

Be a Stream Lesson Details - 10 minutes

STEP ONE. Tell the students we are now going to BE A STREAM.

Ask twelve (12) students to form two parallel lines facing each other. Ask each line to take two big steps away from each other and sit down, facing each other, with their back straight and legs straight out. There should be about one meter between the two lines, form an “aisle” through the center. Hand out 5 strips of blue flagging to each person in one line and stretch it across to the person in the other line sitting directly across from them. Ask the students to touch the flagging to their necks (students may have to move to allow flagging to connect with their necks).

You have just created a stream. Review the parts of the stream with the students: stream bed (legs), stream banks (bodies), and water (flagging). It’s important that the water is always in contact with the stream banks (up to the necks).

What is missing?

What about the stream bank plants?

STEP TWO. Ask eight (8) students to be the plants along the stream bank. Four students, two on each stream bank, will be Planeleaf Willow, and will stand very close to the stream bank. Four students will be Booth Willow and will stand a few feet away from the stream. (Other native plants can be substituted.)

Tie a strip of green flagging between each willow pair at knee height to indicate ground level. Their feet are roots reaching down into the soil.

Now, tie another strip of blue flagging between each pair, slightly below their knee, indicating the groundwater level. This is how much water is underground, stored in the soil for the willows to use.

Have the willows stand with the flagging taut between them.

STEP THREE. BEGIN THE ACTION. Read the following script while students respond to the narrative accordingly.

Once upon a time, there was a beautiful stream called (fill in the name of the local stream or river).

It had tall straight banks and water that filled its banks in the springtime.

(Stream banks sit upright holding water high against their necks.)

The willows around the stream, mostly Booth and Planeleaf Willows (or substituted plants) were healthy, big, and abundant.

(Willows stand tall, smile, with arms “bushy” and extended.)

Natural sediment from the mountains upstream flowed down the stream and was carried into the (name of the local stream or river).

(Sediment “tumble” down the stream, under the water.)

Every spring the people came and fished along the beautiful stream, caught big fish, and picnicked along the water’s edge. Some weekends mobs of people would camp on the banks of the creek. They would play Frisbee and run along the banks all day. Sometimes people brought All Terrain Vehicles (ATVs) and rode up and down the stream banks. Some people brought horses and tied them to the willows along the stream banks. With each passing weekend, and more use, the stream banks began to weaken and erode into the creek.

Be a Stream Lesson Details - 10 minutes (continued)

[Stream banks BEGIN to recline and drop water level accordingly - water (flagging) must touch the stream banks (bodies). Lower the ground water level (blue flagging) on the willows to mid-shin and the willows droop.]

One weekend a rancher brought his cows up to his Forest Service allotment along the Creek. When the cowboy wasn't riding the herd and keeping them away from the riparian area, the cows would often stay in and near the creek bottom to drink, stay cool and eat the juicy plants. Because of all this activity on the stream banks, sometimes big chunks of the stream bank would fall into the stream.

(Stream banks recline fully back on their elbows and water level should be near their bellies or legs. Ground water level for the willows is near their ankles and they die. The willows "become" or are replaced by shallow rooted Kentucky bluegrass or substituted native species.

The elk, deer, and moose that live along the creek also walked down to the creek every evening and morning to get a drink and eat the tasty willows along the stream bank. More sediment from the eroding stream banks flowed into the creek, yet because the stream had been widened, the water level was lower and the sediment could no longer flow easily down the stream, so it was deposited in the stream bed.

(Sediment "crawls" down the stream, below the water's surface, sometimes getting "stuck" in the stream.)

The people continued to come to the creek to camp and fish, yet they didn't catch many fish anymore. The stream was muddy and warm so the aquatic insects and fish couldn't survive there. It wasn't such a nice place to camp anymore because the willows were all dead along the stream.

When school began, the people stopped coming. At the end of the summer, the rancher moved his cattle down from the creek to his ranch in the valley. Winter began to set in and the elk and deer moved down to the valley too, to escape the deep snow in the mountains.

Over time, without anything disturbing the stream bank, the Kentucky Bluegrass was replaced by Planeleaf Willow along the stream bank and grew healthy again.

(Planeleaf Willows perk up.)

The willow's root system began to expand and collect the sediment that were slowly moving down the stream.

(Sediments collect along the stream bank [feet].)

The deep, narrow channel cooled the temperature of the water. The higher water level moved the sediment downstream restoring the clear, clean water. The cool, clear, clean stream was now a good place for fish to live again. The deeper channel also raised the groundwater level (raise blue flagging around willows' legs to knees) so all the willows in the riparian area grew big and healthy because of the additional water.

