

Where Does “It” Go When You Go?

Activity Overview: This activity will show students what happens to wastewater that goes down the drain or toilet, including where it goes and how it is cleaned. It demonstrates the wastewater portion of the human water cycle.

Objectives:

Students should learn to:

- Define “wastewater” and explain what happens to it when it goes down the drain (note: this activity focuses on centralized sewage treatment, not private septic systems);
- Understand why we must clean the water after we use it;
- Describe the stages of the Human Water Cycle;
- Understand the difference between a storm sewer and a sanitary sewer.

Materials:

- Human Water Cycle cards (with magnets)
- Magnetic whiteboard
- Wastewater treatment steps (pictures on board)
- Props (use the props to help explain what happens in the wastewater treatment process)

Set Up/ Take Down:

Please familiarize yourself with the materials at the beginning of the day and the order of the Human Water Cycle and the wastewater treatment process. At the end of the day, please tidy up and place all items in provided bins.

Vocabulary:

Human Water Cycle – the route taken by water for human use. Water drawn from nature (source: Lake Ontario) through intake pipes; delivered and cleaned at the water treatment plant; clean water is piped to homes, schools, businesses, etc.; wastewater is piped from homes, schools, and businesses through the sewer system; wastewater is cleaned at a water resource recovery facility; and returned the source.

Wastewater – the used water from homes, schools or businesses that contain suspended or dissolved solids which is sent down the toilet, sink, tub, shower, washing machine, dishwasher etc.

Watermain – an underground pipe (up to 2.5 m in diameter), made of steel, lined with cement mortar and cast in concrete. It is used to deliver treated water to the end-user.

Sanitary Sewer – underground pipes carrying wastewater from homes, schools and businesses to the water resource recovery facility. They flow under the round manhole covers on the street.

Storm Sewer – underground pipes carrying precipitation runoff (stormwater) from paved roads. Stormwater is not treated at the water resource recovery facility. It flows untreated to the nearest stream, creek, river or lake.

Water Resource Recovery Facility – a facility consisting of huge tanks where wastewater is cleaned. Solids are settled out, suspended solids are consumed and broken down by a variety of helpful micro-organisms and settled out, and the water is disinfected to destroy remaining disease-causing micro-organisms.

Water Treatment Plant – a facility consisting of huge tanks where the lake water is treated to make it safe for human consumption.

What will I be doing? (Procedure):

Before you start your presentation check with the teacher or chaperone that the entire group is present and ready to start.

*Remember that **doing** an experiment and **discovering** the answer is more powerful than watching and listening to someone, so try to involve the children as much as possible.*

Say: “Welcome to Where Does it Go When You Go! This activity will teach you about what happens to dirty water when it goes down the toilet or drain. In Peel, tap water is clean and safe to drink because it is cleaned at a water treatment plant before it comes to our homes. When we flush a toilet or run a sink the wastewater is cleaned at a water resource recovery facility before it is returned to Lake Ontario.

Part 1: The Human Water Cycle

Ask: “Do you know where your tap water comes from?” Answer: For residents of Mississauga, Brampton and Bolton: Lake Ontario. For residents of the rest of Caledon: groundwater (wells).

Ask: “Does the water get cleaned before it comes out of our taps so it’s safe to use?” Answer: Yes!

Ask: “Do you know what “wastewater” is?” Answer: Wastewater is the same as sewage: all the water that we use and send down the toilet or drains is called wastewater.

Ask: “Do you know where the used water goes when it goes down the toilet or drain?” If they say “to the sewer”, continue to ask “then where does it go?” If they say “to the ocean”, explain that it eventually goes to the lake as part of the human water cycle, but it goes somewhere else first. If they say “to the lake”, ask them if they know which lake. Explain that eventually it does go to Lake Ontario, but ask them “would we want all that dirty toilet water going directly into the lake untreated?” Encourage them to think the process through and explain that we must clean our wastewater before we return it to the lake, because it contains germs that can make us sick.

Show the students the Human Water Cycle by referring to the pictures on the whiteboard (lake, to treatment plant, to homes, to wastewater treatment, back to lake). Encourage their participation as you place each item on the whiteboard by asking them, “Where do we get our water? Where does it go next?”

Part 2: Wastewater Activity:

Go through each panel of the wastewater process using the explanations below. Action instructions are included below for you and the students. Encourage students to complete an action for each step to help them focus and participate.



“Now we’re going to discuss wastewater treatment. This is what happens when water goes down the drain or toilets in your schools and homes. Let’s watch what happens to Dew when he goes down the drain.”



Panel 1 – Wastewater down the Drain

“After you’ve used the water and sent it down the sink, toilet, and so on, do we send the water directly back to Lake Ontario? Why not?”

“That’s right, the water is too dirty. The water needs to be cleaned before it can be put back into Lake Ontario so we don’t harm the fish and plant life that live there.”

Action: “Let’s pretend we’re going down the drain, put your arms in tight and turn once on the spot”



Panel 3 – Screening

“Before the water enters the facility it passes through a screen. What items do you think we are screening off?”

Answer: That’s right! Anything larger and things that should never be put down the toilet or drain (dental floss, toys, rags, etc.)”

Action: “Let’s pretend we’re picking items out of the wastewater”



Panel 4 - Primary Settling Tank

“Next the wastewater travels to the primary settling tanks. It gets this name because the water is given time to settle. That means the heavy things sink to the bottom, and lighter things float on the top. Once the materials have settled, this large screen scrapes the heavy material from the bottom and skims the light stuff from the top so that it can be removed. What’s left is the water in the middle, which moves onto the next step.

