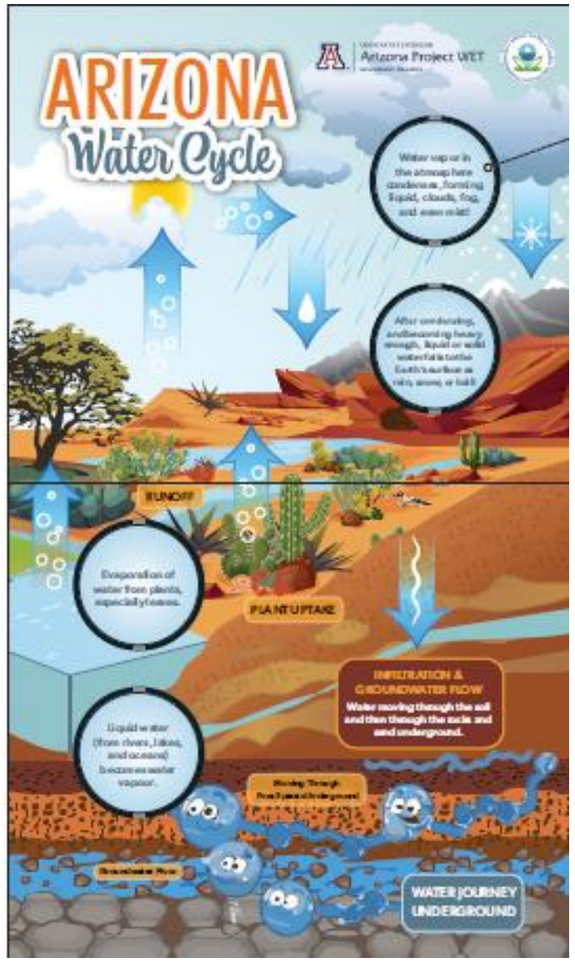

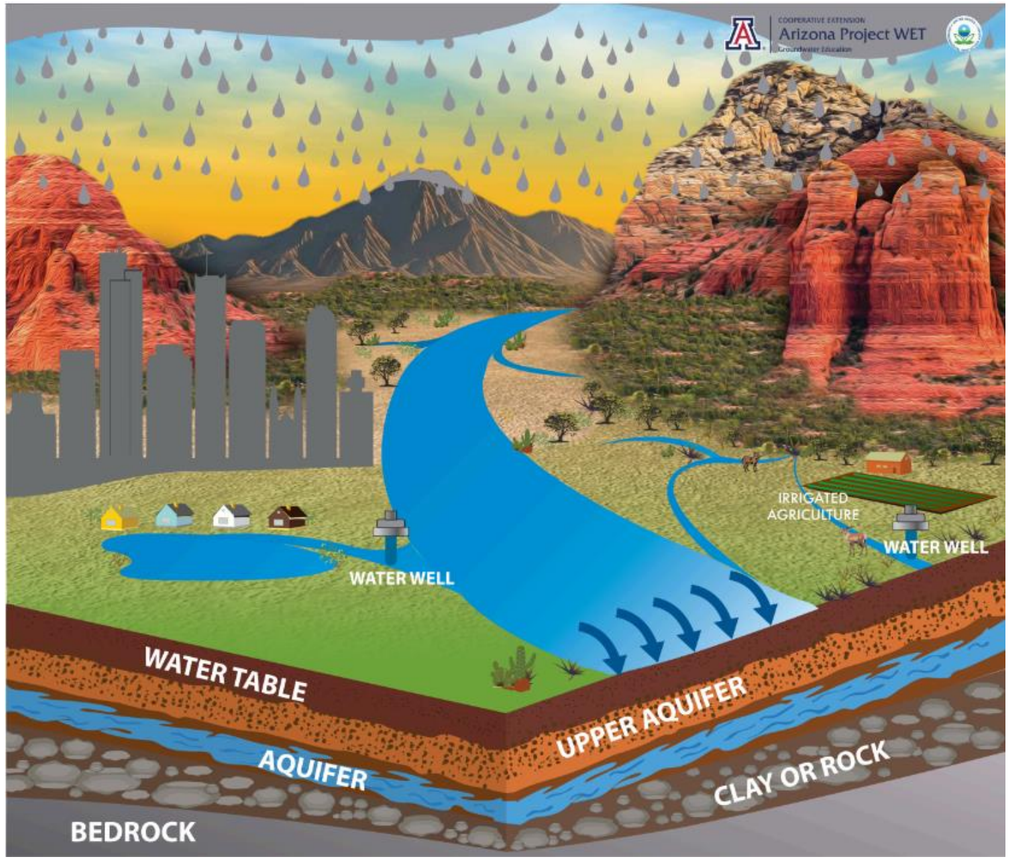

The Nature of Groundwater

Financial Support From:

THE UNIVERSITY OF ARIZONA
Cooperative Extension

2025-2026

ARIZONA
project WET
WATER EDUCATION TODAY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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.”

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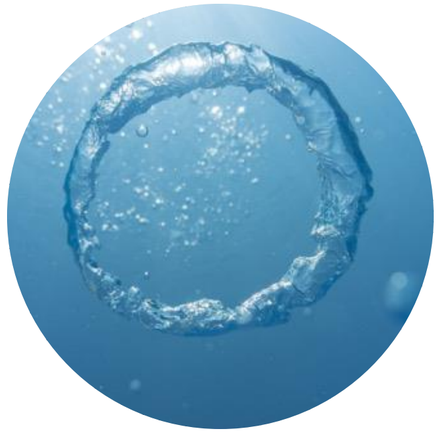
Water Cycle

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.

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.



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.

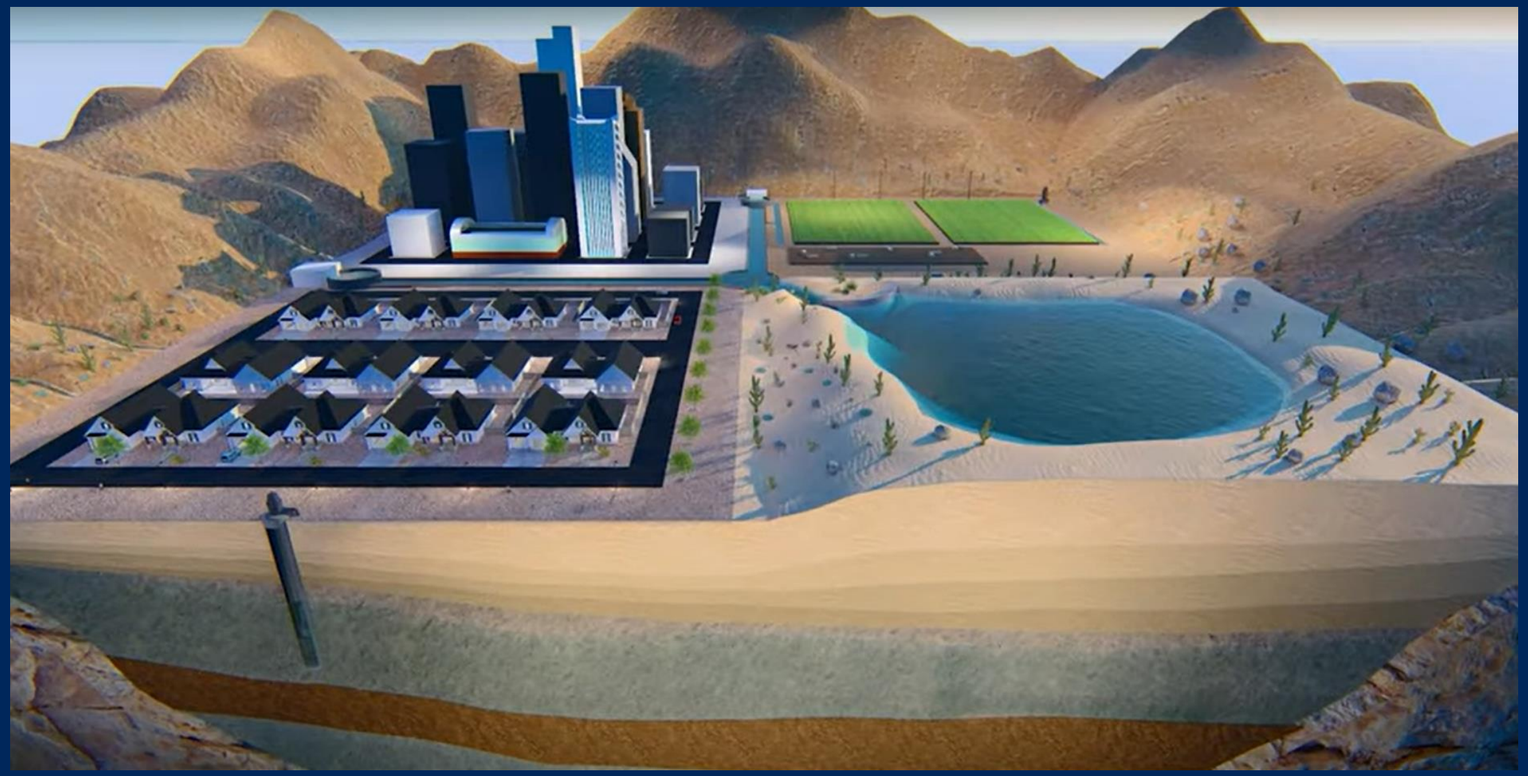
Water Sustainability

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!

The Nature of Groundwater

Today we want to explore:

