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Empowering High School Girls with Eco- Experiential Education: Assessing Glen Stewart Ravine Watershed in Toronto

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Abstract: This study explores the overall health of the ecosystem at Glen Stewart Ravine in Toronto by the caring high school teenagers. Care for their ecological habitat reminds one of an ancient First Nation's proverb: 'We do not inherit the Earth from our ancestors but borrow it from our children'. These high school girls were exploring their neighbourhood environment to exhibit social care and joy for the love of student- motivated Scientific Investigative Project -SIP (Ayyavoo, 2013).

Teenage school girls from the inner city care about their immediate environment and acknowledge the interconnectedness of flora and fauna (including plants, animal and humans). The 'hands-on and minds-on' challenge inspires students to observe and study their natural habitat in depth to show care to sustain their neighbourhood ecosystem. The adage, 'we borrow it from our children', inspires these high school girls to use their scientific strategies to collect a series of biological and chemical test data from their environment. The biological test involved sifting a large net through the running ravine water to classifying the collected macroinvertebrates, while the chemical tests involved measuring the pH level of the ravine in addition to its turbidity levels, oxygen levels, and temperature. The data analysis depicts the health of the ravine, for the moment, at a passable grade. However, in order to maintain this positive state, Glen Stewart Ravine needs to be frequently monitored as new shops and businesses sprout in the nearby surrounding area. The findings of this study may be useful in providing more public awareness on environmental sustainability, care and a community oneness to preserve the ecosystem for the future generation.

Keywords: Outdoor Experiential Field Trips, Investigative BioChem activities, critical-thinking skills, Problem-solution, Macroinvetebrates.

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Pre-amble: Caring About the Environment

The desire to care and preserve the ecosystem supports the idea of cognitively active field trips. The philosophy behind field trips, if planned appropriately, can be perfect opportunities to enrich students' learning experience in a way that not only provides a more hands-on approach, but also stimulates higher levels of thinking with joy. The walking trip to Glen Stewart Ravine motivates students to develop a variety of environmental topics with respect to the health of the ravine and the park environment. Attempting to solve society's crisis inspires students to jot down field observations to identify connections between their research and their own personal lives. Some educators, including administrators and teachers, favour field experiences that empower students to orchestrate their own investigative research during school curriculum instruction time. Such eco-related activities validate younger members of society to contribute valuable information to academic research.

Introduction: Experiential Environmental Pedagogy

The high school girls in this study prefer the active outdoor settings for a full experiential learning than a passive classroom setting to memorise ecological concepts. When learners' imagination is sparked with cognitively active field trips, such as exploring a forest or stream study, students become excited and engaged (Ayyavoo, 2004a; Ayyavoo & Pedretti, 2010), where their "learning naturally blossoms" (Chiarotto, 2011). Teachers realize that field trips are excellent teaching and learning moments where today's tech –savvy students don't get enough of outdoor sensory exposure in schools.

High school science students care and love the connection with nature where they can be in dirty, messy streams. Learning about the natural world seem to occur with memorable sensory perceptions of water rushing downstream and the fragrance of pine needles; yet according to researchers (Balllantyne & Packer, 2009) teachers often face logistics challenges to help students enjoy their environment.. Managing curriculum expectations, obtaining permissions from parents and school administrators, and heightened safety concerns of learners in the field are obstacles that today's educators face (Ayyavoo, Pedretti, Bellomo & Tan, 2009). Yet, high school learners cherish their instinctive motivation to explore these outdoor field experiences by touching, smelling and hearing nature. Our childhood experiences of field trips as school children include passive listening activities when visiting museums and science centers. Such activities require a little more than recording concepts and explanations provided by speakers. Yet, field trips are often the most memorable events of our school lives.

