Wetland in a Pan

Why are wetlands important?   What are ecosystem services?
How do wetlands protect us?   How are wetlands like sponges?

Objective

Students will understand how wetlands around the Bay shoreline protect marine ecosystems from pollution. Students will understand that different ecosystems on earth provide different services, and wetlands provide specific services that other ecosystems do not.

Preparation

You'll need to prepare the wetland model or provide students with materials to make their own. If you cannot make the model or get the materials you can watch the experiment here: https://www.youtube.com/watch?v=1S4r6meg1C0 ; https://www.youtube.com/watch?v=h3dMkhO6jAw
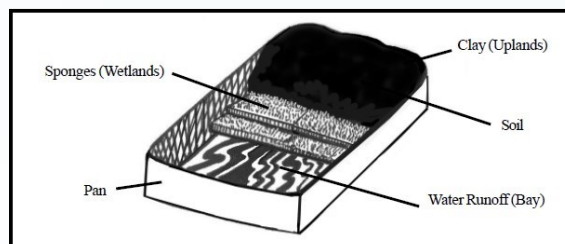
Print out or have the students worksheet ready to view and paper and pencil to answer questions.

Delivery

You can have students watch you perform the experiments or have them run through them independently. Make sure to check and make sure the wetland model they've set up will work. Remind students to

Experiment 1: Rain on land w/ wetlands—spray water until it flows down clay to sponges
Experiment 2: Rain on land w/out wetlands—remove sponges and spray until it flows
Experiment 3: Rain on land with sediment/pollution with wetlands —replace sponges and poor soil on clay or sprinkle colored drink mix and spray until it flows (if you don't have colored drink mix watch the second video above)
Experiment 4: Rain on land with sediment w/out wetlands—remove sponges and place more soil and/or coloring and spray until it flows

Debrief

When sediment runs directly into the Bay...
1. What negative things can happen?
2. How does a wetland protect the Bay from 2. pollution?
3. 90% of the wetlands around San Francisco Bay have been destroyed; how have they been destroyed?
4. Knowing that wetlands are effective filters, 4. do you think wetlands often become polluted?
5. What can you do to help preserve wetlands?
Extension: Climate Change—You can simulate how wetlands protect shoreline communities from sea level rise by pouring a certain amount of water into the Bay side of the pan.

Exp. 1: Pour one cup water with sponges intact   Exp. 2: Pour one cup without sponges

Theme

Watershed Science

Age

All Levels

Duration

60-120 mins

Materials

Modeling Clay • Long shallow pan• Sponges (enough to span the width of pan) • Cup of soil • Spray bottle with water • Q-tips • Colored drink mix

Standards

NGSS: 5-ESS2-1; 5-ESS3-1
EP&C's: P1Cb; P2Ca; P3Cc

Vocab

Watershed: the area of land in which all water drains to the same place
Sediment: bits of rock matter that settle in water
Wetland buffers: is an area of wetland habitat that acts as a transition between the urban development around the San Francisco Bay and the water in the Bay.

Wetlands in a Pan

INTRODUCTION

Think about what happens when rain hits the land. What happens to the water after it falls to the ground? Imagine a rainstorm in a wetland. Grass, reeds, soil, and vegetation act like a sponge, soaking up the water into the floor of the wetland. Now imagine the same rainstorm on a road or in a parking lot. These surfaces are solid and water has nowhere to go. As it flows along, it gains speed and is able to pick up and carry nutrients or chemicals that might be on the land. Soil not protected be vegetation is easily eroded or washed away by fast moving water. In this activity you will work in small groups to build a model of a wetland and test how wetlands act as a buffer and filter as they trap pollutants from city runoff flowing towards the Estuary.

PROCEDURE

1. In the first part of this activity you'll build a watershed with the supplies provided. Spread the modeling clay over half of the pan. Leave half of the pan empty to represent San Francisco Bay. Shape the clay so that it slopes down to the Bay. Smooth the clay along the sides of the pan to seal the edges. You can also form meandering rivers or creeks in the clay that lead into the Bay. Be creative!