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



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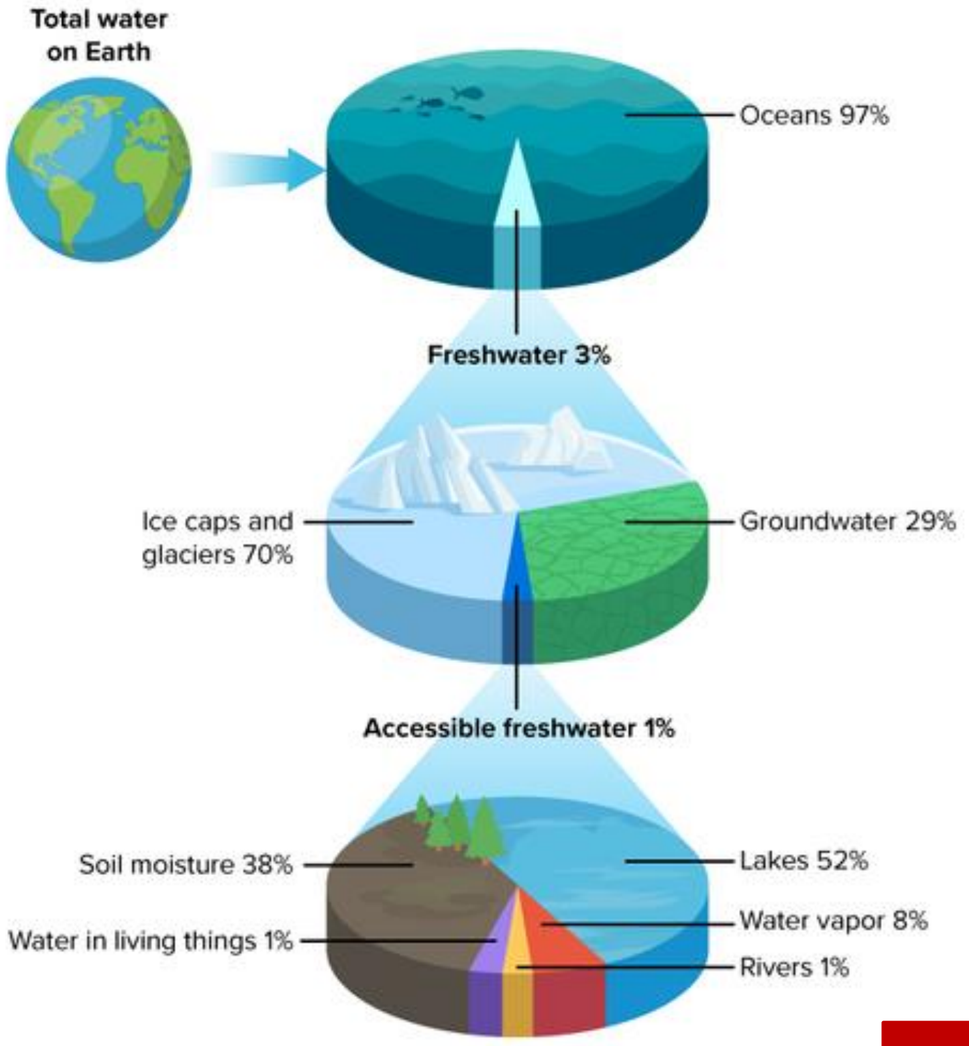
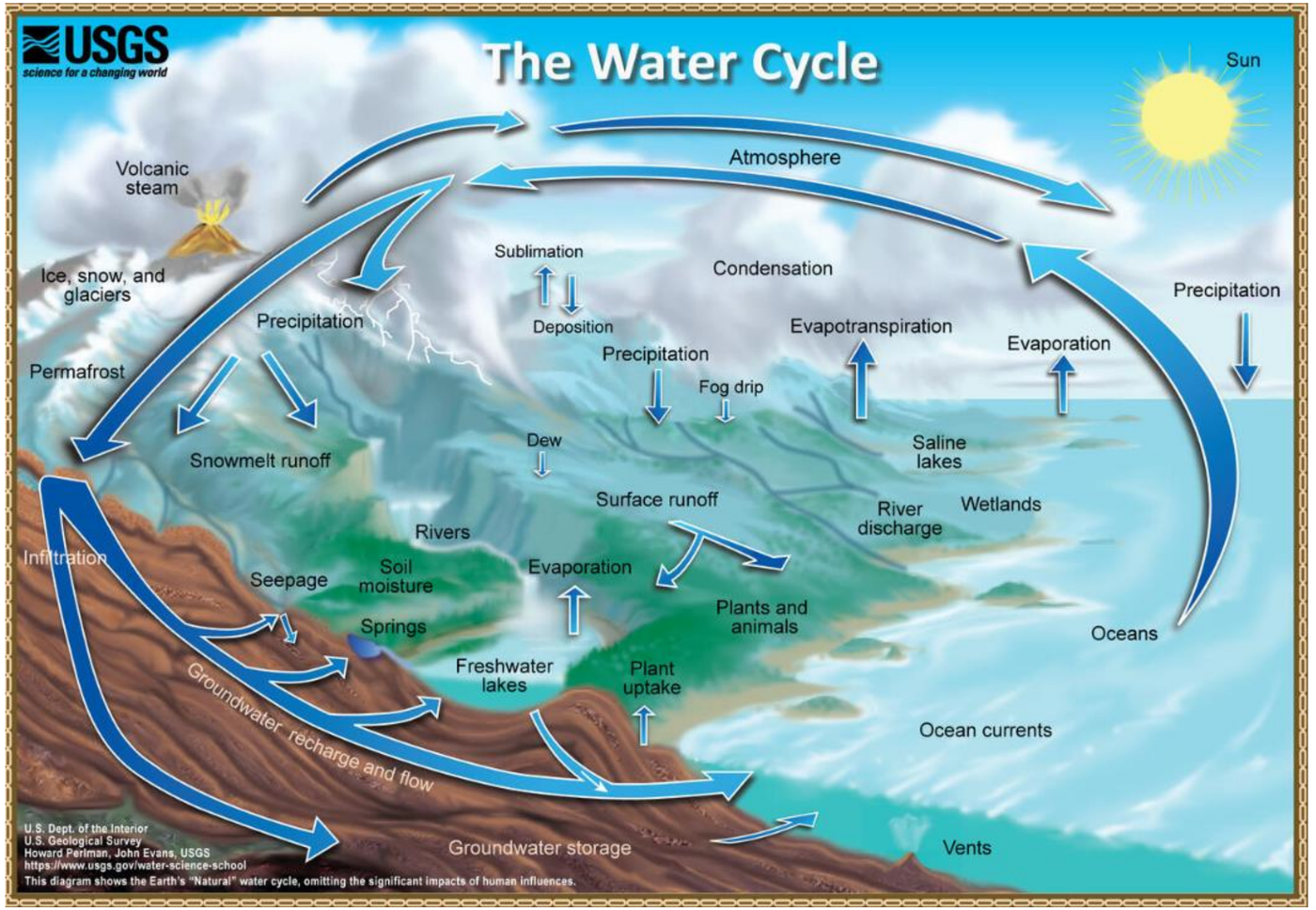
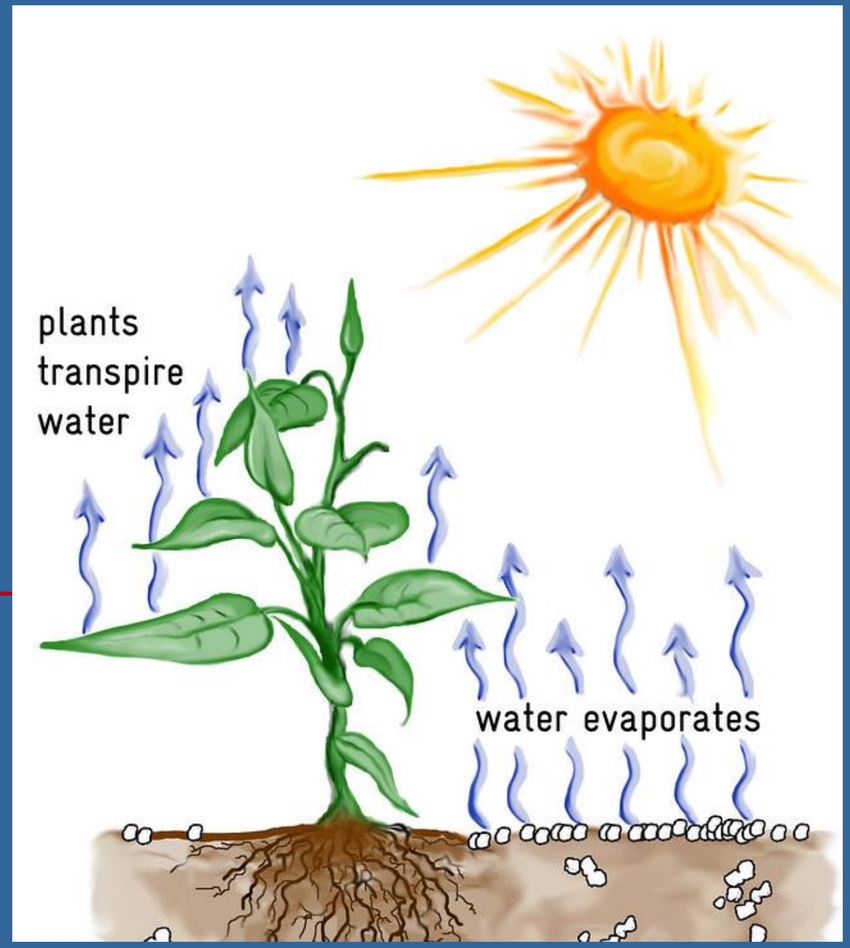
Water is essential for all life on Earth to exist, so it truly connects us all.



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?

