APW Water Festivals

A “Day of” Training Guide

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What is the most important goal of an

Arizona Project WET Water Festival?

.....

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That the 4th graders have an experience that is:

☆ **FUN**

☆ **MEMORABLE**

☆ **INTERACTIVE**

...and the fun energy starts with you!

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Important Reminder about Water Festivals:

The Water Festivals are a fun field trip to **reinforce** lessons already taught in the classroom by using **exploration and play** in the field.

Most teachers have attended our PD and have been/will be teaching in class lessons on the WF topics!

Don't worry if you forget a point or run out of time to cover every single Big Idea.

Just do your best and have fun!

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Tips and Tricks for Keeping it Fun:

- **Ask them what they already know!**
  - Give kids a chance to share their ideas as often as possible
  - Q&A Format = Less "lecturing"

- **Ask open ended questions to invite critical thinking**
  - *"What do you notice?...", What do you think will happen if..."*

- **Use Attention-getters**
  - *Eg., "If you can hear me—wiggle your arms like jello, If you can hear me—catch an invisible bubble in your mouth!"*

- **Put teachers and chaperones to work**
  - Teachers/chaperones should be handling bathroom breaks and big disruptions
  - It is okay to ask for assistance if they do not step in on their own

- **Skip to the Good Part!**
  - *Attention wandering? Eyes glazing over? Maybe it's time to wrap up your talking and get to that part where the kids "Do stuff"*

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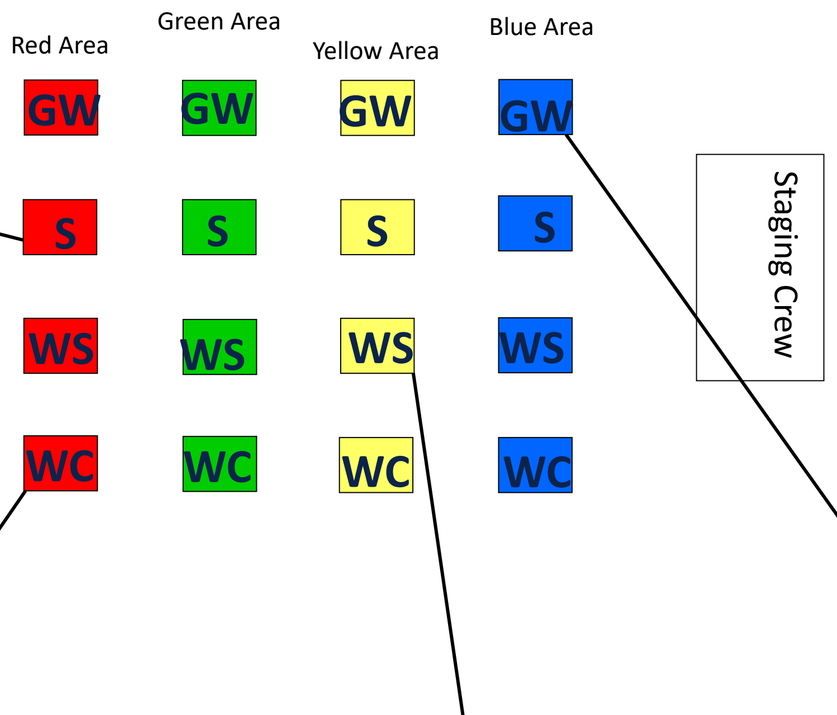
The Water Festival Model:

4th Grade Water Festival

2 to 4 rows of tents (dependent on festival size) will be set up in groups of 4 by color area

Sustainability



Water Cycle

Watershed

Groundwater

Basic Set-Up Instructions:

1. APW will lay out tent signs first

2. Team up with 2-4 people to pop up tents by color area row

3. Hang sign with clips (found in tent bag pocket)

Please remember to return clips to pocket after festival!

4. APW staff will unload station supplies at trailer.

When finished setting up tent, check in and staff will show you supplies to pick up

Try to pay attention to how supplies are packed so that you can repack them the same way after the festival!

5. Listen for APW Staff to announce a Group Up to go over plans for the day

Don’t hesitate to ask if you have questions!

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A Guide to Narratives and Supplemental Info Sheets

WATER CYCLE

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Narrative

Min.	Directions:	What You Say:	Big Ideas:
6	Introduce yourself and begin with a group discussion about the Water Cycle. As students name places where water is found, write them on the whiteboard.	• Can anyone share something they know about the water cycle? • Where are some places you find water here on earth? [Make sure all 9 places are mentioned] • Does water only travel in one set path through the water cycle?	• Water is found in glaciers, clouds, rivers, lakes, oceans, animals, plants, groundwater, soil • The water cycle is more like a web than a circle (contrary to what we often see in pictures of the water cycle). Water does not move in a set pattern
4	Encourage kids to stand up with you and act out how water molecules travel through systems. Repeat the terms out loud together as you act out the following motions: Feel free act out the motions multiple times	What are some of the different ways water travels through the water cycle? Evaporation: Wiggle fingers as you raise hands upwards. Condensation: Bring raised hands together above your head. Precipitation: Wiggle fingers down, in a "raining" motion. Percolation: Lower hands towards ground and rotate them back and forth with palms down and fingers slightly bent. Flow: Simulate wave motions out to the side with your hands and arms. Feel free to add a little dance rhythm pizazz to your flow.	• Water moves through the water cycle by evaporation, condensation, precipitation, percolation, and flow. • Water constantly changes form and moves through the earth's natural system

Water Cycle

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Materials	Bead Color Key
• 9 dice • 9 bead cups with lids • 9 metal rings • 9 different colored beads • 9 station signs with A Frames • Chenille Stems looped at one end • Whiteboard with Expo marker • Whiteboard Eraser	1. River: Baby blue 2. Lake: Royal blue 3. Cloud: White 4. Ocean: Turquoise 5. Groundwater: Orange 6. Plant: Green 7. Soil: Brown 8. Glacier: Glitter 9. Animal: Red

Supporting Information:

Evaporation: Liquid water turns into a gas and floats up into the air

Condensation: Water Molecules in the form of a gas stick to a particle of dust and then to each other, forming larger and larger clouds

Precipitation: Precipitation happens when water droplets in a cloud get too heavy and fall from the sky to form rain, snow, hail, and sleet

Percolation: Water filters through earth materials deep in the ground

Flow: Liquid moves and flows across the earth's surface and even underground

Common Questions and Supporting Facts:

Animal Station: Yep, animals drink and pee! It is totally okay to confirm to the students that animals pee and water molecules are returned to the water cycle. Expect lots of giggles.

