

I. Introduction

Water is essential to life and health, as well as our environmental, economic and social well-being. “Water is necessary to sustain all life”: plants, insects, fish, birds, reptiles, mammals (including humans)... all require water. (This fact is the first of four “Big Water Ideas” that underpin this resource, and which are presented below). Water is a source of food, a means of transportation, a cleanser, the universal solvent, an unrivalled state and shape shifter, the ultimate quencher of thirst. Water is found in miniscule molecules, and the boundless oceans that cover much of our planet. So widespread is this elemental fluid that we may well call our globe “Planet Water,” rather than planet Earth. For many humans and “more-than-humans,” water is a habitat, a home.

By its very nature, water changes with conditions – a process that integrates physical, chemical and biological alterations, which we call the *hydrologic cycle*, and through which all water endlessly re-cycles. For example, the water that pours out of a garden hose this morning was in Lake Ontario yesterday (and in clouds the day before); the water in your garden’s juicy tomatoes tonight may be in your body tomorrow, before moving on elsewhere. This simple example describes some of the ways in which water continuously gets around – a small part of the universal hydrologic cycle, of which we are all a part. In order to better understand how water gets

around in a practical and locally-relevant way, it helps to understand *watersheds*, defined later in this document.

Much of the research reports that the amount of water has not changed significantly since billions of years ago; the quantity of fresh water on this planet is quite fixed.¹ While water quantity is constant, water quality is not. Water can be cleaned as it moves through the watersheds and through the processes of change that make up the hydrologic cycle. However, nature’s ability to clean water does have limits, beyond which water may become polluted. Ideally, healthy natural systems require no intervention to function properly, and a well-functioning natural environment has social, economic, and health benefits for all, now and in the future. Degraded natural systems have costly consequences for communities.² Water can and does carry contaminants that threaten health and life, as in the case of water-borne diseases.

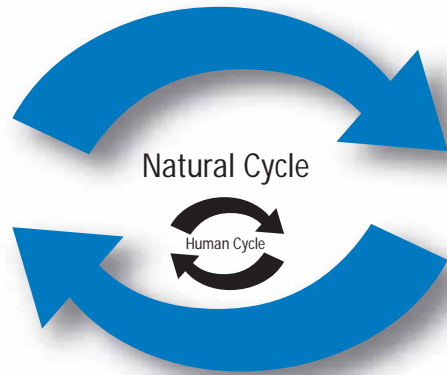
Peel Region has an abundance of ground and surface water resources, but faces “a growing number of water management challenges as the extent and intensity of land uses increase the impact on natural systems, [including] further fragmentation and loss of the natural landscape and Peel’s cultural heritage.”³ The interconnections and relationships among

human activities and the subsequent impacts on ecosystems must be recognized. In doing so, Peel’s *Regional Official Plan* (a public document⁴) has put in place a set of environmental policies to protect and augment the natural environment.

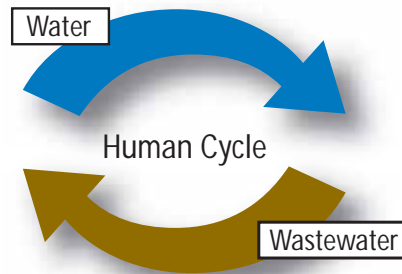
Of course, populated communities have always been challenged to secure the required quantities of water, while simultaneously protecting the water source. Excerpts from Peel’s historical health record are presented in this story, as are some of the causes of and responses to water contamination, past and present.

Modern water treatment and distribution systems are referred to here as the “human water cycle.” The water that people use every day for fire protection, drinking, industrial processes, food preparation, waste disposal, and cleaning—all of this water is diverted from—and ultimately returns to—the “natural water cycle”. That being said, it is important to recognize that human activity is natural since after all, we are part of the biological world. Like beavers and plants, humans direct what happens to water, and therefore we affect other biological beings that share this environment. Our human water cycle remains an integral part of the natural water cycle.

The Region of Peel is the local provider of municipal water. In accordance with provincial



regulations, Peel treats, tests, and distributes water to its more than one million inhabitants, ensuring that it is safe for human consumption. Within the water purveyance profession, the human water cycle is comprised of two integral parts: water systems and wastewater systems. Water that is treated and distributed to the public is simply called water. Water that has been used is discharged from our homes, schools, and workplaces as ‘wastewater’ (or sewage). By treating the wastewater before returning it to the natural environment, Peel’s wastewater collection and treatment network helps to protect the quality of water in our streams, rivers, lakes, and wetlands. The treatment of both water and wastewater in the Region of Peel is strictly regulated by provincial legislation. Furthermore, “It is the policy of Regional Council to protect, maintain and enhance the



quantity and quality of water resources for the supply of potable water and maintenance of ecosystem integrity in Peel.”⁵

A. Gulliver in Lilliput: Experiential Education & Childhood

It is the aim of this Peel Water Story to assist educators in learning about water systems and water issues in an integrated and locally-relevant fashion, especially as they relate to the sustainability of water resources in Peel. The story is intended for school teachers, those influential mentors and gatekeepers for *Peel youth*—that generation of people who are still capable of growing into the habit of taking care of where they live. Because our audience is literate and adult, the chosen vehicle for this information is a familiar one: a book –formal and abstract.

At intervals throughout this story, watersheds (the landscapes) of Peel are described from the

perspective of the mythical giant Gulliver, towering above—while striding firmly upon—the local landscape. The analogy of the giant in *Lilliput* (“the land of the little people”) is borrowed from Jonathon Swift’s allegory, and is used here to provide a visual and conceptual perspective, or *vista*. As adults, we are the giants who see far and wide, making expansive and abstract interpretations about our world. This is not the Lilliputian view of things, however. As every teacher and parent knows, a child’s view of the world is infinitesimally

The Lilliputian View – infinitesimally vast.