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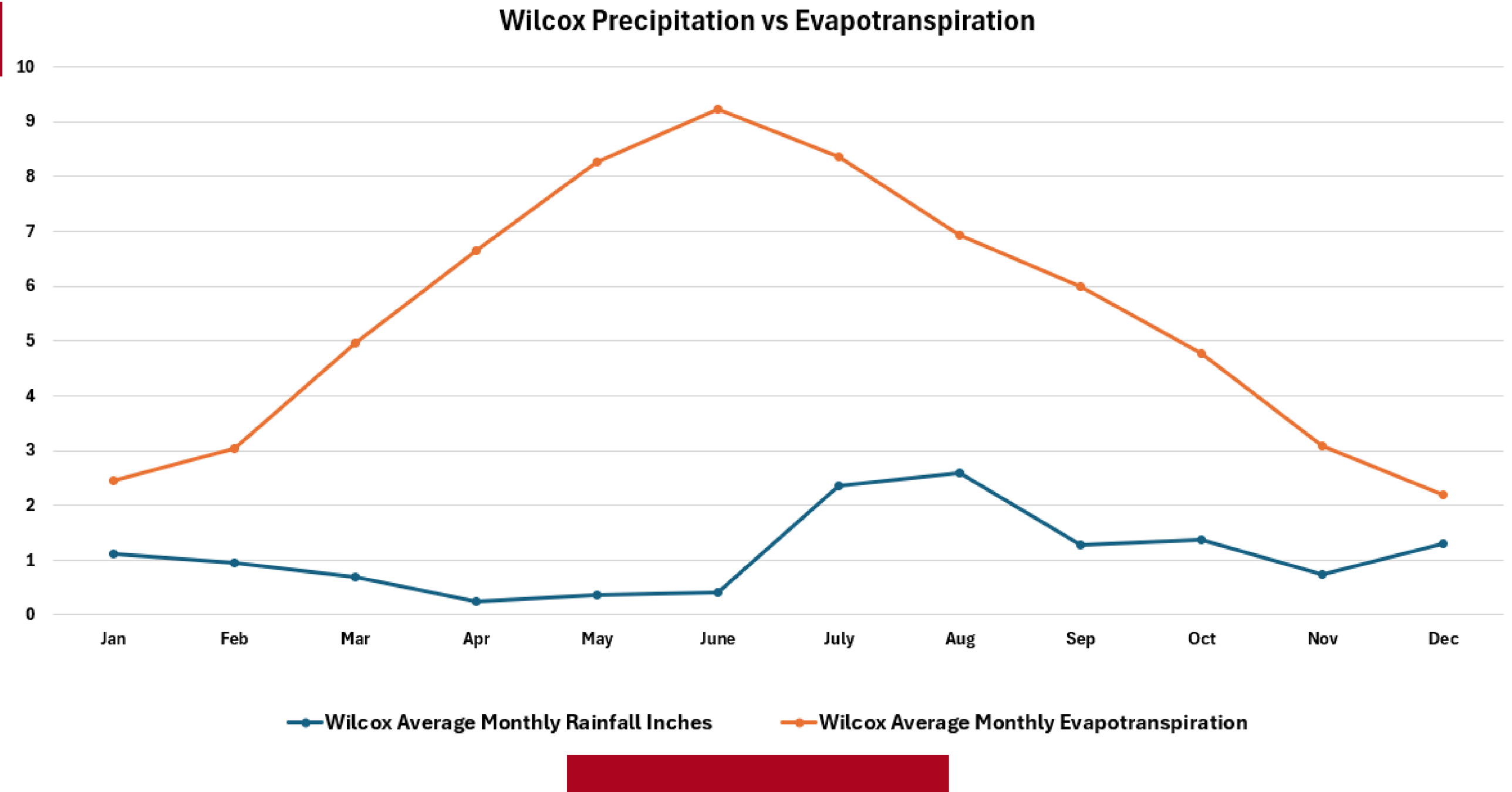
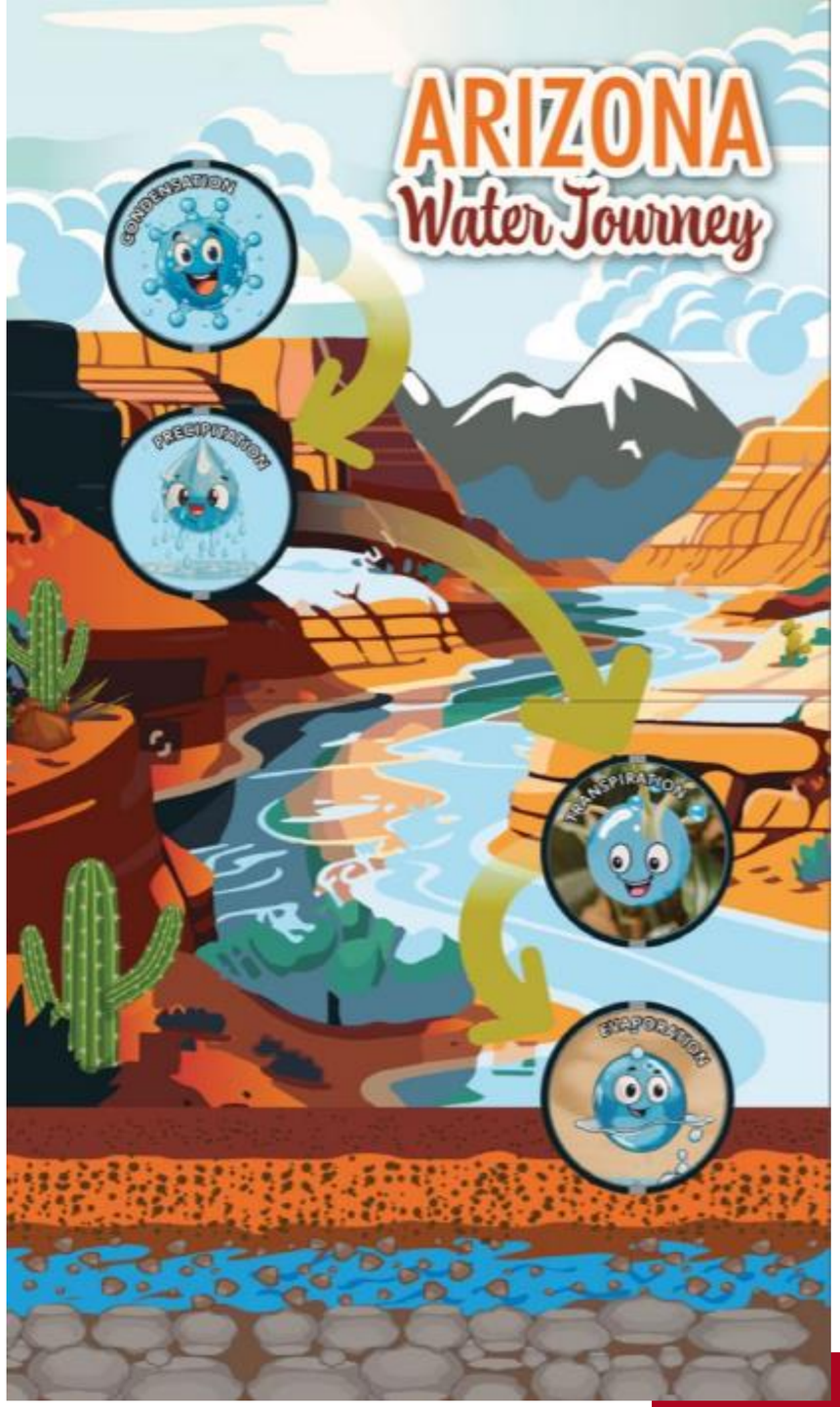
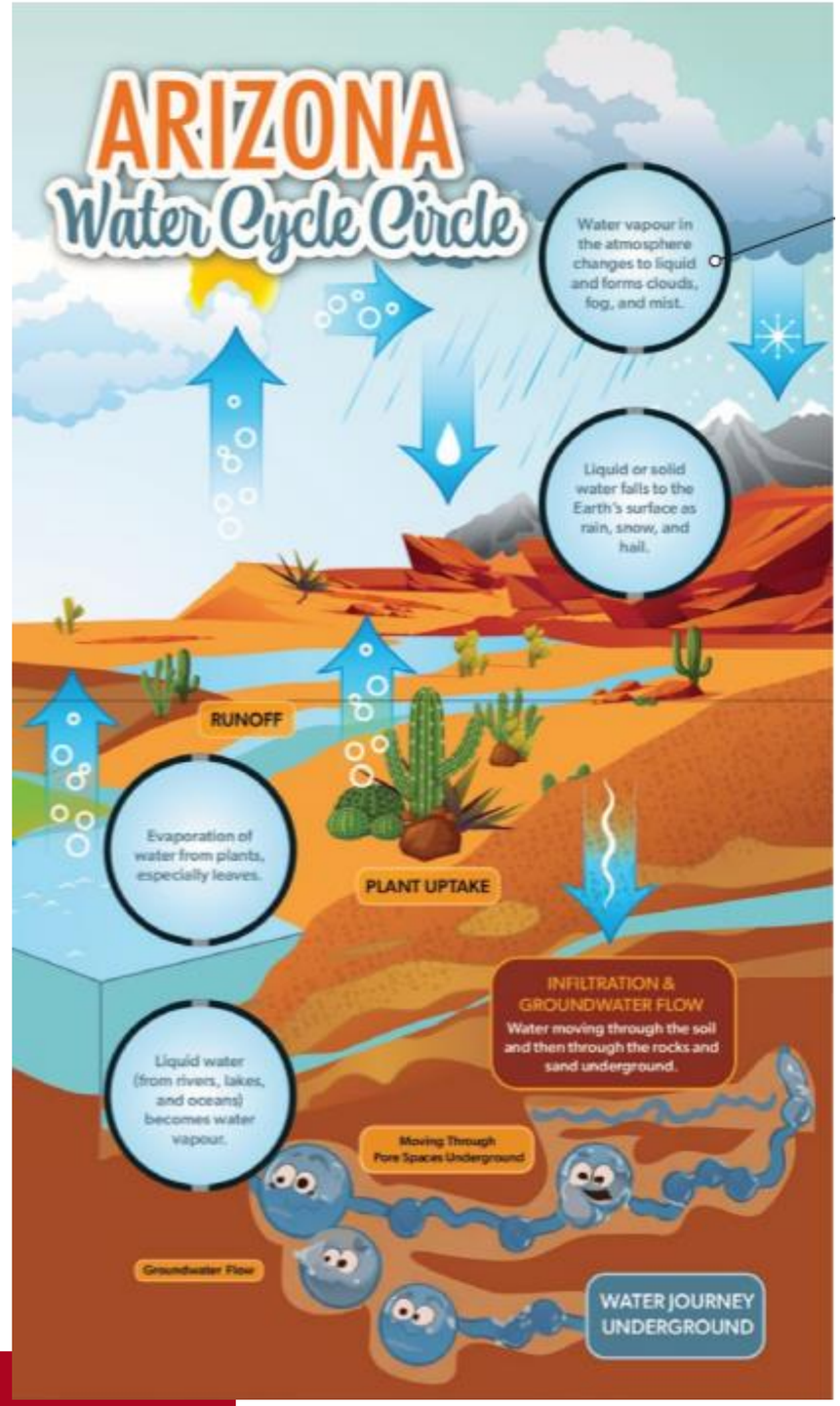

Wilcox Precipitation vs Evapotranspiration
10
9
8
7
6
5
4
3
2
1
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sep
Oct
Nov
Dec
Wilcox Average Monthly Rainfall Inches
Wilcox Average Monthly Evapotranspiration





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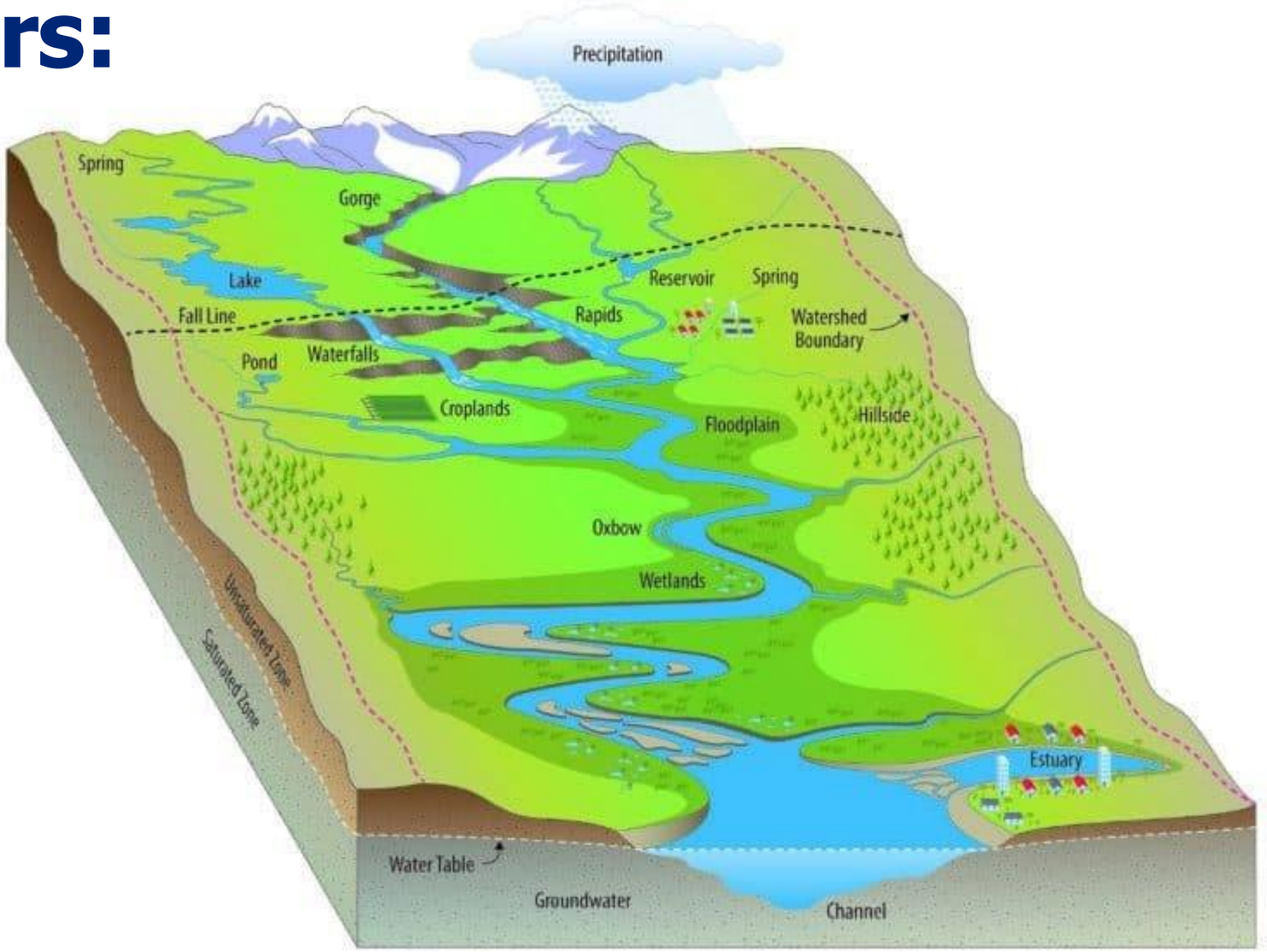
WATERSHEDS

Watershed Wonders:

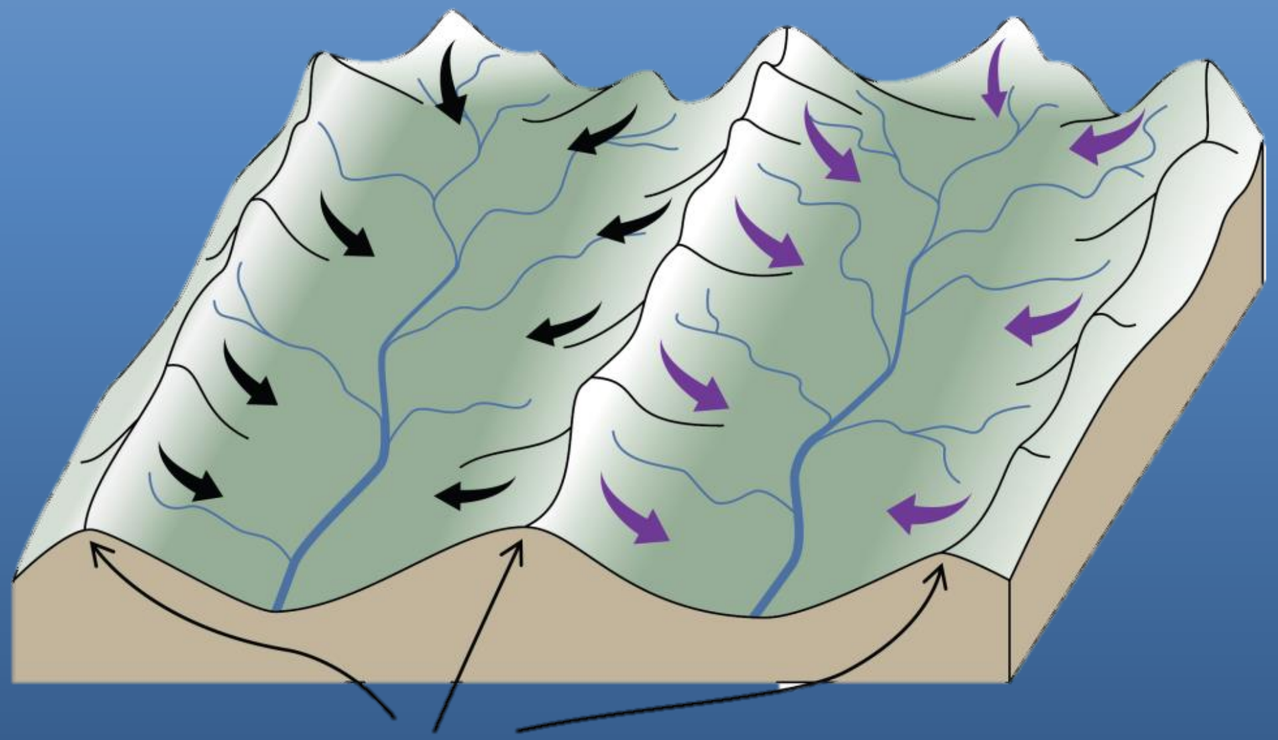
1. You probably know what city and street you live in, but do you know which watershed you live in?

