

Grade 6 Lesson Outline

Lesson Title: How much do we really use?	Duration: 40 minutes
Introduction:	
In this lesson, students will learn how our drinking water and wastewater are treated in the Region of Peel. Students will also learn more about physical and virtual water, how much water a person uses on an average day, and why conserving water is a necessity.	
How to use this resource:	
Download all resources required for this lesson. This file includes: <ul style="list-style-type: none">• Grade 6 – Presentation PPT includes all slides, speaking notes and video links required for the lesson• All About Treatment worksheet where students match the stages of water and wastewater treatment with definitions• Water Footprint worksheet for students to calculate their water footprint Print the following files before you begin the lesson: <ol style="list-style-type: none">1. All About Treatment worksheet (1 per student)2. Water Footprint worksheet optional (1 per student)	
Key Messages:	
<ul style="list-style-type: none">• Water moves through two cycles– the water cycle and human water cycle• The important services the water treatment plant provides that keeps our water safe and healthy for everyone• We need to conserve water, so it stays clean for everyone in the community and the environment• Look at virtual water and learn how much water is used for every day things	
Key Topics:	
<ul style="list-style-type: none">• Water Treatment• Wastewater Treatment• Water Quality• Water Conservation• Physical versus Virtual Water• Water in the Community	
Curriculum Connections:	

For a complete list of curriculum connections, refer to the Curriculum Connections for Grade 6

Science & Technology:

Understanding Life Systems: Biodiversity

- 1.1 & 1.2

Lesson Outline:

Slide 2: The Region of Peel

- Ask students – what city or town do they live in?
- Let students know the city or town they mentioned is part of a larger area that is called the Region of Peel
 - Region of Peel includes the Town of Caledon and 2 cities – City of Brampton and City of Mississauga
 - The Region of Peel is a level of municipal government and some of the programs and services that the Region of Peel provides to our communities include:
 - Recycling and Waste collections and disposal
 - Maintenance of regional roads, including snowploughing in the winter and paving in the summer
 - Health services
 - Ambulance services
 - Peel Regional Police and services and
 - **Peel Region also provides you with clean, safe drinking water and wastewater treatment**
 - Peel has a population of 1.51 million people, that make up this vibrant community where people live, work and play
- Region of Peel has 2 water treatment plants in Mississauga, 2 water resource recovery facilities, 2 for South Peel, and 15 municipal wells that treat water that we use daily
 - Most of these plants are located in Mississauga, close to Lake Ontario as it allows the Region to treat and clean water faster and more efficiently.
- This short video coming up next, will look at how the Region of Peel invests in water. Listen for some interesting facts on water to share as a class after watching the video

Slide 3: Video

- Video: Investing in Water <https://www.youtube.com/watch?v=XMr0JqGOX0A>
- Length of video: 1.46 minutes
- Share information from the video – have students share interesting facts they heard from the video

Did you know?

- Did you know that we have over 200 staff in the Region of Peel who treat and maintain our water to make sure every time you turn on the tap, the water is fresh and healthy to drink?
- And every time you flush your toilets, or take a bath, these dedicated staff also work to make sure that dirty water gets cleaned before putting it back to the lake
- They work to make sure all our water gets treated for everyone, 1.51 million people living and working in Peel
 - Every day the Region of Peel treats 570 million litres of water
 - That's enough to fill 228 Olympic sized swimming pools

Slide 4: Water Cycle

- ____ Review the water cycle with students
- Where do we in the Region of Peel get our water from?
 - Brampton, Mississauga and Bolton get water from the Lake. Other people who live in Caledon get water from wells, either on their own property, or municipal wells that are owned by the Region

- Water from Lake Ontario is fresh, which means that the water is not salty like the water in oceans and seas
- The water cycle is a continuous circulation of water from rivers, lakes and oceans into the atmosphere onto the land and back
 - **Sun:** the source of energy that drives the whole cycle
 - **Lake Ontario:** this is our water source
 - **Evaporation:** the sun heats up the water in lakes, rivers and oceans and turns it onto vapour
 - **Condensation:** water vapour in the air gets cold and changes back into liquid form
 - **Precipitation:** the clouds get heavy and water falls back to the earth in the form of rain, hail, sleet or snow
 - **Runoff:** moves water across land and makes its way to the nearest body of water such as a lake
- **This process is called the natural water cycle. But humans also change the path of water**

Slide 5: Human Water Cycle

Introduction to Human Water Cycle:

- Has anyone ever heard about the human water cycle? What could this be all about?
 - Have students share their thoughts
- What happens when we use water to brush our teeth, shower, go the bathroom – where does it go?
- Do we send it directly to the Lake?
 - NO
 - Why not? (have students share their thoughts)
- The water in Lake Ontario might have bacteria, viruses and germs in it. All those things could make us sick if not treated.
- That is why we have to send the water to get treated, so it can be cleaned and made safe for everyone to drink. The dirty water travel to the wastewater plant for treatment
- The next few slides will cover how we treat our water and wastewater

