

# The San Francisco Bay's Watershed in Your Hands



## Overview

Students first use crumpled paper to create a model demonstrating the basic features of a watershed. They then create the San Francisco Bay's Watershed using their hands to represent major geographical features.

## Estimated Time

30 minutes

## Objectives

Students will be able to:

- Describe the major geographical features of San Francisco Bay's Watershed.
- Define the term "watershed."

## Materials

- One sheet of 8 1/2" X 11" paper for each student (reuse one-sided paper for this activity)
- Water soluble markers or watercolors, paintbrushes, and cups of water
- Spray bottles of water
- A pair of hands!
- Overhead of "Watershed in Your Hands" and/or a map of California

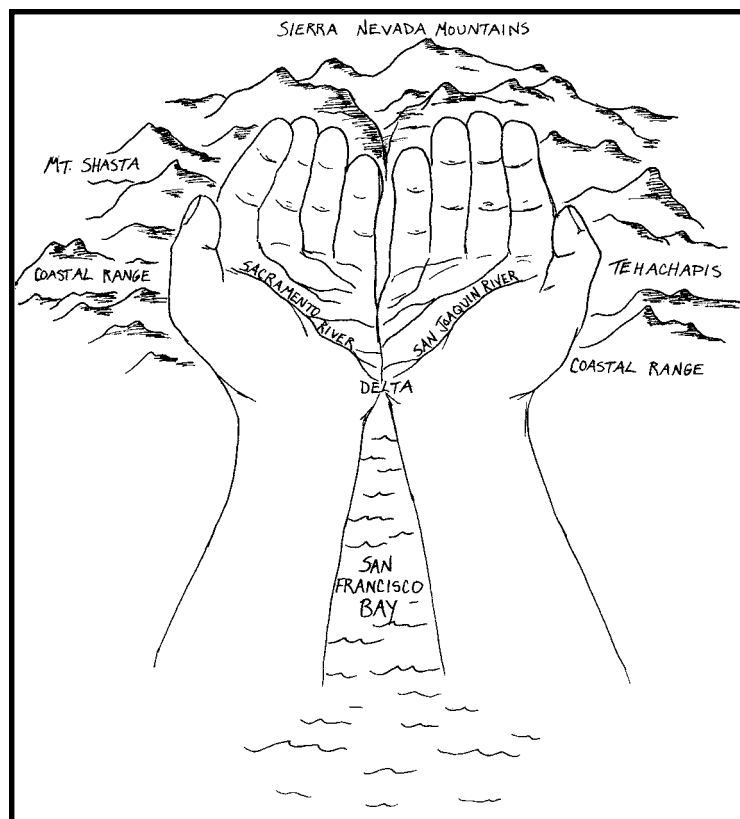
## Vocabulary

watershed, ridge lines, urban runoff, drainage, erosion

## California Science Content Standards

### Grade 4

**Standard Set 5.c:** moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as



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pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).

### Grade 5

**Standard Set 3.e:** the origin of the water used by their local communities.

### Grade 6

**Standard Set 2.a:** water running downhill is the dominant process in shaping the landscape, including California's landscape.

Adapted from *Kids in Creeks*, by Aquatic Outreach Institute

## Additional Resources

The Watershed Project

<http://www.aoinstitute.org/>

Watershed Finder

<http://www.museumca.org/creeks/resc.html>

## Background

A watershed is defined as *an area of land that water flows over or through on its way to a larger body of water*; a watershed is the drainage basin for a body of water, such as the San Francisco Bay. Everyone lives in a watershed. Homes, farms, ranches, forests, small towns, big cities and more exist in watersheds. Watersheds can be large or small. Some cross county, state, and even international borders. Larger watersheds are comprised of many small ones. For example, if water from your schoolyard drains into a creek, and that creek drains into San Francisco Bay, you are part of that creek's watershed, which is in turn part of the San Francisco Bay's watershed.

"A watershed starts at mountain peaks and hilltops. Snowmelt and rainfall wash over and through the high ground into rivulets which drain into fast-flowing mountain streams. As the streams descend, tributaries and groundwater add to their volume and they become rivers. As they leave the mountains, rivers slow and start to meander and braid, seeking the path of least resistance across widening valleys, whose alluvial floor was laid down by millennia of sediment-laden floods. Eventually the river will flow into a lake or ocean. Where the river is muddy and the land is flat, the sediments laid down by the river may form a delta, splitting the river into a bird-foot of distributaries which discharge into the sea. The river's estuary, the place where its sweet waters mix with the ocean's salt, is one of the most biologically productive parts of the river - and of the ocean." (Patrick McCully, *Silenced Rivers: The Ecology and Politics of Large Dams*)

The California watershed covers approximately 40% of the state of California. It begins in the Sierra Nevada mountain range, continues through the Central Valley, and eventually drains into the San Francisco Bay and out into the ocean. By tracing the path of water as it flows through the watershed and into the Bay, one can begin to understand how everyone

who lives in the watershed can affect the Bay's health.

## Teacher Procedure

### Making a Watershed Model

1. Conduct this activity outside or in an area that can get slightly wet (lab area, tables with paper towels nearby, etc.)
2. Pass out a piece of paper and water soluble markers or water color supplies.
3. Instruct the students to crumple their piece of paper into a ball and to gently open up the paper without flattening it out completely. It should look like a landscape with mountains and valleys.
4. They should use one color to represent ridge lines, the highest points on the paper, which separate one valley from another.
5. Another color should be used to represent bodies of water. They may need to guess where rivers or lakes will form on their landscape.
6. A third color should be used to represent human settlements, such as houses, factories, offices, roads, etc.
7. Either hand out the spray bottles to a few students or walk around the classroom with one spray bottle, lightly spraying the finished maps. The spray represents rainfall. The students should notice where rain travels on their landscape.
8. Lead a discussion using some of the following questions:
  - What path does the rain take on your landscape?
  - How does this landscape represent the idea of a watershed?
  - What happened to human settlements? Was there erosion or urban runoff?
  - How should the flow of water affect our choice of building sites within a watershed?

### Watershed in Your Hands

1. Tell the students that they can use their hands to make a model of San Francisco Bay's watershed.

2. You can use a map of California and the overhead of “Watershed in Your Hands” while you are doing this activity to help your students identify major geographical features of the San Francisco Bay’s Watershed.
- Put your hands together, palms upward, and curve them to make a bowl.
  - Imagine that the tips of your fingers are the peaks of the Sierra Nevada Mountain Range.
  - Your left thumb is Mount Shasta, your right thumb is the Tehachapi Mountain Range, and the fleshy parts at the bases of your thumbs are the Coastal Range.
  - The cracks between your fingers are all the small creeks and rivers trickling down from the Sierras, such as the American, Kern, and Mokelumne.
    - The large crease in your left palm (sometimes called your “lifeline”) represents the Sacramento River, and the crease in your right palm represents the San Joaquin River.
      - The crack between your two hands represents the Delta, and the opening between your arms is the Bay.
      - Notice how the small creeks flow into the large rivers, which then flow into the Delta and out into the Bay!

