Nature Connection:

An educational outcome for a sustainable Aotearoa New Zealand

A thesis

submitted in fulfilment

of the requirements for the degree

of

Doctor of Philosophy in Education

at

The University of Waikato

by

THEA DEPETRIS

THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2025

Abstract

Ecological degradation is threatening the life-giving capacity of Earth. This is an unsustainable, existential crisis that requires transformational change. Such a change requires a paradigm shift of the cultural belief and value systems which drive our interactions and relationships with the material world. The global spread of the dominant social paradigm through Westernisation has been driving the development of our social systems in ways that perpetuate human-nature disconnection (physical and psychological separation), leading to adversarial human-nature relations that allow for the ongoing exploitation and degradation of non-human nature. This disconnection is a root cause of our current sustainability crisis.

Increasing calls for interventions that restore nature connection, a construct pertaining to the human-nature relationship, as a mechanism of transformational change are supported by theoretical and empirical evidence. Although nature contact and learning about non-human nature are integral components of environmental education, there is limited research about context-specific meanings and praxis of nature connection as an educational outcome. Furthermore, with respect to the Aotearoa New Zealand context, the challenge of realising nature connection as an educational goal is two-fold. First, environmental education is a non-mandated discipline of the formal education sector and, consequently, viewed by the education community as a 'nice-to-have' rather than an educational priority. Second, when environmental education is implemented in schools, cognitive outcomes are often prioritised over affective outcomes. This has implications for the objective of fostering nature connection because an emotional bond with non-human nature requires nurturing students' feelings and values for all forms of life.

Based on an explanatory sequential research design, the first stage of this study provided a systematic description of environmental education organisations, a network known to support schools across the country with environmental education. A 'snapshot' of features associated with the network's organisational structures and education programmes characteristics was elicited from predominantly quantitative data collected via an online questionnaire. A key finding demonstrated the network's prioritisation of nature connection as an educational outcome of their programmes. To further explore this finding, two additional qualitative stages of research (a questionnaire comprised of open-ended questions, and semi-structured interviews) were undertaken. Based on an interpretive methodology and utilising a grounded theory approach, stages two and three clarified the understandings participants have

of nature connection as an educational outcome, their perspectives about its significance for English-medium schools, and how these views inform their praxis.

The findings confirmed that environmental education organisations prioritise nature connection as an educational outcome for the purposes of resolving unsustainability. Participants identified three cultural aspects as root causes of disconnection. Anthropocentric beliefs and a predominant focus on a utilitarian value of non-human nature were associated with psychological separation, while some features of contemporary lifestyles were linked to humanity's physical separation from non-human nature. Participants highlighted the perpetuation of disconnection through people losing a holistic knowing of non-human nature and a sense of belonging with all of life.

Participants' conceptualisations of nature connection frame the phenomenon as interrelated experiences and outcomes that collectively empower a state of being, knowing and becoming in relationship with non-human nature. This conceptualisation laid the foundation from which to explore the benefits of nurturing the human-nature relationship as perceived by participants.

At the individual level, participants believed educating for nature connection empowers students to become capable and motivated agents of change toward more sustainable trajectories, through safeguarding health and wellness, developing a conceptual understanding of interconnectivity, and serving as a motivational impetus that enhances pro-environmental action and behaviour. Findings pointed to the development of these outcomes as vital for correcting the empirically demonstrated 'teenage dip'—a progressive trend of disconnection that begins around the age of ten and culminates in adolescence. Nature connection was also recognised as a vital co-requisite to issues-based learning, such as climate change education, by helping to prevent the onset of cognitive dissonance and apathy as a response to the profound challenges posed by the Anthropocene.

The systemic impacts of nature connection, as identified by participants, related to shifting societal views, structures and practices that contribute to transformational change. Fostering nature connection through nature-based education was thought to provide students with opportunities to 'see and be' in the world differently. Nature connection as an educational outcome can illuminate indigenous ways of knowing and being, such as te ao Māori, which the participants felt were grounded in eco-centric beliefs and intrinsic values that foster respect for non-human nature and harmonious interactions with the Earth system as a whole. In this sense, the study casts light on nature connection as an act of indigenisation that has the potential to heal human-nature disconnection and contribute to resolving unsustainability.

Based on their lived-experiences of working in the formal education sector, the participants identified aspects of the school structure, curriculum and norms as significant contributors of disconnection. Findings also suggest that nature-based education at the present time, as framed by this study, is often not recognised or valued by educational communities, which include teachers, school administrators, students and parents. Underpinned by place-based, holistic and relational approaches, the findings offer five principles of nature-based education that help bridge the scholarly gap regarding effective praxis for fostering nature connection through education and provide a foundation for future research.

This research is significant as humanity grapples with an existential crisis arising from the entwined socio-ecological challenges of the Anthropocene. The findings suggest that policies promoting nature connection, particularly during childhood and adolescence, are vital for improving human-nature relations that lead to more sustainable futures. Continuing to uphold an education system that perpetuates the reproduction of unsustainable societal norms and paradigms is morally untenable. For life to endure, modern culture must embrace a new trajectory based on reciprocal relationships that unite the wellbeing of both human and non-human nature.

Dedication

This doctoral thesis is dedicated to my two sons, Mackye Gray and Beau Gray, who encouraged me all the way to the finish line, often with the chant of "Lock in Mum, you got this." I am so proud of how you interact and relate with others, both the human and more-than-human. I have no doubt you will continue to make this world a better place. May some of what we have learned together during this PhD journey help steer your trajectory.

I also dedicate this work beyond my own children…

To those who must live tomorrow with the choices we make today (Santone, 2019).

Acknowledgements

As our actions are never undertaken in isolation, this research has been made possible by the essential systems and cycles of nature that support not only human existence but all living beings. Acknowledging this interconnectedness is fundamental to the work of this thesis. In this spirit, I extend my deepest gratitude to the land, waters, air and all living beings that are the source of life and inspiration.

To the participants - thank you for giving up your precious time to take part in the study and for trusting me to make something worthwhile from your experiences and perspectives. Your tireless efforts to operate and maintain educational organisations that care for both people and planet deserve the highest accolades.

To Associate Professor Chris Eames and Dr. Cathy Buntting – I am so fortunate to have had the privilege of you both as my supervisors! Your mentorship and guidance have been invaluable to my journey. Your dedication to your students and the field of education is truly admirable.

To my family and friends, I am forever grateful. Debz and Ian, how blessed am I to have you in my corner, my number one fans. To many friends, old and new, I have deeply appreciated your cheers from the sideline. Becky McCormack, you really are the nature connection expert! Thank you for always sharing your insights and inviting me to take part in opportunities for praxis. Tilly Stevens for being there just at the right moment when I needed to find my 'why.'

And last but not least, to the ReGen Ed Team – Chris Morey, Ria Bright and Thomas Everth - you all made this PhD experience far more meaningful than going solo. Thank you for your friendship and support.

Table of Contents

Table of Figures

List of Tables

Glossary

Definitions of Māori terms used in this thesis are provided here, as defined by Te Aka Māori Dictionary (Moorefield, 2025). These definitions are also included in parentheses within the body of text, following the first use of the term in every chapter. When further explanation beyond the succinct dictionary definition is required, I include additional commentary through a footnote in the main body of text.

Atua (noun) - deity, god, demon, supernatural being, ghost, object of superstitious regard

Hapū (noun) - sub-tribe

Hine (noun) - young girl

Hui (noun) - meeting

Īnanga (noun) - whitebait fish

Iwi (noun) - tribe

Kaitiaki (noun) - guardians

Kaitiakitanga (noun) - guardianship

Karakia (noun) - prayer

Karakia (verb) - to recite ritual chant or prayer

Kaumātua (noun) - an elder of status

Kaupapa (noun) - initiative, topic, plan, purpose, proposal, agenda, subject, programme, theme

Kawa (noun) - protocol/customs of the marae or Māori meeting house

Kawakawa (noun) - type of tree

Kōrero (verb) - to speak

Kōurua (noun) - freshwater crayfish

Kōtuku (noun) - heron

Kura (noun) - school

Kupu (noun) - word

Mahi (verb) - to do work

Mana whenua (noun) - sub-group of Māori people with rights, power and authority over a specified area of land or territory

Maramataka (noun) – seasonal changes and indicators

Marae (noun) - place for formal greetings and discussions

Mātauranga (noun) - cultural knowledge

Maunga (noun)- mountain

Mauri (noun) - life force

Mihi (noun) - introduction

Mokopuna (noun) - grandchildren

Motu (noun) - country

Ngahere (noun) - bush, forest

Pākehā (noun) - New Zealander of European descent

Papatūānuku (personal noun) - Earth mother

Pepeha (noun) - an oral tradition affiliated with Māori tribal culture whereby a person recites their ancestral linkages, including connections to the human and the more-than-human.

Pūrākau (noun) - ancient legend, story

Rangatahi (noun) - young people

Ranginui (personal name) - Atua of the sky and husband of Papatūānuku, from which union originates all living things

Ranginui (personal noun) - Sky father

Rohe (noun) - region

Rongoā (noun) - traditional Māori medicine

Tamariki (noun) - children

Tangata whenua (noun) - the Māori, who are the indigenous people of Aotearoa New Zealand

Taonga (noun) – treasure

Te Ika-a-Māui (noun) – North Island of Aotearoa New Zealand

Te ao Māori (noun) - the Māori worldview

Te reo Māori (noun) - the Māori language

Te Taiao (noun) - the natural environment

Te Tiriti o Waitangi (noun) - Aotearoa New Zealand's partnership agreement between Māori and the British Crown

Tiaki (verb) - to guard, to look after, nurse, care, protect

Tikanga (noun) - cultural practices

Tino rangatiratanga (noun) - Māori autonomy, self-determination

Tohu (noun) - sign, distinguishing feature

Tūrangawaewae (noun) - the place where one has rights of residence and belonging through kinship and whakapapa

Tūpuna (noun) - ancestors

Wāhi tapu (noun) - sacred place

Waiata (noun) - song

Wairua (noun) - spirit, soul

Waka (noun) - boat

Whakapapa (noun) - ancestral linkages based on the connectedness of all things in the world. Reciting whakapapa was, and is, an important skill and reflects the importance of genealogies in Māori society in terms of leadership, land and fishing rights, kinship and status. It is central to all Māori institutions.

Whakatewhatewha (verb) - to explore, inquire into

Whānau (noun) - family

Whānaungatanga (noun) - relationship. Derived from the verb whakawhānaungatanga as defined as the ongoing process of establishing relationships and relations to all things.

Whakataukī (noun) - proverb

Whenua (noun) - land or placenta. Although interpretations of this dual meaning vary, at its most basic, it serves to highlight the connection between the life of humans with the land. Traditionally, the whenua (placenta) and pito (umbilical cord) of newborn babies were buried in a significant place. This practice reinforced the relationship between the child and the land of their birth.

Whiro (personal noun) - moon on the first night of the lunar month - for some Māori tribes

Chapter One - Introduction

This chapter begins by situating the present study within its broader context (Section 1.1) before outlining the rationale that underpinned the research (Section 1.2). Section 1.4 presents the study's aims and research questions, followed by an overview of the thesis structure in Section 1.5

1.1 Context of inquiry

We are living in unprecedented times, marked by the convergence of complex socio-ecological crises that reveal the inherent entwinement of people and the rest of nature[1]. Climate change, biodiversity loss, and widespread pollution, collectively referred to as a "polycrisis" (Lawrence, 2024, para. 1) are all stark symptoms of humanity's profound impact on the Earth system. Anthropogenic forces that drive ecological degradation are eroding the planet's life-sustaining systems at an alarming rate. The context of Aotearoa New Zealand is no exception. *Environment Aotearoa 2022* (Ministry for the Environment & Statistics NZ, 2022), the country's latest environmental synthesis report, paints a sobering picture: 94% of indigenous reptiles and nearly three-quarters of terrestrial birds are either threatened with extinction or at risk of becoming so. Freshwater systems are equally imperilled, with 63% of monitored lakes showing poor water quality, and 76% of indigenous freshwater fish facing extinction risks. Meanwhile, the climate continues to warm as evident in the 35% reduction in total glacial volume between 1978 and 2020 (Ministry for the Environment & Statistics NZ, 2022). The destruction and harm we inflict on our planetary kin perpetuates a vicious cycle of ecological degradation and disconnection from non-human nature (Soga & Gaston, 2018). This is deeply troubling, as human health and planetary health are inseparably linked: the wellbeing of one directly influencing the other (MEA, 2005).

The paramount challenge of our time is to forge future trajectories based on principles of ecological regeneration, social justice and sustainability. Recognising the socio-ecological issues as systemic problems, addressing this challenge necessitates transformational change, analogous to fundamental, system-wide shifts in societal perspectives, structures, and practices (IPBES, 2024). Shifting the dominant social paradigm to foster a more harmonious relationship between humanity and the rest of nature is widely recognised as a deep lever for transformational change (Artmann, 2023; Chapin et al., 2022; Fischer & Riechers, 2019; Folke et al., 2011; Riechers et al., 2021). This implies a need to transform

[1] The phrase 'rest of nature' is used here to reflect the understanding of humans as an integral part of the Earth system. A detailed discussion of my use of the term 'nature' is provided in Section 2.3.1.1.

education systems shaped by the dominant social paradigm, confronting and redressing their role in perpetuating unsustainable mindsets and lifestyles.

Education plays a vital role in empowering people worldwide with the knowledge, attitudes, values, skills, and motivation needed to drive innovation and to tackle the root causes of the systemic socio-ecological issues that threaten our existence (UNESCO, 1977). Environmental education (EE) has long been earmarked as a transformative learning approach that can significantly contribute to a cultural reset with regards to how humanity thinks about, relates to, and interacts with non-human nature. However, despite numerous international declarations exerting pressure on governments to develop impactful policies and curricula (see, for example, UNESCO, 1977, 1992, 2005, 2014), the field continues to face ongoing issues of marginalisation through a lack of systematic integration into national education systems worldwide (Jickling & Sterling, 2017). Broadly speaking, without governmental prioritisation, educational organisations across all levels are left without the high-level support and guidance they need to develop the structures, norms, and priorities (including curriculum) which will help minimise, halt and eventually reverse the global trend of unsustainability.

This deficiency is the long-established reality of the English-medium education sector (including early childhood) of Aotearoa New Zealand as evident by the Ministry of Education's reluctance to formally recognise EE as an official part of the national curriculum. Without mandated status, EE is often perceived by the education community as a 'nice-to-have' rather than a priority, resulting in its inconsistent integration across schools nationwide (Cowie & Eames, 2004). This inconsistency stems from a combination of systemic and policy-related factors, which include a lack of sustained high-level government support as previously mentioned, as well as practical barriers faced by teachers, like limited time and resources (Bolstad et al., 2015).

As an extension of this matter, it should not go unsaid that the reluctance by governments to mandate EE stems from the inherently political nature of education (Chapman, 2011). The neoliberal-capitalistic-industrial model that is deeply embedded worldwide through globalisation influences education systems to uphold ideals of progress that depend on ecological exploitation and social inequity. At the time of writing this thesis, the influence of this model has been starkly evident in the wake of Aotearoa New Zealand's recent shift from a left-leaning to a right-leaning coalition government. Policy announcements by the newly elected government, such as the proposed Fast-Track Approvals Bill (Schlaepfer, 2024), demonstrate a blatant disregard for ecological sustainability, while the proposed the Treaty Principles

Bill (Palmer, 2024) threatens the rights of Māori as tangata whenua (Indigenous Peoples of Aotearoa New Zealand). Regarding the country's education system, the government has ordered a rapid rewrite of the national curriculum, *Te Mātaiaho – The Refreshed New Zealand Curriculum*, that was still in the process of being implemented at the time of the most recent governmental election. This curriculum document was the outcome of a six-year reform process initiated by the previous government to create a more culturally-inclusive and future-focused national curriculum. The re-write decision has been particularly disheartening for the EE community as the original version *Te Mātaiaho* was seen as a vehicle for integrating EE across the curriculum through its emphasis on learning about te ao Māori (Māori worldview) and the mutual well-being of people and planet (NZAEE, 2023b).

As it stands today, the non-mandated status of EE in Aotearoa New Zealand means that its uptake (or not) is determined by the values, priorities and willingness of school staff, as well as support from the wider community. A network of environmental education organisations (EEOs), comprising community groups, government agencies, non-government organisations and social enterprise businesses, is known to be a vital resource for advancing EE teaching and learning (Bolstad, 2020a; Flood, 2018). Guided by EE's pedagogical tenet of education 'in, about and for the environment' (Tilbury, 1995), these organisations play a key role in supporting schools to implement environmental learning initiatives that go beyond the mere objective of knowledge acquisition. However, despite their value, the efficacy of the EEO network to support schools with integrating EE has historically been limited by inconsistent financial support, coordination and advocacy (Bolstad et al., 2015; Cowie & Eames, 2004). At the outset of the study reported herein, there had been relatively few formal investigations into the EEO network as a whole or its influence on the praxis of the formal education sector.

1.2 Personal drivers

The contextual overview as provided above aligns closely with my lived experiences as an environmental educator in Te Ika-a-Māui (North Island), Aotearoa New Zealand. Over approximately a 15-year period, I have led the establishment and management of two non-profit EEOs, during which time I regularly found myself navigating the systemic and policy-barriers highlighted in Section 1.1. At times, these challenges led to my acceptance of some of the realities of working for EEOs, such as operating education programmes on a year-to-year basis without guaranteed future funding. Alternatively, these constraints sparked innovative solutions. For instance, my early professional experiences working predominantly as a one-person staff motivated me to establish the Taupō Environmental Education

Collaborative, a regional network of EEOs for the purpose of uniting and maximising organisational capacity to support EE initiatives (Taupō Environmental Education Collaborative, 2023).

As part of working closely with school management and teachers, I observed their tendency to 'squeeze' education 'about, in, and for' the environment into an already overcrowded curriculum. As a result, many schools opted for one-off, action-based activities, such as litter clean-ups or tree planting, as a way to contribute to environmental and community well-being. Schools that genuinely prioritised EE and integrated it across disciplines were rare. When such integration did occur, it was often driven by the dedication of a single passionate teacher rather than through a whole-school approach.

With the support of my husband and scholarship opportunities, I have been fortunate to pursue postgraduate studies to deepen my understanding of EE theory and practice. After the birth of my sons, I enrolled in a Master's program at the University of Waikato, where I conducted an ethnographic study on the development and implementation of an 18-month pilot project for Kids Greening Taupō, a conservation education program.

My post-graduate studies are an ongoing journey of professional and personal learning that stem right back to my roots as a child. I grew up in New Jersey, the most densely populated state in the United States. Fortunately, these early years were spent living in a small dwelling that my mother rented on a family's farm. Some of my fondest memories are of countless hours I spent playing outdoors – an early experience that undoubtedly nurtured my biophilic roots. In early adulthood I moved to Aotearoa New Zealand where much of my time was devoted to recreational pursuits. During this period, I relished the environment for my own personal benefit but, in hindsight, engaged in relatively few acts of conscious reciprocation. Having graduated from university with a major in geology, I remained unfulfilled and yearned to learn more, not only about the Earth system but about humanity's interactions with the planet. This saw me undertake a postgraduate degree in geography after which I became a secondary school teacher. This path eventually led me to work in the field of EE.

Over the years, my awareness, intention, and commitment to living more lightly as an integral part of the planet has deepened. Through postgraduate studies and the guidance of a few invaluable mentors, I have developed a critical awareness of some of the privileges and limitations inherent in my own heritage. Simultaneously, I have made space in my life to learn from te ao Māori, aiming to stand in solidarity with tangata whenua as an ally of *Te Tiriti o Waitangi* (Aotearoa New Zealand's partnership agreement between Māori and the British Crown). My current academic journey has provided me with

the opportunity to unpack some of the root causes of our sustainability crisis, appreciate the interconnectedness between human and non-human nature, and recognise the fundamental need to shift human-nature relations. As discussed in the epilogue of this thesis (Section 8.9), my PhD has influenced my ways of thinking and living toward greater enactment of reciprocal relationship with all that surrounds me.

1.3 Rationale for this study

From the outset of my PhD, I have been driven by the question of how to support educational organisations to more effectively integrate EE into teaching and learning. Given my professional background, I was already aware of the significant role that EEOs play supporting practice in formal and informal education settings in conjunction with the challenges of limited support for EE in general. From my 15 years of experience working in the field, I knew that translating the inherent complexity of EE into pedagogical praxis could be of assistance to EEOs. Thus, it was logical to focus my research on the EEO network, at least in the initial stages.

Since no systematic description of the EEO network in Aotearoa New Zealand had previously been completed (Bolstad et al., 2015), stage one of the present study commenced by compiling a national database of these organisations, followed by the distribution of an on-line questionnaire across all identified organisations. The purpose of the first questionnaire was two-fold, aimed at developing some understanding of the organisational and programme features that characterise the EEO network, and identify additional lines of inquiry about the network itself and/or the ways these organisations might better support schools and communities. Based on the study's explanatory sequential research design, the findings from data collected through this first questionnaire were used to inform the next stages of inquiry (stages two and three), ensuring that additional outcomes of the study were relevant and meaningful to this community of organisations.

Serendipitously, around the same time as starting my PhD, the New Zealand Association for Environmental Education (NZAEE) secured Ministry of Education funding as a Network of Expertise provider to support teacher development. This funding was novel to NZAEE: historically, the organisation had worked through volunteer capacity only. The funding enabled NZAEE to hire an executive officer to implement the organisation's revised strategy, including the development of a website to provide access to resources and training, and enhance connections between teachers, educators, and EEOs. I was part of a sub-committee formed to guide the website and social media

development, and my database served as the foundation for a national EEO directory (NZAEE, 2021). As part of the process, all listed EEOs from my database were emailed an overview of the website's purpose, offering the option to be included or opt out (Appendix 1). This publicly accessible database is maintained through Ministry funding, as long as it remains available.

My analysis of the initial questionnaire data highlighted the following two topics as significant to the EEO network: 1. improving networking and collaboration, and 2. nature connection as an educational outcome. Contemplating these two potential lines of future inquiry led me to review theories on social networking and nature connectedness while also considering unfolding real-world events. I perceived a growing emphasis on the themes of 'nature connection' and 'nature-based education' in EE contexts, reflected through the rise of nature play programmes and forest schools (Nature Education Aotearoa, n.d.; Tal et al., 2023), international literature focusing on nature-based education (Jordan & Chawla, 2019; Kuo et al., 2019), and emerging theory in relation to the psychological construct of nature connectedness (Richardson, 2023; University of Derby, n.d.). Concurrently, I observed the efforts undertaken by NZAEE to support more networking and collaboration, resulting in outputs like EE collaborative hubs nationwide and webinars targeted at professional development.

Through my reflection, both inquiry topics were shown to hold potential for improving EEOs' programmes and their efforts to support schools. My decision-making process at the time was guided by two main components. First of all, through my sub-committee role I was aware that the NZAEE website and strategy were still under development. Through my involvement, I came to the conclusion that a research project on networking and collaboration would likely be of more benefit once these tools became operational. Second, I was highly motivated by the opportunity to deeply explore the concept of nature connection as an outcome of EE.

Over the years working as an environmental educator, I had become well versed in understanding EE as a holistic educational approach. Holism as a philosophical basis of EE aims to develop understanding and action-taking of environmental issues through pedagogy that engages the head, hearts and hands (Orr, 1992). However, underlying this broad understanding of mine was a desire to explore more deeply what makes EE praxis effective in shaping pro-environmental behaviour. As I began exploring the concept of nature connection through the literature, it became clear that educating for nature connection potentially provides greater efficacy than implementing EE through the literal interpretation of 'educating in, about and for the environment', a historical tenet of the discipline (Tilbury, 1995). This

realisation intrigued me, prompting me to inquire into the significance of nature connection for EE and its potential to enhance efficacy. How might my approach to designing EE programs evolve if grounded in praxis genuinely dedicated to fostering nature connection?

A review of the literature reinforced the significance of this learning outcome, highlighting its transformative potential to improve human-nature relationships and address unsustainability (SEI & CEEW, 2022). Moreover, a revealing substantial body of scientific research demonstrates the importance of nature connection for child and adolescent development. Fostering nature connection via nature-based education is consistently shown to have positive impacts on health and well-being, academic performance, and environmental stewardship through pro-environmental behaviour (Barrable & Booth, 2020; Kuo et al., 2019).

While EE frequently aims to foster nature connection, it often falls short of achieving this outcome (Barragan-Jason et al., 2023; Heyman et al., 2023; Whitburn, 2020b). This shortfall appears to stem from learning activities that emphasise time in and/or knowledge acquisition about nature rather than those designed to cultivate a deeper sense of connectedness (Richardson, 2023). Given this gap and the potential benefits of nature connection, further research is needed to examine how nature connection and nature-based education can be more effectively integrated into education program design and implementation (Barrable & Booth, 2020; Barragan-Jason et al., 2022).

1.4 Research aim and questions

Through its explanatory sequential research design, the present study evolved into three distinct stages. Since EEOs are an important component to supporting the formal education sector with EE, the initial aim of the research sought to contribute to developing an understanding of the network. In stage one, an online questionnaire was distributed to all EEOs identified through my compilation of a national database. The purpose of the questionnaire was to provide a systematic description of the network as based on the following question:

- **Research question one**: What are some organisational and programme features of the current EEO landscape in Aotearoa New Zealand?

Following the analysis of the stage one data, the secondary aim of the study sought to explore nature connection as an educational outcome in the Aotearoa New Zealand context. Through a second questionnaire (stage two) and semi-structured interviews (stage three) as developed through a

grounded theory approach, nature connection was investigated through the following research questions:

- **Research question two**: What conceptualisations of nature connection do EEOs hold?
- **Research question three:** Why do EEOs prioritise nature connection?
- **Research question four:** How do EEOs foster nature connection as part of their education programmes?

1.5 Thesis outline

This thesis is organised into eight chapters.

Chapter One provides an overview of the present study, outlining its context, rationale, research aims and questions.

Chapter Two reviews the literature, establishing the theoretical foundation from which this research emerged. It begins by situating the study within the context of the Earth system and the inherent complexity of the socio-ecological challenges that define the Anthropocene. This section demonstrates why unsustainability cannot be addressed by merely treating the symptoms of socio-ecological problems, and instead, argues for transformative change that tackles their root causes.

The review explores how some underlying beliefs and values have historically been shaped, and continue to influence, contemporary worldviews, institutional structures, and power dynamics that lead to human-nature disconnection and ecological degradation. A paradigm shift in human-nature relations is identified as a critical lever for deep, systemic change, and nature connection is framed as a key intervention.

The literature review then turns to nature connection as an educational outcome, exploring literature on educational approaches, pedagogies, and orientations that inform the discussion on how nature-based education can foster nature connection in the formal education setting. Finally, some opportunities and challenges of implementing such praxis are examined in relation to the present-day educational context in Aotearoa New Zealand.

Chapter Three outlines the methodological framework of the study, which employed a mixed-methods approach within an explanatory sequential research design. The chapter details the research setting, participants, and methods of data collection and analysis, addressing both the quantitative and qualitative components of the study. A thorough examination of grounded theory principles and

heuristics, as applied in this research, is provided. Finally, the chapter discusses the criteria for rigor, considering reliability and validity for the quantitative data and trustworthiness for the qualitative data.

Findings pertaining to features of the EEO network are presented in Chapter Four. The chapter begins by describing the national database of EEOs, a significant output of stage one, which was repeatedly used in stages two and three for data collection. The chapter then details findings about EEOs' organisational structures and programmes, including an explanation as to how these insights informed subsequent stages of inquiry.

Chapter Five explores participants' beliefs about the root causes of unsustainability and their conceptualisations of nature connection. The findings initially present each of the three conceptualisations separately before examining but their interrelatedness, as elected through analysis. This chapter provides an in-depth understanding of why EEOs and their representatives prioritise nature connection as an educational outcome of their programmes.

Chapter Six explores a key finding of the study that schools (English medium) contribute to disconnection from non-human nature. It then introduces nature-based education as an educational approach with potential to repair disconnection. Thereafter, the chapter presents five key principles of praxis and learning progressions related to nature-based education.

Chapter Seven reports the remaining findings from analysis, focusing on EEOs' perceptions of individual and systemic outcomes resulting from fostering nature connection via nature-based education. Collectively, these findings demonstrate how participants' perspectives align with the literature, which highlight nature connection as a lever of transformational change.

The prominent themes of the study, in relation to both the findings and literature, are discussed in Chapter Eight. These themes highlight the significance of the EEO network to the formal education sector in Aotearoa New Zealand and considers what the education community can learn from EEOs' prioritisation of nature connection as an educational outcome. The chapter also outlines the study's limitations, followed by a summary of conclusions, implications, recommendations, and future research opportunities. The thesis concludes with an epilogue, which serves as a reflective account of the study's personal impact on me as the researcher.