Slides 6: Animated Water Treatment

- Dew's Water Adventure <https://peelregion.vids.io/videos/ac9cd9b41d19e1c225/dews-water-adventure> ‘
- Length of video: 4.03 minutes

Discussion Questions:

- What is the purpose of a water treatment plant?
 - Before learning about water treatment, think about how we get water to our homes and schools
 - Have students share their thoughts on what they know, or heard about water treatment

Worksheet: All About Treatment

- Have students complete the worksheet while listening to the animated slides about water treatment

Answer Key: All About Treatment - Water Treatment

A) OMB2 B) Raw Intake Pipe C) Ozone D) BACC E) UV F) Membrane Filtration G) Lab Testing H) Chlorine I) Fluoride J) Drinking water must be kept...

Slide 7: Video

This short video will show footage of the Arthur P. Kennedy water treatment plant

- Video: Peel's tap water from the Arthur P. Kennedy water treatment plant
<https://www.youtube.com/watch?v=J9wY-qMrqZg>
- Length of video: 0.48 seconds

Did you know?

- Arthur P. Kennedy Plant can treat up to 1.2 billion litres per day
- Every day the Region of Peel treats 570 million litres per day
- In the year, 2041 another 21 years from now, it is estimated that almost another 2 million people will live in Peel. That means the Region will have to continue treating water for even more people in Peel, a task that the Region takes great pride in doing.

Discussion Questions:

- Do you think the Region of Peel can treat water for 2 million people?
- Explain your reasoning?
 - **Answer:** Yes, the Region of Peel can treat up to 1.2 billion litres per day. There's always room for more capacity to treat water per day in the Region. Forecasting for future population growth is something that the Region of Peel plans for
- Region of Peel is committed to providing safe and reliable drinking water to everyone

Slide 8: Animated Wastewater Treatment

- Dew's Wastewater Adventure <https://peelregion.vids.io/videos/069cd6b81717e3c58f/dews-wastewater-adventure>
- Length of video: 2.50 minutes

Worksheet: All About Treatment

- Have students complete the worksheet while listening to the animated slides about wastewater treatment
- Take a few minutes to go over and cover the worksheet as a class

Answer Key: All About Treatment – Wastewater Treatment

A) Municipal waste B) Headworks C) Primary Settling Tanks D) Aeration Tanks E) Secondary Clarifiers
F) Chlorination & Dechlorination G) Biosolids H) Anaerobic Digesters I) Ash Lagoons J) Final Outfall

Slide 9: Video

This short video will show footage of the GE Booth wastewater treatment plant

- Video: How the Region of Peel cleans your wastewater
<https://www.youtube.com/watch?v=4uxYZdnxuz8&feature=youtu.be>
- Length of video: 1.11 minutes
- **Did you know?**
 - The Region of Peel treats 518 million litres of wastewater per day
 - That's enough water to fill 200 Olympic sized swimming pools

Slide 10: Where does the water go from here?

- **Ask:** does anyone know what these are? Where can they be found?
 - **Answer:** on the streets, school property, parking lot
- **Ask:** what is the difference between these 2 sewers?
 - **Answer: Sanitary Sewers:** access point for trained professionals to go down to access the pipes. These trained professionals can open these and if you were there when they

opened it, all you would see would be pipes. If there is a blockage or a break in the pipes, they might open this up to fix it

- **Storm Drains:** used for rain/snow collection so the streets don't flood
- **Ask:** where do you think the water goes from the storm drains? Does the water get treated?
 - **Answer:** No, the water goes untreated directly to a stream, creek and eventually to Lake Ontario
- **Ask:** what do you think can be put down the storm drain?
 - Discuss the effects of the biodiversity of the Lake. (pollution, garbage, chemicals, soaps all going to the Lake without getting treated), what would the water quality be like?
 - __It is against the law to put anything down a storm drain other than rainwater or snow, because it can be harmful to the aquatic life in the Lake. Therefore, it is important to not pour any motor oil, paint, or any other fluids that could potentially harm the aquatic life and pollute the water we depend on for so many things
- We need to protect the water we have, as you will notice in the last exercise of this lesson how much water we actually use

Slide 11: Physical versus Virtual Water

Cover the difference between physical and virtual water by calculating your own water footprint. Have students watch this short video:

- Where is Water? – The Water Rooms #2 <https://www.youtube.com/watch?v=b1f-G6v3voA>
- Length of video: 6.50 minutes
- **Discussion Questions after the video:**
 - How much freshwater is available on earth?
 - **Answer:** 2.5% of the world's water makes up freshwater
- What makes up the total amount of surface water?
 - **Answer:** 1.2%
- What amount of water makes up the agricultural industry?
 - **Answer:** 70%
 - What are some advantages and disadvantages to the biodiversity of agricultural practices on land and water? Discuss with the class
- Can you describe in your own words what is virtual and physical water?

