**Title:** Watersheds and river processes: processes and patterns in the landscape that are driven by water

by Suzanne Kelson for BEST Teacher Summer Institute 2018

**Overview**: Students will learn how watersheds are part of the landscape. Students will learn how watersheds are formed, including physical processes of deposition and erosion. They will design an experiment to test ideas about how rivers work.

**Introduction to watersheds (2min):** Watershed in your hands *(see ppt slide 2)*

**Part 1: Simple watershed model (13 min):** Introduction to watershed models. Models can be simple or complex, but in the end they are a way to test the processes the create the patterns we see in nature. *(see ppt slides 3-7 and lesson plan for details)*

Crumple up a piece of paper, and leave it open.

With a brown marker, draw the tops of ridges, with a blue marker draw the water bodies, guessing where they will be.

**Before you start, write predictions in your notebook**: Where will the water move fastest? Where will it pool up? Where will streams and lakes form?

Color the plastic with water-soluble markers for these features.

Spray the landscape with water and watch it flow across the landscape.

**In your notebook:** Where were you right? What surprised you? Share with a partner.

**Mention to teachers about pollution:** Where does pollution have to be to end up in the water?

Draw blocks of color representing human development in a few places in the model.

Does the water travel over the land? How did the water change color with human development in the watershed? (this can indicate point sources of pollution as well)

**Evaluate the model**

**Part 2: River Cutters (total 40 min)**

**Introduction slides (2 min):** start and end of a river, introduce concepts *(see ppt slides 8-11)*

Vocabulary: stream channel, delta, erosion, deposition, alluvial fan, meander

**First trial (8 min):** set up and observe *(see River Cutters master lesson plan for details on set up)*

**Notebooks:**

What did you notice?

Describe and/or draw what you see happening – things to include are:

What does the surface look like now?

Where is the head of your river? How wide is it? Describe what is happening by the head of the river.

Where is the mouth of your river? How wide is it? Describe what is happening at your river mouth?

What are some ways you could describe what happened?

Can you use numbers to describe the pattern you see?

Did you and your partner notice the same things?

**Bridge (2-5min):**

Look at slides *(see ppt slides 12-15)*

- what are some things that can change how rivers are formed? Think through one option together, like changing the slope of the stream -> think through the example together --what data would you collect?

**Second trial (20 min): Test a question of your own!** *(see River Cutters master for some ideas)* Brainstorm as a group: what are some questions that we could test?

**In your notebook:** (How does \_\_\_\_\_ affect\_\_\_?)

Predictions: If I change \_\_\_\_\_\_\_\_\_\_\_\_ I predict that\_\_\_\_\_\_\_\_\_\_\_\_\_

Now that you have your question, what are some ways that you could test? What things might change? What things can be measured?

**Introduce data tables** (model/have them draw it in their notebook) *(see ppt slides 14)*

What are some tools we can use to measure?

Choose a question with your partner and test it!

Be sure to record DATA in your notebook.

**Presentations (5min)**:

-Look at your data: does it support your prediction?

Write down if it did or does not in your notebook and include the evidence that supports your statement. You can use a sentence frame like: Our prediction that\_\_\_\_ affects \_\_\_\_\_ is supported and my evidence is \_\_\_\_\_.

Have teachers share what they found, using evidence (data tables) to back up their conclusions.

You can also have students go around and look at the results of each other’s experiments – each group leaves one person to explain their experiments and results.

**Discussion/further information (5 min):**

Google fly over of the Alvarado park/Wildcat Creek watershed

Google fly over of the SF Bay watershed

Field trip ideas *(see ppt slide 16)*

Discussion on why we care about erosion, rates of stream flow