Chapter Two – Literature review

2.1 Chapter introduction

Figure 1 *Earth Rise*

Note: The lunar horizon from the Apollo Eight mission – 1968. Credit: Public domain

Precious Earth. Our home. The photo of "Earthrise" as shown in Figure 1 was captured by NASA astronaut William Anders in 1968 during the Apollo Eight mission, the first crewed journey to orbit the Moon. Described by (Waite, 2019, para. 1) as "the photograph that changed the world," views of Earth from space like this are known to foster deep emotions, particularly a sense of awe and connection to all of life. Some astronauts describe having a profound experience when witnessing our blue planet surrounded by the deadly vacuum of space, often expressing a greater appreciation for the Earth and its fragility (NASA, 2013).

As these astronauts attest, the Earth is miraculous. Through an exceptionally stable period in the Earth's history, life as we know it, including human civilisations, has developed and evolved. Through the lens of Earth system science, human activities are an integral part of the Earth's biosphere and its dynamic interplay of processes and feedback loops (Steffen, 2004). From this understanding we come to realise that our livelihoods, health and wellbeing are coupled to the health of the planet as a whole (Barragan-Jason et al., 2022). Yet paradoxically, we as a species are negatively impacting the land, waters and atmosphere to such an extent that we are diminishing its life-giving capacity.

This chapter commences by providing an account of the state of our planet. Although sobering, understanding the context is critical if we are to make change that helps rather than hinders. Section 2.2 introduces the concept of the Anthropocene, a proposed geological epoch signalling the time when humanity has become a dominant force in shaping the planet's environment and altering the stability and resilience of the Earth state, from the very local to global scale.

Section 2.3 argues that transformational change is required to literally change the system from which the problems of unsustainability arise. From a systems thinking perspective, this requires addressing the root causes of ecological degradation, rather than merely treating the associated symptoms through shallow interventions or techno-optimist solutions.

Through tracing an epistemic trail of cultural influences toward modernity, the review of the literature moves to considering some theoretical 'big picture' causes and consequences of disconnection from nature in Section 2.4. A perception of a human-nature dichotomy,

anthropocentric beliefs and a utilitarian value of nature are aspects of the dominant social paradigm discussed as being significant contributors to unsustainability. Section 2.5 lays the theoretical foundation that supports the rationale for the prioritisation of human-nature relations and connection with nature as a mechanism of social change toward more sustainable trajectories. Following this, the last three sections of the literature review explore education as a means to scaling up nature connection from the individual to the societal level. Section 2.6 argues that education must evolve toward a transformational purpose, which includes a goal of educating for nature connection. This is followed by Section 2.7 that explores some educational approaches and pedagogies that may be use useful for achieving this goal. Lastly, an overview of opportunities and challenges with respect to implementing EE, including focus on fostering nature connection, in Aotearoa New Zealand is presented.

2.2 The Earth system

As travellers to space directly observe from above, Earth's zone of life exists within a relatively thin layer of life between the Earth's crust and outer space (Folke et al., 2021). The life-giving capacity of this zone is the consequence of over three billion years of interaction between the biosphere (consisting of all living organisms and ecosystems) and the broader geosphere (comprised of energy flows and non-living materials within the atmosphere, hydrosphere, lithosphere and cryptosphere). Around the same time as the early days of space flight in the 1960s, Lovelock (1972) posited the Gaia theory, the idea of planet Earth as a living, self-organised system that, through self-regulation, has the capacity to control its global environment to meet its needs. Later works on the Gaia theory led to the identification of a complex network of feedback loops that interlink the living and non-living systems, regulating planetary conditions through the Earth's climate, ocean currents, salinity, etc. (Margulis & Lovelock, 1974). Rather than viewing Earth as a lifeless ball of rock in space whereby plants and animals by chance have just found the right conditions for evolution, the Gaia theory postulates Earth as creating the conditions for its own existence to flourish (Capra & Luisi, 2014).

In the early 21st century, contemporary systems thinking began to be applied to the Earth as a whole, initiating the emergence of Earth system science. The term 'Earth system' is defined as a "suite of interlinked physical, chemical, biological and *human processes* that cycle (transport and transform) materials and energy in complex dynamic ways within the system" (Steffen et al., 2020 p.7, emphasis added). Conceptualised as the anthroposphere, human processes act as an additional functional component that is capable of altering the Earth system state (Richardson et al., 2023). Collectively, the biosphere, geosphere and anthroposphere are seen to operate as a single, complex adaptive system driven by a dynamic interplay of local, regional and global interactions, networks,

feedbacks and dependencies amongst energy flows, matter and organisms (Folke et al., 2021). Further, within the Earth's system as a whole, there are an array of interconnected and interdependent subsystems operating. For instance, the biosphere encompasses subsystems in the form of different ecosystems, such as forests, deserts and oceans, and the anthroposphere is comprised of subsystems affiliated with human communities, like finance, energy, infrastructure, etc.

This systems thinking approach is a way of making sense of the complexity of life on Earth by focusing on its connectedness, relationships, patterns and context, in comparison to a more reductionist approach that concentrates on splitting life down into its quantities and its smallest constituents. These two approaches represent different perspectives to understanding the functioning of the Earth system. Capra & Luisi (2014) argue that neither one perspective eliminates the need for the other, but as highlighted in Section 2.4, the over-emphasis on reductionist approaches in recent years has been problematic.

The ontological premise of Earth system science is embedded in the reality that humanity has developed the collective capability to influence the Earth system state, from microscopic to planetary scales (Hamann et al., 2018), whilst the survival of species and ecosystems remains dependent on a stable and resilient system (Mustonen et al., 2021). The Earth system's contribution to the quality of human life first and foremost depends on a stable climate, maintaining air and water quality, and supporting biological productivity . Additional contributions from the Earth system to quality of human life take the form of the material and non-material (MEA, 2005), the former including the provision of resources like food, medicine and energy while the latter has led to beneficial physical and psychological experiences such as a sense of place (UNEP, 2021).

Over 10,000 years, and until very recently, the biosphere has been exceptionally stable, with geosphere conditions (e.g., temperature, air and water) that have remained within a relatively narrow range (Rockström et al., 2009). Known to geologists as the Holocene, this period of stability has supported life as we know it, including that of modern humans (*Homo sapiens*), one of the multitudes of species who dwell in the biosphere (Folke et al., 2021). As a consequence of the stability of the Holocene epoch, in conjunction with the contributions as identified above, human civilisations have developed and flourished.

2.2.1 Welcome to the Anthropocene

At the turn of the millennium, Nobel Laureate chemist Paul Crutzen and biologist Eugen Stoermer coined the term 'Anthropocene' as a concept to describe a new geological era fully dominated by human activity (Crutzen & Stoermer, 2000). A proposal was made to modify the world's official

geological timescale, designating an Anthropocene epoch to reflect the profound ways in which the anthroposphere has significantly impacted the Earth system (especially from the 'Great Acceleration' period starting in the 1950's, as discussed more thoroughly in Section 2.2.3). Although the proposal was eventually rejected by the International Union of Geological Science[2] (Carrington, 2024), the concept has taken root in scientific and popular discourse, offering a powerful narrative for understanding the Earth system as an interdependent, co-evolving social-ecological system in which a major planetary transition has occurred. The meaning of the Anthropocene remains useful across physical and social sciences, encouraging new ways of thinking about and resolving our impact as a species (Zalasiewicz et al., 2024).

Of course, some observers had been documenting and grappling with anthropogenic (human-induced) environmental change long before the conceptualisation of the Anthropocene. Examples include the 19th century works of Alexander von Humboldt (Wulf, 2016), Aldo Leopold's (1966) *A Sand County Almanac*, Rachel Carson's (1962) *Silent Spring* and Garett Hardin's (1968) *Tragedy of the Commons.* In 1972, the United Nations initiated the Stockholm Conference, the first in a series of decadal conferences focused on environmental challenges and solutions. Subsequent international cooperation has established an extensive foundation of shared environmental knowledge that has often gone hand in hand with intergovernmental agreements, instruments and actions to curb ecological degradation and achieve greater sustainability (recent examples include the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (2024) and; Intergovernmental Panel on Climate Change (2022). However, despite over 50 years of intentions to address anthropogenic change through these means, degradation of our land, waters and atmosphere continues at an alarming rate. As summarised below, there is no shortage of evidence that ecological degradation is humanity's greatest current challenge.

Degradation of the Earth system comes in many forms. Original ecosystems have been replaced by agricultural activities in the form of crops, plantations and pastures and infrastructure development like roads, buildings, dams, waste dumps and mining operations. The remaining global land surface that still does function in a nearly natural way, with its biodiversity intact, is mostly located in dry, cold or mountainous areas with a low human population (UNEP, 2020). Widespread land degradation across the world has led to a loss of ecosystem function; this phenomenon has been

[2] The International Union of Geological Sciences rejected the idea of the Anthropocene in a series of votes. The geologists' final decision was based a collective unease for including a new unit in the geological timescale with a span of less that a single human lifetime. Critics argued that this has been a missed opportunity to make clear the simple reality that our planet left its natural functioning state, sharply and irrevocably, in the mid-20th century.

present for so long and in so many places, that it is often thought of as a natural state or perceived as an inevitable consequence of human progress. By 2020, over three-quarters of the global land surface had been radically transformed from its natural state and an estimated ten million hectares of forest continue to be cut annually (Ritchie, 2021).

Similarly, in the ocean, no area is unaffected by human influence, and large fractions (41%) are strongly affected by multiple impacts (Harper et al., 2013). For example, rising nutrient loads from human actions coupled with warmer global temperatures have led to declining oxygen concentrations in both the open ocean and coastal waters (Limburg et al., 2020). The surface of the ocean is acidifying 50 times faster than any other time in history (Armstrong et al., 2018). The production and use of human-manufactured chemicals is increasing, with adverse effects on the life systems inhabiting the terrestrial and aquatic domains that help absorb pollutants(UNEP, 2020). Emissions of greenhouse gases in the atmosphere, in particular, carbon dioxide, methane and nitrous oxide, have resulted in concentrations much higher than at any time in the last 800,000 years and are responsible for a warming climate.

Human impact is further evident in the sheer mass of the current human population, which is ten times greater than that of all wild animals combined (Folke et al., 2020). When the weight of livestock raised for human use and consumption is included, wild mammals account for only 4% of the total mammalian biomass on Earth. Through applying technologies like artificial selection, controlling reproduction rates of some species varieties over others, and sculpting habitats, humans are determining the constitution of species with whom we share the planet (Jørgensen et al., 2019). Through purposely reducing the diversity of life on Earth, in conjunction with ecological degradation, the planet has entered a sixth mass extinction event of species and habitat - the first mass extinction knowingly driven by humankind (Ceballos et al., 2020).

The extensive planetary degradation as outlined above is damaging the Earth system that is conducive to life and human 'progress'. Steffen et al. (2020) refer to the Anthropocene as the most influential concept for describing the disproportionate role of humanity as a driver of environmental change. We have the potential to negatively impact the life-giving capacity of the planet by decreasing water and food security, altering planetary conditions that increase health risks for ourselves and other ecosystems (e.g., air pollution, extreme temperatures, etc.), and spreading infectious diseases (Hamann et al., 2018). Climate change, biodiversity loss, and pervasive global pollution – collectively referred to as a polycrisis (Lawrence, 2024) – are all symptoms of the anthropogenic impacts that are undermining the life-giving processes of our planet. As we enter the post-Holocene, we leave behind the stable and resilient Earth state and enter a much more

uncertain, unpredictable and dangerous time[3] (Eva Lövbrand et al., 2015). As explained next, this path of human-induced degradation is ultimately unsustainable for life as we know it (Kendall, 1992; Ripple et al., 2017).

2.2.2 Crossing planetary boundaries

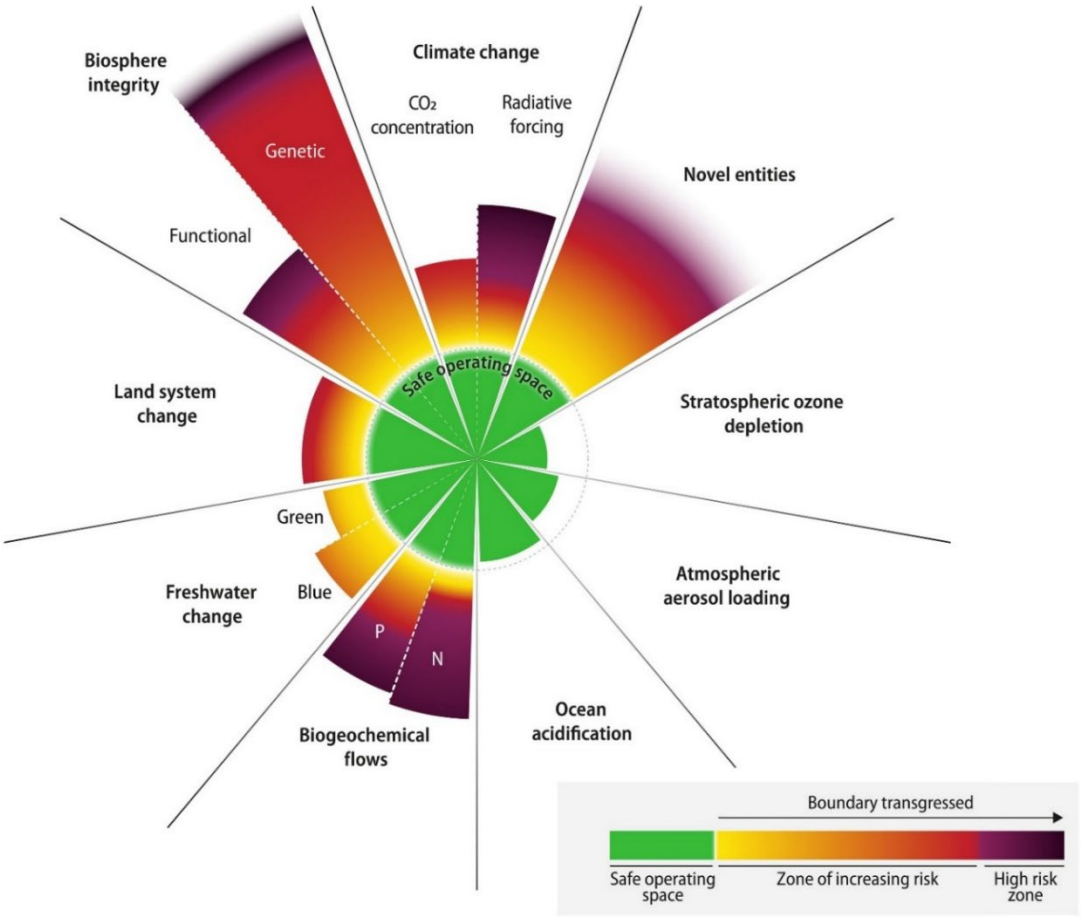
In view of the threats of the global ecological degradation as outlined above, developing greater awareness and understanding of the Earth system, in relation to the Gaia theory and Earth system science, has become a matter of great urgency. The current predicament increases the likelihood of exceeding critical thresholds within the Earth's feedback loops, resulting in systems and subsystems 'tipping' from one state into a profoundly different state (Steffen, 2004). Some of these shifts will happen continuously and gradually, while others will take the form of more sudden and surprising change (Folke et al., 2021). The interconnectivity between the Earth system as a whole means that crossing thresholds and tipping points can unleash a domino effect that triggers further tipping elements and regime shifts, often in non-linear and irreversible ways that are deleterious or potentially even catastrophic for life on Earth (Cumming & Peterson, 2017). The collapse of the expansive ice sheets in Greenland and Antarctica, the widespread thawing of Arctic permafrost, the death of coral reefs in warms waters and the collapse of oceanic currents in the North Atlantic are all identified as paramount thresholds at risk of tipping with a global temperature rise above 1.5 degree Celsius (Global tipping points, 2024; McKay et al., 2022). Tipping points like these can trigger devastating domino effects, including the loss of whole ecosystems, extensive drought and diminished capacity to grow crops with the potential to ignite societal upheavals including mass population displacement, political instability, war and financial collapse (Cumming & Peterson, 2017). The social-ecological reality of the Anthropocene as presented above is referred to herein as 'our sustainability crisis'.

Preventing these types of large-scale, environmental tipping points and societal collapse scenarios is clearly in the self-interest of humanity. Drawing upon Earth system science, the planetary boundary framework was developed to bring a scientific understanding of anthropogenic impacts with respect to defining a safe planetary operating space for humanity (Richardson et al., 2023; Rockström et al., 2009), and inform efforts and decision-making toward resolving our sustainability crisis (Steffen et al., 2018). The framework, as shown in Figure 2 is comprised of nine planetary boundaries as defined by the bio-and geosphere processes representative of the Earth state and critically-affected

[3] I note that Indigenous Peoples have already lived through dystopia and apocalyptic futures induced through different types of colonisation, a topic examined more closely in Section 2.4.

anthropogenic impacts. These boundaries are: climate change; novel entities (i.e., human-made substances and modified life forms such as synthetic chemicals and genetically modified organisms); stratospheric ozone depletion; atmospheric aerosol loading; ocean acidification; biogeochemical flow; freshwater change; land use change; and biodiversity integrity. Although the framework displays boundaries as separate, Earth system science draws attention to the interconnectivity and interdependence between subsystem processes. Quantifying the interactions between the boundaries remains as an ongoing challenge (Lade et al., 2019). Most recently, Richardson et al. (2023) reported the transgression of six of the nine boundaries; climate change and biosphere integrity boundaries are in a zone of rapidly increasing the systemically-linked risks associated with environmental tipping points and subsequent socio-ecological effects.

Figure 2 *Planetary boundary framework*



Note: The green zone (delimited by the hashed circle) is the safe operating space in relation to nine specified planetary boundaries. Yellow to red represents the zone of increasing risk for boundary transgression, with purple the highest risk zone when the stable Earth system conditions are transgressed with high confidence. Reprinted from Science Advances (Richardson et al., 2023). © The Authors, some rights reserved; exclusive licensee AAAS. Distributed under a CC BY-NC 4.0 License (http://creativecommons.org/licenses/by-nc/4.0/)

The planetary boundary framework does not offer a roadmap for achieving more sustainable trajectories and futures, but merely provides scientific insight into the present-day context and predicament of the Anthropocene. It is our decisions and actions as a species that will, to a large extent, determine how we further influence these critical thresholds. Given the complexity of achieving sustainable futures, minor adjustments to current societal pathways are insufficient (Steffen et al., 2018). Stabilising the Earth system within a safe operating space demands rapid, transformative change in human activities (Folke et al., 2021). As presented next, this requires identifying and addressing the drivers that underpin ecological degradation.

2.2.3 Drivers of ecological degradation

Ecological degradation is the result of an array of anthropogenic drivers, classified as direct and indirect drivers (MEA, 2005) through which humans alter the physical, chemical and biological make-up of the biosphere and geosphere. Some examples of direct drivers discussed previously included land use change, nutrient loading of waterways, and the release of emissions into the atmosphere. Profound causes of degradation are also to be found in indirect drivers (e.g., population demographics, economic and political regimes, and individual lifestyle choices) that are entwined as part of the Earth system (Hamann et al., 2018). As shown in Figure 3, both types of drivers are interconnected and interdependent to the Earth system state, the availability of planetary contributions, and human health and wellbeing. Essentially, human health/ill-health is reciprocally linked to the health/ill-health of the planet (MEA, 2005). This section explores some indirect drivers that underpin our sustainability crisis, helping to demonstrate the interconnectedness of everything in our world: the Earth system, the state of human and planetary health, and the drivers of ecological degradation.

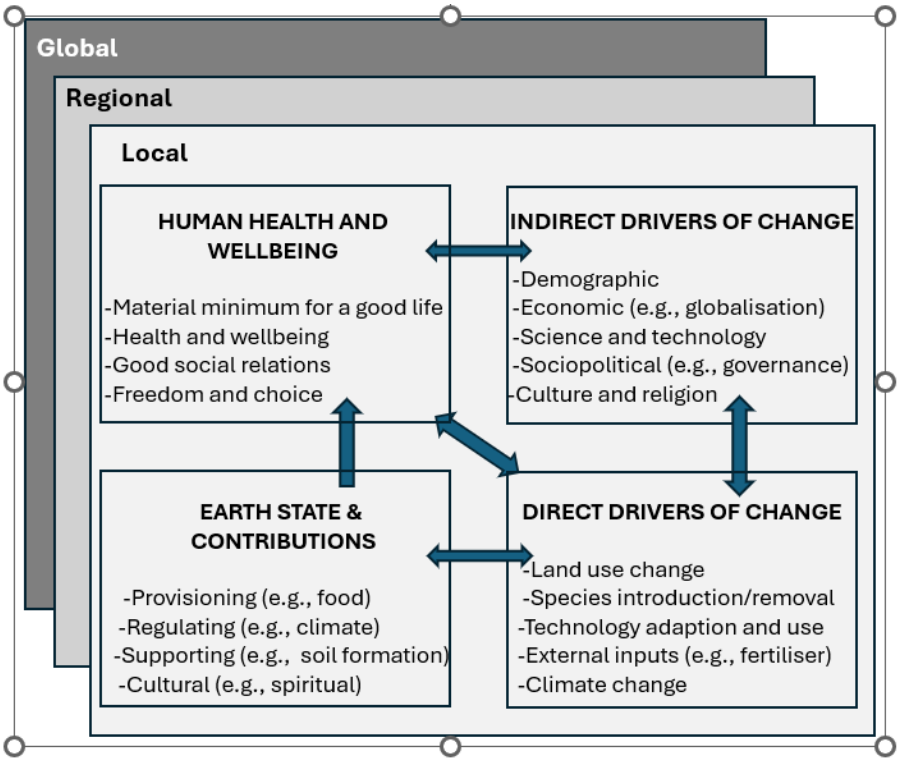
Over the past century, the world has witnessed dramatic environmental change and equally profound changes to human civilisations and their social landscapes[4] (Fromm, 1964; MEA, 2005; UNEP, 2021). Neoliberal ideology and capitalistic policy, underpinned by the belief that human progress, happiness and prosperity is linked to perpetual economic growth (Eckersley, 2013), is a significant indirect driver of ecological degradation. Although the dire implications of untapped growth for a planet with finite resources were strongly forewarned in the *Limits to Growth* (Meadows et al., 1972) (and subsequently in *Limits to Growth: The 30-Year Update* (Meadows et al.,

[4] The term social landscape is used herein to refer to the both the tangible (e.g., structures and processes) and intangible inner worlds of people and societies, including but not limited to bodies of knowledge, values, beliefs, rules of behaviour and power relations.

2004)), the promulgation of free market economies around the world has prevailed (Barnett & Pauling, 2005; MEA, 2005). Characterised by short-term, profit-driven behaviour and the 'free' extraction and exploitation of the planet, this economic regime has been an epic failure in terms of prioritising and protecting the stable Earth state and planetary contributions that provide quality of life (IPBES, 2024; IPCC, 2023; MEA, 2005, UNEP, 2021). With economic growth as the prime measure of success, the neoliberal agenda has led to an extraordinary increase in human population, industrialisation, urbanisation, consumption and technologisation. Some trends of so-called societal 'progress' include:

- A world population that grew from an estimated 3.7 billion people in 1970 to 8.1 billion people at the time of writing (World Bank, 2024);
- Humans living primarily as an urbanised species with the level of urbanisation expected to rise to seven out of ten people living in cities by 2050 (Division of the United Nation's Department of Economic and Social Affairs, 2018); and
- A global economy that has increased nearly fivefold over the past 50 years, propelled by an increase in energy production of more than 270% (of which fossil fuels made up more than 80% of the demand) (UNEP, 2021).

Figure 3 *Drivers influencing environmental change*



Note: (MEA, 2005). Used with permission by World Resources Institute.

Steffen et al. (2009) align the onset of the Anthropocene with the acceleration of socio-economic trends like these, beginning in the 1950s and referred to as the 'Great Acceleration.' Through this period of time, the human growth enterprise has given rise to a complex, globalised social landscape that is tightly interconnected and operating at high speeds with hyper-efficiency in several dimensions. Some of these dimensions include the internationalised production and distribution of goods and supplies, strong connectivity between financial and capital markets, widespread movement of people, and the advancement of communication, technological capacity and social innovation (Helbing, 2013). The essential features that support this landscape is human-made in the form of physical infrastructure, digital networks and novel substances that have also been rapidly expanding around the world at a phenomenally fast pace (Folke, 2021). Through a global quantification process, Elhacham et al. (2020) demonstrated that the weight of everything made by humans, from clothing to buildings to roads to computers, was soon to exceed the mass of all living things on the planet. As an ever-increasing fraction of the Earth's materials are extracted and exploited to support this growth, humanity remains entwined and dependant on the Earth system. The prominent work of Steffen et al. (2015), depicting the parallels between both Earth system indicators and socio-economic trends, is evidence of the interconnectivity between humans and the non-human.

The impacts of this rapid transformation present not only as environmental issues but also as social issues, like rising inequalities. In the strictest sense, inequality is explained as an unequal distribution of scarce Earth materials, benefits or costs. Through the analogy of a pie, inequality is about an uneven distribution the pie pieces. Inequity is in close association to inequality; a similar but more normative term based on the unfair or unjust distribution of privileges across groups of people through distinctions such as ethnicity or age (Leach et al., 2018). Through an equity lens, more pieces of the pie are distributed to those who need it. For the purposes of my discussion below about indirect drivers, I refer solely to the term inequality with the caveat that more sustainable futures require considerations and actions based on the principles of fairness and justice (as accounted for by the concept of equity).

Rising inequality affects everyone, but the burden weighs most heavily on the poor and vulnerable, where women and Indigenous Peoples are often overrepresented (UNEP, 2021). Inequality tends to be sustained by unequal power relations that exist in multiple forms (e.g., economic power, technological power, cultural power, etc.) at different levels (e.g., individual, community, institutional). Of particular concern is the growing wealth gap between the rich and poor, amongst and within countries. The most recent *World Inequality Report* (Chancel et al., 2022) found that ten

percent of the global population, or some 700 million people, live in extreme poverty, living on less than $2.15 a day. In the United States, Europe and China, estimates show the bottom fifty percent of the population own approximately two percent of national wealth and the top ten percent own seventy percent.

Although significant, economic inequality is only one form of the unequal distribution of power and vulnerability. The varied distribution of privileges occurs in different forms across society, referred to by *The World Social Science Report* (UNESCO et al., 2016) as the seven dimensions of inequality that include: economic, social, environmental, educational, cultural, political and knowledge-based. These inequalities invariably intersect and potentially reinforce one another to influence human actions and behaviours that can impede efforts toward securing more sustainable futures. For instance, economic and education inequalities often intersect political and environmental inequalities such that low-income levels and few learning opportunities may result in less people engaging in the democratic decision-making process about human actions that impact the environment.

Inequality is not only one of the most critical social challenges of our time, but as relevant to this study, it is identified as a potent driver of ecological degradation and unsustainable behaviour. For instance, there is robust evidence linking increasing inequality with falling species diversity at the national scale (Holland et al., 2009), while a never-ending and unsustainable 'race' for higher incomes and greater wealth accumulation can occur when social norms, status and self-esteem are tied to relative income and wealth accumulation (Folke et al., 2021). Furthermore, ecological degradation often exacerbates inequalities in ways such as decreasing water and food security and increasing health risks through exposure to the likes of air pollution, extreme temperatures (Piketty & Saez, 2014). The impact of environmental change on inequality can happen abruptly through climate disasters such as floods and wildfire, as was clearly evident in the aftermath of Hurricane Katrina in New Orleans (Lewis et al., 2017), or through the slow, more gradual change in environmental variables as is the case with respect to climate change.

Studies of the relationship between inequality and environmental change have historically focused on a unidirectional way in which rising inequality affects ecological degradation, or vice versa (Hamann et al., 2018). However, the relationship is far from linear, but rather a complex entanglement of the two. The reciprocal link between these two indirect drivers can lead to a downward cycle of poverty traps and further degradation due to realities such as the livelihoods of the poor being dependent on direct utilisation of their local environment and that low incomes tend

to lead to low investment in physical capital and educational interventions that help protect the contributions offered by their surrounds (Folke et al., 2021).

To continue on the current trajectory of the Anthropocene is nothing less than suicidal – as (Plumwood, 2002) suggests that, environmentally, our story is parallel to that of the Titanic:

> We [humans] have reached the stage in the narrative where we have received the iceberg warning, and have made the remarkable decision to double the engine speed to Full Speed Ahead and go below to get a good night's rest. A change of course might be bad for business, we might have to slow down, lose time. Nothing, not even the ultimate risk of the death of nature, can be allowed to hold back the triumphant progress of the ship of rational fools. (p. 1)

As part of the fundamental need to address this reality, Soga and Gaston (2018) highlight the shifting baseline syndrome as a particularly problematic phenomenon. With ongoing ecological degradation, people's thresholds of awareness of, and understanding about, environmental conditions are continually being lowered. Without knowledge of past conditions, each generation perceives its upbringing as the norm. Self-reinforcing feedback loops amplify shifting baseline syndrome, accelerating ecological degradation. This phenomenon remains largely understudied.

The entwinement of complex socio-ecological problems like inequality and ecological degradation are unlike earlier environmental challenges that humanity has faced, resolved through linear, cause and effect approaches and technological fixes as was the case of repairing atmospheric ozone depletion (Thornton et al., 2019). As is explored next, survival depends on transformational change through paradigm shift.

