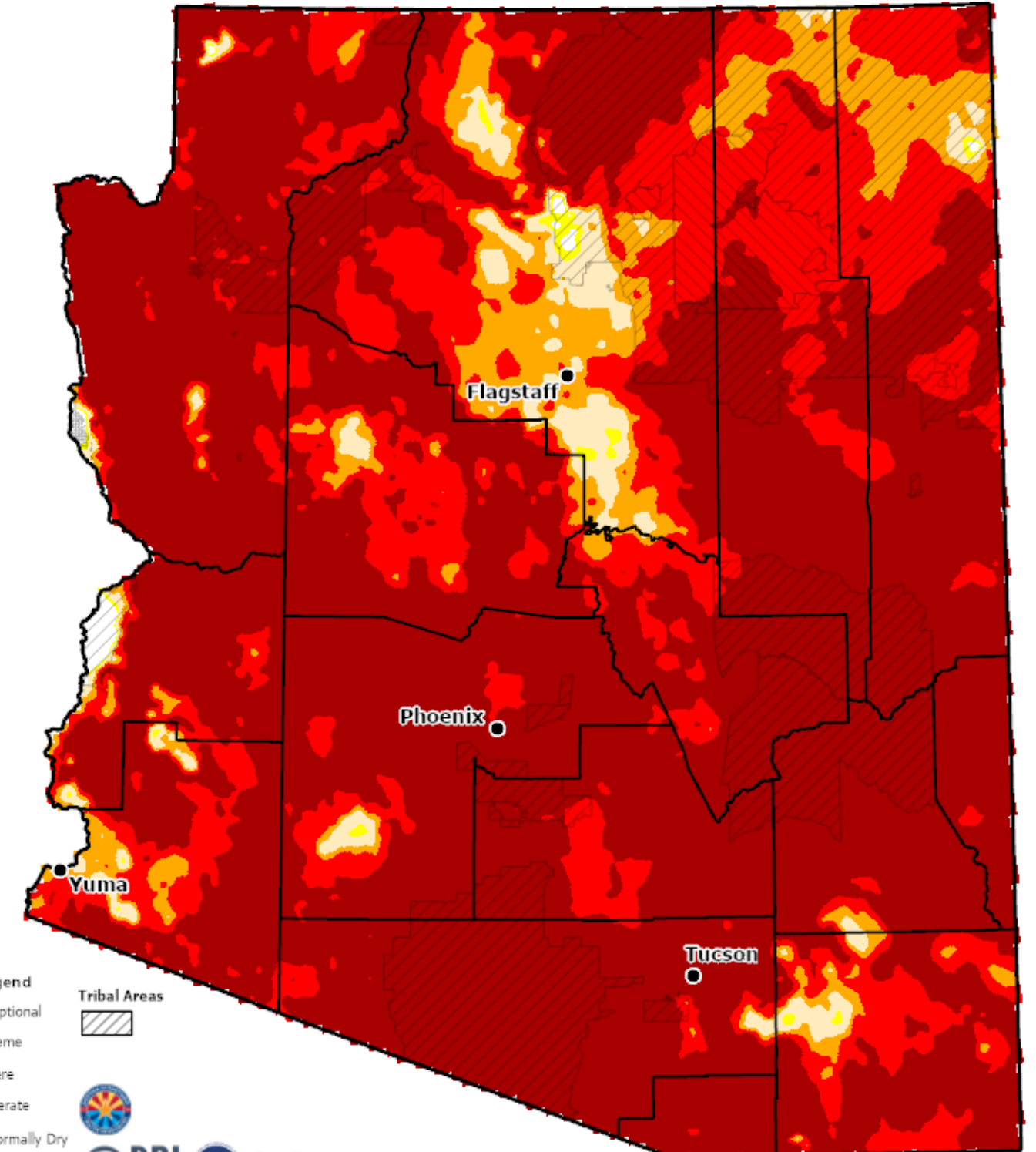
Rocky Bilotta  
NCEI/NOAA



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

## Arizona Long-Term Drought

Average SPEI Published April 2026



