



MATERIALS

- 1 materials box and one cooler with snow
- 2-3 fiberglass watershed models on tables
- 2 spray bottles - one with cloud top
- 1 bucket for extra water - may be shared with another station and/or color area.
- 1 permeable and 1 impermeable surface (felt or sponge and laminated road)
- 1 bag/container of clay
- 1 bag of plants, animals, buildings and vehicles
- 1 small container of coffee grounds
- 1 small container of sand
- 1 watershed map of Arizona

Learning Objectives:

Understand how water moves through a watershed and demonstrate the human impact of changes to that natural system; city surfaces affect the movement of water, and those changes can be observed/measured.

BIG IDEAS

1. A watershed is a land area where water flows from high to low points
2. Everyone lives in a watershed
3. Everyone can care for our watershed

Activity Flow

1. Students start together on tarp
 - Not under shade structure with models
2. Intro, **establish attention-grabber**, define watershed (**Big Idea 1**), share map (**Big Idea 2**)
3. Divide students into 2 or 3 groups for each watershed model
 - Presenters stand behind mountain
 - Students on the other three sides.
4. Let the contents of watershed kit remind you of each of the interactions:
 - A. Snowpack
 - B. Sand (erosion)
 - C. Storm now and after each of the following:
 - D. Felt and paper (impermeable and permeable surfaces)
 - E. Add plants, animals, buildings and vehicles
 - F. Use clay to build dams and gates
 - G. Use instant coffee to create pollution
 - H. Consider pollution solutions (**Big Idea 3**)
5. Have students help collect all materials
6. Regroup to reiterate **Big Ideas** on tarp
7. Clean models using some leftover storm water
 - Tilt over to drain
 - Refill storm bottles

WATERSHED

Supporting Information:

Water from hundreds, and often thousands, of creeks and streams flow from higher ground to rivers that eventually wind up in a larger waterbody. As the water flows, it often picks up pollutants, which may have negative effects on the ecology of the watershed and, ultimately, on the reservoir, river, bay, or ocean where it ends up.

Not all water flows directly to the sea, however. When rain falls on dry ground, it can soak into, or infiltrate, the ground. This groundwater remains in the soil, where it will eventually seep into the nearest stream. Some water infiltrates much deeper, into underground reservoirs called aquifers. In other areas, where the soil contains a lot of hard clay, very little water may infiltrate. Instead, it quickly runs off to lower ground.

Rain and snowmelt from watersheds travel via many routes to the sea. During periods of heavy rain and snowfall, water may run onto and off of impervious surfaces such as parking lots, roads, buildings, and other structures because it has nowhere else to go. These surfaces act as "fast lanes" that transport the water (and everything it picks up along the way) directly into storm drains. The excess water volume can quickly overwhelm streams and rivers, causing them to overflow and possibly result in floods. <https://oceanservice.noaa.gov/facts/watershed.html>

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. Students should spend considerable time during this activity "playing" with the model and considering the consequences of their choices when it rains, depending on where they place the toy plants/animals/buildings/vehicles/dam (clay) in the models. Take time to wonder with them and answer their questions.
- This narrative asks students to be thoughtful biologists and ecologists, considering the needs of plants, animals, insects, and all of the non-human inhabitants of our watersheds. Then students can imagine themselves as city planners and dwellers, thinking about where to place buildings and vehicles. Students are challenged to become engineers when they choose where to place gates and dams to control the flow of water.
- Go over the rules and expectations as a group. Be sure to establish an Attention Grabber, that includes "hands on hearts" to remove the temptation of continuing play during key moments in the narrative.
- Try to establish a rhythm whereby students listen, then interact/respond, then listen, etc.
- Let students take an active role in the demonstrations to solidify their understanding of the concepts being taught. Every student should get to do multiple things (make it rain, place a toy, etc.).
- 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.



WHAT YOU SAY AND DO

4 Minutes - What is a watershed?

- Students start as a whole class sitting on the tarp (not under the shade structure).
- Introduce yourself and **establish an attention grabber**. Then ask:

What is a **watershed**?

Help make mental connections, by asking:

What is a **shed**? (*Place to store things*)

What is **another meaning** for shed? Do you have pets, do they shed? (*To fall off like dog hair*)

Here is another way to remember:

Sweep arms in in circle above head, ending in a “V” for low points and define a Watershed:

A WATERSHED IS A LAND AREA WHERE WATER FLOWS FROM HIGH POINTS TO LOW POINTS

Why does water **flow downward**? (*Let students respond.*) Yes, **gravity**! Do **you live** in a watershed? Yes!