2.2.4 Section summary

The section has demonstrated the complexity of our sustainability crisis. According to the Gaia theory, planet Earth is a self-regulating entity through feedback loops that interlink everything, including human processes as part of the planet as a whole. Through exceptionally stable conditions of the Holocene epoch, human civilisations have developed to such an extent that our collective impact as a species has now become a dominant force that is degrading the life-giving capacities of the planet. Framed as the Anthropocene, the present-day is characterised by uncertainty as the feedback loops of the Earth system begin to transgress environmental tipping points and increasing risks toward upheaval and collapse of our ecological systems and civilisations. By the nature of the wicked problems that comprise the crisis, in terms of their severity and entwinement, the case has been made that unsustainability cannot be resolved by treating the symptoms of these problems.

This section explored some drivers of the rapid environmental and social changes that have led to our sustainability crisis, most expediently from the 1950s onward. Science has revealed the global scale of ecological degradation and social science has shown how the impacts hit vulnerable communities the hardest. Unless we learn to live within planetary boundaries, the Anthropocene implies devastating trajectories of a destabilised Earth system that will undermine all attempts for equitable human development on our planet. Life as we know it is threatened. As explored in the next section, we must resolve the root causes of the anthropogenic drivers of environmental and social issues that collectively have caused, and continue to contribute to, this crisis.

2.3 Transformational change toward more sustainable trajectories

Section 2.2 highlighted the Anthropocene as a time when human-driven impacts have reached such magnitude that they are causing severe ecological degradation, threatening the planet's ability to sustain life. This has given rise to a contemporary context defined by a complex web of entwined socio-ecological issues. By definition, these issues are systemic problems because they refer to complex, pervasive problems rooted in the interconnectedness and interdependence of various systems—be they social, environmental, political, or economic (Capra & Luisi, 2014). Systemic issues arise from multiple interacting factors that influence one another in dynamic and often unpredictable ways such as climate change**,** which involves interrelated factors such as greenhouse gas emissions, deforestation, energy systems, consumption patterns, political governance, and social inequality. These problems are difficult to resolve because they transcend national boundaries and different stakeholders often have competing interests in relation to the proposed solutions. Simply, systemic issues are wicked problems because they lack a 'one-size-fits-all solution' (Rittel & Webber, 2017), and instead require a mix of mitigation, adaptation and transformation strategies.

The paramount challenge of our time is enacting more sustainable and equitable trajectories (Leach et al., 2018). Up to now, humanity's efforts toward resolving unsustainability have fallen short. As explained in Section 2.2.1, degradation of the environment continues at an alarming rate despite international discourse, cooperation and implementation of solutions. Opinions diverge as to whether ecological degradation is solvable given enough money, and the right policies and technologies, or otherwise represent dilemmas for which the only answer is the conscious creation of the social landscape anew (Orr, 1992; Pyle, 2003).

Treating the visible effects of the problems (i.e., shallow solutions) fail to consider the issue from systems-thinking perspective founded on the principle of the interconnectivity and interdependence of all things. Similarly, techno-optimist solutions like shallow solutions are deemed inadequate as they tend to address the symptoms of the problems rather than root causes. Through shallow and

techno-optimist solutions, the problems are never fully resolved and will likely persist or recur. As the European Union's Environmental Agency (UNEP, 2021) stated, "Only a system-wide transformation will achieve wellbeing for all within the Earth's capacity to support life, provide resources and absorb waste" (p. 15).

Correspondingly, transformational change is increasingly being called for at the international level defined as a "Fundamental, system-wide shifts in views [ways of thinking, knowing and seeing]; structures [ways of organising, regulating and governing]; and practices [ways of doing, behaving and relating]" (IPBES, 2024; p. 5). Transforming the systems from which wicked problems arise (i.e., deep solutions) are more effective because they address the underlying or root causes of unsustainability (Chapin et al., 2022; Folke et al., 2021). This study is positioned in the belief that a sustainable[5] world cannot emerge through the same consciousness that created our crisis, and instead, will only arise through transformational change and social innovation (Chapin et al., 2022; Fischer & Riechers, 2019).

2.3.1 Leverage points for transformation

The Gaia theory as introduced at the start of Section 2.2 postulates that the Earth system as a whole is always changing. In a metaphysical sense this is often framed as 'becoming' (Akomolafe, 2022). Due to the existential nature of the Anthropocene predicament, the contemporary age is considered a time of becoming that is most significant to the human species and a wide variety of other life forms. Drawing on theory from the field of meta history[6], Stein (2019) refers to the present-day context as a "time between two worlds" (p. 274); a period of transitioning from one world ending to another world emerging. Stein speaks of the present-day as a "liminal epoch"- a transitional period in which anthropogenic systems, flawed by design in terms of sustainability, are undergoing transformation.

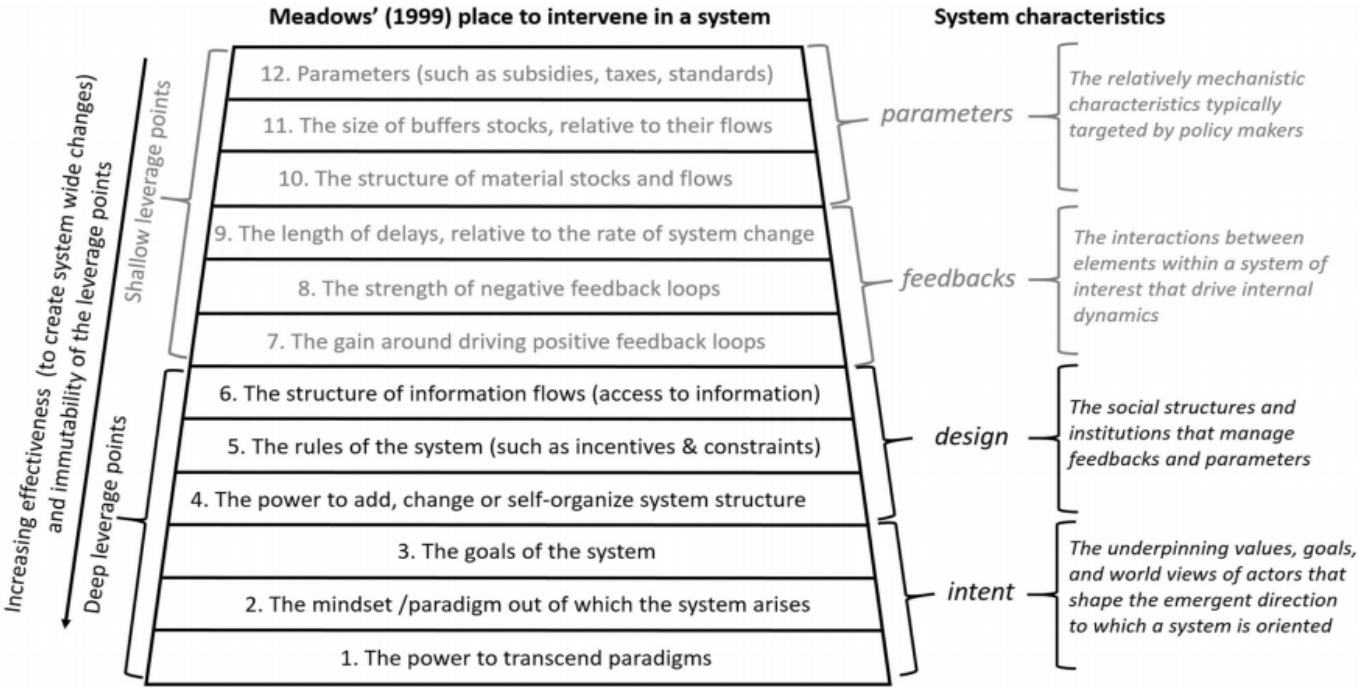
[5] 'Sustainable' is defined here in relation to the concept of a 'sustainable society' that was comprehensively described by Robert Lester, the founder of the Worldwatch Institute. In this seminal piece, Brown explains a sustainable society as one that "satisfies its needs without jeopardizing the prospects of future generations" (Worldwatch Institute, 1984, p.4). I build on this definition by acknowledging that a sustainable world has two interrelated components. First, it is an ecologically sustainable world where the anthropocentric impacts that cause the transgression of planetary boundaries are halted and human activities that restore and regenerate the life-giving capacity of the planet commence. Secondly, a socially just world is equally important to this vision because, as elaborated in Section 2.2, social inequalities are part of the entangled web of drivers that cause ecological degradation.

[6] Metahistory is the study of the nature and meaning of history, which encompasses a broad range of aspects including macro-historical trend analysis that is applicable to Stein's book *Education in a Time between Worlds* (2019).

If we accept a liminal epoch as an opportunity to enact change, a core question then asks where and how to most effectively transform the social systems in ways that reduce impact on the biosphere and geosphere's ability to sustain life. The concept of leverage points is applicable to this question, which systems theorist Donella Meadows (1999) explain as "places within complex systems (an economy, a living body, a city, an ecosystem, the Earth system) where a small shift in one thing can produce big changes in everything" (p. 1). Meadows proposes a hierarchy of twelve leverages of transformation toward sustainability, from shallow to deep, from which interventions in a given system may be made. Shallow leverages are those that are easier to achieve and historically have been most frequently applied to socio-ecological problems. Making changes to measurable parameters, such as subsidies and taxes to reduce inequality, is an example of a shallow intervention. On the opposite end of a spectrum lie leverages, such as changing beliefs and mindsets, that are considered to be deep and transformative because they seek to address the underlying root causes of the problems. Although deep interventions tend to be more difficult to implement across societal scales, they are more likely to lead to more effective, long-lasting changes (Riechers et al., 2021).

Change toward an ecologically sustainable and socially just world requires the interactions of multiple leverage points (Chapin et al., 2022) for transforming multiple elements of the social landscape, which are comprised of both tangible and intangible aspects (Abson et al., 2017). Abson aggregated Meadows' twelve realms of leverage into four broad types of system characteristics: parameters, feedbacks, design and intent. As shown in Figure 4, changing the overall intent of a system, or in other words paradigm shift, is identified as a deep lever of change (Abson et al., 2017; Leventon et al., 2021; Meadows & Wright, 2008). The paradigm concept is most often associated with Kuhn's (1977) works on scientific paradigms. Broadly, paradigms represent a shared belief and value system that shape culture (Hayward, 1984 as cited in Cajete, 1999). These beliefs are directly dependent upon the consensus of the cultural community about aspects like what is real in the world and what is not, what they value in the world and what they don't. Essentially, paradigms represent our beliefs in relation to the 'facts' about how the world works (Marks, 2024).

Figure 4 *Leverage points for transformational change*



Note: From Meadows' twelve leverage points to Abson's four system characteristics within which interventions of a given system may be made (Abson et al., 2017). Reproduced with permission from Springer Nature.

The pertinent thing about paradigms in relation to unsustainability/sustainability is that they are the "the sources of our systems" (Meadows, 2008, p.18) from which everything else flows. Fundamentally, paradigms shape not only how people perceive and value the world around them, but they drive humans' physical interactions and relationships with the material world. Whether anthropogenic impacts are negative or positive in relation to the planet's life-giving capacity hinges upon cultural "value and belief systems, at levels ranging from individuals to societies"[7] (Fischer et al., 2012, p. 158). In this sense, shifting paradigms can act as a deep lever of change toward more sustainable trajectories (Abson, 2017; Meadows, 2008); the need for changing belief and value systems in ways that help improve human-nature relations is increasingly recognised as paramount

[7] This is not to simplify unsustainability to a linear causality of belief systems only. Significant development of social theory in the twentieth century has demonstrated the determinants of social reality as influenced by a myriad of cyclical, interacting tangible and intangible factors. For example, see works of Habermas for understanding the emergence of social phenomena via interactions between social structures and human agency (Brunkhorst et al., 2018) and Whatmore (2002) for a discussion that expands agency beyond the human realm.

to achieving such (Artmann, 2023; Chapin et al., 2022; Fischer and Riechers 2019; Folk 2011 Richer). Before expanding more on the significance of human-nature relations and its relation to nature connection, the term 'nature' and some affiliated concepts require explanation.

2.3.1.1 Clarifying 'nature'

This chapter commenced by framing the Earth system as a co-evolving socio-ecological system characterised by a web of interconnected relationships and dependencies between species, elements and processes that are affiliated with the human and non-human. Up to this point, I have intentionally avoided using the term 'nature' within this review of the literature; my reasoning being that I did not want to give a false impression of an ontological belief of a reality comprised of separate entities – the social and the natural. The ontological positioning of this thesis is based on the understanding of humans and the rest of nature as mutual parts of the Earth system as a whole. Nature is not 'out there', separate from humankind, but instead comprised of an entwinement of humans and non-human nature as one, naturally derived from the Earth system.

In *Making sense of nature,* Castree (2014) describes the term 'nature' as encompassing a plurality of meanings from which its use depends on one's understanding of the phenomenon and, at times, the objectives of the user. I rely on a critical interpretive lens which deems nature to be socially constructed, but at the same time, real in the material sense that otherwise there would be no life. I note the 'relational turn' in scholarship that seeks to advance thinking around the perception of the entities of the world (West et al., 2020), and critiques of speaking systematically of humans and nature as two foundation types, which may inadvertently reproduce and/or increase the perceived separation between humans and nature. Hoping to advance non-dichotomous conceptualisations, in this thesis I tend to use phrases like "humans and non-human nature" or "humans and the rest of nature" to remind readers that these phenomena are not separate nor mutually exclusive, but instead exist as components of a greater whole. In saying this, the language used in the findings chapters of the thesis (Chapters Five – Seven) is that of the participant's voice, which differs from my own voice through their tendency to refer to "humans and nature". Since language is fundamental to imparting understanding about beliefs, the ways we verbally position humans amongst the rest of nature is an important discussion point revisited in Chapter Eight.

2.3.2 Conceptualisations and paradigms of human-nature relations

Humanity's relationship with nature has been a topic of scholarship explored throughout human history (Ives et al., 2017). As the environmental movement has gained traction since the 1970s, so too has exploring a perceived disconnection between humanity and the rest of nature, or in other

words, the human-nature dichotomy as a root cause of our sustainability crisis (Barry, 2010; Nisbet et al., 2009; Pyle, 2003; Vining, 2003; Zylstra et al., 2014). More recently, attention has been drawn to the need for reconnecting with nature and improving human-nature relations as part of transformation toward more sustainable trajectories (Barrera-Hernández et al., 2020; Beery et al., 2024; Richardson et al., 2020). An overview of understandings around some of the key concepts and research findings that are pertinent to human-nature relations is provided next.

As pointed out in Section 2.3.1, the belief systems that underpin paradigms give rise to the ways people perceive, value, relate to, interact with, and ultimately impact nature. Anthropocentricism and ecocentrism have become catch-all terms for describing the dominant and alternative paradigms, respectively, as associated with human-nature relations (Barry, 2010). Anthropocentricism assumes that humans have a unique status or superiority over non-human nature, which leads to the prioritisation of human needs and interests. Ecocentrism, on the other hand, recognises the intrinsic value and agency of all living beings, considering humans as just one part of the interconnected web of life. Anthropocentric/eco-centric paradigmatic framing is often used as the foundation to debates about different trajectories for achieving transformational change, with environmental thinkers and educators arguing for paradigm shift toward ecocentrism (see, for example Fein, 1993; Huckle, 1993; Milbraith, 1989; Sterling, 2001).

Also relevant to a discussion about human-nature relations and sustainability is Pirages and Ehrlich's (1974) concept of the dominant social paradigm. This concept has helped to build the credibility of the notion of a social paradigm (in contrast to Kuhn's scientific paradigm), described by Pirages and Ehrlich as "the prominent worldview, model or frame of reference through which individuals or collectively, a society, interpret the meaning of the external world" (p. 43). In *Sustainable Education: Re-visioning Learning and Change* (2001), Sterling elaborates on this by contrasting mechanistic and ecological paradigms. The mechanistic paradigm, he argues, is characterised by reductionism, dualism, hierarchy, and control, whereas the ecological paradigm is holistic, systemic, non-dualist, and participatory. As the epistemic overview in Section 2.4 will demonstrate, the dominant social paradigm underpinning much of human thinking in the modern era is largely mechanistic in character.

Not surprisingly, people's beliefs and perceptions of themselves and wider society in relation to non-human nature influences environmental values, attitudes and behaviour (Vining et al., 2008). Examining modern classifications of human-nature relationships, Flint et al. (2013) identified the following dimensions commonly used to describe various relationship types: (1) the positionality between humans and nature (humans as above nature, humans as part of nature…); (2) the

understanding of nature itself (unpredictable, fragile, predictable, resilient…); and (3) the character of the bond between humans and nature (utilitarian, spiritual…). In response to today's industrialised, globalised and science-techno-oriented world, the conceptualisation of human 'mastery over nature' populates much of the sustainability literature. This concept is explained by Muhar and Böck (2018) as follows:

> Humans as superior to nature, capable and entitled – or even morally obliged – to control nature in the sense of improving nature's productivity in order to provide food and resources for humans, and to reduce the risk from natural hazards such as floods and pests. (p. 995)

Characterised by an anthropocentric positionality and utilitarian value of nature, mastery over nature reduces non-human nature to a resource, valuing it only for its usefulness to humans and failing to recognise any inherent value. Anthropocentricism and utilitarianism are thus theorised as leading to the human-nature dichotomy and adversarial relationships between humans and non-human nature (Barry, 2010). In addition, Barry points to the conceptualisation of 'nature as sacred' as also contributing to the dichotomy by romanticising all that is nature and villainising the human aspects. The crux of the sacred conceptualisation is that when human activity is deemed unnatural, people neglect the places they live, while establishing "shrines around iconic natural wonders" (Barry, 2010, p. 124).

Contrary to anthropocentric perspectives are psychological constructs like 'ecological identity' (Naess, 1973) and 'inclusion of nature in self' (Schultz et al., 2004) that perceive human interconnectedness as part of the Earth system and a sense of inclusion in nature. These constructs refer to the degree to which individuals include nature within their sense of self and identity, so that damage to the planet is seen as damage to the self (Nisbet et al., 2009). Environmental concern is also relevant because it is argued that when people value and feel concern for nature, they will then want to protect it (Shultz, 2000). Constructs such as these are well aligned with indigenous ways of being, knowing and doing that are underpinned by holistic and relational paradigms, a theme explored in more depth in Section 2.5.2.4.

This leads to the final concepts to be discussed - connection with nature, and its opposite, disconnection from nature. In a multidisciplinary review of literature associated with connection/disconnection, Ives et al. (2017a) demonstrated that the approaches to conceptualising and measuring these phenomena are fragmented across various disciplinary schools and normative agendas. One of the earliest conceptualisations of nature connection is traced back to Fromm's (1964) concept of 'biophilia' and defined as "the love of life or living systems" (p. 41). Biophilia was

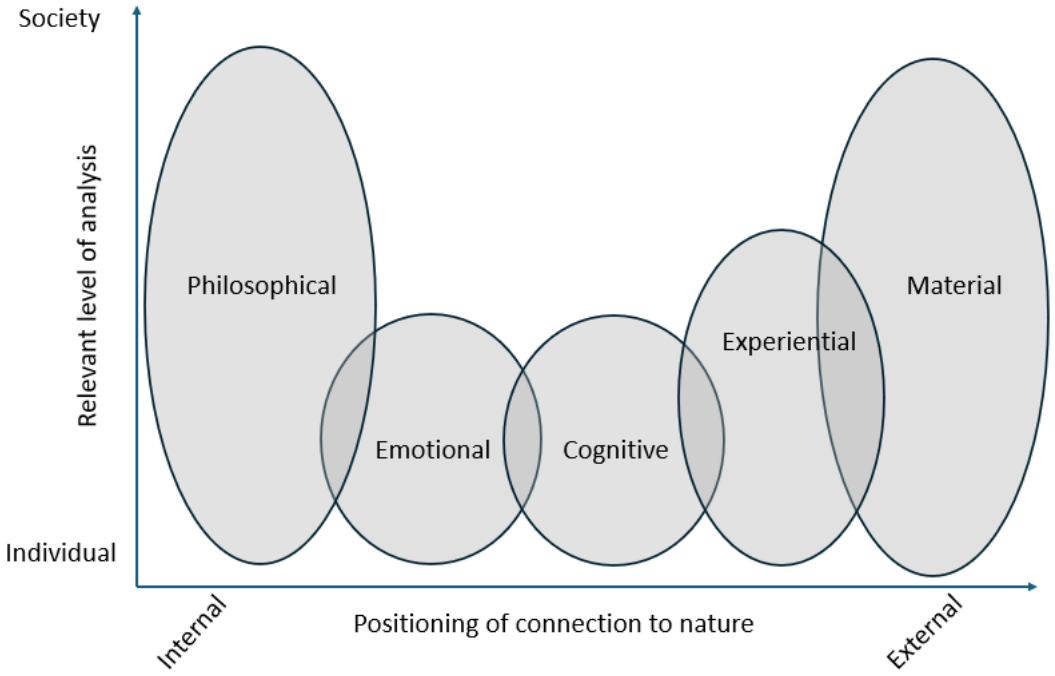
further developed into the 'biophilia hypothesis' (Wilson, 1984), which explores the idea that humans have an innate desire to connect with nature. Over the course of human evolution, the landscape offered both opportunities and threats to survival, leading to human preference for certain aspects of nature and aversion to others (Kahn, 2011, as cited in Lumber et al., 2017). The biophilia hypothesis proposes that humans have a physical need and psychological desire to affiliate with life and life-like processes and that the human-nature bond is an expression of a deeply ingrained element of human evolution (Wilson, 1984). The biophilic bond was likely to have aided humanity's survival in the past, and may remain essential for well-being and quality of life today (Kellert & Wilson, 1993).

Additional conceptualisations of connection/disconnection, such as 'nature deficit disorder' (Louv, 2005) and 'extinction of experience' (Pyle, 1993) have emerged as part of agendas to promote the importance of direct interactions with nature. More recently, a social-ecological systems perspective emphasises the dependence of human societies on non-human nature and calls for 'reconnecting to the biosphere' (Folke et al., 2011), while 'nature connectedness' originated in psychology literature for capturing an individual's sense of relationship with non-human nature and determining the degree to which they feel belonging as part of the Earth system (Richardson, 2023; Schultz, 2002). Generally, disconnection from nature is identified as a primary driver of our sustainability crisis, while nature connection has become a mantra for resolving the associated problems of unsustainability (Zylstra et al., 2014) or as a "treatment" to unsustainability (Ives et al., 2018, p. 1392). The use of these concepts, connection and disconnection, have been critiqued by some, in part, because it can be interpreted as a reinforcement of the human-nature dichotomy (Fletcher, 2017). However, the concepts as used herein, like in much of the associated literature, are not suggesting that humans are completely separated from and/or above the rest of nature, but rather, of the opportunity for humans to re-familiarise themselves with humanity's entanglement with non-human nature via multiple connection types (as discussed below) and dependence on non-human nature.

Attempting to organise this existing literature and direct future research toward greater coherence, Ives et al. (2017b) developed a multifaceted conceptual framework of human-nature connection that this thesis draws on. This framework identifies human-nature connection across five-dimension types. These are identified as (1) material connections such as using goods/materials derived from nature; (2) experiential connections through direct interactions in nature; (3) cognitive connections such as knowledge, beliefs and attitudes about nature; (4) emotional attachments to and empathetic responses toward nature; and (5) philosophical perspectives and worldviews associated with eco-

centric human-nature relations. In reality, these types of connection do not operate in isolation, but interact and are influenced by one another. As Figure 5 illustrates, the five connection types are considered to operate along a spectrum from internal connection with nature (e.g., emotions or worldviews) through to external connections with nature (e.g., physical interactions and experiences). This conceptual platform also considers the scale at which these connections operate and can be analysed, from the individual to societal scale.

Figure 5 *Conceptualisations of human-nature connection dimensions*



Note: Dimensions are shown along a spectrum from people's inner to outer worlds (x-axis) and their relevance at different scales of social aggregation (y-axis). While presented as independent categories here, in reality, each type of human-nature connection may interact with and influence the other. (Ives et al., 2017b) Reprinted with permission under Creative Commons.

Disconnection from nature, on the other hand, can be understood as individual identity or societal paradigms that lack awareness or intentionally disregard a sense of belonging with respect to one or more of the five types of connection as identified above (Beery et al., 2023). Some examples of disconnection types include: material disconnection when an individual is unaware of nature's contributions in the food they eat or the materials used to make their clothing; emotional disconnection when negative attitudes toward nature cause nature to be feared; and the cognitive disconnection when a lack of knowledge about the 'how to' for outdoor pastimes impedes on opportunities to directly interacting with nature (experiential disconnection). Types of disconnection like these are identified as exacerbating the human-nature dichotomy by producing a 'blind spot' – that is, an inability to see oneself as part of nature and/or ignorance and/or denial of humanity's interconnectedness with and dependency on non-human nature (Zylstra et al., 2014).

Reflecting the fact that connection with nature is multidimensional, a number of different measures and scales have been developed to measure nature connection (see, for example, Nisbet et al., 2009; Salazar et al., 2020). As human-nature relations are complex, not all of the instruments measure the same thing (Ives et al., 2017b). Some are designed to measure long-standing, deeply rooted cultural and individual values, while others assess the more immediate impact of a specific intervention (Cuadrado et al., 2023). Some scales only measure a single dimension, such as the Connection-to-Nature scale that considers emotional connection only (Mayer & Frantz, 2004), while other scales are multidimensional, like the Nature Connection Index, which encompasses affection and experiential connections with nature (Richardson et al., 2019). Through the empirical measure of nature connectedness, a person's emotional connection or perceived subjective sense of relationship with non-human nature can be quantified (Richardson, 2023). Nature connectedness science is helpful for enhancing understandings about human-nature relations and how they can be improved.

In both the literature about connection/disconnection, and associated empirical tools, there is a dominant focus on personal identity and the individual scale. This thesis acknowledges that people's connection/disconnection and experiences in nature are embedded in larger social, institutional and political contexts influencing opportunities for and expressions of connection with nature (Andersson et al., 2022). Put another way, connection/disconnection results from both individual and societal factors and drivers. For this reason, Beery et al. (2023) expand the types of disconnection to also include socio-cultural, institutional and political dimensions. For instance, school grounds extensively covered in a synthetic material like concrete is an example of an institutional structure that inhibits nature experiences and may contribute to disconnection.

Before concluding this section, one final point about connection/disconnection is necessary. In addition to the associated terms and scales of connection/disconnection being fragmented, the use of these terms varies in relation to the focus of the discussion, explained by Ives et al., (2017b) as (1) the *causes* of disconnection; (2) the *consequences* of disconnection, and/or (3) reconnecting to nature as a *treatment* for some problem. The discussion going forward incorporates all three foci to some degree, with greater emphasis on the causes and consequences of disconnection in Section 2.4 followed by a focus on nature connection as a treatment to unsustainability in Section 2.5.

2.3.3 Section summary

Transformation toward sustainability must address the root causes of ecological degradation. This requires transforming the systems from which the problems have arisen. Therefore, a key question asks where and how to most effectively intervene in the anthroposphere? Social paradigms have

been highlighted as pertinent to transformation because they fundamentally shape the ways people perceive, value, relate and interact with the world around them. Thus, this section identified paradigm shift, particularly in relation to improving human-nature relations, as one of the deepest levers of transformational change. Some key conceptualisations that pertain to the link between human-nature relations and sustainability were explained as part of the discussion. These included: anthropocentrism, ecocentrism, human-nature dichotomy, connection with nature and disconnection from nature.

From here, the review of the literature moves to considering some theoretical 'big picture' causes and consequences of disconnection from nature.

2.4 Looking to the past to inform the future

Shifting trajectories toward more sustainable futures require understanding aspects of the dominant social paradigm that have led to unsustainability (Thornton et al., 2019). Identifying these aspects and their sources of origin are a critical part of confronting and addressing them in contemporary worldviews, institutional arrangements and power structures. Historical knowledge as such is important for transformational change because it can help explain the present and inform the development of interventions going forward in the future (Marks, 2024).

In order to fit within the scope and timeline of this thesis, the following epistemic overview focuses on a Eurocentric version of history, centralising its people, events and ontologies, and its influence on the global spread of the dominant social paradigm through Westernisation. This focus is justified because more sustainable trajectories require transforming the unsustainable mindsets and ways of living affiliated with modernity as a colonising culture. However, I acknowledge that cultures affiliated with Eurocentric origin are just one part of the global community, and a multitude of narratives and scholarship highlight the influences, both negative and positive, that other cultures and their respective paradigms have made to the modern era (Marks, 2024).

