



A Human Watershed

(Adapted from the Watershed Institute, CSUMB)

Background

Sanctuaries are marine waters that are protected and managed to ensure that its natural and cultural resources continue to exist. The Monterey Bay National Marine Sanctuary (MBNMS) was originally designated in 1992 to protect the area from oil exploration and drilling in its offshore waters. It is important to protect the sanctuary and its natural resources to ensure the future of living things in the sanctuary, scientific studies, recreational activities, educational trips, fishing, kelp harvesting and aquatic transportation. When students understand how the water cycle works, it helps them understand how the things we do on the watershed can affect our sanctuary ocean resources.

The water cycle is a continual exchange of water among the land, seas, and atmosphere. Water evaporates from the ocean surface and is carried landward by the winds. When this vapor collides with a colder mass of air, it condenses and falls to land as rain. The rain runs off into the watershed, which includes streams, lakes, rivers and groundwater. The watershed transports this water to the ocean. Ridge lines or areas of higher elevation separate watersheds from each other. Watersheds are known by the major streams and rivers into which they drain.

The health of the sanctuary depends, in large part, on the health of the watershed. The sanctuary is adjacent to nearly 300 miles of California's coastline and receives runoff from eleven major watersheds. The 7,000 square miles of land uses in those watersheds range from forest and grazing lands to heavily agricultural and urbanized areas.

Objectives

- Students will revisit the water cycle concept.
- Students will gain an understanding that water travels through watersheds.
- Students will understand the importance of keeping watersheds healthy as they flow into the Monterey Bay National Marine Sanctuary (MBNMS).
- Students will understand the land to sea connection and the relevance of their own actions in preserving our special watershed and marine resources while building a sense of pride in their own local environment.

Materials

Local watershed map, MBNMS map, large (8 foot) clear plastic tarp, one or more spray bottles with water, and adhesive labels with names of the local landmarks that form the watershed (i.e. local major streams, creeks, rivers, lakes, mount ranges (use two or tree labels for each range), prominent mountains and one or two labels for the Monterey Bay Marine Sanctuary)

Vocabulary

Condensation, evaporation, groundwater, percolation, precipitation, resources, runoff, sanctuary, transpiration, topography, watershed, water cycle

Procedures

1. Water Cycle Review.

- a. Ask students to explain the water cycle on the board. Have them explain how water moves through its various states.
- b. Ask them if they know where do the streams and rivers go after a heavy storm. Where does all the water flowing down the streets go?

2. Introduction to the Monterey Bay National Marine Sanctuary.

- a. Ask students what they think a marine sanctuary is.
- b. Explain or clarify the following for students:
 - Sanctuaries are marine waters that are protected and managed to ensure that its natural and cultural resources continue to exist.
 - The MBNMS was originally designated in 1992 to protect the area from oil exploration and drilling in its offshore waters. It is important to protect the sanctuary and its natural resources to ensure the future of living things in the sanctuary, scientific studies, recreational activities, educational trips, fishing, kelp harvesting and aquatic transportation.
- c. Show students a map of the sanctuary and explain the following:
 - The Monterey Bay National Marine Sanctuary covers 5,328 square miles and is larger than the state of Connecticut. Our sanctuary includes the sandy shores to the deep canyons below the sea. Of the 13 National Marine Sanctuaries, the Monterey Bay Sanctuary is the largest.

2. Introduction to Watersheds.

- a. Ask students what they know about watersheds. What is in a watershed? Where is the nearest watershed?

- b. Ask students to brainstorm the names of local rivers, streams, lakes, prominent mountains and ranges and write them on the board. Use the local watershed map to help students identify missing landmarks and also to help students visualize each of their location.
- c. Tell students they are going to build a watershed model to learn how water flows and how the health of the watershed affects the health of the ocean.
- d. Instruct students to go outside. Choose two students who will form the model of a watershed.
- e. Ask the two students to sit down side by side on the ground. Tell the two students to recline on their elbows and forearms so that the upper half of their body is at a slope and their knees are slightly bended.
- f. Lay the clear plastic tarp over the two students' bottom half of their bodies.
- g. Explain to students that this tarp will represent their local watershed, like the one on the map. And that they will be labeling the major landmarks that form the local watershed.
- h. Ask students to decide where north, south, east and west are, and then have the two students representing the watershed model aligned their legs facing north.
- i. Assign each student an adhesive label with the name of one of the landmarks. If necessary, you can assign more than one landmark per student.
- j. Ask students to start labeling their watershed. Have them start with the major mount ranges. If students are not sure where to place their labels, instruct them to use the watershed map as a reference. If necessary, students can ask the two students representing the watershed model to adjust their legs or feet to help them represent any of the landmarks.
- k. After the identifying the mount ranges, ask the students with the prominent mountains to place their labels on the model. Continue with the major rivers, creeks and lakes, and finish with the marine sanctuary labels. You can add any other familiar landmarks or structures of your choice, or from the previous list students created on the board.
- l. Once all labels are on the watershed model, ask students: What is a watershed? What is in a watershed? What is the purpose of a watershed?
- m. Tell students the watershed model will experience a rainstorm. Ask them to predict where will the water flow and collect in the model.

- n. Ask a student to spray water over the model for several minutes for a continual flow. Have students identify the branching pattern as water from smaller streams merge into larger streams, and to note where water has collected.
- o. Ask students to determine if smaller watersheds overflow into larger watersheds. Ask students what they think determines where a watershed starts and ends? How many watersheds do they see in this model?
- p. Ask students to think about things that we do on land that affect the health of the watershed, and eventually affect the health of the marine sanctuary. Have them explain in what ways the watershed and marine resources are affected, and what actions can we take to prevent this from occurring.