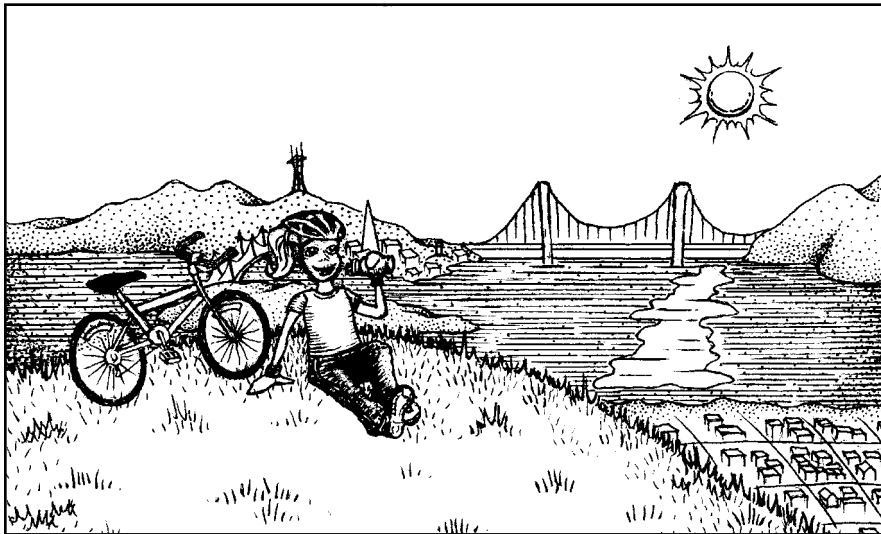


Water Pollution Solution



Summary

Using a simple model of a watershed, youth see where many kinds of pollution end up. They then try to clean up polluted “Bay water” and in the process learn why it’s better to keep it clean in the first place.

Learning Objectives

Youth will:

- Describe ways that people and other living things rely on water for survival.
- Describe how oil, soap, and other materials can pollute water by washing from the ground and running off into a lake, stream, or bay.
- Understand that it is better to keep water clean in the first place than to have to clean it up.

Materials

For the group

- Newspaper
- 8.5" x 11" sheet of paper
- Marker with water-soluble ink
- Small spray bottle of water
- Chocolate syrup
- Liquid soap
- A few strips of shredded paper
- A handful of dirt in a sandwich bag
- Food coloring
- A sponge for cleanup

One for the whole group, or for each group of 2-5 participants (see variations)

- A clear plastic container (quart to half-gallon size)
- A sponge
- 2 small cups
- Strawberry basket or funnel
- Coffee filters or paper towels
- Toothpicks
- Small pieces of cardboard
- Turkey baster (can be shared between groups)

For each participant

- Copy of *Things you can do for the Bay* handout

Correlation to California Content Standards

Science

- Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. (Grades 3-8)

History–Social Science

- Students demonstrate an understanding of the physical and human geographic features that define places and regions in California. (Grade 4)
- Chronological and Spatial Thinking: Students use map and globe skills to...interpret information. (Grades 3-5)



Background Information

During a rainstorm in the city, what comes down from the sky as clear, clean rainwater quickly becomes a murky mess as it flows along city streets, collecting oil, mud, and more. This mixture ends up in the storm drain system and eventually flows into the San Francisco Bay.

The Bay's biggest source of water pollution is urban runoff, the rain and other water that flows over streets, parking lots, and rooftops before reaching the Bay. Runoff dumps more toxic substances like lead, copper, and zinc into the Bay than sewage treatment and industrial discharges combined. It also includes many other pollutants, such as litter, food waste, automotive fluids, paint and other construction materials, and yard waste, all of which can harm fish, birds, and other wildlife.

Our cities have two different drainage systems—sewers and storm drains. Sewers carry wastewater, which is the water from sinks, showers, washers, toilets, and drains. This water is treated (cleaned) before it is directed into creeks, rivers, or the Bay. The storm drain system channels rainwater

away from city streets to prevent flooding. This system contains no filters, so the water flows into the Bay without getting treated.

Preparation

Put down newspapers to protect the table from getting wet. Fill containers with water and set aside.

Procedure

Step One: Introduce the activity by asking the youth whether they've visited the greenbelt.

- ? **What body of water did you see on the trip to the greenbelt?**
- ? **How clean do you think that water is?**
- ? **Why might it be important for water to be clean?**

Step Two: Help students understand that water is absolutely crucial for life. Point out that without water, people, animals, and plants simply could not live. Even though the students may not drink much plain water (they might drink soda, juice, or milk), they are getting water from these drinks and from the food they eat. Talk about the different ways people use water and why it is important that water be clean.

? **What are some ways that you use water?**

(For example, drinking to keep our bodies healthy, cooking, growing food, bathing, washing dishes, doing laundry, and so on.)