Plant Station: Plants pull water from the ground through their roots. Water returns to the cycle through transpiration and evaporation. This is the act of water leaving the plant as vapor through pores known as stomata

Scientists helped to determine the chances of a molecule moving, as reflected on the dice!

Set the Stage for Success:

- Model excitement with your expressions and encourage engagement by asking open ended questions to get the students sharing their own ideas and thoughts
- Go over the rules as a group and demonstrate "how to" roll the dice. Show what it looks like when you get a bead (once it's your turn in line and before rolling)
- Show the sides of the dice. Talk about what the "Stay" side means (Move to the back of the line at the same station, get another bead when you get to front of line again)
- Move around the circle and interact with the kids as they collect beads
- Kids will get frustrated when they get "stuck". Use your judgement on whether to use the moment to teach or to announce a "natural event" of your choosing and send the individual (or the whole line) to a new station

Used Throughout Festival:

- Estimated minutes per section
- Directions per section
- "What you say" and [Action Guides]
- The Big Ideas
  - (also serve as answers to questions you ask the kids in "What You Say" Section)

Binders containing Grid narrative, Supporting info, and activity specific graphs handed out at each festival-- but feel free to also bring your own printed copy with notes as desired

Reviewed Before Festival:

- Materials list

Some variation based on activity:

- Additional Details/Supporting Facts
- Common Questions or Activity Hiccups
- Additional Tips for Success

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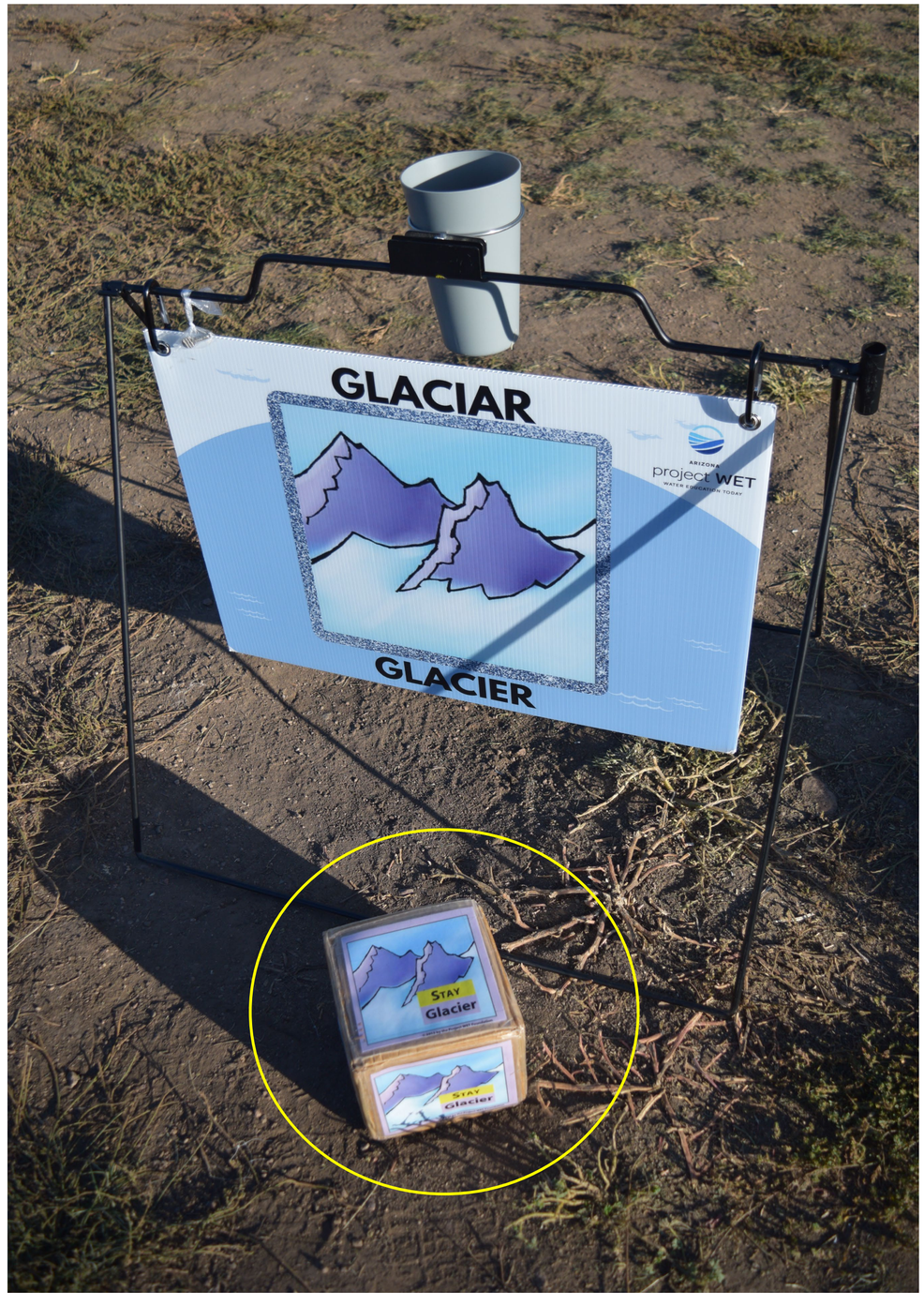
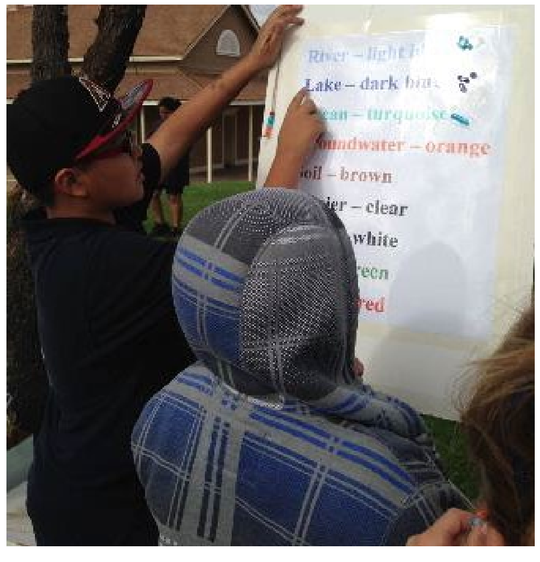
Water Cycle Set-Up