**Drought Legend**



**Tribal Areas**

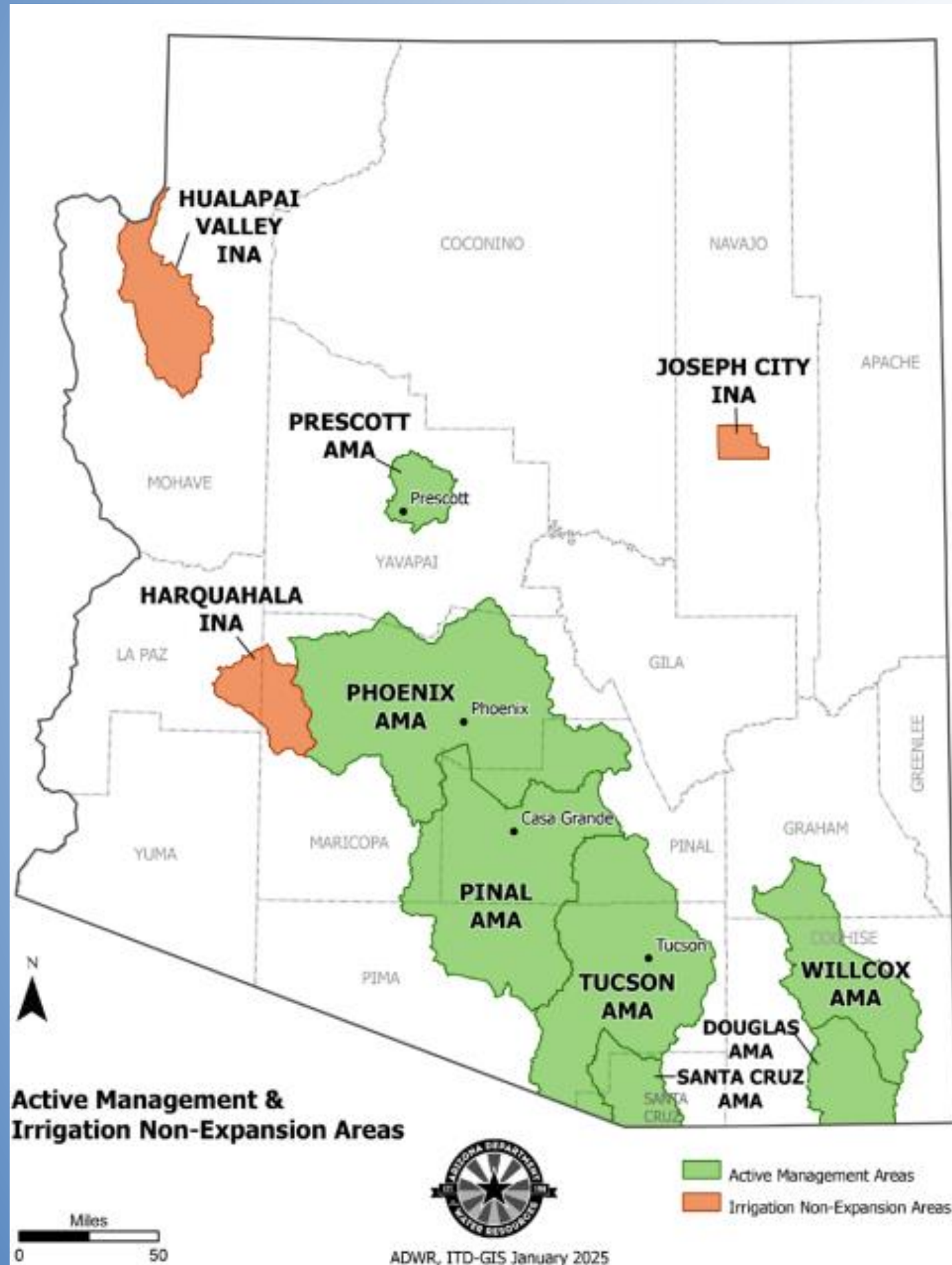


Data Source:  
WRCC Climate Engine; PRISM

Copyright 2026 Arizona State Climate Office

Weekly drought map