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.

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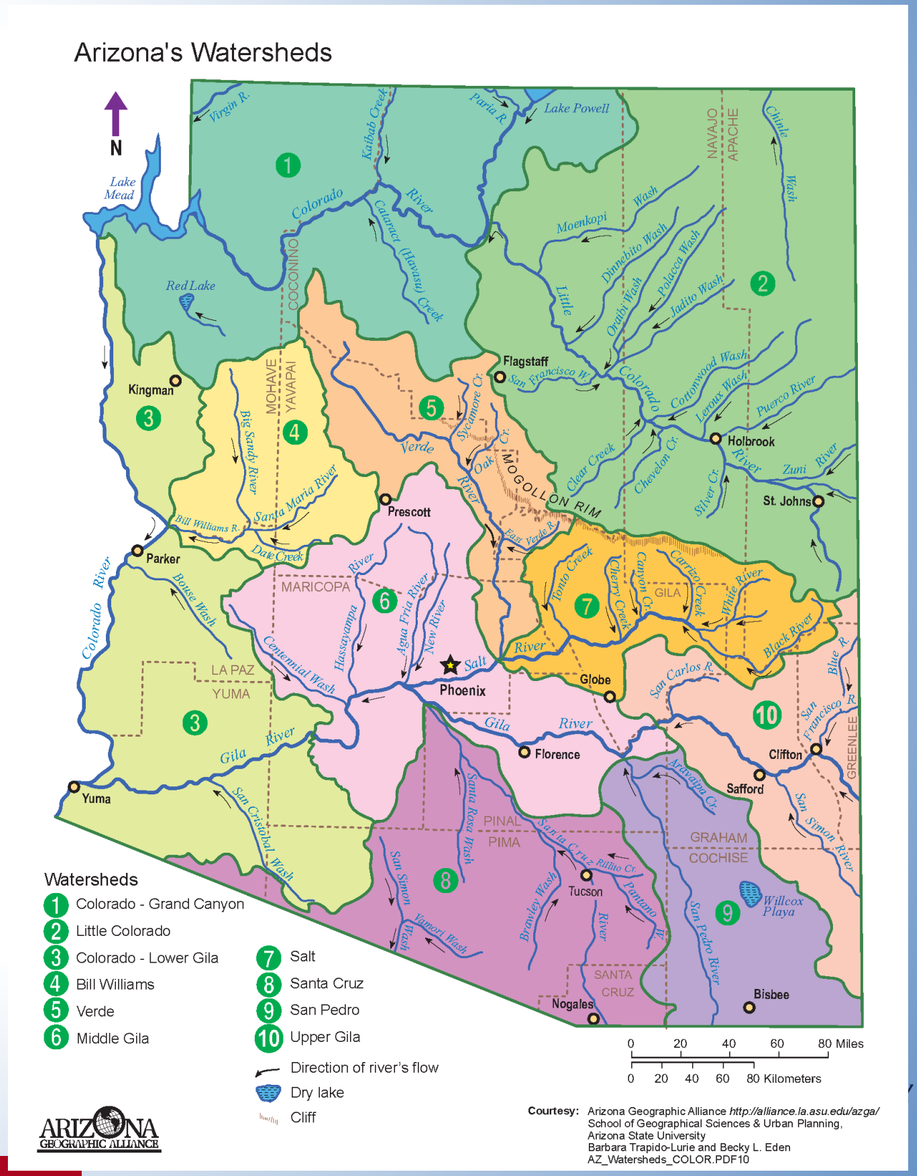
WATERSHED: Watersheds Work

What are we managing when we talk about watershed management?

The land and water in that area.



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

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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?

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GROUNDWATER & SUSTAINABILITY:

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)?

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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?

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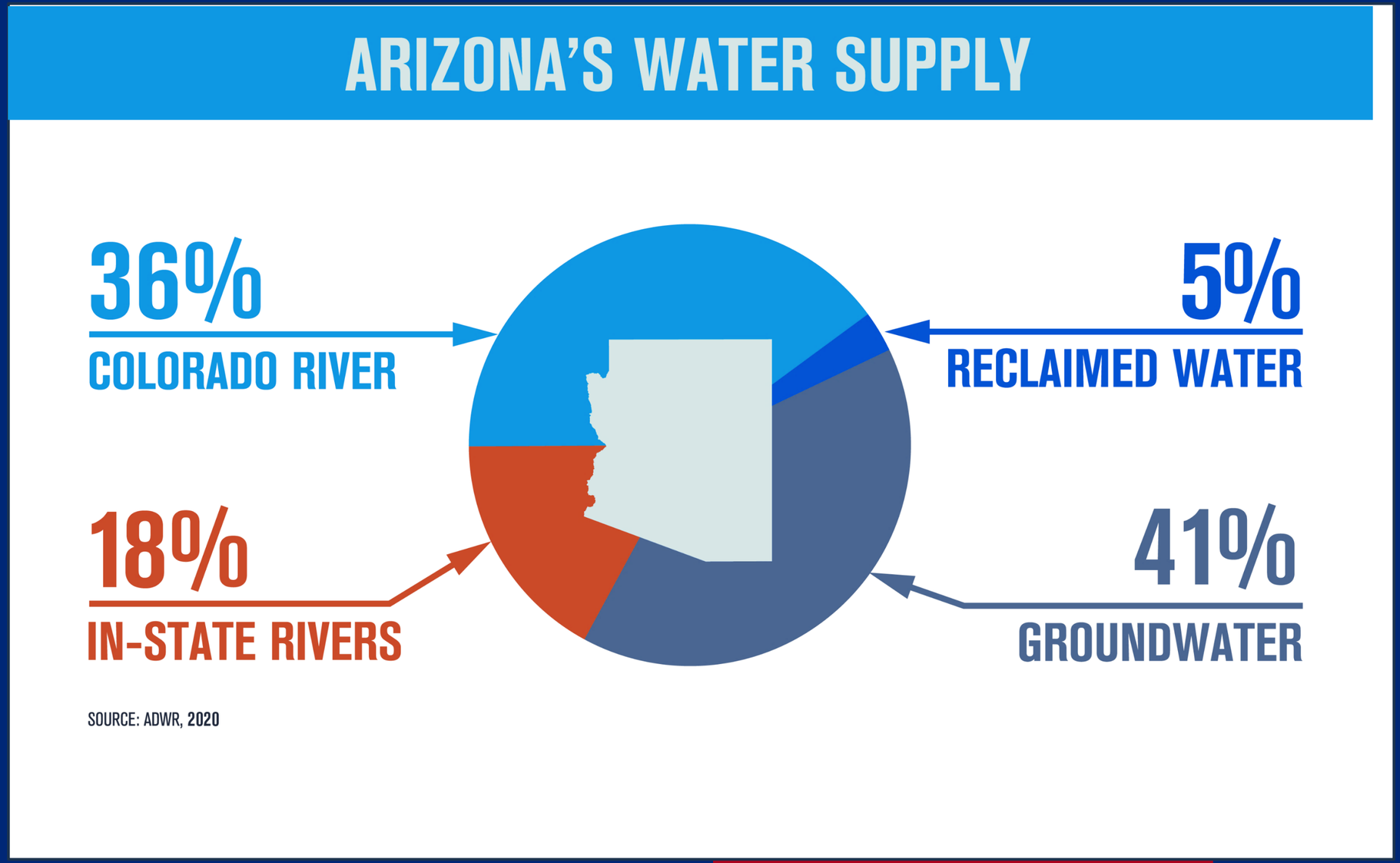
GROUNDWATER & SUSTAINABILITY



How important is groundwater to Arizona?

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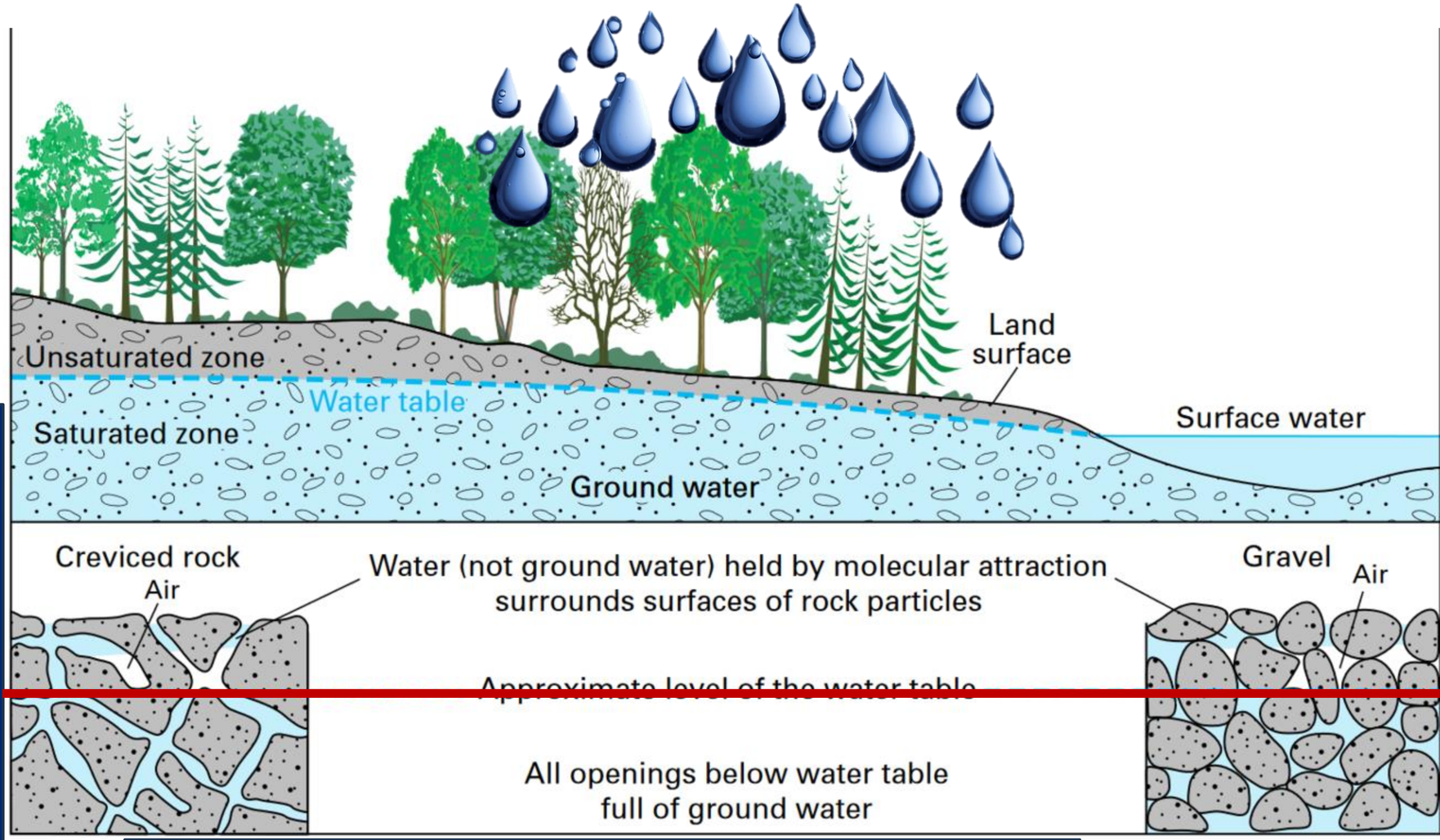
Let's Dig In!

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.