Students naturally explore with their touch (hands) and questions (minds) on how things work. Learning from first hand observation adds to their memorable cognitive experiences in high school. Indeed, cognitively active field trips involving an investigational study can provide opportunities for students to engage in both subject matter and socioscientific issues (Ayyavoo, 2012; Pedretti &Nazir, 2011). Transforming experience to new knowledge, meaning should be derived from their hands-on and minds-on activities. Experiential field trips can entice critical thinking and encourage students to create questions, test their hypotheses, gather data (Chiarotto, 2011; Scarce, 1987) and using their findings to identify applications to Science-Technology-Society-Environment (STSE) (Ayyavoo, 2013). An obvious connection to "hands and minds-on" evidence approach is supported by Ontario Ministry of Education's environmental goal which fosters the following excerpt:

> Environmental education enables students to develop the knowledge and skills they need to be environmentally active and responsible citizens and to apply their knowledge and skills cooperatively to effect long-term change. (Ontario Ministry of Education, 2009, P. 11)

The emphasis of "environmentally responsible citizens" reinforces the Ontario Ministry of Education's support for relevant inquiry through classroom and field activities. The full potential of environment-focused education can extend into students' own lives. Experiential education provides an opportunity to utilize well thought-out social decisions from multidimensional and multicultural perspectives to solve STSE-based issues such as school gardening, school compost and "litterless lunch" activities and monitoring stream pollutions (Ayyavoo, 2005 & 2013).

Ecological Intelligence: Research-based Investigative Field Trips

Experiential field trips can provide opportunities to identify problems and issues in forests, conservation areas and stream/watershed settings. When my enriched biology class visited the local conservation area, such as the Glen Stewart Ravine (Toronto), they identified various plants species and insects in the small water streams but more importantly identified human pollution as issues in the environment. David Orr expressed in his book (Earth in Mind, 2004); that one of the characteristics of ecological intelligence is "to think the matter out for themselves" (p.52). These biology students were interested in discovering the causes to environmental degradation and consequently became aware of the concept of sustainability. In that, whatever humans do to cause an effect (either directly or indirectly) to the environment, than they must become aware of protecting the environment so to maintain harmony between human and nature (EPA, 2009). Sustainability has become the significant concern that drove students to investigative on natural resources and its relationship with human population. In this case, students identified different topics of interest to study with respect to the health of the forest environment as frequent visitors and their pets used the forest. In order to encourage higher-order critical thinking, students were encouraged to find relevancy and connections between their research work and their daily lives. Small group assignments were created to facilitate learning about social-scientific connections. Field assignments, such as this study, amplify students' passion to learn and empower them to create a research design that suits their research needs.

The following sections will discuss the grade 11 students' research findings of their eco-experience. A specific field investigation was conducted by a group of girls from the enriched biology class of a single-gender school. Empowered by their research task, the girls divided their investigative roles to evaluate different components of the health of the Glen Stewart Ravine. Despite feeling out of their element in the wooded forest, these girls buckled up with joy, got their feet wet and hands dirtied as they picked up insect larvae to classify into different taxon while others performed chemical tests on the stream water. It illustrates students' desires to share the wealth of field knowledge constructed with peers, educators, and socialpolitical groups and contribute to academic, social and environmental research.

Open-ended Environmental Assignment: Student-Designed Research Experiences Introduction

The Toronto Beaches area has encountered many problems with pollution over the past several years. However, many efforts have been taken to reduce the amount of waste entering these waterways, watersheds and streams are considered safe for both terrestrial and aquatic creatures. Woodbine Beach and Kew Balmy Beach are the two closest beaches to the stream that pours into Lake Ontario. These streams are tested by the Toronto Public Health Unit for levels of E.coli bacteria (Toronto Public Health, 2013). Canadian Council of Ministers of Environment (CCME) in 2009 conducted a study and identified the presence of E. coli in proximity to the current research site. The water data indicated that the public parks and areas are contaminated. In addition, CCME published the following update on water quality:

> E. coli is used as a water quality indicator because large numbers of the bacteria are always present in the feces of humans and other warm-blooded animals, but are not naturally found in water. Since these bacteria don't live long in water once outside the intestine, their presence in water means there has been recent contamination through sewage discharges or other sources (CCME, 2009).

Research Question

With this information, our question and concern is stated here: Is the ravine site, near the school, contaminated with not just bacteria, but with other pollutants that may affect animals in the park? Since 2009, there is little record of research done on the E. coli level on this aquatic environment (Eastern Beaches Strom Sewer Outfalls Control, 2009). In addition, no known research was conducted on the health of aquatic life in the neighbourhood gully caused by other pollution. The Toronto Public Health Unit performs tests on the waters of the Toronto Beaches but seems to limit the research to E. coli bacteria levels. As such, it gives us a social-ecological reason to look deeper into what is actually happening in this waterway, its environmental pollution level and its effects on aquatic life.