# GROUNDWATER & SUSTAINABILITY

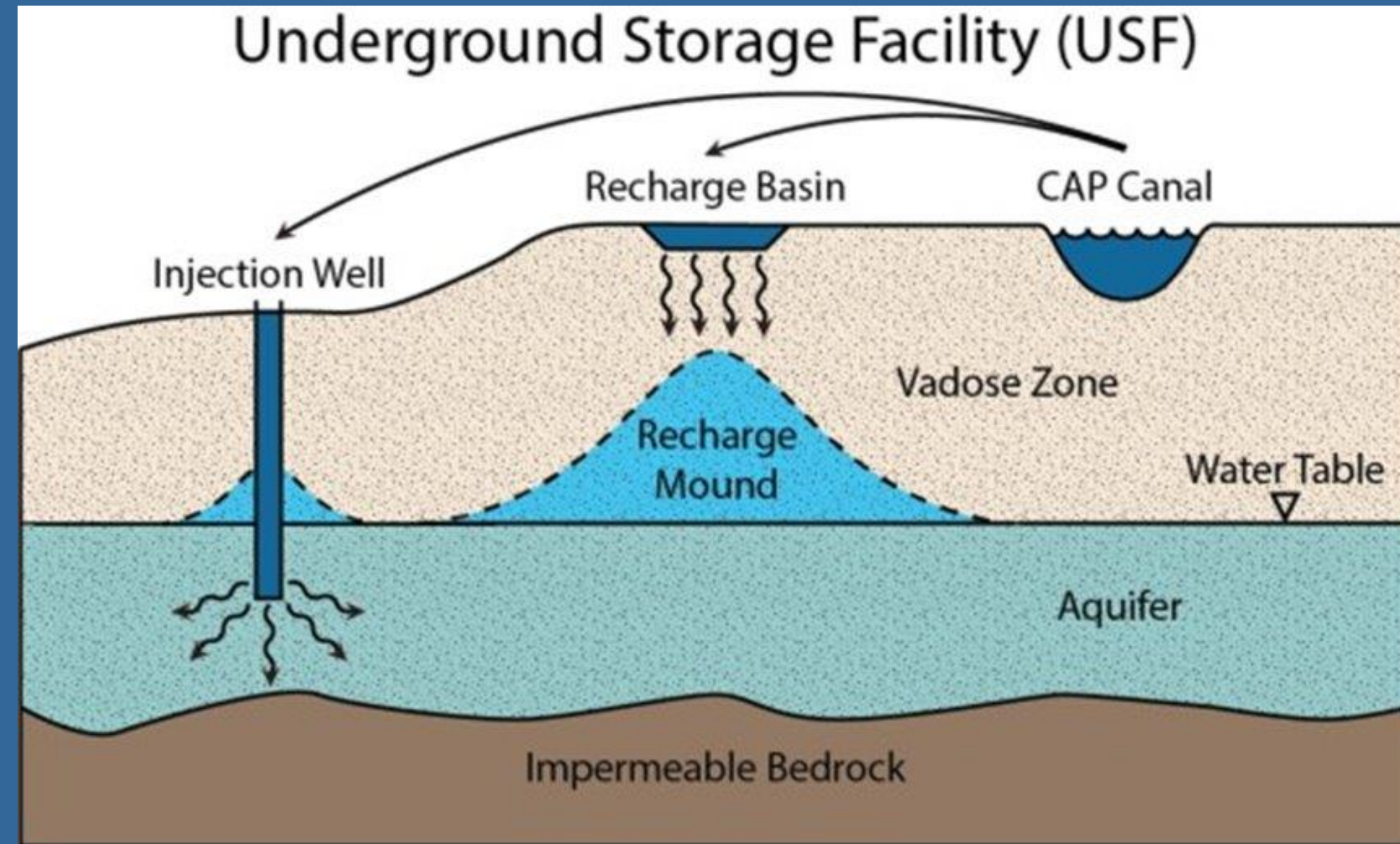


## 1980 Arizona Groundwater Management Act

- Active Management Area and Irrigation Non-Expansion Area designations
- Groundwater pumping limitations
- Recharge