Water Cycle Set-Up





- 9 A-Frames set up in a big circle with the *Incredible Journey* station signs hanging
- Numbered bead cups (#1-9) resting in metal rings that screw into A frames at top
  - White board lists *Incredible Journey* stops, also numbered 1-9 for easier set up
- Water Cycle Dice matched to sign
  - Match dice that says "Stay" to matching sign

Water Cycle in Action

Kids are divided into 9 groups and line up behind their number's cup.

They take turns rolling the dice at their "stop" in the Incredible Journey game.

Each time they get to the front to roll, they take a bead to represent their stop.

Once they roll, they either "Stay" and return to the back of the line or travel to a new stop in the journey.

Water Cycle in Action

Once each student has enough beads to make a bracelet/keychain, then the group will gather up on the tarp to review Big Ideas and show off their unique journey bracelets!

WATER CYCLE

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Narrative

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4	Have a student pour water on the felt/sponge to explain the concept of permeable vs impermeable.	• What happens when we spray water over the sponge? [Student spray water on sponge] • What happens when we spray water over the road? [Student spray water on road] • Where can we find permeable and impermeable surfaces?	• Sponge is permeable (water absorbs), road is impermeable (water runs off) • Permeable examples: Natural environments such as grassy parks, green corridors, desert landscaping, dirt lots • Impermeable examples: roads, parking lots, and sidewalks
5	Have each student add human elements to the model. Elect two students as engineers and the rest as consultants. Have students do the dam engineer challenge.	• Where on the model should we build a dam to store water for our city? --[Provide students with clay, and let them build] --[Students test the dam by adding water to the model] --[Have students make changes to their dam and test again] --[Remove dam and make observations]	• Humans manage watersheds to ensure water availability • Dams are made to make reservoirs and provide water for cities and agriculture • Networks of pipes and canals transport water from our rivers and reservoirs to our cities and farms
3	Discuss how impermeable surfaces increase heat in urban areas.	• How might impermeable surfaces affect how water flows in a watershed? • How might impermeable surfaces affect heat? • What does it feel like to walk barefoot at the pool or on the sidewalk in the middle of the summer?	• Impermeable surfaces prevent water from going into the ground, and water will run off these surfaces. • Impermeable surfaces like roads and parking lots absorb and radiate heat, creating hotter temperatures in cities.

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Water Sustainability Set-Up

Basic Set-Up Guide: 3 Rows of “Action” Stations + shaded area to review technology packets after

Water Sustainability Set-Up

1 bucket at EACH end of Relay row

Tip: Have kids waiting to take their turn team up to refill starter buckets when empty

Basic Set- Up Guide
3 Rows of "Action" Stations

1. **Do the Laundry**
(Spin around # of times rolled)

2. Take a Shower
(Pour water in cup # of times rolled)

3. Dripping Faucet
(Hop on one foot # of times rolled)

Try to spread each station out enough that it is a fun distance to run a bit, but not so far that kids are across the field at the end. 6-12 feet apart is a good distance, dependent on festival spacing in general.

Cup with holes set in metal ring at the "Take a Shower" Station

Dice and Regular Cup at Starting Station "Do the Laundry"
Dice rolled by first kid in line (just in the beginning) to determine how many times that team does each action

Water Sustainability In Action

Keep it fun for kids waiting in line by encouraging them to cheer on and clap for their classmates who are taking their turn.
Kids who finish can help cheer and/or wait in shade with a teacher!

Technology Packets

When all 3 teams finish, have them stay in their teams and group up under shade tent

Measure end buckets and announce "winner"
Point out how what really mattered was *how careful they were* with their water AND the number they rolled (could represent either the number of people in their family or how many times they do the action in a day)

Let them explore tech bag items and then review tech packets and big ideas

Technology # 4/6

BEFORE AFTER

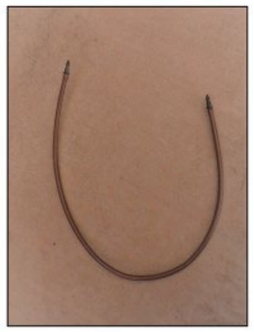
Aerator

How it works:
- Aerators are found at the tip of a faucet.
- They mix air and water together to create more pressure and use less water.
- Almost any faucet can be adapted easily with an aerator.

How do you know if your sink has one?
- Turn on your sink and observe the water flow.
- If water flows as a controlled, steady stream with air bubbles that make the water look white, then it's got an aerator installed.
- If water comes out like the way a stream falls down a mountain and is very clear, then you need one.