2.4.1 Pre to early-modern era

Historically, during what Marks (2024) refers to as pre-modern era, the dominant worldview was organic (Hamilton, 2002). People mostly lived in ways which did not clearly differentiate between material and spiritual phenomena. Their view of the world was reflected in people's innermost perceptions, beliefs and experiences of themselves and their relationships with non-human nature. As Berman explained (1981):

> The view of nature that predominated in the West down to the eve of the Scientific Revolution was that of an enchanted world. Rocks, trees, rivers and clouds were all

> seen as wondrous, alive, and human beings felt at home in this environment. The cosmos, in short, was a place of belonging. (p. 16)

However, there is also evidence of anthropocentricism (Artmann, 2023; White, 1967). Plato and Aristotle used human rationality and intelligence to justify a privileged and separate status for humans (Vining, 2003), while the Greek god Prometheus, who was capable of capturing fire to give symbolises mastery over nature (Muhar & Böck, 2018). The Bible (Genesis 1:28, New International Version) reinforced this view through a clear and divine mandate for humans to dominate nature:

> … God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground."

Significant changes to humanity's relationship with the land and animals continued to take hold through the Agricultural Revolution, a lengthy transition from hunter gather societies to farming societies. Food derived through the hard work of agriculture replaced sentiments of food as a gift from the Earth (Eisenstein, 2007). As the landscape was divided and placed into private ownership, new values and cultures evolved based on accumulation and dominion over animals. For the European majority, the organic and animistic worldview of the time was gradually being replaced by a view that elevated human status above non-human nature (Naveh & Bird-David, 2014).

The Scientific Revolution and the Enlightenment Period are observed as having profound effects on values, attitudes and behaviour toward non-human nature (Orr, 1992). The epistemic trail denotes a radical shift in worldview around the start of the sixteenth century, as stated by Capra and Luisi (2014):

> Between 1500 – 1700, there was a dramatic shift in the way people in Europe pictured the world and in their whole way of thinking. The new mentality and new perception of the cosmos gave our Western civilisation the features that are characteristic of the modern era. They became the basis of the paradigm that has dominated culture for the past 300 years. (p. 19)

Collectively, the founders of modern science, such as Bacon, Newton and Descartes, contributed to revolutionary changes to ideas related to physics, astronomy and scientific experimentation, which proved remarkably successful for explaining many of the workings of the universe. However, alongside of their achievements, these works are also recognised for grounding dichotomous, anthropocentric and utilitarian aspects in the dominant social paradigm (Capra & Luisi, 2014; Muhar, 2018; Vining 2003).

Of particular relevance was the influence of Descartes as a mathematician, scientist and philosopher. Descartes' founded an analytical method based on reductionism, or the fragmentation of thoughts and problems into smaller and smaller constituents. Aided by this thought process, Descartes arrived at his famous Cogito Argument through which he concluded that the only certainty in the world was the existence of his thinking mind (Barry, 2010). It is from here that the Cartesian Division of mind (human) from matter (everything else, nature) came to be, made famous in Descartes' statement "Cogito, ergo sum," "I think, therefore I exist." This tenet is considered to have profoundly influenced the evolution of the dominant social paradigm in which humans are perceived as separate to, and above, nature (Hamilton, 2002). Of additional significance was Descartes' view that everything comprising the material world (exempt the human soul) could simply be viewed as machines that work like clockwork (Capra & Luisi, 2014).

Following the life works of Descartes, Sir Isaac Newton's achievements in physics increased credibility of Descartes' thinking. Through Newtonian laws of motion, the universe was demonstrated to operate as one huge mechanical system from which everything could be accounted for through precise mathematics and an ontological distinction between subject and object (Beery et al., 2023). The empirical evidence gathered by application of these laws helped to further embed a belief in the certainty of scientific knowledge and of non-human nature as mindless, lifeless, soulless and non-agentic machines. Consequently, the pre-modern view of an organic, living and spiritual universe was transcended by a reductionist perspective (Merchant, 2018). In decades to come the Baconian creed of scientific knowledge and technological power over nature (White, 1967) laid the foundation for the pervasiveness of behaviours and norms based on human dominance, control and mastery (Artmann, 2023).

This revolutionary period of science and philosophy had profound effects on peoples' beliefs, values, attitudes and behaviour toward non-human nature (Muhar & Böck, 2017). Explaining the ecologically-minded value and behaviour system of Europe prior to the scientific revolution, (1992) wrote:

> The image of the earth as a living organism and nurturing mother served as a cultural constraint restricting the actions of human beings. One does not readily slay a mother, dig into her entrails for gold, or mutilate her body … As long as the earth

> was considered to be alive and sensitive, it could be considered a breach of human ethical behaviour to carry out destructive acts against it[8]. (p. 43)

Through the Agricultural, Scientific and soon to commence Industrial Revolutions, cultural constraints associated with protecting the living universe began to fade (Merchant, 1992; Wiedmann et al., 2020). The perception of animals as having no agency or sentience, along with the emerging rationalistic ideas through the Enlightenment Period, justified the instrumental use of non-human nature via exploitative means. As Plumwood (2002) contends:

> Rationalism and human/nature dualism helped create ideals of cultural and human identity that promote human distance from, control of, and truthlessness towards the sphere of nature as the Other, while minimising non-human claims to the earth and to elements of the mind, reason and ethical consideration.(p. 4)

Framed by Plumwood as the 'Other', non-human nature became something for the taking, to be utilised as deemed fit by humanity. The relationship between humans and the Earth was not only changing, but breaking (Richardson, 2023).

2.4.1 Colonisation

As the economic order of capitalism and the Industrial Revolution gained momentum, the Eurocentric worldview developed a more secular and materialistic orientation (Capra & Luisi, 2014). Enticed by the 'discovery' of America, a race commenced between European nations to claim new lands and riches and establish overseas colonies. This imperialistic turn was given legitimacy through the Doctrine of Christian Discovery by which the Vatican provided European monarchies with the 'right' to conquer and claim foreign lands, and to convert or kill the native inhabitants of those lands as necessary (Ngata, 2019). Domination, control and exploitation of the Other expanded to include non-white and non-Christian populations (Plumwood, 2002) as emerging scientific thinking and social conventions identified differentiation and superiority of some races over others (Edmonson, 1976, as cited in Muradian & Gómez-Baggethun, 2021). These influences all helped to further embed a belief of supremacy and entitlement of some groups of people over the Other as part of the dominant social paradigm.

The European expansion across the globe saw voyagers claiming land, establishing settlements, channelling wealth back to their homelands, and often enacting horrific acts of violence on the Other

[8] I note the irony in this passage where Merchant refers to the Earth as a mother but then concludes with the pronoun 'it.' This serves as a useful example of how language does not always align with our beliefs—even for a well-known feminist and environmental writer like Merchant.

(Ngata, 2019). Indigenous Peoples were significantly impacted as European colonists shaped their new homelands in the image of the nations from whence they originated (Simpson, 2004). The European settlers imposed on the native inhabitants their languages, religions, education systems, and notions of conduct, including private property rights and currency, to name just a few (Cole, 2024).

When Indigenous Peoples were an obstacle toward Europeans establishing sovereignty over the 'new' world, the colonisers focused on destroying their respective knowledges as a mechanism to annihilate and/or assimilate these populations (Ngata, 2019). Virtually every aspect of indigenous knowledge systems was attacked: assimilating children through a colonial education system; banning native languages; outlawing traditional governance; rendering indigenous spirituality and ceremonial life illegal; and degrading the non-human nature to which Indigenous Peoples are intrinsically connected with (Elkington et al., 2020; Henderson, 2000; Kimmerer, 2020).

Colonialism is the deliberate devaluation and erasure of Indigenous Peoples and their ways of being, knowing and doing (Thornton, 2019). Whyte (2018) points to different types of colonialism, whether through land dispossession, forced relocation or environmental destruction, as having ended Indigenous Peoples' local and direct relationships with plants, animals, insects and entire ecosystems. Needless to say, the annihilation of Indigenous Peoples and their respective cultures is morally abhorrent, but as Section 2.5.3.4 argues, it is also an act that destroys alternative paradigms and ways of being that otherwise could offer hope in the face of our sustainability crisis.

The Eurocentric power derived from stolen wealth of foreign lands and people significantly enabled the international spread of the dominant social paradigm (Ngata, 2019), referred to as Westernisation (Heidegger & Rojcewicz, 2015). Aided by policies of neoliberalism and globalisation, aspects of the dominant social paradigm that contribute to unsustainability have been codified into economic, political and institutional practices across the world (Plumwood, 2002). As highlighted in this section, these paradigmatic aspects include anthropocentricism, reductionism, rationalism, and ultimately the human-nature dichotomy. In this light, Westernisation is framed as a colonising culture that has fuelled the rise of humanistic thought, whereby the human experience is perceived as the supreme source of authority and meaning (Richardson, 2023). Consequently, large swathes of the human population have been colonised into ontological and epistemic traditions that contribute to ecological degradation and social injustice (Steffen, 2019; Taylor & Taylor, 2023).

2.4.2 Modernity – a colonising culture

The colonising culture of modernity is high paced, technologically driven, competitive and exploitative (Steffen et al., 2015). In the capitalistic-industrial society, the promise of happiness and

prosperity is based on a perpetual cycle of controlling and exploiting nature for the purpose of economic growth, which is reflected in the increasing commodification the likes of forests, water and biodiversity (Gómez-Baggethun & Ruiz, 2011). This on-going cycle has become modernity's cardinal sign of 'progress' (Eckersley, 2013). Yet, as the outcome of the international study described below demonstrates, the consequences include lower levels of nature connectedness.

Using data initially collected through a survey of 16,000 people across 18 countries to assess connection with nature (White et al., 2021), Richardson et al. (2022) conducted a secondary study to see how individual levels of nature connectedness across various countries were associated with country-level measures of factors linked to this so-called progress (e.g., personal income and technological advancement). Some key findings of the secondary study included: a moderate association between high levels of income and low levels of nature connectedness; strong association between high levels of smart phone ownership and lower levels of nature connectedness; and a strong positive relationship between biodiversity and nature connectedness.

Other types of immediate drivers that diminish peoples' connection with nature have been found to include increased urbanisation (Barrable & Booth, 2020; Cumming et al., 2014); reduced access to green spaces (Lin et al., 2014); and rise in electronic media (Pergams & Zaradic, 2006), resulting in environmental illiteracy (Zylstra et al., 2014). Through these drivers, many within contemporary societies are increasingly distanced and alienated from non-human nature (Vining, 2003). Zylstra et al., (2014) explain the consequences:

> As people de-sensitize and/or adapt to these social and environmental changes, the (acceptable) reference point for measuring the extent of the human/nature disconnect is lowered with each generation. The cumulative result is the 'extinction of experience': a devolution toward a largely unnoticed loss of regular, direct, and meaningful contact with nature. This enlarges the 'blind spot' concerning dependency on nature, can invoke fear and intolerance of certain species and has profound [negative] implications for ecologies, societies, economies, and human well-being.

The perception of human-nature dichotomy is reinforced when the phenomena of nature no longer form part of the experiences that shape consciousness (Zylstra et al., 2014). Furthermore, disconnection is blamed for cognitive dissonance and apathy toward non-human nature (Beery et al., 2023), which justifies and enables the contemporary notions of progress to continue through control, exploitation and destruction of the Other (Hamiton, 2002; Taylor & Taylor, 2023). The

implications for non-human species is that they are only considered with reference to their usefulness as a resource, like Steffen (2019) suggests:

> [It] is no longer valued and respected as our planetary life support system, and in its own right as a realm of beauty and solace, but rather viewed simply as a 'resource' to be costed, exploited, wasted and then abandoned as investment dollars move elsewhere. (p. 129)

Framed as shifting baseline syndrome (initially mentioned as a driver of ecological degradation in Section 2.2.3), the consequences include an increased tolerance for progressive ecological degradation and changes in people's expectations as to what is a desirable state of the Earth system (Soga & Gaston, 2018).

In sum, the colonisation of modernity has not only significantly degraded the state of environment, but has also diminished humanity's sense of belonging and connection with the Earth system and the cosmos as a whole. This history has led to what Richardson et al., (2022) refers to as the "failing human-nature relationship" (p. 2210). Although social justice movements have long been making links between colonialism, disconnection, and socio-ecological issues (Whyte, 2018), this reality is only now becoming more readily accepted.

The term colonialism has finally made its way into the latest IPCC report (2022), thirty years following its first report released in 1990. As explained in this report, colonialism is a historical and ongoing issue, with entangled impacts of ecological degradation and on people, particularly Indigenous People's culture, land stewardship and self-determination. The recent adoption of the Kunming-Montreal Global Biodiversity Framework (Convention on Biological Diversity, 2022) positions humanity's place as part of nature and signals the restoration of a harmonious relationship with non-human nature as fundamental to restoring biodiversity. The contributions and rights of Indigenous Peoples and local communities, and different value systems and concepts affiliated with 'Mother Earth', are also made explicit.

2.4.3 Section summary

By tracing an epistemic trail of Westernisation, this section explored some aspects of the dominant social paradigm that, collectively, are considered a root cause of our sustainability crisis. Some of the most significant aspects included anthropocentricism, reductionism, rationalism, and utilitarianism. The conceptualisation of nature as sacred and the emergence of humanistic ideology were also noted as contributing to the dichotomy. It was argued that this belief and value system has influenced societal attitudes, behaviours and norms in ways that seek or contribute to the

domination, control and mastery of the Other. This history was demonstrated as significantly contributing to the human-nature dichotomy.

Through the colonisation of modernity and its notions of progress, ecological degradation persists, and individuals and societies are increasingly distanced and alienated from non-human nature. Shifting baseline syndrome or the lowering of people's threshold awareness and understanding about environmental conditions was also shown to be problematic. Ecological degradation, disconnection from nature and shifting baseline syndrome result in a range of interrelated consequences such as the extinction of direct and meaningful experiences with non-human nature, and a growing blind spot whereby humans no longer can see themselves as part of nature and dependant on nature's contributions. The epistemic trail as presented above frames the extractive, exploitative and destructive practices of modernity as a consequence of a failing human-nature relationship.

Based on the assertion that when worldview shifts so do ethical actions (McKeon, 2012), we are morally obligated to implement interventions that hold potential for shifting paradigms in ways that may contribute to transformational change toward more sustainable trajectories. The next section explores nature connection as holding potential for achieving this.

2.5 Nature connection: A mechanism of transformational change

This literature review has so far focused on beliefs and values of the dominant social paradigm that shape the social systems that presently drive unsustainability. Transformational change requires the emergence of alternative dominant social paradigm/s underpinned by nothing less than a radically new conceptualisation of life on Earth (Capra & Luisi, 2014; Fox et al., 2022). Receptiveness to the interconnectivity, complexity and ambiguity of the world is crucial (Capra & Luisi, 2014), as is a commitment to relationships, eco-ethics and inclusivity (West et al., 2018). Learning to live sustainably is aided by eco-centric beliefs that perceive humans as part of nature, and visions of the future where all of life itself is centred, not just that of humans (Barragan-Jason et al., 2022).

Up until most recently, the Anthropocene narrative has dominated Earth system research and sustainability problem solving, with the social sciences and humanities marginalised (Leach et al., 2018; Malm & Hornborg, 2014). As Lövbrand et al. (2015) highlight,

> In the quest for solutions to urgent collective action problems […] attention has hereby been diverted away from the social and cultural norms, practices and power relations that drive environmental problems in the first place. As a consequence, the global change research community has been charged with producing a post-political

> Anthropocene narrative dominated by the natural sciences and focused on *environmental* rather than *social* change. (p. 212, original emphasis)

Fortunately, the literature indicates a shift in this trend, which has seen a greater integration of the humanities as part of high-level scientific discourse (SEI & CEEW, 2022; UNEP, 2021) and reports (IPCC, 2022; UNESCO et al., 2016), and media developed for a more general audience (Figueres & Adarve, 2024; Gameau, 2022). Through this shift in the discourse and research about sustainability solutions, a commitment to improving human-nature relationships is increasingly becoming part of the scientific agenda (Richardson, 2023) [9].

The next sections take a deep dive into nature connection as an important indicator and metric for measuring human-nature relations. Section 2.5.1 considers the theoretical foundation of nature connection; Section 2.5.2 outlines some key benefits pertaining to pro-environmental behaviour (PEB) and environmental stewardship, health and wellness, and learning outcomes; and Section 2.5.3 explores some strategies and research-based evidence with regards to how nature connection develops.

2.5.1 Theoretical foundation of nature connection

Interventions focused on improving human-nature relations aim to transform the societal belief system that justifies humanity's exploitation of non-human nature (Richardson, 2023; SEI & CEEW, 2022; Taylor & Taylor, 2023). The theoretical foundation of improving human-nature relations draws on the long-held scholarly assumption that responsible action and behaviour toward the environment is closely related to people's feelings of connection with non-human nature (Pyle, 2003). The assumption finds its fundament in the biophilia hypothesis as previously mentioned in Section 2.3.2, which posits that humans have an innate affection for all living things (Kellert & Wilson, 1993; Wilson, 1984). Nature connection as a construct has since broadened to being not only about the positive feelings one holds for nature, but also a view of the world that perceives humans as an integral part of the Earth system. This understanding has been integrated into nature

[9] At the time of reviewing this chapter toward the completion of this thesis, the government of Aotearoa New Zealand announced significant changes to the Marsden Fund, a primary source of 'blue skies' research funding. These changes involve disbanding humanities and social sciences panels, effectively eliminating funding for these disciplines through the Marsden Fund (Gordon and Ardue, 2024). So although the literature reported increased receptiveness by some for the critical need of the humanities and social science research, this government decision essentially curtailed such opportunities previously enabled by the Marsden Fund. As I note in my epilogue, this example reflects an increasing trend, both nationally and internationally, toward right-wing ideology.

connection literature across a range of disciplines (for example, see Hamilton, 2002 – economics; Naess, 1973 – philosophy; Ruck & Mannion, 2021 – education)

As part of the theoretical foundation to nature connection, environmental psychology extended self identity to incorporate nature (Clayton & Myers, 2009; Mayer & Frantz, 2004; Schultz & Tabanico, 2007), while also looking to interpersonal relationships and the factors that influence relationships as important to motivating PEB (Richardson et al., 2020). One such factor is relational closeness, or in other words, the extent to which a person includes another as part of self (Aron et al., 1991). As the closeness of the relationship increases between relationship partners so does empathy and willingness to help the other (Cialdini et al., 1997). Relational closeness may extend to human-nature relationships too - as a person develops a close connection with non-human nature, empathy for non-human nature may develop, which motivates caring and even altruistic behaviour (Barragan-Jason et al., 2022; Martin et al., 2020; Schultz, 2000; Whitburn et al., 2020a). Through this theoretical framing, the human-nature relationship is justified as a type of interpersonal relationship that adds value to a way of thinking about and addressing humanity's growing disconnection with non-human nature and unsustainable ways of living (Antal & Drews, 2015; Lengieza et al., 2023; Mackay & Schmitt, 2019). Section 2.5.2 explores the benefits of nature connection in more detail.

2.5.2 Benefits of nature connection

The measurable construct of nature connectedness originated out of an extension of the principle of relational closeness as part of human-nature relationships (Schultz et al., 2004). As nature connectedness science has evolved, so too has the accumulation of evidence demonstrating that human-nature relationships share many parallel associations with interpersonal relationships. For instance, nature connectedness is self expansive(Schultz & Tabanico, 2007); can fill a person's basic need for belonging (Capaldi et al., 2014) and is positively associated with personal wellbeing (Capaldi et al., 2015; Piccininni et al., 2018; Pritchard et al., 2019) and PEB (Mackay & Schmitt, 2019; Martin et al., 2020; Pritchard & Richardson, 2022). A person's willingness to sacrifice for other people as an outcome of interpersonal relationships and relational closeness may be applied to human-nature relations, with PEB as the willingness to sacrifice for non-human nature (Davis et al., 2011; Lumber et al., 2017).

Positive correlations between nature connectedness and PEB have been found for both children (Miller et al., 2021; Whitburn et al., 2020a) and adults (Barrable & Booth, 2020). The body of empirical evidence builds on theory about significant life experiences that has documented the relationship between childhood experiences in nature and adult environmental attitudes and values (Chawla, 1998, 2007; Tanner, 1980). Of particular importance to the present study is the

understanding that the life stage of childhood is a critical period for the development of adult nature connectedness and environmental stewardship (Wells & Lekies, 2006). However, additional evidence of a relationship between nature connectedness and PEB is found in multiple studies that show age-related differences in PEB as mediated by lower nature connectedness (Krettenauer, 2017; Krettenauer et al., 2020; Richardson et al., 2019). This empirically demonstrated drop in nature connectedness in adolescence is discussed more in Section 2.5.3.3.

With the development of nature connectedness as a measurable construct has come a wealth of empirical research confirming that nature contributes to health and wellbeing in both children (Barrera-Hernández et al., 2020; Children and Nature Network, 2016; Miller et al., 2021; Whitburn, 2020b; Zhang et al., 2022) and adults (Martin et al., 2020; Richardson, 2023). Systematic analyses demonstrate that people with higher levels of nature connectedness tend to have higher levels of hedonic (i.e., happiness) and eudaimonic (i.e., worthwhile life) wellbeing (Barragan et al., 2022; Capaldi et al., 2014; 2015; Prichard et al., 2019). This is significant given that that mental health is a global issue of concern in both adolescents (Silva et al., 2020) and adults (Steel et al., 2014). In Aotearoa New Zealand, the Ministry of Health (2023) reported approximately 30% of the adult population have experienced moderate to high levels of psychological distress in the past year, with 20% of young people aged 15 -24 experiencing high psychological distress.

An array of nature-related factors (i.e., time in nature, indirect engagement with nature, nature connectedness, study of nature, etc.) are shown to influence health and wellness. Through examining these nature-related factors in concert with one another, a study by Richardson et al. (2021) was a first of its kind for demonstrating the prominence of nature connectedness and engagement with non-human nature to be more closely linked to higher wellbeing (both types) and lower illbeing (i.e., depression and anxiety) in comparison to other nature-related factors, including time in nature. In other words, the benefits depend on how we engage with and relate to non-human nature rather than how long we spend in nature, an important finding expanded upon in Section 2.5.3.1. In addition, after accounting for a wide range of socio-demographic variables, Martin et al. (2020) found that nature connectedness was four times more important that socio-economic status for influencing feelings associated with a meaningful and worthwhile life.

Lastly, in relation to the learning benefits of nature connection, Kuo et al.'s (2019) study provides a targeted and critical review of literature about nature-based learning. Based on peer-reviewed research published from 2015, the study focused on an overarching question: Do nature experiences promote learning and childhood development?. Kuo et al. are reflective of the recent maturation of the field of nature-based learning, explaining how their review of the studies revealed "an evidence

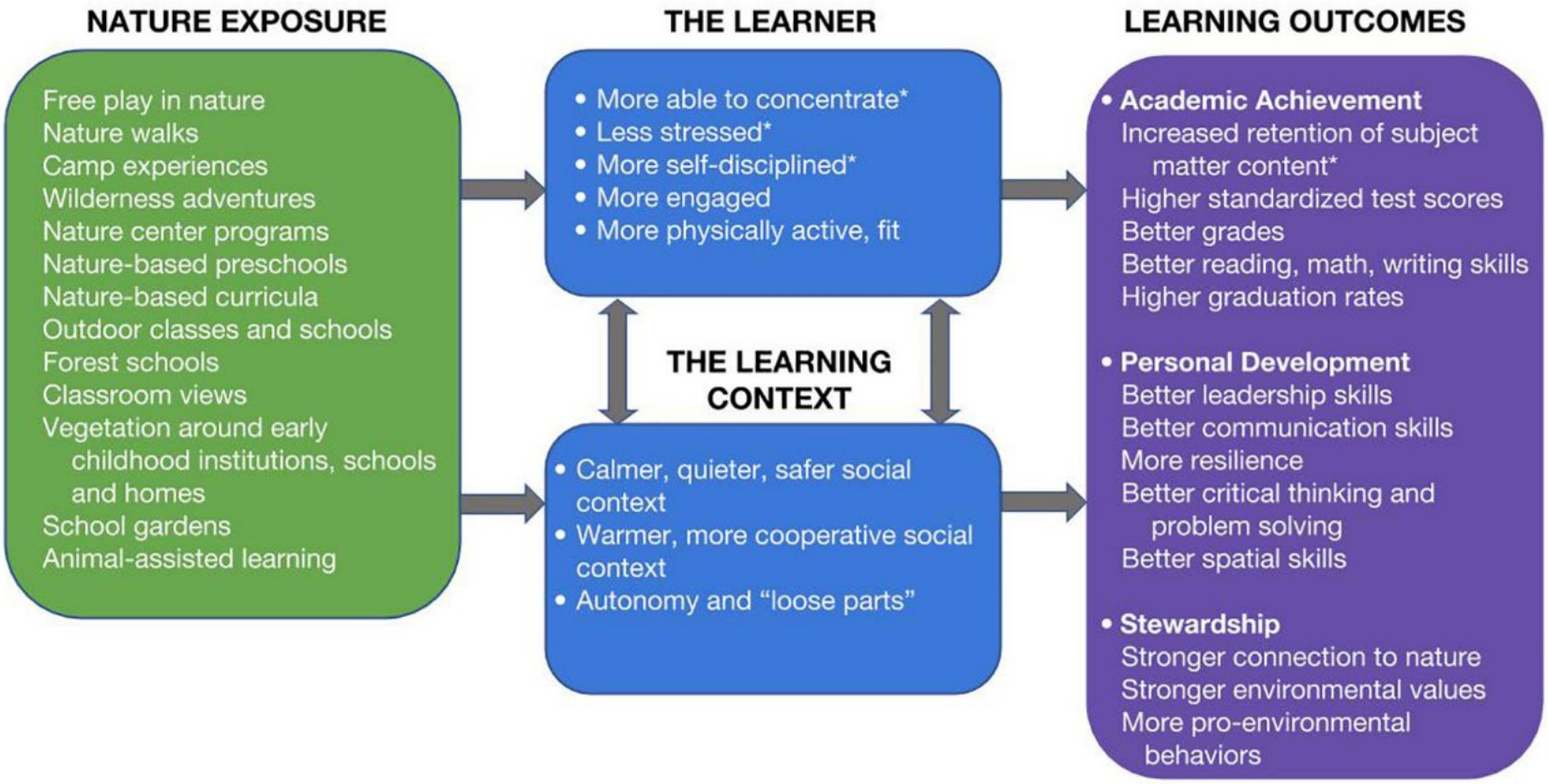
base stronger, deeper, and broader than [their] first impression might suggest: weak research designs are supplemented with strong ones, striking findings are replicated in multiple contexts; and the research on nature and learning now includes evidence of mechanism" (p. 6).

Kuo et al.'s (2019) study provides a snapshot of the research evidence on the benefits of learning outcomes, carefully distinguishing between cause-and-effect relationships and evidence of associations. As shown in the purple box in Figure 6, the evidence suggests that experiences of nature are positively associated with academic achievement, personal development and environmental stewardship. An unexpected finding arose in the course of their review that demonstrates nature-based learning as effective for students for whom traditional classroom-based instruction is ineffective. In the context of nature-based learning as an alternative educational approach, Kuo et al. pointed to robust evidence demonstrating nature-based learning working better for disadvantaged students, boosting interest in uninterested students, and reducing disruptive episodes and dropouts amongst students identified as at-risk.

Eight likely pathways or mechanisms through which experiences of nature might impact learning were also identified (shown in the blue boxes in Figure 6). The pathways were identified by examining the nature benefits literature and, for each benefit, determining whether it was understood to be a precursor for learning. For example, one of the benefits of nature experiences is improved self-discipline; self-discipline is, in turn, understood to be an important factor in learning, and therefore was identified by the study a nature-based learning pathway. Five of the eight plausible pathways between nature experiences and learning were identified as those which are centred in the learner; thus boosting learning via direct effects on learners (e.g., less stressed, improved concentration), while the other three pathways provided more supportive contexts for learning (e.g., nature-based settings that seem to foster warmer, more cooperative relations or those that seem to encourage creative, self-directed play via 'loose' parts).

Nature connection is a malleable intrapersonal trait, and given the right opportunities, it can be fostered. This is becoming of utmost importance as society becomes cognizant of the fact that non-human nature is not just a nice-to-have but an essential part of our lives. From here, some antecedents, factors and interventions for increasing levels of nature connectedness are explored next.

Figure 6 *Summary of scientific literature on the influence of nature on learning*



Note: The components of nature-based learning as shown here, exposures (green box), probable pathways to learning (blue box) and outcomes (purple box), were identified through a targeted and critical review of literature relevant to the over-arching questions "Do nature experiences promote learning and child development". Relationships for which there is cause-and-effect evidence are indicated with an asterisk. (Kou et al., 2019). Reprinted *with permission under Creative Commons*.

2.5.3 Understanding how nature connection develops

As explored in Sections 2.5.1 and 2.5.2, theoretical and empirical evidence posits nature connection as beneficial to both human and planetary wellbeing. With interest growing in human-nature relationships as a lever of transformational change toward more sustainable and just futures, measures of nature connectedness are useful for improving understanding around which conditions and interventions are of most benefit. A range of nature connectedness measures and scales have helped develop a collective understanding of the antecedents, factors and interventions that lead to, and inhibit, humanity's connection with non-human nature (Ives et al., 2017b). A complete account of all antecedents, factors and interventions for improving nature connection are beyond the scope of this review; those considered next are deemed to be most applicable to the topic of the study – nature connection as an educational outcome for the formal education system in Aotearoa New Zealand. Sections 2.5.3.1 – 2.5.3.4 explore the following themes in relation to improving nature connection: nature contact versus nature connection, quality engagement with non-human nature, socio-demographic factors, and indigenous worldviews and local knowledges.