Brief History of the Beaches Area and the Current Glen Stewart Ravine

The city of Toronto is known for its many neighbourhoods, all differing in the distribution of different businesses and, especially in the flora and fauna. A very prominent area in city of Toronto is called the Beaches, an area where this study took place. The Glen Stewart Ravine is one of Toronto's most diverse areas in terms of its residential, commercial and several ecologically-safe areas for recreation. It is also the closet natural conservation site closet to our school and church (St. John's). Both Figures 1 and 2 shows the location of the Glen Stewart Park where the study was conducted in relation to Lake Ontario and the communities around the identified Glen Stewart Ravine (Area A).

Figure 1: The Beaches Area and the identified Glen Stewart Park (A).

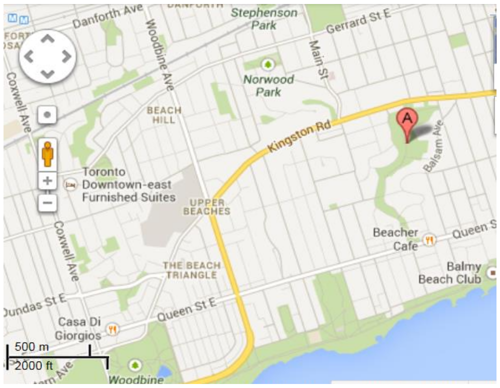


Figure 2: The Glen Stewart Ravine with

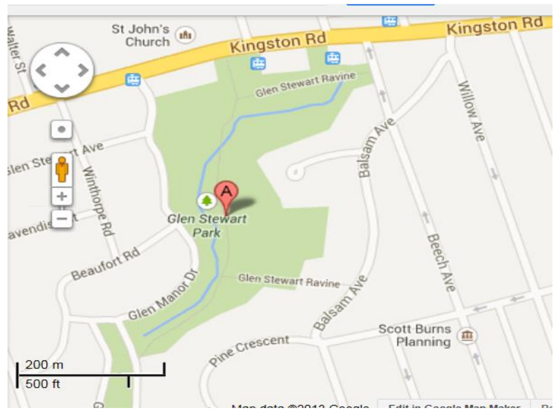


Figure 1and 2 shows the location of the Glen Stewart Park in relation to Lake Ontario and the communities around the identified Area A.

The Beaches area has been settled as a residential neighbourhood for a more than a hundred years. John Graves Simcoe, Upper Canada's first Lieutenant-Governor in the late 1700s, divided up the area into constitutional lots in 1793. The Beaches soon became an extremely popular lot and fast-growing residential and recreational area. This eventually drew hopeful business owners to open up shop in the Beaches vicinity or constitutional lots. The highly commercial area, specifically along Kingston Road (built through the Beaches area throughout the1800s) is occupied with many small shops and restaurants. This information is to be considered with respect to the observations recorded in this field investigation which are discussed later in this paper.

The current aquatic samples were collected from the Glen Stewart Ravine in the Beaches lot as shown in Figure 2. In this study, the area of the gully analysed included where the two streams merged into the main ravine as shown in the Figure 2. The smaller stream passes through the more residential area, and the other, larger stream (visible in the Figure 2) passes alongside the more commercial area, near Kingston Road. The water samples were collected from the gullies with respect to the pH levels, turbidity levels and other data discussed in the method and analysis section.

The ravine is 11 hectares long with a naturally diverse amount of plants and wildlife species. In order to protect the habitat of these plants and animals, the City of Toronto underwent various restoration projects. The aim was to enhance the natural conditions of the area by improving the overall infrastructure so visitors could enjoy the ravine without impeding on the natural growth. Renovations included the two small pedestrian bridges (under ten feet in length), approximately 100 feet of wooden staircase that connected the small cliff leading from Kingston Road down to the ravine, in addition to sandbag barriers that help preserve the natural slope of the area. A wooden boardwalk was also built to allow easier access to the ravine trail. Wooden fences were also constructed to prevent the plant life from being trampled by those walking along the trail. These installations were done in Glen Stewart Park by community stakeholders who value and desire to preserve the natural environment for public use. This shows that a large portion of the Beaches community wishes to see the ravine withstand the effects of time and be sustained for future use and enjoyment.