Regular Faucet	Faucet with Aerator
Uses 2.2 gallons per minute	Uses ≤0.5 gallons per minute

Technology # 5/6



Technology # 1/6

High Efficiency Shower Head

Did you know?
- The average person uses up to 40 gallons per day just by showering. That's 14,560 gallons per year!
- **High Efficiency** means to use less resources (water) to produce the same result (a great shower)

How it works:
High efficiency shower heads have smaller holes for water to pour through, and sometimes mix with air to create a good-feeling high pressure shower while using less water.

Regular Shower Head	High Efficiency Shower Head
Uses 2.5 gallons per minute	Uses 2.0 gallons per minute

Crunching the numbers:

Regular Shower head:	High Efficient Head:
5 minute shower ~13 gal	5 minute shower ~10 gal
10 minute shower ~ 25 gal	10 minute shower ~ 20 gal

Technology # 2/6

Drip Irrigation

How it works:
- Drip irrigation is a method of watering outdoor plants that brings water directly to the roots of a plant.
- Water drips from the small tubes slowly over time so it sinks into our desert soil.

Did you know?
- Watering plants with a sprinkler or hose can often waste water.
- Water can spray or run off the landscape into streets or sidewalks.
- Using drip irrigation is often healthier for plants, especially trees and desert-adapted or native plants. You can even customize the flow.

Technology # 6/6

Hose Nozzle

How it works:
Hose nozzles save water by temporarily stopping the flow of water from the hose until you are ready to use it.

Did you know?
A garden hose could release anywhere from **9 gallons to 30 gallons per minute** that water is running.

Even better!
Hose nozzles can also adjust the water pressure and create the best water flow for what you want to do. Many have options like mist, sprinkler, jet, etc. It's pretty helpful, and also pretty fun!

Dual Flush Toilet

Did you know?
- Toilets use the most amount of water in your home.
- The average person flushes their toilet more than **5 times a day**. You can check your toilet to see its gallons per flush rate (G/F).

How it works:
Dual-flush toilets offer two types of flushes, and a button for each. A normal amount of water can be flushed for solid waste and a smaller amount of water for liquid waste. Many toilets can be converted to dual flush using a kit.

Older Toilets	Newer Toilets	Dual Flush Toilets
3-5 gallons per flush	1.6 gallons per flush	1 g/f for liquid 1.6 g/f for solids

Crunching the numbers:

Older toilets:	New toilet:
5 flushes a day ~17 - 25 gal	5 flushes a day ~ 5 - 8 gal

Technology # 3/6

Toilet Flapper

How it works:
- A toilet flapper stores water in the tank behind the toilet.
- When you flush, the handle lifts the flapper and lets fresh water into the bowl, then closes back up tightly (if working properly) like a door between two rooms.

Did you know?
- Toilet flappers are made of rubber and can wear and break easily.
- This can cause water to **leak non-stop**. The toilet tank continues to fill the tank as the water leaks out to the bowl.
- A leaky toilet can be very quiet and can waste up to **200 gallons a day**.

What you can do:
Put food coloring in the toilet tank and see if the colored water flows into the toilet bowl without flushing the lever. If it does, you have a leak. Time for a new toilet flapper! Test your toilet flapper several times a year or whenever you suspect a leak.

SUSTAINABILITY

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Narrative

Min	Directions:	What You Say:	Big Ideas:
2	Gather students and introduce yourself. Begin with a brief discussion to define technology.	• Who here can tell me what technology is? • Is this cup a form of technology? Why or why not?	• Technology is anything that helps us do things easier, better, or faster • The cup is technology! It makes it easier and better to hold and drink liquids
5	Following the questions, facilitate a discussion about how Arizonan's use water.	[Show gallon jug to students] • How much water does this jug hold? • How much water does the average Arizonan use in a day? • What is some technology that we use to access water? • Can technology make it easier to waste water? Why or how? • Can technology help us save water? [Encourage students to share ideas on how to save water]	• The average Arizonan uses about 100 gallons a day! • Technology like pipes and canals help us get water to our communities every single day • Yes, technology makes it easier to waste water because we can access it so easily (e.g., letting sink run, using more than we need, etc.) • Yes, technology can help us save water

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15	Introduce and demonstrate the relay race Divide students into 3 even groups and send them to relay lines Play the game Measure water at the end of the game Gather groups on the blue tarp	Goal: Move water from 1 side of the line to the other side, measure after. [Each person goes once] • 1st person in line, per team, rolls dice • Number rolled is number of times each teammate will repeat all the following Technology Tasks • [Demonstrate each Technology Task:] • Run back and hand cup off to next in line • Winning team is the team that moves the most water into the far bucket.	Tips for Success: Interact with kids during the game to keep things fun and moving Encourage students who finish or are waiting to cheer on their team Rolling a higher number on the dice can be interpreted in 2 ways: 1. Family size 2. Number of times you repeat a chore
5	Distribute technology item bags to each group. Encourage them to take turns looking at the items. Go through technology packet with the entire class. Put items away	• Look in your bags, pass around the items, and as a group, see if you can guess what each item is. [Walk around while interacting] • Do you have any of these items at home already? • Can you think of any other pieces of water saving technology? • What actions can you take to help conserve water?	• Refer to technology packet to explain what each item is and the water it can save • There are many different forms of technology we can use to make sure water is being used more wisely • Technology makes it easy for us to access water, but it can also be easier to waste • Be mindful and careful about how we use water, we can save more
3	Review big ideas	• What is technology? • How has technology made it easier for us to use and waste water? • How does technology help us save water? • What actions can we take to conserve water?	• Technology is anything that helps us do things more easily, better, or faster • Technology makes water accessible but can make us careless when we use it! • Technology can help use use less water. • To be truly sustainble with our water, we must make more sustainable choices!