2.5.3.1 Nature contact versus nature connection

Clearly, spending time in nature is good for humans, and this has led to a great deal of ongoing research that aims to increase human access to nature and contact with nature (Richardson, 2023). However, when the purpose of nature connection is to specifically improve human-nature relationships, contact with nature is not the same as nature connection as understood as engagement with nature.

As with all interpersonal relationships, it is not only the time spent interacting with a relationship partner that influences relational closeness, but the *quality* of the engagement between partners as part of relationship building and maintenance (Lengieza et al., 2023). The significance of quality engagement as part of fostering a close relationship with non-human nature was previously introduced in Section 2.5.3. A simple analogy is useful here for demonstrating the difference between contact and connection. For instance, if an individual steps into a room full of strangers, some engagement is necessary if a new relationship between this individual and the roomful of people is to develop. If the person was to just stand there for a long period of time without any interactions with the others, it would be very unlikely that a close relationship, if any relationship at all would be formed. On the other hand, regular positive interactions between this individual and the other people in the room is likely to see some degree of closeness develop. This example suggests that the outcomes of nature contact may significantly differ

from those acquired through quality engagement with nature (i.e., nature connection) as discussed in more detail next.

Research demonstrates that physical contact with nature on its own doesn't bring about environmentally friendly actions and behaviour that are critical to a sustainability, and instead, it is psychological connection with nature (i.e., nature connectedness) through which human and nature's wellbeing emerges from (Richardson, 2023). As part of a systematic review of 16 meta-analyses covering 832 independent studies, the impacts of physical connection and/or psychological connection with nature on human health and wellbeing, and on attitudes and actions that promote nature conservation, were investigated (Barragan-Jason et al., 2023). In the study, physical connection was defined as contacts, visits and exposure with nature. Types of contact varied, including indirect contact (e.g., viewing non-human nature through a window or screen), incidental contact (e.g., encountering a tree while walking in a streetscape), and intentional (e.g., participating in an outdoor recreational activity like tramping/hiking). Psychological connection represented one's emotional bond with nature and the extent to which people see themselves as part of nature. The results confirmed that (1) being physically connected with a nature benefits human wellbeing and improves psychological connection with nature and (2) being psychologically connected with nature benefits both human wellbeing and nature conservation. When Martin et al., (2020) measured human health outcomes through nature contact and nature connection as part of the same study, it was found that nature connection made the bigger contribution to human wellbeing than nature contact.

Barragan-Jason et al.'s (2023) systematic review identified some significant gaps in the research about impacts associated with nature contact and nature connection. There is a need for improving understanding the array of ways in which human-nature contact and connection develop, including the effects of negative interactions along with the more well-studied positive interactions. The ways that these interactions vary across more diverse geographical, cultural and socio-economic contexts, as well as over the life course, is also under-studied (Soga & Gaston, 2020). Furthermore, Barragan-Jason et al.'s (2023) systematic review reveals a significant bias in the nature contact/connection studies undertaken toward adult populations who live in northern and Western regions of the world (i.e., Global North), meaning that increased scholarly attention should be paid to children and adolescents, as well as populations in the Global South and non-Westernised cultures.

The research that has been undertaken about children's contact and connection with nature conclude that positive childhood experiences of nature provide multiple benefits relating to those benefits

outlined in Section 2.5.2: PEB and environmental stewardship, health and wellbeing, and learning and personal development. Additional studies, which are often retrospective, also conclude that positive childhood experiences in nature are a determinant of psychological connection in the childhood life stage (Whitburn et al., 2019; Windhorst & Williams, 2015) and adulthood (Chawla, 1998, 2007; Wells & Lekies, 2006). The significance of parent/guardian/mentor involvement in a child's experiences in nature, and the adult's nature connectedness, is also highlighted as primary to exerting influence on connectedness. For example, Passmore et al. (2021) investigated child nature connectedness (n = 209 children, n = 209 adults) as a function of the following predictor variables in combination: children's age and gender; adult (from the same household) nature connectedness, visits to nature, watching nature programmes, and demographics including neighbourhood space, urbanicity and deprivation. A key finding of the study was that the level of nature connectedness among a significant adult in households emerged as the strongest predictor of children's nature connectedness.

The body of research as identified previously on the 'significant life experiences' of adults who have demonstrated their dedication to environmental protection and/or education supports the finding that a pathway to nature connection in children is simply through regular opportunities to be in nature with role-modelling by a nature-loving adult. The strength of this research is that it involves a diverse international sample, and despite nationality or vocation, people across countries and cultures give similar answers (Chawla, 1998). In these studies, from half to more than 80% of respondents identify childhood experiences of nature as a significant experience, such as free play in the outdoors, camping, fishing and foraging. The involvement of role-modelling adults as part of these experiences is mentioned as often or second in importance to the actual experience/s. Chawla (2009) found that conveying environmental values indirectly, rather than through direct teaching, was most effective in fostering nature connection. For instance, drawing the child into appreciative attention to the elements of nature and caring for nature through their own example (e.g., being good stewards of their gardens). This body of literature implies that policies and programmes to connect children with nature should involve parents and other adults, such as teachers, who serve as critical mentors for children.

The key points made in this section are well summarised by Lengieza et al. (2023):

> While time and interaction are an important part of relationship formation, the ingredients of a sustained relationship that is close and committed go well beyond simply spending time around a potential relationship partner. This particular point—that relationships go beyond mere contact—continues to be emphasised because, in the

> context of human–nature relationships, mere contact with nature tends to dominate much of the discussion. (p.6)

To conclude, outcomes achieved through spending time in nature should not be conflated with those derived through nature connection. The evidence provided here strengthens the case for prioritising the human-nature relationship over simply nature exposure. This calls for operationalising interventions that strengthen nature connectedness, through pathways and experiences like those discussed next.

2.5.3.2 Quality engagement: Nature connection pathways and experiences

Since research-based evidence demonstrates greater benefits through nature connection rather than simply nature contact, this section provides some explanation and evidence around what constitutes quality engagement with non-human nature.

A couple of meta-analyses of studies that evaluated interventions and experimental studies focused on nature connectedness are worth mentioning. First, findings Sheffield et al.'s (2022) meta-analysis of 36 studies involving adult participants (N = 2855) showed that a variety of intervention types had significant medium positive effects on nature connectedness in the short term but the effect size on nature connectedness through different predictors, such as type of nature contact (e.g., indirect versus direct) and quality of engagement (e.g., passive versus active), could not be determined. This meta-analysis clarified some specific types of interventions important for future studies. Second, Barragan-Jason et al.'s (2022) study undertook a meta-analysis of 59 experimental studies involving both adults and children (N = 6761) that were based on six types of: (1) direct contact with real nature; (2) exposure to virtual nature (i.e., videos or pictures); (3) mindfulness: focus on one's self and one's environment in the present moment; (4) combination of direct contact with real nature and mindfulness; (5) EE via exposure to naturalist, scientific and ecological knowledge; and (6) combination of EE and direct contact with real nature (i.e., nature-based education). The key finding from this second meta-analysis was that all experimental designs, except EE via exposure to knowledge only, positively affected nature connectedness to varying degrees. Interestingly, mindfulness interventions, with or without direct contact with nature, had the most positive effect on nature connectedness. Both meta-analyses demonstrated that long-term positive effects on nature connectedness were only observed in interventions that offered regular (daily or weekly engagement) or long-duration experiments (two days or longer). Overall, these two studies demonstrate that intentionally designed interventions and

practices can create enduring shifts in how people relate to non-human nature and call for more in-depth studies about different types of interventions.

Lumber et al. (2017) provide an example of a systematic study undertaken to explore some potential types of engagement with non-human nature and measure their impact on nature connectedness. The study commenced through two online surveys (n = 321) of participants' engagement with, and value of, nature activities structured around nine values of the Biophilia Hypothesis (Kellert, 1993). These values describe how humanity has evolved to affiliate with non-human nature in different ways and include: utilitarian, naturalistic, scientific, aesthetic, symbolic, humanistic, moralistic, dominionistic, and negativistic. From the initial surveys, five predictors of nature connection were identified as emotion, contact via the senses, beauty, compassion and meaning, and were collectively referred to as nature connection pathways (Table 1).

Subsequently, an empirical investigation was undertaken to operationalise these nature connection pathways through an outdoor activity (i.e., a walking intervention) in an urban setting. Individuals' levels of nature connectedness were subsequently measured. Findings from the study indicated that nature connectedness was enhanced as a result of engaging through the nature connection pathways. Conversely, changes in nature connectedness levels were negligible or inverse when the activity was framed around values of knowledge acquisition (e.g., species identification), utilitarianism (e.g., hunting) and dominion (e.g., sport).

Research on the nature connection pathways aligns with theory around interpersonal relationships and spending quality time with non-human nature as outlined in Section 2.5.3.1. A qualitative study of 40 people across Aotearoa New Zealand identified aspects of the nature connection pathways as important factors that renewed participants' sense of nature connection during Covid 19 (Greenway, 2024). Participants highlighted how the enforced mandatory lockdowns allowed them to see, hear and feel non-human nature more intensely both at home and in their local areas as a result of slowing down.

Richardson and Butler (2022) highlight community-based programmes that have successfully applied the pathways framework as useful examples of enacting theory. The significant effect of engaging with nature via these pathways, especially in urban environments, has implications for organisations that seek outcomes associated with human and planetary wellbeing.

Table 1 *Summary of five pathways to nature connectedness*

Pathway	Meaning	Example
Contact	Tuning in to nature through the senses.	Listen to birdsong, smell flowers.
Beauty	Noticing nature's beauty.	Paint the amazing colours of a butterfly, visit a place with an amazing view.
Emotion	Feeling alive through the emotions nature brings.	Notice three good things in nature and experience the joy and calm they bring.
Meaning	Identifying the meaning nature brings to one's life.	Celebrate the longest day, create a story about a tree.
Compassion	Caring and taking action for nature.	Feed the birds, put up a nest box.

Note: (University of Derby, n.d.)

A significant body of research has focused on children's disconnection from nature (Cheng and Monroe, 2010; Hughes et al., 2015; Louv, 2006; Miller, 2005; Soga & Gatson, 2016; Wells & Lekies, 2006). Studies of children's engagement with non-human nature, beyond those of contact through experiences and education, and that influence nature connectedness are nascent. As mentioned previously, childhood experiences of nature, in conjunction with the involvement of an influential adult role model who takes a positive interest in both nature and the child, have been demonstrated as key "entry-level variables" (Hungerfold and Volk, 1990, p.10) that predispose people to take an interest in non-human nature, and later, work for non-human nature's protection. Additionally, there is difficultly finding robust studies that measure interventions to increase nature connectedness in children and adolescents. For instance, the review of literature by Barrable and Booth (2020) about interventions to promote nature connectedness in children and young people under the age of 18 identified over 1300 possible studies, with only 14 having had met the criteria (i.e., using a validated instrument to measure connection and incorporating both pre and post testing.). This small sample of studies of interventions were mainly

affiliated with EE type activities, characterised by different durations and environments, from field trips lasting a few hours to week-long residential programmes.

One of the 14 studies reported a negative effect on nature connectedness through the programme's high information content (Kossak & Bogner, 2011), while immersive experiences in nature and free outdoor play were seen as positive features in relation to nature connection (Mullenbach et al, 2018). Bruni et al. (2017) found that positive shifts in nature connectedness were only through activities that engaged children creatively with nature, such as photography and nature art. Similar to other systematic reviews about the effectiveness of nature connection interventions (e.g., Barragan-Jason et al. 2022; Chawla and Cushing, 2007; Rickinson, 2004; Sheffield et al., 2022), regular engagement and longer duration interventions were found to have had greater impact on nature connectedness. Analysis in relation to the array of environments where the interventions were held were inconclusive.

The relationship between education and nature connection interventions are discussed in greater detail from Section 2.6. The next section moves to discussing some socio-demographic antecedents and factors of nature connection.

2.5.3.3 Socio-demographic factors

The relationship between socio-demographic factors and nature connectedness is complex and influenced by multiple interacting variables such as gender, geographic location and age (Prichard & Richardson, 2022). Adding to the complexity is the fact that cultural differences result in individuals and societies viewing and relating to non-human nature differently (Chawla, 2021; Krettenauer et al., 2019). The research on socio-demographic factors and predictors that influence nature connectedness gives varying insights for both adults and children.

A few socio-demographic factors consistently show clear patterns in their association with nature connectedness. In general, there is higher nature connectedness amongst females (Price et al., 2021) and also in relation to perceived levels of biodiversity (Buxton et al., 2021; Franco et al., 2017). As was signalled in Section 2.5.1, there are also age-related differences (Passmore et al., 2020) as studies that have measured nature connectedness across populations illuminate a worrying trend of a sharp decline in the levels of nature connectedness in adolescence. Findings related to the majority of other factors, for example neighbourhood greenspace and deprivation, are less conclusive, inconsistent, or even counter intuitive (Passmore et al., 2021). This points to the need to look beyond simple assumptions. The discussion below predominantly focuses on age-related differences in children's and adolescent's

connection with nature. Understanding these differences is necessary for securing the benefits of nature connectedness, explained as including both individual and planetary wellness.

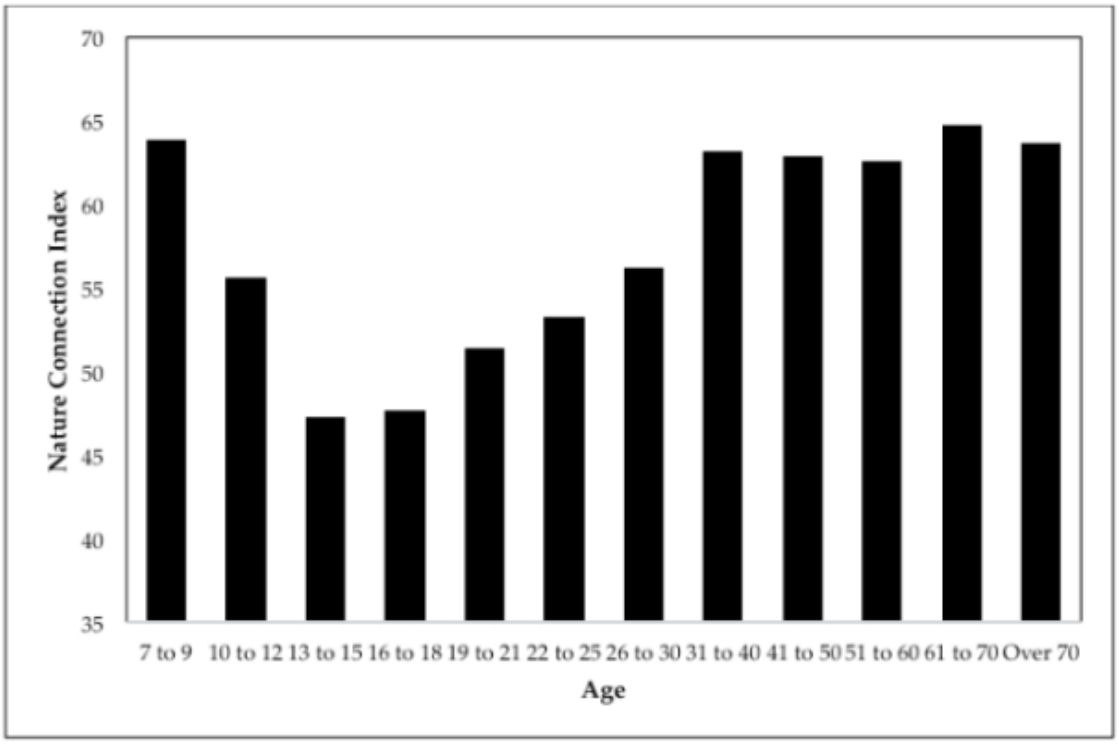
The Nature Connection Index (NCI) is highly useful for investigating socio-demographic factors because it can be used for both children and adults, which enables longitudinal research that profiles nature connectedness across the lifespan (Richardson et al., 2019). Using the NCI in conjunction with a national survey opportunity routinely undertaken in the United Kingdom (Natural England, 2018), Richardson et al. (2019) measured levels of nature connectedness in 3,568 adults (aged 16-91) and 351 children (aged 7-18). Analysis revealed the mean nature connectedness level across the population to be 61, which falls below the suggested NCI score of 70 or above as needed to foster PEB that helps deliver a sustainable future. Moreover, as shown in Figure 7, the data illuminated a sharp drop in nature connectedness in adolescence (i.e., the teenage dip) with slow recovery to the adult population mean around 30 years of age. The notable decrease in levels of nature connectedness begins from about 10 years of age; a pattern that has also been identified in studies of children and adolescence in Canada (Piccininni et al., 2018), China (Krettenauer et al., 2019) and Aotearoa New Zealand (Eames et al., 2019). Interestingly, another study undertaken in the United Kingdom, using slightly narrower age groupings (i.e., two-year intervals instead of three-year intervals), showed nature connectedness levels decreasing from an earlier age of seven/eight (Price et al., 2018).

Richardson et. al. (2019) surmise that the teenage dip is indicative of profound developmental and situational factors associated with the adolescent life stage. Adolescents experience cognitive and affective shifts as they become more invested in peer relationships and their developing self-identity, often at the expense of time spent in nature (Prichard & Richardson, 2022): “During these complex years, nature, and one’s relationship with nature, may lose relevance and importance amid other meaningful relationships” (Richardson, 2023, p. 64). Kaplan and Kaplan (2002) referred to the adolescence stage as a “time out” phase in the human relationship with nature.

Developmental factors were similarly highlighted in findings of a study of ten 13 to-15-year old students from Aotearoa New Zealand who were identified by teachers as having enthusiastically and knowledgably embraced environmental principles and practices in their later primary years (Eames et al., 2019). Acknowledging the cognitive advances that come with the adolescent phase that enable one to consider abstract and complex relationships, Eames et al. summarised the finding of participants’ changing value set since entering secondary school in this way:

> The students often appeared to be struggling to rationalise an eco-centric view of the world with an ego-centric view, that is, there appeared to be a tension between how they see their relationship with the environment (Morris, 2002), and their relationship with self and peers with respect to their views of the environment and lifestyle choices (Kempton & Holland, 2003). The secondary school years indeed appeared for these students to be time when a rapidly expanding awareness of conflicting social priorities is being negotiated, and caring for the environment necessarily jostles with the task of establishing an identity of self (Blatt, 2014, Sauve, 2010) which is secure and sustainable. (p. 21)

Figure 7 *Mean nature connectedness scores across the lifespan*



Note: (Kou et al., 2019). Reprinted with permission under Creative Commons.

In addition to internal and social identity shifts, there are other situational factors that may influence decreasing nature connectedness among teenagers. These include the transition from primary to secondary school environment, the latter of which where focus often takes precedent on examinations and siloed academic subjects, and the physical sciences typically being taught separately from the social sciences. Furthermore, outside of school, children tend to change their use and requirement of green

spaces as they grow older, transitioning from developmental needs of play toward prioritising socialisation amongst peers. These needs can be poorly understood and tolerated by local community and land owners/managers (Richardson, 2023). Also important, with modernity has come new technology-driven pursuits that have replaced activities more akin to fostering nature connection (Louv, 2006).

Further research is necessary to clarify when and why nature connectedness begins to decline in childhood, as well as considering the influence of cultural context on this phenomenon (Braun et al., 2015). Tackling the teenage dip in nature connectedness could see a greater proportion of the adult population, at an earlier age, with higher nature connectedness levels from which PEB is more likely to occur (Price et. al., 2019). The teenage dip also has wellness implications for parents and schools. A large-scale study of approximately 30,000 Canadian children found that those who believed a sense of connection with nature was important had 25% fewer mental ill-health symptoms (Piccininni et al., 2018). Interventions that help sustain nature connectedness through the childhood and adolescence life stages hold potential for tapping into the health and wellness benefits of connection with nature for individuals during what can be a formative, yet vulnerable life stage, while at the same time contributing to planetary wellness.

2.5.3.4 Indigenous paradigms

The potential for indigenous paradigms to inform interventions to help foster nature connection is considered next. A focus on te ao Māori (the Māori world) recognises Aotearoa New Zealand as the setting of this study.

Indigenous Peoples have established long-standing relationships with their surrounding environments, accumulating place-based perspectives and local knowledges (Burgos-Ayachla et al., 2020). Through their histories, they have maintained an equilibrated social-ecological system while periodically overcoming a variety of crises and challenges (e.g., changes to the availability of nature's abundance, and/or climate and ecosystems) (Berkes et al., 2000). Their cultural survival over millennia attests to sustainable ways of living. Presently, most of the biodiversity on Earth is located in the territories of Indigenous Peoples where approximately half a billion people collectively look after about a quarter of the world's land (Garnett et al, 2018). Compared to non-indigenous practices, higher native and rare species richness (Arceses et al., 2014) and less deforestation (Garnett et al, 2018; Peres, 1994) is often associated with indigenous land management practices. As considered through the Māori whakataukī

(proverb), *Hoki whakamuri kia anga whakamua*, meaning walk backwards into the future, 'new' solutions to contemporary issues may be found with the help of indigenous paradigms (O'Sullivan, 2018).

Indigenous cultures comprise a rich diversity of traditions, languages, customs, among other elements, yet they share commonalities in their social paradigms "whereby ontology (being), epistemology (knowing), methodology (doing), and axiology (accounting; ethics) are both *interrelated* and operate or exist through *relationship*s" (Latulippe & Klenk, 2019, p. 8, original emphasis). Based on the premise that worldview lies at the heart of culture and guides human interactions with all things (Marsden 2003), some of the shared commonalities underpinning indigenous worldviews are explored in this section as contributors to nature connection, and hence sustainability.

Systems thinking, the underpinning approach to Earth system science (as detailed in Section 2.2) is mirrored in the ways indigenous paradigms acknowledge the elements, processes and energies of the universe as a whole (Cajete, 1999). Indigenous worldviews perceive the nature of all things as interconnected, interdependent, and interrelated (Williams, 2021). Humans are neither above nor below the rest of life, but are one part of a wider ecological and spiritual network. In this way the world is viewed through a kinship system of relationships that have a past, present and future. Relationships are encoded in the structure of indigenous cultures – embedded within their languages, spiritual beliefs, traditional forms of governance (Simpson, 2020). In *Braiding Sweetgrass*, Kimmerer (2020) speaks to the metaphor of three strands of sweetgrass representing relationship, responsibility and reciprocity; when interwoven, these strands provide a model for harmonious human-nature relationships that endure.

The Earth system and its workings have always been the source of the most important lessons to Indigenous Peoples, fundamental to the meanings they interpret from the world and their ways of living (Cajete, 1999; Henderson, 2020). Indigenous ways of knowing come from the empirical relationships that Indigenous Peoples have with the Earth, the local ecosystems and the places in which they dwell (Cajete, 1999; Kimmerer, 2013; Marsden, 2003; Royal, 2010; Salmón, 2000; Tapsell, 2021; Young, 2021). Often indigenous traditions are grounded in animism, the belief that all living and non-living entities possess their own life spirit (Cajete, 1999).

Holistic and relational perspectives underpin te ao Māori (Williams, 2021) and are applied to life situations and the value system through Māori mātauranga (cultural knowledge), kaupapa (fundamental principles) and tikanga (customs) (Marsden, 2003). The cultural construct of whakapapa (genealogy) is a

foundational concept of Māori identity that traces ancestral lineage, extending beyond human genealogy to include all forms of life, including water, mountains, and forests. For Māori, whakapapa does not simply map biological relationships, but serves as a reminder of the holistic connections between people and their tūpuna (ancestors), iwi (tribes) and te taiao (natural world) (Burgess & Moko-Painting, 2020).

Whakapapa not only explains the creation of the universe, but informs kaitiakitanga, the Māori principle of environmental stewardship (Warbrick, 2023) through which Māori take the role of kaitiaki (environmental guardians) to protect and sustain socio-ecological systems. Cultural values such as whanaungatanga (connectedness and relationships) and manaakitanga (love and compassion) are applied to cultural practices and ways of living that prioritise long term, intergenerational sustainable solutions over easier, and often, more profitable short-term options (Mckay, 2014; Pou, 2021). The granting of legal personhood to the Whanganui River (New Zealand Parliament, 2017th para.) was an expression of kaitiakitanga, whereby the iwi, appointed as the river's kaitiaki, care for this entity in accordance with Māori values. This case heightened understanding of indigenous worldviews and local knowledge as beneficial to all and helped illuminate how environmental and social injustice/justice are entwined with ecological degradation/restoration. Assigning legal rights to non-human nature is an avenue not only for environmental protection, but may increase recognition of the plurality of views that underpin human-nature relations and lead to changed behaviour over time (SEI & CEEW, 2020).

Relational and holistic perspectives, like those of indigenous paradigms as discussed above, have been demonstrated to enhance environmental empathy and encourage PEB (Schultz, 2000). By realising the interconnectedness, interrelatedness and interdependence of the ecological community, humanity becomes bound in reciprocal relationship with and responsibilities for non-human nature (Kimmerer, 2013). The embodied and place-based systems that apply to indigenous cultures hold power to shift contemporary mindsets in ways that acknowledge the wholeness and comprehensiveness of reality (Cajete, 1999); essentially, the perceived human-nature dichotomy is blurred.

In conclusion, one caveat is offered. Indigenous perspectives and knowledges are inextricably linked to indigenous self-determination and rights (Latulippe & Klenk, 2020; SEI & CEEW, 2020). As examined in Section 2.4, Indigenous Peoples have endured a long history of exploitation and appropriation of their land and culture and are highly cautious of a new wave of intellectual colonisation through Westernisation. Indigenous ways of knowing must not simply be integrated into modern cultural frameworks, as Kerridge (2024) explains:

> Integration requires us to work with what is common between those two worlds [paradigms]. And then leave all the rest behind – the bits we disagree on, the bits we don't understand about each other's cultures. But it's in those bits where the gold is.

Kerridge's point highlights that learning to live more sustainably means drawing on diverse perspectives and knowledges in contextually appropriate ways. Viewing indigenous paradigms as merely supplemental to the dominant social paradigm for achieving environmental goals risks perpetuating colonial exploitation in new forms. The protection of Indigenous Peoples and their cultures is a growing concern in the context of implementing social change interventions, such as discussed here. For the sake of both human and non-human futures, it will be essential to shift the dominant social paradigm through the contribution of indigenous ways of knowing, being and doing, based on the terms and conditions as set by Indigenous Peoples (Latulippe & Klenk,2020; Thornton, 2020).

2.5.4 Section summary

Reversing the trends of ecological degradation, disconnection from nature and shifting baseline syndrome requires a shift of paradigms. Improving human-nature relationships is increasingly recognised as necessary part of the necessary paradigm shift in order to address perceptions, beliefs and values that contribute to unsustainability, namely a perceived human-nature dichotomy, anthropocentricism and the instrumental valuation of non-human nature. Connection with nature as a treatment to unsustainability is shaped by multiple opportunity-and orientation-related factors, and therefore there is no one simple, straightforward pathway to achieve this objective.

The theoretical foundation from which the transformational potential of human-nature relations emerges is based on the biophilia hypothesis, environmental inclusion in self-identity, and interpersonal relationships. Nature connectedness as a construct originated out of psychology literature pertaining to the interrelationship between an individual and non-human nature. Nature connectedness is identified as a potentially powerful lever and metric for deep change toward a more sustainable future.

This section explored some key themes in relation to antecedents, factors and interventions that are affiliated with nature connectedness in relation to the objective of improving human-nature relations. The critical ones which will be re-visited in Chapter Eight Discussion are as follows:

- Nature contact and nature connection are different phenomena and their respective outcomes should not be conflated. Nature contact is associated with human wellness and nature

connection, while nature connection is associated with human wellness and environmentally friendly actions and behaviours;

- When considered in the same study, nature connection is found to make a bigger contribution to human and planetary wellness than nature contact;
- Developing nature connection entails quality engagement with non-human nature;
- Quality engagement is empirically demonstrated through nature connection pathways that include: nature contact via the senses, beauty, meaning, emotions and compassion;
- Compared to one-off experiences, interventions that are long-term duration and/or offer regular engagement with non-human nature are demonstrated to lead to more sustained improvements in nature connectedness;
- Positive childhood experiences in nature provide multiple benefits related to health and wellness, learning and nature connectedness, as well as influencing nature connectedness in later adult stages of life;
- Involvement of parents/guardians/mentors in children's nature experiences, and the adults' nature connectedness, are some of the strongest predictors of children's nature connectedness;
- There is a lack of research into non-educational interventions, especially ones that do not focus on knowledge-based learning, for engaging children with non-human nature;
- A teenage dip in nature connectedness is identified by a number of studies across different countries, after which levels of nature connectedness do not meet preteen levels until around 30 years of age;
- Although developmental and situational factors help to explain the sharp drop in levels of nature connectedness commonly found in late childhood/adolescent life stages, targeted interventions are needed in this respect given the significance of nature connectedness to human and planetary wellness;
- 'New' solutions to sustainability issues, including the potential to positively influence nature connectedness, may be found with the help of indigenous worldviews and local knowledges that are holistic, relational, and place-based;
- Shifting paradigms with the help of indigenous worldviews and knowledges must be undertaken in ways as set by Indigenous Peoples in order to avoid a new wave of colonial exploitation and appropriation.