# GROUNDWATER & SUSTAINABILITY

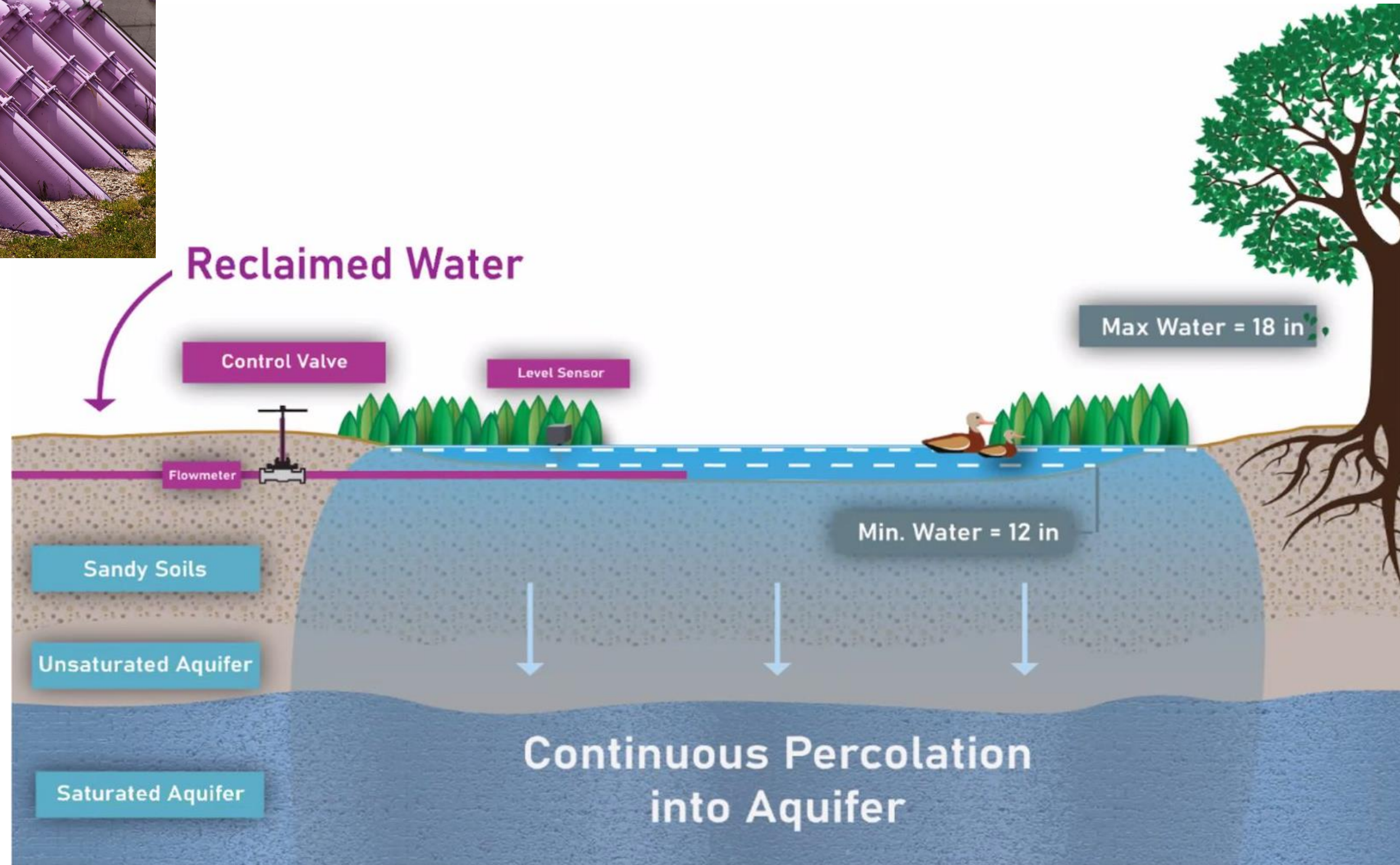
## Recharging the Aquifer



# GROUNDWATER & SUSTAINABILITY



City municipalities are now using reclaimed water to create urban wetlands, creating beautiful bio-diverse habitats while also recharging our groundwater.



# GROUNDWATER & SUSTAINABILITY



- We have a series of Arizona Groundwater Videos – an APW & ADWR joint project.



