Importance of Environmental Education and Public Outreach for the Stewardship of Primary Forests:

The Catchacoma Old-growth Forest

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Summary

Ultimately, the most significant lesson we have gleaned from the Catchacoma Forest Project is that effective forest conservation and protection efforts require getting the message out in as many ways as possible. Catchacoma Forest outreach has taken place through public hikes, educational field trips, public talks, educational booths at local events, popular press articles, technical reports, meetings, and a documentary film. The more mediums and approaches used and audiences engaged, the more significant the impact will be.

Introduction

In the fall of 2022, I was in the field surveying old-growth trees in the central portion of the Catchacoma Forest with the help of a volunteer (Image 1). She is a brilliant naturalist, easily naming various species of trees, plants, birds, and fungi as we walked through the Forest. Soon after meeting that same morning, we had learned that both of us originally grew up in Toronto, Ontario. And so, as we made our way through the Forest, moss underfoot and towering hemlocks above us, she asked me how it was that I came to love nature and work as an ecologist if I grew up in Toronto.

Image 1. Surveying Old-growth Trees in Central Portion of Catchacoma Forest with Volunteer, October 2022

It was what she implied in her question—the rarity of connecting with nature if you are from an urban area— that really made me stop and reflect. Until that moment, I had never truly appreciated how my experiences as a child—visiting family outside of the city and spending time in wild places—had given me the chance to form a special bond with the natural world.

As it happens, this reflection is supported by abundant research that shows that time spent in nature, especially as a child, fosters care and concern for the natural world and ultimately motivates environmental action (Chan et al 2016; Charles et al 2018; Ives et al 2018; Chawla 2020). Unfortunately, as a result of increasing urbanization, technology, and sedentary lifestyles, people are spending less time in nature—and it is having an impact (NRPA 2013; Parks Canada 2014; Soga & Gaston 2016).

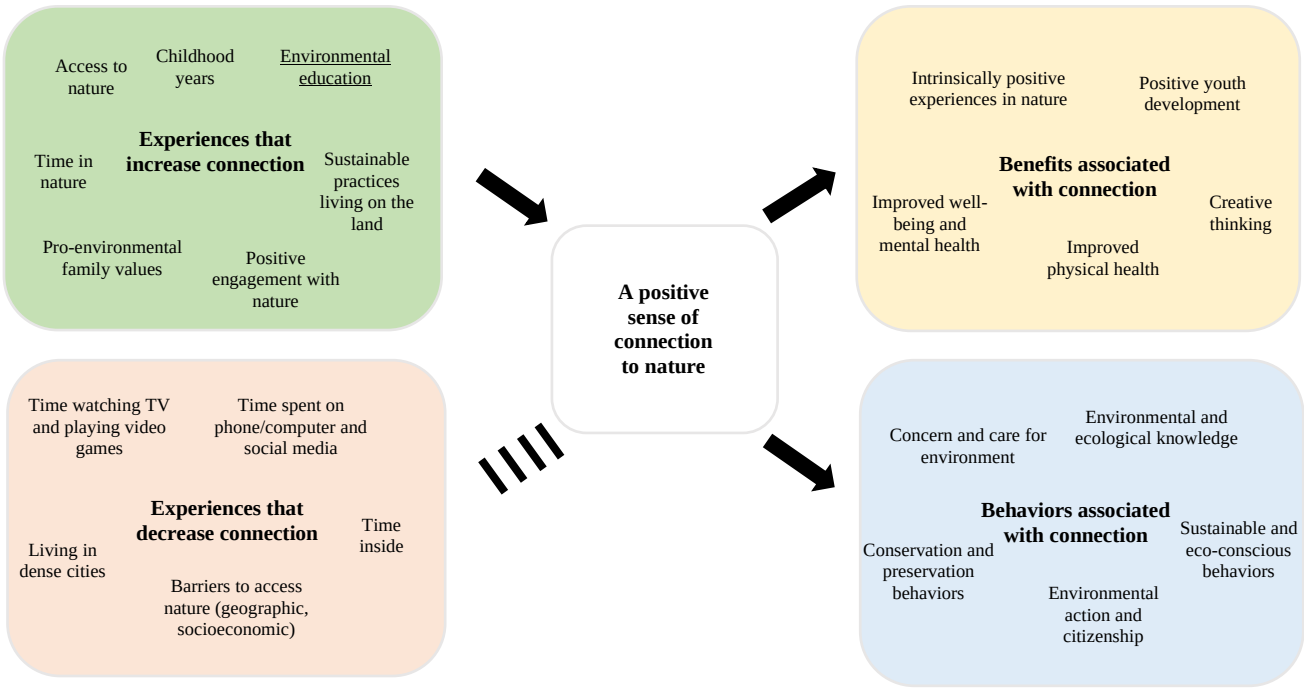
References to nature in books, films, and song lyrics have been steadily decreasing since the 1950s (Kesebir & Kesebir 2017). We are now at a time when children can name more Pokémon characters than real wildlife species (Balmford et al 2002). Canada's national symbol – the 'beaver'—was removed from the Oxford Junior Dictionary in 2008, along with other well-known species like acorn, ivy, heron, and magpie (Parks Canada 2014). The evidence is clear: our connection to nature is fading.

Even the way humans and nature are often discussed in the same sentence – as separate entities – reflects the gaping disconnect of modern-day humans and the natural world (Vining et al 2008). And it is this disconnect that is ultimately digging us deeper into our current environmental crisis.

It is clear that an essential step towards solving any environmental issue is fostering a connection between people and nature (Figure 1). Because how can you begin to have respect, concern or care for something that is a stranger to you? Among others, public outreach and education are valuable tools in addressing this question.