Method

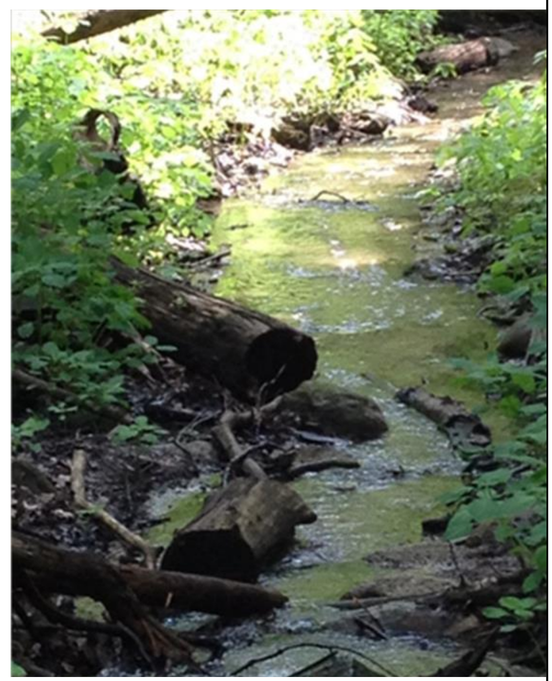
The overall water quality of the ravine in Glen Stewart Park seemed to possess health concerns for the flora and fauna. The water condition for the organisms that live and use it may be influenced by the ravine's proximity to residences and the main road with shops. The ravine water condition was tested using both chemical test and biological test. These stream water tests were recorded and compared on two different visits at three different research ravine sites. Water samples from various locations in the ravine were collected and the results were compared (shown in Diagram 1).

Diagram 1: Shows students collecting macroinvertebrates from the stream. The next two adjacent photos show the shallow streams where both chemical and biological data were collected.

NOTE: Two unique biological and chemical test strategies were developed to examine the conditions and health of the watersheds. These tests were designed by overseer Dr. Ayyavoo (Ayyavoo, 2004):

With the biological test, students discovered the relationship between the land and aquatic inhabitants and stream water quality. The aquatic inhabitants, also known as benthic - invertebrates, are found under rocks and in the stream's bed. These invertebrates, which included larva and water bound insects and molluscs, were collected at three different sites, identified by distance from each other. For example, Site 1 was located by the first bridge and was closer to Kingston Road. Site 2 was 10m downstream from the bridge (see Table 1). By using a benthic invertebrates chart, students identified aquatic species and estimated the populations of each species. The data was recorded on a sheet of paper.

Figure 3: Shows the two sites of data collection sites. Number 1 indicates near the bridge and site 2 is about 100m downstream and site 3 is about 50m downstream as shown here.



For the second test, chemicals from the La Motte test kit were used to identify the pH and oxygen levels of the water. The chemical test was conducted at the same three sites where the macroinvertebrate specimens were collected (see Table 1). This was done to confirm the findings from the stream and identify any extraneous data missed in the biological study component. By using chemical indicators, students analyzed the water quality of the stream. The evaluation included: turbidity tests, dissolved oxygen tests, pH tests, and temperature measurements for both the environment and water taken from the stream. Data from these tests will be examined and discussed in the next section.

First Data Collection and Analysis: Using Chemical Tests

Following the instructions of the La Motte kit, the water's turbidity levels, dissolved oxygen levels and temperature, in addition to the velocity of the water flow were recorded, as shown in Table 1.

Table 1: Summary of Chemical Data collected at the Glen Stewart Ravine

	First Collection: April 26th, 2013			Second Collection: June 12th, 2013			
	Site 1 First Bridge Closer to Kingston Road	**Site 2 100m Down Stream from Bridge**	**Site 3 (50m) Down stream**	**Site 1 First Bridge Closer to Kingston Road**	**Site 2 (10m) Down stream**	**Site 2 (100m) Down Stream**	**Site 3 (50m) Down stream**
Turbidity (JTU)	10	15	13	10	10	10	10
Oxygen Level	1	1.5	1	0.5	0.75	-	0.75
Temperature (°C) of Water	Approx. 14	15	17	-	20	19	18.5
pH Level	8	7.7	8	7	7.3	7.5	8.5
Velocity of Water	0.67 m/s	-	0.60m/s	-	0.38m/s	-	0.56m/s