# SUSTAINABILITY & STEWARDSHIP:

## We all have a role:

- The quality of water in our watershed or groundwater is influenced by both natural factors and how people use the land around it.
- Everyone is responsible for the health of the watershed and the water systems within it.
- Our actions, good or bad, have an impact on our water supply.



# SUSTAINABILITY & STEWARDSHIP:

---

## *My Water Footprint*

---



- How much water do you use daily?
- Why is water use called a water footprint?
- How can you be a better water steward?

# Indirect Water Use

The water used to produce the goods and services we all enjoy. It is the water hidden or not seen by the end-user during the process or manufacturing of a good or service.



# Direct Water Use

Water you use directly to do something immediately. Water that is seen, felt and used at that given time. When you turn on your faucet or hose for water.



# Splashing into Solutions

## You Have the Power!

### What is Water Conservation?

- Beneficial reduction in water loss, waste or use by changing behavior to use less water.

### What is Water Efficiency?

- Minimize the amount of water used to accomplish a function or task. Doing more with less water. Normally relies on well-engineered products and fixtures or technology

# SUSTAINABILITY & STEWARDSHIP:

## BE THE TIDAL WAVE OF CHANGE!

Your daily choices and actions can add up to make a positive difference.

**Water Wise or Water Waste?**  
Look at the pictures and circle the option that is waterwise:

It's just a little drip! I must stop the leak!  
I'm always thirsty! I'm drought tolerant & native!  
Eco-friendly, non-toxic natural products. It's my dog, so it's my job to clean it up!  
Pesticides & Herbicides. The rain will wash it away!  
Leaks of property!  
Other ways I can help!

**SUSTAINABILITY ACTIONS**  
Place a check ✓ next to each item YOU can do to help conserve and keep our water clean.

<input type="checkbox"/> Water plants instead of pouring water down the drain.	<input type="checkbox"/> Make sure family's car isn't leaking oil in driveway.
<input type="checkbox"/> Try to take shorter showers.	<input type="checkbox"/> Let my trash blow away in the wind.
<input type="checkbox"/> Pick up after my dog and remind others to do the same.	<input type="checkbox"/> Be a detective and always be aware of possible leaks.
<input type="checkbox"/> Bring my own reusable water bottle.	<input type="checkbox"/> Always use a hose nozzle on my hose.
<input type="checkbox"/> Plant native and drought-tolerant plants that belong here.	<input type="checkbox"/> If I wash my car at home, let the hose run the whole time.
<input type="checkbox"/> Run the washing machine even when it isn't full.	<input type="checkbox"/> Recycle whenever possible.
<input type="checkbox"/> Always leave the water running when brushing my teeth.	<input type="checkbox"/> Don't care about the dangerous chemicals my family uses.

I PLEDGE to become a **water steward** and to do my best to make smart choices and take actions that help conserve and keep our water supply clean.  
Name: \_\_\_\_\_ Date: \_\_\_\_\_