(Willows robust and happy.)

With healthy and diverse plants along the stream bank, more birds and animals lived along the stream bank.

(Birds and animals come in and flutter about.)

The people learned that riparian zones are very special places that need our care. We can still camp, fish, play, and graze cattle in these areas but we must do so carefully. With our help, healthy riparian vegetation in the stream was restored and the insects, fish, birds, wildlife, and people lived happily ever after!

Follow-up.

Discuss the following questions with students:

What role do willows (and sedges) play along stream banks?

What is ground water? Why is it important?

What is the first thing that happens to a stream when the stream banks are disturbed (trampled)?

Once the stream banks slump, what happens to the water level in the stream?

When the water level lowers, what happens to the ground water?

What happens to the willows that depend on the groundwater?

Can people recreate along a stream without causing severe impacts? How?

How can you reduce your impacts on our stream during the next activity?

Watershed Scavenger Hunt Lesson Details - 15 minutes

Materials

Watershed Scavenger Hunt (1 per student)

pencils

Background

Most large watersheds are made up of many smaller watersheds associated with tributary rivers and feeder streams that contribute flow from areas known as sub-basins. Sub-basins are separated by drainage divides, topographically high places like ridge tops, where water will tend to run in particular directions depending on which side of the divide the water is falling on (*Montana Water: Montana Watersheds*).

What is a watershed?

Use a map to locate the local watershed. Discuss how it is larger than just a given segment of a river or stream. By definition a watershed is any sloping surface that sheds water, but a more practical definition is an area of land that is drained by a particular river, stream, or creek. Watersheds can be as small as a single valley and creek or as large as the Missouri River Basin and its numerous tributaries. A large stream like the Missouri River can drain a huge land area and encompass a watershed of thousands of square miles. The Missouri River basin watershed is the largest in Montana and drains more than one half of the state's land area (*Montana Water: Montana Watersheds*).

Introduce the local watershed to be studied.

What is the students' local watershed?

What river or stream will students be investigating?

Where are the headwaters of the local river and to which river does it drain?

What are some of the uses of the water and land within the students' watershed?

(Irrigation, municipal, livestock, recreation, crops, pasture, residential)

STEP ONE. All scientists, no matter what they study, must use their senses to observe the world around them. Have students sit or stand outside in the schoolyard, close their eyes, and remain silent for approximately one minute. This allows them to focus and use their senses to detect what they sometimes don't see, hear or feel. Ask some students to share their feelings. Hand out a Watershed Scavenger Hunt (copy from the next page) to each student and explain that, staying within a set boundary, they will use their senses to observe the watershed that surrounds them. For each item they are to give a one or two word description of their discovery. Identify the students' boundaries and share with them a signal or word for gathering back together. They have 5 minutes to complete their scavenger hunt. Ask some of the students to share their discoveries.

WATERSHED SCAVENGER HUNT

Use your senses and the watershed that surrounds you to locate the following items. In one or two words, describe your “discovery”.

- a source of water for your watershed _____
- 2 sounds of nature _____
- a bird _____
- something brown _____
- a human-made structure/activity
that affects the watershed _____
- evidence of precipitation _____
- sound of humans _____
- something green _____
- a use of the land within the watershed _____
- flowing water _____
- an example of a landform
within the watershed _____
- evidence of wind _____
- water being used from the watershed _____

Crumple a Watershed Lesson Details - 45 minutes

Materials

white copy paper (1 per student)

cardstock paper (1 per student)

markers: green, brown, blue

tape

spray bottle of water

Project WET Activity Guide 1995

STEP ONE. Each student *lightly* crumples a sheet of paper (copy). Un-crumple each sheet and tape it down onto a sturdier piece of paper (cardstock). Using one color (brown), trace all of the folds/crumple lines that will turn into peaks, hilltops, and ridgelines.

STEP TWO. In another color (blue), trace areas that will become bodies of water. This represents the conduits corridors conveyance by which water is stored. Explain that the blue marker lines indicate where water travels from the brown ridge tops to the tributary streams to the main stems.

STEP THREE. Use a spray bottle to gently mist the paper and notice which way the color moves down each of its watersheds. The color movement may take a few minutes, but identify branching patterns as the colors move.

Note.

In the big picture of watersheds, like the Missouri River watershed, the Gallatin River is simply a tributary of the Missouri although in a different sense it is also a main stem artery itself with multiple tributaries converging to create it.