Turbidity is the amount of solid particles—such as gravel, silt, microscopic organisms, and various environmental pollutants—suspended in a body of water. It is measured in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU) depending on the method and equipment used. Turbidity measured in NTU uses nephelometric methods and depend on passing a specific light with a specific wavelength through the sample. Jackson Turbidity Unit (JTU) values also approximate NTU but the JTU system was easier to use in this study. In addition, it was the unit of measurement provided in the test kit.

Site 1's turbidity level was 10 JTU. However, Site 2, which is about 10 meters downstream, had a higher turbidity of 15 JTU. Turbidity levels of the water measured between 10-50 JTU is considered to be the normal characteristic of water in these areas. The levels related to the enriched nutrients including phosphate run-offs capable of supporting planktonic life (Ayyavoo, 2004a, Wilson, 2010). Phosphates are also found in human and animal waste run offs, (Ayyavoo, Duchen, Savage, Shrumm, 2004b) possibly linking to sewer leakage.

The turbidity levels measured along various points at Glen Stewart Ravine ranged from 10 to 15 JTU (see Table 1). The low turbidity of the ravine is supported by the transparent appearance of the water. It should be noted that the depth of the stream ranged from 10cm to a maximum of over 30cm at various parts of the stream. The low turbidity is positive data in regards to the health of the environment and its organisms, because a large presence of solid substances or wastes can prevent sunlight from reaching lower depths of the water. Reduced sunlight can inhibit the growth of aquatic plants living near the bottom of the stream because it decreases the rate of photosynthesis, which in turn, could lower the water's dissolved oxygen levels. Considering that both the higher and lower sections of the river have turbidity within the safe range, we can infer that these results signify the water is relatively safe for the organisms and animals living in the ravine and pets visiting it.

From the first data collection, the water temperature in the ravine hovered between 14 and 17 degrees Celsius. Temperature can have huge effects on the growth of various organisms because extreme temperatures have more difficulty sustaining life. A temperature range of 15-17 degrees Celsius can easily support the growth of vegetation in and around water banks, as seen in the Glen Stewart Ravine's temperate forest.

The levels of dissolved oxygen collected from the ravine had a saturation of about 1 to 2. The level of dissolved oxygen in the water seems to be able to support some aquatic insects and plants. There is a correlation between dissolved oxygen levels and turbidity, therefore, with the low turbidity level, the dissolved oxygen level makes sense. Simultaneously, the alga vegetation also helps create a suitable amount of oxygen in the water for the various other organisms.

Finally, pH levels measure how basic or acidic a substance is, strong acids and bases are dangerous for most organisms so it is good to have levels as close to seven (neutral) as possible. The pH level recorded along the ravine was around seven to eight. This indicates a healthy level, as a common water pH level in southern Ontario falls between six and eight.

Second Data Collection and Analysis: Using Biological Tests of Macroinvertebrate Population

The second method of studying the water quality of Glen Stewart Ravine involved assessing the invertebrate populations. Macroinvertebrates (i.e. molluscs, annelids, other arthropods, etc.) were collected from the stream and used as a biological assessment technique to study the water quality of the Glen Stewart Stream. Invertebrate samples were collected using D-nets while disturbing the soil levels of the streams. After the specimens were acquired, they were identified and placed in the respective categories (see Table 2). All specimens were returned back into the streams.

Table 2: Marcoinvertebrates specimens collected from the Glen Stewart Ravine

		First Collection: April 26, 2013			Second Collection: June 12, 2013		
Class (common name)	***Tolerance Level**	**# of organisms**	**Calculations**	**HBI Value**	**# of organisms**	**Calculations**	**HBI Value**
Amphipodia (scud)	6	46	(6)(46)/60	4.267	13	(13)(6)/22	3.545
Oligochaeta (aquatic worm)	8	1	(8)(1)/60	0.133	3	(8)(3)/22	1.091
Oligochaeta (string worm)	10	7	(10)(7)/60	1.167	3	(8)(3)/22	1.091
Unionoida Sphaeriidae	6	-	-	-	6	(6)(6)/22	1.636
Damselfly	8	1	(8)(1)/60	0.125	-	-	-
Mayfly	5	2	(5)(2)/60	0.167	-	-	-
Gastropoda (Lunged snail)	8	-	-	-	1	(8)(1)/22	0.364
			Total:	**5.859**			**6.636**

*Tolerance level –Values are determined on a regional basis (Southern Ontario Stream Assessment Protocol for Ontario V.2.1, 1998).