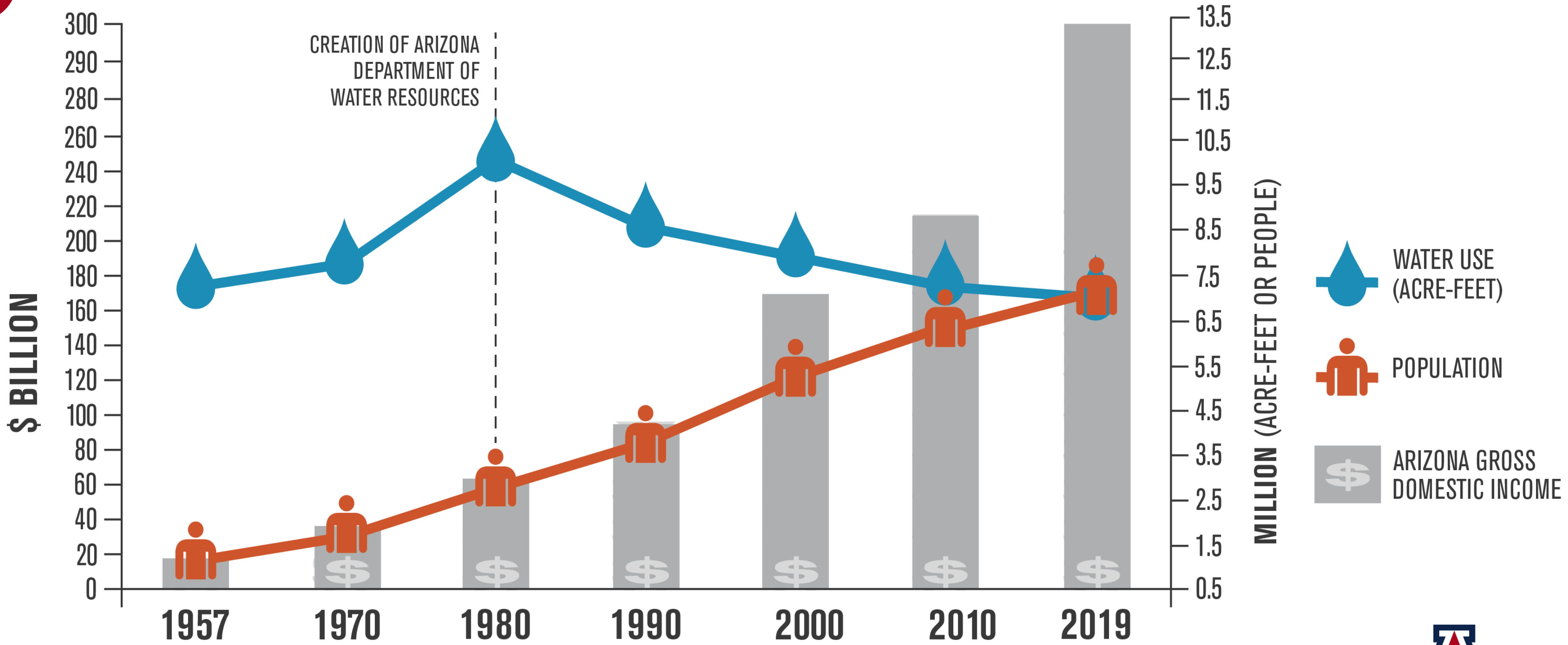
**Water Wise Technologies**  
These are things you can try to use at home!

<b>High Efficiency Shower Head</b> Did you know? The average person uses up to 40 gallons per day just by showering. That's 14,560 gallons of water per year! Uses 2.0 gallons per minute.	<b>Hose Nozzle</b> Did you know? A garden hose could release anywhere from 9 gallons to 30 gallons per minute that water is running! Hose nozzles save water by temporarily stopping the flow of water and you can also adjust the pressure for your need.
<b>Aerator</b> Did you know? Aerators are found at the head of a faucet. They mix air and water together to create more pressure and to use less water. 2.2 gal vs. 0.5 gal If water flows steady with air bubbles that looks white, then you have one, but if water is clear then you may need one.	<b>Toilet Flapper</b> Did you know? A toilet flapper stems water in the tank. When you flush, the handle lifts the flapper and lets water into the toilet bowl, then closes back up tightly like a door between two rooms. Flappers are made of rubber and can weily dry out causing a leak. It can waste up to 200 gallons a day! Want to be a detective and try an experiment? See how on the next page!

**CAN YOU FIND THE LEAK?**  
**Toilet Leak Challenge:**

- Let's make sure your toilet flapper isn't leaking! This experiment can be done several times a year or whenever you suspect a leak.
  - With permission from an adult, you can put some food coloring in the toilet tank.
  - Set a timer and **do not** flush your toilet for 30 minutes.
  - Then go back and see if the colored water flowed into the toilet bowl.
  - If you saw any color in your bowl then your flapper is leaking and it is time to replace it.
    - With assistance, measure the size of your current flapper so you know what size to replace it with. Then your family can purchase a new one.





SOURCE: ADWR, 2020



# Water Education is in our Nature



**Thank you for this opportunity.**  
**Any questions?**

**Kirstyn Kay, Program Supervisor – [kkay@arizona.edu](mailto:kkay@arizona.edu)**  
**Lexi Smith, Program Specialist – [alexiasmith@arizona.edu](mailto:alexiasmith@arizona.edu)**

Financial Support From:



THE UNIVERSITY OF ARIZONA  
**Cooperative Extension**

2025-2026

