

Wastewater Treatment

Objective:

To introduce students to the New York City wastewater treatment process through discovery and problem-solving. Students will learn about the processes used to treat our used water before it is released into New York City's surrounding water bodies. They will also explore their relationship with these processes and how they can help to protect harbor water quality.

Vocabulary:

Aeration, disinfection, primary treatment, secondary treatment, sewers, sludge, storm sewers, wastewater

Recommended for:

6th – 12th grade students

Materials:

- Jar with lid
- Water
- Spoons
- Liquid soap, shampoo
- Tissue paper
- Small sticks, soil, leaves
- Soda bottle cap, piece of coffee cup
- Torn newspaper
- Pieces of plastic shopping bag
- Cooking oil

Motivation:

Ask students if they created wastewater today.

Method:

- Ask students where they think water goes after it flows down the drain. Describe the different processes, including:
 - **Primary treatment** - consists of wastewater flowing through bar screens to remove large solids. It then flows to tanks where the remaining solids settle to the bottom and are removed.
 - **Secondary treatment** - Bacteria break down the organic solids present in the wastewater through aeration. Wastewater then flows into final settling tanks where the remaining sludge is removed. Disinfection occurs by adding chlorine to kill the remaining organisms. Sludge is treated and dewatered.
- Ask your students to name the ways they use water in their homes and schools. Ask them to name materials that go down the drain. Include cooking oil, tissue paper, and soap. List student answers on the board.
- Add paint, liquid soap, tissue paper, and cooking oil to a jar to represent the materials students identified. Ask students to include materials found outside the home which may accumulate in wastewater as it enters storm drains and sewer pipes. Add remaining materials to the jar. Screw the lid on and shake the jar. Explain that this water represents the water that travels from our homes and streets through the sewers to New York City's 14 wastewater treatment plants.
- Challenge students to devise a plan, using the information given, to separate the materials from the water in order to clean it. Discuss and share group plans. Do you think these plans will work? What can you do to make improvements?

- Discuss what happens when there is less water entering the sewer system. How can you conserve water at home and school? How does this impact the wastewater treatment process?

Research: New York City's Wastewater Treatment Process

The following questions may be discussed following a program at the Visitor Center at Newtown Creek or included as part of a student research assignment.

- What is wastewater?
- Where are NYC's wastewater treatment facilities?
- How is wastewater collected and transported to wastewater treatment facilities?
- How is wastewater treated? How do rain events impact the treatment process?
- How much wastewater is treated in New York City each day? What is the composition of wastewater?
- Select a specific wastewater treatment facility. How much wastewater is the facility designed to treat? What is its drainage area? What is the composition of the wastewater?
- How is energy created and used at wastewater treatment plants? How can energy use be reduced?
- Where is treated wastewater discharged?
- What does the treatment plant do with the sludge after it has been dewatered? How is the sludge transported for treatment?
- Who are some of the people who work at wastewater treatment plants and what are their responsibilities?
- What are some of the unique local water quality problems the wastewater treatment plants must address?

- What happens to street litter during a rain storm?
- What is the proper way to dispose of grease and cooking oil?
- What impact do we each have on the wastewater process?

Extension: Science Fair Project

Ask students to design and build a wastewater treatment plant to treat the used water created for this project. The students can work individually or in small groups. Students can also research some wastewater issues, such as the problem of grease clogging sewer pipes. What happens when grease is poured down the drain instead of being disposed of properly? What impact does a clogged sewer have on the environment? What does a clogged sewer look like and what is the correct way to dispose of grease?

For more information contact:

New York City Department of Environmental Protection

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Also visit DEP's website at:

www.nyc.gov/dep