Public outreach is a relatively broad term, encompassing various approaches, stakeholders, and target audiences. In its simplest form however, it is the act of engaging the public in an issue or cause. Environmental public outreach typically aims to promote awareness, education, and concern around an environmental issue, and then generate support and community action to solve said issue (Climate-ADAPT 2015; University of Massachusetts Amherst n.d.). Environmental outreach can take the form of news articles, films, videos, teaching material, campaigns, and community activities and events, among others. Environmental education is at the core of environmental outreach, and is discussed in depth in this chapter.

Figure 1. Inputs and Outcomes Associated with Connection to Nature

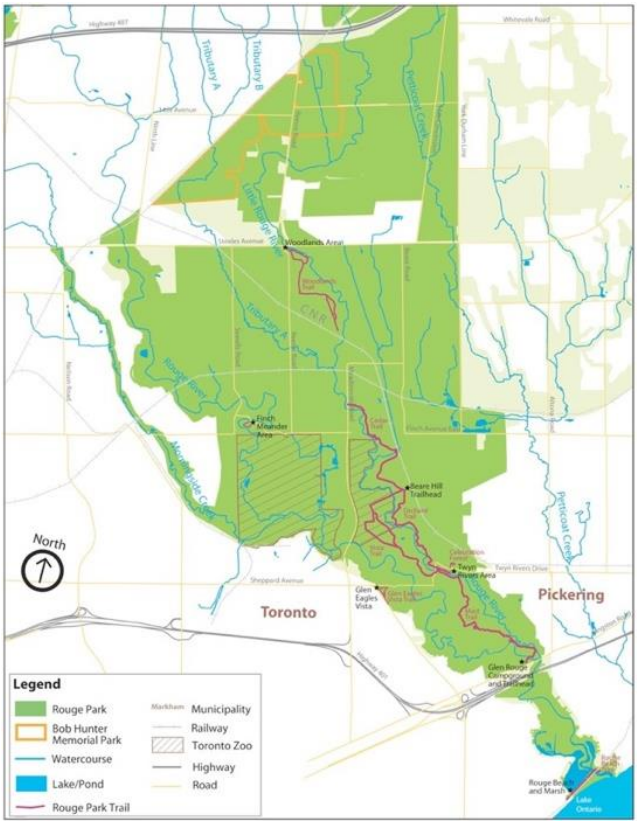


(Adapted from Chawla 2020)

Environmental education (EE) allows individuals to gain awareness of the natural world and acquire knowledge, skills, values, and experiences in their environment that can then motivate them to protect it (Ardoin et al 2020). Both public outreach and environmental education are valuable in the way they connect people to environmental issues, stimulate real environmental action, and mobilize local knowledge and resources (Ardoin et al 2020). As public concern is often the impetus for formulating policy (Bernabo 1995), it is imperative that it is not just scientists, activists, and politicians engaged in environmental issues but also the public at large.

Take Rouge National Urban Park in Toronto, Ontario for example. Beginning with a group of local citizens who formed the organization Save the Rouge Valley System (SRVS) in 1975, it took more than 30 years and the continued determination and effort by various community members and organizations to protect this area (Finkelstein 2018). Education and outreach brought interested stakeholders and activists together and rallied advocacy efforts, resulting in the creation of Canada's first and largest Urban National Park in 2015 (Image 2; Merringer 2013)

Image 2. Rouge Valley Urban Park (RVCC 2022)



Environmental education and outreach are especially powerful tools in the conservation and protection of primary forests (unlogged), including old-growth. They can connect people with forest landscapes, educate about the ecological, spiritual, health, educational, and research values of old-growth forests and the various threats they face, and motivate public engagement in forest conservation and protection (Lemieux et al 1995; FSG 2019).

Environmental Education: What and Why?

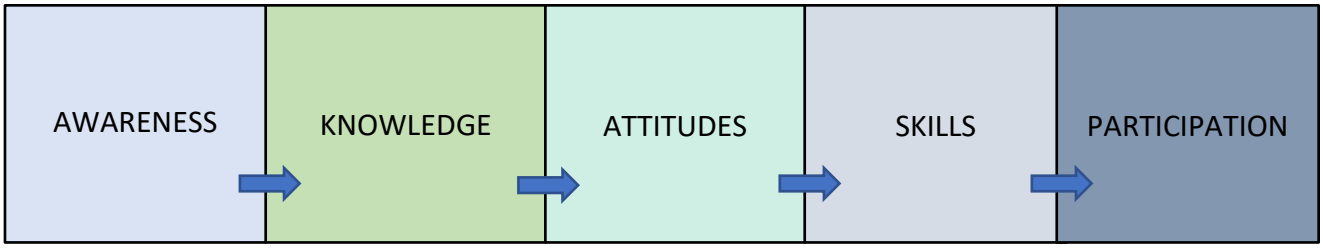
Humanity's growing disconnect from the natural world is occurring in a series of detrimental cycles that must be broken. The average human now lives 9.7 km away from a natural area – 7% farther than in 2000 (Cazalis et al 2022). As more people move to urban areas, these areas become more densely developed which erodes opportunities for urban dwellers to experience nature, and as time spent in nature declines, so does their interest and care for the natural world, which then further reduces their motivation to seek out natural areas (Soga and Gaston 2016).

This disengagement from nature is likely to be passed down from parents to children, which overtime may cause a generational shift wherein the public has less understanding and value for the natural world and is thus less invested in its protection (Chawla 2020). This cycle, often referred to as the "extinction of experience" occurs similarly with technology. For example, children today spend only 4 to 7 minutes in unstructured outdoor play per day while spending an average of 7.5 hours in front of electronic media (NRPA 2013). As people spend more time engaging with technology like television, social media, and video games, they spent less time in nature, and so their understanding and concern for the natural world diminishes, and so on (Parks Canada 2014).