? **What would you do without water?**

? **Do you know anyone who fishes in the Bay? Why is it a problem for fish and people if the Bay water is polluted?**

Step Three: Make a simple model of the San Francisco Bay (or other body of water) and show it to the youth:

- Crumple up a piece of paper and lay it out so that its largest indentation is in the middle, representing the Bay.
- Tell the group that this represents the Bay Area, but with the Bay dry. Point to a higher area of the model and ask:
 - ? **What would happen if someone living here changed the oil of their car and dumped it onto the street? Where would the oil go? (It might sit in the street or run into a storm drain.) What do you think would happen if it rained?**
- Using a water-soluble marker, make a small circle on the model to represent the oil.
- Ask for a volunteer to spray water lightly over the entire model. Water will collect in the indentation that represents the Bay. The water will also dissolve some of the ink, and you should be able to see some ink in the Bay.
- Clean up the model by pouring the water into the sink and recycling the paper.

Step Four: Introduce the next activity by telling the youth they are going to look for the solution to pollution. Have them imagine that the Bay is like a soup, with all the ingredients that get washed from the area around it. Give each group of 2-5 participants a container of water that will represent the Bay.



Urban runoff is the largest source of pollution in the San Francisco Bay.



This section of Strawberry Creek in Berkeley was daylighted—or returned from underground pipes to the surface—and now enhances a public park.

First, ask them to imagine that someone's car leaks oil.

? **Where does the oil end up?**

(On the streets and then in the Bay.)
Pass the chocolate syrup around and have the youth pour a small amount of it into the Bay water.

Then, have them imagine that someone washes their car on the street.

? **Where does the soapy water end up?**

(In the Bay.)
Pass the soap around and have the youth pour some liquid soap into the Bay.

Have them imagine that someone drops trash on the sidewalk.

? **Where does it end up?**

(In the Bay.)
Place some small strips of paper into the water.

Have them imagine that a bare hillside loses dirt when it rains.

? **Where does the soil end up?**

(In the Bay.)
Add a bit of dirt to the water.

Finally, have them imagine that a factory leaks some chemicals into a nearby stream.

? **Where do the chemicals end up?**

(In the Bay.)
Add one or two drops of food coloring to the water.

? **Do you think this water would be good for fish, birds, or people? What do you think we could do to make it cleaner?**

Step Five: Give each group the collection of materials. Give them some time to use the tools provided to see how clean they can get the water. Then ask:

? **What methods worked?**

? **Is the water completely clean? Does it look clean? Smell clean?**

? **What else could we try?**

Step Six: Try other suggestions if the materials are available. When the water is as clean as the group can get it ask:

? **Do you think fish or other animals would want to swim in this water?**

? **Is this water you would want to drink?**

(This is the ultimate test; if you can't drink it, then it isn't clean.)

? **Which do you think is easier: cleaning up water or keeping it clean in the first place?**

Step Seven: Ask them if they have figured out what the solution to pollution is (lead them to understand that the best solution is to avoid pollution in the first place).

Wrap-up Questions

? **Why should we be careful about what we put on the ground?**

? **Why should we care about clean water?**

? **What could you do to help keep water clean?**

Distribute the *Things you can do for the Bay* handout.

Variation

The second activity (steps 4-7) is most effective with the youth in groups of 2-5, each group with its own container of simulated Bay water. As an alternative, the whole class can work together with one container. Attempt to clean the Bay water in front of the class by asking for volunteers to suggest how the pollution can be removed. Students can come to the front of the room and demonstrate their methods.

Things you can do for the Bay

- Don't litter! Trash from the streets ends up in the Bay.
- Pick up litter you see and throw it away or recycle it.
- Put dirty cleaning water down a sink or toilet, not in the gutter or storm drain.
- Pick up after your pet.
- Organize your group to stencil storm drains with the message "No Dumping—Drains to Bay." In Alameda County, call (510)670-5543. Elsewhere around the Bay, call your city's stormwater program manager. Some of the Bay Area agencies are:
 - Alameda Countywide Clean Water Program
 - Contra Costa Clean Water Program
 - Fairfield-Suisun Urban Runoff Management Program
 - Marin County Stormwater Pollution Prevention Program
 - San Mateo Countywide Stormwater Pollution Prevention Program
 - Santa Clara Valley Urban Runoff Pollution Prevention Program
 - Sonoma County Water Agency
 - Vallejo Sanitation and Flood Control District
- Make sure the adults in your family know they can recycle used car oil at local gas stations. Pouring it in the storm drain sends it straight to the Bay.

Find out more...

- Call your water district to find out where your water comes from and look for that place on a map. In San Francisco, call the San Francisco Public Utilities Commission at (415)551-3000 and in the East Bay, call the East Bay Municipal Utilities District at (866)40-EBMUD, or ask your family for the phone number from the water bill.
- Find out about San Francisco and East Bay creeks and watersheds at www.museumca.org/creeks.
- Visit the Save the Bay website (www.savesfbay.org) to learn more about the San Francisco Bay.
- With your family, visit a nearby body of water on a free Greenbelt Outing. Find the schedule at www.greenbelt.org.