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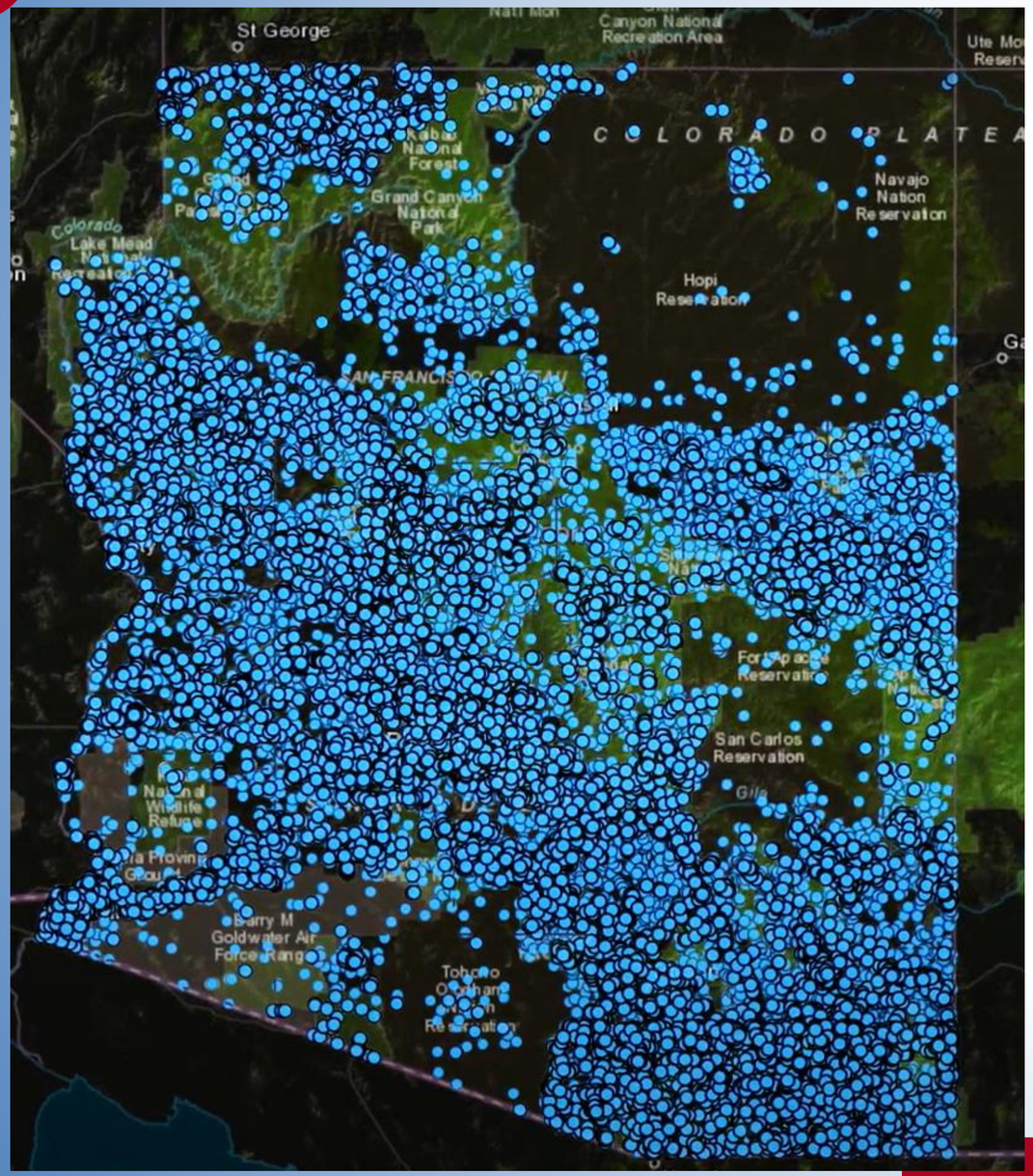
GROUNDWATER & SUSTAINABILITY



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.

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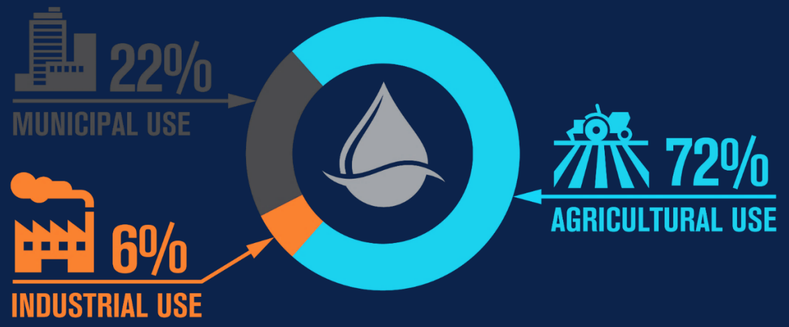
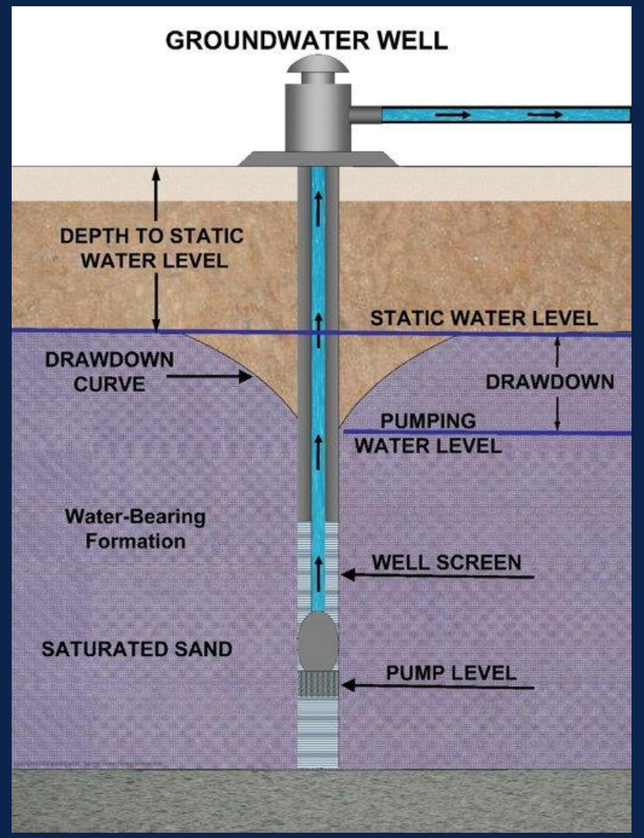
GROUNDWATER & SUSTAINABILITY

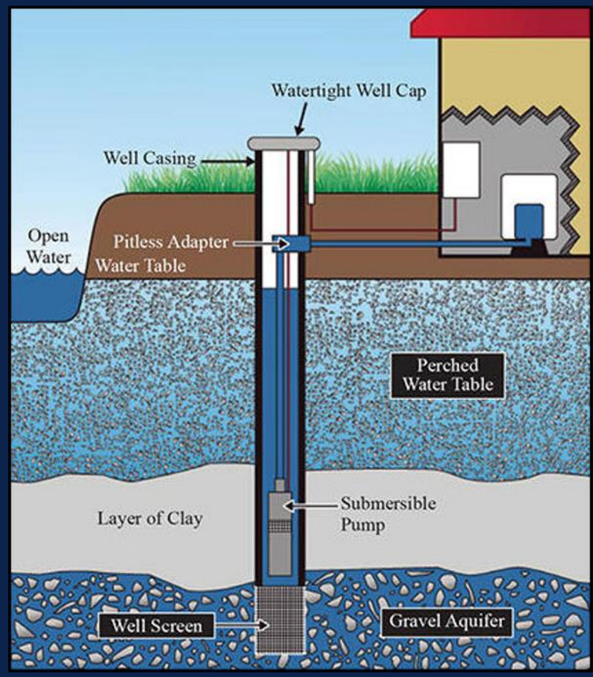
How do we pump it up and why?

- We use it for drinking water, agriculture, and for pretty much everything else.

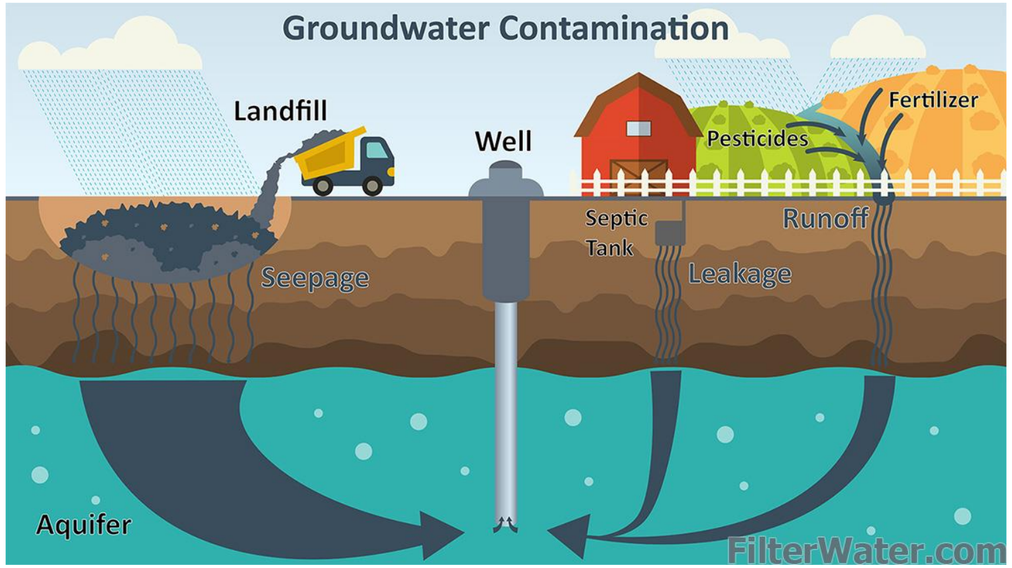
- Do different places have different amounts of groundwater? Do you think it is evenly distributed under Arizona?