One of the worrisome dangers of this disconnect from nature is the risk of generational environmental amnesia, a phenomenon wherein each new generation uses their childhood experiences of nature as a reference point from which they measure environmental degradation in the future—so as people spend less time experiencing nature, their reference point changes, indifference to environmental degradation grows, and people become less motivated to speak up and take environmental action. EE is perhaps one of the most powerful tools for dismantling these cycles and rebuilding and fostering connections between humanity and the natural world.

So, what exactly is environmental education? EE is a process that provides learners with awareness and knowledge about the environment and fosters the development of the attitudes, skills, and motivations to enable learners to make informed decisions and participate to help solve environmental issues (Figure 2; Zandvliet et al 2007; USEPA 2022). The goal of environmental education is the facilitation of environmentally literate citizens (CEGN 2006).

Figure 2. The 5 Main Components/Outcomes of Strong Environment Education



EE aims to integrate concepts and principles from the natural and social sciences (i.e., ecology, biogeography, sociology, psychology, politics, economics, etc.) into an interdisciplinary framework (Zandvliet et al 2007). As such, EE requires a multi-disciplinary approach that is respectful of the diversity of values that exist in our society. It is particularly important to provide students with tools and skills to think critically, to analyze issues from multiple perspectives, and to encourage the acknowledgement and respect of other perspectives (Zandvliet et al 2007).

There are three main ways to deliver EE including: (1) formal - where learning takes place in the formal education system, (2) non-formal - where learning is organized in programming or activities provided by community organizations, youth groups, nature/interpretive centers, etc., and (3) informal - where learning occurs outside any organized educational or institutional structure, such as in every day experiences, interactions with others, media and personal reading (CEGN 2006).

As an umbrella, EE covers a range of topics - from wilderness education to conservation education, outdoor education, ecological education, place-based education and sustainability education. Sometimes these terms are used interchangeably, but mostly they reflect a specific focus, philosophy, or approach that distinguishes them from the others. For example, place-based education emphasizes the value of connecting learners to their local community, whereas sustainability education emphasizes the integration of the environmental, economic, and social spheres (CEGN 2006).

EE is a critical tool in solving current environmental issues, which requires the support and active participation of not just environmental experts, but of the general public who take on influential roles as consumers, voters, employers, and community and business leaders (CEGN 2006).

What is Needed to Foster Strong Environmental Education?

As a broad, interdisciplinary subject that can take many shapes and forms, what exactly is effective EE? What approaches or factors cultivate strong and effective EE? One of the most important approaches is *outdoor, experiential learning* (Zandvliet et al 2007; Sutherland & Swayze 2012; Jose et al 2017). This type of learning is rooted in real-world experiences that take place outside the classroom. These experiences encourage meaningful connections with nature and positive environmental values and attitudes (Parks Canada 2014; Rosa et al 2018). In essence, experiential learning is “learning by doing”. This mode of learning fosters a real passion for learning that many individuals carry throughout their lives.

The real-world facet of experiential learning encourages critical thinking, decision making, and active participation and helps students to engage with material and see the meaning and outcomes of their learning (Parks Canada 2014). Encouraging respect, humility, and gratitude for the natural world is a key component of experiential education, and of EE in general (Zandvliet et al 2007).

Place-based education is another type of experiential learning that is particularly successful for delivering strong EE. It differs from conventional classroom-based education in that it

focusses on the local community as the primary resource for learning. It immerses learners in local heritage, cultures, landscapes, nature, opportunities and experiences as its foundation (Clark 2014).

Place-based education can be particularly effective for providing *hands-on* and *action-based* learning - another key approach for strong EE (Thomson et al 2010). Giving students the opportunity to build on their knowledge, skills, and values and apply them in action-based projects in the community promotes higher-order thinking and cooperative contexts for students to learn about environmental problem solving.

Integrating formal and informal education in the community can help students apply formal learning in a real-world context, better understand the interdisciplinary nature of environmental issues, and make meaningful environmental impacts in the community (CEGN 2006). Partnerships among educational institutions and government agencies, private business, and environmental NGOs can all act as mechanisms to promote this kind of action-based EE (Bjorkland and Pringle 2001).

EE *focused on children and youth* is another particularly important strategy as an opportunity to make an impact at a key developmental stage of life in order to promote a lasting curiosity and concern for the natural world (CEGN 2006; Rosa et al 2018). A study by Wells and Lekies (2006) interviewed thousands of adults and concluded that their environmental attitudes and relationships with nature were developed as a child, usually by the age of 11. They also found that children who engaged in nature-based activities such as gardening, visiting parks, outdoor learning, and unstructured outdoor play were more likely to appreciate and protect nature as they got older. These results demonstrate that early experiences in nature are fundamental to nurturing positive environmental ethics.

Integrating Indigenous Knowledges

Despite the rich lessons that Indigenous Knowledges (IK) hold for environmental stewardship and sustainability, they have largely been overlooked and marginalized in mainstream EE, both for non-indigenous and indigenous learners (Sutherland & Swayze 2012; Nesterova 2020). EE can play a vital role in decolonizing Western education by including IK and its pedagogies (Sutherland and Swayze 2012).

Where traditional Western science typically encourages the exploitation of the natural world and its resources by positioning humans as separate from and above nature, Indigenous science typically shares the view that humans are an interdependent part of the natural world, and as such we must treat nature with respect and care (Aikenhead 2007; Sutherland and Swayze 2012; Nesterova 2020). Integrating IK, ways of knowing, and educators in EE is therefore a major step to culturally appropriate and holistic learning of the environment, sustainable practices and attitudes, and paths towards reconciliation (Zandvliet et al 2007; Nesterova 2020).