2. Next, you will create a wetland along the low edges of land. To do this use the pieces of cut sponges to completely fill the space across the pan along the edge of the clay (Make sure the wetland fits well - the model won't work if there are spaces under the wetland or at the sides).

3. Make sure the sponges aren't completely dry - wet them with the spray bottle to moisten them.
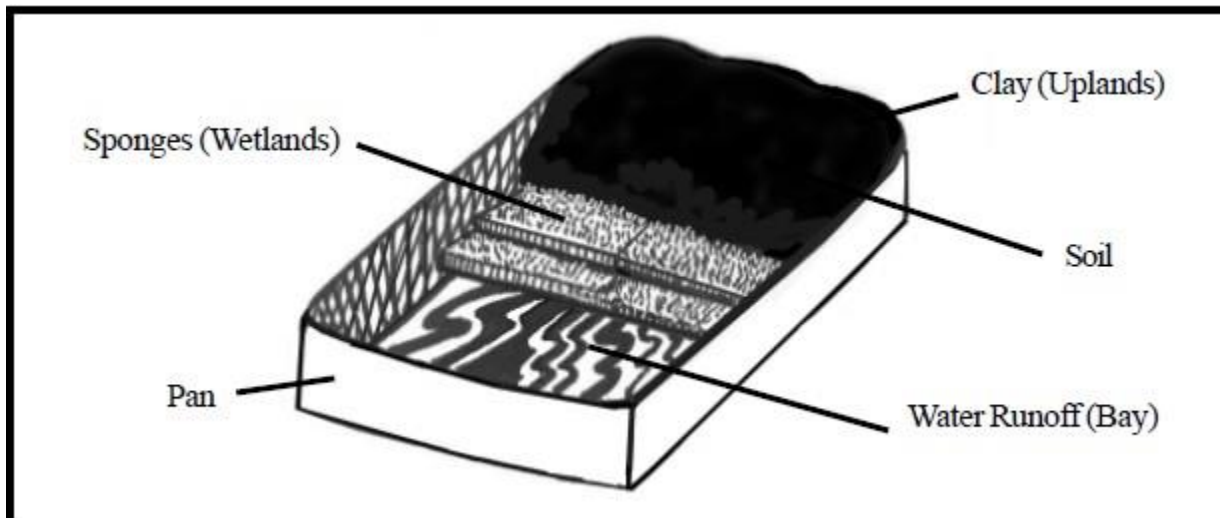
Experiment I - Rain on land with wetland

1. Predict what will happen to the water when it rains.

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2. Create rain on the land by spraying water on the upland area.

3. Record your observations: What happened to the water as it hit the wetland?

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Experiment II - Rain on land with wetland removed.

1. Predict what will happen to the water when it rains on the upland.

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2. Remove the sponges from your model and spray water in the upland area. Record your observations.

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Experiment III - Rain on land with sediment / pollution (with wetland).

1. Put sponges back in place and then sprinkle the soil on top of upland areas (clay).

2. Place about 1 tsp. of colored flavored drink mix somewhere on the upland above the wetland. This simulates pollution.
3. Predict what will happen to the sediment and pollution when rain hits the land.

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4. Predict what will happen to the sediment and pollution when it reaches the wetland.

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5. Spray water on the land of your model. Record your observations. What happened to the sediment and pollution?

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Experiment IV: Rain on land with sediment (wetland removed).
1. Pour the water out from the last experiment into a sink and rinse out sponges. Replace a new layer of soil on top of the land surface. Do not replace the wetland (sponges).

2. Predict what you think will happen to the sediment and pollution as the rain hits the land.

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Conclusions:
A "wetland buffer" is an area of wetland habitat that acts as a transition between the urban development around the San Francisco Bay and the water in the Bay. Thinking about your experiments, what functions does a "wetland buffer" serve?

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