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Build a Watershed Model Directions

Science standards for grades Three, Four, Five

- Ensure Understanding
  - Students will be able to define what a watershed is and give examples
  - Students will be able to analyze how abiotic factors (such as wind and geography) influence biotic factors (humans, plants and animals)
  - How do our actions affect the health of a watershed? & vice-versa?
  - Where does our drinking water come from?
- Science and Engineering Practices
  - Engaging in Argument through Evidence
  - Constructing Explanations and Designing Solutions
  - Developing and using models
- Cross Cutting Concepts
  - System and System Models
  - Cause and Effect
  - Patterns
  - Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Activity Instructions

- Materials
  - large metal or plastic trays
  - construction paper, or any other paper large enough to cover the trays surface
  - water soluble markers
  - spray bottles (with water)
- Set Up
  - 10 minutes prep time, 30-40 minutes class time, inside or outside
  - Students work in pairs or small groups to make their model watershed
  - Make a model of the shape of the land: Arrange crumpled paper in the aluminum tray to represent the shape of the landscape in the location of your map. This is a model of a landscape with hills, valleys, and connections between them.
  - Draw the waterways on your model: Think about rain falling in your model watershed. Where would the rainwater go? Where would rivers and streams form? Would there be any waterfalls? Where will the water form lakes or ponds? Draw the locations where you think rivers and lakes would form with a permanent marker.
  - Draw the boundary of a watershed on your model: Using a different color of permanent marker, draw the boundary of the largest watershed in your model. Also draw the boundary of a smaller watershed within the larger watershed. Mark a spot where you would like to live. Mark a spot for your school.

- It's time for some rain! Use the spray bottle to 'rain' on the top of your highest 'mountain.' Continue raining until the water forms streams, rivers, and lakes.
- Your instructor will introduce a land use change to your model. How did this land use change impact the lakes, streams, and rivers? How do you feel about the location of your house?

- Discussion
  - Before "Rain" (Predict)
    - Where do you think the rain will collect the most?
    - Where would you build your house or a town?
    - Where would you build a dam?
  - After "Rain" (Observe)
    - Were you correct about your hypothesis about where the rain would collect?
    - How did your houses/town hold up? Did they flood?
    - How many different ridgeline or drainage basins did you create?
    - What patterns did you see?
    - What direction did the water flow?
    - Theorize from what you saw, what kind of vegetation will grow on either side of the mountain (for example, redwood trees & ferns VS grasslands or chaparral (manzanita, coyote brush) and why?
  - Lead a class discussion about the models (Evaluate)
    - Ask students to consider the usefulness of this model. How is this model like a real landscape? Discuss the limitations of this model. How is this model different from a real landscape? Ask student to brainstorm what changes they would make to improve the model. Follow up with a field trip to Mt Tamalpais, or just a walk around the neighborhood of the school. Can students identify ridgelines, where water would flow, where can you predict flooding?
- Optional
  - Gather images that illustrate the paths of rivers and the shape of watersheds. If possible, find examples from your region. Aerial photographs work well, and so do topographic maps (if students are familiar with those). It is also nice to have an example of a hydrological map of your area (with all the waterways and water bodies marked) and a map of a large area (state of CA, for example) to examine watersheds at different scales.
  - Gather materials from outdoors to enhance your model (twigs, rocks, leaves, soil).

Build a Watershed adapted from:

- http://www.windows2universe.org/teacher_resources/teach_watershed2.html
- https://omsi.edu/sites/all/FTP/files/expeditionnw/4.E.1.Crumple.pdf
- http://fergusonfoundation.org/teacher_resources/crumpled_paper.pdf
- https://www.montereybayaquarium.org/-/m/pdf/education/curriculum/shower_curtain_watershed.pdf