The next few slides will be an activity for students to calculate their own water footprint

- Students will need GOOS paper to track their results or use the Water Footprint worksheet for this exercise

Slide 12: Our Water Footprint – Shower

Question: How many times a week do you shower?

- A) 1-2 times a week (1 point)
- B) 3-4 times a week (2 points)
- C) 5-6 times a week (3 points)
- D) 7 or more times a week (4 points)

Question: How long does your typical shower last?

- A) Less than 5 minutes (1 point)
- B) 5-10 minutes (2 points)
- C) 10-15 minutes (3 points)

- D) More than 15 minutes (4 points)

Slide 13: Our Water Footprint – What we eat

If you consume red meat, how many times a week do you consume it (e.g. beef, pork)?

- A) Never (0 points)
- B) 1-2 times a week (1 point)
- C) 3-4 times a week (3 points)
- D) 5 or more times a week (5 points)

Slide 14: Our Water Footprint – What we drink

Do you drink tap water or bottled water?

- A) Always tap water (1 point)
- B) A mix of both (2 points)
- C) Always bottled water (3 points)

Slide 15: Our Water Footprint – What we buy

How often do you go shopping for clothes?

- A) Almost never (1 point)
- B) Every couple of months (2 points)
- C) Once a month (3 points)
- D) Once a week (5 points)

Slide 16: Our Water Footprint – What we watch

How many hours a day do you spend in front of a screen (TV, computer, phone, etc.)?

- A) Less than 1 hour (1 point)
- B) 1-3 hours (2 points)
- C) 3-5 hours (3 points)
- D) More than 5 hours (4 points)

Slide 17: Our Water Footprint – What we wear

What do you do with your old clothing?

- A) Donate or recycle (0 points)
- B) Use it for rags (1 point)
- C) Throw it away (3 points)

Slide 18: Our Water Footprint – Transportation

How do you usually get to school?

- A) Walk or bike (0 points)
- B) Bus (1 point)
- C) Carpool with friends (3 points)
- D) Get a ride to school (4 points)

Slide 19: Our Water Footprint

Have students tally their results **Physical**

Water

- Direct uses of water, water that we can use for drinking, showering, washing hands and flushing toilets

Virtual Water

- Non-direct uses of water, water that we can't see, touch, taste or feel, and it makes up a big part of our water footprint
- We wear water, it takes 8500L of water to make 1 pair of jeans
- Furniture, houses, cars, roads, all these things we build, also needs water
 - We also spend money on generating electricity with our phones and watching TV which

also uses water and

Farming uses huge amounts of water

Below Average:	6-11 points
Average:	12-20 points
Above Average:	21-32 points

Discussion Questions:

- Can anyone guess the average water usage per Canadian? ○ The average water usage **per person per day in Peel is 300L**, and this is physical water, like taking a shower, washing our hands before we eat a meal, but when we consider our virtual water usage, our average jumps to 4700 L per day!!!!
 - That's a lot of water! In fact, **Canadians are among the highest consumers of water in the world!**
- If you're above average user, the purpose of this exercise is not to make anyone feel guilty, but to be more aware of how much water you use. Remember that our freshwater we have available is 1.2%. So, it's important that we conserve the water we have for future generations to be able to enjoy.
- What types of things could you do to reduce your water use?
- Think about some adjustments in your own life that you can make to help conserve our water?
 - Just a 10-minute shower can use up to 85 L of water
 - A pair of jeans uses 8500L for just 1 pair, so do really need that new pair?

Slide 20: Conclusion

End of the lesson, ask students

- What have you learned today about water?
 - Have students share their findings
- Share with students that everyone including them, have a part in protecting and conserving water

Extension Activities:

- Looking for ways to extend your learning, check out our extension activities at [peelregion.ca/enviroed](https://www.peelregion.ca/enviroed)

Want to learn more about water and wastewater treatment, watch the following videos:

- Barry's Water Treatment Tour <https://www.youtube.com/watch?v=xc4zoS9EgY4>
- Length of video: 6:07 minutes

- Barry's Wastewater Treatment Tour <https://www.youtube.com/watch?v=vC42YTljxpM>
- Length of video: 8:16 minutes

Peel Water Story:

These modules will help develop understanding of local watersheds, water sources, water quality and how these aspects can impact water supply and distribution <https://www.peelregion.ca/waterstory/>

- Module 1: Lay of the Land
- Module 2: Rain to drain
- Module 3: Taking the plunge