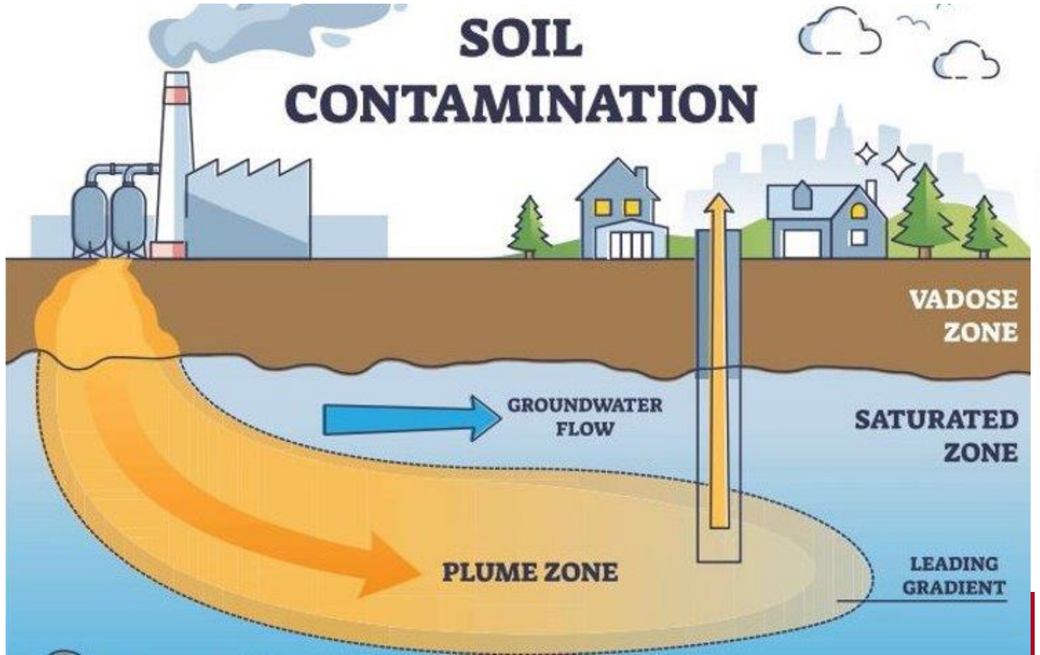


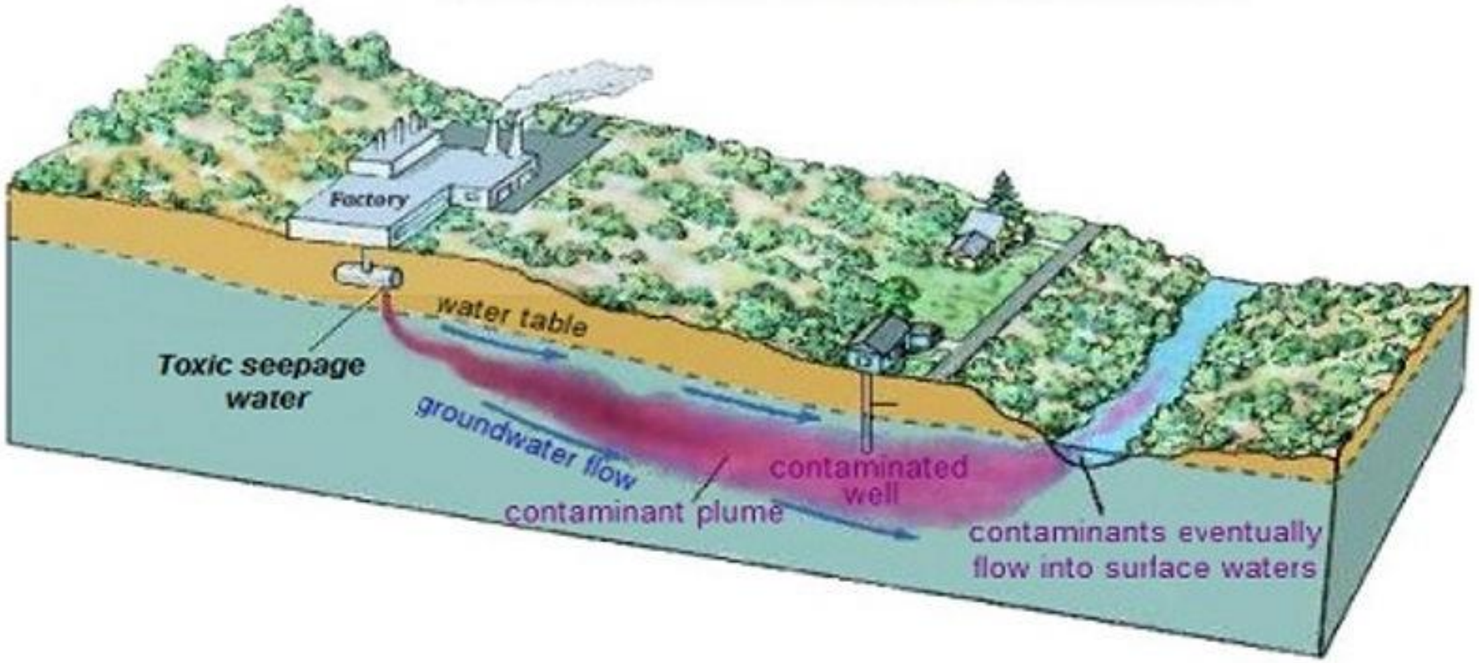


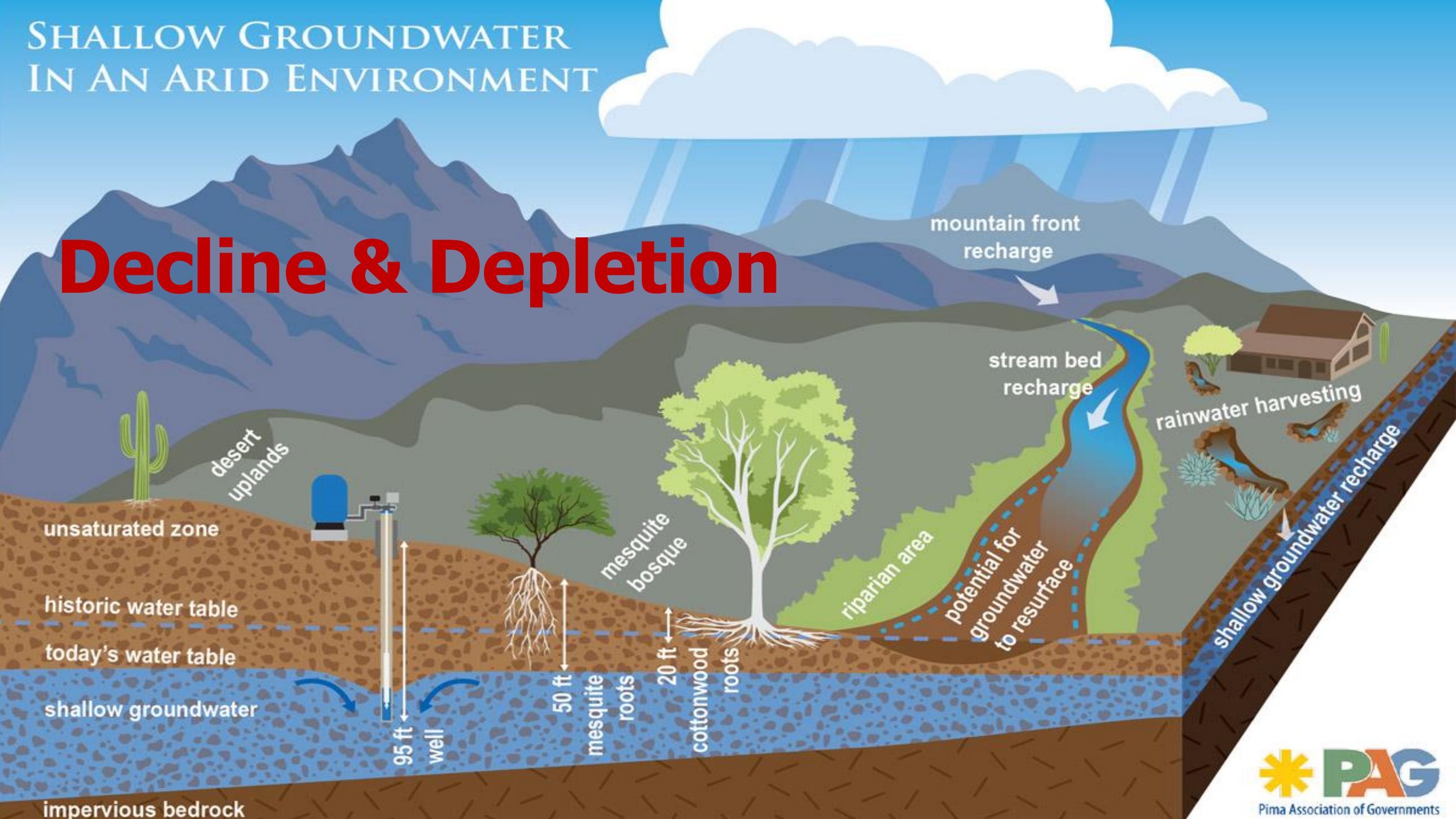
GROUNDWATER & POLLUTION



Does groundwater pollution stay in one place?

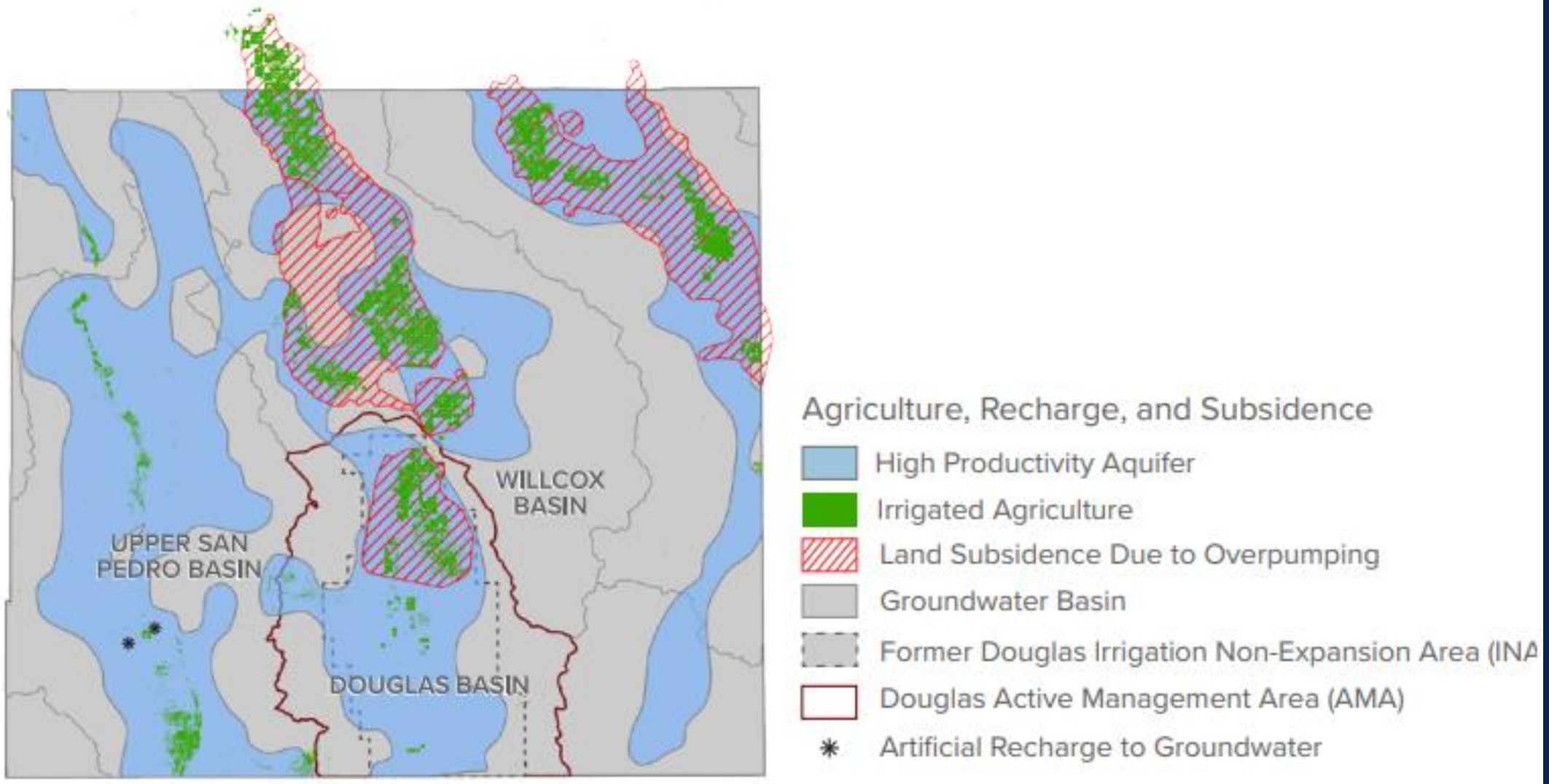





SHALLOW GROUNDWATER
IN AN ARID ENVIRONMENT
Decline & Depletion
mountain front
recharge
stream bed
recharge
rainwater harvesting
shallow groundwater recharge
desert
uplands
unsaturated zone
historic water table
today's water table
shallow groundwater
impervious bedrock
mesquite
bosque
riparian area
potential for
groundwater
to resurface
95 ft
well
50 ft
mesquite
roots
20 ft
cottonwood
roots
PAG
Pima Association of Governments

Sink Holes, Fissures & Land Subsidence, Oh My!

