AGE LEVEL 13-15

Estuaries: Nature's Water Filters

Life Skill: Wise use of resources

Project Skills: Modeling an estuary; exploring land use and water quality

Objective 1: Learn the role of intact wetlands and estuaries in protecting water quality

Objective 2: Learn how stormwater runoff affects the estuarine environment

Success Indicator: Participants build a model of a wetland and its functions or map how stormwater flows between their neighborhoods and the ocean

Provisions Needed

Activity 1

- 13" x 9" sturdy paint tray
- Modeling clay (black or brown)
- Sponge (must be as wide as the pan)
- Spray bottle or watering can
- Soil
- Food coloring (dark colors work best)
- Measuring cup

Activity 2

- Topographical and highway maps

Trailhead

Have you ever noticed how the water in streams and rivers gets muddy after it rains? The water is filled with soil, chemicals from agricultural fields and neighborhood lawns, trash, and other debris. Eventually it all flows toward the ocean. But nature has a natural filter that helps keep most of these unwanted substances out of the sea. This natural filter, called an estuary, also is home to many of the shellfish we eat, an important habitat for birds, and the base of many coastal economies. **An estuary is a place where fresh water mixes with salt water.**

Trailblazing

Do at least one of the following activities.

Activity 1: *Create a model that demonstrates how estuaries and other wetlands help cleanse water.*

you can build a wetland model

1. Place the modeling clay in half of the pan to represent land. Shape the clay so that it gradually slopes down to the empty half of the pan, which represents the ocean. Smooth the clay along edges of the pan to create a seal. You can also create shallow trenches in the clay to represent streams running into the body of water.

2. To create your wetland, cut the sponge so that it fills the width of the pan along the edge of the clay. Make sure the sponge is a tight fit.

eventually all water flows toward the ocean

3. Measure 1 cup of water into the spray bottle or watering can. Spray or pour all of the cup of "rain" onto the land in your wetland model. Gently squeeze the sponge into the measuring cup to see how much rain the wetland captured. How much made it into the ocean?

4. Empty the water from the pan and spread a thin layer of soil over the clay. Gently make it rain again. Imagine that the soil represents an area that was cleared for the construction of a new hotel. What happened this time?

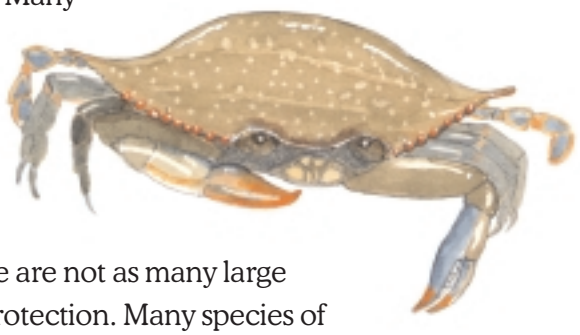
5. Empty all the water and soil from the pan. Add a couple of drops of food coloring to the water to represent chemical pollution. Make it rain on your wetland again. What color is the water in the ocean? Is it lighter or darker than the rainwater? Why?

6. Empty the pan and remove the wetland buffer strip. Do steps 3 through 5 again. Record your observations for comparison.

Activity 2: Research where storm drains in your neighborhood empty. Where does rainwater in your neighborhood go? Track all bodies of water that eventually carry rainwater from your neighborhood to the ocean. Prepare a map or diagram that demonstrates how stormwater flows. What actions in your neighborhood could positively and negatively change the quality of the water that enters the storm drain or local water body?

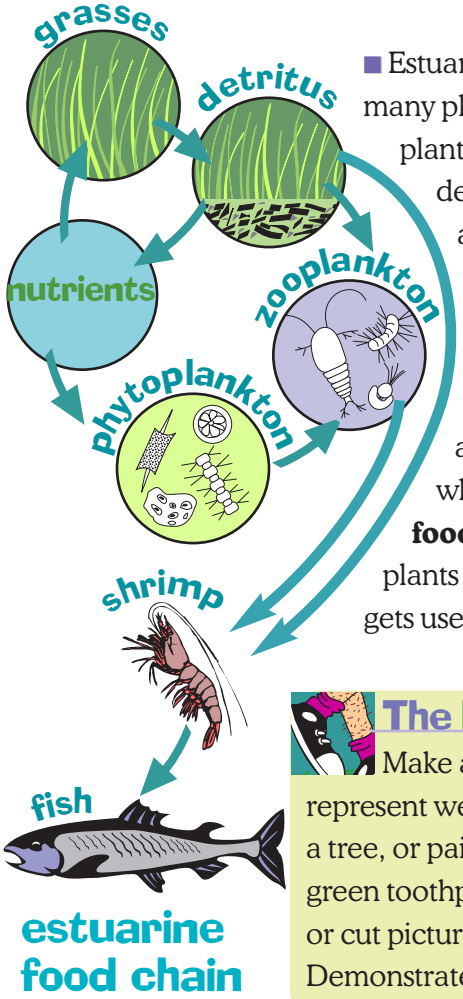
FieldGuide the ocean's nursery

■ Few plants can live in **salt marshes**, but the salt marsh cordgrass *Spartina alterniflora* is common. Cordgrass and other marsh grasses help clean the water by trapping solid particles like silt. Many marsh plants are adapted to absorb excess nutrients from the water, thereby helping prevent **blooms**—or excessive growth—of algae that can eventually deplete the water of needed oxygen and kill fish. Marshes also slow the flow of water, allowing many solid particles to settle out.



■ **Estuaries** serve as the ocean's nursery. In an estuary, there are not as many large predators, and the salt marsh provides plants for shelter and protection. Many species of fish, shrimp, and crabs begin their lives in an estuary. In fact, 90 percent of fish and shellfish targeted in commercial and recreational fishing spend some part of their lives in an estuary.

Estuaries: Nature's Water Filters



■ Estuaries are packed with **food for young animals**. Though there are many plants in a salt marsh, few animals actually eat the live plants. Instead, plants become a vital food source after they die and decay. Bits of decomposing plants are called **detritus**. Because bacteria and fungi already have begun to break the dead plant material down into an easily digestible form, detritus is a great food source in the estuary. When detritus is eaten, all the bacteria and fungi are digested. **Phytoplankton**, which are microscopic plants that float in water, receive the nutrients they need from detritus. Microscopic floating animals called **zooplankton** feed on the phytoplankton and detritus, which in turn are eaten by shrimp. This is the beginning of an **estuarine food chain**. Estuarine food chains are interconnected, meaning many plants and animals depend on each other to survive. Everything in an estuary gets used eventually. When food chains overlap, they become **food webs**.

The Extra Mile

Make a fancy model wetland for a demonstration. Use household items to represent wetland plants and animals. Glue pieces of green sponge to a twig for a tree, or paint a pinecone green. Use pine needles as salt marsh cordgrass and green toothpicks and brown clay for cattails. Use clay to make wetland animals, or cut pictures from a magazine and place them in your model with toothpicks. Demonstrate your experiments to a group of people.

Field Notes

share

- What happened when you removed the wetland buffer strip in your model?
- What did you learn about wise use of resources during your activity?

process

- What would happen if we didn't have estuaries?
- What would happen if animals become absent from the food web?
- Is there a limit to a wetland's ability to remove pollutants from water? Why?
- How do activities on land affect the health of rivers and estuaries?

generalize

- If you don't live near an ocean, how can the health of an estuary affect you?
- How do people use their resources compared to a natural system such as an estuary?

apply

- How can you use what you learned to live your own life more efficiently?

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