Nature connection is a worthy consideration for progressing toward a cultural reset in terms of the ways individuals and societies view non-human nature, interact with non-human nature, and ultimately, 'use' non-human nature (SEI & CEEW, 2022). The antecedents, interventions and factors of nature connection can be scaled up by their adoption in every sector, including education, as a lever of transformation. The next section explores the potentialities of educating for nature connection as a means to improving human-nature relations.

2.6 Education and nature connection

The previous section (Section 2.5) explored the theoretical and empirical evidence of the transformational potential for improving human-nature relations via nature connection. This section now considers the role and potentialities of the education sector to scale-up nature connection as a mechanism of paradigm shift. The discussion begins by considering the role of education in transformational change, highlighting EE and its objective of PEB as essential in this respect. The case is then made for a greater focus on nature-based education as part of EE, because of the way in which this approach has been shown to be capable of developing both an intellectual understanding of, and emotional connection with, non-human nature.

2.6.1 The shifting purpose of education

Our sustainability crisis is the consequence of the detrimental ways the human species has come to exist on Earth. While science and technology have shaped the modern world, our existence today is further being influenced via ecological degradation and its symptoms, manifested as socio-ecological issues (Irwin, 2020). As Section 2.2 demonstrated, it is evident that the dominant social paradigm and normative lifestyles of contemporary culture are no longer fit for the purpose of long-term survival of all living things.

Over the last 250 odd years, educational systems have played a significant role to colonise and entrench the dominant social paradigm around the world (Jones, 2008), and develop mind-and skillsets for expanding modernity (Irwin, 2020). Orr (1992) suggests this has led to a dominant form of education today that:

> Alienates us from life in the name of human domination, fragments instead of unifies, overemphasises successes and careers, separates feeling from intellect and the practical from the theoretical, and unleashes on the world minds ignorant of their ignorance. (p. 220)

Education in this sense has been framed as a mechanism of cultural reproduction (Webb et al., 2020) and contributing to disconnection as a root cause of our ecological crisis (Orr, 1992). Over the next few generations, humankind will face problems of a nature and magnitude never before faced in the entire history of our species (Cajete, 1999). The ongoing cultural reproduction of ‘progress’ based on the dominant social paradigm is untenable (Everth & Bright, 2023); this is reality, not a matter of ideology.

Considering the context through a more positive lens, our crisis represents a fundamental educational opportunity – a time to turn away from the production of the status quo and make possible new worlds to be born from within those worlds that are dying (Stein, 2019). As Everth (2023) says:

> We are entering a remarkable time when students, teachers and all of society need to learn and discover new ways of understanding the world, what it means to be human, and how to share this planet collectively and sustainably with the rest of the biosphere. (p. 80)

Surely with the life-support system of the planet in jeopardy an educational priority should be to learn how to live more in sync with our planet? It is in this spirit that Irwin (2020) calls for putting education into the "driving seat of cultural transformation" (p. 494). This study positions education, formal and non-formal types, as an indispensable mechanism to improving human-nature relations and paradigm shift in ways that support a more sustainable future trajectory.

Learning opportunities can prioritise ecocentrism and social justice as the foundation to developing knowledge, attitudes, values and behaviour; fostering critical thinking and problem-solving skills; and motivating and empowering students to take action. Furthermore, education systems can provide opportunities, spaces and resources to explore, imagine and experience different and new ways of being, thinking and doing (Thornton, 2020). Cajete (1997) proposes learning objectives affiliated with relationship, responsibility and resonance with non-human nature in addition to the traditional educational 'Rs' of reading, writing and arithmetic.

Since the 1970s, international policy and publications have highlighted the potential of education to help alter the destructive impacts of humankind (UNESCO, 1975, 1977, 1992, 2005). Historically, Aotearoa New Zealand has officially recognised the need to promote education as a response to ecological degradation (Law, 2004) and in response, have supported environmental education policy, initiatives and publications to varying degrees over the years (Bolstad, 2004, 2020a; Bolstad et al., 2015). Most recently, Aotearoa New Zealand signed the *Declaration of the Common Agenda for Education and Climate Change,* a global initiative for 'greening' schools, curricula, and teacher education training around the world, which was unveiled at the 28th annual conference on climate change (UNESCO, 2023). Although this demonstrates some recognition and efforts toward utilising education for reversing the trend of ecological degradation, evaluations of praxis and outcomes in the Aotearoa New Zealand highlight limited successes achieved to date as

a result of inconsistent and inadequate governmental support and resourcing (Bolstad, 2020a; Chapman, 2011). This issue is discussed further in Section 2.8.

2.6.2 Environmental education: An overview

Environmental education (EE) has always been underpinned by an ultimate purpose of securing long-term survival on the planet by halting ecological degradation. For instance, the *Belgrade Charter,* the first ever EE global framework stated:

> To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions to current problems, and the prevention of new ones. (UNESCO, 1975, p. 3)

As EE evolved over a number the decades, this fundamental purpose has predominantly remained intact but is often communicated in a more positive way. For instance, Saylan and Blumstein (2011) promote the purpose of EE as a "means to teach people how to live and flourish in a sustainable way" (p. 9), while Roczen et al.'s(2014) state "the goal of environmental education is ultimately to enable a person to strive for and to attain a more ecological way of life" (p. 972). Such messaging is evident too in Aotearoa New Zealand, expressed in the vision of the national strategy document *Mātauranga Whakauka Taiao: Environmental Education for Sustainability Strategy and Action Plan* (Department of Conservation, 2017): "All New Zealanders value a connection to our environment by actively working together for a sustainable future" (p. 7).

The *Tbilisi Declaration* is a landmark EE document that laid the foundation for global EE policies and practices, establishing key principles and goals that continue to guide EE efforts worldwide (UNESCO, 1977). Since its inception, EE has been promoted as an interdisciplinary part of the education process as a whole, a lifelong process that does not remain confined to the formal education system, and as a holistic educational approach that engages the head, heart and hands in ways that account for pluralistic values and perspectives. The *Tbilisi Declaration* also made clear that a key goal of EE is "to search for a new ethic based on respect for nature' (UNESCO, 1978, p. 28); this goal clearly aligns with calls to improve human-nature relations.

The objectives of EE - environmental awareness, knowledge, attitudes, values, skills and participation – are key ingredients for achieving the purpose of the discipline for resolving environmental problems (Rickinson, 2001; Stern et al., 2014; UNESCO, 1977). *Mātauranga Whakauka Taiao* frames these

objectives through an Aotearoa New Zealand perspective based on a Māori holistic health model - *Te Whare Tapawhā* (Durie, 1985). Figure 8 sets out the EE objectives for the Aotearoa New Zealand context based on *Te Whare Tapawhā*'s four dimensions of health, which, as illustrated, are believed to ultimately lead to behaviours and actions that benefit the environment.

Figure 8 *Objectives of environmental education for the Aotearoa New Zealand context*

Note: As set by the national strategy – Mātauranga Whakauka Taiao. Each objective is inspired by one of the four dimensions of health as based on a holistic Māori health model – Te Whare Tapa Whā. (Department of Conservation; 2017). Reprinted with permission under Creative Commons.

The theme of holism underpins the EE objectives and flows through to the EE pedagogical tenet of education 'about, in and for' the environment (Tilbury, 1995), from which a range of educational approaches have been developed. For instance, *Mātauranga Whakauka Taiao* identifies five principles for guiding learning opportunities that help achieve the strategy's vision of fostering environmental connection and PEB. These include: growing knowledge, skills and understanding; sharing values; taking collective action, thinking for the future; and adopting a uniquely New Zealand perspective. Chawla and Cushing(2007) characterise effective EE programmes as those that integrate the following pedagogical principles: (1) occurring over an extended duration; (2) learning about immediate and local environmental issues; (3) practicing and mastering action skills; (4) taking ownship of environmental problems; and (5) working together with role models, mentors and expert organisations. Hands-on

participation in environmental community initiatives, often supported by environmental education organisatons (EEOs), are promoted as an important component of effective EE. In a national survey about climate change and sustainability of primary and intermediate school teachers across Aotearoa New Zealand, 58% of respondents (N = 620) reported having good access to EEOs for supporting environmental educational initiatives (Bolstad, 2020b).

A final key point to be made in this overview of EE examines the framing of the concepts 'sustainability' and 'sustainable development'. In the 1980s, growing awareness about the connection between world poverty and ecological degradation (World Commission on Environment and Development, 1987) led to the inclusion in EE of interdependent goals associated with social equity and economic growth. From this point, EE evolved from being mostly concerned with environmental issues to encompassing social, economic and political dimensions (Tilbury, 1995). This is reflected in the additional terminology used to name the field such as 'education for sustainability' and 'education for sustainable development' (UNESCO, 2021), or as in the case of *Mātauranga Whakauka Taiao* (Department of Conservation, 2021), 'environmental education for sustainability'.

With this evolution came increasing scrutiny of EE, with particular critique of the term 'sustainable development' as diluting the ecological basis of EE and proliferating anthropocentric notions (Jickling & Sterling, 2017). Critical theory scholars also highlighted concern about focusing too heavily on individual behaviour change rather than increasing collective action toward the transformation of wider societal structures and norms. Over time, EE has continued to evolve, with educators, practitioners and researchers increasingly supporting more complex pedagogies that target both individual behaviour and collective action (Hickman, 2020; Kwauk, 2020). Nevertheless, the principles and goals of the *Tbilsi Declaration* remain the backbone of EE, maintaining a strong focus on developing environmentally literate citizens.

The next section provides some background on the development of PEB and its alignment to improving human-nature relations.

2.6.2.1 Pro-environmental behaviour

Traditionally, influencing PEB was thought to be a linear process - imparting environmental knowledge would increase awareness and influence attitudes, which in turn would increase PEB (Hungerford & Volk, 1990). However, this approach has been found too simplistic because providing knowledge does not necessarily translate into behaviour change. Empirical studies have consistently found no direct

relationship between environmental knowledge and PEB (Hungerford & Volk, 1990; Kollmuss & Agyeman, 2010; Steg & Vlek, 2009), or a weak relationship at best (Frick et al., 2004; Otto & Pensini, 2017).

Research has shown that the antecedents and factors that influence behaviour are much more complex than originally thought. Based on their review of a number of commonly used analytical frameworks for explaining the development of PEB, Kollmus and Agyeman (2002) arrive at the conclusion that "what shapes pro-environmental behaviour is such a complex one that it cannot be visualised through one single framework or diagram" (p. 239). Elaborating further, they state:

> We see environmental knowledge, values and attitudes, together with emotional involvement as making up a complex we call 'pro-environmental consciousness'. This complex in turn is embedded in broader personal values and shaped by personality traits and other internal as well as external factors. (p. 256)

In sum, PEB arises from a complex intermingling of cognitive and affective processes, in conjunction with social and cultural factors and behavioural costs (Braun et al., 2018; Kaiser et al., 2010; Kollmuss & Agyeman, 2010).

Influencing PEB through education is addressed differently by different educational scholars. Some suggest the promotion of specific behaviour types (for example, action competence (Jensen & Schnack, 1997); collective political action (Chawla & Cushing, 2007), while others retreat from behaviour and prescribed outcomes and instead advocate for the development of critical, independent thinkers (Jickling & Sterling, 2017). Roczen et al. (2014) contribute to the debate suggesting that EE should align with a fundamental purpose of education to advance competencies that enable people to successfully master real-life challenges. Central to this angle are two key features: (a) there is a real-life challenge or goal to attain and (b) there are interrelated aptitudes that are necessary to ensure successful action.

In accordance, Roczen et al., (2014) corroborated Kaiser et al.'s (2013) pro-environmental competence model that proposed pro-ecological behaviour (e.g., the real-life goal) may develop through the acquisition of environmental knowledge (e.g., intellectual aptitude) in conjunction with intrinsic motivation by way of feeling connected with nature (e.g., emotional aptitude). Rockzen et al.'s finding is of relevance to the present study because it frames the potential for EE to influence the development of pro-ecologically competent people via increasing both environmental knowledge and nature connection. Pro-environmental competence better reflects the complexity of PEB based on the fact that

personal and life circumstances differ from person to person and situation to situation. Rather than influencing one specified type of behaviour, the ultimate outcome is the development of pro-environmental competence, in other words a constellation of behaviours that are good for the environment (Ardoin & Heimlich, 2021). Going forward, PEB as used herein refers to the goal of developing pro-environmental competence.

Studies demonstrate that participation in education programmes can have positive effects on environmental knowledge (Kahn, 1999; Rickinson, 2001; Whitburn, 2020b); however as mentioned previously, environmental knowledge does not seem to directly influence PEB. Environmental knowledge has the potential to *support* positive attitudes and behaviour (Ardoin & Heimlich, 2021; Liefländer et al., 2015), particularly as an intellectual prerequisite to enacting PEB (Frick et al., 2004; Otto et al., 2014). Although we can change the world by changing our minds; people still need to understand what it is that needs changing. For this reason, developing critical knowledge should always be a fundamental objective of EE.

While environmental knowledge is the intellectual basis that may influence behaviour to some degree, nature connection has been corroborated to be a formidable motivational force that directly influences self-reported PEB (Kaiser et al., 2013, Otto & Pensini, 2017; Roczen et al., 2013, Whitburn, 2020a). As explored in Section 2.5., the theoretical and empirical evidence demonstrates that a positive relationship with non-human nature translates into individuals wanting to protect the environment. The development of intrinsic motivation toward PEB is seen as crucial for democratic societies where extrinsic motivations (e.g., incentives and punishments) are often met with opposition and have only temporary effects (De Young, 2000*)*. Fostering intrinsic motivation is also affiliated with calls for deep learning whereby students are motivated to learn for the sake of understanding rather than to simply pass a test (Sterling, 2001).

Furthermore, according to transformational theory, new meanings and modified frames of reference have the potential to shift behaviour patterns toward innovative ways of thinking and living (Kokkos, 2019; Sterling, 2001). Some scholars promote nature connection because it enables people to 'see and be' in the world differently than as espoused through the dominant social paradigm (Osborn et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2022). As explained in Cutter-Mackenzie-Knowles (2019), a greater emphasis on relational perspectives as influenced by nature connection may help to "disassemble human-centric education and raise a new pedagogy of dwelling with the more than human world – with other species, and rocks, oceans, ecosystems and atmosphere which we call Earth – our

only home" (p. vii). Educating for nature connection enables students' opportunities to reflect on their 'place' in the world - in relation to themselves, and to others, both humans and non-humans (Sauve, 2010).

While teaching and learning through knowledge inquiry is a standard component of EE, nature connection in its profound sense (i.e., the relational closeness and sense of oneness with non-human nature as measured through nature connectedness) has traditionally not been prioritised as a fundamental EE outcome (Otto and Pensini, 2017; SEI & CEEW, 2022). Moreover, even when nature connection is a focus, there is often little understanding about effective praxis for facilitating this outcome (Barragan-Jason et al., 2022; Bueddefeld et al., 2022; Ernst & Theimer, 2011; Liefländer et al., 2015). Some research findings previously discussed in Section 2.5.3 provides a foundational understanding of the ways nature connection develops and helps explain EE's lack of efficacy with respect to fostering nature connection through conventional understandings of 'education in, about and for the environment'.

Barragan-Jason et al. (2022) suggest that EE's overall lack of efficacy to improve nature connection is likely "due to the traditional anthropocentric 'rational' transmission of scientific knowledge, which has delegitimised and suppressed its content" (p.5). Essentially, their reasoning aligns with the argument made in Section 2.4 that Westernisation has resulted in the objectification, rationalisation and commodification of non-human nature, which has diminished humanity's' affective connection with the Earth as a whole and all its non-human entities (e.g., species, elements and processes). Because the dominant social paradigm significantly influences what we educate for and how we go about the process, EE has traditionally been enacted as a disparate, scientific subject focused on knowledge-based approaches (Ardoin et al., 2020; Richardson, 2023). According to Verlie (2019) growing one's capacity to feel is not yet considered a way of knowing in the contemporary educational paradigm.

Going forwards, for EE to be a genuine mechanism for improving human-nature relations, its focus must shift from predominantly knowledge building to also fostering the affective domain. In this respect, this study highlights nature-based education (NBE) as a pedagogical starting point due to its simultaneous promotion of both environmental knowledge and nature connection.

2.6.2.2 Nature-based education

The effects of participation in a NBE programme were examined by Otto and Pensini's (2017). The authors claim this study to be the first of its kind for demonstrating a substantial positive effect on self-

reported PEB mediated via environmental knowledge and nature connection. The study used data collected from students aged 10 to 12 years of age from five selected schools in Germany (N = 255) and validated scales for measuring PEB, nature connection and environmental knowledge (e.g., Campbell paradigm (Kaiser et al., 2010), Disposition to Connection to Nature scale (Brügger et al., 2011), and a Rasch-based environmental measure (Frick et al., 2004), respectively). Participation in NBE was found to be positively associated with PEB, corroborating the pro-environmental competence model (Kaiser et al., 2013; Rockzen et al.,2014) as previously discussed. A key finding of the study demonstrated the effect of nature connection on PEB as considerably stronger than that of environmental knowledge: nature connection explained 69% of the variance in behaviour while environmental knowledge determined only 2%. Otto and Pensini (2017) highlight NBE as promising for increasing PEB through the approach's educational setting that can combine the promotion of nature connection and environmental knowledge.

As part of a large-scale review of NBE research, Jordan and Chawla (2019) defined NBE as "Learning through exposure to nature and nature-based activities, which occurs in natural settings or where elements of nature have been brought into built environments, such as plants, animals and water" (p.767). By its very definition, NBE provides students with experiences in and with non-human nature. However, as was established in Section 2.5.3.1, outcomes arising through nature contact versus nature connection differ. Therefore, intentional and targeted praxis is required to foster relational closeness with non-human nature through NBE. Besides some limited research on 'forest school' approaches (SEI and CEEW, 2022), there is a dearth of research focused on effective educational praxis for fostering nature connection via EE (Bueddefeld et al., 2022; Whitburn, 2020a).

Coming from the angle of what praxis doesn't work, Ruck and Manion (2021) discuss traditional EE approaches as potentially reinforcing the human-nature dichotomy, especially those that focus on stewardship pedagogies that emphasise a utilitarian perspective, position human mastery as the sole or main agents of change, and frame the environment as a passive object dependent on human care and protection. Post modern perspectives like that of Ruck and Manion call for embracing human-nature relations beyond that of stewardship models as typically characterised through EE epistemologies (Thornton, 2020).

Based on the understandings developed in this and the previous section in relation to the empirically-demonstrated benefits of educating for nature connection, the next section broadly outlines some

promising teaching and learning approaches that may inform NBE praxis for the educational context in Aotearoa New Zealand.

2.7 Promising approaches to inform nature-based education

Since nature contact is a prerequisite for nature connection, the embeddedness of a NBE setting in or close to nature is highly beneficial (Otto and Pensini, 2017). But once nature contact is readily accessible, the focus of NBE must look to teaching and learning orientations, pedagogies and approaches that best facilitate quality engagement with non-human nature. With little empirical research about NBE to draw on, it is difficult to ascertain which types of approaches are most effective. Additional difficulty arises when descriptions of NBE praxis are provided without contextualisation, as is often the case in studies that are more of a theoretical nature.

This section provides a foundation to inform NBE praxis with the specific purpose of fostering nature connection. The discussion herein is predominantly based on the antecedents, factors and interventions of nature connection as examined in Section 2.5.3, in conjunction with some commonly used EE approaches in the Aotearoa New Zealand context. The following educational approaches and principles are not an exhaustive exploration of ideas and suggestions for NBE praxis.

2.7.1 Whole-school approaches

Whole-school approaches are applicable to fostering nature connection as an educational outcome because they seek to transform all aspects of educational organisations.

Eames et al. (2013 p.15) describe these in terms of four aspects:

- People—including the organisational structures of the school and the processes for student involvement in decision making, leadership, and community collaboration;
- Programmes—including the formal and informal curriculum;
- Practices—the systems and operations that manage the use of resources in the school; and
- Place—the physical surroundings and spaces within which learning occurs.

Although educating for nature connection does not require remote settings relatively devoid of human interference (Fisher, 2024), regular nature contact is necessary. Biophilic design is the intentional design of indoor and outdoor spaces that integrate elements and patterns of non-human nature into the built environment (Children and Nature Network, 2024). Without needing a complete rebuild, there are numerous affordable retro fit strategies to introduce biophilic design into existing schools, such as clear glass windows that allow for sunlight and views, plants in classrooms and outdoor eating spaces with

fragrant flower and herbs and/or views of wildlife habitat (Leif & Loftness, 2024). Greening school grounds via increasing biodiversity is also of great relevance (Barragan-Jason et al., 2022; Children and Nature Network, 2022).

Other types of educational settings exist where non-human nature is readily integrated into learning experiences. For instance, in Aotearoa New Zealand, an organic network of EEOs is known for supporting schools and teachers with EE (Bolstad, 2015). Many EEOs such as zoos, urban gardens and forest schools operate from nature-based settings or involve students in local environmental projects. Interactions between schools and EEOs are most effective for fostering nature connection when they are based on an on-going relationship rather than one-shot visits (Louv, 2012)

Lastly, whole-school approaches recognise the influence of teacher knowledge, attitudes and skills, on teaching practice (McFarland et al., 2013). Additionally, as highlighted previously, a teachers' level of nature connection will also influence their students' nature connectedness. This study looked at how EEOs develop understandings of how teachers learn to value NBE, integrate affiliated praxis into their school day, and facilitate positive outcomes (Jordan and Chawla, 2019).

2.7.2 Age-appropriate learning experiences

As has been established, in order to foster and maintain nature connection, NBE praxis must go beyond nature contact and carry out targeted praxis. Meaningful learning experiences are paramount for enabling students to become conscious of how non-human nature relates to them and they relate to non-human nature (Carmargo, 2022). Ideally, this is a life-long process starting from the moment each person is born. Then, as a person grows and evolves, the learning experiences change with their development and needs.

Designing NBE praxis should take into account age-appropriateness because children's developmental states significantly influence their capacity to engage with non-human nature and learn from nature-based contexts. The efficacy of NBE depends on aligning teaching and learning methods with cognitive abilities, emotional maturity, physical skills and developmental needs. Age-appropriateness helps to ensure that students aren't alienated from non-human nature by learning experiences that are irrelevant, too easy or difficult (Sobel, 1996). This may include learning experiences that:

- ensure learners feel safe and positive about their interactions with non-human nature;
- are aligned with student cognitive, emotional and physical capability and capacity; and

- gradually increase levels of complexity, independence and responsibility in accordance to the age of the learner.

In *Beyond Ecophobia*, Sobel (1996) explains his research about children's perceptions of the world around them and their relationship with it. Over a ten-year period, he collected and analysed neighbourhood maps drawn by hundreds of children in the United States, Canada and the Caribbean, with follow up interviews and fieldtrips. His findings point to clear patterns of development between children's age, their perceptions of the world, and what they emphasised as important to them. Sobel identified three stages of childhood development and argues that each stage requires a different EE focus and style.

Firstly, in early childhood stage (ages four to seven), learning should focus on enhancing the developmental tendency toward empathy for non-human nature and encourage feelings for species great and small. This developmental stage is characterised by a lack of differentiation between the self and the other. Rather than force separateness, the sense of connectedness should be cultivated so that it eventually becomes the emotional foundation for motivating action-taking for the environment in later stages. Given the opportunity, most young children benefit from free play with non-human nature, and other activities through which animals can be a focal point, such as through songs, stories and celebrations. Secondly, exploring the nearby world should be a primary objective for the middle childhood years (ages eight to 11). Exploration at this age starts close to home and school, and then gradually expands out into neighbourhood, the community, the region and so on. Sobel identifies public green spaces, forests and playgrounds as important landscapes of middle childhood. Activities are based around the primary experience of adventure and exploration: making forts, hunting and gathering, treasure hunts, taking care of animals, etc. Thirdly, as self-identity becomes a focus at early adolescence (ages 12– 15+), at least as seen in Western cultures, increasing emphasis is placed on building connection with wider society. This stage aligns with taking-action projects through which relevant abstract concepts like interconnectedness are introduced. NBE play and project boundaries start as close as possible to 'where a child's feet are' (Penetito, 2008)) and then expand outwards with developmental progression.

A key message from Sobel about fostering nature connection in children is the need to go slow and not rush the three developmental stages:

> What's important is that children have an opportunity to bond with the natural world, to learn love it and feel comfortable in it, before being asked to heal its wounds.

> Knowledge without love will not stick. But if love comes first, knowledge is sure to follow." (Sobel, 1995, p 184).

2.7.3 Experiential learning

Experiential learning emphasises direct, hands-on experience (Papprill, 2016), providing students with opportunities to interact with species, elements and processes that comprise their local environment. Direct experiences with non-human nature have been demonstrated to foster greater emotional affinity and support for protecting biodiversity (Bueddefeld et al., 2022; Soga and Gaston, 2020). The nature connection pathways of beauty, senses, emotions, meaning and compassion (Lumber et al., 2017) can readily be integrated into this type of NBE.

Based on nature connection as a type of interpersonal relationship, Lengies et al. (2023) promotes novel and enjoyable interactions that give rise to a sense of intimacy and interdependence between students and non-human nature. Learning opportunities like these help build and maintain student's emotional bond with non-human nature from which feelings of love, empathy and reverence may develop. This can be particularly important for the conservation of species traditionally associated with negative connotations because of their lack of 'cuteness' factor, like bees and spiders (Bueddefeld et al., 2022).

Experiential learning enable students to come 'to know' non-human nature. In relation to EE outcomes, an explanation of the term 'to know' is necessary. A contemporary interpretation of 'to know', based on the dictionary definition, is to "become aware of through observation, inquiry and information" (Oxford Languages, n.d.). This definition aligns with a modern reductionist perspective that sees the purpose of learning as generating facts and knowledge acquisition about things - in order to know about things, the known and the 'knower' are separated with the thing of interest broken down into further separate parts (Richardson, 2023). As Section 2.4 argued, too much reductionism is a key culprit of perceptions and beliefs based on a human-nature dichotomy. In contrast, another way of knowing speaks to seeing, sensing, hearing, noticing, experiencing, appreciating, and feeling (Louv, 2004; Richardson, 2023). This type of holistic knowing emerges through one's interactions and relationship with the places they inhabit (Fox et al. 2022), from which they may "sense the invisible, the interactions, energy flows and essential life qualities (vitality)" (Carmargo, 2022, "Senses" section, para 2).

The linkages between a holistic knowing, the affective domain and PEB is captured in the quote of Louv (2012): "We cannot protect something we do not love, we cannot love what we do not know, and we cannot know what we do not see, hear, or sense" (p. 80).

2.7.4 Play, inquiry and eco-pedagogies

Play, inquiry and eco-pedagogies are three effective types of experiential learning that can be integrated into NBE praxis. These pedagogies align nicely with age-appropriate learning experiences too. With respect to the early childhood stage, free play in nature-based settings has been shown to foster environmental empathy and a sense of belonging, both components that align with nature connectedness (Chawla, 2009). At this life stage, utilising non-anthropogenic ways of understanding and relating to non-human nature may help maintain the sense of connectedness that young children inherently come into to the world with (Barragan-Jason et al., 2022). This understanding empowers teachers and parents to allow children to play and learn as part of nature rather than speeding them along to become detached observers of the non-human.

Inquiry-based learning is a student-centred approach that encourages learners to ask questions, investigate and draw conclusions through their experiences and observations (Pedaste et al., 2015). This educational approach helps to develop children's reasoning and problem-solving ability, typically commencing in the middle years of childhood. Inquiry-based learning through NBE emphasises exploration and reflection of interactions with non-human nature, enabling students to see themselves as part of and as active participants in the environment rather than detached observers (Linnemanstons & Jordan, 2017). In this way, inquiry learning may help foster a more intimate and personal relationship with non-human nature.

Lastly, eco-pedagogies are a useful NBE praxis when more abstract thinking begins to develop in the early adolescent stage. Having emerged through the broader tradition of critical pedagogy, this educational approach seeks to challenge dominant socio-cultural narratives that contribute to ecological degradation (Kahn, 2010). Eco-pedagogies focus on themes related to environmental literacy, social justice and sustainability. In the context of nature connection, eco-pedagogy invites learners to critically examine human-nature relations and encourages them to envision alternative, sustainable ways of living. Developing action competence is an example of eco-pedagogy in action through which students can increase environmental knowledge and deepen nature connection that is rooted in a sense of moral obligation and global citizenship (Kahn, 2010).

