STREAM SCIENCE

MODEL STREAM FORMATION AND OBSERVE ITS AFFECT ON LANDFORMS

2nd Grade NGSS Correlations:

- ESS1.C: The History of Planet Earth
  - 2-ESS1-1
- ESS2.A: Earth Materials and Systems
  - 2-ESS2-1
- ESS2.B: Plate Tectonics and Large-Scale System Interactions
  - 2-ESS2-2
- ETS1.C: Optimizing the Design Solution
  - 2-ESS2-1
- ETS1.A: Defining and Delimiting Engineering Problems
  - K-2-ETS1-1
- EST1.B: Developing Possible Solutions
  - K-2-ETS1-2
- EST1.C: Optimizing the Design Solution
  - K-2-ETS1-3

Pre-trip Information/Activities:

- Why do Rivers Curve? Video
- Bodies of Water: River NewsELA Article
- Moving Water Shapes the Land Video

Objectives:

- Understand how the force of moving water changes landforms
- Model the creation of a stream and observe how it affects/is affected by the landscape
- Demonstrate human impacts on streams/rivers

Materials:

- Empty stream bins
- Mixed substrate (ground walnut shells and sand)
- 2 small empty trash cans or buckets per stream bin
- 1 turkey baster per stream bin
- Assorted “building materials” (sticks, legos, rocks, etc.) for each group

Background:

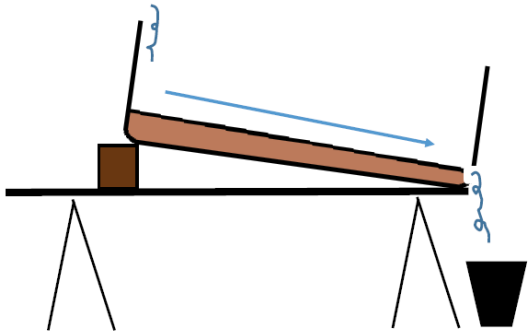
Which way does water flow? Have you ever seen water flowing uphill? Rivers and streams are formed by **precipitation** (water in the form of rain, snow, or hail) falling on high areas of lands (such as

mountains) and flowing downhill. As water moves to the lowest available point, these droplets come together and form small channels of water. These channels join one another to create a stream, and streams join other streams to form a river, all the while flowing downhill. Eventually the rivers reach a valley or other relatively flat area of land, at which point they wind their way across the land until they reach the ocean. The path that a river takes largely depends on the landscape it meets along the way.

Flowing water, like that in a river, is very powerful, and it carries a lot of energy. This energy allows water to **erode** (gradually wear away at or break apart) the soil, rock, and land that it flows over. Flowing water moves in a corkscrew or swirl motion, which carves away at the edges of the stream, eventually causing bends to form (called **meanders,** meaning winding course). The water picks up the small particles of soil or rock it has eroded and carries it downriver. When the water goes around a bend it slows down and loses energy, causing the small particles of dirt or rock to drop (or **deposit**) and become a part of the river bank (the side of a river) or river bed (the bottom of a river) in this new area. Over time these bends can grow and change, and occasionally disappear altogether. By definition, rivers are constantly changing, and are able to change the landscape they interact with.

Activity:

- Prior to the beginning of the activity, set up the stream bins with ~1 ½-2" of mixed substrate each. Elevate one end of stream bin with the block, and line up the opposite end (end with hole drilled into it) with the edge of the table. Place the empty trash can/bucket below the hole to catch the water as it exits the table. (See diagram below).



- Break students into 5 groups and assign each group a stream bin.
- Explain that in order to simulate the precipitation on the highest points of their landscape they will take turns using a turkey baster to drop water on the designated spot (the X marked on the bin). They can model different types of flow (a light sprinkle vs. a heavy rainstorm) by letting out more or less water at a time.
- **First run through** the students will be modeling the flow of water over an undisturbed landscape and observing the way the water interacts with it.
    - Do not have students make any changes to the initial set up, and have them each take a turn making it "rain" using the full turkey baster.
    - Have students observe what happened.

    - Reset each station (or have students smooth over the formed river using their hands).
- **Second run through** you're going to have the students add some mountains/hills/valleys to their landscapes (use their hands to form mounds and pits in the sand).
    - Have students take turns making it "rain" using the full turkey baster.
    - Reset each station (or have students smooth over the formed river and landscape using their hands).
- **Third run through** have students add landscape again, and this time have them use legos to "build" cities, farms, etc. where they think they would go on the landscape.
    - Have students take turns making it "rain" using the full turkey baster.
    - Reset each station (or have students smooth over the formed river and landscape using their hands).
- **Fourth run through** have students add landscape, cities, farms, etc. Now have them build a dam and reservoir where they think they would go.
    - Have students take turns making it "rain" using the full turkey baster.
    - Reset each station (or have students smooth over the formed river and landscape using their hands).
- Let students keep playing with their stream bins and making changes for the duration of the time.

Discussion:

- What was different when you let the water out slowly vs. quickly (with more force?)
- How would the river formation change if you let the water flow for several hours?
- How did the formation of the river change when you added mountains and valleys to the landscape?
- What happened when you started adding human-made structures to the landscape? Were they ever consumed by the river?
- Do you think real rivers form in the same way as the models we just used? Why or why not?

Post-trip:

- Have students research the major rivers of California and draw and label them on a blank map of the state. (2.RI.1, 2.L.2.a)
- Have students illustrate the stream formation they observed on a story board or 6 panel comic template.
- Have students research an important river in the world and create a poster or presentation highlighting where that river starts, any important cities it passes on its journey, if it played an important part in history, etc. (2.RI.1, 2.SL.3.a)