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Sustainability

Materials
• 3 dice • 1 ruler • 3 metal rings • 9 station signs with A Frames • 6 (2 ½) gallon buckets • 3 cups without holes • 3 cups with small holes • 3 bags of water conservation technologies (6 items) with info cards • 1 gallon jug

Supporting Information:

Technology: Anything that helps us do things more easily, makes our work better, or helps us finish tasks faster. It can also help us save water and waste it depending on how mindful we are!

Pipes & Canals: Help communities get water from one area to another. In the case of canals, water is moved from the Salt or Colorado rivers to our towns and cities. Pipes carry that water from the canals to be cleaned then to our homes.

Shower Station: When at this station, students must do a full pour. This ensures no one can get away with cheating and that it is properly representative of how we use water.

Relay: The relay is representative of how we use water in our everyday lives within our individual households.

Sustainability: In most cases, what will make the most impact is our decision making processes. Technology can solve problems in the immediate future but it will take long term habits to really change things!

Set the Stage for Success:

- Encourage the students to think critically about what technology is and the positive and negative effects of increased water availability thanks to technology
- Run through the relay once yourself to demonstrate how do each station.
- Model excitement by cheering the teams on and encouraging the students to do so as well.
- Keep an eye out for kids who are getting bored in line, and interact with them as they wait.
- Kids will often treat the relay like a race, when really it is more important that they are careful with transporting their water.
- We don't announce this ahead of the game, but use it to reinforce the idea of being mindful during our recap.
- If students complain about the dice roll being unfair, keep things light and fun when you respond.
- Calmly explain that we can't control how many people are in our family or how careful others are with their water

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Watershed Set-Up

To lead kiddos through Watershed Management Activities you will have:

- Watershed map
- Small tote containing:
  - Model pieces (cars, buildings, trees, people)
  - Sand, clay, coffee
- Small cooler with shaved ice
- Color coded bag with:
  - Spray bottles
  - Clear domes for heat island activity

Watershed Set-Up

Have students find where they are in the watershed

A watershed is a land area that starts at a high point and drains to a low point.

We ALL live in a watershed!

Watershed In Action

Watershed

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Narrative

Min.	Directions:	What You Say:	Big Ideas:
4	Gather students on blue tarp and introduce yourself. Lead discussion on watersheds using the map.	• What is a watershed? If students struggle, ask: What is a shed? (Place to store things.) What is another meaning for shed? (To fall off.) • Do you live in a watershed? [Show map to students to highlight we all live in a watershed]	• A watershed is a land area that drains to the low points. [Demonstrate "Land area that drains to a low point" action] • Most of the watershed is the land. • We all live in a watershed. • Have students show where they are on the map
4	Gather students around models. Have a student add "snow" to the top of the mountains. Students add sand to the mountain, and spray water on sand.	• Look at the model, what do you see? • Where are the high points and the low points? • Have you seen snow on the mountains? What is that snow called? [Students add snow to mountains] • When the snow melts, where does the water go? • Does water have the power to move rocks? [Have students add sand to the model and spray water on sand]	• It is called snowpack and is an important source of water in Arizona. • Water flows from high points (mountains) to low points (rivers/valleys) because of gravity. • Yes, water can move and wear away rocks (erosion). Humans can help manage erosion.

**This activity in particular has a lot to remember!

Feel free to keep this Narrative guide in your hand or nearby

during the activity. Don't stress, just do your best and have fun!

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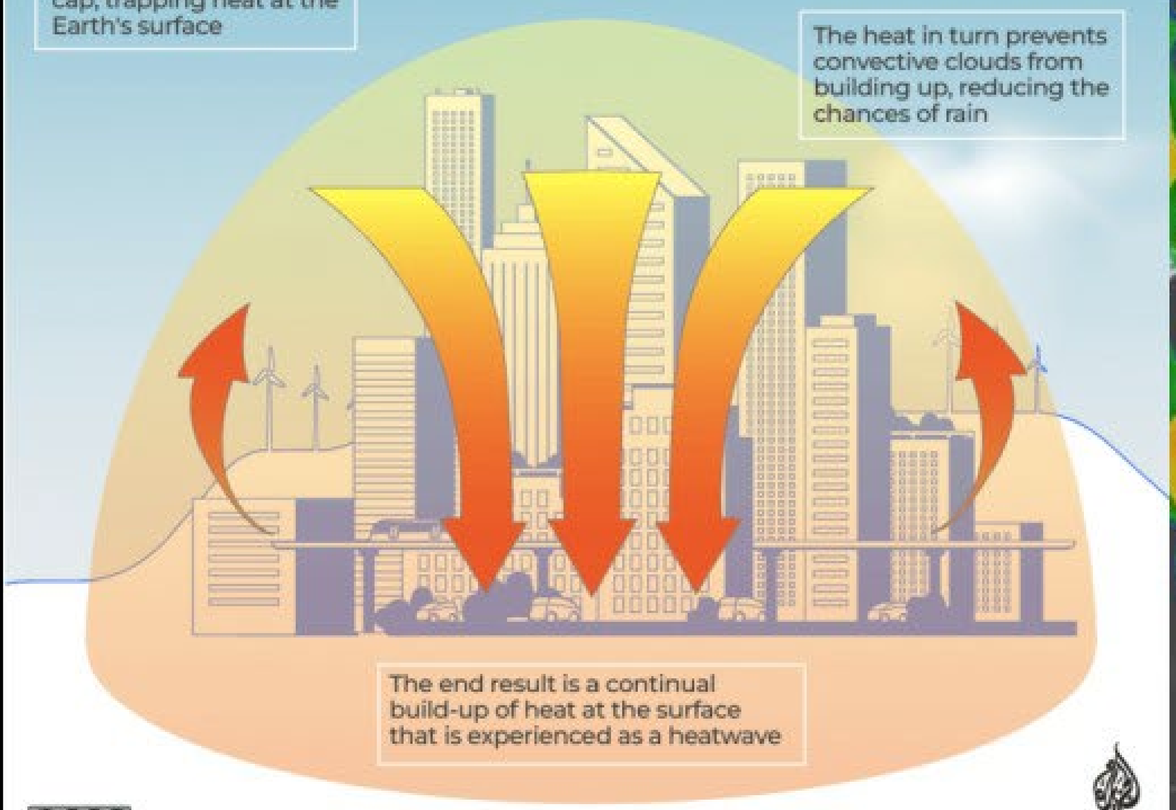
4	Have a student pour water on the felt/sponge to explain the concept of permeable vs impermeable.	• What happens when we spray water over the sponge? [Student spray water on sponge] • What happens when we spray water over the road? [Student spray water on road] • Where can we find permeable and impermeable surfaces?	• Sponge is permeable (water absorbs), road is impermeable (water runs off) • Permeable examples: Natural environments such as grassy parks, green corridors, desert landscaping, dirt lots • Impermeable examples: roads, parking lots, and sidewalks
5	Have each student add human elements to the model. Elect two students as engineers and the rest as consultants. Have students do the dam engineer challenge.	• Where on the model should we build a dam to store water for our city? --[Provide students with clay, and let them build] --[Students test the dam by adding water to the model] --[Have students make changes to their dam and test again] --[Remove dam and make observations]	• Humans manage watersheds to ensure water availability • Dams are made to make reservoirs and provide water for cities and agriculture • Networks of pipes and canals transport water from our rivers and reservoirs to our cities and farms
3	Discuss how impermeable surfaces increase heat in urban areas.	• How might impermeable surfaces affect how water flows in a watershed? • How might impermeable surfaces affect heat? • What does it feel like to walk barefoot at the pool or on the sidewalk in the middle of the summer?	• Impermeable surfaces prevent water from going into the ground, and water will run off these surfaces. • Impermeable surfaces like roads and parking lots absorb and radiate heat, creating hotter temperatures in cities.