As different Indigenous groups inhabit different landscapes, IK across the globe is not a monolithic system but rather a mosaic of unique place-specific epistemological processes including relationships with the land, knowledge systems, and approaches to learning

(Nesterova 2020). The challenge with respectfully including IK within EE programs is therefore to ensure that the strategies used reflect *local* cultural traditions, languages, beliefs, and perspectives (Sutherland and Swayze 2012).

The localization of EE is being emphasized by programs sprouting up across the globe. '*Facing the Mountain Education*', is one such program, developed by the Bunun Indigenous group in Taiwan for indigenous and non-indigenous students. One of the core principles of this program, which can be adopted in EE programs abroad, is the importance of localizing EE programs in order to rebuild on land-based knowledge, develop concern and obligation to protect local conditions and traditions, and rely on local or Indigenous pedagogies, knowledge systems, and educational structures and leadership (Nesterova 2020).

Another inspiring EE program closer to home in Manitoba, Canada is '*Bridging the Gap* (BTG)'—a year-long program that provides grade 4 low-income students from Winnipeg with free, culturally relevant, experiential science-based EE programming. Activities include day trips to local natural areas, in class-activities like seed starting and medicine wheel lessons, and hands-on experiences such as urban gardening and stewardship initiatives (BTG 2020). BTG is an inspiring example of an EE program that did not originally incorporate IK into their program (content was solely focused on addressing learning objectives from the Manitoba Science Curriculum), but now brings together EE and local IK and cultural values by placing equal emphasis on addressing the Manitoba Aboriginal Languages and Cultures Curriculum (BTG 2020).

For EE programs globally looking to integrate local IK into their programming, a valuable resource is an Indigenous science education framework also developed in Manitoba, Canada called Ininiwi-kiskānītamowin – meaning "the knowledge of the people in how we understand the earth" in Swampy Cree[1] (Sutherland and Henning 2009). This framework identifies several foundational components for successful educational programming in Indigenous cultural contexts, such as the incorporation of (1) elders (2) culture (3) language and (4) experiential learning (Sutherland and Swayze 2012).

Eco-Anxiety: A Major Challenge

As our current ecological crisis worsens, so is a mental health phenomenon known as *eco-anxiety*, which is a culmination of feelings like guilt, grief, fear, anger, and despair that are linked to climate change, the biodiversity crisis, and other complex environmental issues (Pihkala 2020). The growing wave of eco-anxiety poses a significant challenge for EE. This is due to the overwhelming nature of the suite of environmental issues that people throughout the world face and the psychology of despair that can result from it.

Many experience a demoralizing loss of hope for the future and a belief that environmental action is futile and pointless (Chawla 2020; Hudson 2001). As such, it is more important now

[1] Swampy Cree is a rendition of the Algonquian language spoken in many communities in Northern Manitoba, Central Northeast Saskatchewan, and along the coast of the Hudson Bay and James Bay (Sutherland & Swayze 2012)

than ever to cultivate a culture of hope, particularly among youth and educators who are disproportionately experiencing eco-anxiety (Zandvliet et al. 2007; Chawla 2020).

When young people are concerned about environmental issues and believe that they and others can help address these issues, they are more likely to feel hope (Bethune 2020). Where despair and fear are negatively related to action, hope and concern motivate action, thus making it a crucial part of EE (Li and Monroe 2019). Cultivating hope in EE requires teaching about a vision of a possible positive future, the awareness of pathways to reach this future, and the belief in the ability that this can be achieved (Hudson 2001, Chawla 2020).

Creating a receptive space for people to express their emotions without fear of judgment is also an important aspect of addressing eco-anxiety. Adolescents are more likely to express constructive hope regarding environmental issues when they anticipate their teachers will respect and support their emotions rather than dismiss them (Chawla 2020).

Other key steps to addressing eco-anxiety in EE include: (1) providing people with opportunities to take action and see the positive consequences, (2) connecting people with nature, (3) making information personally relevant by relating it to local issues, and (4) fostering community and collective action (Chawla 2020). Ultimately, while EE requires discussion of threats and damage to the natural world, it is also critical to show the beauty and wonder of the natural world and to foster hope to promote positive action (Hudson 2001).

One example of fostering hope is the *Southeastern Forests and Climate Change Curriculum*, developed by the University of Florida and Project Learning Tree for U.S. high schools. In this curriculum, 14 experiential activities teach students about the responses of regional forests to climate change (PLT 2019). Activities foster hope by teaching students about what they and others can do to aid this issue, what impactful actions others are taking such as scientists and landowners sharing practices to sequester carbon and promote forest resilience, and the impact that present decisions have on future realities (Monroe and Oxarart 2015). This curriculum features positive possibilities, pathways, and agency, and as students' knowledge increased, so did their hope and motivation in the face of the environmental issues that they were learning about (Monroe and Oxarart 2015).

The Case of the Catchacoma Old-Growth Forest

Purpose of Education and Outreach

Since 2019—when it was discovered that the Catchacoma Forest was the largest known old-growth eastern hemlock stand in Canada—Ancient Forest Exploration & Research (AFER), the Ontario Wilderness Committee (OWC), and the Catchacoma Forest Stewardship Committee (CFSC) have been running education and outreach activities in the Forest.