Show students the **watershed map** and **name the watershed** after the students identify their location

EVERYONE LIVES IN A WATERSHED!

So, wait, is your school in a watershed? (*Let students respond.*) Yes, your school is in a watershed!

- Divide students into **2 or 3 groups**, 1 group **per watershed model** (*a few festivals have 3 models*)
- **Presenters stand behind the mountain** and students on the other 3 sides
- Let the contents of your watershed kit remind you of each of the interactions

2 Minutes - Snowpack

Look at the model, **what do you see**? (*Ask for hands*) **Everyone point to a high point! Everyone point to a low point!** Raise your hand if you have seen **snow on the mountains!** Who knows what that snow is called?

(*Have 1-2 students pack 1 handful of snow onto the mountain*) It's called **snowpack!**

Point to where you think the **snow goes** when it melts! **What happens to rivers** if there is **less snow** in the winter? *Let students respond.* (*There will be less water in the river, lakes and streams*).



2 Minutes - Erosion

Thumbs up if you think **water has the power** to move rocks, **thumbs down** if you think no. Let's find out! (Have some **students sprinkle sand** on mountain, have others **spray sand** with water/rain cloud)

What is it called when **water moves & wears down** rocks? (Let students respond) Yes! **Erosion**

3 Minutes - Permeable and Impermeable Surfaces

Take out and **hold the felt** for a student to **spray/sprinkle water** on:

What happens when we spray water onto this **felt**?

(Let students respond) (water soaks in or absorbs - like the grass we are on)

We call this a **PERMEABLE** surface - where **water can sink in or percolate** down into the ground and the groundwater.

Let a student **sprinkle water on laminated paper**:

What happens when we spray water on this **road**?

(Let students respond) (Water stays on the surface and pools - like on the blacktop or pavement)

We call this an **IMPERMEABLE** surface. The water **cannot soak in**.

Tilt the paper and ask:

What is it called **when water flows across or over the land**? (Let students respond) **It's called RUNOFF!**

Everyone point to a **PERMEABLE** surface around us. **Everyone point** to an **IMPERMEABLE** surface.

Which type of surface do you think **will be hotter**? (impermeable)

Do you think that this will be important when we decide **where we want to live and build**?

Let students respond



5 Minutes - Built Environment and Non-Human Elements

What is missing from our watershed? (Let students respond)

What and **who** lives in a watershed? Where might they choose to live based on **water access**?

Pass out **plants** and **animals**.

What else do we need to live, play, and work? (Let students respond)

Work together as city planners and watershed managers to **decide the best places** for your city

Pass out **buildings** and **cars**. Let the students **play and discuss** for a couple of minutes.

What will happen when it rains? Let 1-2 students **make it rain**.

Do you see **any hazards**? (Allow students to respond and **make changes** as needed.)

3 Minutes - Water Saving and Dams

Does it rain all year in Arizona? (Student response)

No! Most of our rain comes in **winter and summer**

How **can we save water** for times when it doesn't rain? Let students respond
(with reservoirs or dams)

Where on the model **should we build a dam** to store water?

You can **work together** and **combine your clay** if you want to build a bigger dam.

Hand out a little clay to each student and have them work together.

Let **students create a storm** to add water to the system.

Let's see, **what would happen** if I **remove a dam** from here - or here? Let students respond



WATERSHED

3 Minutes - Pollution

Raise your hands and tell me some **types of pollution** we find in our cities?

Let students respond (eg: litter, dog poop, fertilizers, pesticides, car oils)

Presenter sprinkles coffee on roads/farm/areas to represent pollution

When it rains, **what happens** to the pollution?

Have **two students create rain** and as the others observe **pollution runoff**

What can **you** do, **even as a 4th grader**, to **help keep your watershed healthy** for everyone?

Take some ideas from multiple students, **help brainstorm** as needed, and **emphasize Big Idea:**

(pick up trash, pick up dog poop, don't let the family car leak oil in the driveway, etc.)

EVERYONE CAN CARE FOR OUR WATERSHEDS

2 Minutes - Clean-up

Ask **students to help you gather** all materials.

Tilt model, away from students, and **use some of the water to clean it** ahead of the next group.

2 Minutes - Big Ideas Recap

Have **students return to the tarp** and review the **Big Ideas**

Repeat **hand motions** with students and **say together** 2 or 3 more times:

A WATERSHED IS A LAND AREA WHERE WATER FLOWS FROM HIGH TO LOW POINTS

Do we live in a watershed?...Yes!

EVERYONE LIVES IN A WATERSHED

Can you help to care for your watershed?...Yes!

EVERYONE CAN CARE FOR OUR WATERSHEDS