3	Engage in discussion of urban heat island effect. Show students infographic.	• When everything is so hot in the summer, what happens to the water? • Why does it rain so rarely in Phoenix? [Student place bowl over the city and students spray water over the city] • What is this called when cities are so hot they push the rain clouds away? • How can we reduce heat in cities to protect water resources?	• More heat creates hotter temperatures that increase water evaporation and higher air pressure, which pushes away rainstorms. • This is referred to as the urban heat island effect. • The urban heat island effect causes it to rain less and by creating warmer temperatures. • We can add more green spaces, natural landscaping, like planting trees.
5	Students add coffee grounds to the road to represent pollution. Spray water over the coffee, allowing the brown water to flow into the river.	[Add coffee grounds and spray water] • What do you think the coffee represents? • What are some possible sources of pollution that we might introduce into the watershed? • What are some things you can do to make sure our water stays clean and our environment healthy?	• Pollution. Oil from cars, dog poop, trash/litter, fertilizers, pesticides, cleaning products • We are all responsible for maintaining the health of the watershed where we live • We can prevent our pollutants from entering the water by picking up pet waste, litter, and being careful with chemicals • Simple actions, like reducing pollution and conserving water, can make a big difference
2	Move students to blue tarp and review big ideas. Begin to reset the station.	• What is a watershed? • Do you live in a watershed? • What are the connections between people, heat, water, and the environment? • Can you help manage the watershed?	• A watershed is a land area that drains to a low point. • Yes, we all live in a watershed • They are all connected, and humans impact the environment through construction of impermeable surfaces • Yes, we can all take actions to help take care of the watershed

CLIMATE

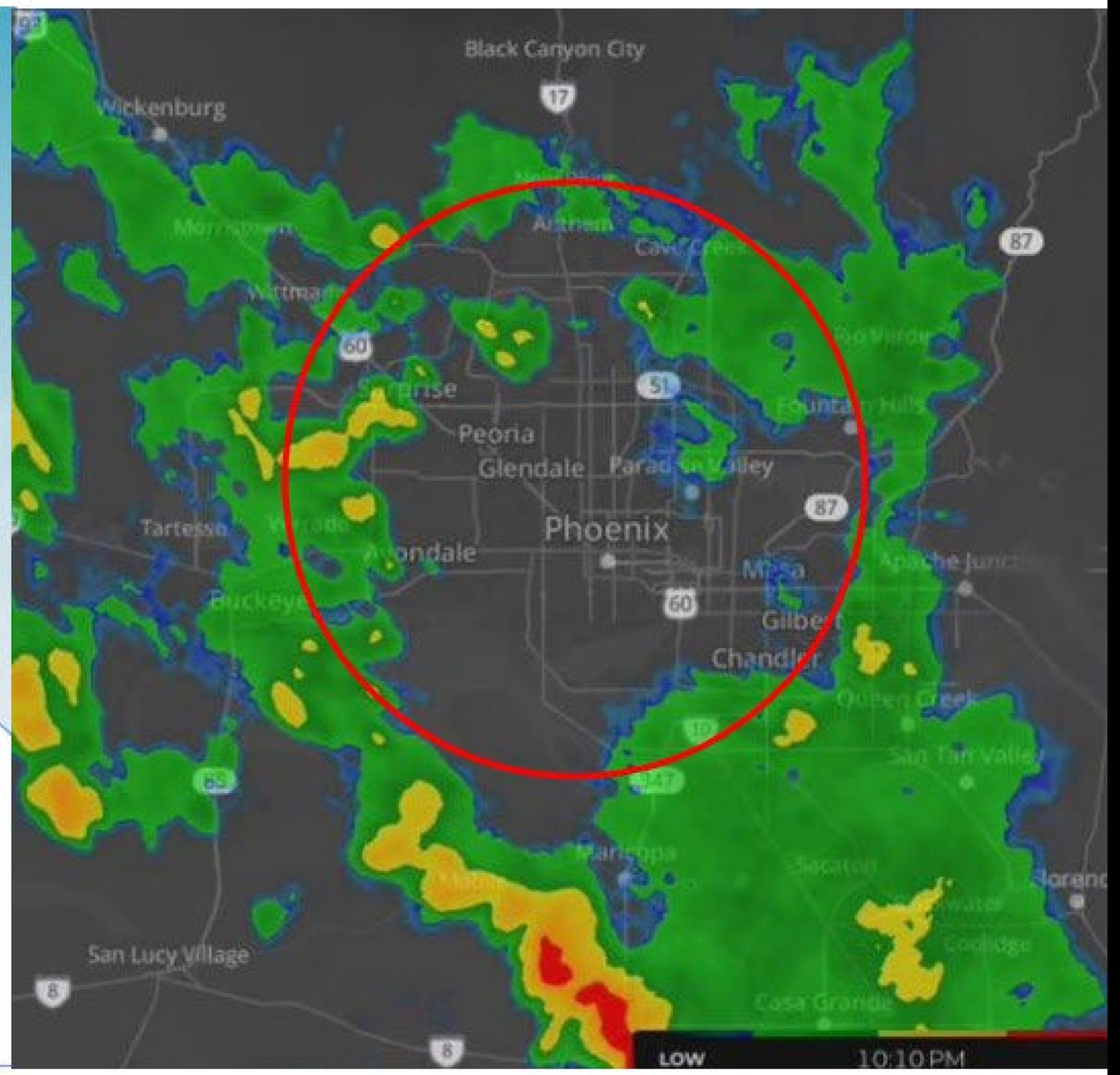
What is a heat dome?