The purpose of these activities has been to:

- increase awareness of the Forest among local people and communities,

- encourage connections between people and the forested landscape,
- educate people about the Forest's suite of non-timber values and unique old-growth,
- generate awareness about the 2019-2021 logging that took place in the Forest, the upcoming contingency logging scheduled for 2021-2031, and all the work that AFER, OWC, and CFSC have done to halt logging and make the forest a protected area, and
- encourage people to act – to support and advocate for the protection of the Forest.

Catchacoma Forest Stewardship Committee

The CFSC has been an integral force in facilitating education and outreach opportunities to support Catchacoma Forest protection efforts. The Committee is comprised of local citizens such as landowners, cottagers, teachers, students, ecologists, naturalists, seniors, and representatives from the Catchacoma Cottager's Association, the local rate payer's association, AFER, and OWC.

Members are intimately familiar with the ecology and history of the local landscape and with the issues of most concern to local residents. Members also have their own unique connections to the local community and beyond, and have used these connections to spread the word about the special values of the Catchacoma Forest and to inform on protection efforts within relevant political spheres. Finally, committee members have facilitated press coverage through outreach and education, and have provided outreach and input to municipal and provincial land use planning processes.

Impact of Covid-19

Covid-19 struck in Ontario shortly after AFER discovered that the Catchacoma Forest was in fact the largest known stand of its kind in Canada—and that the Forest was about to be logged. Though AFER and OWC immediately focused on engaging with the Ministry of Natural Resources and Forestry (MNRF), the Ministry of Environment, Conservation and Parks (MECP), and the Bancroft Minden Forest Company (BMFC) to advocate for the protection of the Forest, Covid-19 limited opportunities to engage the public in education and outreach activities to rally support during this time. School closures made bringing classes into the Forest for education more difficult. Meeting in groups was very limited even in the outdoors, which made it difficult to facilitate outreach events.

When meeting in the outdoors was once again allowed, people were still hesitant to meet in groups which continued to make it challenging to unite people to rally protection efforts. Ultimately, as a result of the pandemic, considerable education associated with the protection of the Catchacoma Forest has been run outside in the Forest since it began over three years ago. Although running activities in the Forest itself is likely the most meaningful for participants, certain barriers can make it challenging to organize and run these activities (i.e. schools not having available funds to bus students to the Forest, liability-related hesitancy of schools to send their students into the Forest, teachers' lack of awareness of the Forest and knowledge of the area, etc.), which were additional challenges during the pandemic and still are today.

Public Hikes

Since 2019, AFER staff and Katie Krelove from the OWC have run ten public hikes in the Catchacoma Forest. From summer biodiversity explorations to winter snowshoeing to observe wolf tracks, spring wetland walks and fall turtle talks, these hikes brought roughly 300 people into a unique Forest experience (Images 3a, 3b). Participants were led through both logged areas and intact old-growth forest as they learned about the history of logging in the Forest and the efforts of AFER, OWC, and CFSC to halt upcoming logging and make the Forest a permanently protected area.

Participants were also taught about the ecology of the landscape – from the species at risk that inhabit the Forest, to its old-growth characteristics, to the ecology of eastern hemlock and why it is so unique to see such a large expanse of this old-growth species in one area. Through the hikes, participants were also taught about the suite of non-timber values that the Forest holds— wildlife habitat, carbon storage, pollination, water and air filtration and purification, human health benefits, recreation, education, and research opportunities, and more. The aim of these hikes was to increase awareness of the Catchacoma Forest among local people, foster a connection between them and the Forest, and ultimately to motivate them to help support efforts to protect this unique and valuable old-growth forest.

Image 3 a, b. Winter solstice public hike in Catchacoma Forest, January 2022

The Peterborough Youth Leadership in Sustainability Program

A major avenue of education and outreach in the Catchacoma Forest over the past three years has been the collaborative partnership between AFER and Youth Leadership in Sustainability (YLS). YLS is an innovative, experiential-learning program founded by Cameron Douglas and based in Peterborough, Ontario that prepares grades 11 and 12 students for

leadership roles in sustainability initiatives at local to global levels. In 2019, AFER approached the YLS class with a unique citizen science project opportunity.

This project, funded by the Ontario Trillium Foundation, aimed to find, document and characterize old-growth forests in Peterborough County. Using Ontario government forest mapping data (FRI data), the AFER team had recently discovered the area now known as the Catchacoma Forest – that appeared to hold a significant expanse of old-growth. However, they still needed to conduct considerable field work in the Forest to assess for old-growth features and better understand the ecology, natural history, and conservation values of the area. And so the YLS class joined their call, venturing into the Forest, and learning about citizen science and old-growth forest ecology first hand as they helped AFER to survey the most accessible portions of the Catchacoma Forest.

Before their initial visit to the Forest, students received two full days of training – one in the classroom and one in the field—on establishing plots, assessing habitat features and evidence of logging, trees species identification, measuring tree DBH, and evaluating coarse woody debris. With AFER staff direction, students then established and sampled ten plots in the Catchacoma Forest in order to perform rapid assessments of old-growth characteristics. Students provided approximately 550 person-hours of field effort for this project, and from the data they collected, various reports have been written (i.e., Quinby and YLS 2021).

With the looming upcoming logging, “our [forest] metrics work quickly turned into advocacy work”—says Cameron Douglas, founder and teacher of the YLS program. The YLS class reached out to BMFC and continued to work with AFER and OWC to advocate for the protection of the Forest. Since their initial venture into the Forest, the YLS class has not stopped contributing to this effort. Each year, a new group of students joins the program and they come to know the Forest in their own way, helping AFER with new research projects and advocacy efforts (Images 4a, 4b).

Image 4 a, b. YLS educational hike, September 2022

This past year in October 2022, the YLS class had their first ever over-night field trip into the Catchacoma Forest (Image 5). Carrying their packs and gear 2 km in from Highway 507, they set up a base camp atop a ridge overlooking Pencil Creek with no facilities, running water, outhouses, firepit, picnic tables, or tent pads. A real back-country experience for these 22 students. Over the two days that the class spent camped in the Forest, they helped to establish and sample four plots in the logged areas west of Pencil Creek. While sampling the trees, snags, logs, and stumps of each plot, students learned how to use field sampling equipment such as DBH tapes and calipers, and they learned field techniques such as laying out plots, tree species identification and dead wood decay class assessment (Images 6-7).

Image 5. YLS students setting up overnight camp in the Forest, October 2022

This field work was part of an AFER project aimed at determining how much carbon the 2019-2021 logging removed from the Forest and how carbon in logged areas compares to intact areas. When the field work was finished for the day, students returned to their camp and settled under the stars as they cooked over a fire, told stories, and connected with the land around them in a way that few people have the opportunity to do (Images 8-9). To keep things interesting, temperatures overnight dropped below freezing, but students were prepared and kept their spirits high as they spent the next day exploring the towering old-growth trees east of Pencil Creek.

The partnership between AFER and YLS has been a very positive force over the past three years. It has brought over 85 students in critical developmental stages of their lives into a unique landscape, where they have learned about old-growth forest ecology, conservation biology, citizen science, forest management, and environmental advocacy.

Image 6. YLS students sampling a logged plot for carbon project, October 2022

Image 7. YLS students sampling logged plots for carbon project, October 2022

Image 8. YLS class dinner on overnight trip to the Forest, October 2022

Image 9. YLS class on overnight field trip in the Forest, October 2022

Grade 6 Class

In addition to the YLS program, other school classes have ventured into the Catchacoma Forest with AFER and OWC staff as their guides (Image 10). In November of 2022, 30 students from a grade 6 class at Roger Neilson School in Peterborough, Ontario took to the Catchacoma Forest for an educational field-trip guided by AFER (myself) and their teacher, Nansi Harris (Image 11).

Image 10: Fleming College class educational hike and forest bathing trip in the Forest, October 2022

"*It was a perfect winter wonderland day and despite the cold and the damp students were thrilled to be out in the woods and awed by the beauty and majesty of the forest*", says Nansi. The class hiked through the stumps of logged areas and then deep into the intact old-growth east of Pencil Creek.

They spent the day among the towering trees – learning the differences between white pine and eastern hemlock, red oak and white oak. They were encouraged to observe and notice things around them – the fungi growing on trees, the various animal tracks, the leaves poking out from the snow that gave hints about what trees were around them. Students got to nibble on wild wintergreen and use DBH tapes find white pine and hemlock mother trees.

Image 11. Grade six Roger Neilson class educational field trip in Catchacoma Forest, November 2022

A highlight for many students was a silent solo walk beneath the giant hemlocks along Pencil Creek (Image 12). "*They talked about feeling calm and grounded, and about how they felt peaceful and quiet inside*", says Nansi. Near the end of the trip, students drank hot chocolate and roasted hot dogs and marshmallows over a fire beside the Pencil Creek wetland—many of them for the first time in their lives (Image 13).

Image 12. Solo walk with Roger Neilson class, November 2022

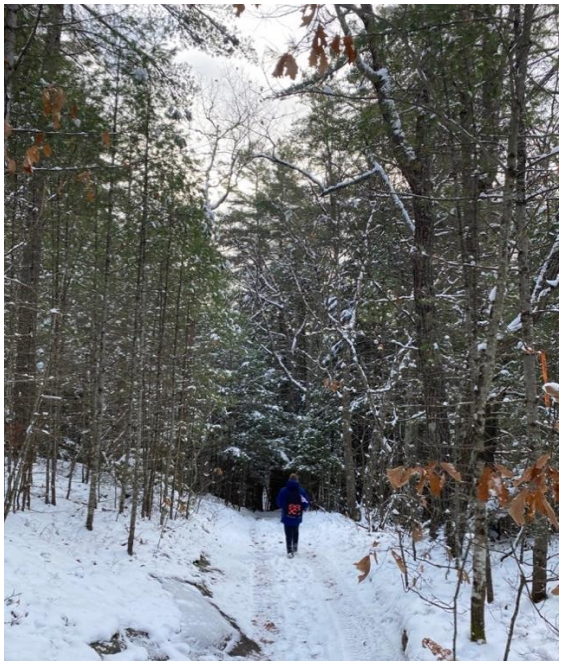


Image 13. Roasting marshmallows with Roger Neilson class, November 2022

This field trip was very special for the many students who had never before experienced a large intact natural area such as the Catchacoma Forest and would not normally have the opportunity to do so because of the costs associated with this kind of trip.

One of the teachers explained to me that, especially for the girls, these experiences in nature were few and far between, if they existed at all. She explained that many girls' families did not view experiences in nature as important, and combined with socio-economic barriers, these kind of nature opportunities were therefore very rare. Due to these barriers, Roger Neilson School covered all costs associated with this field trip so that students could join, even giving them the option to bring their family members if they wished.

Forest Bathing

In the fall of 2022, two classes – an ecotourism class from Fleming College and the YLS class—came to the Forest separately for a unique experience: forest bathing with our guide, Beth Foster. Within the towering old-growth trees east of Pencil Creek, Beth led students through their first ever forest bathing experience—a slow meditative walk where students were frequently invited to connect with the forest using their five senses (Image 14).

Image 14. YLS class forest bathing session with Beth Foster, September 2022

Students were invited to roll sprigs of hemlock between their fingertips and inhale deeply to connect with the smell of the Forest. They were invited to look closely from the forest floor up to the towering canopy for any signs of movement, to connect with the sight of the Forest. Students were invited to drink tea steeped from the hemlock around them, to connect with their sense of taste (Image 15). Again and again, as students walked through the Forest with Beth's invitations in mind, she would ask them: "*what are you noticing*?" Students were encouraged to slow down, observe, notice, and connect.

Image 15. Fleming College class tea ceremony in forest bathing session with Beth Foster, October 2022

Forest bathing, also known as forest therapy or Shinrin-yoku—meaning "*absorbing the forest atmosphere*"—is a term that was coined in 1982 by Yoshifumi Miyazaki, a professor at the Chiba University for environment, health, and field sciences in Japan (Park et al. 2010). Miyazaki was one of the first to conduct scientific research on the health benefits of forest immersion. Now, due to the robust research surrounding the health benefits of forest bathing, it has become an integral part of preventative health care and healing in Japanese medicine and is now spreading across the globe (Park et al. 2010).

Forest bathing has been found to decrease physiological stress, boost immune response and reduce depression and anxiety, namely by lowering cortisol concentrations, pulse rate, blood pressure, inflammatory cytokines, and blood glucose, and by increasing parasympathetic nerve activity (Park et al. 2010; Kuo 2015). Forest bathing impacts physiological, immune system, and mental health responses through various pathways such as phytoncides, which are antimicrobial volatile organic compounds given off by plants, *Mycobacterium vaccae*, a microorganism found in soils, and the sights and sounds in natural landscapes (Kuo 2015).

The accumulating body of research surrounding the health benefits of forest bathing and time spent in nature has led to the development of a novel type of prescription known as "*green prescriptions*". As the name suggests, these prescriptions allow health care professionals to prescribe time spent in nature to their patients. Across Canada, licensed health-care providers in four provinces – British Columbia, Saskatchewan, Manitoba, and Ontario—are starting to hand out these prescriptions to patients. Some doctors even give their patients yearly passes to Canada's National Parks, marine conservation areas and historic sites to encourage nature experiences (PaRx 2022). They are doing so through a BC Parks Foundation initiative called *PaRx*—Canada's first national, evidence-based nature prescription program driven by health-care professionals who want to improve their patients' health by connecting them to the natural world (PaRx 2022).

Green prescriptions and forest bathing are bringing a new dimension to the environmental movement by intertwining and legitimizing the improvement of human health with time spent connecting with nature. As green prescriptions can be used to cover the cost of forest bathing sessions, they can increase access to this unique type of environmental education that provides people with the opportunity to learn about and benefit from nature in a deeply personal and spiritual way. With this easy access, forest bathing has the potential to make significant positive impacts in environmental education and action across the world, and to counteract the ever-increasing problem of eco-anxiety.

Saving Catchacoma Documentary Film

A major public outreach event run by the CFSC in the effort to protect the Catchacoma Old-growth Forest was the creation and premier of the documentary *Conserving Catchacoma*. This short documentary was produced by Mitch Bowmile, and profiles community efforts to protect the Catchacoma Forest from logging. The documentary was featured in the *2022 ReFrame Peterborough International Film Festival*—a festival showcasing environmental and social justice films in late January 2022.

The film was screened at Patagonia in Toronto for Earth Day in April 2022, and then launched publicly online in June 2022. The documentary has been featured in various articles published in the *Peterborough Examiner* and *Kawartha Now* for awareness-raising and fundraising efforts. It was a semi-finalist for the *Films for the Forest* 2022 competition run by Rainforest Partnership (https://www.filmsfortheforest.org/).

The film can be viewed here:
https://vimeo.com/725771400?embedded=true&source=video_title&owner=1726930.

Press Coverage

The rare old-growth in the Catchacoma Forest and the efforts to protect it have also received considerable press coverage (~20 articles), which has served as outreach to the local community and beyond. Articles written about the Catchacoma Forest have been published in the *Peterborough Examiner*, *National Post*, *Canada Today*, *The Toronto Star*, *Ontario Nature*, and *Kawartha Now* (https://www.peterborougholdgrowth.ca/press-coverage). Since 2019, abundant resources and action tools to learn more about the Catchacoma Forest and send advocacy letters to the MNRF, MECP, and BMFC have also been made available on the OWC online platform (https://www.wildernesscommittee.org/take-action/support-protection-catchacoma-old-growth-forest).

Meetings

In-person and internet (e.g., Zoom) meetings with government officials, certification bodies, forestry companies, other NGOs, expert advisors, local citizen committees, the general public, supporters, etc. are good opportunities to educate people about a particular forest conservation issue. These interactions were utilized by the CFSC to get the word out about the non-timber values of the Catchacoma Forest.

Outcomes and Lessons Learned

Students Naturally Engage with Nature

After the Roger Neilson grade six class excursion to the Forest, their teacher Nansi Harris commented that,

"*students were their absolute best selves during their trip to the Catchacoma Old-growth Forest. They enjoyed being explorers and adventurers and despite the cold, and the long hike, stayed positive and enthusiastic about how special it was to be in the woods. When we talked about the trip back at school, they were unanimous in their conviction that we need to protect the Forest for future generations of kids and families. And, they want to know when we can go back*."

This positive sentiment was echoed by Cam Douglas, founder and teacher of the YLS program, when discussing his class' overnight visit to the Forest in November, 2022:

"They loved the overnight that we spent there. To me, a deeper connection happens when you're able to step back and have that unstructured time in the forest, under the stars, by the campfire, singing songs, waking up in the morning and seeing the mist rising and having slept in the tent. That was a really powerful experience, to have that time in a wild place."

