Micro-Lesson #4: Wastewater Treatment

Featuring: "DriP" the Water Drop!
Through this micro-lesson, students will discover where that “stuff” that gets flushed down the toilet goes including how it is treated at the wastewater treatment plant. Students will gain an understanding of how our behaviours can have a negative impact on our environment. This Micro-Lesson contains:

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<th>Key Question</th>
<th>Objective</th>
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<td>Colouring Page #2 - Where Does Wastewater Go?</td>
<td>Where does the water that goes down our drains go?</td>
<td>Develop an awareness that wastewater ultimately ends up in the environment</td>
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<td>Video #2 - Wastewater Treatment</td>
<td>How is wastewater treated?</td>
<td>Wastewater treatment is necessary to protect human health and the environment.</td>
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<td>Activity #5 - What’s in Wastewater</td>
<td>What is wastewater made up of?</td>
<td>Identify that wastewater is a toxic mixture made up of waste from homes and business.</td>
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<tr>
<td>Wastewater Treatment Video Questions</td>
<td>How is wastewater treated?</td>
<td>Wastewater treatment is necessary to protect human health and the environment.</td>
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<td>Colouring Page #7 - Wastewater Treatment</td>
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<td>Develop an awareness of the scale and complexity of the Wastewater Treatment Plant</td>
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</tbody>
</table>

Warm-up

Wastewater is the dirty water and other “stuff” that goes down your drain. In the past, our wastewater was either contained in latrine pits, allowed to flow freely in open gutters or dumped directly in the environment. This practice led to widespread pollution and disease. An outbreak of Cholera in Hamilton in the 1800’s that saw thousands of residents getting sick with many of them passing away due to contaminated drinking water. This event and others like it around the world shows the importance of modern wastewater collection and treatment systems. Ask your students to think about where the dirty water or wastewater goes after they flush the toilet, have a bath, brush their teeth etc. The answer will likely be “down the drain” but where does that drain lead to? Is that water in the drain really dirty?

Wastewater is extremely toxic to humans, plants and wildlife. It’s important it gets cleaned so that there is no harm to human health and the environment including our water, plants and wildlife. Wastewater goes through the sewer system to the Wastewater Treatment Plant to be cleaned before going back into the environment (Hamilton Harbour). Students can complete Coloring Page #2 - Where Does Wastewater Go? for a visual representation.
Wastewater Treatment

Warm-up

Wastewater is a toxic mixture comprised of everything that goes down drains and toilets of homes and businesses and, in some areas, rain water from catch basins. Have your students brainstorm all of the different things that they might find in the wastewater in Hamilton sewers. It might be gross but it’s a great exercise to get students thinking about the importance of treating the wastewater! Distribute Activity #5 - What’s in Wastewater. This activity requires students to search for common pollutants found in wastewater including where they come from and how they can have a negative impact.

Instruction

Wastewater treatment combines mechanical and biological processes that remove contaminants so that the water going back into the environment will not have a negative impact on plant and animal life including human health. It is a highly complex process utilizing vast amount of infrastructure, equipment and staff expertise.

Wastewater treatment is a service that many residents in the City of Hamilton don’t think twice about even though it’s a service that they use every single day of the year. Many are unaware of the impact that their sometimes negative behaviours can have like flushing garbage down the toilet or pouring paint down a drain. Once things get flushed or go down the drain, they are out of mind.

To provide insight on wastewater treatment, have students watch the Wastewater Treatment Process video located here:

https://www.youtube.com/watch?v=fn3Sx8WIQnc

Students can complete the attached Wastewater Treatment Video Questions sheet as they watch the video.

After watching the video and answering the questions, students can also complete Colouring Page #7 - Wastewater Treatment as a supplementary activity.
Where Does Wastewater Go?

Did you know that all of that dirty water that goes down your drains has to end up somewhere? The sewer system takes the dirty water to be cleaned before going into Hamilton Harbour!

You can help keep our environment clean by only flushing pee, poo and toilet paper and keeping chemicals out of your drains!
What’s in Wastewater?

Wastewater from homes and businesses is an extremely toxic mixture! Below are some common pollutants found in wastewater. Search for each item online and complete the chart below.

Name:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>How does it get into wastewater?</th>
<th>Why is bad for the environment?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Garbage</strong></td>
<td>Like dental floss, cotton swabs, plastic, etc.</td>
<td>From people flushing garbage down the toilet.</td>
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<tr>
<td>Detergents</td>
<td></td>
<td></td>
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<tr>
<td>Heavy Metals</td>
<td></td>
<td></td>
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<tr>
<td>Nitrates / Phosphates</td>
<td></td>
<td></td>
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<tr>
<td>Pathogens</td>
<td></td>
<td></td>
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<tr>
<td>Pesticides</td>
<td></td>
<td></td>
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<tr>
<td>Sediments</td>
<td></td>
<td></td>
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<tr>
<td>Oil and Grease</td>
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</tbody>
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Watch the Wastewater Treatment Process video on hamilton.ca/watereducation to find out where the “stuff” you flush down the toilet goes and how we all have an impact on the environment. Answer the questions below while you watch the video!

1) “Wastewater” is all of the dirty water that goes down your toilets and drains. Where does wastewater go to be treated (a.k.a. cleaned)?

2) How does the wastewater get there?
   a) Wastewater Collection System   b) Trucks   c) Tunnels

3) After initially being pumped, ___________ moves the wastewater through the rest of the treatment plant.
   a) A pump   b) Gravity   c) A worker

4) During pre-treatment, a chemical is added to remove phosphorus from the wastewater. This is important because too much phosphorus can cause __________ in Hamilton Harbour which has a negative impact on plants and wildlife.
   a) Waves   b) Drought   c) Algae blooms   d) Acidic water

5) Only the 3Ps should be flushed down the toilet. What are they?

6) At the treatment plant, clarifiers remove solids from the liquid wastewater which are treated separately. Solids sink to the bottom of the clarifiers and fats, oil and grease float to the top. These things are referred to as:
   a) Sludge & Scum   b) Sludge & Slime   c) Slime & Scum
Do you know where all of the wastewater A.K.A. the “stuff” that gets flushed down your toilet goes? The Wastewater Treatment Plant of course! Here are just a few of the stops that your wastewater makes before going back into the environment. Give the plant some colour!

**Tip:** Visit the Woodward Ave Wastewater Treatment (700 Woodward Ave) on Google Maps!

- **Methane Sphere**
  Where methane is stored before it is turned into natural gas and electricity.

- **Digesters**
  Where organic waste is broken down.

- **New and Old Wet Wells**
  Where wastewater is collected!

- **Aeration**
  Where air is bubbled through the wastewater.

- **Secondary Clarifiers**
  Where solids and liquids are separated.

- **Chlorine Contact Tank**

- **Primary Clarifiers**
  Where solids and liquids are separated.

- **Environmental Laboratory**

**Watch the Wastewater Treatment Process Video on hamilton.ca to see how your wastewater gets cleaned!**