2.7.5 Posthuman orientations

Posthuman orientations challenge the dichotomous human-nature positionality by illuminating humanity's entanglement with the Earth system. Educational approaches and pedagogies, like

experiential learning, can be reframed through posthumanism's relational ways of thinking. For example, in Taylor's (2017) critique of stewardship pedagogies, important questions are raised about the suitability of engaging students in conservation activities based on a utilitarian value of non-human nature and the positioning of humans as masters of a non-agentic environment who 'save' nature through narrow solution-based approaches. Taylor suggests that these pedagogies are inadequate, perhaps even counterproductive, to achieving the much-needed paradigm shift in human-environment relations. In lieu, Taylor and Giugni (2021) promote common world pedagogies for children, encouraging freedom of play and exploration without an agenda to protect.

Taylor's critique is considered by Ruck and Mannion (2021) in relation to older students and the formal education system. Their study focused on the Polli: Nation project, and EE initiative to create pollinator-friendly habitats in school grounds. Over a two-year period, Polli: Nation was implemented through an EEO in 260 schools across the United Kingdom, targeting students aged 9-13. Teachers were also involved for integrating the project into classroom curricula. A pre and post survey was completed by each participating school for measuring changes in biodiversity on school grounds. An ethnographic study was also enacted through 30 participant-observations in 12 schools, which provided insight into students' lived experiences of the learning opportunity.

Although Polli: Nation was found to prioritise utilitarian and stewardship perspectives, the findings suggest that conservation activities can align with posthuman orientations providing the 'right' objective and design of the learning opportunity. Ruck and Mannion identify these as maximising the potential for unplanned relational encounters between students and non-human nature that allowed students to come to know non-human nature in embodied, non-rational ways. In Harrington's (2009) study comparing and contrasting outcomes of real and virtual reality field trips, she reports a similar affective impact arising through spontaneous sightings of salamanders as part of ecological lessons delivered outdoors.

Through unplanned encounters with non-human nature, the findings illuminated the development of the students' affective domain, expressed through strong emotions, such as excitement, empathy and curiosity. Ruck and Mannion (2021) describe these emotions as an affective force through which they observed shifts in the students' relationships with different types of invertebrates over the course of the study. For this reason, the results spoke to students appearing to transcend their perceptions of themselves as solely responsible stewards of the environment (or not).

Ruck and Mannion discuss the potential difficulties and tension faced by schools with respect to facilitating unplanned encounters with non-human nature, highlighting a need for programmatic facilitation in the formal school system. They suggest using conservation opportunities as an overarching task, while minimising learning opportunities that are too prescriptive, nor place too much emphasis on quick and efficient completion. Regular involvement in the project through loosely structured groups and slow pedagogies all help to enact a lived curriculum rather than simple reproduction of curriculum as planned (Aokis, 1996 cited in Ruck & Manion, 2021). Lastly, Ruck and Mannion advocate for linking conservation projects with a cross-curricula intent. By taking NBE praxis beyond a scientific knowledge-base, students are able to express their emotions for non-human nature, consider non-technical ways of relating to and being with other species, and go beyond the rational quest of knowing the world through reductionist approaches.

2.7.6 Place-based education

Place-based education engages students' learning through the context of the local environment, culture and community (Smith, 2002; Sobel, 1996). This approach is well suited to NBE because it enables learning through the non-human nature species, elements and processes that are part of place, beyond the classroom. Place-based education emphasises the importance of relationships – with one another and to the land (Penetito, 2008). Through relationship, one comes to know the people and ecosystems of the place they inhabit (Lewicki, 1997), as well as fundamental features common to all places such as seasonality, circularity, reciprocity, relational exchange etc. (Hopkinson, 2020). A localised focus that embeds learning within one's own societal context is shown to correlate with stronger environmental values and PEB (Ardoin et al., 2020).

Place-based education is a means to engage in critical consciousness and bring to light the complex history and legacy of colonisation (Hopkinson, 2020). Learning through the places in Aotearoa New Zealand can help address the three principles of *Te Tiriti o Waitangi* (Aotearoa New Zealand's partnership agreement between Māori and the British Crown): protection, partnership, and participation (Te Ara- the Encyclopaedia of New Zealand, n.d.). Based on these principles, Hopkinson(2020) identifies a place-based framework as a means to become a responsible partner; develop an abiding relationship with Papatūānuku (the Earth mother); and contribute toward a better world through active participation.

Lastly, placed-based approaches challenge the traditional hierarchical structure of teacher-student relationships by positioning teachers as co-learners and facilitators rather than authoritative figures (Gruenewald, 2003). This shift encourages a more participatory and democratic learning process, which may empower students to increasingly take ownership of their own relationship with other humans and non-human nature.

2.7.7 Indigenous and land-based education

This review of the literature has explained how a person's worldview frames their relationships with the Earth system. In Section 2.5.3.4, indigenous worldviews and local knowledges were shown to be grounded in nature and underpinned by holistic and relational perspectives. The interconnectedness of all things is a tenet of indigenous ways of knowing, from which emerges the realisation that the wellbeing of humans is entangled with the wellbeing of the planet as a whole. Hence, reciprocal relationship is fundamental to indigenous ways of thinking and living.

Through land-based education, indigenous perspectives like these may be embodied:

> Being on the land allows the learner to experience and encounter indigenous philosophy and the interconnectedness of all living and non-living things. (Bowra et al., 2021, p. 135)

Learning through sustenance practices (e.g., hunting, fishing, food preparation) is common (Bolstad & Durie, 2024), as is sharing of traditional narratives that acknowledge humanity's evolutionary roots in nature through connections that are physical, emotional, psychological and spiritual (Fox et al., 2022). Themes that run through the literature of indigenous education include 'land as teacher' (Kimmerer, 2020) and 'educating for decolonisation' (Bowra et al., 2021).

At the bare minimum, indigenous education provides students with opportunities to learn from others who have lived, and continue to live, harmoniously with all of life (Carmargo, 2020). Students may reflect on their own worldview and relationship with the land as well. For these reasons, indigenous and land-based education can provide NBE with an alternative epistemology, and potentially lead to more sustainable ways of knowing and being (Kimmerer, 2020). For the Aotearoa New Zealand context, learning opportunities with respect to te Ao Māori helps students embrace the bicultural heritage of the nation as well as nourish their emotional connection with non-human nature. In this ways, indigenous education can benefit all (Durie, 2004).

2.7.8 Arts-based disciplines

By engaging students' senses, emotions and bodies in direct experiences with non-human nature, an arts-based approach to NBE can deepen connection to non-human nature in ways that abstract, intellectual learning cannot (Ison & Bramwell-Lalor, 2023). Furthermore, environmental activities that utilise the arts have been shown to produce a stronger connection with nature than compared to other types of activities (Arbuthnott & Sutter, 2019; Bruni et al., 2017). Studies showcase how art-based approaches provide visceral and embodied experiences, whether through painting, sculpture, storytelling, or performance, that lead to quality engagement with non-human nature (Hallam et al., 2022; Inwood & Taylor, 2012). Through creative expression, students have opportunities to reflect and make meaning from their relationship with non-human nature, whether through nature's beauty or the emotions that arise through interactions with species, elements and forces of the Earth system. Art activism can activate the compassion pathway too (Lumber et al., 2017).

2.7.9 Section summary

This section discussed some educational orientations, pedagogies and approaches that can inform NBE for the purpose of fostering nature connection: whole-school approaches, age-appropriateness, experiential learning opportunities, posthuman orientations, place-based approaches, indigenous education and art-based pedagogies. These were selected as holding promise for informing NBE praxis because of their alignment, in some way, with antecedents, factors and interventions known to positively influence nature connectedness (see Section 2.5.3). Some key characteristics that may improve the effectiveness of praxis were identified as:

- Regular and ongoing opportunities for nature contact and nature connection;
- Age and-developmentally appropriate learning opportunities embedded in nature-rich settings and implemented by nature-loving educators;
- Contextualised programme design that accounts for socio-cultural-demographic variables;
- Engagement with EEOs undertaken through on-going relationships (rather than one-visit offerings) and implemented in ways that connect with place;
- Targeted praxis informed by nature connection pathways;
- Prioritisation of holistic and relational pedagogies;
- Cross-curricula learning, especially those that promote creativity; and
- Allowing for unplanned encounters with non-human nature through slow pedagogies and students' lived curricula.

The next section provides an overview of the education sector in Aotearoa New Zealand with respect to some features, historical and present-day, that may influence opportunities for educating for nature connection via EE and NBE.

2.8 Educating for nature connection in Aotearoa New Zealand: Challenges and opportunities

Aotearoa New Zealand's geographic isolation, colonial history and bicultural status through *Te Tiriti o Waitang*i (Ministry of Education, 1999) provide unique challenges as well as opportunities for prioritising nature connection as an outcome of EE in the formal education context. However, despite the nation's point of differences, the path to developing EE policy and curricula for the English-medium education sector (including early childhood) has been similar to most Westernised countries, characterised by a reluctance to formally recognise EE as an official part of the national curriculum (Palmer, 2002).

As highlighted in Section 2.6, research on nature-based education is becoming more prevalent overseas, however, there are relatively few studies in relation to the Aotearoa New Zealand context. During the development of the national database of EEOs for this study, some nature-based bush kindergartens and nature-based one-day school programmes operating across the country were identified. Some of these programmes operate through early childhood organisations or schools, while others are private entities based on user-pay models. A number are affiliated with an 'umbrella' organisation, Nature Education Aotearoa (n.d.), which has led an annual nature education conference since 2009 (The Nature Education Network, 2024). Despite this activity, none of the national curriculum iterations or policy frameworks reviewed in this study explicitly recognise nature-based education as a distinct or reputable EE approach. For this reason, this overview of the Aotearoa New Zealand context predominantly focuses on the inclusion of EE in general, based on the understanding that this can also pertain to nature-based education.

2.8.1 National curricula and links with EE

With regards to *Te Whāriki* (Ministry of Education, 1997) the national curriculum for early childhood education (ECE), its principles, strands and goals collectively give expression to the document's vision that children grow up as "competent and confident learners and communicators, healthy in mind, body, and spirit, secure in their sense of belonging and in the knowledge that they make a valued contribution to society" (p. 5). Whilst *Te Whāriki* does not explicitly identify with EE, its vision and the language used within the document make implicit connections to the discipline (Duhn et al., 2010). Furthermore, ECE is considered as having a pedagogical affiliation with EE through its promotion of holistic, experiential and

inquiry-based strategies (Croft, 2018), which in reflection of Section 2.7, are well aligned with educating for nature connection.

With respect to the formal schooling years, opportunities for EE as part of the formal education sector have been evolving since the early 1990's as part of the iterations of the national curriculum document. The first official inclusion of environmental and sustainability ideas became evident in the development of the *New Zealand Curriculum Framework* (Ministry of Education, 1993). This was in response to Aotearoa New Zealand's obligations of international agreements like the Earth Summit's *Agenda 21* (UNESCO, 1992). An infusion approach saw EE integrated across the specified learning areas of the national curriculum document rather than included as a stand-alone discipline (Barker, 2001). Through this model, EE was designated as optional and the onus put on individual schools to perceive the opportunities afforded by the national curriculum and determine how, if at all, to integrate EE into their respective school curriculum.

A few years later, under pressure from the Ministry for the Environment and the wider EE community (Eames et al., 2004a), the *Guidelines for Environmental Education in New Zealand Schools* (Ministry of Education, 1999) were produced to give schools better direction for implementing EE. Through its key aims, concepts and pedagogies, the *Guidelines* provided a framework that assisted schools to coherently integrate education 'about, in and for' the environment in ways that did not add to an already 'overcrowded' curriculum (Chapman, 2011). Of particular significance to fostering nature connection was the *Guidelines'* recognition of the Māori worldview and this perspective's understanding that people and non-human nature are interconnected and interdependent. This inclusion was a response to changing legislation related to *Te Tiriti o Waitangi* and the environment (Ministry of Education, 1999).

The *New Zealand Curriculum* (Ministry of Education, 2007) represents the next wave of national curriculum development. Again, EE was not mandated in any way; however, the new document improved the visibility of, and opportunity for, EE compared to previous the national curriculum document *(*Bolstad et al., 2015). For example, the *New Zealand Curriculum* clearly advocated for schools to incorporate values, such as ecological sustainability, community and participation, and principles of equity, as well as highlighting concepts like sustainability and globalisation as part of specific learning areas and cross-curriculum issues. Some of the key competencies and pedagogical developments emphasised by the *New Zealand Curriculum*, like inquiry-based and student-based learning pedagogies, were also considered to provide a stronger message and create greater opportunity for EE inclusion (Eames et al., 2006).

Student-led inquiry approaches have tended to be more accessible to primary schools than secondary schools, predominantly because the latter's learning objectives are often constrained by the assessment standardisation of the National Certificate of Educational Achievement (NCEA) (Bolstad, 2020a), a country-wide national assessment regime. NCEA sees students obtain predetermined credits through standards that tend to limit learning objectives, materials and timetables to only those in direct relation with assessment criteria, resulting in inertia and resistance to change by individual schools (Everth, 2022). Subsequently, integrating EE as part of secondary school structure and curriculum via effective approaches like experiential and place-based learning is perceived to be notoriously difficult in Aotearoa New Zealand (Birdsall & Glasgow, 2014; Brignall-Theyer et al., 2009).

Beginning in 2018, a third wave of curriculum reform commenced, including changes to be made to NCEA. As part of the proposed six-year reform process, the Ministry of Education widely consulted with students, educators, academics and Māori and Pasifika communities to ensure diverse voices were heard (Education Gazette, 2021; 2023). The aims proposed for the revised curriculum at the time of its conception, referred to as *Te Mātaiaho – The Refreshed New Zealand Curriculum* (Ministry of Education, 2021), were to develop a more culturally inclusive, future focused and coherent curriculum for learning in Aotearoa New Zealand.

Te Mātaiaho sought to sustain the competency-driven outcomes that underpinned the *New Zealand Curriculum* (Ministry of Education, 2007) while at the same time providing greater guidance about what critical knowledge/content should be developed through the formal education system (Education Gazette, 2021). The refreshed curriculum also represented a shift from merely acknowledging *Te Tiriti o Waitangi* and its principles to developing an authentic understanding and value of this foundational document. Well-aligned with principles of sustainability, *Te Mātaiaho* aimed to inspire transformation of the education sector in ways that ensure fair and equitable education and outcomes for all students, especially Māori who historically have not benefited as well as others (NZAEE, 2023a). In this light, the refreshed curriculum was perceived as underpinned by an intention to decolonise the formal education system by highlighting the value of te ao Māori and embedding this worldview as an equal component to the Western worldview.

Although EE was once again treated as an non-mandated discipline to be infused across multiple learning areas, *Te Mātaiaho* offered opportunities to strengthen EE through its strong focus on te ao Māori, and centring the understanding of the interconnectedness of people and non-human nature, and our mutual wellbeing, at the heart of all learning (NZAEE, 2023b). Through an Understand-Know-Do

model, many of the 'big' content ideas of *Te Mātaiaho* were linked to environmental contexts and fundamental pedagogies aligning with EE including place-based approaches and those focused on developing student-centred learning and agency through localised curriculum opportunities.

Worringly for proponents of EE, the future of *Te Mātaiaho* has become uncertain since a new coalition government (including the right-wing ACT and New Zealand First parties) took office in late 2023. At the time of writing, a Ministerial Advisory Group has been tasked with reviewing the English and Mathematics curricula within T*e Mātaiaho*, while progress on the rest of the document remains on hold. This matter and potential consequences for EE are discussed in more detail in Section 2.8.3 which looks more closely at the present-day educational context of Aotearoa New Zealand.

Next, an overview is provided in relation to what external support has been made available to assist schools with EE over the same period of time as these developments in the national curricula.

2.8.2 Support for EE

Around the same time as the development of the *Guidelines for Environmental Education in New Zealand Schools* (Ministry of Education, 1999)*,* the Ministry of Education also funded a number of initiatives that helped build momentum for EE as part of the formal education sector*.* These included professional development workshops assisting schools to make use of the *Guidelines* and the employment of regional EE facilitators who regularly worked with teachers, through which 64 EE pilot projects were implemented around the country (Bolstad et al., 2004). Additionally, funding also helped launch the non-profit EEO, Enviroschools (Enviroschools, n.d.), and undertake a national research project to evaluate EE praxis in schools and ascertain future possibilities (Bolstad et al., 2004). Collectively, these initiatives established the first, and to date, only central government framework to assist with the coordination of EE integration across sector groups at a national scale (e.g., schools and EEOs) (Law, 2004).

Unfortunately, much of the funding and support that was responsible for this momentum progressively came to a halt following the election of a more right-leaning central government party in 2008. Through the influence of this newly elected political party, this period earmarked a sharp transition in schools towards economic imperatives and a focus on literacy, numeracy and Māori achievement. Consequently, governmental support for EE, such as funding for Enviroschools, was cut (Eames and Barker, 2011). Radio New Zealand captured the Minister for the Environment's response about the removal of funding for the Enviroschools, saying:

> Environmental sustainability is very important, that is why it has been added to the national curriculum. But in these tough economic times, the Government's focus has to be on its core priorities for the education of raising literacy and numeracy achievement, and increasing the number of students leaving school with qualifications. Programmes such as Enviroschools are a nice to have but do not contribute directly to these priorities. (Chapman, 2011, p 199).

Despite the cutbacks, Bolstad et al. (2015) provide evidence demonstrating that the EE facilitators affected by the loss of funding carried their expertise, skills and passion into new areas of employment (e.g., local government agencies, EEOs, and schools). The benefit was that at least some of the EE development and growth was retained via redistribution across the wider social landscape.

In 2017, with the election of a more left-leaning coalition government (including Green Party representation), some central governmental support and funding for EE affiliated initiatives was reinstated. Some examples included: a $5 million dollar contestable fund supporting school initiatives to reduce energy consumption and environmental impact (e.g., grants for solar power installation, removing coal boilers, etc) (Ministry of Education, 2020); an educational resource assisting the development of localised, place-responsive, student-centred camp programmes for schools (Education Outdoors New Zealand, n.d.), funding to support the New Zealand Association for Environmental Education (NZAEE) as a Network of Expertise provider and updating the national EE strategy for the discipline - *Mātauranga Whakauka Taiao: Environmental Education for Sustainability Strategy and Action Plan* (Department of Conservation, 2017). Yet, once the new strategy was finalised, no further funding was made available to enact the strategy's proposed actions.

Furthermore, teacher confidence and knowledge of EE plays a significant role as to whether they choose to incorporate the discipline into their respective curriculum or not (Birdsall, 2010; Hipkins et al., 2010). The general lack of professional development opportunities in relation to EE, including pre-service training, hinders its implementation across Aotearoa New Zealand (Dada et al., 2018).The literature also demonstrates that EE implementation is clearly linked to the values and priorities of staff, parents and caretakers (Brignall-Theyer et al., 2009; Eames & Barker, 2011; Vaealiki & Mackey, 2008). Consequently, the infusion approach results in school curriculum that reflects the local community's values and interests, rather than wider moral considerations pertaining to the collective good for humans and non-human nature.

In summary, in the absence of a clear governmental mandate for EE and sustained support, EE has always been marginalised in the education system of Aotearoa New Zealand. This has led to the uptake (or not) of EE as determined by the values, priorities and willingness of school staff, and support from the wider community. Because of this, the network of EEOs has evolved into a vital resource for promoting and advancing EE teaching and learning.

2.8.2.1 The network of environmental education organisations

The implementation of EE in schools is aided by an organic network of EEOs comprised of community groups, government agencies, non-government organisations and social enterprise businesses (Bolstad, 2020a). According to Papprill (2016), rather than schools going 'solo', in isolation from the place and societal structures in which they sit, more meaningful EE learning programmes are developed when in collaboration with the wider community. Effective EE in the formal school sector relies on ongoing partnerships with EEOs (Eames & Bolstad, 2004b) and opportunities for participating in community-based initiatives (Law, 2004). Surveys of teachers undertaken for an impact review of EE in the Hawkes Bay region of Aotearoa New Zealand identified EEO facilitators as the most important resource available for utilising real-life contexts, obtaining physical resources for hands on learning, and accessing topic expertise (Flood, 2018). Moreover, 58% of teachers (n = 620) from a representative sample of 181 schools across the country who participated in a national annual survey[10] reported having good access to people, organisations and resources to support climate change education (Bolstad, 2020b).

Despite this evidence of these organisations as a valuable resource for schools, historically there has been minimal governmental advocacy, coordination, and financial support with respect to the EEO network. At the time of commencing this study, there was little understanding about EEOs as a whole and their impacts on educational praxis. However, over the course of the four years taken to complete this study, there has been a significant shift in this space through the official positioning of NZAEE as a Network of Expertise provider through governmental funding obtained around 2017in 2021 . This funding, secured through 2025, has enabled NZAEE to move from an organisation solely run through volunteers to employing contractors who have developed an organisational website, curated educational resources, promoted the network of EEOs and provided opportunities for collaboration and

[10] As part of the New Zealand Council of Educational Research series of national surveys of schools that takes place every three years, since 1989.

professional development (NZAEE, 2021). Stage one of this study helped inform an EEO database as part of the development of an NZAEE website. A short synopsis of some of the key types of EEOs that comprise the network is provided below.

Enviroschools is without a doubt the largest provider of EE facilitators in Aotearoa New Zealand. The Toimata Foundation in partnership with Te Mauri Tau is a charitable trust entity which supports Enviroschools (English medium) as well as Te Aho Tū Roa (te reo Māori medium). Statistics from the Enviroschools webpage (Enviroschools, n.d.) indicate there are approximately 155 regional facilitators presently working with 166 regional partners. Enviroschool initiatives support approximately 1,100 educational organisations, predominantly comprised of early childhood organisations and primary and intermediate schools (Enviroschools, 2017). Historically, Enviroschools has struggled to engage secondary schools because of structural barriers as previously highlighted in Section 2.8.1.

Local governmental bodies like district and regional councils are another type of EEO with whom schools commonly partner with in order to support EE integration into their teaching and learning (Eames & Bolstad, 2004b). In some localities, particularly large cities like Tāmaki Makaurau (Auckland) and Ōtautahi (Christchurch), the respective council authorities often contribute financially to Enviroschools facilitation, while at the same time, employing specific educational staff within their organisations to target learning outcomes relevant to their own organisational objectives (Auckland City Council, 2020; Christchurch City Council, n.d.). Until recently, the Department of Conservation had a national outreach and education team with staff working across the country in regional roles, supporting conservation outcomes and providing outdoor educational opportunities such as the Toyota Kiwi Guardians programme (Department of Conservation, n.d). Unfortunately, this team was disbanded in 2022, likely related to organisational restructuring and budget cuts (Williams, 2024).

Lastly, the non-profit sector, and the recent emergence of social enterprises (see, for example, Discovery through nature, n.d.) also represent an important type of EEO. Some non-profit organisations focus on general environmental themes such as Marine Metre[2] (2024), which develop understanding about the local marine environment, while other programmes, like Kids Greening Taupō (2022) integrate a real-life context into curriculum (e.g., Kids Greening Taupō involves schools with local restoration work undertaken by its sister organisation – Greening Taupō). The *Education Gazette* provides a number of case study examples demonstrating how early childhood organisations and schools have developed contextualised learning programmes based on environmental and sustainability issues with support from EEOs (see, for example, Education Gazette, 2019; Education Gazette Editors, 2020) .

Typically found in EEOs' promotion of their work is the rhetoric of 'connecting' students with nature. Although commendable, these organisations invest a great deal of money, time and effort to implement nature connection interventions while there remains little evidence of their effectiveness. As Whitburn (2020a) acknowledges, it is rare for programme outcomes to be articulated as programme objectives and then subsequently measured. Overall, there is a lack of systematic evaluation, and what evaluation is undertaken tends to focus on knowledge rather than nature connection or self-reported behaviour change.

2.8.3 Present-day context of environmental education

Today, the status of EE in the English-medium formal education sector in Aotearoa New Zealand continues through a non-mandatory infusion approach. Bolstad et al. (2008) suggest this model sends schools mixed messages about the priority EE should have within education, while more cynically, Chapman (2011) sees it giving Aotearoa New Zealand the appearance of meeting international obligations, while in reality maintaining an educational agenda that prioritises the neoliberal agenda.

Consequently, the extent to which EE is incorporated into a school's curriculum and structure, if at all, is determined by each individual school, its Board of Trustees (the school's elected governance body) and the availability of external support. This model does not guarantee that all schools and their students have access to EE. In a research update of EE in Aotearoa New Zealand, Bolstad (2015) describes the national EE landscape as a patchwork of successful pockets unevenly spread across the country. With no consistent high-level coordination and support for EE, the successes are continuously susceptible to changes brought about by political climate, funding provision and local support from school staff and EEOs. More encouragingly, a recent report identified 78% of primary/intermediate schools as integrating a focus on kaitiakitanga (intergenerational guardianship) (Bolstad, 2020a); however, secondary schools that reported an environmental focus were far less common (Bolstad, 2020c).

As mentioned at the conclusion of Section 2.8.1, the future of the recently 'refreshed' national curriculum document, *Te Mātaiaho – The Refreshed New Zealand Curriculum,* remains uncertain. What is known is that the newly elected coalition government has very different educational priorities than those initially utilised as the foundation to developing *Te Mātaiaho*. At the time of writing this thesis, the coalition government had announced its focus going forward to be on numeracy, literacy and assessment (NZAEE, 2024c), marking a transition away from previous priorities such as local curriculum

design and cultural competency that are known to be well aligned with the pedagogies of EE, including nature-based education.

This education model has evolved based on achieving outcomes sought through an industrial, colonial model of assimilation (Jones & Jenkins, 2008) and the production of workers for propelling the neoliberal agenda (Robinson & Aronica, 2015). The model's purpose has had nothing to do with the rights of children and young people, but instead, is about the power and control over what they think and learn in association with the reproduction of dominant social paradigm (Irwin, 2020; Webb et al., 2020). This is a model that does little for developing the knowledge, attitudes, values, skills and behaviour required for transforming toward a more sustainable world.

After 13 years of formal schooling in today's age of the Anthropocene, are we really content with preparing students to simply pass exams to become active cogs in a dominant social paradigm that is directly linked to the destruction of people and planet? Or otherwise, are we ready to embrace educational outcomes that transition the education process from the purpose of cultural reproduction toward cultural transformation in ways that support the regeneration of the life-giving capacity of the planet? The review of the literature undertaken for this thesis, in conjunction with the wide consultation undertaken to develop *Te Mātaiaho* clearly point to needing the latter.

Given the reciprocal relationship between healthy people and healthy planet, aligning academic prowess with personal and planetary flourishing makes sense. In the face of our sustainability crisis that is genuinely an existential crisis, this is far from an ideological endeavour, but instead, an ethical obligation. Thus, the literature review presented herein underscores the need for a formal education system that cultivates future generations that are empowered and equipped to address and adapt to the pressing challenges of our times. With this proposed purpose of the education sector in mind, this study aims to improve understanding about the way environmental education organisations are supporting the formal education sector in the the Aotearoa New Zealand, and more specifically, how nature connection as an educational outcome can contribute to the flourishment of both people and planet.

2.9 Chapter summary

The systemic socio-ecological problems that characterise the Anthropocene indicate that the path as paved by Westernisation is inherently unsustainable. Through a systems theory perspective, ecological degradation can only be resolved by addressing the root causes of our sustainability crisis. Paradigm shift is a deep lever of transformational change toward more sustainable trajectories. A strong theoretical foundation, with fundaments in the biophilia hypothesis, environmental inclusion in self-identity and interpersonal relationships, call for improving human-nature relations as a mechanism of paradigm shift. Originating out of an extension of the principle of relational closeness, nature connectedness offers a metric for capturing an individual's sense of relationship with non-human nature and the degree to which they feel belonging as part of the Earth system. Nature connectedness is positively associated with human health and wellness and PEB.

The literature review explored some factors and interventions for improving human-nature relations through nature connection. Importantly, the review explained nature contact and nature connection as different phenomena with different outcomes. Nature connection significantly influences PEB while nature contact on its own does not bring about change in behaviour. Nature connection also results in greater positive impacts on mental wellness than merely being in nature.

Quality engagement with non-human nature, indigenous worldviews and socio-demographic variables influence nature connection. Quality engagement refers to nature-based experiences that connect a person with non-human nature through their senses and/or emotions; knowledge-based activities do little to improve nature connection. Positive childhood experiences with non-human nature, in conjunction with a parent or mentor with a high level of nature connectedness, is one of the strongest predictors of nature connectedness in children, as well as influencing connectedness in later adult stages of life.

Secondly, Indigenous cultures, such as Māori culture, are underpinned by a shared belief system that recognise the interconnectedness of all things in the world. Opportunities to learn from Indigneous Peoples may lead to 'seeing and being' in the world differently than that espoused solely through the dominant social paradigm and potenitally may lead to more harmonious human-nature relations. Thirdly, the socio-cultural-demographic variables of gender, age and levels of biodiversity within local surrounds are variables that seem to influence nature connectedness most consistently. Studies across

multiple countries highlight a sharp dip in nature connectedness levels (i.e., the teenage dip) in later childhood/early adolescent life stages.