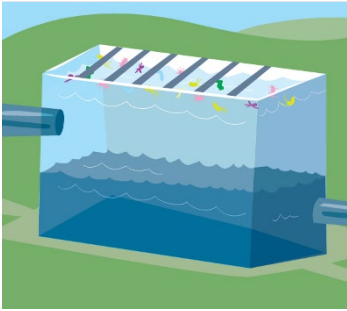
Action: “Let’s pretend we’re getting really heavy and sinking to the bottom, crouch down”



Panel 5 - Aeration Tanks

“The water then travels to the aeration tanks. Here oxygen is pumped into the tank which allows good bacteria to live and grow. The bacteria eat any of the food particles or solid waste that didn’t get removed in the last step. This is where the water turns from brown back to clear.”

Action: “Let’s pretend we’re a good bacteria and we’re helping to eat up any of the bad bacteria”



Panel 6 - Clarifying Tanks

“Have you ever eaten a big dinner and afterwards all you feel like doing is sleeping? Well, the good bacteria have helped us out and eaten so much that they’re super tired as well. They start to sink and rest on the bottom of these clarifying tanks. Once the bacteria sink to the bottom they are removed. The water is almost ready to be put back into Lake Ontario.”

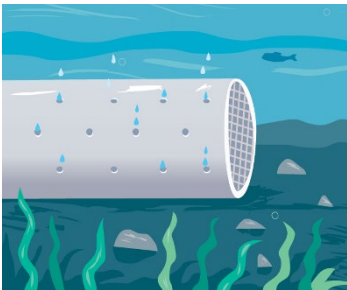
Action: “We’re getting sleepy – show me what it looks like if you were to fall asleep standing up”



Panel 7 – Testing

“Before the water is put back into Lake Ontario it is tested to make sure it’s safe for the fish and plants.”

Action: “Pretend you’re a scientist and testing the water”



Panel 8 - Lake Ontario

“At the bottom of Lake Ontario there is a large pipe, similar to the pipe that is attached to the Water Treatment Plant, where the water is slowly put back into the Lake.”

Action: “Let’s pretend we’re a water droplet swimming back into the Lake”

Part 4: What can and can’t go down the drain

Say: Now that we have gone through the human water cycle and the steps in our wastewater treatment process. Let's play a little game to review.

*Lay the items out onto the table

Say: “Using the information we just learned, let’s try to determine if these items should or should not go down the drain. I want you to make the shape of a “Y” if you think “Yes it should go down” or make a shape of a “N” if you think no, it should not go down!

Say: “Are we ready to play?”

*Hold up each item and let students make a shape.

*Items should: pee, poo, toilet paper

*Items that should not: dental floss, toys, paper towel, wet wipes, chip bag, hair

Red Colour Group - Challenging

*If students vote yes to an item that should not go down the drain, explain that it will not break down in our wastewater treatment process. Explain where the products should be disposed of.

Say: Now that you are experts in the wastewater treatment process let's take a wastewater pledge. Repeat after me!

Say: "I will only flush the 3ps down the drain! Pee, Poop, Toilet Paper

Say: Awesome job everyone!

Recall with the students what you have taught them in this activity.

Specifically remind students:

- The human water cycle is how we take water from our source (Lake Ontario), clean it, and send it through underground pipes to homes, schools, and hospitals. Where it is used through drinking water, showering, and washing our hands. It then goes back through underground sewer pipes where it is cleaned at our water resource recovery facility before it is returned to the lake.
- When using water, we clean it twice: first before it goes to your home and again after you've sent it down the drain before it can be returned back to the Lake.

Background Information (for volunteers):

- After water is "used" (from bathing, washing clothes or dishes, flushing the toilet, etc.), it is called **wastewater**. Wastewater treatment is one stage in the **Human Water Cycle**.
- Once the wastewater goes down the drain or toilet etc., it enters the **sanitary sewer** system. Sanitary sewers are hundreds of kilometres of underground pipes that carry wastewater from homes, schools and businesses, to one of two water resource recovery facilities in Peel. These two facilities are also located on the shores of Lake Ontario (Clarkson and GE Booth for reference).
- This wastewater system applies to residents of Mississauga, Brampton, Bolton and Caledon East. The remainder of Caledon residents treat their water using septic systems, in their own back yards. Septic systems are like mini-underground water resource recovery facilities that clean the wastewater from only one house, as opposed to thousands of households.
- Wastewater is actually 99% water and 1% solids. Visualize how much water actually goes down the toilet and drains compared to the amount of "solids" from human waste, toilet paper, dirt from clothes, dishes, and bathing. We generate huge quantities of wastewater!
- Water resource recovery facilities use physical, biological, and chemical methods to clean the wastewater so that it can be safely returned to the lake. Upon arrival at one of these facilities in Peel, the wastewater travels through a series of huge tanks to be cleaned.
- Water is considered a renewable resource: "renewable" referring to that portion which circulates through hydrologic cycle. But clean, fresh water is also considered a limited resource because communities are continually growing and the demand for water is increasing. Because our water use almost always leads to some degree of deterioration in water quality, the more water we waste, the more we upset the natural balance of our aquatic ecosystems, and the quality of water decreases.