The Incredible Ecotourist

Play an imagination game that links to relationships. While at a pond, park, or puddle, have the children imagine shrinking in size seven successive times. Use a metre stick as a comparison. A pond, 5 metres in diameter, would be twice the size of the Pacific Ocean when shrinking the seventh time. You then find yourself in the microscopic world of *E-Coli*. The children can sense and connect with this world within a world, and view what it would be like. What is alive in this place? How big? How small? Use a hand lens to help with the visualization. What does the water look like from this view? What do the sands, stones, and rocks appear to be? Describe for the children the microscopic life there, or show them under the microscope. Check out the biodiversity – places that are the same, but different. What do you see that is different? What do you hear? What are the smells? Describe what it feels like to touch something here. Take a few friends and role play the creatures you connect with. These are the ways to get to know the landscape. These are the ways to know your connections to your place. Your watershed is teeming with life.

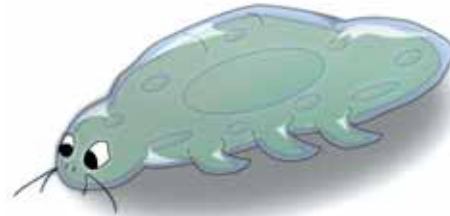
Let the children share their personal understandings. Sketch or map part of this Lilliputian world. Have them write expressively about feelings and experiences. They will develop metaphors of connection that will be theirs for life. Have them show and tell their stories to others.⁸



SEE “TAKE THE pH CHALLENGE” ACTIVITY



Tardigrade (“Water Bear”) Protozoa found in water (real and imagined).



vast, but it is not the adult vista; the Lilliputian view is much closer to the ground.

Experience in childhood corresponds with perceptual and cognitive stages of development; it is not (yet) formal or abstract. For children, “the world of nature is not a scene or even a landscape...nature is sheer sensory experience.”⁶ Children’s experiences on the watersheds are *their* maps, which guide *their* understandings of *their* relationship to nature throughout *their* lives.

People can’t help but learn, but in order for the intended learning to occur, instructive experiences must correlate with the stages of

children’s development. Any child-focused education concerned with sustainability needs to place children locally in nature where, with all their senses, they can consciously and meaningfully participate in important relationships that support life. This water-focused resource features local places that you and your students may have visited or heard of. Alternatively, there are other places you will want to visit and learn about, right in your own backyard: exciting, beautiful, awe-inspiring places where children can see, hear, smell, touch, taste, walk, and talk with others who walk there too.⁷ These are the ways to know the landscapes from a Lilliputian view. This local immersion is the imperative foundation for the ecological understandings and purposeful actions that can help sustain our watersheds.

“An important interrelationship exists between Peel’s natural and cultural heritage that illustrates the historic link between the municipal community and its surrounding environment, and which provides a sense of place and identity.”⁹ As local places surrounding schools are losing their biodiversity, children need opportunities to get to know these places and the water connections there that support life. When children connect to a natural place in this way, learning will be prodigious. Then they may be able to respond to this decline, and know how to restore these places, and themselves.¹⁰

As a leader in the Public Works industry, the Region of Peel understands the complex connections that exist between natural ecosystems, the infrastructure that provides water and wastewater services, and the people of Peel who create a demand for those services. We likewise recognize that these systems and their interconnections are out of sight and therefore little understood by most people. In recognizing the shared responsibility (for sustainably managing water resources) that exists between the Region as service provider and Peel residents as consumers, and respecting the environment that supports us all, this resource aims to go “beyond the water cycle” and make these connections better understood. We can look at these connections from a perspective of “place” and in story form. The place is Peel Region, and the story is The Peel Water Story.

B. Peel’s “Big Water Ideas” and the Ontario Curriculum

The Peel Water Story elaborates on four “Big Water Ideas,” which state that:



1 Water is necessary to sustain all life.



2 The natural water cycle affects and is affected by all life forms within local watersheds.



3 Human activity within local watersheds affects both natural and human water cycles, with significant impacts on water quality and quantity.



4 The Region of Peel supplies safe, secure and reliable water and wastewater services while promoting environmental protection and stewardship.

As you read the narrative story that follows you will encounter five separate “Curriculum Connection” pages. The embedded pages relate to those parts of the story that surround them, and show which of the Big Water Ideas are addressed in the text. They also demonstrate some of the Ontario Curriculum’s learning expectations that are covered in the narrative (using the 2005 revised version of the curriculum). These connections are not exhaustive, but rather aim to show how the story is relevant to a teacher’s mandated curricular program. The connections made are for content subjects only, namely Social Studies, History, Geography, and Science & Technology. (Teachers with the Peel District School Board will notice that the S&T connections are consistent with the “Enduring Understandings” document.) The story is also relevant to numerous other subject areas such as Language Arts, Math, Physical Education, and Visual Arts.

Each Curriculum Connection box contains three elements:

- i) an essential quotation from the text suggesting an overarching theme from that part of the story;
- ii) one or more “Big Water Ideas” addressed in the surrounding text; and,
- iii) relevant curricular strands, by subject area and grade, K – 12.

Indeed the curriculum flows throughout the story, as the same curricular strands are repeated for various grades in different chapters of the Peel Water Story.

The references to curriculum expectations in this resource serve as a guide to the relevance of the content; teachers will determine the methods to be used in teaching the curricular concepts that are linked to the Peel Water Story. The Ontario Curriculum is generic in nature and the Peel Water Story localizes important aspects of the curriculum through story, activities, and featured local action projects.

And now, the Peel Water Story...