WATERSHED

Narrative

BIG IDEAS:

- A watershed is a land area that drains to the low points.
- The edges or boundaries of a watershed are the high points or mountains.
- We all live in a watershed and we manage the land (neighborhoods, farms forests, etc.) for the water quality and health of the people and ecosystem.

MATERIALS:

2 watershed models
4 spray bottles
Small cooler with ice
2 small pieces of clay
2 containers of instant coffee
Buildings, tractors, cars for each model
2 13-inch pieces of plastic tubing
2 containers of sand
2 sponges
watershed map

Q AND A — Watershed Managers – 5 Minutes.

1

In a circle away from the model, tell students: **Today, we are going to be watershed managers**. **What is a manager?** Does your classroom have a manager? Do your parents manage anything for you? **What do managers do?** Managers make sure that things run smoothly.

Ok, so we know what a manager is, but what is a watershed? We know what water is right? What about a shed? Students may latch onto the word SHED (as in tool shed). **What does a tool shed do?** Stores tools. **What is a different definition of the word shed? What about your dog? Does your dog shed? What does that mean?** When something sheds, it means that it falls off**. A watershed has to do with storing water and water falling off of the land. I have a special definition of watershed: A watershed is a land area that drains to the low points.** Have students stand up and teach this with hand motions. Have students repeat it with hand motions twice. Have students do this a third time, but this time they lead it.

So, what makes up most of a watershed? It's the *land*! It is also the water.

If we're going to manage a watershed, first we need to find the *boundary*, or edge of that watershed. Do the hand motions moving from high to low as you ask: **What would be the edges of the watershed**? The higher areas. If you can see them, have the students point to mountains nearby. These are some of the edges or boundaries of a watershed. **So do you think we live in that watershed?**

Show the students the large watershed map**. Where are we on this map? What watershed are we in? What do you think the blue lines represent?** Rivers. **What do you think the green lines represent?** Mountains or high points of land. **What do you think the color in between represents?** The land area.

EXPLORATION — Natural Watershed Features – 8 Minutes.

2

Divide the students into two groups, one for each model and have each group gather around a watershed model. If classroom management support is needed, involve the chaperones by assigning them the role of "consultant" – removing students who are not following directions.

Watershed Boundaries

You are looking at a portion of a watershed. Can you point to the watershed boundary or edge on our model? Remind them of the ridges all around them, and relate the big mountain on the model to local mountains. Have students point to various features on the model and ask students: **Is that part of our watershed?** Yes. **What do all of those places have in common?** They are all land areas.

Runoff and Surface Water

Let's pack this ice to represent snow up in the mountains. Have a couple volunteers do this. **What do you think we call this?** Snowpack. **What do you think will happen to that snow?** Let students observe what happens. The snow or ice will melt. **What do you think we call that water?** Snowmelt.

Where does the water from the mountainsides go? A student sprays some additional water down the mountainsides. **What do you think we call this water?** Runoff. Runoff runs over the land and eventually flows into a low area (wash, stream, river or lake). **Why does the snowmelt and water run downhill in a watershed?** Gravity. Yes because gravity works!

What is surface water? Point to the surface water. Surface water is water that collects in the low areas in a stream, river, lake, wetland or ocean.

Erosion

Have a student put some sand up on the mountains. **Can water move particles of soil? Sand?** Spray water on the mountains again. **Even pieces of rock?** Yes, it can! **What do we call this when water moves particles?** Erosion. Erosion is the breaking down of rock by water and wind. **Is erosion good or bad? What are some good effects of erosion?** Erosion can bring good fertile soil into a flood plain. Erosion can form beautiful landforms. **What do we have in our state that was formed by the power of water eroding the land?** The Grand Canyon. **What are some bad effects of erosion?** Erosion can bring sediment into a stream changing the habitat for fish and other animals. Erosion can cause landslides or avalanches. **Watershed managers manage the land, including erosion.**

EXPLORATION — <u>Human Activity in the Watershed</u> – 12 Minutes.

Do you live in a watershed? Yes. **There are no people in this watershed. We are going to put some buildings and other things in this watershed. If I pass something out to you, you are in charge of it. You will have 1 minute to decide where you want it to go. Now I'm going to count down from 5 and when I get to 0 your hands need to be down by your sides. 5, 4, 3, 2, 1... hands by your sides.**

Water Storage and Transportation

People often want water where it is not flowing. **Now, as watershed managers, we are going to be engineers looking at the question: How do we store and move water to where we want to use it? What do you think?** Canals & dams. If students don't get this right away, that's ok. We will come back to this soon. **This is one thing that watershed managers do.**

Do you remember where the snowmelt came from? Where did it rain? The mountain.