A high-pressure system in the atmosphere that traps heat over a certain area.



Source: NOAA | June 18, 2024

@AJLabs AL JAZEERA



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ARIZONA project WET WATER EDUCATION TODAY

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Watershed

Materials

• 2 fiberglass watershed models
• 2 spray bottles
• 1 bucket for extra water
• 2 sponges
• 1 box containing props
  ○ 1 bag of clay
  ○ 1 bag of toy figures
  ○ 1 small container of coffee grounds
  ○ 1 small container of sand
• 1 laminated heat island effect pictograph (in binder)
• 1 rolled watershed map of Arizona

Supporting Information:

- Watershed Dynamics:
  - Water flows from high points (mountains) to low points (rivers).
  - Permeable surfaces allow water to soak into the ground, filling the aquifer and reducing temperatures.
  - Impermeable surfaces like concrete increase runoff and contribute to erosion and higher temperatures.
- Human Impact:
  - Construction of roads, buildings, and farms alters natural water flow. Humans manage watersheds to prevent erosion, store water in reservoirs, and avert flooding.
  - Stormwater management is vital for preventing pollution from entering water sources. We are all responsible for ensuring we do not pollute the watershed.
- Urban Heat Island Effect:
  - Cities are warmer than rural areas due to the absorption of heat by buildings and roads, as well as more impermeable surfaces.
  - This heat can increase water evaporation and reduce groundwater infiltration, in turn preventing rain over the city and exacerbating drought conditions.
  - Solutions include using heat-reflective materials, increasing green spaces, and implementing permeable surfaces in urban planning.

Set the Stage for Success:

- Model excitement with your expressions and encourage engagement by asking open ended questions to get the students sharing their own ideas and thoughts
- Go over the rules and expectations as a group. Introduce the concept of "hands off the watershed model!"
- Let students take an active role in the demonstrations to solidify their understanding of the concepts being taught.
- Be ready to adapt the lesson based on the students' responses and level of understanding. Use real-life examples that relate to the students' own experiences.

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Groundwater Set-Up

Groundwater models will be set up in a circle around the edge of tarp

Classes will be divided into 6 groups to gather around the models for investigative activities/experiments

Volunteers and teachers can move around the inside and outside of the circle to assist and engage students

There will be **a lot** of reset for this activity!
Plan to have kids help fill sand and water containers (pitchers and cylinders) during the activity.

There should be a large water receptacle set up near the station to help with this

Only volunteers should handle the food dye!
2-3 drops per lake should be plenty per “pollution event” in each model

Groundwater Set-Up

Materials
• 6 Student groundwater models, with 2 syringes with tubes • 12 magnifying glasses • 12 earth material tubes, 6 gravel and 6 sand • 12 (100ml) graduated cylinders • 1 Bucket for extra water • 1 Bucket of fresh sand • 1 Bucket for wet sand • 1 Food coloring dropper • 12 small pitchers for students

Earth material tube guide:
There is a 4 Area shared tote for each gravel and sand tubes. Take one of each type per model during AM set-up.

Gravel tubes come filled and stay filled.

Sand tubes come empty. Have students fill to about "ground level" each rotation.
Use small disposable cups provided in your kit to fill sand. They hold just about the right amount of sand

Return all tubes to main totes at end of day—
gravel filled, sand empty

Ground Water in Action

"Groundwater and surface water are connected" experiment (Pitchers poured ALL over model)

Pumping "polluted" groundwater from the wells (blue tubes) and back into pitchers with syringes

Making observations before predicting which earth material the water will travel through fastest (100 ml cylinders)

Ground Water in Action

Have students hold earth material tubes up <u>above the model</u> to make observations and time the flow.
Get more students involved by having them work together and each do a different task (hold, pour, etc)