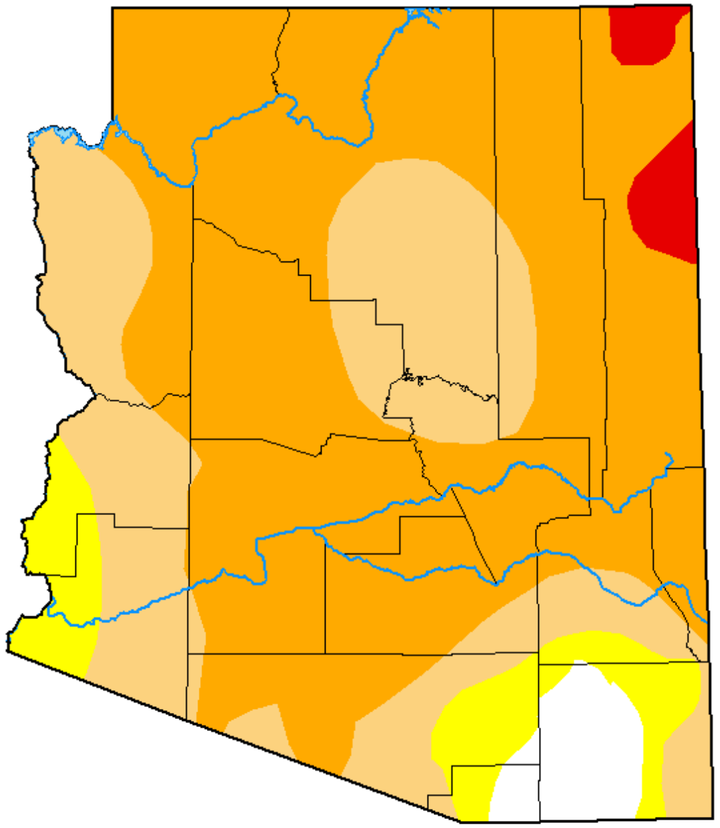
Land Subsidence in Cochise County



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

Drought

U.S. Drought Monitor
Arizona



Weekly drought map

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
Current	3.54	96.46	89.35	62.33	2.14	0.00
Last Week 05-12-2026	3.54	96.46	86.86	48.89	0.00	0.00
3 Months Ago 02-17-2026	31.98	68.02	34.36	6.18	0.00	0.00
Start of Calendar Year 01-06-2026	27.93	72.07	47.69	13.76	1.03	0.00
Start of Water Year 09-30-2025	0.00	100.00	100.00	79.21	25.06	1.49
One Year Ago 05-20-2025	0.00	100.00	99.34	82.18	60.75	6.14

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

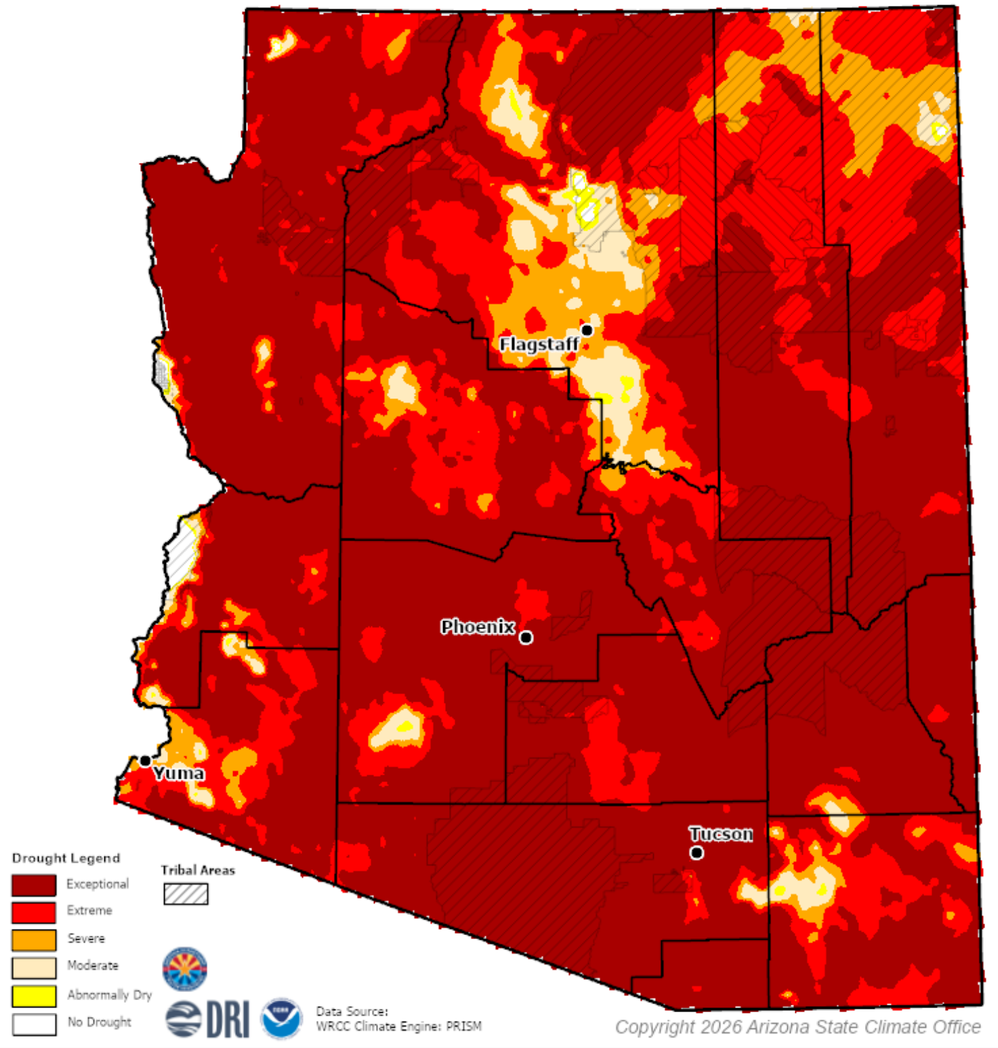
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Rocky Bilotta
NCEI/NOAA