Farmers sometimes need to be engineers, because they need to water their fields every day in the growing season. How do they water their fields without wasting water? After you've introduced the question, let a group of 3-5 students try to answer it by engineering a system. They will use clay to build dams trying to water the farm without wasting water. When they are finished, test their system by having a student pour water on the mountain. **Did any water leave the field? Are there ways that you could re-engineer your system so that all the water stays on the field for the plants?** Allow them to re-engineer and then retest the system. Ask for the clay when they are finished retesting.

Let's get a new engineering team. Hand a blob of clay to another group of 3-5. **Now you have a new challenge. You'll need to design a system that will store the most water. Where and how will you do that?** Let students place a dam or series of dams in the river to make a lake or series of lakes. When they are finished, test their system. Allow them to re-engineer and then retest the system. **Does anyone know what we call a human-made lake?** A reservoir. Ask for the clay when they are finished retesting.

Let's get a new engineering team. Hand a blob of clay to another group of 3-5. **This team will now design a system to not only store water, but to move it to the neighborhood area.** Hand them the tube and the clay. Give them time to think and build. Test their system by allowing another student to pour water up on the mountain. **Did you get water to flow through the tube to the neighborhood?** Allow them to re-engineer and then retest the system.

Storm Water and Non-point Source Pollution

Have a student sprinkle some instant coffee in the neighborhood. **What do you think this instant coffee represents in our watershed?** Dirt. **Yes, it could represent dirt. What about cars, are their cars in your neighborhood? What could they leave on the road?** Oil. **Does anyone here have a dog? What could your dog leave on the grass?** Poop. **Now let's make it rain.** Spray water to simulate the rain. **If that instant coffee represented dirt, oil and poop what happened to it?** It moved with the water to the low point. **Would you swim in it?** No. **This is a type of runoff we call storm water. Storm water is something that we manage, as watershed managers in our cities. We all live in a watershed and contribute to the quality of the water.**

Q AND A — <u>Wrap Up</u> – 5 Minutes.

Have students step away from the model back to the original big circle and ask:

- What is a watershed?
- Do you think your house is in a watershed like the one that we talked about today?
- Why do we manage watersheds?
- How can you help manage the watershed that you live in?

If there is extra time: Pair students up and have them talk about all of the watershed managers they can think of.

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Cliffs Notes

Arizona Water Festival

Min.	ELEMENT:	What you ask:	Big Ideas
5	**Q & A:** Watershed Managers	• **What is a manager?** What do **managers do**? • **What is a watershed?** • **A watershed is a land area that drains the low points.** With hand motions, 2 times. Have students lead 3rd time. • What **makes up** most of a **watershed**? It's the LAND … and the water. • What would be the **edges** of the watershed? • Do you think we **live in a watershed**? • **Where are we** on this map? What do you think the **blue** lines represent? What do you think the **green** lines represent? What do you think the **color** in between represents?	• **A watershed is a land area that drains to the low points.** • **The edges or boundaries of a watershed are the high points or mountains.** • **We all live in a watershed.**
8	**EXPLORATION:** Natural Watershed Features • Watershed Boundaries • Runoff & Surface Water • Erosion	• Can you **point to the watershed boundary** or edge on our model? • Pack ice on mountains. What do you we call this? **Snowpack.** What do you think will happen to that snow? What do you think we call that water? **Snowmelt**. • Where does the water from the mountain sides go? What do you think we call this water? **Runoff**. • Why does the snowmelt and water run downhill in a watershed? **Gravity**. • Point to the surface water and ask: What is this? **Surface water** is water that collects on the ground in a stream, river, lake, wetland, or ocean. • Can water move particles of soil? Sand? What do we call this when water moves particles? **Erosion.** What are some **good effects** of erosion? What do we have in our state that was **formed by the power of water eroding the land**? What are some **bad effects** of erosion?	• **A watershed is a land area that drains to the low points.** • **The edges or boundaries of a watershed are the high points or mountains.**

12	**EXPLORATION:** Human Activity in the Watershed • Water Storage & Transportation • Non-point Source Pollution	• How do we **store and move water to where we want to use it?** 1. **How do farmers water their fields without wasting water?** 2. Now, you'll need to design a system that will **store the most water. Where and how** will you do that? 3. Lastly, this team will now design system to not only **store water**, but to **move it to the neighborhood area**. • What do you think the instant coffee represents in our watershed? If the instant coffee represents dirt, oil, and dog poop, **what happens to it when it rains**? This is a type of runoff we call **storm water**.	3 • **We all live in a watershed and we manage the land (neighborhoods, farms forests, etc.) for the water quality and health of the people and ecosystem.**
5	**Q & A:** Wrap Up and Big Ideas	**Big ideas to review:** • What is a watershed? • Do you think your house is in a watershed like the one that we talked about today? • Why do we manage watersheds? • How can you help manage the watershed that you live in?	4 • **A watershed is a land area that drains to the low points.** • **The edges or boundaries of a watershed are the high points or mountains.** • **We all live in a watershed and we manage the land (neighborhoods, farms forests, etc.) for the water quality and health of the people and ecosystem.**