Bay In A Bottle Lesson Plan

SOL Standards - Elementary

- 4.7 The student will investigate and understand that the ocean environment has characteristics. Key characteristics include
 - c) interaction of organisms in the ocean.
- 4.8 The student will investigate and understand that Virginia has important natural resources.
 - o a) watersheds and water

Overview

After learning that HRSD cleans wastewater before releasing it back into rivers contributing to the Chesapeake Bay, students will make their own "Bay In a Bottle". Students will understand that millions of gallons of wastewater is produced in the Hampton Roads region everyday and that water must be treated to reduce pollutants and harmful substances before entering the Chesapeake Bay.

Essential Questions

- What is wastewater?
- Who cleans our wastewater and where does it go?
- What would happen if we did not treat wastewater?
- Why is the Chesapeake Bay important?
- More information about the Chesapeake Bay
 - o https://www.chesapeakebay.net/discover/bay-trivia
 - o <u>https://www.chesapeakebay.net/issues/threats-to-the-bay/wastewater</u>
- Where does the water from the Chesapeake Bay go?

Materials

- Blue Food Coloring
- Clear Bottle
- Vegetable Oil or Baby Oil
- Water
- Marbles
- Mini Aquatic Animals
- Glue or Tape to seal the bottle
- Optional: sand and seashells
- Optional: funnel may be needed to pour in liquids

Vocabulary

- Watershed
- Aquatic
- Estuary
- Pollution
- Chesapeake Bay

Procedures

1. Have a discussion about oceans

- Oceans over about 70% of Earth's surface
- 97% of Earth's water is in oceans
- Discuss salinity of the ocean

2. Discuss wastewater and its impact on the Chesapeake Bay

- Watch this video about wastewater
- Wastewater is used water. It is all the dirty water from your toilets, sinks, dishwashers, and washing machine in your home, but also waste from industrial and commercial buildings!
- HRSD began in November 1940. We trace HRSD beginnings to the early 1920s when the Virginia Department of Health condemned a large oyster producing area in Hampton Roads because of the pollution in the Chesapeake Bay. HRSD returns highly treated effluent to nature in a way that continues to nurture our water's delicate ecosystem.
- HRSD's workforce of scientists, engineers, water quality professionals and other staff diligently work together to fulfill the HRSD vision that our communities will have clean waterways and reliable water resources for generations to come.

3. Introduce the Chesapeake Bay Watershed

- A watershed is all of the land whose water and rainfall will eventually drain into a particular river, lake, bay or body of water.
- The Chesapeake Bay watershed is 64,000 square miles and covers 6 states (Delaware, Maryland New York, Pennsylvania, Virginia, West Virginia, and Washington D.C.)
- Emphasize that water from the Chesapeake Bay flows into the Atlantic Ocean
- The Chesapeake Bay is home to 3,000 species of plants and animals! Learn more with the Chesapeake Bay Foundation <u>here</u> and the National Wildlife Federation <u>here</u>.
- 4. Bonus activity (especially for younger audiences), read the story <u>Olly Explores 7 Wonders of</u> <u>the Chesapeake Bay</u>
 - Discuss some of the animals discussed in the book oyster, Great Blue Heron, Blue crab
 - Discuss their connection to the Chesapeake Bay and how they may be impacted by polluted Bay.
- 5. Provide each student with one clear plastic bottle.
 - You can buy plastic bottles with caps, or you can reuse a plastic bottle. I prefer bottles with a wide mouth so the students can add the aquatic toys and sea shells.
 - Inform the students that this will be how we create our Bay in a Bottle.

6. Pour water inside each bottle.

- Fill the bottle up about 1/3 to 1/2 cup. You want to make sure the student has enough room to add their aquatic animals and marbles.
- 7. Add blue food coloring to the water.
 - Let the students choose if they'd like lighter blue or darker blue water. This can open a discussion about how depth of water impacts the amount of light and the temperature of the water.
- 8. Optional: add sand to the bottom of the bottle.
- 9. Pour the oil inside each bottle.
 - Add about 1/4 cup of oil to each bottle.

10. Provide students with marbles aquatic animals and seashells to add to their bottle

• Instruct them to add the "animals" to their aquifer systems. This will represent the aquatic animals found in the Chesapeake Bay. Optional add seashells to the bottle.

Discussion Questions:

- What are the two main nutrients that must be removed from wastewater before it goes into the Bay?
- How does nitrogen and phosphorous impact water quality and marine life in the Chesapeake Bay?
- What can you do to help reduce the amount of pollution in the Chesapeake Bay?

Examples:





