

Claremont Colleges

## Scholarship @ Claremont

---

Pomona Senior Theses

Pomona Student Scholarship

---

2021

### Connecting Youth to Nature: Environmental Education's Role in the Future of Wellbeing and Stewardship

Claire Generous

Follow this and additional works at: [https://scholarship.claremont.edu/pomona\\_theses](https://scholarship.claremont.edu/pomona_theses)



Part of the [Environmental Studies Commons](#), and the [Indigenous Education Commons](#)

---

#### Recommended Citation

Generous, Claire, "Connecting Youth to Nature: Environmental Education's Role in the Future of Wellbeing and Stewardship" (2021). *Pomona Senior Theses*. 249.

[https://scholarship.claremont.edu/pomona\\_theses/249](https://scholarship.claremont.edu/pomona_theses/249)

This Open Access Senior Thesis is brought to you for free and open access by the Pomona Student Scholarship at Scholarship @ Claremont. It has been accepted for inclusion in Pomona Senior Theses by an authorized administrator of Scholarship @ Claremont. For more information, please contact [scholarship@cuc.claremont.edu](mailto:scholarship@cuc.claremont.edu).

# Connecting Youth to Nature: Environmental Education's Role in the Future of Wellbeing and Stewardship

Claire Generous

In partial fulfillment of a Bachelor of Arts Degree in Environmental Analysis

2020-2021 Academic Year, Pomona College, Claremont, California

Readers:  
Char Miller  
Marc Los Huertos

## **Acknowledgements**

I would first like to thank The College School alumni who shared their experiences with me for my prerequisite summer research. I would also like to thank Pomona College for funding this summer research. A huge thank you to my readers Char Miller and Marc Los Huertos for their time and guidance. Finally, thank you to my family and friends for their support.

**Table of Contents:**

<b>Introduction</b> .....	4
<b>Chapter 1: Nature Connection, Environmental Education, and its Benefits</b> .....	8
The Age of Nature-Deficit Disorder .....	8
Causes of Nature-Deficit Disorder.....	8
Defining Nature Connection .....	12
Indigenous Connection to Nature .....	14
The Painful Connection .....	18
Measuring Nature Connection .....	22
Nature Connection and Wellbeing.....	23
Nature Connection and Environmental Stewardship.....	25
The Role of Environmental Education .....	27
A History of Western Environmental Education in the U.S.....	29
Current Research on Environmental Education.....	33
Environmental Education, Nature Connection, Wellbeing, and Stewardship .....	34
<b>Chapter 2: Indigenous Knowledge and Environmental Education</b> .....	37
Indigenous and Western Worldviews .....	37
History of Colonization and the Effects on Wellbeing.....	41
Youth's Role in Environmental Education and Wellbeing .....	43
Indigenous Environmental Education .....	44
Implementing Indigenous Environmental Education .....	52
The Need for and Outcomes of Indigenous Environmental Education .....	56
<b>Chapter 3: Forest Schools and Environmental Education</b> .....	59
A Brief History of Forest Schools .....	59
What are Forest Schools?.....	61
Examples of Forest School Programs .....	66
Outcomes of Forest Schools .....	68
<b>Conclusion</b> .....	72
Moving Forward .....	73
Citations .....	75

## Introduction

During my childhood, I was constantly immersed in nature. Going to a Green Ribbon School, The College School (TCS), which was focused on outdoor experiential education, I developed a connection with nature early on in life. For nearly 60 years, TCS has integrated environmental education through its classroom curriculum, intensive local and regional field studies, week-long camping excursions, and a capstone field ecology study of ecosystems throughout the southeastern US wilderness. I attended TCS from Pre-K through 8th Grade and through my experiences there, I developed a close connection with nature and a deep love for learning. During the Kindergarten program, “Day in the Woods,” I explored and hiked in the wilderness for an entire day with my eager classmates. Like every campout or fieldtrip, we journaled, sketched, and reflected in our notebooks to capture our experiences. As I grew, the trips, campouts, and themes became more involved. In 3rd Grade, we created our own community, “River City,” where each student built a model of a business, community center, or public space alongside the river on campus. I chose to build a park and interviewed a parks manager to understand their perspective of what a park should be like and how it fits into the community.

The 5th grade caving theme involved trips to local and regional caves to study their unique ecosystems. In some caves, we had to crawl on our bellies to get through certain passages. In one of them, I was up to my waist in mud and almost lost a shoe. In 6th Grade, I went on “Wilderness,” a rite of passage week-long backpacking trip involving rock climbing, repelling, orienteering, canoeing and hiking. Solo night is the highlight of the Wilderness trip where we camp alone under the stars for one night, left with only our journals and a Hershey’s kiss as company. In 8th grade Field Ecology, we took a nine-day trip through Tennessee,

Georgia, and North Carolina. My classmates and I split into teams of botanists, chemists, human-impact researchers, zoologists, digital data collectors, and biologists to assess each natural ecosystem.

I credit my early environmental experiential learning for helping me choose my college major in Environmental Analysis and take on leadership roles in college outdoor programs. TCS instilled in me a passion to advocate for nature, be civically engaged, reflect on my experiences, and learn by doing. I was not the only one whose life choices have been influenced by my outdoor experiential learning school. During the summer of 2020, I received Remote Alternative Independent Summer Experience (RAISE) funding from Pomona College to conduct research on TCS young adult alumni. To assess TCS's impact on its students, I surveyed TCS young adult alumni focusing on participants' relationships to nature, lessons learned at TCS, personal motivation to address environmental issues, environmentally responsible behavior, and leadership development. My research revealed that most participants felt that their education contributed to their leadership abilities and environmental awareness. Most participants had a strong connection to nature and motivation to help conserve nature through environmentally responsible behavior (ERB). Some recurring themes from both the survey and interviews included confidence, adaptability, independence, caring about nature, and the importance of experiential learning and reflection (Generous, 2020). These benefits are crucial to addressing environmental issues in the world.

The environmental crises call for swift action from future generations. The earth's climate is quickly deteriorating due to increasing pressure from resource consumption, over population, over exploitation, habitat loss, spread of invasive species, pollution, and climate change (Steffen et al., 2015). Climate change also impacts the health of people with increased

disease, freshwater shortages, worsened smog and more (NASA, 2020; “Impacts of,” 2020). The Climate Clock, a display in Manhattan’s Union Square of the time left to act before an irreversible climate emergency occurs, is a dismal reminder of the immanency of the climate crisis (Hassan, 2020). With just over seven years until humanity reaches a point of no return, it is vital that youth are engaged in climate change mitigation efforts. According to several studies, children who establish a connection with nature are more likely to develop an appreciation and care for the earth (Bunting & Cousins, 1985; Martin, 1999; Sobel, 1996, 2004). Since the 1990s, researchers asking “young people about their hopes and fears for the future reveal high levels of alarm about environmental changes” (Chawla, 2020). First, children must form a connection with nature. For the sake of the planet and the health of future generations, youth must have an avenue to connect with nature to understand their responsibility to protect nature. This avenue could be environmental education.

At the time this thesis is being written, Stanford University and the North American Association for Environmental Education (NAAEE) is conducting research on “The Benefits of EE and Nature Connections in Early Childhood.” They explore the role of environmental education and how nature connection influences health and stewardship. In pursuing this thesis, I hope to build upon this research and my RAISE research by delving into the reasons why connecting with nature has health benefits and increases in environmental stewardship. Some questions I will pose through this thesis include: How does education play a role in promoting children’s connection to nature? What kinds of health benefits are gained from connecting to nature? What cultural components play a part in learning about the environment and health? How do children’s connection with nature foster positive environmental behaviors? I begin by exploring what nature connectedness involves and the role of environmental education in

promoting this connection. Then I explore how nature connectedness cultivates health and wellbeing and environmental stewardship through studying Indigenous environmental education and Forest Schools.

## **Chapter 1: Nature Connection, Environmental Education, and its Benefits**

### **The Age of Nature-Deficit Disorder**

In *Last Child in the Woods*, journalist Richard Louv spotlighted the importance of childhood connection with nature. Louv documented children's loss of freedom to discover themselves in nearby nature (2008). This loss of freedom happened within little more than a generation as children's lives became more managed and confined indoors despite increasing research that indicates "direct experiences of nature in childhood contribute to care for nature across the life span" (Chawla, 2020).

Louv coined the term "Nature-deficit disorder" to describe the current phenomenon of disconnection from nature:

"Nature-deficit disorder describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses. The disorder can be detected in individuals, families, and communities. Nature deficit can even change human behavior in cities, which could ultimately affect their design, since long-standing studies show a relationship between the absence, or inaccessibility, of parks and open space with high crime rates, depression, and other urban maladies" (Louv, 2008, p. 36)

Other issues children are facing in the age of Nature-Deficit Disorder are increases in obesity and mental health disorders. Researchers believe that among children, more screen time and less physical outdoor play are some of the causes ("Forest and Nature," 2014). The National Wildlife Federation (2014) says, "our kids are out of shape, tuned out and stressed out, because they're missing something essential to their health and development: connection to the natural world."

### **Causes of Nature-Deficit Disorder**

According to a study by at the University of Maryland, from 1997 to 2003, there was a decline of 50 percent in the proportion of children nine to twelve who spent time in such outside

activities as hiking, walking, fishing, beach play, and gardening (Hofferth & Sandberg, 2001). The increasing use of computers, smart phones, television, and other technology in this modern world has disconnected youth from the natural world (Edelman, 2017). *The Nature of Americans National Report*, a study authored by Dr. Stephen R. Kellert from Yale University and funded by Fish & Wildlife Foundation of Florida, Florida Fish & Wildlife Conservation Commission, Texas Parks & Wildlife Department, Walt Disney Corporation, Wildlife Management Institute, and Morrison Family Foundation, is a national initiative to understand and connect Americans and nature. The study surveyed over 11,000 adults, children, and parents across the United States in 2015-16 and found that more than half of adults reported spending five hours or less in nature each week, and parents of children 8 to 12 years old said that their children spend three times as many hours with computers and televisions each week than they do playing outside (Kellert, 2017; Edelman, 2017). The study outlines five interrelated, society-wide forces that disconnect adults and children from nature in daily life:

- 1) Physical places, or a built environment, generally discourage contact with the natural world.
- 2) Competing priorities for time, attention, and money prevent contact with nature from becoming routine and habitual.
- 3) Declining direct dependence on the natural world for livelihoods and subsistence allows Americans to orient their lives to other things.
- 4) New technologies, especially electronic media, distract and captivate.
- 5) Shifting expectations about what “good” contact to nature ought to be mean adults are generally satisfied with the relatively little time they spend outdoors in nature. (Kellert, 2017, p. 3)

Coupled with more people moving to urban areas, the opportunity for children to connect with and spend time in nature has decreased because urban development has “resulted in both environmental degradation and increasing separation of people from wildlife, plants, undeveloped landscapes, and other features of the natural world” (Kellert, 2017, p. 23). This generation of children are also more supervised by their parents than previous generations;

parents who also do not spend significant time outdoors are more concerned about their children's safety and thus do not allow their children to freely explore their neighborhoods and nearby nature (Louv, 2008).

Local ordinances also hinder children from connecting with nature. Treehouses are torn down due to permits and ordinances. In Pennsylvania, a family built a tree house and was ordered to tear the house down because they had no building permit. In Mississippi, another family was ordered to demolish their tree house because it violated an ordinance prohibiting construction of an accessory building in front of a house. Parks are being closed off to protect endangered species. For example, 3000 acres of camping and fishing in Angeles National Forest were closed year-round to protect the endangered Arroyo southwestern toad. At California's Oceano Dunes region, Kite flying was banned because kites may scare off a protected species of birds, the snowy plover, which has limited habitat suitable for nesting (Louv, 2008). In the past two to three decades, housing tracts, condos, and planned communities "are controlled by strict covenants that discourage or ban the kind of outdoor play many of us enjoyed as children" (Louv, 2008, p. 9). According to the Community Associations Institute, more than 57 million Americans live in homes ruled by condominium, cooperative, and homeowners' associations. Louv points out "countless communities have virtually outlawed unstructured outdoor nature play, often because of the threat of lawsuits, but also because of a growing obsession with order. Many parents and kids now believe outdoor play is verboten even when it is not; perception is nine-tenths of the law" (2008, p. 28).

Biophobia prevents children from connection with nature. Biophobia, the opposite of biophilia, is the fear or rejection of nature "with the aim of promoting protective, rejection or withdrawal behaviors to avoid harm" (Olivos-Jara, et al., 2020, p. 2). Biophobia involves the fear

of death which is related to the uncontrollability of nature (Koole & Van den Berg, 2005). Biophobia can be developed even when an individual does not have direct experiences in nature (Cho, 2018). Research has found individuals “describe insects negatively with words like ‘dirty’, ‘creepy,’ ‘causing harm to humans,’ ‘ugly,’ ‘unattractive,’ ‘dangerous,’ etc” (Cho, 2018, p. 448). However, studies have found that direct experiences in nature can turn biophobia into biophilia (Platt, 2020).

Another barrier to nature connectedness is the divide between society and nature that has been a part of Western thought from at least the 16<sup>th</sup> century. Due to the scientific revolution that took place between the 16<sup>th</sup> and 17<sup>th</sup> centuries, anthropocentrism quickly became a prevailing part of Western society (Lumber, 2017). One example of this disconnect between nature and society is the separation of colleges of social sciences from colleges of physical sciences and medicine (Wierietielny, 2013). For the most part of Western history, wild nature was presented as “a creepy, dark space inhabited by savages,” but this changed in the beginning of the 19<sup>th</sup> century with the Romantic movement (Wierietielny, 2013). Romantics glorified nature and idealized rural upbringing in the natural environment. Furthermore, the Wilderness Act of 1964 is an example of how the division between human society and nature was institutionalized in the West. The Act distinguishes wilderness areas from “areas where man and his own works dominate the landscape” (“The Wilderness Act”, n.d.).

Demographics reveal another barrier to nature for certain groups. According to *The Nature of Americans National Report*, minorities and urban residents perceive fewer places nearby to enjoy nature than their white counterparts (Kellert, 2017). Parents of minority children reported that there were fewer parks nearby compared with parents of white children. The social safety of places (traffic, speeding vehicles, dangerous people) was an important concern for all

parents, especially minorities and urban residents. Groups including minorities, younger adults, and urban and suburban residents “encounter additional barriers, including discomfort being outdoors alone, a lack of financial resources, and a lack of social support, such as adults to accompany children outside or friends to encourage other adults to make time for nature” (Kellert, 2017). Research shows that safe nearby nature favors White, affluent communities across the United States (Reese, 2018). Additionally, fear of crime in impoverished areas may serve as a significant barrier to outdoor recreation. Clearly, access to nature differs depending on socioeconomic status and other demographic factors.

In the time of coronavirus, children are prohibited from connecting with nature because they could contract the virus and spread it to others. A Canadian study reports that most children and youth (71.1%) were not meeting physical activity or screen time guidelines and only 2.6% were meeting the combined 24-hour movement behavior recommendations. The most dramatic decline in all physical activities was outdoor physical activity and sport, whereas leisure screen time and social media was reported much higher than before the coronavirus outbreak (Moore et al., 2020).

### **Defining Nature Connection**

Nature connectedness, as defined by Zylstra and colleagues (2014) is “a stable state of consciousness comprising symbiotic cognitive, affective and experiential traits that reflect, through consistent attitudes and behaviours, a sustained awareness of the interrelatedness between one’s self and the rest of nature” (Charles, et al., 2018, p. 28). The ecological identity or ecological self, a term coined by Naess (1973), often refers to the interrelatedness of one’s self and nature. An ecological identity encompasses the self, the human and non-human, and the

planet's ecosystems, so that damage to the planet is also damage to the self (Nisbet et al., 2010). Nature connectedness is the converging of self and other so that one recognizes that there is no disconnect between nature and human beings.

Nature connectedness is related to the concept biophilia. Biophilia hypothesizes that humans have a natural affinity for nature. Biophilia also means “having a sense of awe and worship for nature” (Cho, 2018, p. 446). The term was originally a Latin word meaning “love of life” and was used by Erich Fromm who employed the term to refer to a psychological attachment to all living things (Orr, 1993). Carson asserted in her autobiographical book, *The Sense of Wonder*, that early childhood is a critical time in an individual's life to develop biophilia. In the “biophilia hypothesis,” authors S.R. Kellert and E. O. Wilson contend that because human beings began living in cities relatively recently, they have not lost the innate biological affinity for nature (Kellert & Wilson, 1993). Evidence of the biophilia hypothesis “lies in the popularity of outdoor wilderness activities, zoos, gardening, our relationship with animals, and our fondness for natural scenery” (Nisbet et al., 2010, p. 304). S. R. Kellert (1997) has expanded on the biophilia hypothesis, “suggesting that our biophilic tendencies drawing us to natural diversity are important for optimal emotional and psychological development” (Nisbet et al., 2010, p. 305).

Another term used intermittently with nature connectedness is “nature relatedness” which “refers to the affective, cognitive, and experiential relationship individuals have with the natural world or a subjective sense of connectedness with nature. NR encompasses one's appreciation for and understanding of our interconnectedness with all other living things” (Nisbet et al., 2010, p. 304). Nature relatedness “encompasses emotions, cognitions (e.g., beliefs, attitudes, knowledge), as well as the experiences people have in nature” (Nisbet & Zelenski, 2014, p. 1).

## Indigenous Connection to Nature

Indigenous Peoples comprise a rich diversity of languages, cultures, traditions and cosmologies, yet they share commonalities in their cosmologies, worldviews, and ways of being (collectively referred to as cosmologies). These cosmologies are “rooted in observation and interaction with nature [...and] portray the primary components of the environment, including the sky, the ground, the subterranean realm, the waters, atmospheric processes, plants, animals, and more, as an integrated system energized and managed by the power of spirits and gods. The structure and order attributed to the cosmos underpins a system of thought that orders the social structure, political mechanisms, the economy, and religious expressions of the community” (Krupp, 2015, p. 1660). Such common approaches include an intergenerational and inter-species family members, and their reciprocal relationship with one another. There is no distinction between nature and humans. As a result, Indigenous worldviews are holistic: they see the whole (physical, emotional, spiritual and intellectual) human and non-human person (plant, animal, water) as interconnected and in relationship with each other (“Indigenous Ways,” n.d.).

The story of Skywoman, shared by the original peoples of the Great Lakes region of North America, is an example of one Indigenous cosmology. Before recounting this cosmology, it is important to refer to Professor Robin Wall Kimmerer’s note on Indigenous stories:

We are told that stories are living beings, they grow, they develop, they remember, they change not in their essence but sometimes in their dress. They are shared and shaped by the land and the culture and the teller, so that one story may be told widely and differently. Sometimes only a fragment is shared, showing just one face of a many faceted story, depending on its purpose. So it is with the stories shared here. (Kimmerer, 2013, p. 386)

Skywoman falls slowly from a hole in the Skyworld clutching a bundle in her hand. A shaft of light from Skyworld luminates her path in the dark emptiness surrounding her. This light reveals many eyes in the dark water below gazing at the sudden shaft of light. These eyes track a

dust mite size figure spiraling downward in the shaft of light. Growing as it nears the water, they see that this figure is a woman with outstretched arms and black hair billowing behind her. All the geese nod at one another and rise together out of the water and fly beneath her to break her fall and carry her downward. She finds comfort and warmth in their soft-feathered embrace. The geese cannot hold the woman above the water for long and hold a council to decide what to do. Loons, otters, swans, beavers, fish of all kinds gather. A great turtle floats by and offers its back for her to rest. The others realize that the woman needs land for her home and the divers among them suggest such land can be found at the bottom of the water. Many strong swimmers make brave attempts, yet cannot bring up the bottom mud. A tiny muskrat, the weakest diver, volunteers and is underwater for a long time. Eventually its body surfaces clutching a fist full of mud, and the turtle offers to hold it on its back. Skywoman spreads the mud over the turtle's shell. Inspired by the extraordinary gifts the animals gave her, she sings thanksgiving and dances upon the mud. The mud grows and grows on the turtle's back until the whole earth forms. "Not by Skywoman alone, but from the alchemy of all the animals' gifts coupled with her deep gratitude. Together they formed what we know today as Turtle Island, our home." (Kimmerer, 2013, p.3-4).

Skywoman did not come empty-handed. When first falling from Skyworld she grabbed the branches of Tree of Life. These branches, and the fruits and seeds of all kinds of plant life are in the bundle she held. She scattered these onto the newly-formed world and tended each one until the brown mud turned to lush green earth. Sunlight from Skyworld bathed the plantings and they and their medicines spread everywhere. The animals now had plenty to eat, and many joined Skywoman and living with her on Turtle Island. (Kimmerer, 2013).

The early generations of first people lived by their understanding of the Skywoman cosmology and fashioned the ethics of their hunting practices, family life, and ceremonies that made sense for their world. (Kimmerer, 2013). Ours, in many ways, is a different world. Yet, the we are beginning to understand that the health and well-being of ourselves and our world may hinge on re-purposing the lessons of Skywoman.

For example, New Zealand Māori scholar Sir Mason Durie fashioned a holistic health model based on Māori narratives. Durie developed Te Whare Tapa Whā, a model of the four dimensions of wellbeing. The four dimensions included taha tinana (physical wellbeing), taha hunengaro (mental wellbeing), taha wairua (spiritual wellbeing), and taha Whānau (family wellbeing). Whenua (land) forms the foundation for the other four dimensions as shown in Figure 1. By nurturing the four dimensions, one supports their health and wellbeing, as well as the health and wellbeing of the land, realizing the oneness of nature and humans.



Figure 1:

Te Whare Tapa Whā (Māori model of wellbeing). Reproduced from “Te whare tapa whā and wellbeing,” 2020, *Health Navigator New Zealand*.

In New Zealand, the Indigenous Māori people “have traditionally held a deep connection to the environment, focused on their tribal lands and waters in particular. The Māori world view positions Māori as both part of the natural system and guardians for that system” (Charles, et al., 2018, p. 22). This deep connection to the environment is situated in the view that the land is an entity in itself, the Earth Mother and the river, sea, and mountains. Indigenous people of the Americas “have many ways of remembering and practicing Earth-based wisdom” (Charles, et al., 2018, p. 22). For example, the Makunas, an Eastern Tukanoan groups from the Northwest Amazon, believe there is no separation between beings, “between the visible and invisible, or between culture and nature, making evident the complete interdependence of all living beings” (Charles, et al., 2018, p. 22).

Many Indigenous peoples believe that humans are not separate from nature. Australian Indigenous culture is characterized “by a land-based spirituality [...] and feeling connected to the

world is a key component of Indigenous identity and belonging (Robinson, 2019, p. 342). The Australian SAGE Handbook of Outdoor Play and Learning “highlights the significance of the natural world to Indigenous spirituality, stating, ‘there is no division between human life and other forms of life in the natural world; there has always been and will always continue to be a deep and mutual connection’ (Robinson, 2019, p. 342). Australian Indigenous culture also asserts that “people and nature are created as one, and humans do not have dominion over the natural world” (Charles, et al., 2018, p. 22).

### **The Painful Connection**

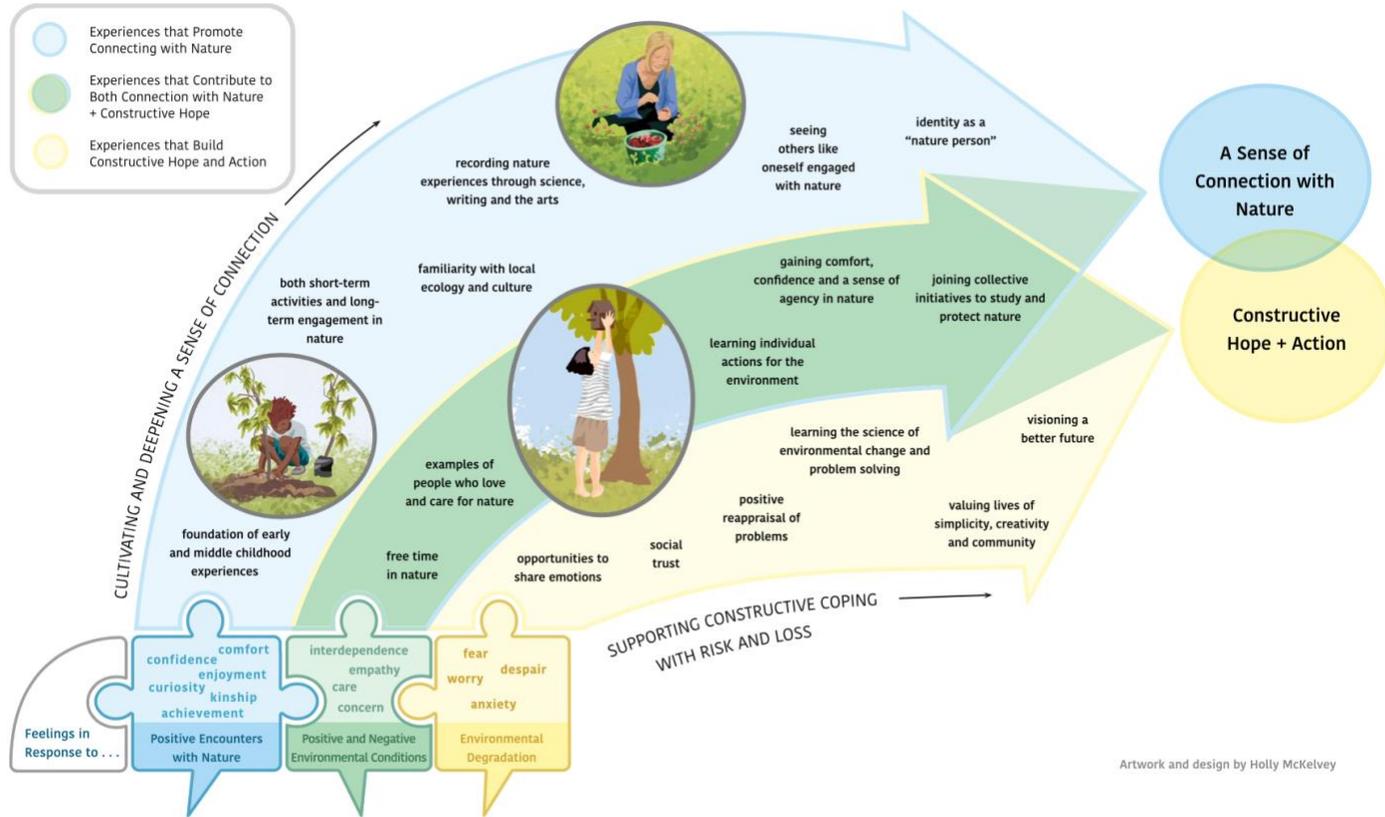
While connection to nature can be beneficial to health and wellbeing, the connection can also cause depression, anxiety and stress when children feel overwhelmed by environmental degradation (Chawla, 2020). When a child feels that an environmental problem is too much to solve alone, “individual strategies can lead to feelings of futility and reduce wellbeing (Chawla, 2020, p. 631). However, if one can channel feelings of despair into feelings of hope, then positive action can be achieved. A study in Sweden by Ojala (2016) identified three ways of coping with difficult emotions: “emotion-focused, which seeks to escape painful feelings; problem-focused, which addresses problems that cause these feelings; and meaning-focused, which finds positive value in confronting problems” (Chawla, 2020, p. 631). The third form of coping, meaning-focused “is especially important when a problem cannot be solved quickly but requires active engagement over a long period of time” (Chawla, 2020, p. 631). When young people use meaning-focused coping, “they are more likely to express positive feelings and life satisfaction” and construct hope that their and others’ actions can make a difference.

As Figure 2 shows, children may express fear, worry, despair, and anxiety when faced

with environmental degradation, but when combined with positive encounters with nature that elicit feelings of confidence, comfort, enjoyment, curiosity, kinship, and achievement, these negative emotions can be channeled into constructive hope and action and contribute to connection with nature. Some of the experiences that build constructive hope and action include opportunities to share emotions about environmental degradation, fostering social trust, learning the science of environmental change and problem solving, and visioning a better future.

Experiences that promote connecting with nature include a foundation of early and middle childhood experiences in nature, short-term activities and long-term engagement in nature, familiarity with local ecology and culture, recording nature experiences through science, writing, and the arts, seeing others like oneself engaged with nature, and identifying as a “nature person.”

When children are faced with positive and negative environmental conditions, they feel interdependence, empathy, care, and concern which are manifested through free time in nature, examples of people who love and care for nature, learning individual actions for the environment, gaining comfort, confidence, and a sense of agency in nature, and joining collective initiatives to study and protect nature (Ojala, 2012; Yilmaz et al. (2020); Gebhard, Nevers, & Billmann-Mahecha, 2003; Hughes et al., 2018; Richardson et al., 2015 Chawla, 2020).



Artwork and design by Holly McKelvey

Figure 2: Practices that help young people connect with nature and cope constructively with environmental change. Reproduced from “Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss,” by Louise Chawla, 2020, *British Ecological Society*.

### Ways Nature Connectedness Can Occur

One way that nature connectedness can occur is through early childhood experiences. Chawla found that most attribute their commitment to the environment ‘to many hours spent outdoors in ‘keenly remembered’ wild or semi-wild places (Charles, et al., 2018, p. 4). Individuals are also “more likely to find positive values and form strong emotional bonds with nature if they built an intimate and sustainable relation with natural world in their childhood” (Cho, 2018, p. 447). Free play, where caretakers supervise from a distance, is an essential way that children form connections with nature. Playtime, “especially unstructured, imaginative play— is increasingly recognized as an essential component of wholesome child development” (Louv,

2008, p. 48). Many studies show that when nature is accessible for play, children gravitate to it (Chawla, 2007). Studies also show that children around the world choose natural areas as favorite places if they have no serious reasons to fear them” (Chawla, 2007, p. 148). Childhood connection to nature “can result in reduced stress, improved brain development and restoration, increased social and emotional skills development, and civic engagement” (Braus & Milligan-Toffler, 2018, p. 193). Outdoor play has been “linked to the development of core skills, including problem-solving and reasoning, creativity, curiosity, risk-identification, resilience, self-regulation and social and emotional learning” (Charles, et al., 2018, p. 14).

Another way nature connectedness occurs is through adult role models. Often, a parent, grandparent, or other trusted guardian demonstrates care for nature to the child (Charles et al., 2018). For most, “the caregivers who first introduced them to the world remain their exemplars of what to notice in the environment and how to respond throughout their growing years” (Chawla, 2007, p. 162). About 75 percent of a sample of people from Norway and Kentucky “talked about family members who directed their attention to elements of the natural world: usually a parent, but sometimes a grandparent, uncle, or older sibling” (Chawla, 2006, p. 59). For children, caretakers “provide a sense of security and promote interest, attention, empathy and respect for living things and the land” (Chawla, 2020, p. 629). Teachers also foster an interest in nature for individuals (Jose & Nelson, 2017). For those who actively pursue protection of the environment, they cite time spent in special, outdoor places with an influential adult as a primary factor in shaping their commitment to environmental causes (Chawla, 1999; Sobel, 1996).

## Measuring Nature Connection

At least nine published assessment tools measure connectedness to nature. Kals, Schumacher, and Montada developed a 16-item scale that measures emotional affinity toward, or love of, nature (Kals, et al., 1999). As shown in Figure 3, Schultz developed the Inclusions of Nature in Self measure, a single item adopted from a technique used to assess emotional closeness in human relationships (Schultz, 2001).

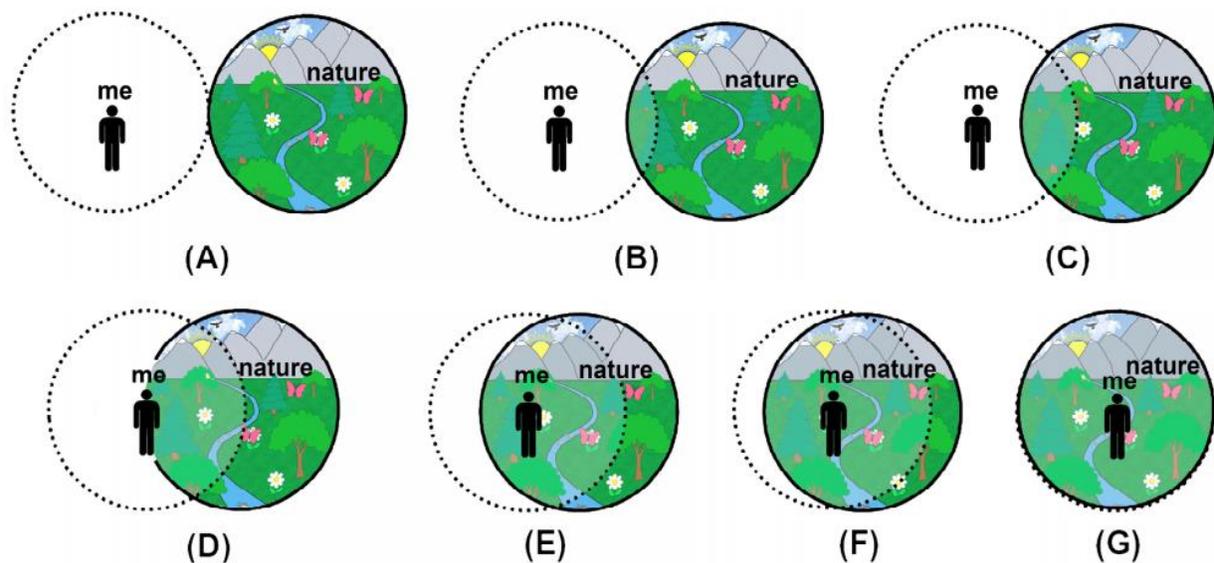


Figure 3: Finale Version of the Illustrated Inclusion of Nature in Self Scale (IINS) Reproduced from “Measuring Connection to Nature—A Illustrated Extension of the Inclusion of Nature in Self Scale,” by M. W. Kleespies, T. Braun, P. W. Dierkes, and V. Wenzel, 2021, *Sustainability*.

Clayton developed the Environmental Identity Scale (EID) which has 20 items and assesses “the extent to which the natural environment plays an important part in a person’s self-definition” (Clayton, 2003, p. 52). Frantz and Meyer introduced the 14-item Connectedness to Nature Scale (CNS) in 2004 and have since developed a revised 10-item version for children (Frantz & Meyer, 2014). The CNS is “based on Aldo Leopold’s concept of the land ethic and is intended to measure people’s sense that they are egalitarian members of the natural world” (Frantz & Meyer, 2014, p. 86). Dutcher, Finley, Luloff, and Johnson developed a scale called Connectivity with

Nature that is designed to measure “a sense of a shared or common essence between the self, nature, and others” (Dutcher et al., 2007, p. 474). Davis, Le, and Coy “developed a 15-item measure of commitment to nature based on interdependence theory: to the extent that we recognize we are interdependent with someone or something, we are more committed to it” (Davis et al., 2011; Frantz & Meyer, 2014, p. 86). Nisbet, Zelenski, and Murphy developed the Nature Relatedness Scale which has 21 items that assess “one’s appreciation for and understanding of our interconnectedness with all other living things on earth” and includes “affective, cognitive, and experiential aspects of individuals” connection to nature (Nisbet et al., 2010, pp. 715- 718). The most recent additions include Brugger, Kaiser, and Roczen’s Disposition to Connect with Nature Scale, which conceptualizes connection to nature as an attitude, and Cheng and Monroe’s Connection to Nature Index (CNI) (Brugger et al., 2011; Cheng & Monroe, 2012).

### **Nature Connection and Wellbeing**

Wellbeing can be measured in several ways including physical, spiritual, psychological, and social. Psychological wellbeing involves “emotional regulation, increased attention, positive thinking, improved stress management, resilience, [and] mood upliftment” (Chowdhury, 2020). A growing body of evidence reports physical, psychological, and social wellbeing benefits from connecting with nature (Bowler et al., 2010; Chawla, 2015; Gill, 2014; Hartig et al., 2014; Keniger et al., 2013; Matsuoka & Kaplan, 2008; McMahan & Estes, 2015).

As the nature deficit grows, an emerging body of scientific evidence indicates that direct exposure to nature is essential for physical and emotional health. A University of Illinois study suggests that exposure to nature may reduce the symptoms of Attention Deficit Hyperactive

Disorder (ADHD), and that it can improve all children's cognitive abilities and resistance to negative stresses and depression (Kuo & Taylor, 2004). Nature experiences increase children's empathy for the natural world, "as well as their perceptual skills, self-esteem, and self-efficacy" (Nisbet et al., 2010, p. 305). Research studies indicate that time spent in nature can reduce the need for medication and services among mental health patients: "Even a walk in a park can have the same level of benefits as medication [...] People who are more physically active in leisure-time tend to have higher rates of wellbeing and lower rates of depression" (Faculty of Public Health, 2010, p. 3). A study done on gall bladder patients found that those in hospital rooms facing a grove of trees compared to those facing a brick wall had several days shorter hospitalization (Ulrich, 1984). Another study by Roger Ulrich, a Texas A&M researcher, found that "people who watch images of natural landscape after a stressful experience calm markedly in only five minutes: their muscle tension, pulse, and skin-conductance readings plummet" (Ulrich, 1991; Louv, 2008, p. 46). Research also shows that "immersing children in nature to play and learn can result in reduced stress, improved brain development and restoration, increased social and emotional skills development, and civic engagement" (Braus & Milligan-Toffler, 2018, p. 193). These results are measured by air quality, physical activity, social cohesion, stress reduction, activities, and characteristics of the nature under study (Hartig, et al., 2014).

Connecting with nature can also benefit individuals suffering from mental health conditions like attention disorders, mood disorders, and different forms of anxiety (Chowdhury, 2020). Nature walks benefit people suffering from depression (Chowdhury, 2020). Studies show that people suffering from mild to major depressive disorders showed significant mood improvements when exposed to nature, and they also felt more motivated and energized to

recover and get back to normalcy (Berman et al., 2012). Nature contact and images of nature have been found to have corrective or remedial measures to counteract stress and anxiety (Nisbet et al., 2011). In fact, “people living in greener environments have better mental health, report fewer physical symptoms, and better general health than those deprived of access to nature” (Nisbet et al., 2011, p. 305; de Vries et al. 2003). Such measurements of psychological wellbeing include intensity and duration of pleasant and unpleasant emotions, life satisfaction, sense of purpose, personal growth, autonomy, vitality, optimism, self-esteem, and healthy cardiovascular and immune functions (Nisbet et al. 2011).

### **Nature Connection and Environmental Stewardship**

The second aspect of nature connection I explore is environmental stewardship. As aforementioned, the “oneness” resulting from nature connection one feels is a key component of environmental stewardship. As individuals become more connected to nature, they are likely to feel more positive emotions which could inspire more environmentally responsible behaviors (ERB). A number of studies now suggest that happiness and wellbeing are related to self-reported pro-environmental behavior (Brown & Kasser, 2005). Children who express a greater connection with nature are “more likely to report taking action to care for nature. Children's connection with nature increases with time spent in nature, and extended time in nature in childhood, many studies show, predicts active care for nature in adulthood” (Chawla, 2020, p. 621). Research has linked childhood play in nature with every form of care for the environment (Chawla & Derr, 2012). Li and Monroe (2019) found that when young people feel concerned about environmental problems which they believe others can address effectively, they are more likely to feel hope. Both hope and concern motivate action (Chawla, 2020).

When children feel connected with nature and see themselves as part of nature, they are more motivated to protect and conserve the environment. Childhood experiences are measured by time spent in nature, types of activities in nature such as hunting, fishing, hiking, camping, vacationing, and environmental sensitivity and emotional affinity towards nature. These measures are a leading predictor of self-reported adult positive environmental behaviors. (Chawla, 2006). Schultz (2000) found that participants instructed to take the perspective of an animal being harmed by pollution scored significantly higher in biospheric environmental concerns than participants instructed to remain objective. Schultz (2000) and Howard (1997) have argued that if people value and feel concern for nature, they will want to protect nature. As mentioned in the introduction, an ecological identity or ecological self is the understanding of humans' interconnectedness with the earth, so that damage to the planet means damage to the self (Nisbet, 2009). These studies are aligned with Aldo Leopold's observation: "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect" (Leopold, 1949, p. vii).

ERB can include private everyday behaviors, behaviors at work, political actions, or environmental activism. People generally favor more convenient behaviors than demanding or costly ones (Kaiser et al., 2011). Some examples of ERB include voting for pro-environment people policies, joining a nature club, recycling, eating locally and organically, reducing consumption, walking or biking, and talking with others about the importance of environmental protection ("Green Eco Tips," n.d.). Research shows that "children and adolescents with higher measures of nature connection show greater environmental knowledge, and greater willingness to commit to conserving nature" (Chawla, 2020, p. 629; Cheng & Monroe, 2012; Otto & Pensini, 2017; Giusti, 2019; Müller et al., 2009; Zhang et al., 2014). These results were measured by

Schultz' Inclusion of Nature in Self Scale (INS) and Cheng and Monroe's Connection to Nature Index (CNI) which is composed of four major elements: enjoyment of nature, empathy for creatures, sense of oneness, and sense of responsibility (Guitsi, 2019; Cheng & Monroe, 2012). The results were also measured by a questionnaire focusing on current contact with nature, and willingness for pro-environmental commitment (Müller et al., 2009). Finally, the results were measured by a questionnaire that addressed the following topics: children's contact with nature, children's biophilia, children's biophobia, willingness to conserve animals, and their general attitudes toward animal conservation (Zhang et al., 2014). Studies in Sweden (Ojala, 2016) and the United States (Stevenson & Peterson, 2016) "found that young people almost always report individualized actions in the private sphere, such as household energy conservation, rather than collective engagement" (Chawla, 2020, p. 631). Certain barriers may prevent children from partaking in ERB. These barriers include personal cost (finance, time), lack of structural support (e.g., efficient public transport), knowledge, and age restrictions. Given these barriers to nature connection, environmental education is a vital tool to connect youth to nature.

### **The Role of Environmental Education**

In an era when children's free time is moving indoors, environmental education provides a viable means to formally introduce children to nature. Environmental education is not easily defined in one way. The aim of environmental education is to promote pro-environmental behaviors (Cho and Lee, 2018). Environmental education can take several forms. The NAAEE designates four types of environmental education: adventure education, nature-based/outdoor education, place-based education, and sustainability education. Adventure education "uses human-powered outdoor pursuits to help people learn about interpersonal and intrapersonal

relationships” (“What is Adventure Education”, n.d.). Outdoor education is “education *in, about* and *for* the outdoors” (Donaldson & Donaldson, 2013). Place-based education as defined by the Center for Place-Based Learning and Community Engagement is “an immersive learning experiences that places students in local heritage, cultures, landscapes, opportunities and experiences, and uses these as a foundation for the study of language arts, mathematics, social studies, science and other subjects across the curriculum” (“What is Place-Based Education?”, n.d.). Sustainability education focuses on principles of sustainability and community development. Experiential learning or “learning by doing” imbues all forms of environmental education. Experiential learning is a hands-on form of learning which involves adventure and challenge, observation and reflection, abstract thinking, and application to life (“What is Experiential”, n.d.).

Outdoor learning is essential to environmental education and is defined as “‘that which is beyond the walls of the indoors,’ and is believed ‘to provide more memorable and stimulating learning experiences’ and instill ‘excitement, interest and motivation to learn’” (Harris, 2018 p. 223). Outdoor learning can provide opportunity to learn across many subjects and support children’s holistic development. Outdoor learning can involve group work, team building, and the development of social and communication skills. In addition, “a sector of outdoor learning provides focus specifically on risk and adventure, pushing students beyond their normal “comfort zone” to cope with new challenges and develop skills to overcome them” (Harris, 2018 p. 223). Harris found a relationship between key themes of student freedom of movement, relaxed state, facilitation of learning, and stimulating with aspects of learning space. Interviews with Forest School Practitioners yielded several cross-cutting themes regarding these key themes and the physical and behavioral and expectations of norm learning space. Children experience an

increased freedom of movement in an increased physical learning space which goes beyond the normal physical constraints of the classroom and such freedom allows children to learn without interfering with each other. The behavioral space and expectations of norms of free movement create a calming atmosphere, ability to choose learning styles and activities, ability to make noise or be calming and reflective. A relaxed state related with student interaction with the natural environment and with better concentration and more receptive to learning. Facilitation of learning is related to activities contingent on the environment and the space to do whatever they need, and is also related to allowing learning through discovery and a sense of satisfaction for the children. The key theme of Stimulating is related to a rich physical learning environment, one which engages all the senses, changes each week, outdoors is associated with enjoyment, students are challenged by new environments, allows for seeing how things work, and experiences are memorable. Practitioners also observed changed confidence levels (Harris, 2018).

### **A History of Western Environmental Education in the U.S.**

Although the exact origins of environmental education are contested, certain authors and scientists in Europe and North America influenced an environmental movement which advocated for environmental education. In 1836, Ralph Waldo Emerson published his essay *Nature*, which outlines the relationship between people and the natural world, laying the foundation of Transcendentalism (Emerson, 1836). Eighteen years later in 1854, as one of the main voices of the Transcendentalism movement, Thoreau wrote *Walden*, which documented two years living in a cabin in the woods isolated from society (Thoreau, 1854). George Perkins Marsh wrote *Man*

*and Nature* in 1864, which called for conservation, warned against deforestation and desertification, and critiqued industry and pollution (Marsh, 1864).

Sir Patrick Geddes, a Scottish botanist and urban planner, organized the first Summer Meetings of Art and Science in 1883, which attracted scholars from Britain, Europe, and America. Geddes implemented an interdisciplinary approach to promote “learning by doing,” which entails a hands-on approach to learning where students must interact with their environment to adapt and learn. Eight years later in 1891, Wilbur Jackman wrote *Nature Study for the Common School*, which defined the nature study movement. Nature study gained prominence in the USA during the late nineteenth and early twentieth centuries with the writing and public speaking of John Muir and Enos Mills who popularized wild nature as a source of recreation, replenishment, and solace. John Dewey published *Experience and Nature* in 1929. Dewey promoted a more student-centered and holistic approach to education, focusing on learning by doing, lifelong learning, and interdisciplinary efforts (“Lesson 2”, 2017).

In the 1930s, the “Dust Bowl” in the American heartland gave rise to the conservation education movement supported by state and federal natural resource agencies as well as many non-government organizations. The National Education Association assumed the leadership role for conservation education in schools in 1935. Wisconsin also became the first state to enact a state statute requiring preservice teachers (students trained from higher education institutions to become professional teachers) to have “adequate preparation in the conservation of natural resources” (McCrea, 2006).

At the Conference for the Establishment of the International Union for the Protection of Nature (ICUN) in Paris in 1948, Thomas Pritchard, Deputy Director of the Nature Conservancy in Wales, used the term “environmental education,” perhaps the first public professional use of

the term. Professor Clay Schoenfeld began the journal *Environmental Education* in 1969, later renamed *The Journal of Environmental Education*. In January 1970, President Richard Nixon signed into law The National Environmental Policy Act of 1969 (NEPA) which remains the environmental law of the United States today. In an address to Congress, President Nixon stated:

It is also vital that our entire society develop a new understanding and a new awareness of man's relation to his environment—what might be called “environmental literacy.” This will require the development and teaching of environmental concepts at every point in the education process (Nixon, 1970, p. vii).

This address is the first nationwide call for environmental education in the United States. Shortly following this address, the National Environmental Education Act was passed which authorizes the creation of an Office of Environmental Education in the U.S. Dept. of Health, Education and Welfare, the establishment of a National Advisory Council for environmental education, and the establishment of a domestic grants program. This act stated that environmental education: “is intended to promote among citizens the awareness and understanding of the environment, our relationship to it, and the concern and responsible action necessary to assure our survival and to improve the quality of life” (EPA, n.d.).

The National Association for Environmental Education (now the North American Association for Environmental Education), a professional association for environmental educators, was founded in 1971. The United Nations Conference on the Human Environment was held in Stockholm, Sweden in 1972 where Recommendation 96 called for the provision of environmental education as a means to address environmental issues worldwide. In 1975, The International Workshop on Environmental Education was held in Belgrade, Yugoslavia and resulted in what became known as the Belgrade Charter. The Belgrade Charter built on the framework of Stockholm and proposed what has become the most widely accepted definition of environmental education:

Environmental education is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and the prevention of new ones (“UNESCO-UNEP”, 1976).

The first Intergovernmental Conference was held on environmental education in Tbilisi, Georgia, USSR in 1977. The document now known as *The Tbilisi Declaration* was formulated during this conference and built on the Belgrade Charter. The declaration remains a definitive statement on what environmental education is and should be and established the following objectives of environmental education:

- Awareness - to acquire an awareness and sensitivity to the total environment and its allied problems;
- Knowledge - to gain a variety of experiences in and acquire a basic understanding of the environment and its associated problems;
- Attitudes - to acquire a set of values and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection;
- Skills - to acquire the skills for identifying and solving environmental problems; and
- Participation - to encourage citizens to be actively involved at all levels in working toward resolution of environmental problems (“UNESCO-UNEP,” 1976).

Thirteen years later, the United States Congress passed the National Environmental Education Act of 1990 which authorized an office of Environmental Education in the U.S. Environmental Protection Agency, an environmental education and training program Environmental education grants, student fellowships, the President’s Environmental Youth Awards, the Federal Task Force and National Advisory Council, and the National Environmental Education and Training Foundation (NEETF). The State Education and Environment Roundtable released its groundbreaking study *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning* in the same year, which represented the first ever comprehensive analysis of the efficacy of using the environment as an integral tool in learning

and education. In 1992, the United Nations conducted the Conference on Environment and Development in Rio de Janeiro, Brazil. Chapter 36 of Agenda 21 focused on “reorienting education towards sustainable development; increasing public awareness; and promoting training” (p. 320).

The NAAEE initiated the *National Project for Excellence in Environmental Education* in 1993 which provided guidelines for the development and assessment of environmental education materials as well as standards for practitioner and student knowledge on environmental topics. Richard Louv’s 2005 book, “*Last Child in the Woods*” popularized the idea that children should spend as much time as possible outdoors and caused a resurgence in environmental education (Forest School Foundation, 2020b). The U.S. Department of Education launched the Green Ribbon Schools Award in 2011 to recognize schools, districts, and institutions of higher education for distinctive environmental education programs. Most recently, in 2015, the *Every Child Succeeds Act* became law, which for the first time, supported opportunities to provide students with environmental education and hands-on, field-based learning experiences (NAAEE). The United Nations declared the first part of the 21<sup>st</sup> century (2004-2015) as the Decade of Education for Sustainable Development. This declaration marked a shift that began in the 1980s which some saw as a replacement of environmental education with the broader concept of Education for Sustainable Development (Barrable & Arvanitis, 2018).

### **Current research on Environmental Education**

Experts at Stanford University analyzed 119 peer-reviewed studies published over a 20-year period that measured the impacts of environmental education on K-12 students (“The Benefits,” 2020). This literature review found clear evidence that environmental education

programs provide a variety of benefits including development of environmental literacy, critical thinking skills, academic achievement, and emotional and social skills such as self-esteem, character development, teamwork and leadership skills. This literature review also found that environmental education programs cultivated environmentally friendly behavior such as reducing water use, increasing recycling, and participating in community cleanups. Finally, the review found that environmental education programs promote civic interest and engagement including feelings of civic responsibility, feelings of empowerment, and motivation to address community and environmental issues (“The Benefits,” 2020). These results were measured through focus groups and surveys with environmental education participants and practitioners.

### **Environmental Education, Nature Connection, Wellbeing, and Stewardship**

Wellbeing and environmental stewardship go hand in hand. Longitudinal and cross-section studies “support the idea that children who live near nature and spend more time in nature experience more well-being, have better social skills, and hold more environmentally friendly attitudes” (Dopko et al., 2019, p. 134). Furthermore, children who grow up near nature or spend time in nature “appear to reap psychological and social benefits and may engage in more pro-environmental behaviors” (Dopko et al., 2019, p. 135). Environmental behaviors and attitudes have been positively linked with perceptions of wellness and life satisfaction: “the more a person cares for the natural world, the more they often report indicators related to subjective wellness” (Reese, 2018, p. 292). Several correlational studies also show that people who engage in more environmentally responsible behavior experience more wellbeing (Brown & Kasser, 2005; Kasser & Sheldon, 2002; Xiao & Li, 2011). Research reveals that, overall, “people

associate environmentally-friendly behavior with positive emotions [...] and may experience feelings of “warm glow” after acting this way” (Venhoeven et al., 2017, p. 229).

Pleasure plays a part in whether people engage in environmentally responsible behavior. For example, “some people enjoy riding their bicycle on a sunny day or perceive a train ride to be more comfortable than a flight with a low-cost airline. For these people, engagement in these activities thus not only benefits the environment, but also is inherently enjoyable” (Venhoeven et al., 2017, p. 230). However, not all pro environmental behavior is enjoyable such as “turning down the thermostat on a cold winter day, waiting for the bus at a small, windy bus stop, or cycling in the rain” (Venhoeven et al., 2017, p. 230). “Self-concept” is another way that people engage in environmentally-friendly behavior: “if you are making the effort to engage in good behavior, you must be a good person. Indeed, well-being is greater when one’s actions are perceived as doing good instead of doing harm, [...] and how positively people think of themselves is determined by how moral they perceive themselves to be (Venhoeven et al., 2017, p. 231). Following this reasoning, seeing oneself as an environmentally friendly person is beneficial for wellbeing and self-concept: “it may mean you see yourself as someone who does good” (Venhoeven et al., 2017, p. 231). To engage in environmentally responsible behavior long term, people must find what they are doing to be meaningful and align with their values. People who value the ecosystem and biosphere, “people with strong biosphere values, place a strong importance on preserving the environment, which they see as a guiding principle in their lives [...] engagement in environmentally friendly behavior may contribute more to the well-being of individuals with strong biospheric values (Venhoeven et al., 2017, p. 232). Engagement in environmentally responsible behavior may be considered meaningful regardless of the impact, and thus diagnostic of a good self-concept and wellbeing.

Environmental education programming has been associated with self-reported responsible environmental behaviors, promoting connectedness to nature, pro-environmental attitudes and environmental knowledge, and environmental stewardship and awareness (Reese, 2018). Without developing a nature connection, “one might access natural spaces with reduced frequency and therefore experience fewer wellness benefits or be less attuned to environmental issues later in life. In contrast, the greater the connection, the more one might access and care for nature over time” (Reese, 2018, p. 292). Environmental education plays a key role in connecting children to nature, and thus increasing their wellbeing and motivation to protect nature. Environmental education also offers students opportunities to engage in pro-environmental behavior which could positively impact their “self-concept” and wellbeing.

## Chapter 2: Indigenous Knowledge and Environmental Education

### Indigenous and Western Worldviews

Indigenous worldviews and knowledge are invaluable to environmental education. While Indigenous communities have many similarities, their experiences are also incredibly diverse and the following chapter does not reflect all experiences. However, I attempt to capture the general history and contemporary narratives of Indigenous peoples. One common thread is a spiritual socio-environmental identity where Indigenous peoples “view all entities as being of equal importance and act non-destructively towards everything that inhabits the Earth” (Nesterova, 2020, p. 1048). UNESCO defines “Indigenous knowledge” as “the understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings” (UNESCO, n.d.). Indigenous people have an intimate relationship with the earth and all its creatures. Anishinaabe scholar Winona LaDuke (1999) writes:

Native American teachings describe the relations all around—animals, fish, trees, and rocks—as our brothers, sisters, uncles, and grandpas. Our relations to each other, our prayers whispered across generations to our relatives, are what bind our cultures together. The protection, teachings, and gifts of our relatives have for generations preserved our families. (p. 2)

Susan Miller (2008), a Seminole Native American historian, adds that Indigenous worldviews relate to everything in the cosmos:

In Indigenous thought, people are seen as families or communities rather than individuals. The pervasive importance of the family surpasses even its considerable importance in American and other non-Indigenous worldviews. Indigenous family encompasses the entire cosmos: Earth is the Mother; and the Sun, the Sky, or a powerful celestial entity is the Father. Every element of the cosmos has a place in the family. Everything is alive and has needs and rights. (p. 27)

Thus, people’s health and wellbeing are directly related with the health and wellbeing of everything in the cosmos: “The key distinctive assumption of an Indigenous worldview is that the cosmos is a living being and that the cosmos and all its parts have consciousness [...]”.

Because of this assumption, the relationship between humans and all parts of the cosmos inherently speak to notions of reciprocity and respect” (Kapryka & Dockstator, 2012, p. 100).

Nature is seen as family, so humans must take care of nature as they would a relative. Cree scholar Evelyn Steinhaer (2002), explains that according to Cree Elders, showing respect to mother earth and all her creatures is a key part of life:

Respect regulates how we treat mother earth, the plants, the animals and our brothers and sisters of all races. Respect means you listen intently to others’ ideas that you do not insist that your idea prevails. By listening intently you show honour, consider the well being of others, and treat others with kindness and courtesy. (p. 72)

The Indigenous relationship with nature is one of reciprocity and respect. The Indigenous identity “is anchored in the land and reflected in their languages, arts, stories, ceremonies, and so on” (Greenwood & Lindsay, 2019, p. 82). Reciprocal relationships with the earth resembles a circle in which humans and earth indefinitely care for one another without an end point in mind. In practice, this means that “when something was taken from the natural world or animals were killed, ceremonies and symbolic ritual acts were performed to ensure the perpetuation of this right balance and attitude towards relationships” (Cajete, 1994, p. 88). Kimmerer emphasizes that it is “one of our responsibilities as human people is to find ways to enter into reciprocity with the more-than human world. We can do it through gratitude, through ceremony, through land stewardship, science, art, and in everyday acts of practical reverence” (2013, p. 190). Indigenous worldviews see nature as an integral part of their way of life and a reciprocal source of health and wellbeing. Health in Indigenous communities encompasses four elements of life: the physical, emotional, and spiritual (Hatala, 2020).

Unfortunately, Indigenous worldviews are not always embraced by the dominant white culture and the mainstream. Sometimes, Indigenous views are obscured by “the brick wall of a deeply embedded belief and practice of Western Universality” (Ermine, 2007, p. 198). Western

belief does not have the same connection to land as Indigenous people: “Most Western educators believe their approaches to be based on value-free techniques and thinking; however, they are still dominated by philosophical ideas that developed in the 17<sup>th</sup> to 19<sup>th</sup> centuries and are centered on the separation of humans from nature, or humans from their natural environment” (Kapryka & Dockstator, 2012, p. 101). Western science “isolates its objects of study from their vital context by putting them in simplified and controllable experimental environments—which also means that scientists separate themselves from nature, the object of their studies” (Mazzocchi, 2006, p. 464).

Professor Kimmerer confronted this issue when native basket weavers asked botanists to see if different ways of harvesting sweetgrass might be causing sweetgrass to disappear from historic locales. Upon proposing this question for a graduate thesis project to a faculty committee,

there was an uneasy silence in the conference room. One professor shuffled through the proposal pages and pushed them aside dismissively. “I don’t see anything new here for science,” he said. “There’s not even a theoretical framework.” [...] Our research was most definitely grounded in theory [...] in the traditional ecological knowledge of indigenous peoples: If we use a plant respectfully, it will flourish. If we ignore it, it will go away. This is a theory generated from millennia of observations of plant response to harvest, subject to peer review by generations of practitioners, from basket makers to herbalists. Despite the weight of this truth, the committee could only struggle not to roll their eyes. The dean looked over the glasses that had slid down his nose, fixing Laurie with a pointed stare and directing a sidelong glance toward me. “Anyone knows that harvesting a plant will damage the population. You’re wasting your time. And I’m afraid I don’t find this whole traditional knowledge thing very convincing.”

[...]

Undeterred, we carried on. The basket makers had given us the prerequisites of the scientific method: observation, pattern, and a testable hypothesis. That sounded like science to me. So we began by setting up experimental plots in the meadows to ask the plants the question “Do these two different harvest methods contribute to decline?” And then we tried to detect their answer.

[...]

Laurie presented her graphs and tables to demonstrate that sweetgrass flourishes when it's harvested and declines when it is not. The doubting dean was silent. The basket makers smiled. [...] We are all the product of our worldviews—even scientists who claim pure objectivity. Their predictions for sweetgrass were consistent with their Western science worldview, which sets human beings outside of “nature” and judges their interactions with other species as largely negative. They had been schooled that the best way to protect a dwindling species was to leave it alone and keep people away. But the grassy meadows tell us that for sweetgrass, human beings are part of the system, a vital part. (Kimmerer, 2013 p. 151-163)

The traditional Western scientific approach of disconnecting human experience from nature not only fails to see the benefits humans can give to nature but, in turn, promotes “a model for living that supports the priorities of a materialistic society in which capitalistic ideals seemingly justify unlimited resource extraction—and this type of lifestyle is alarmingly unsustainable” (Kapryka & Dockstator, 2012, p. 104). When thinking about stewardship of the land, Western thinking differs greatly from Indigenous thinking: “Western thinking environmentalists tend to think of the land in terms of protectionism and conservation (no resource extraction and limited or regulated use of the land) while Indigenous peoples look to the land in terms of engaging with it by upholding relationships and responsibilities (hunting, gathering foods and medicines, and engaging in ceremony with the land)” (Kapryka & Dockstator, 2012, p. 103). Indigenous environmentalism recognizes “that human communities and their environments are inconceivable except as a single, integrated whole, each part dependent on the others for health and survival” (Miller, 2009, p. 29). Even regarding conservation efforts of nature, Western thinking views nature as separate from humans. In comparison, Indigenous views sees humans and nature as part of an interconnected system where there is no separation between humans and the environment. While indigenous worldviews and Western worldviews differ greatly, implementing both in environmental education is vital to the

health and wellbeing of individuals and communities as well as increasing stewardship of the earth.

### **History of Colonization and the Effects on Wellbeing**

Before addressing how Indigenous knowledge contributes to environmental education, I acknowledge the history of colonization and genocide inflicted on Indigenous populations and the resulting damage to communal health and wellbeing. One of the atrocities of colonization was the forced assimilation of Indigenous people. In Canada, the “Indian Residential School Systems” forcibly removed children from their homes to “civilize” them which ended in “many cases with physical, emotional and sexual abuse including slavery, spread of infectious diseases, violent punishment for speaking an Indigenous language, and death. Many students battled the destruction of their culture, language and identity and were denied cultural opportunities to develop parenting skills, speak their language, take part in spiritual ceremonies, or practice cultural activities such as harvesting off the land” (Lines et al., 2019, p. 2). By taking the land of Indigenous communities, colonizers disrupted Indigenous people’s relationship with the land and thus, their way of life, wellbeing, and source of cultural values:

The displacement of Indigenous people from their land through colonization is bound up with cultural disruption, social exclusion and tension, increased stress, diminished sense of identity and status, political and social subjugation, loss of control over lives and the loss of livelihoods – including proper nutrition. All such factors are heavily implicated in Indigenous peoples’ poor health. (“Social determinants,” 2007, p. 35).

Colonization criminalized cultural practices such as songs and ceremonies, removed children from families, and marginalized Indigenous communities (Greenwood & Lindsay, 2019). The disparities in all measures of health and wellbeing that impact Indigenous peoples across the world today in colonial and postcolonial nations are due to colonization where the violent

physical and spiritual separation of Indigenous people from their lands was a primary objective. Despite the violence of colonialism, “Indigenous peoples around the world have maintained connections to their lands, languages, and cultures, and are actively contributing to a resurgence of Indigenous knowledge that is passed through the generations” (Lines et al., 2019, p. 82). An Indigenous individual’s health “even broadly defined, cannot be understood in isolation of the collective well-being of their community and / or nation” (“Social determinants,” 2007, p. 24). The resurgence of Indigenous knowledge is a testament to the resilience of Indigenous people. While the effects of colonialism prevail to this day, Indigenous people and their knowledge are living entities that combat colonization and promote the wellbeing of people and land.

The intergenerational consequences of trauma from colonization and its resulting systemic racism are still manifested in the health status of Indigenous populations. Indigenous people in Canada rank lower in almost every determinant of health than non-Indigenous Canadians. In 2011, 29% of Canadian Indigenous adults aged 25 to 64 had less than a high school education compared to nearly 12% of the non-Indigenous population. Indigenous Canadians are almost three times more likely to experience food insecurity than their non-Indigenous counterparts, with more than 230,000 Indigenous youth aged 12 to 17 estimated to live in households with moderate to severe food insecurity. These deficits are reflected in multiple adverse health outcomes, including, but not limited to, elevated rates of: “infant and young child mortality, infectious diseases, malnutrition, tobacco use, accidents, interpersonal violence, homicide, suicide, obesity, cardiovascular disease, diabetes, and diseases caused by environmental contamination” (Lines et al., 2019, p. 2). Health issues faced by Indigenous peoples are entrenched in education and healthcare system inequalities. A connection to the land is vital to Indigenous health and cultural survival. Environmental education is one way that

Indigenous people can connect to the land. Although “colonialism has interrupted the organic transmission of Indigenous knowledges, many Indigenous peoples recognize that for their cultural knowledge to thrive, it must live in many sites, including Western education and research” (Kapryka & Dockstator, 2012, p. 104).

### **Youth’s Role in Environmental Education and Wellbeing**

A relationship with the land promotes wellbeing and health for Indigenous people. Environmental education is a means by which Indigenous people can engage with the land and form healthy, reciprocal relationships with it. Youth are the key to forming these relationships. In North America, Indigenous youth “are typically underestimated or underutilized by the ‘Western’ public and research community, where adults usually practice ‘adultism’ or hold power over youth” despite the fact that “many Indigenous scholars emphasize the importance of including youth’s health perspectives when capturing a community’s holistic health perspective” (Lines et al., 2019, p. 3). In 2016, fifteen Yellowknives Dene First Nation (YKDFN) youth in the Canadian Northwest Territories participated in the 'On-the-Land Health Leadership Camp' and shared their perspectives on health. The youth emphasized the land-health relationship through the following practices: surviving off the land, learning and passing on traditional knowledge, practicing cultural skills, understanding YKDFN history, gathering and preparing food, being out on the land, and working together. The following summarizes the youth’s perspectives on health:

In the first subtheme, the youth expressed a relationship between the health of community members and the land. Secondly, the youth envisioned future health solutions as taking place on-the-land, with a distinct youth role in maintaining this relationship through regularly practicing cultural and traditional skills, knowledge, and values. Thirdly, the youth voiced ‘being healthy’ within a community as being related to a symbiotic balance of relationship of land and people, which the youth actively uphold. Together all data supported a clear overall theme where youth identified connection between health and land as a primary determinant to YKDFN health that should be incorporated in future

health solutions. (Lines et al., 2019, p. 9).

The YKDRN youth also spoke of “the importance of participating in relationships with Elders and traditional knowledge holders, who pass down knowledge to youth through on-the-and experiences” (Lines et al., 2019, p. 9). The YKDFN youth reflect other First Nations communities where the youth are leaders in decision making, act as role models to increase positive outcomes for the next generation, shelter responsibilities for the community, and act on behalf of the community in addressing issues such as health, communication, justice, and food security. Youth “are the cultural pathway to collective survival and wellbeing” (Greenwood & Lindsay, 2019, p. 82).

Youth play a critical role in sustaining Indigenous communities’ health and wellbeing which is why environmental education must be focused on youth populations, Indigenous and non-Indigenous, to create reciprocal relationships between students and nature. In Canada, “Indigenous Peoples’ views on health encompass not only physical, spiritual, emotional, and mental wellbeing, but also a positive balance of relational connections between family, community, and land” (Lines et al., 2019, p. 9). With the right curriculum, this balance can be sustained through environmental education practices.

### **Indigenous Environmental Education**

Incorporating Indigenous knowledge systems into environmental education is essential for multiple reasons. One is that Indigenous knowledge can close gaps in contemporary understanding about the environment that will enable people to combat the threats to the natural environment such as climate change, deforestation and forest degradation, pollution, and more. Another reason is that settler societies can introduce Indigenous knowledge into education and

support the processes of “transitional and historical justice to heal the damage inflicted on Indigenous peoples during colonialism and reconciliation and the building of new, just and equal relationships between Indigenous and non-Indigenous groups” (Nesterova, 2020, p. 1051). Finally, connecting to the land through environmental education increases health benefits and environmental stewardship.

One of the approaches to incorporate Indigenous knowledge into environmental education is the “two-worlds” (or “two-eyed seeing”) approach. This concept includes Indigenous and Western perspectives but does not merge the two. Rather, “it avoids knowledge domination and assimilation by engaging in a learning philosophy based in equitable inclusion” (Kapryka & Dockstator, 2012, p. 106). This means that both Indigenous and Western perspectives are acknowledged in equal measure. Researchers Marilyn Iwama and Cheryl Bartlett explain “two-eyed seeing” as overlapping of each “eye” where there is “a guiding principle of binocularity to their integrative science that experiences a wider, deeper, and more generative ‘field of view’ than might either of these perspectives in isolation” (Kapryka & Dockstator, 2012, p. 105). This is similar to Donald’s “Métissage,” “two- eyed seeing” which emphasizes a weaving back and forth between Indigenous and Western knowledges where each strand is necessary to the teaching process. In addition to Indigenous knowledge, it is important for students to gain Western scientific literacy and competency: “This allows Aboriginal environmental problem solvers to use knowledge and skills from both knowledge systems in addition to enabling students to deconstruct and critique scientific evidence used to justify environmental destruction in their territories” (Simpson, 2002, p. 20). Although there exists common ground between Indigenous knowledge and Western science, the two should not be integrated, but rather viewed as “complimentary sources of information and wisdom [...] where

practitioners of both would benefit from a reciprocal flow of knowledge” (Kapyrka & Dockstator, 2012, p. 103).

Combining Indigenous knowledge with Western knowledge may bring up conflict within the student about which knowledge system is more valid. Students must be able to process feelings of anger, confusion, and conflict between Western science and Aboriginal knowledge. This will require culturally based methods of healing, conflict resolution, and the leadership of Elders. Indigenous environmental education “curriculum must also include a critical evaluation of Western science from Aboriginal perspectives including the negative impacts of science on Aboriginal communities in the past and in contemporary time” (Simpson, 2002, p. 22). Curriculum must acknowledge that Western science is not the only knowledge system: “It must also acknowledge explicitly and implicitly that Aboriginal Peoples have been employing complex technologies, engineering knowledge, mathematics, and methods of experimentation for thousands of years, that both knowledge systems have their benefits and weaknesses” (Simpson, 2002, p. 22). Curriculum that employs “applied and issues based approaches must not be viewed as being less academically rigorous simply because they present science in a different way than traditional [Western] science courses” (Simpson, 2002, p. 23). Kapyrka and Dockstator (2012) discuss elements of a “two-worlds” approach:

A crucial element involved in a “two-worlds” approach includes a fundamental requirement for teachers to animate the principle of holism, engaging mentally, emotionally, spiritually, and physically with all topics covered in a course. To engage in this new approach, it is critical to acknowledge a specific analysis of the past and the historical influence of Indigenous-settler relations on educational practices. The importance of storytelling as pedagogy and highlighting personal narratives and self-location of both students and instructors will facilitate this necessity. (p. 106)

Indigenous education is holistic and encompasses learning from emotional, intellectual, physical, and spiritual realms (Simpson, 2002). This means embracing hands-on-learning techniques

where students apply their learning to real-world situations. This promotes life-long learning, personal reflection, and personal growth. Incorporating “ceremonies, dreams, visions and visioning, fasting, storytelling, learning-by-doing, observation, reflecting, and creating” allows students to learn in a culturally inclusive manner (Simpson, 2002, p. 18). Indigenous education does “not simply include a transmission of a particular universal content or knowledge about the environment, but centres on lived experiences, praxis and shared meaning and knowledge-making” (Nesterova, 2020, p. 1048). Incorporating a diverse set of teaching methods with time for “personal reflection and emotional, intellectual, physical, and spiritual support can refocus post-secondary education programs from content driven curriculum to process-oriented learning” (Simpson, 2002, p. 18). This means forgoing the “standard evaluation techniques used in post-secondary science programs (quizzes, tests, multiple choice exams) and embracing appropriate alternatives (community reports, critiques, field reports, journals, etc.)” (Simpson, 2002, p. 23).

Teaching Circles can be implemented so that students have the chance to participate in class discussions, while Sharing Circles can assist students in working through emotional aspects of the curriculum such as processing climate change and decolonization. The natural environment is where Elders are often most comfortable teaching and interacting with students. Nature acts as a teacher and a classroom: “it supports its learners’ development of a spiritual connection to their surroundings and teaches them to listen to nature” (Nesterova, 2020, p. 1049). In addition, “students must be able to personally identify with course content and the real-world applications of that content. This means designing courses and programs with substantial Aboriginal content, issues, and case studies at the fore in addition to using Aboriginal teaching and learning methods to present Western ideas” (Simpson, 2002, p. 22). One example of this is the Bridging the Gap (BTG) yearlong program that provides largely Indigenous inner-city

students from Manitoba, Canada free, culturally relevant, science-based environmental education programming. The BTG program content brings together environmental education and local Indigenous Knowledges and pedagogies (Sutherland & Swayze, 2012). The framework of the program “Ininiwi-kiskānitamowin,” which is translated from the Swampy Cree language as “the knowledge of the people in how we understand the earth,” (Sutherland & Henning, 2009, p. 174) involves four levels or components:

- Learning science wholisitcally by “coming-to-know”: perspectives that identify how individually, Indigenous students uniquely engage with Western science and Indigenous knowledge;
- Culturally relevant approaches to teaching science: suggested pedagogical approaches to teaching science in Indigenous settings;
- Social and ecological justice: approaches to teaching for social and ecological justice in science; and
- Ecological literacy: the inclusion of incorporating values into science instruction with the overall goal of ecological literacy (Sutherland & Swayze, 2012, p. 85-86)

The students objectives are as follows:

- a) recognize how knowledge of plant and animal populations and interactions helped Aboriginal peoples to survive in the past,
- b) demonstrate proper cultural protocols when working with Elders, and
- c) describe the traditional Aboriginal perspective on natural resources (Sutherland & Swayze, 2012, p. 90)

This example uses Aboriginal teaching and learning methods to present substantial Aboriginal and ecological content.

Indigenous environmental education programs not only teach students to connect with and care for the earth, but the programs also intend to support students through healing and decolonizing processes. A decolonizing component of Indigenous environmental education is the use of Aboriginal language. Using Aboriginal language “is an essential skill for communication within Aboriginal communities and with Elders, it reinforces a deeper understanding of Aboriginal knowledge and it lays the foundation for cultural survival” (Simpson, 2002, p. 19).

Elders must be included in Indigenous environmental education curriculum: “Elders are keepers of tradition, guardians of culture, the wise people, the teachers. In Aboriginal societies, elders are known to safeguard knowledge that constitutes the unique inheritance of the nation” (Simpson, 2002, p. 17). To include Elders, they must be seen as “valuable Gifts,” not as “extras” or “guest speakers.” Simpson (2002) goes on to talk about how Elders must be included:

Programs must adapt to provide teaching and learning environments that compliment Elders’ cultural teaching styles and comfort levels in addition to the special needs of Elders. Programs must ensure that Elders are properly compensated for their participation, leadership and instruction. Our Elders provide us with the inspiration, knowledge, and guidance to face contemporary environmental issues and to assume our roles within our cultures, communities, and Nations. Promoting Indigenous Knowledge as the foundation of Indigenous environmental education programs necessitates our experts, the Knowledge-Holders, [elders], to be at the fore of program and curriculum development as well as course instruction. (p. 17)

Elders can also provide ceremonies and counseling support. A component of decolonizing education is thinking about how “Ancestors have resisted the processes of colonization, colonialism, and assimilation in the past” (Simpson, 2002, p. 19). By doing this, students can recognize how their Ancestors have worked hard to protect Traditional Territories, cultures, and knowledge, and counters the stereotype that Aboriginal peoples were helpless victims in the horrific processes of colonization. Thinking about Ancestors’ resistance also assists students and instructors in “recognizing their responsibilities to the coming generations and allows students to develop the skills they need to engage in effective resistance strategies once they graduate” (Simpson, 2002, p. 19). Revitalizing cultural knowledge and alternatives for the future based on traditional Indigenous values can be implemented through theatre, singing, drumming, dancing, and storytelling. The theme of decolonization should be consistent and run throughout the curriculum, “rather than attempting to compartmentalize into a unit or learning module” (Simpson, 2002, p. 20).

One example of Indigenous environmental education is the “Facing the Mountain Education,” developed by the Taiwanese Bunun Indigenous people for Indigenous and non-Indigenous people. This program’s objectives are learning with and from the natural environment, re-building and strengthening Indigenous identities, cultures, and ways of life, and contributing to decolonization of settler societies and reconciliation between groups. Rather than modeling the program on formal education that primarily focuses on textual literacy and testing, the program “values the process of developing and understanding through dialogue with others and with nature and building relationships that emphasize the value of obligation to the living and non-living world” (Nesterova, 2002, p. 1049). Class takes place in Indigenous homes, followed by activities in nature. The program relies on intergenerational relationships: “Indigenous people of all ages, from children to elders, engage in collaborative experiential learning and meaning-making to work together for and make collective decisions to protect the Land” (Nesterova, 2020, p. 1049). Participants collectively discuss and remember the knowledge and wisdom received from their elders and ancestors and learn from their diverse experiences. They also engage in social and community-building activities such as cooking and sharing meals, caring for children and grandparents, or being outside in the mountains.

The curriculum starts by discussing students’ local landscape, with a specific focus on local plants, what they consist of, and how they are used in traditional medicine and cooking. The program embraces a biocentric approach that links students to the mountain, signifying that they students come from the mountain and in fact *are* the mountain: “it is only by going back to ‘the mountain,’ to nature, and facing it, that they will be able to face their past and fears, develop self-respect and strengthen identities” (Nesterova, 2020, p. 1049). The program places a particular emphasis on connecting the students to nature:

The programme thus focuses on defining and connecting one's cultural identity as an Indigene with the environment, to establish a strong identity grounded in the culture and environment a person comes from, and an obligation to both. For this, along with group activities, the participants are guided to communicate with the environment on their own and to face themselves (face the mountain), their shattered identity, past and fears, and reflect on their relationships and connection between themselves and the Earth. Only in this way, by developing a strong connection between the cultural and environmental identities, is it believed that moral responsibility to protect, respect and relate to everyone and everything around them can be restored and reignited. With a secured, healthy identity and understanding of themselves and their place – locally, nationally, globally, they then feel empowered to protect their environment and transmit the necessary knowledge and values for a sustainable life. (p. 1049)

Three principles of the program can be used in other Indigenous environmental education programs. The first principle is “the need to nurture a solid interconnection between the varied individual, group and ecological identities a person possesses, the Land and place they inhabit and their conceptions of individual and collective social, ecological, economic and political life, duty and progress” (Nesterova, 2020, p. 1050). The second principle is “the focus on collaborative, shared meaning- and decision-making between individuals and generations to draw on the diversity and complexity of their knowledge and experiences” (Nesterova, 2020, p. 1050). The third principle “includes localization of any such programmes to not only (re-)build on Land-based knowledge and needs but to also develop love for and obligation to protect and care for the local context” (Nesterova, 2020, p. 1050). Localizaiton means “reliance on local or Indigenous pedagogies, knowledge systems and educational structures that are familiar and relatable for the people involved, as well as local Indigenous ownership and control over such programmes” (Nesterova, 2020, p. 1050). Finally, the objective of the “Facing the Mountain Education” program is to focus on the process of learning, teaching, collaborating, and interacting. This program can be adapted to be used in other environmental education programs to help Indigenous and non-Indigenous learners to develop a connection with nature and take on a responsibility to protect nature, challenging the anthropocentric approach to learning that is

prevalent in the Western world.

An example of Indigenous environmental education that utilizes the “two-worlds” approach is the Soaring Eagle program (Gaa Bi Ombaashid Migizi) a four-week community-based cultural immersion program for Aboriginal youth concerning different environmental issues from both Western and Aboriginal perspectives. The majority of the program “takes place on the land and the curriculum is rooted both pedagogically and epistemologically in Anishinaabeg Knowledge. Western science is presented as a useful tool for Aboriginal communities to address particular issues within this context” (Simpson, 2002, p. 16). Another example of Indigenous environmental education that utilizes the “two-worlds” approach is the First Nations Environment and Education Training Program at the Centre for Indigenous Environmental Resources in Winnipeg:

This program promotes both Indigenous and Western scientific pedagogy and content to Aboriginal students from across Canada. Teams of instructors including an Elder, a Western scientist and an Aboriginal academic or community person teach each course. Over the 18 month program, there is an emphasis on hands-on learning, support for field trips onto the land and into communities, and scientists are encourage to adopt an issues based approach to their course material. (Simpson, 2002, p. 16)

### **Implementing Indigenous Environmental Education**

To avoid appropriation and misrepresentation of indigeneity, implementing Indigenous knowledge into environmental education programs must be approached with respect. Cultural appropriation has been defined as “the taking – from a culture that is not one’s own – of intellectual property, cultural expression or artefacts, history and ways of knowledge” (Ziff & Rao, 1997, p. 1). Curators of Indigenous curriculum must not stereotype or romanticize “Indigenous knowledge systems, lives, experiences and identities as static, monolithic, primitive and performative” (Nesterova, 2020, p. 1051). Building trust, establishing relationships with, and

collaborating with Indigenous communities to develop curriculum and teaching methods that draw on Indigenous knowledge systems is essential for respectful inclusion and representation. Processes of decolonization in curriculum is intensely personal and emotional, so programs should have appropriate support mechanisms in place. Students should also “be encouraged to work through these issues at their own pace and must be given time and space for their personal decolonization path” (Simpson, 2002, p. 20). Ultimately, decolonization requires a “strong commitment to educating students in not just *culturally appropriate* ways, but *culturally inherent* ways” and a “willingness to completely recognize Indigenous Knowledge and Indigenous education philosophies on their own terms, as valid ways of teaching and learning, equal to their Western counterparts” (Simpson, 2002, p. 17). Scientists and educators who have experiences working with Indigenous peoples and communities and are sensitive to the needs and realities of Aboriginal communities must be employed. Finally, curriculum should be relevant to the territory the program is in. For example, traditional territories in Ontario, Canada include Anishinaabe/Ojibwe, Haudenosaunee, Algonquin, and Cree peoples, so Indigenous environmental education curriculum should be tailored to these groups.

When implementing Indigenous knowledge into environmental education, programs must be equipped to handle certain challenges. One challenge is that most teacher candidates are non-Indigenous and lack knowledge about Indigenous peoples or Indigenous pedagogies (Kapryka & Dockstator, 2012). Because of this, there is a likelihood of “shallow integration with an incoherent approach to Indigenous knowledges, which can result in superficial treatment of culture and a reinforcement of stereotypes” (Kapryka & Dockstator, 2012, p. 107). Another challenge to implementing a “two-worlds” approach to environmental education is a low number of Indigenous academics available to participate in the program. This reality is in part due to the

“lack of curriculum regarding Indigenous peoples and perspectives in current mainstream K-12 models and has been identified as a leading catalyst of poor retention of Indigenous students in educational programs” (Kapryka & Dockstator, 2012, p. 107). Curriculum does not provide Indigenous students the knowledge to apply to the situations they face in their communities or the skills to ensure cultural survival of their people. Western educators must “confront their own hidden interests, unconscious attitudes, and ignorant assumptions that animate Western dealings with Indigenous peoples” to implement a “two-worlds” approach. Kapryka and Dockstator (2012) continue to describe another barrier to implementing the “two-worlds” approach:

A “great divide” still exists between Indigenous and Western knowledges which is then reflected or reproduced in curriculum. For example, to posit reality as a construct of interrelatedness—with a spiritual dimension—can be seen as an irrational leap to many Western educators because Western knowledge or science has largely concerned itself with the study of a physical and rational reality (Iwama et al., 2009). Honouring the interdependency of all beings in all aspects of being—spiritual, emotional, physical and mental—and surviving an academic world that privileges the ‘intellectual’ is a difficult task for the implementation of Indigenous perspectives in mainstream or Eurocentric education systems. (p. 108)

Professor Robin Wall Kimmerer, an American Distinguished Teaching Professor of Environmental and Forest Biology, Director of the Center for Native Peoples and the Environment, at the State University of New York College of Environmental Science and Forestry, and an enrolled member of the Citizen Potawatomi Nation, writes in *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants* about an example of this “great divide”:

On Mondays, Wednesdays, and Fridays at 9:35 a.m., I am usually in a lecture hall at the university, expounding about botany and ecology – trying, in short, to explain to my students how Skywoman’s gardens, known by some as “global ecosystems,” function. One otherwise unremarkable morning I gave the students in my General Ecology class a survey. Among other things, they were asked to rate their understanding of the negative interactions between humans and the environment. Nearly every one of the two hundred students said confidently that humans and nature are a bad mix. These were third-year students who had selected a career in environmental protection, so the

response was, in a way, not very surprising. They were well-schooled in the mechanics of climate change, toxins in the land and water, and the crisis of habitat loss. Later in the survey, they were asked to rate their knowledge of positive interactions between people and land. The median response was “none.”

I was stunned. How is it possible that in twenty years of education they cannot think of any beneficial relationships between people and the environment? Perhaps the negative examples they see every day – brownfields, factory farms, suburban sprawl – truncated their ability to see some good between humans and the earth. As the land becomes impoverished, so too does the scope of their vision. When we talked about this after class, I realized that they could not even imagine what beneficial relations between their species and others might look like. How can we begin to move toward ecological and cultural sustainability if we cannot even imagine what the path feels like? If we can’t imagine the generosity of geese? These students were not raised on the story of Skywoman. (Kimmerer, 2013, p. 6)

This example highlights the disparity between Indigenous teachings and Western education where students were not raised on the Indigenous story of Skywoman:

On one side of the world were people whose relationship with the living world was shaped by Skywoman, who created a garden for the well-being of all. On the other side was another woman with a garden and a tree. But for tasting its fruit, she was banished from the garden and the gates clanged shut behind her. That mother of men was made to wander in the wilderness and earn her bread by the seat of her brow, not by filling her mouth with the sweet juicy fruits that bend the branches low. In order to eat, she was instructed to subdue the wilderness into which she was cast.

Same species, same earth, different stories. Like Creation stories everywhere, cosmologies are a source of identity and orientation to the world. They tell us who we are. We are inevitably shaped by them no matter how distant they may be from our consciousness. One story leads to the generous embrace of the living world, the other to banishment. One woman is our ancestral gardener, a cocreator of the good green world that would be the home of her descendants. The other was an exile, just passing through an alien world on a rough road to her real home in heaven.

And then they met – the offspring of Skywoman and the children of Eve—and the land around us bears the scars of that meeting. (Kimmerer, 2013, p. 7)

Western scientific literacy is seen as an important tool for Indigenous people to work in the field of the environment, “yet mainstream science education has failed miserably at attracting and retaining Aboriginal students” (Simpson, 2002, p. 20). Indigenous students can either be assimilated into Western framework or further alienated by undermining their knowledge systems. In many cases, Indigenous students have negative first encounters with Western science

through their own communities or within the public-school system: “the historic (and often contemporary) relationship between Western science and Indigenous Peoples has been laden with racism, power imbalance, and oppression (Tuhiwai-Smith, 2000). Aboriginal students need to be afforded the opportunity to express these experiences, seek validation, and heal from pain this has caused them” (Simpson, 2002, p. 22). For example, Professor Robin Wall Kimmerer recounts her own experience with traditional Western science:

In moving from a childhood in the woods to the university I had unknowingly shifted between worldviews, from a natural history of experience, in which I knew plants as teachers and companions to whom I was linked with mutual responsibility, into the realm of science. The questions scientists raised were not “Who are you?” but “What is it?” No one asked plants, “What can you tell us?” The primary question was “How does it work?” The botany I was taught was reductionist, mechanistic, and strictly objective. Plants were reduced to objects; they were not subjects. The way botany was conceived and taught didn’t seem to leave much room for a person who thought the way I did. The only way I could make sense of it was to conclude that the things I had always believed about plants must not be true after all. (Kimmerer, 2013, p. 41-42)

To implement a successful Indigenous environmental education model, the program must consider the divide between Western and Indigenous worldviews and prioritize supporting Indigenous students as they process reconciling this divide in the curriculum.

### **The Need for and Outcomes of Indigenous Environmental Education**

Indigenous nations currently face some of the most devastating environmental destruction. The UN states the following:

Indigenous peoples are among the first to face the direct consequences of climate change, due to their dependence upon, and close relationship, with the environment and its resources. Climate change exacerbates the difficulties already faced by indigenous communities including political and economic marginalization, loss of land and resources, human rights violations, discrimination and unemployment. (“Climate Change,” n.d.)

In Canada, the “Gwitch’in and First Nations in the Yukon are battling toxic contamination

brought to their territories through long-range transport, industry, and government ignorance” (Simpson, 2002, p. 14). Inuit Elders in Nunavut warn of the dangers of global warming as they witness accelerated climate change. The Mohawks of Akwesasne in southeastern Ontario “continue to fight against industrial contamination of their waters, air, land, fish, and animals in addition to the human health impacts of that contamination” (Simpson, 2002, p. 14). The Pimicikamak Cree Nation in northern Manitoba demand to be treated fairly and equitably by governments responsible for flooding 1.2 million hectares of their land for hydroelectric development. In western Canada, “the Haida and Gitsan Nations are working to protect their forests from unsustainable industrial clear cutting, while the Nuu-chah-nulth and Shuswap Nations try to protect their lands from the impacts of tourist development and deforestation and their waters from exploitation” (Simpson, 2002, p. 15). Approaching the development of Indigenous education programs with the needs of Indigenous students at the fore “can produce programs that promote Indigenous knowledge, Indigenous processes of teaching and learning, and the appropriate use of Western science to counteract the environmental destruction in Indigenous Territories” (Simpson, 2002, p. 24).

The impact of Indigenous environmental education programs varies by student, but some common themes run throughout. One of the most common questions students ask is Why were we not taught this before? Students can become angry or upset that they had not been introduced to Indigenous knowledge earlier in their education. Concurrently, however, these same students exude attitudes of awe and respect when they engage in Indigenous ways of thinking about the world. They also “become intellectually inspired, spiritually moved, and physically prompted to learn more and/or to ‘do something’” (Kapyrka & Dockstator, 2012, p. 106). For a study in Canada where students participated in a writing exercise about what they learned from the

Indigenous curriculum, “students describe personal accounts of how their thinking has become more aware, inclusive, and respectful of the natural environment and their relationship with it. They passionately suggest that all ‘science students should know this stuff’ and ‘should be required to take these classes’” (Kapyrka & Dockstator, 2012, p. 106). Protecting the land through environmental education “will provide future generations of Aboriginal Peoples with the wisdom and tools to strengthen their relationships to the land and to continue to decolonize their communities and Nations” (Simpson, 2002, p. 23). Ultimately, listening, understanding, and connecting to the land will create reciprocal relationships between land and people, thus protecting the health and wellbeing of the natural environment and humans. The following chapter will explore a Western style model of environmental education, which can be included in a “two-eyed seeing” or “two-worlds” approach.

### **Chapter 3: Forest Schools and Environmental Education**

To implement the “two-eyed seeing” or “two-worlds” approach where Western and Indigenous knowledges are adjacent to each other, Forest Schools provide an example of Western style teaching that complements Indigenous environmental education. Like Indigenous environmental education, Forest Schools focus on developing a relationship with the land to improve wellbeing and environmental stewardship. Forest Schools also include hands-on learning techniques to engage students with nature. As mentioned in the previous chapter, implementing Western and indigenous curriculum together can be difficult because Western knowledge or science largely concerns itself with the study of physical reality whereas Indigenous curriculum also focuses on the spiritual dimension. Forest schools emphasize a holistic teaching method that involves developing a spiritual relationship with the earth which is why Forest School are the focus of this chapter.

#### **A Brief History of Forest Schools**

Since the eighteenth century, pioneers of early education, namely Froebel, Montessori, and Steiner, have recognized the importance of contact with nature and hands-on play and learning (Turtle et al., 2015). Contact with nature and hands-on play and learning improves attention and reduces stress in children, contributes to healthy child brain development, benefits children’s emotional resilience, and increases connection to nature, and thus positive environmental behaviors (Bravender & Bravender, 2020). Over the last decade and a half, schools have started to recognize the importance of outdoor time for children. This has resulted in the development of programs that implement outdoor learning. One of the programs that has increased in popularity in recent years is Forest Schools (Coates & Pimlott-Wilson, 2019). Forest

School pedagogy comes with deep roots in other educational theories: “These include Froebel’s ideas emphasizing freedom and play, [...] Dewey’s philosophy of ‘real learning’ and learning through life situations, [...] and Steiner’s awareness of the natural environment as a facilitator of experiential learning” (Barrable & Arvanitis, 2018, p. 42). Through these traditions “emerges a pedagogy that is child-centered, flexible, and allows learners a freedom to control their own learning experiences, largely through play and exploration” (Barrable & Arvanitis, 2018, p. 42). Challenge is an inherent part of the Scandinavian Forest School approach: “by placing an emphasis on challenge, FS aims to nurture children’s awareness of risk, at the same time as helping them develop the skills to tackle appropriate challenges” (Barrable & Arvanitis, 2018, p. 45).

Forest Schools originated in Denmark and Sweden in the late 1950s, and then expanded into Europe, China, Australia, New Zealand, the United States, and Canada. Ella Flautau established the world’s first known forest school in Denmark in 1952. She and other parents formed a group and created an initiative to establish “walking kindergartens” out of the Waldorf-Steiner approach to child-led and play-based education, with adults as facilitators not teachers (Forest School Foundation, 2020b). The Waldorf-Steiner pedagogy strives to develop students’ intellectual, artistic, and practical skills in an integrated, experiential, and holistic manner. Forest schools started popping up around Denmark in the 1950s as the country struggled with a lack of indoor space for young childhood education centers. Forest Schools were introduced to the United Kingdom in the 1990s, after a group of Early Years Professionals from Bridgewater College in Somerset were inspired to start their own version of a forest school following a visit to Denmark (Turtle et al., 2015). Over 50 Forest Schools are in Britain. The first known modern forest school in the United States was founded in 1996 in California. The ethos and approach of

Forest Schools can be directly related to the key aim of Every Child Matters movement (started in 2001): “being healthy; staying safe; enjoying and achieving; making a positive contribution; and enjoying economic well-being” (Turtle et al., 2015, p. 3). Between 2016 and 2017, the United States saw a 66 percent increase in the number of registered outdoor preschools and kindergartens. An estimated 240 nature preschools exist in the United States (Forest School Foundation, 2020b).

Forest Schools go by several different names: Nature Kindergarten, Outdoor School, Waldkindergarten, Rain or Shine School, Enviroschool, Nature school, Naturbørnehavens and Bush School (“Forest and Nature,” 2014; Forest School Foundation, 2020b). In Sweden, forest schools are called udeskole. In Australia, Forest Schools have been adapted to be called “Bush Kinders” and elements of Australian Indigenous culture have been integrated into the Bush Kinder education, including Indigenous cooking, foraging, and art elements. In New Zealand, early childhood care and education services established “enviroschools,” which are grounded in indigenous Māori knowledge and feature strong connectedness to place and a deep, spiritual relationships with the land, mountains, rivers, and oceans (Forest School Foundation, 2020b). In China, forest schools are gaining popularity in urban cities despite the limitations of urban built environments and Chinese cultural views on education achievement based with visible, trackable outcomes. Japanese forest schools, or Mori-no-ie or Mori-no-youchien, are becoming more popular because they provide an escape from the strict rules in Japanese society.

### **What are Forest Schools?**

Forest Schools originated in Denmark but have recently been adopted across the world as a model for progressive education. Forest Schools are described in several ways:

- “Forest School is a form of outdoor education that is particularly associated with early years education (children from the age of three to the age of eight) wherein young children spend time in forest or woodland settings.”

- Leather (2018, p. 2)

- “Forest Schooling is a philosophy of education that “broadly follows a holistic approach to learning, and is normally carried out in a natural or wild place such as a forest and is child led.”

- Turtle, Convery and Convery (2015, p. 2)

- “the key underlying feature of the forest preschool approach is that children spend long and regular periods of time in unstructured play in natural forest or beach environments, ranging from weekly visits over a preschool term to an everyday, all-year-round occurrence.”

- Elliot and Chancellor (2014, p. 46)

In general, these programs are outdoors-centered, play-based, and child-led. Forest Schools are underpinned by the Danish philosophy of *friluftsliv* which roughly translates as “free air life.” The core aspects of this philosophy are freedom, fresh air, experiential learning, and a spiritual relationship with the earth (Drew, n.d.). In Forest Schools, children spend anywhere from a half-day to a full-day outdoors in local woodlands and green spaces, various urban and near-urban parks, natural spaces adjacent to or on school grounds, or natural playgrounds and outdoor classrooms (“Forest and Nature,” 2014). Forest Schools can take place in a variety of spaces, including local forests, creeks, meadows, prairie grasses, mountains, shorelines, tundra, natural playgrounds, and outdoor classrooms. The places for nature connection do not need to be vast or grand; they can be in “ditches, ravines, and pockets of wildness even in urban landscapes” (“Forest and Nature,” 2014, p. 37). The forest or natural area “is essentially a resource of rich, individualized opportunities for children to act in accordance with their innate capabilities and tendencies” (Barrable & Arvanitis, 2018, p. 45).

The Forest School Association (2019), set up in 2011, has produced six guiding principles for Forest Schools (FS):

1. FS is a long-term process of regular sessions, rather than a one-off or infrequent visits; the cycle of planning, observation, adaptation and review links each session.<sup>[11]</sup><sub>[SEP]</sub>
2. FS takes place in a woodland or natural environment to support the development of a relationship between the learner and the natural world.
3. FS uses a range of learner-centered processes to create a community for being, development and learning.
4. FS aims to promote the holistic development of all those involved, fostering resilient, confident, independent and creative learners.
5. FS offers learners the opportunity to take supported risks appropriate to the environment and to themselves.
6. FS is run by qualified Forest School practitioners who continuously maintain and develop their professional practice.

By providing an environment for children to take risks, children improve their confidence, expand their worldviews through exposure to new, unique, and authentic challenges in risky play, develop motor skills, and learn to evaluate risks. Opportunities to experience risk are an integral part of learning and healthy development (“Forest and Nature,” 2014). Risk management is viewed as a fundamental skill needed for young people’s safety and wellbeing. By spending significant time outdoors, children develop an affinity with and affection for nature, establish habitual outdoor play that can carry on for years, and establish physical exercise as a normal everyday activity. Through outdoor learning that occurs in all weather conditions, children develop resilience and learn about weather: “Students learn that they are embedded within an environment with many temperaments and a delicate balance of seasons. This can help them appreciate the importance of taking concepts like climate change seriously” (Drew, n.d.). Engaging in play-based learning results in “organic and authentic peer communication experiences; Spontaneity, including spontaneous opportunities for learning that occurs in context” and creativity (Drew, n.d.). Some benefits of child-led learning are that children learn to develop initiative, have control over their own experiences, develop skills and confidence, develop healthy relationships with themselves and the environments they live in, and develop

leadership skills (Barrable & Arvanitis, 2018, p. 42). Ceremonial events that bookend the sessions can include reflective roundtable discussions, campfires with parents, storytelling, ceremonial dancing, and special foods. These ceremonies are used to teach children that “something special is about to happen, or has just happened” (Knight, 2009, p. 17).

Some Forest School programs are offered to students one half-day per week, whereas other schools and early years centers offer Forest School programs on a full-time basis where students spend the majority of their time outdoors. Forest schools often happen alongside mainstream school provision, delivered during the school day and running alongside the school curriculum over a number of weeks or the full school year (Coates & Pimlott-Wilson, 2019). The defining feature of Forest School programs “is that children are provided with opportunities to build an on-going relationship with the land, to a dedicated educator, to one another, and to themselves through this educational approach” (“Forest and Nature,” 2014, p. 12). Forest Schools differ from other outdoor and environmental education programs by adhering to the following: “regular and repeated access to the same natural space, as well as emergent, experiential, inquiry-based, play-based, and place-based learning” (“Forest and Nature,” 2014, p. 12). This regular and repeated access increases the strength and depth of children’s connection to a place in nature, prompting them to want to protect and conserve nature more than if they only went to a place in nature once or a few times.

Experiential learning defines effective learning as “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience” (Kolb, 1984, p. 41). Thus experiential learning tends to be outside of the classroom where children are engaged actively in a learning experience (Coates & Pimott-Wilson, 2019). Forest Schools incorporate inquiry-based learning, “a dynamic and

emergent process that builds on students' natural curiosity about the world in which they live" ("Forest and Nature," 2014, p. 23). Teachers use an inquiry-based approach to encourage students to ask and genuinely investigate their own questions about the world. Inquiry-based learning places students' questions and answers at the center of the learning experience, rather than the teachers. Teachers are thereby decentered, and their role is to provide "a variety of tools, resources, and experiences that enable learners to investigate, reflect, and rigorously discuss potential solutions to their own questions about a topic the class is studying" ("Forest and Nature," 2014, p. 23).

Play-based learning is one aspect of this self-directed learning process. Play "is important for the healthy development of children physically, emotionally, and mentally [...]. Play has long been known to have a significant role in building communication and social skills, aesthetic appreciation, creativity and problem solving, and scholars have highlighted its role in the development of the flexible and non-specialist behaviour necessary for our species' survival as ecological and other conditions change" ("Forest and Nature," 2014, p. 25). Children attending Forest Schools have the opportunity to learn in a natural environment on a regular basis. This place-based learning is firmly rooted in the act of connecting children to a particular place through direct experiential contact: "the ability to know a place intimately and to return to a natural space again and again, provides children with familiarity while honing their ability to recognize and understand processes of change" ("Forest and Nature," 2014, p. 30-31). Some examples of play-focused learning activities include den building, fire lighting, and tool use, which help to develop problem solving skills, co-operation abilities, confidence, self-motivation, and self-esteem (Coates & Pimlott-Wilson, 2019). Play can also offer opportunities to take

managed risks which benefit children's emotional resilience, social function, and physical health and wellbeing (Coates and Pimlott-Wilson, 2019).

### **Examples of Forest School Programs**

One study titled "The Hare and the Tortoise go to Forest School: Taking the scenic route to academic attainment via emotional wellbeing outdoors" explores the concept that, for disadvantaged children, wellbeing through outdoor learning plays an important role in school-readiness and achievement (McCree et al., 2018). Researchers explored the impact of a Forest School intervention program on participating children's nature connection, emotional wellbeing, and academic development. Eleven children from disadvantaged backgrounds participated in the study. The children were all considered to be economically and emotionally disadvantaged and had special education needs including behavioral difficulties. Their home lives were known to include stress, trauma, and complex family relationships. The children aged 5-7 at the beginning of the study and 7-10 at the end of the study, attending weekly Forest School outdoor learning sessions over a three-year period. Multiple assessments involving the children, the teaching team, the project practitioners, and some parents were used to evaluate the impact of the program. These assessments included annual interviews with each child and two in-depth case studies with two of the children. As children exited the program, they completed the Connection to Nature Index which found that the "mean average differences between the school (3.9, n = 95), the study cohort (4.5, n = 11) and a national survey (4.05, n = 1200) (Bragg et al., 2013; RSPB, 2013) [indicated] that the intervention strengthened the children's connection to the rest of nature" (McCree et al., 2018, p. 984). Staff participated in focus group discussions each term

during the program, and field notes, observations, questionnaires, and measures of wellbeing and involvement were collected each weekly session (McCree et al., 2018).

Positive outcomes for the children included an increase in wellbeing and academic development. Indicators of increased wellbeing were evident in changes in children's self-regulation and resilience, which appeared to be supported by "emotional space" — defined as "the provision of a physical space and time in which the children are free to be themselves and express their emotions" (McCree et al., p. 985). Results also included increased confidence for learning and connection to nature. Children were recognized as "wild experts" at school. Though not a controlled study, by the end of the program, the academic development of the participating children compared favorably with their non-Forest School participating peers. According to the children, parents, and the school team, the Forest School experience played a major role in positive academic outcomes. This study suggests that children's social development and emotional wellbeing are supported by Forest School curriculum, and that Forest Schools can be an effective intervention for children with disadvantaged backgrounds.

Another example of a successful Forest School program is the Maplewood Forest School in Guelph Ontario, Canada. For three years, educator Jen Mason took a group of children out to Forest School for one hour a day, four mornings a week, throughout the school year to connect with nature (Forest and Nature," 2014). The Forest School setting was in a city park behind the school, featuring some mixed forest and a marsh. One of the students saw a sign announcing a future housing development that would be built in or near a marsh and was incredibly upset by this, asking their mother about the red-winged blackbirds in the marsh: "Where will they make their nests? Where will they live?" (Forest and Nature," 2014, p. 31). Her reaction displayed a concern for the environment that she developed during the Forest School program:

Such a beautiful and simple display of deep connection with non-human kin is a powerful validation of the importance of nature connection and place-based learning. At no time in Jen's Forest and Nature School program had they talked overtly about the value of all living things or the importance of preserving wild and semi-wild spaces. Rather, the children had walked in rubber boots along a marsh's muddy edge, made boats out of cattails, listened to the distinctive calls of the red-winged blackbirds, followed deer tracks through the ice and snow, made sculptures out of chunks of ice, laid on their backs and listened to cattails rustling, let snowflakes land on their faces, and celebrated the return of the red-winged blackbirds from warmer climes—the harbingers of spring. The children came to know the marsh and some of its inhabitants, and they developed an emotional connection to that landscape. Such a connection does not come from books or videos, but from a place-based relationship—from getting wet and muddy, paying attention, and spending time. (p. 31-32)

The children participating in this program expressed concern for the environment through connecting with nature. They did not need to be told to care for nature or preserve wildlife. By engaging in hands-on learning and play based curriculum, the students naturally developed a desire to protect the environment.

### **Outcomes of Forest Schools**

Outdoor learning in Forest Schools supports the building of a relationship between children and nature “in ways that are not accessible in traditional educational settings” (Barrable & Arvanitis, 2018, p. 48). This development of Nature Relatedness (NR) or nature connection is linked with general psychological wellbeing and subjective wellbeing as well as environmental concern and pro-environmental behaviors (Nisbet & Zelenski, 2014). Pathways to improve NR “involve sustained contact, emotion and compassion towards nature, as well as appreciation of beauty” (Barrable & Arvanitis, 2018, p. 48). Relationship building is another desired outcome of Forest School pedagogy. On one level, there is the interaction of the practitioner with the learners where “communication is important for the support of autonomy and competence” (Barrable & Arvanitis, 2018, p. 47). To support NR and build authentic connection and

involvement, interaction must come from genuine interest in the learners' perspectives. By showing genuine interest, motivation to protect the environment occurs. On another level, there is the interaction among learners. Participant relationships facilitate the emotional and social development of each person involved. Social skills are developed through "teamwork, turn taking, mutual respect and cooperation" (Barrable & Arvanitis, 2018, p. 48). The result of interpersonal relationships is a sense of relatedness to one another and belonging to a social group.

Coates' and Pimlott-Wilson's (2019) research, which included more than 30 interviews with children between four and nine attending a Forest School, found that during Forest School, children felt more independent, and as a result, had a greater sense of personal, social and environmental responsibility. Forest Schools are also linked to better performances in math, reading, writing, listening, and better critical thinking skills ("Forest and Nature," 2014).

Forest School outcomes can be measured in relation to Bloom's Taxonomy. Bloom's Taxonomy is a hierarchical ordering of cognitive skills that can help teachers teach and students learn. Bloom's Taxonomy is broken down into six tiers from bottom to top: remember (recall facts and basic concepts), understand (explain ideas or concepts), apply (use information in new situations), analyze (draw connections among ideas), evaluate (justify a stand or decision), and create (produce new or original work) (Armstrong, 2010). Assessing Forest Schools by these six tiers ensures that curriculum addresses understanding a concept, applying a concept, evaluating and analyzing the learning process, and creating an accurate conclusion.

According to the Forest School Foundation, many benefits of Forest Schools relate to the mind, body, spirit, family, community, and planet. For the mind, children gain hands-on STEAM learning, creative problem-solving, focus and concentration, and risk assessment and

management. Concerning the body, children gain complete sensory experiences, balance, coordination and motor skills, physical strength and stamina, and general health and immunity. In terms of the spirit, children benefit from character development and self-awareness, confidence and self-esteem, creativity, curiosity, and imagination, and independent thinking and play. The family experiences emotional resiliency, decreased stress and anxiety, secure attachment and trust, self-sufficiency, and practical life skills. The community benefits from language and communication, teamwork and cooperation, empathy and altruism, and mixed-age group connection. Finally, in relation to the earth and its habitats and species, children experience environmental and seasonal changes, environmental exploration, sustainability and stewardship, and biological and ecological literacy.

Forest Schools can heal and strengthen children's bodies through physical fitness, higher levels of vitamin D, and better eyesight (Ebberling et al., 2002; Collins, 2011; Children & Nature Network, 2012). Forest Schools can also counteract children's decreasing knowledge of biodiversity and the environment. (Children & Nature Network, 2012). By exposing children to hands-on learning in areas of nature, Forest Schools can help children become stewards of the natural world. The connection to place resulting from repeated visits to a particular outdoor education creates a sense of belonging and ultimately a sense of stewardship for that place, the broader community, and earth. Experiences children have in natural areas such as the forest, without adult supervision, have been shown to increase the likelihood of the same children returning to these places as adults (Wells & Lekies, 2006).

Evidence suggests that there is a link between children who have experiences in nature and adults who have pursued careers in conservation. For example, Chawla (2006) explored what experiences influenced career environmentalists in Norway and the United States and found

that the most common reason for entering into an environmental career was due to childhood experiences of nature. A Cornell University study also found that childhood nature experiences like hiking, camping, hunting, or fishing impact later life environmentalism (Wells & Lekies, 2006). Another study investigated, among other things, the influences of childhood experiences in nature and career choice of 104 Canadian environmental scientists (including atmospheric science, biology, chemistry, computer science, ecology, environmental science, geography, geology, mathematics, medical sciences, oceanography, physics, or statistics) (Wright & Wyatt, 2008). Two questions of the survey examined the participants' experiences with the natural world in early childhood (0–12 years old), and adolescence (13–19). For early childhood, 92 percent of participants provided detailed descriptions of their outdoor experience with the natural world. In adolescence, participants reported similar experiences with the natural world to those of early childhood, but with increased and often more independent experiences with the natural world. Another trend in adolescence was how much curriculum (e.g., field trips and visits to outdoor education centers organized by the high school) and high school teachers influenced their experience of the natural world (Wright & Wyatt, 2008). Forest Schools' natural settings, play-based, child led curriculum, and outdoor experiential learning opportunities may lead students to become environmental scientists themselves.

## Conclusion

Environmental education is a crucial tool to develop responsible environmental stewards. To mitigate the current environmental crises, youth must be involved in future decision and policy making. By participating in environmental education programs, youth are immersed in nature, and thus develop a relationship with the land and invest in protecting it. Connecting to nature also has health benefits and can improve brain development in children. Despite the Nature-Deficit Disorder, environmental education programs are flourishing and creating environmentally-minded youth around the world. By learning about the benefits of environmental education, more programs can be recognized and implemented.

Indigenous environmental education is particularly important because it promotes reciprocal relationships with the earth. The more children help the planet, the more the planet will benefit them. Indigenous environmental education also is important because it offers an alternative to Western style teaching, includes marginalized communities, and implements decolonization techniques. Indigenous environmental education programs involve hands-on learning that is engaging to students and connects them to the land. Regardless of what students pursue as careers, because of Indigenous environmental education programs, they will be more informed about the environment and make more environmentally-conscious decisions in their work and personal lives.

Forest Schools also offer hands-on learning techniques to connect children to the land and a complementary component of the “two-eyed seeing” or “two-worlds” approach. In the past few months, the Forest School model has made international headlines in the major news publications, including The Washington Post, The New York Times, Vogue, and more. Especially in the time of the coronavirus, Forest Schools are touted for their health benefits –

outdoor spaces have been proven to reduce the infection and spread of coronavirus. There is even evidence that vitamin D can boost immunity against the virus (Forest School Foundation, 2020a). In addition to protecting children from coronavirus, Forest Schools improve wellbeing and strengthen environmental stewardship behavior.

### **Moving Forward**

In future research on environmental education, one could conduct case studies on Indigenous environmental education and Forest Schools to better understand specific curriculum that is effective in nurturing young environmental stewards. One could also delve more into the cultural ways environmental education can engage with underserved youth, people of color, and other marginalized groups to gain a more nuanced understanding of the impacts of environmental education programs and make environmental education more culturally appropriate and inclusive. Further research could explore other environmental education programs and how they can be implemented. Some questions that are beyond the scope of this paper include the following: What is the future of Indigenous environmental education and Forest Schools in the United States and the world? How can environmental education be promoted from a policy perspective?

With this thesis, I hope to add to my previous research from The College School where I found most students, through environmental education, had a strong connection to nature and motivation to help conserve nature through ERB. My findings pertaining to Indigenous environmental education and Forest Schools have broadened my understanding of what environmental education can achieve – school performance, psychological and social benefits, cultural awareness and decolonization, and the development of ERB. Ultimately, environmental

education is crucial to the future of the planet with improving the health of its people and its environment.

## Works Cited

- Armstrong, P. (2010). *Bloom's Taxonomy*. Vanderbilt University Center for Teaching  
<https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>
- Barrable, A., & Arvanitis, A. (2018). Flourishing in the forest: Looking at Forest School through a self-determination theory lens. *Journal of Outdoor and Environmental Education*, 22(1), 39–55. <https://doi.org/10.1007/s42322-018-0018-5>
- Berman, M. G., Kross, E., Krpan, K. M., Askren, M. K., Burson, A., Deldin, P. J., Kaplan, S., Sherdell, L., Gotlib, I., & Jonides, J. (2012). Interacting with Nature Improves Cognition and Affect for Individuals with Depression. *J Affect Disord*, 140(3), 300-305.  
<https://doi.org/10.1016/j.jad.2012.03.012>
- Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 10(456), 1-10. <https://doi.org/10.1186/1471-2458-10-456>
- Braus, J., & Milligan-Toffler, S. (2018). The Children and Nature Connection: Why It Matters. *Ecopsychology*, 10(4), 193–194. <https://doi.org/10.1089/eco.2018.0072>
- Bravender, T., & Bravender, L. (2020). *Nature Play: A Prescription for Healthier Children*. Contemporary Pediatrics. [www.contemporarypediatrics.com/view/nature-play-prescription-healthier-children](http://www.contemporarypediatrics.com/view/nature-play-prescription-healthier-children).
- Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social Indicators Research*, 74(2), 349–368.  
<https://doi.org/10.1007/s11205-004-8207-8>
- Brugger, A., Kaiser, F. G., & Roczen, N. (2011). One for all? Connectedness to Nature, Inclusion of Nature, Environmental Identity, and Implicit Association with Nature.

- European Psychologist*, 16(4), 324–333. <https://doi.org/10.1027/1016-9040/a000032>
- Bunting, T. E., & Cousins, L. R. (1985). Environmental dispositions among school-age children: A preliminary investigation. *Environment and Behavior*, 17(6), 725–768. <https://doi.org/10.1177/0013916585176004>
- Cajete, G. (1994). *Look to the Mountain: An Ecology of Indigenous Education* (1st edition). Kivaki Press.
- Charles, C., Keenleyside, K., Chapple, R., Kilburn, B., Salah van der Leest, P., Allen, D. ... Camargo, L. (2018). *Home to Us All: How Connecting with Nature Helps Us Care for Ourselves and the Earth*. Children & Nature Network.
- Chawla, L. (1999). Life paths into effective environmental action. *Journal of Environmental Education*, 31(1), 15–26. <https://doi.org/10.1080/00958969909598628>
- Chawla, L. (2006). Learning to love the natural world enough to protect it,” 2, 57-78. Norsk senter for barneforskning.
- Chawla, L. & Derr, V. (2012). The development of conservation behaviours in childhood and youth. In Clayton, C. (Ed) *The Oxford Handbook of Environmental and Conservation Psychology*. Oxford University Press.
- Chawla, L. (2015). Benefits of nature contact for children. *Journal of Planning Literature*, 30(4), 433-452. <https://doi.org/10.1177/0885412215595441>
- Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, 2(3), 619–642. <https://doi.org/10.1002/pan3.1012>

- Cheng, J. C. H., & Monroe, M. C. (2012). Connection to nature children's affective attitude toward nature. *Environment and Behaviour*, 44(1), 31-49.  
<https://doi.org/10.1177/0013916510385082>
- Children & Nature Network. (2012). *Children & Nature Worldwide: An Exploration of Children's Experiences of the Outdoors and Nature with Associated Risks and Benefits*. IUCN. <http://www.childrenandnature.org/downloads/CECCNNWorldwideResearch.pdf>
- Chowdhury, M. R. (2020, October 16). *The Positive Effects of Nature On Your Mental Well-Being*. Positive Psychology. <https://positivepsychology.com/positive-effects-of-nature/>
- Clayton, S. (2003). Environmental identity: A conceptual and operational definition. In S. Clayton & S. Opatow (Eds.), *Identity and the natural environment: The Psychological Significance of Nature*. (pp. 45–65). MIT Press.
- Climate Change. (n.d.). United Nations: Department of Economic and Social Affairs: Indigenous Peoples. <https://www.un.org/development/desa/indigenouspeoples/climate-change.html>
- Coates, J. & Pimlott-Wilson, H. (2019). *Forest schools: how climbing trees and making dens can help children develop resilience*. The Conversation. <https://theconversation.com/forest-schools-how-climbing-trees-and-making-dens-can-help-children-develop-resilience-117920>
- Collins, N. (2011, October 24). *Time spent outdoors linked to better eyesight*. The Telegraph. [http://www.telegraph.co.uk/health/children\\_health/8846020/Time-spent-outdoors-linked-to-better-eyesight.html](http://www.telegraph.co.uk/health/children_health/8846020/Time-spent-outdoors-linked-to-better-eyesight.html)
- Davis, J. L., Le, B., & Coy, A. E. (2011). Building a model of commitment to the natural environment to predict ecological behavior and willingness to sacrifice. *Journal of Environmental Psychology*, 31(3), 257–265. <https://doi.org/10.1016/j.jenvp.2011.01.004>

- de Vries, S., Verheij, R. A., Groenewegen, P. P., & Spreeuwenberg, P. (2003). Natural environments—healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and Planning A*, 35, 1717–1731.
- Donaldson, G. W., & Donaldson, L. E. (2013). Outdoor Education a Definition. *Journal of Health, Physical Education, Recreation*, 29(5), 17-63.  
<https://doi.org/10.1080/00221473.1958.10630353>
- Drew, C. (n.d.). *Forest Schools Philosophy & Curriculum, Explained!* Helpful Professor.com.  
<https://helpfulprofessor.com/forest-schools/>.
- Dutcher, D. D., Finley, J. C., Luloff, A. E., & Johnson, J. B. (2007). Connectivity with nature as a measure of environmental values. *Environment and Behavior*, 39(4), 474–493.  
<https://doi.org/10.1177/0013916506298794>
- Ebberling, C., Pawlak, D., & Ludwig, D. (2002). Childhood obesity; public health crisis, common sense cure.” *Lancet* 360(9331), 473 – 482. [https://doi.org/10.1016/S0140-6736\(02\)09678-2](https://doi.org/10.1016/S0140-6736(02)09678-2)
- Edelman, Daniel Munczek, et al. (2017, April 27). *U.S. Study Shows Widening Disconnect with Nature, and Potential Solutions*. Yale E360. [e360.yale.edu/digest/u-s-study-shows-widening-disconnect-with-nature-and-potential-solutions](http://e360.yale.edu/digest/u-s-study-shows-widening-disconnect-with-nature-and-potential-solutions).
- Emerson, R. W. (1836). *Nature*. James Munroe and Company.
- EPA. (n.d.). *National Environmental Education Act*. United States Environmental Protection Agency. <https://www.epa.gov/education/national-environmental-education-act>
- Ermine, W. (2007). The ethical space of engagement. *Indigenous Law Journal*, 6(1), 193-203.

Faculty of Public Health and Natural England. (2010). *Great outdoors: How our natural health service uses green space to improve wellbeing (An Action Report)*. Issuu.

[https://issuu.com/healthygreenfutures/docs/natural\\_health\\_service](https://issuu.com/healthygreenfutures/docs/natural_health_service)

*Forest and Nature School in Canada: A Head, Heart, Hands Approach to Outdoor Learning*.

(2014). Forest School Canada.

Forest School Association (FSA). (2019). *Principles of Forest School*. Forest School

Association. <https://www.forestschoollassociation.org/what-is-forest-school/>

Forest School Foundation. (2020a). *The Forest School Way: Approaching Education & Child-*

*Care in a Post-COVID World*. Growing Wild Forest School: Asheville.

<https://www.growingwildforestschool.org/post/the-forest-school-way-education-childcare-in-a-covid-future>

Forest School Foundation. (2020b). *A Brief History of Forest Schools Around the World*.

Growing Wild Forest School: Asheville.

<https://www.growingwildforestschool.org/post/the-brief-history-heritage-of-forest-schools-around-the-world>

Frantz, C. M., & Mayer, F. S. (2014). The importance of connection to nature in assessing

environmental education programs. *Studies in Educational Evaluation*, 41(2014), 85–89.

<https://doi.org/10.1016/j.stueduc.2013.10.001>.

Gebhard, U., Nevers, P., & Billmann-Mahecha, E. (2003). Moralizing trees: Anthropomorphism

and identity in children's relationships to nature. In S. Clayton & S. Opatow (Eds.), *Identity*

*and the natural environment* (pp. 91–111). Cambridge, MA: MIT Press.

- Generous, C. (2020). *Environmental Education & its Lasting Impacts: A Survey of The College School Alumni Classes 2008-2015*. Pomona College Remote Alternative Independent Summer Experience.
- Gill, T. (2014). The benefits of children's engagement with nature: A systematic literature review. *Children, Youth and Environments*, 24(2), 10-34. <sup>[1]</sup><sub>SEP</sub>  
<https://doi.org/10.7721/chilyoutenvi.24.2.0010>
- Giusti, M. (2019). Human–nature relationships in context. Experiential, psychological, and contextual dimensions that shape children's desire to protect nature. *PLOS ONE*, 14(12), e0225951. <https://doi.org/10.1371/journal.pone.0225951>
- Green Eco Tips for Sustainable Living*. (n.d.) Global Stewards: Sustainable Living Tips.  
<http://www.globalstewards.org/ecotips.htm>
- Greenwood, M., & Lindsay, N. (2019). A Commentary on Land, Health, and Indigenous Knowledge(s). *Global Health Promotion* 26(3), 82–86.  
<https://doi.org/10.1177/1757975919831262>.
- Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and health. *Annual Review of Public Health*, 35, 207-228. <https://doi.org/10.1146/annurev-publhealth-032013-182443>
- Hassan, Jennifer. (2020). *How Long until It's Too Late to Save Earth from Climate Disaster? This Clock Is Counting down*. The Washington Post. [www.washingtonpost.com/climate-environment/2020/09/21/climate-change-metronome-clock-nyc/](http://www.washingtonpost.com/climate-environment/2020/09/21/climate-change-metronome-clock-nyc/)
- Hatala, A. R., Njeze, C., Morton, D., Pearl, T., & Bird-Naytowhow, K. (2020). Land and nature as sources of health and resilience among Indigenous youth in an urban Canadian context: A photovoice exploration. *BMC Public Health*, 20(1), 538. <https://doi.org/10.1186/s12889-020-08647-z>.

*Health Benefits and Tips.* (2014). National Wildlife Federation. <https://www.nwf.org/home/kids-and-family/connecting-kids-and-nature/health-benefits-and-tips#:~:text=Benefits%20to%20Body%2C%20Mind%2C%20and,connection%20to%20the%20natural%20world.>

Hofferth, S. L. & Sandberg, J. F. (2001). How American Children Spend Their Time. *Journal of Marriage and Family*, 63(3), 295-308.

Howard, G. S. (1997). *Ecological psychology: Creating a more earth-friendly human nature.* University of Notre Dame Press. <https://doi.org/10.1111/j.1741-3737.2001.00295.x>

Hughes, J., Richardson, M., & Lumber, R. (2018). Evaluating connection to nature and the relationship with conservation behaviour in children. *Journal for Nature Conservation*, 45, 11–19. <https://doi.org/10.1016/j.jnc.2018.07.004>

*Indigenous Ways of Knowing and Being.* (n.d.) BCcampus.

<https://opentextbc.ca/indigenizationfrontlineworkers/chapter/indigenous-ways-of-knowing-and-being/>

Jose, A. L. S., & Nelson, K. E. (2017). Increasing Children's Positive Connection To, Orientation Toward, and Knowledge of Nature through Nature Camp Experiences. *International Journal of Environmental & Science Education*, 12(5), 933-944.

Kaiser, F. G., Hartig, T., Brügger, A., & Duvier, C. (2011). Environmental protection and nature as distinct attitudinal objects: An application of the Campbell Paradigm. *Environment and Behavior*, 45(3), 369-398. <https://doi.org/10.1177/0013916511422444>

Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31, 178–202. <https://doi.org/10.1177/00139169921972056>

- Kapryka, J., & Dockstator, M. (2012). Indigenous Knowledges and Western Knowledges in Environmental Education: Acknowledging the Tensions for the Benefits of a “Two-Worlds” Approach. *Canadian Journal of Environmental Education*, 17, 97-112.
- Kasser, T., & Sheldon, K. M. (2002). What makes for a Merry Christmas? *Journal of Happiness Studies*, 3(4), 313–329. <https://doi.org/10.1023/A:1021516410457>.
- Kellert, S. R. (1997). *Kinship to Mastery: Biophilia In Human Evolution And Development*. Island Press.
- Kellert, S. R. (2017). *The Nature of Americans: Disconnection and Recommendations for Reconnection (National Report)*. Nature of Americans.
- Kellert, S. R. & Wilson, E. O. (1993). *The Biophilia Hypothesis*. Island Press.
- Keniger, L. E., Gaston, K. J., Irvine, K. N., & Fuller, R. A. (2013). What are the Benefits of Interacting with Nature? *International Journal of Environmental Research and Public Health*, 10(3), 913-935. <https://doi.org/10.3390/ijerph10030913>
- Kimmerer, R. W. (2013). *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. Milkweed Editions.
- Kleepsies, M. W., Braun, T., Dierkes, P. W. & Wenzel, V. (2021). Measuring Connection to Nature—A Illustrated Extension of the Inclusion of Nature in Self Scale. *Sustainability*, 13(1761), 1-14. <https://doi.org/10.3390/su13041761>
- Knight, S. (2009). *Forest Schools and outdoor play in the early years*. London: Sage.
- Kolb, D. (1984). *Experiential Learning: Experience As The Source Of Learning And Development*. Prentice Hall.

- Koole, S. L., & Van den Berg, A. E. (2005). Lost in the Wilderness: Terror Management, Action Orientation, and Nature Evaluation. *Journal of Personality and Social Psychology*, 88(6), 1014–1028. <https://doi.org/10.1037/0022-3514.88.6.1014>
- Krupp, E. (2015). Native American Cosmology and Other Worlds. *Encyclopedia of Astrobiology*. <https://doi.org/10.1007/978-3-662-44185-5>
- Kuo, F. R. & Taylor, A. F. (2004). A Potential Natural Treatment for Attention-Deficit/Hyperactivity Disorder: Evidence From a National Study. *Am J Public Health*, 94(9), 1580-1586. <https://doi.org/10.2105/ajph.94.9.1580>
- LaDuke, W. (1999). *All our relations: Native struggles for land and life*. South End Press.
- Leather, M. (2018). A critique of Forest School: something lost in translation. *Journal of Outdoor and Environmental Education*, 21(1), 5-18. <https://doi.org/10.1007/s42322-017-0006-1>
- Leopold, A. (1949). *A Sand County Almanac: With essays on conservation from Round River*. Ballantine Books.<sup>[1]</sup><sub>[SEP]</sub>
- Lesson 2: Timeline of EE History*. (2017). NAAEE. [naee.org/eeopro/learning/eelearn/history-ee/lesson-2](http://naee.org/eeopro/learning/eelearn/history-ee/lesson-2)
- Lines, L.A., Yellowknives Dene First Nation Wellness Division, & Jardine, C. G. (2019). Connection to the land as a youth-identified social determinant of Indigenous Peoples' health. *BMC Public Health*, 19(1), 176. <https://doi.org/10.1186/s12889-018-6383-8>
- Louv, Richard. (2008). *Last child in the woods: Saving our children from nature-deficit disorder (Updated and expanded.)*. Algonquin Books of Chapel Hill.

- Lumber, R., Richardson, M., & Sheffield, D. (2017). Beyond knowing nature: Contact, emotion, compassion, meaning, and beauty are pathways to nature connection. *PLOS ONE*, *12*(5), e0177186. <https://doi.org/10.1371/journal.pone.0177186>.
- Marsh, G. P. (1864). *Man and Nature; or, Physical Geography as Modified by Human Action*. Sampson Low Son and Marston.
- Martin, P. (1999). Critical outdoor education and nature as a friend. In J.C. Miles & S. Priest (Eds.), *Adventure Programming* (pp. 463-471). State College, PA: Venture Publishing, Inc.
- Matsuoka, R. H., & Kaplan, R. (2008). People needs in the urban landscape: Analysis of landscape and urban planning contributions. *Landscape and Urban Planning*, *84*(1), 7-19. <https://doi.org/10.1016/j.landurbplan.2007.09.009>
- Mazzocchi, F. (2006). Western science and traditional knowledge: Despite their variations, different forms of knowledge can learn from each other. *EMBO Reports*, *7*(5), 463-466.
- McMahan, E. A., & Estes, D. (2015). The effect of contact with natural environments on positive and negative affect: A meta-analysis. *Journal of Positive Psychology*, *10*(6), 507-519. <https://doi.org/10.1080/17439760.2014.994224>
- McCrea, E. (2006). *The Roots of Environmental Education: How the Past Supports the Future*. Environmental Education & Training Partnership. <https://files.eric.ed.gov/fulltext/ED491084.pdf>
- McCree, M., Cutting, R., & Sherwin, D. (2018). The Hare and the Tortoise go to Forest School: taking the scenic route to academic attainment via emotional wellbeing outdoors. *Early Child Development and Care*, *188*(7), 980-996, <https://doi.org/10.1080/03004430.2018.1446430>

- Miller, S. A. (2008). Native America writes back: The origin of the Indigenous paradigm in historiography. *Wicazo Sa Review*, 23(2), 9-28. <https://doi.org/10.1353/wic.0.0013>
- Miller, S.A. (2009). Native historians write back: The Indigenous paradigm in American Indian historiography. *Wicazo Sa Review*, 24(1), 25-45. <https://doi.org/10.1353/wic.0.0018>
- Naess, A. (1973). The shallow and the deep ecology movements. *Inquiry: An Interdisciplinary Journal of Philosophy*, 16(1-4), 95–100. <https://doi.org/10.1080/00201747308601682>
- NASA. (2020, August 21). *The Effects of Climate Change*. NASA, [climate.nasa.gov/effects/](https://climate.nasa.gov/effects/)
- National Wildlife Federation. (2014). *Health Benefits*. National Wildlife Federation. <http://www.nwf.org/be-out-there/why-be-out-there/health-benefits.aspx>
- Nesterova, Y. (2020). Rethinking Environmental Education with the Help of Indigenous Ways of Knowing and Traditional Ecological Knowledge. *Journal of Philosophy of Education*, 54(4), 1047–52. <https://doi.org/10.1111/1467-9752.12471>
- Nisbet E.K., Zelenski J.M. & Murphy, S. A. (2009). The Nature Relatedness Scale: Linking Individuals' Connection With Nature to Environmental Concern and Behavior. *Environment and Behavior*, 41(5), 715-740. <https://doi.org/10.1177/0013916508318748>
- Nisbet E.K. & Zelenski J.M. (2014) Nature Relatedness and Subjective Well-Being. In: Michalos A.C. (Eds.) *Encyclopedia of Quality of Life and Well-Being Research* (pp. 4269-4276). Springer, Dordrecht. [https://doi.org/10.1007/978-94-007-0753-5\\_3909](https://doi.org/10.1007/978-94-007-0753-5_3909)
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2010). Happiness is in our Nature: Exploring Nature Relatedness as a Contributor to Subjective Well-Being. *Journal of Happiness Studies*, 12(2), 303–322. <https://doi.org/10.1007/s10902-010-9197-7>

- Nixon, R. (1970). President's message to the Congress of the United States. In Environmental quality, the first annual report of the Council on Environmental Quality, together with the President's message to Congress. Washington, DC: U.S. Government Printing Office.
- Ojala, M. (2012a). Regulating worry, promoting hope: How do children, adolescents, and young adults cope with climate change? *International Journal of Environmental and Science Education*, 7(4), 537–561
- Ojala, M. (2016). Young people and global climate change: Emotions, coping, and engagement in everyday life. In N. Ansell, N. Klocker, & T. Skelton (Eds.), *Geographies of global issues: Change and threat: Geographies of children and young people* (Vol. 8, pp. 1–19). Singapore: Springer Science + Business Media. <https://doi.org/10.1080/00958964.2015.1021662>
- Orr, D. W. (1993). Love it or Lose it: The Coming Biophilia Revolution. *The Biophilia Hypothesis*, 258-262.<sup>[1]</sup><sub>SEP</sub>
- Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behaviour. *Global Environmental Change*, 47, 88–94.  
<https://doi.org/10.1016/j.gloenvcha.2017.09.009>
- Platt, J. (2020, March 13). *An Emerging Threat to Conservation: Fear of Nature*. The Revelator.  
<https://therevelator.org/biophobia-fear-nature/>
- Rautaki, M. (2017). *Mātauranga Whakauka Taiao: Environmental Education for Sustainability*. Department of Conservation. <https://www.doc.govt.nz/Documents/getting-involved/students-and-teachers/environmental-education-for-sustainability-strategy-and-action-plan.pdf>

- Richardson, M., Sheffield, D., Harvey, C., & Petronzi, D. (2015). *The impact of children's connection to nature: A report for the Royal Society for the Protection of Birds*. Derby, UK: College of Life and Natural Sciences, University of Derby.
- Robinson, C. (2019). Young children's spirituality: A focus on engaging with nature. *Australasian Journal of Early Childhood*, 44(4), 339–350.  
<https://doi.org/10.1177/1836939119870907>
- Schultz, P. W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues*, 56(3), 391-406.  
<https://doi.org/10.1111/0022-4537.00174>
- Schultz, P. W. (2001). The Structure of Environmental Concern: Concern for the Self, other People, and the Biosphere. *Journal of Environmental Psychology*, 21(4), 327–339.  
<https://doi.org/10.1006/jevp.2001.0227>
- Simpson, L. (2002). Indigenous Environmental Education for Cultural Survival. *Canadian Journal of Environmental Education* 7(1), 13-25.
- Sobel, D. (1996). *Beyond Ecophobia: Reclaiming the Heart of Nature Education*. The Orion Society.
- Sobel, D. (2004) *Place-Based Education, Connecting Classrooms & Communities*. The Orion Society.
- Social determinants and Indigenous health: The International experience and its policy implications*. (2007). Cooperative Research Centre for Aboriginal Health.
- Steffen, W.; et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1-10. <https://doi.org/10.1126/science.1259855>

Sutherland, D. & Henning, D. (2009). Ininiwi-Kiskanitamowin: A Framework for Long-Term Science Education. *Canadian Journal of Science, Mathematics and Technology*

*Education*, 9(3), 173-190. <https://doi.org/10.1080/14926150903118359>

Sutherland, D. & Swayze, N. (2012). Including Indigenous Knowledges and Pedagogies in

Science Based Environmental Education Programs. *Canadian Journal of Environmental Education*, 17, 80-96.

*Te whare tapa whā and wellbeing* (2020). Health Navigator New Zealand.

<https://www.healthnavigator.org.nz/healthy-living/t/te-whare-tapa-wh%C4%81-and-wellbeing/>

*The Benefits of Environmental Education for K-12 Students*. (2020). North American

Association of Environmental Education.

<https://naaee.org/eepro/research/eeworks/student-outcomes>

*The Wilderness Act*. (n.d.). Wilderness Connect - University Of Montana, [wilderness.net/learn-about-wilderness/key-laws/wilderness-act/default.php](http://wilderness.net/learn-about-wilderness/key-laws/wilderness-act/default.php).

Thoreau, H. (1854). *Walden; on, Life in the Woods*. Boston Tickor and Fields.

Turtle, C., Convery, I., & Convery, K. (2015). Forest Schools and environmental attitudes: A case study of children aged 8–11 years. *Cogent Education*, 2(1), 1-14.

<https://doi.org/10.1080/2331186X.2015.1100103>

Ulrich, R.S. (1984). View Through a Window May Influence Recovery from Surgery. *Science*,

224(4647), 420-421. <https://doi.org/10.1126/science.6143402>

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., and Zelson, M. (1991).

Stress recovery during exposure to natural and urban environments. *Journal of*

*Environmental Psychology*, 11(3).

<https://www.sciencedirect.com/science/article/abs/pii/S0272494405801847>.

UNESCO (n.d.) *What is Local and Indigenous Knowledge?* UNESCO.

<http://www.unesco.org/new/en/natural-sciences/priority-areas/links/related-information/what-is-local-and-indigenous-knowledge/>.

UNESCO-UNEP Environmental Education Newsletter: The Belgrade Charter. (1976). Connect.

<https://www.slideshare.net/UNIPLETRAS/the-belgrade-charter>.

*United Nations Conference on Environment & Development Rio De Janeiro* (1992). United Nations Sustainable Development.

<https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>

Venhoeven L., Steg L., Bolderdijk J.W. (2017) Can Engagement in Environmentally-Friendly Behavior Increase Well-Being?. In: Fleury-Bahi G., Pol E., Navarro O. (eds) *Handbook of Environmental Psychology and Quality of Life Research* (229-237). *International Handbooks of Quality-of-Life*. Springer, Cham.

[https://doi.org/10.1007/978-3-319-31416-7\\_13](https://doi.org/10.1007/978-3-319-31416-7_13)

Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments*, 16(1), 2–24. 

*What is Adventure Education?* (n.d.) Plymouth Statue University.

<https://campus.plymouth.edu/hhp/degrees-options-minors/bs-adventure-education/what-is-adventure-education/>.

*What is Experiential Education?* (n.d.) Association for Experiential Education.

<https://www.aee.org/what-is-ee>.

- What is Place-Based Education?* (n.d.). *Promise of Place*. <http://promiseofplace.org/what-is-pbe/what-is-place-based-education>.
- Wierietielny, M. (2013, May 8). *Symptoms of Western Nature-Culture Dichotomy*. *EcoPost*. <https://ecopostblog.wordpress.com/2013/05/08/symptoms-of-western-nature-culture-dichotomy/>.
- Wright, T. S. A. & Wyatt, L. S. (2008). Examining Influences on Environmental Concern and Career Choice among a Cohort of Environmental Scientists. *Applied Environmental Education and Communication*, 7(1-2), 30-39. <https://doi.org/10.1080/15330150802194896>
- Xiao, J. J., & Li, H. (2011). Sustainable consumption and life satisfaction. *Social Indicators Research*, 104(2), 323–329. <https://doi.org/10.1007/s11205-010-9746-9>
- Yilmaz, S., Çig, O., & Yilmaz-Bolat, E. (2020). The impact of a short-term nature-based education program on young children's biophilic tendencies. *Ilkogretim Online – Elementary Education Online*, 19(3), 1729–1739.
- Zhang, W., Goodale, E., & Chen, J. (2014). How contact with nature affects children's biophilia, biophobia and conservation attitude in China. *Biological Conservation*, 177, 109–116. <https://doi.org/10.1016/j.biocon.2014.06.011>.
- Ziff, B. H., & Rao, P. V. (1997). *Borrowed power: Essays on cultural appropriation*. Rutgers University Press.
- Zylstra, M.J., Knight, A.T., Esler, K.J., Le Grange, L.L.L., (2014). Connectedness as a core conservation concern: An interdisciplinary review of theory and a call for practice. *Springer Science Reviews*, <sup>[[[</sup>2(1), 119-143. <https://doi.org/10.1007/s40362-014-0021-3>