There were 60 specimens collected on the first sample collection date compared to 22 specimens on the second visit. It can be speculated that the drop in sample size and disappearance of some insects (including the damselfly and mayfly) is due to several factors: one being the change in weather and seasons that indicates some insects have undergone the metamorphosis stage and have left the aquatic media, meaning these aquatic larvae would have pupated and entered the terrestrial region as adult flies.

Certain macroinvertebrates are valuable sources that help to identify environmental condition changes. Highly-sensitive macroinvertebrates (i.e. caddisflies, mayflies and stonefly larvae) are good indicators of water quality, since they are sensitive to pollution (shown in figure 4). Their presence at the ravine indicates the water quality has a lower amount of pollution. Similar results were obtained in a different spring study by Dr. Ayyavoo and fellow researchers (2004b). In that study, they identified that high counts of sensitive larvae related to high oxygen concentration and low pollution.

Figure 4: Sample of Macroinverts

Aquatic macroinvertebrates (i.e. lunged snails, aquatic worms, etc.) are non-sensitive to pollution. These organisms were found on the first collection date, but not on the second collection. A possible reason for this could be attributed to the road runoffs from the rain in the early spring season. These runoffs add pollution and temporary increase in organic waste (Ayyavoo et al., 2004b) to the stream enabling aquatic worms to be in abundant in our early data collection.

In addition to using the presence of sensitive macroinvertebrates in the ravine, another comparison was made using the Hilsenhoff Biotic Index (shown in Table 2 under HBI Value). This index can be used to check the health of a particular body of water and the surrounding ecosystem by identifying the tolerance levels of different species of macroinvertebrates on a scale ranging from 0-10. The values closer to 0 indicate that the organisms are very sensitive to organic wastes in the environment whereas the values closer to 10 means that the organisms are much more tolerant (Voss, 2013).

Calculation of Hilsenhoff Biotic Index

$$\text{Hilsenhoff Biotic Index - HBI} = \Sigma \frac{n_i t_i}{N}$$

n_i = number of individuals in the group
t_i = tolerance value of group

With the acceptable value at less than 10 for Amphipodia, the ravine data shows 4.6for April and 3.55 for June 2013. This is an acceptable value for these invertebrates. The Ologochaete taxon with the aquatic worms is also within the acceptable range of 0.13 and 1.09 in April and June, respectively. The gastropod is the only specimen that is considered to be under the acceptable value.

The data collected shows that the ravine is healthy, but more effort is required to maintain this final remaining ravine in the Upper Beaches area, as new shops and business slowly creep into the area. The overall findings indicate that ravine should be frequently monitored and tested, but it is healthy and suitable for life.

Discussions: Social and Environmental Impacts of Water Quality

Water quality of the investigated ravine can affect the health of ecosystems and the organisms which inhabit the stream. It is important to keep the water healthy, to enable inhabitants' population to be in equilibrium. There are several causes of water contamination which indicates both social and environmental impacts on the ecosystem. Environmental impacts include examples such as dumping of industrial waste, sewage and wastewater leaks, oil spills, underground storage and tube leaks and, finally, atmospheric pollution deposition. In 2004, Ontario Science Centre students under the supervision of Dr. Ayyavoo also found similar environmental issues with the Don River that is located in Canada's highly urbanized region (Jones et al., 2003; Ayyavoo 2004a, Ayyavoo at el., 2004b). In urban areas, water can be contaminated in several ways such as leaks in water pipe joints where the water pipe and sewage line are close together. Contamination of water in urban areas can also be caused by pesticides, fertilizers, synthetic organics and acidification.