Cam Douglas also commented on the YLS class' 2022 forest bathing experience in the Forest, saying,

"I really appreciated the work we did around forest bathing with Beth Foster, to be present in the land and soak in the sounds and smells and feel—it fosters a really deep personal connection. I think that's a really important starting point for the rest of the world, to feel that deep connection with the forest. And that's not going to happen with any forest— some forests are heavily tracked out with people, some are close to sound and noise. There is value in the fact that you can walk into this forest and absolutely feel like you are in the wilderness, so that you are able to nurture that deep connection."

Personal comments like this, from both teachers and students who have visited the Catchacoma Forest, help shed light on the impact and effectiveness of the educational experiences that the CFSC has run in the Forest. In turn, obtaining feedback helps us to modify and improve these educational programs for the future.

Education Value of Catchacoma Forest

We know that education and outreach activities in the Catchacoma Forest are a valuable way of educating people about the forest itself and its protection efforts. However, through these activities we also learned that the Forest has immense educational value for environmental education and learning in broader contexts. It is a rich outdoor classroom, offering immeasurable opportunities for individuals to learn about the natural world in unique old-growth forest, wetland, and riparian ecosystems.

"*We are dialing in more on the relevance and importance of old-growth and the concept of the mother tree, and there's really not many places around this locale where you can get into an old-growth forest like Catchacoma and see what these mother trees look like… the canyon, the wetland, all these things are pieces you can throw together in conversations about water courses, water buffers, the roles that wetlands play*" says Cam Douglas.

The Forest may also be particularly impactful for some individuals' life-long learning and career directions. For example, in *ReWilding the Classroom,* a documentary about the YLS program, one student commented that "I really enjoyed going up to the Catchacoma Forest and plotting out how much carbon was in the area. That's something that really interests me and I think that could be something I could actually do as a career when I'm older."

The forest's close proximity to Peterborough (~45 min) provides an incredible opportunity for the 6 large high schools, 20 elementary schools, and various post-secondary education institutes such as Trent University and Fleming College in Peterborough to engage in meaningful, local, outdoor environmental education.

Action

It is evident from personal reflections that students took away positive, meaningful experiences from their time in the Forest. At the CFSC we see this as a major success, as one of the main purposes of these education and outreach activities is to cultivate connections between local communities and the Forest. Measurable action is also very important, so a lesson we have learned through these education and outreach activities is to encourage students and participants to engage with the OWC action tools and write letters to decision-makers after and based on their experiences.

A total of 272 people engaged in the December 2019 – June 2021 action tool that sent an email to MNRF and BMFC in support of a moratorium on logging. After the moratorium was granted in 2021, the OWC's action tool changed and now sends emails to the MECP in support of permanent protection for the Catchacoma Forest. To date, 171 people have engaged with this tool and it is still active.

Through conversations with students from different classes and field trips, we have also learned how much students enjoy stepping outside of the classroom to experience the outdoors in a hands-on way. This is especially true for some students who find in-class learning styles to be challenging but excel in an experiential learning environment. As such, we continue to offer education and outreach events outside in the Catchacoma Forest.

Access to Nature

Through these education and outreach activities we have also learned that there are considerable socio-economic barriers that prevent some people from accessing natural areas. Within the formal education system, field trip costs are usually the responsibility of students' families, some of whom do not have the means to send their children on outdoor education experiences. Without funding opportunities to support outdoor and environmental education in Ontario's school systems, financial support to help children that cannot afford these experiences is difficult to obtain. Therefore, AFER is now looking to start an education fund to cover transportation costs for schools wishing to bring their students into the Forest.

We also learned from the Roger Neilson class excursion that inviting students' families, parents, and/or guardians to participate in outdoor education trips can be an effective way to get students comfortable in nature. It is relatively common for children and/or their families to be uncomfortable or fearful in the outdoors if they have spent little time in it. Hence, cultivating EE that families can experience together may increase student and families' comfort levels in the outdoors and the likelihood that they will choose to seek out natural places in the future.

Indigenous Communities

One facet of EE and public outreach in the Catchacoma Forest that is very much still in progress is the effort to integrate local Indigenous educators, knowledge, and ways of knowing into these events. CFSC has reached out to Curve Lake First Nation and has

connected with two local Indigenous ecologists about collaborating in Catchacoma Forest protection efforts. However, we are still working to establish a stronger relationship with these groups at the community level. One of our current funding applications specifically includes funding for the development of this effort.

The Upshot

Ultimately, the most significant lesson we have gleaned from the Catchacoma Forest Project is that effective forest conservation and protection efforts require getting the message out in as many ways as possible. Catchacoma Forest outreach has taken place through public hikes, educational field trips, public talks, educational booths at local events, popular press articles, technical reports, meetings, and a documentary film. The more mediums and approaches used and audiences engaged, the more significant the impact will be.

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AFER's Mission and Guiding Principles

AFER is a non-profit scientific organization with a mission to carry out research and education that leads to the identification, description and protection of ancient (pristine) forested landscapes, including old-growth forests. The earth-stewardship principles that guide our work include the following.

- Many forest ecosystem types are now endangered. We consider these ecosystems and other ancient forests to be non-renewable resources, which is not consistent with the practice of mining or logging them.
- We consider biodiversity conservation needs at local, provincial, federal and international scales.
- We support the Government of Canada's commitment to increase protected areas to 30% of the Canadian land base by the year 2030.
- We support the *New York Declaration on Forests* to end natural forest loss by 2030.

Additional Resources

EcoSchools Certification Canada: https://ecoschools.ca/

Forest & Nature School Practitioner Course, Child and Nature Alliance of Canada: https://childnature.ca/forest-school-canada/

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