Groundwater

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Narrative

Min.	Directions:	What You Say:	Big Ideas:
4	Gather students on blue tarp and divide into 6 groups Prompt each group gather around a model Introduce yourself and begin the lesson	• Look at your model, tell me what do you see? • What is groundwater? • Where does groundwater come from? • Where is the water underground? • Why should we care about groundwater?	• Model is a representation of the real world. • Groundwater is water that is underground. • Rain and snow that falls to ground (precipitation) and goes into the ground (percolation) • Water travels through and collects in the spaces between the grains of earth materials (rocks & sand) • We use groundwater every day. 41% of Arizona's water comes from groundwater
10	Lead discussion and then direct students through investigation steps—gravel 1st, sand 2nd Different student per "task". One student holds tube up, while another pours 100 ml water through Each group counts "Colorado" seconds until the first water drop exits tube.	• Take turns with the magnifying glass to look at the sand and gravel. What do you see? • Does groundwater move or does it stay in one place? • Will the water flow faster through the gravel or the sand? [Direct groups pour water into material tubes] • Which tube did the water flow through faster? • Why do you think the water flowed faster through the gravel?	• Sand is tiny rock and there are spaces/pores between the rocks and grains of sand • Gravity causes water to move underground just like it does on the surface • Water flows between these spaces/pores • Sand does not absorb water • The larger the spaces the faster the water will flow

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Min.	Directions:	What You Say:	Big Ideas:
10	Direct students to fill up 1L contains with water Students pour 1L of water into the model Two new students pump water from the model into the 1L containers Make sure to pump from the blue tubes (wells)	[Instruct students to get water and pour water into model] • Look at the side of the model. Do you see the groundwater? • We know what groundwater is, so what is surface water? Do you see any in our model? [Have students pump water out] • What happens as we pump water out? What happened to the lake? • What happens if we keep pumping and don't add water? • Are groundwater and surface water connected?	• The height of groundwater is called the water table· • Surface water is water above ground. There is a lake in our model • The water percolated through the grass because of gravity, in turn the water table went up. • Ground and surface water rise when water is added and lower when we pump groundwater • If we keep pumping groundwater without any being added, ground and surface water decrease • Groundwater & surface water are connected.
4	Direct 2 students to pour water back into the model Volunteers add a few drops of food dye into the lake Students pump ALL the water out of the model	• What do you think the syringes and blue tubes represent in our model? • How does water get from underground to our homes and businesses? [Add food dye. Students pour water into the model and students pump ALL water out] • What does the food coloring represent? • What happened after we added the pollution? Why was the water you pumped out green?	• Syringe represents pumps and blue tube represents wells • We use technology (wells, pipes, plumbing, and canals) to access groundwater • Pollution spread through the groundwater and got pumped out by our wells • Any pollutants that might get added to our groundwater supply get pumped
2	Review big ideas Begin to reset your station and pour dyed water into dye container	• What is groundwater? • Does groundwater move underground? How? • Is groundwater connected to surface water? • Why do we care about groundwater?	• Groundwater is water that is underground. • Groundwater does move underground because of gravity • Yes, groundwater is connected to surface water • We use it for our everyday needs, and don't want to pump it out before it can replenish

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Groundwater

Materials
• 6 Student groundwater models, with 2 syringes with tubes • 12 magnifying glasses • 12 earth material tubes, 6 gravel and 6 sand • 12 (100ml) graduated cylinders • 1 Bucket for extra water • 1 Bucket of fresh sand • 1 Bucket for wet sand • 1 Food coloring dropper • 12 small pitchers for students

Supporting Information:

- **Water Use:** 41% of Arizona's water comes from groundwater
  - 82% of the water use in Arizona is Agriculture
- **Aquifers:** Groundwater is found in the spaces between rocks and sand, called an aquifer.
  - They are filled by precipitation and snowmelt, as water percolates into the ground, and as humans pump groundwater out, they drain
- **Pumping Effects:** If we pump groundwater irresponsibly, we will eventually run out.
  - Over pumping of groundwater can cause subsidence, sinkholes, and erosion
  - Once this water is gone, the spaces between the rocks collapse--reducing ground permeability and aquifer capacity, and increasing the risk of floods
- **Pollution:** Human activities like mining, agriculture, industry, and not cleaning up after pets introduces pollutants into the watershed
  - Pollution does not remain where it is introduced--it spreads throughout the watershed as groundwater moved by gravity

Set the Stage for Success:

- Model excitement with your expressions and encourage engagement by asking open-ended questions to get the students sharing their own ideas and thoughts.
- Introduce expectations about how to interact with the materials at the start. Remind students these are not toys, but scientific models we will be using to conduct experiments, and to please treat them gently so other kids can use them in the future.
- Make sure students are dividing responsibilities equitably in their group and sharing materials. Every kid should do something at least once.
- At the end of the activity, take each wet sand earth material tube and empty it into the wet sand bucket. Use cup to refill with dry sand up to the level of artificial grass.
- Kids can help reset your station whenever there is time!

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Please note:

We are currently planning to refilm our volunteer training videos after updating this season.

We **do** have 3 old videos of activity training that are still *very similar* to our current activities.
Be sure to rely on the Grid Narratives versions shown here in this slide show **first**,
but you can also review the following training videos as a helpful guide.
(*ctrl + click to open*)

Watershed Activity:
Watch Watershed Activity Here

Sustainability Activity:
Watch Sustainability Activity Here

Water Cycle Activity:
Watch Water Cycle Activity Here

Groundwater Activity:
Coming Soon!

Videos can also be found on our website's volunteer page at:
https://awf.projectwet.arizona.edu/volunteers

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Students begin leaving at final whistle. We did it!!

1. At the end of the festival, give yourself a round of applause!!

2. Return **all** of your laminated pages to the Narrative binder—

clip into binder if there are holes punched or place in pocket if there aren't!

3. Return binder to the Volunteer Area

4. Grab a drink and wait for lunch/breakdown instructions.

General Breakdown Instructions:

1. Pack supplies away first

2. Take down tent sign (return sign clips to tent bag pocket)

3. Work with 2-4 people to collapse tents

(Pro tip: Align zipper side with tent wheel side so securing pegs line up with tent leg holes)

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T H A N K Y O U !

Truly.

Without you, Water Festivals would not be possible.