In Toronto, there are three major contributors to water pollution: firstly, the overflow of diluted sewage that contains both storm and sanitary wastewater during heavy rain falls. Secondly, pollutants such as road salt and pesticides are carried into the lake from creeks, rivers and storm sewers. Lastly, storm water pollution from other municipalities is carried downstream into our waters. Due to storm water runoff and untreated overflows from combined sewers, E.coli bacteria levels increase in Toronto's creeks, rivers and in Lake Ontario. Some suggestions to decrease the contamination of water are: cleaning up animal wastes (including dog walkers who use the wooded areas) and reducing the use of fertilizers and pesticides. Frequent water testing is also needed to check for toxic substances in the sewer system that leaks or flows into the ravines. In addition, parts of the ravine were found to contain litter which should be dropped off at a Household Hazardous Waste Depot.

Water purification involves filtering out the physical and visible particles in the water, and also involves chemical purification involving sewage treatment. There are three stages of sewage treatment; each one more intensive than the preceding stage and is a costly adventure. Primary treatment only filters out large, physical debris from the sewage water. For secondary treatment, water is filtered out of the physical debris and microbial population. It is fortunate that Toronto's water can undergo secondary treatment. Failure to treat sewage may result in the risking of human health, in terms of exposure to pathogenic microbes (such as E. coli). By testing water quality, we are one step closer to preventing water-borne diseases in our environment.

Having high turbidity can significantly reduce the aesthetic quality of lakes and streams. Water clarity impacts on both recreation and tourism. Aesthetic value can increase the cost of water treatment. A high turbidity may not be suitable for use in industrial processes; suspended solids can clog pipes and machinery. In addition, it can harbour high concentrations of bacteria, viruses and protozoa. Water turbidity can also affect invertebrates that inhabit the streams as part of the ecosystem.

Bodies of water, such as that found in the Glen Stewart Ravine, need to be kept healthy and uncontaminated. If the water quality of this environment is not maintained, there could be many repercussions. The health of the wildlife, along with the domesticated animals that are walked through this area, would be seriously affected. Loss of wildlife would affect the ecosystem of the ravine, and also if domesticated animals were also affected by the water quality, owners would suffer as much as their pets would. Poor water quality would affect community members' wellbeing as well, though the area's water supply does not come from ravine water, many families take leisurely strolls through this area and walk in the water. Therefore, these people could obtain horrible pathogens from being in this environment. Also, the plants that grow in this area might absorb this water and also become diseased as the pathogens and pollution in the water may affect their photosynthesis rates. Water quality affects many parts of an area, environmental and societal, and it is important to make sure the water stays pure in order to protect this environment.

Conclusion

The sewage leaks and wastes entering the Glen Stewart Ravine need to be monitored frequently. The recent restoration of the walkway in the ravine is a great start towards the betterment of the local ecosystem. However, the main source of pollution may be leaks from sewage systems and runoffs from the main road. Since the ravine is used by many dog walkers and nature lovers, this area must be maintained for all who value it, during this time and in the future. The ravine's health must be taken care of by all users of the lush vegetation. For an area to be ecologically sustained, the entire community must be on board to help protect it, everyone must be aware of the effects of their actions and do their best to reduce the negative impacts of these actions. For example, simply lowering the amount of garbage and litter runoff from Kingston Road by throwing trash out in proper disposal areas would definitely have a great impact on the Glen Stewart Ravine environment. If every community member did small acts, , it would certainly help sustain the Glen Stewart Ravine for future generations.. As the late anthropologist, Margaret Mead, said, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has" and if this appreciation and love for the Glen Stewart Ravine grows more popular with the Beaches community, this area definitely could be sustained for future enjoyment.

For eco-experiential learners, the ravine is more than an experimental project for students taking science. Here, students' natural curiosity can be capitalized by engaging them in touching, smelling and truly experiencing nature. A direct interaction with the natural setting is truly required in a society that often turns to technology for fun and relaxation. As educators, it is our responsibility to empower our students to make inquiries, to challenge decisions and make new ones. Environmental inquiry, whether it encompasses science or social-environmental issues, needs to be available for those future generations as well.

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Jolina Marie Cuevas

Stephanie Kotiadis

PHOTOS

Clockwise starting from left

Allanna Hopper, left bottom,

de Silva, D., Left top

Marciano, A., center top

Kotiadis, S., right top

Dacanay, K., right,

Cuevas, J., center.