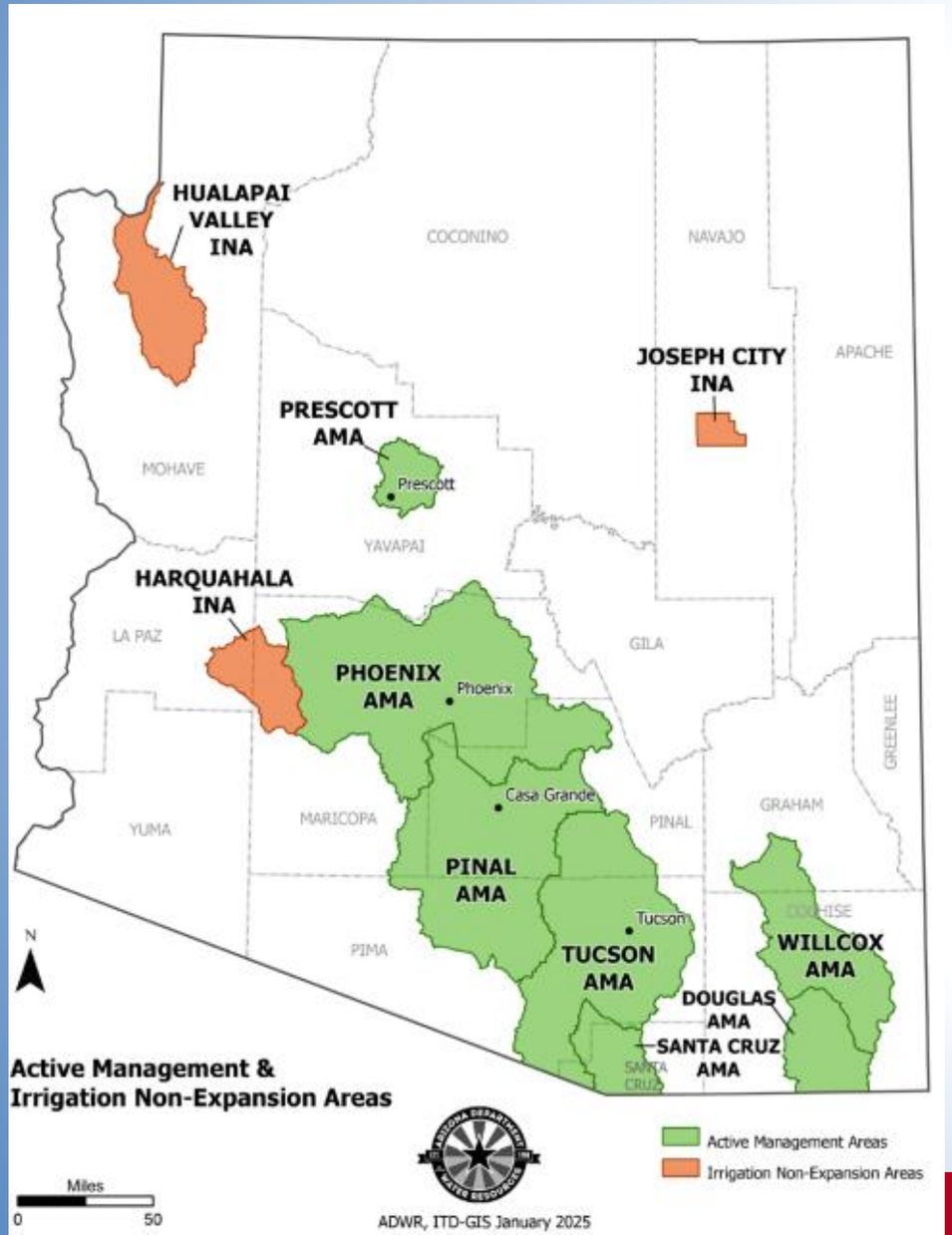
droughtmonitor.unl.edu

Arizona Long-Term Drought

Average SPEI *Published April 2026*



GROUNDWATER & SUSTAINABILITY



1980 Arizona Groundwater Management Act

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

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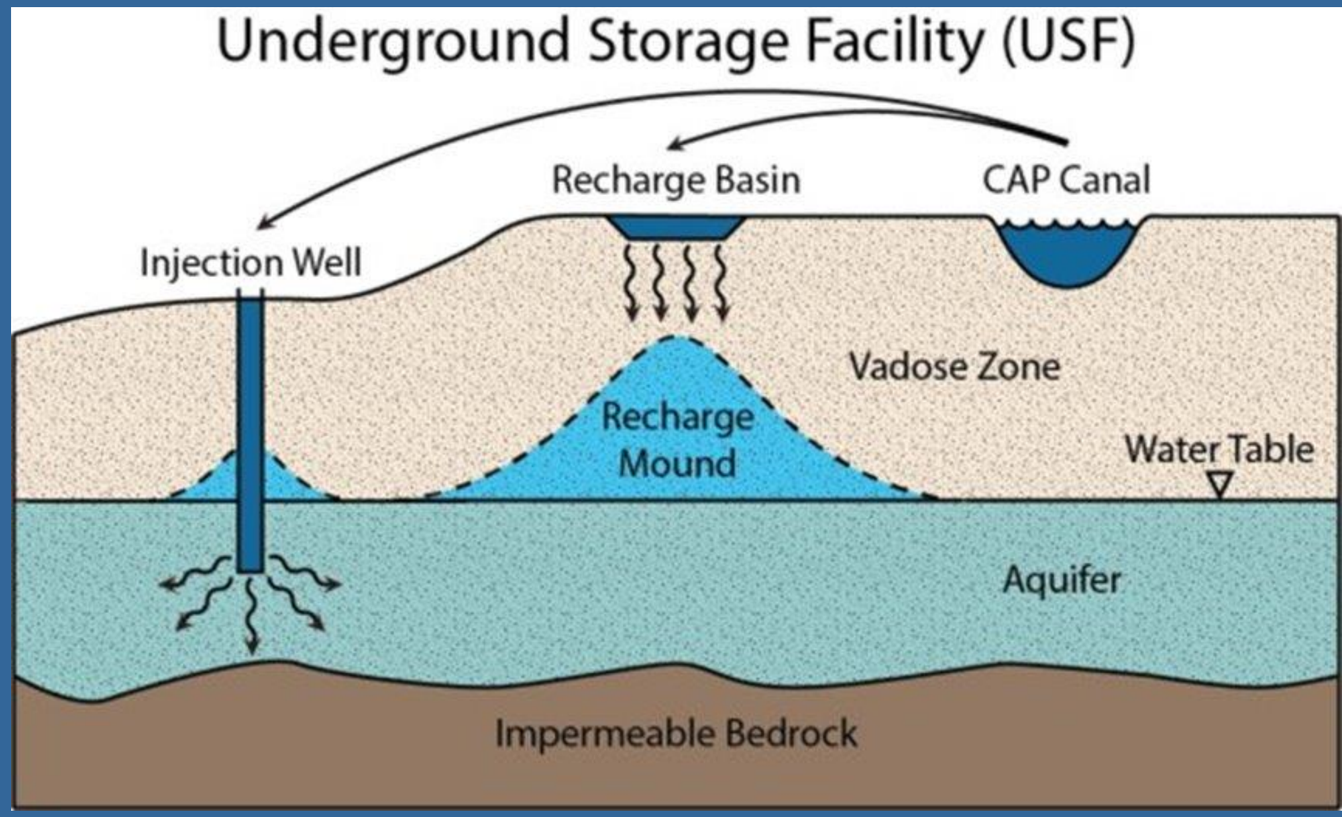
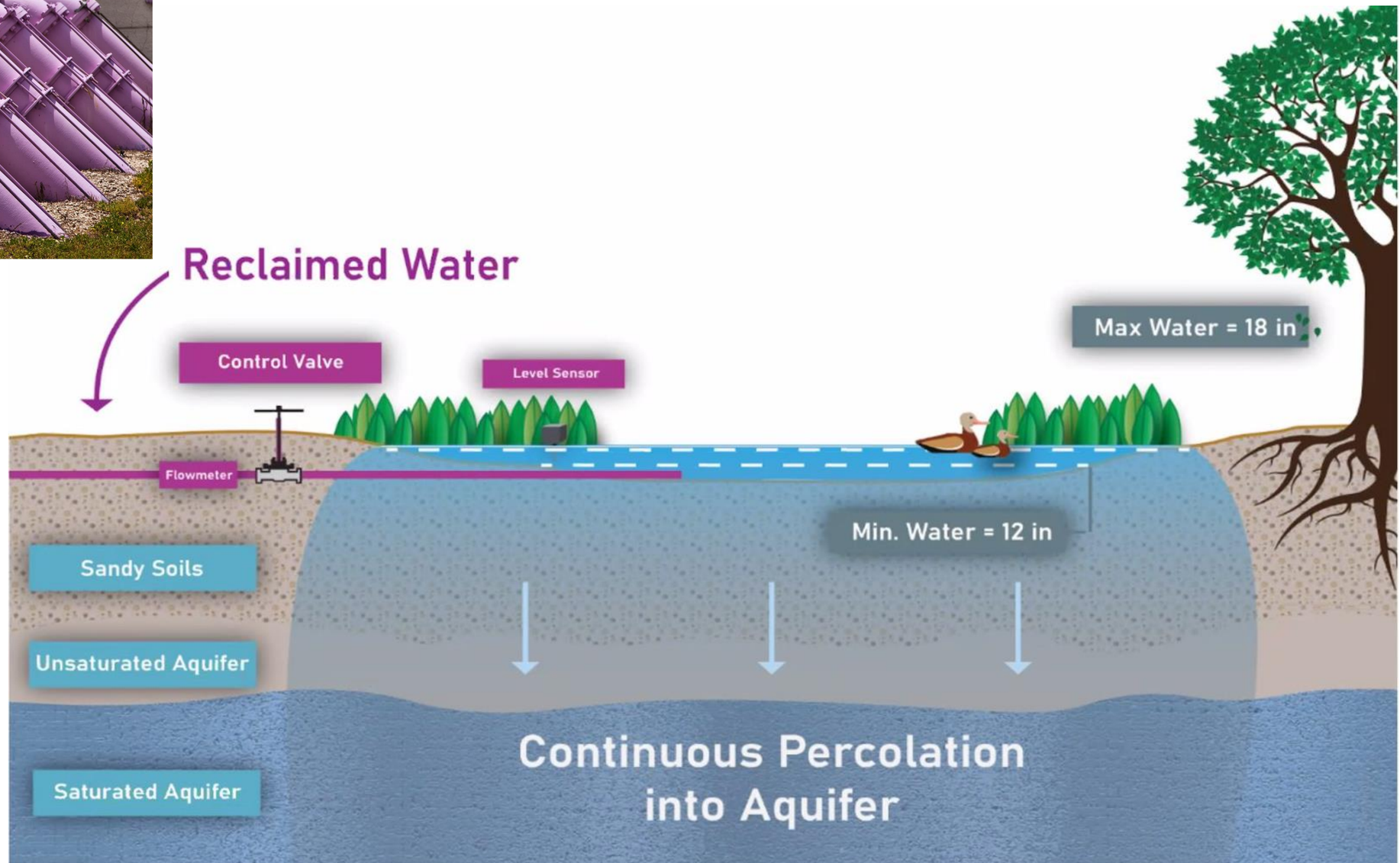
GROUNDWATER & SUSTAINABILITY

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.

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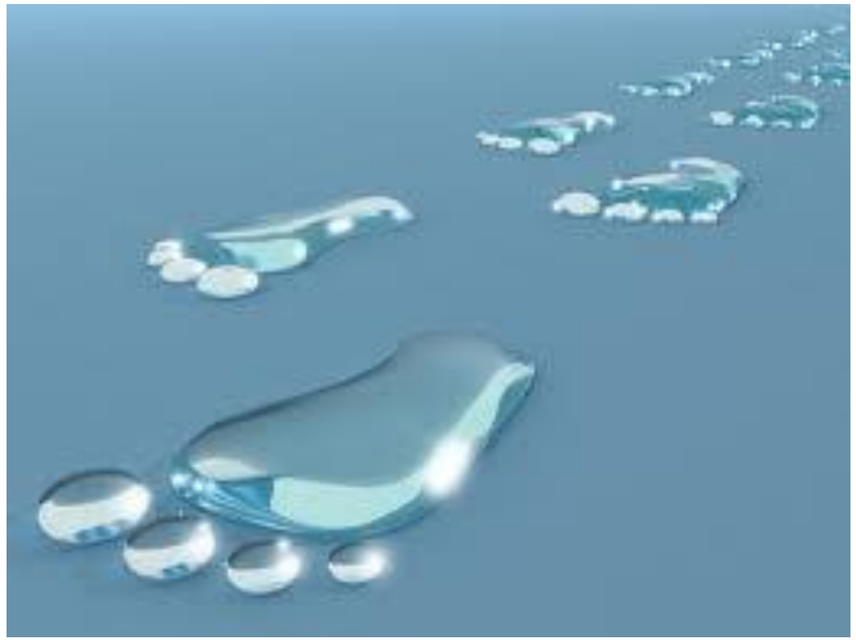
SUSTAINABILITY & STEWARDSHIP:

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?

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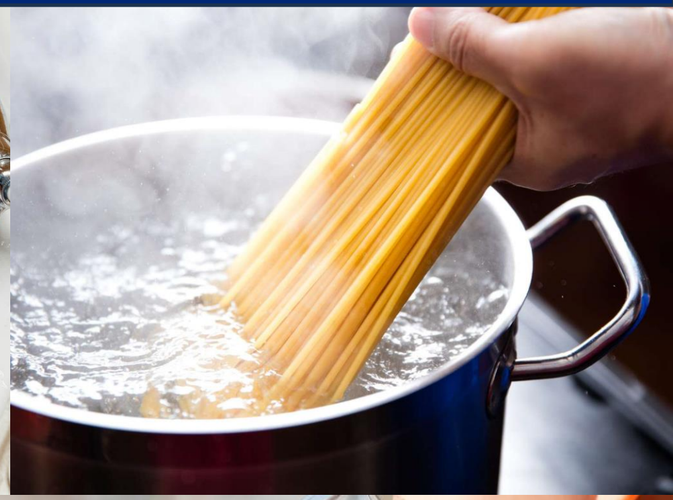
Indirect Water Use

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

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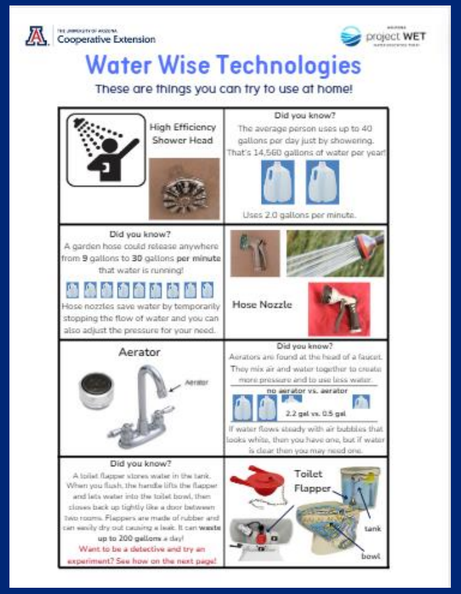
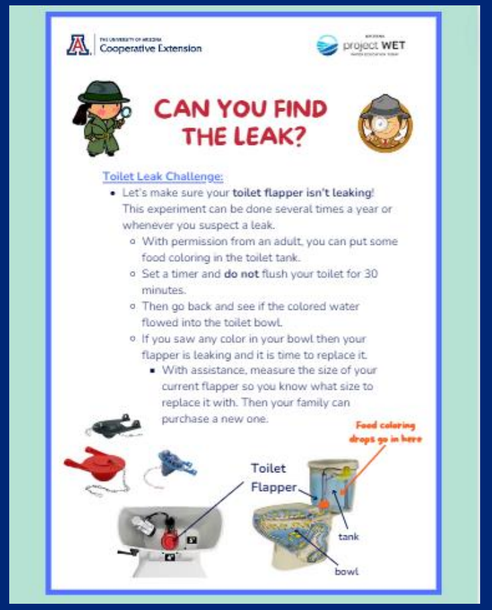
SUSTAINABILITY & STEWARDSHIP:

BE THE TIDAL WAVE OF CHANGE!

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





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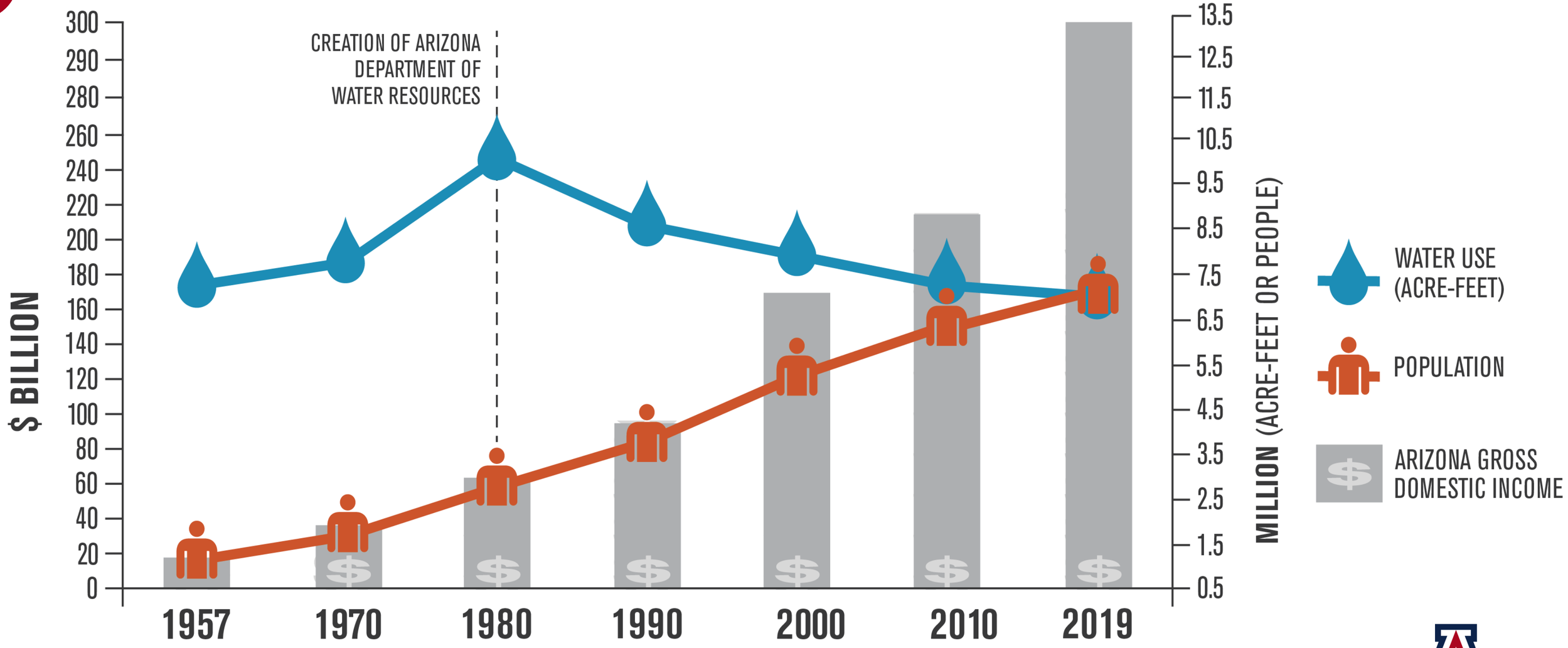

SOURCE: ADWR, 2020

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Water Education is in our Nature



Thank you for this opportunity.

Any questions?

Kirstyn Kay, Program Supervisor – kkay@arizona.edu
Lexi Smith, Program Specialist – alexiasmith@arizona.edu

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Cooperative Extension

2025-2026

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