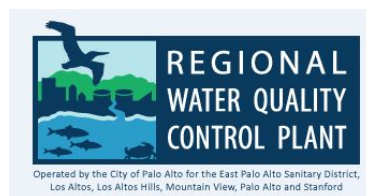




Who Dirtied the Bay?

Pollution Prevention Lesson Series

Provided by:



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Who Dirtied the Bay?

Objectives

- The San Francisco Bay that we know today has changed drastically over geologic time, and continues to change.
- Humans have been living around the Bay for thousands of years, and their ways of living have had different impacts on water quality.
- There are changes each of us can make to continue improving the Bay's water quality.

Introduction

For an introduction to water in our environment, [click here](#) and we'll meet you back here!

Each day 20 millions of gallons of wastewater are filtered at the Regional Water Quality Control Plant and discharged into the Bay. If you think about what goes down the drains and toilets in your house, you can start to imagine why this is such an important service. But most people don't think too much about what ends up into the Bay, both now and in the past.

In this lesson, students will do a reading taking them back in time thousands of years to learn about how the Bay has changed over time, and how humans have changed and continue to change this dynamic body of water.

Activity

Materials

- Online access (optional)
- Who Dirtied the Bay reading (pages 4-5)
- Who Dirtied the Bay worksheet with questions and timeline (pages 6-7)

Introductory video: If students have online access, have them watch [this brief video](#) about the formation of the San Francisco Bay.

Guided reading and timeline: Have students look at the timeline on their worksheet; they will be filling in different inputs to the Bay over time. In the reading, there are numbers to help guide them along as they read and fill in what has entered the bay over thousands of years of history.

Learning reflection: After students have completed the reading and filled in the timeline, have them answer the questions on the second page of the worksheet.

Additional resources

- [This video](#) from the Regional Water Quality Control Plant covers some of the same themes as the reading, and highlights how understanding differences between the storm drains and the sanitary sewer system can help us keep local water clean.

NGSS Alignment

Disciplinary core ideas	Science and engineering practices	Crosscutting concepts
ESS3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	Constructing explanations and designing solutions: Use evidence (e.g., observations, patterns) to construct an explanation.	Cause and effect: Cause and effect relationships are identified, tested, and used to explain change.

Guided Reading: Who Dirtied the Bay?

20,000 years ago, you could have walked beneath what is now the Golden Gate bridge and out to the Farallon Islands, which, instead of islands, would have been hills for you to explore. At the end of the last ice age, around 10,000 years ago, the glaciers began to melt, sending water coursing down through rivers and contributing to sea level rise. As seawater rose and filled in the Golden Gate valley area, it met with rivers flowing from the mountains (the Sierra Nevada) carrying massive amounts of fresh water.

*Imagine walking beneath the Golden Gate
Bridge on dry land!*



The newly melted ice from the mountaintops rushed down to fill the valley below, and picked up and carried sediment (1) with it. As the water slowed in the newly forming bay, the sediments settled out of the water, forming the surrounding wetlands. Plants like tule rushes (2) grew along the newly formed wetlands, providing habitat for animals like birds, mammals, and shellfish. Many different groups of Native Americans lived around the bay for thousands of years, using tule rushes to make their boats and eating shellfish from the bay. They left shells (3) in piles by the bay, a few of which are still there today!

About 250 years ago, settlers from Spain came, bringing plants and animals from their home continent. They lived differently from the Indians, creating settlements with different kinds of wastes and food trash. Think about one kind of food waste these settlers might have produced, and write it in (4).

In 1849, gold discovered in the Sierra Nevada mountains set off the California Gold Rush. Mining in the mountains loosened huge amounts of sediment (5) that washed down into the bay. Mercury (6), a toxic chemical, was used in the mining process, and it also flowed to the Bay. To this day, mercury can be found buried in the dirt and mud of the Bay.

Everybody wanted their bit of gold! All the people rushing to California needed houses to live in and food to eat. Farmers began using the rich land around the Bay to grow crops for the growing population, increasing soil (7) entering waterways. To help their plants grow faster, farmers used fertilizer (8), which also made its way into the Bay.

Lots of California's land is still used for farming.



Besides eating and drinking, all humans also have to use the bathroom! The people in the newly built houses didn't have access to a treatment plant like we do, and in those days the human waste (9) went straight into the Bay. Yuck!

As more people came to the Bay Area and technology advanced, cars and boats became part of daily life here. San Francisco grew into a major seaport, and large oil tankers and ships began loading and unloading cargo in local ports. Tankers sometimes dripped and spilled oil into the Bay (10). Factories built along the Bay's edge emptied waste and chemicals into the Bay (11).



A container ship ready to be unloaded at the Port of Oakland.

The population around the Bay continues to grow and impact the local water quality. When we drive our cars, some motor oil (12) and brake dust (13) end up on the streets, flowing into creeks and out to the Bay. People washing their cars on the streets can send soapy water (14) into our waterways.

Pesticides (15) and herbicides (16) that people use in and around their homes flow to creeks and into the Bay during storms. Pet waste (17) left outside flows into creeks when it rains, sometimes making wildlife ill. Trash that makes its way into creeks and then on to the Bay commonly includes plastic food packaging (18) and plastic mailers (19). Think of one other kind of trash (20) you've seen in the streets or park that could, if left, end up in the Bay.

The good news is, the Bay's water quality has actually gotten cleaner over the past decades. In 1934, the first local sewage treatment plant was built, and since then the water that flows through our sanitary sewer system (from our toilets, sinks, and appliances) has been cleaned before it is released back to the Bay. There are creek and coast cleanups every year where volunteers pick up millions of pounds of trash from our creeks and beaches so it doesn't end up in the Bay or ocean.

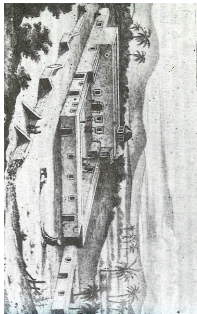
What other things can we do to reduce the amount of harmful materials flowing into the Bay?

10,000 years ago:
end of the last ice
age



Native Americans living in area: ~13,000 YA to present

250 years ago:
beginning of
Spanish
settlement



1.

2.

3.

4.

1848: Gold Rush!

5.

6.

7.

8.

9.



1934: First local
sewage treatment
plant built

Modern times

10.

11.

12.

13.

14.

15.

16.

17.

18.

19.

20.

Name: _____

Who Dirtied the Bay?

1. Give some examples of how our actions in the city (in our houses, schools, outside) affect the water in our Bay.
2. What are two things that have helped the San Francisco Bay become cleaner in the past decades?
3. What are three things you can do to help make the Bay cleaner?
4. Do you know of any animals that live in or near the Bay? If you have time, draw a picture of one.