Educating for nature connection was theoretically framed as an effective mechanism for improving human-nature relations and as a treatment to unsustainability. Although holistic educational approaches are promoted by EE's pedagogical tenet of education 'about, in and for' the environment, associated praxis typically does not equate to effectively fostering nature connection. Teaching and learning via NBE is a promising educational approach as it is embedded in a setting through which both environmental knowledge and nature connection can be developed. However, with little evidence demonstrating what makes for effective NBE in relation to the outcome of nature connection, it is difficult to determine which pedagogies and characteristics of praxis are most efficacious. Based on the empirical evidence of factors and interventions known to increase nature connection, potential educational approaches were identified through the literature review. These included: whole-school approaches, age-appropriateness, experiential learning opportunities, posthuman orientations, place-based approaches, indigenous education and art-based pedagogies.

The national curricula developed for Aotearoa New Zealand over the past three decades have enabled, to varying degrees, early childhood organisations and schools to integrate EE (including NBE) within their own respective curricula. There are dispersed pockets of EE success across the country that wax and wane according to political climate, funding availability, and local support. The non-mandatory status of EE as part of the curricula means that the uptake of the discipline is largely dictated by the school community. EE is perceived by the formal education sector in Aotearoa New Zealand as a nice to have rather than an educational priority.

The range of governmental and non-government organisations that comprise the EEO network are a valuable resource for the formal education sector with respect to supporting the implementation of EE. However, despite the evidence of their usefulness, inconsistent advocacy, coordination, and financial support for the network equates to fluctuating levels of assistance to schools by EEOs. A lack of systematic evaluation of pedagogies and outcomes is part of this reality. For example, EEOs are known for whole-heartedly investing significant amounts of time, effort and resources toward programme outcomes such as nature connection, but rarely are measures put in place to demonstrate the effectiveness of approaches and pedagogies for realising the proposed outcomes. This is particularly worrying given the evidence that traditional EE approaches based on knowledge inquiry and stewardship pedagogies may not be as effective as assumed to be.

Chapter Three – Methodology

3.1 Chapter introduction

The literature review presented in the previous chapter argued that environmental education (EE) plays a paramount role in resolving our sustainability crisis and highlighted the significance of nature connection and nature-based education in this respect. Broadly, this study sought to contribute to the integration of EE in the English-medium education system in Aotearoa New Zealand (hereafter, referred to as the education system), based on understandings and lived experiences of representatives from environmental education organisations (EEOs). For this study to be deemed credible, it must demonstrate rigour through methodological transparency. This chapter intends to achieve such.

The chapter begins by restating the research aim and questions that set my course. Next, the methodological landscape is described, discussing the ways that interpretivism and grounded theory informed the decisions I made about my research journey, undertaken through an explanatory sequential mixed-methods design. Thereafter, subsequent sections outline how I assembled the research design components as a whole, framing the study through its setting and my positioning as researcher, and then followed by a discussion about the methods employed for sampling, data generation and analysis, and criteria of rigour for the study.

3.2 Restating aims and research questions

I started my PhD based on the aim of exploring organisational and programme features of the network of EEOs operating in Aotearoa New Zealand. A single research question set the course for providing the first systematic description of this community of organisations:

i) **Research question one**: What are some organisational and programme features of the current EEO landscape in Aotearoa New Zealand?

It was always my intent that I would use data collected from this research question for identifying additional inquiry topic(s) of relevance to the community of EEOs in Aotearoa New Zealand. Following the analysis of the stage one data and a reflection process (see Section 1.3), I committed the next stages of the study to exploring nature connection as a prioritised educational outcome of EEOs.

To guide the next stage of inquiry, three additional research questions were formulated:

ii) **Research question two**: What conceptualisations of nature connection do EEOs hold?

iii) **Research question three:** Why do EEOs prioritise nature connection?

iv) **Research question four:** How do EEOs foster nature connection as part of their education programmes?

These questions set the course of the study and informed the methodological framework as described next.

3.3 Methodological framework

Positivism and interpretivism are two paramount theories of research, often referred to as the traditional philosophical paradigms (Wahyuni, 2012). Today, educational research acknowledges a wide variety of paradigms through which the world can be viewed and known that go beyond the simple either/or choice between positivism and interpretivism. An array of philosophical 'camps' illuminate scholarly endeavours to explain the occurrence and implications of the diversity of social phenomena that is the reality of our world, such as critical theory, participatory modes of inquiry and a set of 'posts' – posthumanism, poststructural, postmaterialist (Denzin et al., 2023; Dickson et al., 2016). While every camp has roots in one of the two traditional paradigms (Dickson et al., 2016), they each also hold true their own particular ontological, epistemological, axiological and methodological stances (Denzin et. al., 2023). In this sense, a study must consider the paradigm in which it is situated and the ways through which these philosophical underpinnings influence its methodology.

3.3.1 Adopting an interpretive paradigm

This study was positioned through an interpretive paradigm, which understands social realities as a product of human intellect. Ontologically, social reality as viewed through an interpretive paradigm is subjective, value-laden and context specific. Interpretivism makes clear that there is no one true or valid interpretation of social reality (Crotty, 2003), therefore, recognising realities as multiple and changeable (Lincoln & Guba, 1985). For this reason, social realities can only be studied holistically because they cannot be "understood in isolation from their contexts, nor can they be fragmented for separate study of the parts" (Lincoln & Guba, 1985, p. 39).

Interpretivist epistemology develops understanding about the social world through the experiences and subjective meanings people attach to it. The goal is always to go beyond mere description of 'the what' and account for 'the why' things are (Miles et al., 2020). Interpretivism subscribes to the belief that knowledge and meanings of social reality are constructed via interactions with others through shared

practices, language, documents and objects; this process is theorised as constructivism (Dickson, 2016; Wahyuni, 2012)**.** Interpretivism prioritises researching in the natural settings of these interactions, referred to by Lincoln and Guba (1985) as research with the "entity-in-context" (p. 39).

Axiologically, interpretivism situates the researcher as an active instrument of the research process (Creswell & Creswell, 2018; Lincoln & Guba, 1985). The human as instrument is most appropriate for qualitative inquiry because it is flexible enough to capture the complexity of the human experience and adapt to the indeterminate situations that will be encountered in naturalistic settings (Lincoln & Guba, 1985; Miles et al., 2020). In this sense, the researcher is recognised as an omnipresent influence on all stages of research process - from choice of topic, formulation of research questions, choice of literature read, design of research methods, construction of meaning and reporting of findings. The knower can never be separated from the known because "the very act of observation influences what is seen" (Lincoln & Guba, 1985, p. 39).

The interpretive paradigm aligned with the intention of this study to develop socially-constructed knowledge through the lived experiences and understandings of representatives from the EEO network. The philosophical constructs of interpretivism aligned with the aim of deeply exploring the epistemological questions of why nature connection was prioritised as an educational outcome by a large number of organisations from within the network, what pedagogical approaches they believed to be effective for achieving this outcome and their rationales for these decisions. Interpretivism's acknowledgement of the subjective construction of knowledge through the interactions of social actors, including that of the researcher, was particularly important for me since I came into the study having worked as part of the EEO network for approximately 15 years.

3.3.2 Going beyond interpretivism

There is no doubt that I have been personally transformed through my interactions with the literature and participants of this study. Through reflexivity, I became attuned to my own 'becoming' (similar to the ongoing 'becoming' of the planet, as discussed in Section 2.3.1), recognising changes to my ontological, epistemological and axiological assumptions and beliefs. One of the many personal outcomes has been an acute increase in my awareness of the existential ontological implications of the Anthropocene and sustainability polycrisis. Axiologically, I believe this shift requires humanity to look beyond the human, to provide and protect equal rights for non-human nature, and to shift from merely living 'on' the planet to living 'with' our planet (Akomolafe, 2022). Epistemologically, this has led me to consider the need to uplift

other forms of knowing. Some of these knowledges, like indigenous knowledges, are socially-constructed, while others belong to the non-human species that we share this planet with. After four years of learning and becoming, I now have a window from which I can see potentialities offered through the posthumanist space. I find myself on the precipice of moving beyond a conventional humanistic approach, thinking in ways similar to those shared by Gullion (2018):

> I've been trained to set my gaze on human social interactions. But what about the rest of the world, in which these interactions occur? Is all of reality socially constructed (through language), or does a reality exist outside of humans, a reality with its own ontologies and epistemologies? Are humans the only entities with agency? Does agency require language? (as cited in Denzin et al., 2023, p. 10)

My quest to protect the life-giving capacity of Earth through a singular focus of developing human potentiality - in the form of knowledge, competencies, skills, values and motivations – has shifted through the course of the study. This is an example of an interpretive reality which is never completely determined; it is always changing and becoming through the interactions and agency of the world. Because there is no single picture of the world, I believe there can be no single blueprint for social research (Cohen et al., 2018); every research project is unique and therefore calls for a unique methodology (Crotty, 2003). This belief underpins the pragmatic orientation that guided my PhD research, as explained below in relation to the mixed-methods design utilised for the study.

3.3.3 Mixed-methods design

A pragmatic orientation is grounded in an interpretive epistemological stance that acknowledges diverse ways of knowing and their collective contribution to understanding social reality (Kashik & Walsh, 2019). Pragmatism, therefore, supports a mixed-methods design, integrating both quantitative (numerical) and qualitative (non-numerical) data within a single study (Creswell & Creswell, 2018). I was drawn to the idea that incorporating multiple ways of knowing leads to a more comprehensive understanding of the phenomenon under investigation.

Another pragmatic aspiration shaped my PhD, as I aimed to contribute both theoretically to the field and practically to the EEO network. This led me to develop a national database of EEOs at the outset of the study, which was later adopted by the New Zealand Association of Environmental Education (NZAEE) to support its website revamp and enhance networking and collaboration among EEOs and with schools. The database also provided samples for all three stages of the present study.

To ensure this study was meaningful and relevant to the community of EEOs, I employed an explanatory sequential design, one of three types of mixed-method designs identified by Creswell & Creswell (2018). In this design, quantitative data is collected and analysed first to examine distributions and relationships among variables relevant to the research question. Quantitative approaches emphasise objectivity, positioning the researcher as an impartial observer in the knowledge discovery process (Wahyuni, 2012).

These results then informed the second, qualitative phase. Unlike quantitative methods, qualitative approaches generate non-numerical data, typically in the form of spoken words or text, though they can also include actions, images, and sounds. In this study, qualitative methods enabled rich, detailed descriptions of nature connection as a social phenomenon and the subjective experiences and beliefs of EEO representatives, and facilitated the construction of new insights and meanings (Cohen et al., 2018). Qualitative approaches recognise the researcher as an active participant in knowledge construction, shaped by language, perspectives, and interactions (Lincoln & Guba, 1985).

A key feature of interpretive studies is emergence, defined as "the making of decisions about data collection and analysis over the whole course of inquiry – in response to what is learned in the course of the investigation" (Hammersley, 2008, p. 55). Through honouring emergence, this study evolved through three main stages of data generation and analysis, illustrated in Figure 9. As discussed next, a grounded theory approach informed the qualitative phase of the study (stages two and three).

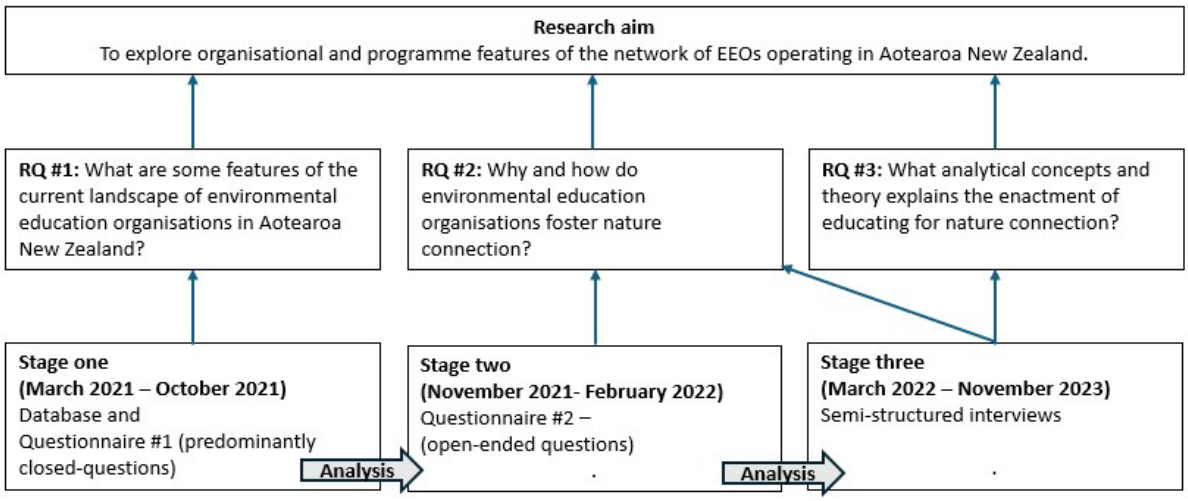
3.3.4 Grounded theory

The historical context of grounded theory reflects the discourse, debate, and momentum in social science inquiry and qualitative approaches in the United States throughout the twentieth century. Early ethnographic approaches were criticised for lacking methodological transparency (Glaser & Strauss, 1967) which led to a greater emphasis on quantitative research. As a result, inquiry into the human experience became increasingly constrained to quantifiable variables, as quantitative researchers, and funding bodies, prioritised the discovery of concrete information (Charmaz, 2014) and the development of grand theories to explain the workings of the world (Thornberg & Keane, 2022).

This trend toward quantification had two significant implications. First, it diminished support for other ways of knowing, particularly those explored through qualitative methods. As a result, much of the research community ignored questions and human problems that did not fit within positivist research designs (Charmaz, 2014). Second, it widened the gap between empirical research and theory

development (Glaser & Strauss, 1967; Charmaz, 2014). While quantitative researchers refined existing theories, their work rarely contributed to new theory construction.

Figure 9 *Overview of the present study's explanatory sequential design*



With their publication of *The Discovery of Grounded Theory,* sociologists Barney Glaser and Anselm Strauss (1967) challenged the mid-century focus on quantitative methodological assumptions. Through grounded theory methodology, Glaser and Strauss showcased qualitative inquiry as capable of investigating the social world in a systematic and rigorous way. Their seminal work to promote theorisation through a qualitative approach, in conjunction with their explicit guidance and research strategies for doing so, resulted in a qualitative revolution throughout the latter part of the twentieth century (Charmaz, 2014).

Since then, the promotion and use of grounded theory as a qualitative approach has not gone unmodified, nor unscathed. Over time, Glaser and Strauss each took the methodological approach in somewhat divergent directions (see, for example, Glaser, 1992; Strauss & Corbin, 1990) which contributed toward the evolution of different versions of grounded theory (Thornberg & Keane, 2022; Timonen et al., 2018). A postmodernist critique of the approach for "clinging to an outdated modernist epistemology of methods" is well documented (Charmaz, 2014, p. 13). This section does not intend to dissect this history, but instead, positions the study as specifically drawing a constructivist grounded theory, one of the four prevalent versions (Charmaz, 2000, 2014). Constructivist grounded theory honours the fundamental tenets of grounded theory as proposed by Glaser and Strauss in their original text, while simultaneously aiming to overcome its epistemological shortcomings. As implied by its name, this version of grounded

theory draws on constructivist epistemology that moved the approach away from positivistic assumptions – like the ways that the original version emphasised an objective, detached and biased research position and aimed for the 'discovery' of concepts and theory (Thornberg & Keane, 2022).

The next section provides an overview of actions and strategies undertaken by grounded theorists at large. Thereafter, two following sections explain how the approach has been tailored through constructivism. The ways in which the principles and heuristics of grounded theory were applied in the study are described over the course of these sections.

3.3.4.1 Objectives and heuristics

The core focus of grounded theory is to develop understandings of social world phenomena, particularly in relation to what people, individually and collectively, do and why they do it (Timonen et al., 2018). Grounded theory is distinguished from other qualitative methodologies through its emphasis on analytical development and middle-range theories in relation to the context where the data were generated (Charmaz, 2014; Meyer & Mayrhofer, 2022; Timonen et al., 2018). In these ways grounded theory moves beyond a general focus of identifying and sorting themes and topics which underpin more general qualitative approaches (Charmaz, 2000). The ultimate goal of grounded theory is to develop context specific theory, described by Corley & Gioia (2011) as "a statement of conceptual themes and their interrelationships that shows how and/or why a phenomenon occurs" (p. 12).

Two main reasons underpinned my choice of grounded theory as the methodological approach for exploring the how and why of nature connection as a prioritised educational outcome of EEOs in Aotearoa New Zealand. Firstly, as there was limited established theory about the topic, I believed grounded theory's focus on analytical development as grounded in the data to be highly appropriate. Secondly, I was enticed by grounded theory as a systematic and rigorous, yet flexible approach (Bryant, 2017; Thornberg & Keane, 2022); systematic through ample offering of guidelines, methods and heuristic principles for gathering and analysing data, while flexible through an inquiry process that allows for emergence and open-endedness. Bryant (2017) explains grounded theory as "an approach to research that is most certainly not ad hoc, but on the contrary, is guided by well-founded activities that have been clearly articulated in the form of a set of heuristics or rules of-thumb" (p. 90).

Charmaz (2014, p. 15) outlines the following nine actions and associated strategies as heuristics or rules-of-thumb that grounded theorists make use of:

1. Conduct data collection and analysis simultaneously in an iterative process;
2. Analyse action and processes rather than themes and structure;
3. Use comparative methods;
4. Draw on data (e.g., narratives and descriptions) in service of developing new conceptual categories;
5. Develop inductive abstract analytic categories through systematic data analysis;
6. Emphasise theory construction rather than description or application of current theories;
7. Engage in theoretical sampling;
8. Search for variation in studied categories or processes; and
9. Pursue developing a category rather than covering a specific empirical topic.

Not all authors agree to what extent grounded theory studies must account for theory generation (as per steps six to nine as above). Some scholars draw the line at action five which explicates the development of abstract analytical categories and/or themes through induction (Charmaz, 2014; Thornberg and Keane, 2022); conceptual development that may stand on its own or be of help to refine or deepen existing theory (Saldaña, 2021). While others, like Hood (2007), specify theoretical sampling (action seven) as the crucial criterion for grounded theory studies. Hood's belief is underpinned by the approach's long-held notion of theory development, requiring the collection of pertinent data to support emerging theory, in addition to conceptualisation and categorisation.

Through developing an understanding about these scholars' differing perspectives around the bottom-line intentions of grounded theory, I recognised that my aim was to take analytical development as far as I could within the bounds of the time and funding limitations of my PhD. At the minimum, grounded theory would contribute to improving conceptual clarity of nature connection and the processes EEOs undertook to educate for nature connection in the Aotearoa New Zealand context. I took heed of Charmaz's (2014) suggestion that "Perhaps your codes lead you to make a phenomenon explicit that many people experience or witness but had not yet conceptualised" (p. 140). Through my own lived experiences working as an environmental educator, I knew that connecting with nature was a term commonly and loosely used by many other educators, but I was unaware of scholarly efforts to unpack its deeper meanings or construct a framework for praxis as relevant to this specific context. From this perspective, I believe there were benefits to be derived through conceptualising nature connection and explaining how EEOs prioritised educating for nature connection. My hope was for this to provide an analytical foundation about the concept of nature connection, inform nature-based education praxis

and promote further research. It was always my objective to go beyond merely reporting the data as collected and to consider the 'So what?'. But to what extent I would theorise was uncertain, mainly due to the time limitations imposed by my PhD.

The next section accounts for how these objectives and heuristics, as original tenants of grounded theory, are incorporated through a constructivist lens.

3.3.4.2 Applying constructivism to grounded theory

Constructivist grounded theory (hereafter referred as CGT) starts by acknowledging the interpretive assumptions and beliefs that underpin it. As previously outlined in Section 3.3.1, interpretivism implies that social reality is multiple and changeable, and that the researcher's position, perspectives and interactions must be accounted for as an inherent part of the research reality. Interpretivism perceives data as situated in a particular socio-cultural context, and co-constructed and influenced by the researchers' preconceptions, knowledge, values, skills and so on. Human as instrument accounts for researcher positionality in terms of the interactions between themselves, the research setting and its participants (Lincoln and Guba, 1985). Through a constructivist turn, grounded theory's notion of 'discovering' knowledge shifts to a more reflexive approach of knowledge construction (Thornberg and Keane, 2022). Therefore, instrumental to CGT are strategies for acknowledging the influence of human as instrument on a study.

3.3.4.3 Strategies of analytical development

As highlighted previously, analytical development is a key tenet of grounded theory that distinguishes it from more general qualitative approaches. As such, a brief summary of the methods affiliated with analytical development through CGT is provided next, and then explained in more detail as part of the discussion about research design.

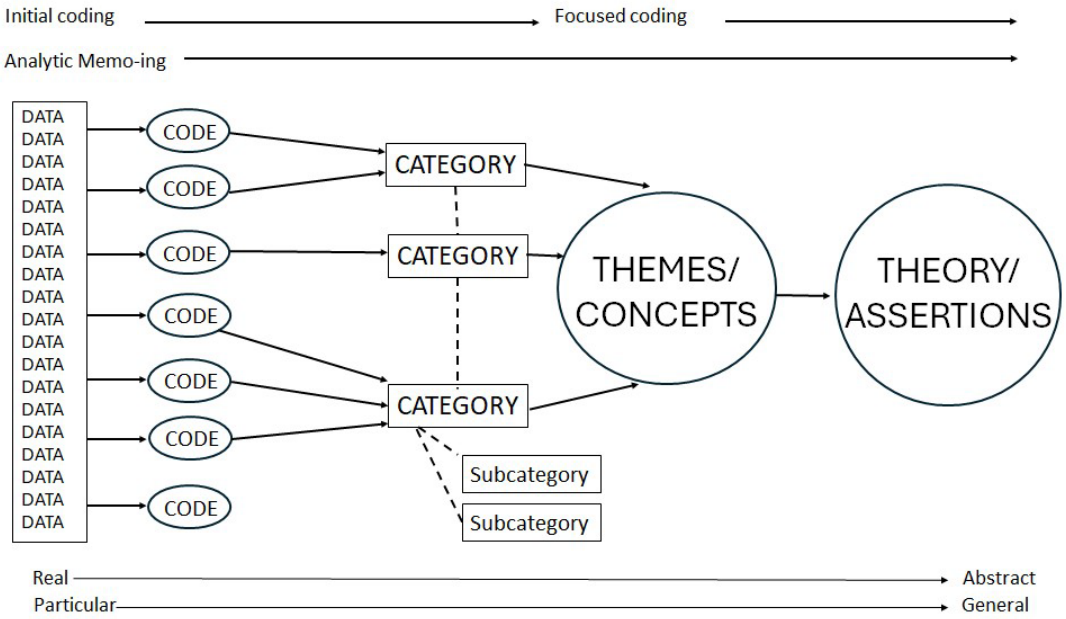
Grounded theorists seek out narratives and field settings from which they collect rich and detailed data about the context-specific phenomenon under investigation. Following data collection, analysis methods interpret and condense data into categories and themes from which meaning is constructed. The analysis process commences by coding data units (i.e., sections of the data) to interpret data and detect recurring patterns, predominantly through induction. Eventually, codes are sorted, sifted and synthesised to create categories and/or conceptualisations. Through the process of constant comparison, the interrelationships between codes, categories and concepts are developed into

analytical meaning at a higher level. This is the foundation to theory development. The broad sequence from coding to theorisation is shown in Figure 10.

Maintaining an open mind and memo-ing are two key strategies of analysis via grounded theory. Because CRT acknowledges that a researcher holds *a priori* knowledge, this methodology promotes techniques for maintaining open-mindedness as part of the inductive–abductive logic approach that is inherent in its exploratory and iterative nature (Thornberg and Keane 2022). Maintaining an open mind helps the researcher focus on what the data has to *say* rather than force-fitting data into preconceived ideas and concepts (Maykut & Morehouse, 1994). Memo-ing, or notetaking as the name implies, is another a reflexive strategy critical to CGT. Writing memos encourages the researcher to pause and ask, 'What is going on here?' and 'How can I make sense of this?' (Keane, 2015). This method provides grounded theorists with an interactive space to engage with the subjective decisions they make – from decisions about research questions and directions to pursue; choices of data collection and analysis methods; which data are selected to code; the words used to codify; and themes pursued toward theorisation (Charmaz, 2014).

Lastly, further analytical and theory development is undertaken through theoretical sampling, the final stage of a grounded theory approach. For theoretical sampling, a grounded theorist specifically seeks out people, events and/or information that illuminate and define the properties, boundaries and relevance of an emerging theoretical concept, category or theme (Charmaz, 2014).

Figure 10 *Analysis progression: From coding to theorisation*



Note: (Saldaña, 2022).

3.3.5 Section summary

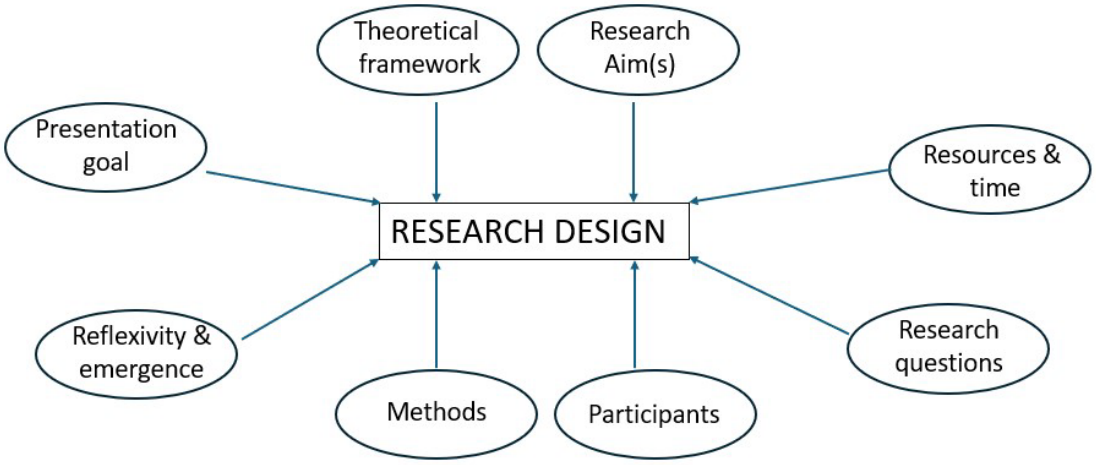
This section presented the methodological framework of the study. Interpretive philosophical assumptions and beliefs were highlighted as aligning with the study's research questions, as well as my inner reality at the time the research project commenced. Through an explanatory sequential design, quantitative and qualitative data were collected. My choice for using this design type was based on my intent to collect numerical data to measure pre-determined variables of the EEO network and identify phenomena of significance that justified further inquiry. Nature connection as an educational outcome was selected for further exploration through a CGT approach. The ways in which I applied the heuristics and strategies of CGT are discussed in the following sections about the research design of the study.

3.4 Research design

The underpinning interpretive intent of this mixed-methods study meant that its research design was governed predominantly through a qualitative approach. My goal was to generate and interpret data in a systematic, yet reflexive way. While designing the master plan for the study, a number of different components were considered (Flick, 2022). Figure 11 illustrates the key components that I took into account. I begin my discussion about the research design by setting the scene in relation to the context

in which the study was conducted and the influence my role as researcher played in carrying out the project.

Figure 11 *Key components considered for research design*



3.4.1 Research setting

My research focused on the EEO network as comprised by an organic blend of community groups, local government agencies, non-government organisations (NGO's) and social enterprise businesses. Operating across Aotearoa New Zealand, these organisations deliver EE programmes and support professional learning support (Bolstad, 2020a), as well as providing authentic learning opportunities in the environmental space (DePetris & Eames, 2018). I have anecdotally witnessed an increase in networking and collaboration between these organisations over the 15 years of working in the field. Historically, EEOs have tended to work independently, but then intermittently coming together to connect and learn from one another. The latter most often occurred through national conferences hosted by NZAEE. However, more recently, there has been a greater focus on forming local and regional hubs amongst EEOs through which individual organisations are networking and collaborating on a more frequent basis. My efforts to develop a national EEO database greatly aided steps to research-the-entity-in-context (i.e., the network) through increasing my awareness of the many different organisations operating around the country and providing opportunities to connect with regional informants through email and phone correspondence.

There were also wider features of the research setting that affected my decisions about the topic of inquiry and research design. Because my research project took place in 2021, the year following the 2020 COVID-19 outbreak and associated lockdowns, my research design accounted for the uncertainty of these

times. This equated to ensuring that all data generation methods could be undertaken online and from home if necessary. Furthermore, the data generation phase of the study coincided with national and international initiatives that drew my attention toward the paramount importance of learning from, and taking action through, an indigenous worldview for resolving unsustainability. A summary of the initiatives that caught my attention included: the sixth IPPC report (IPCC, 2022) that identified indigenous knowledges as pertinent to achieving the wide-scale shifts in attitude and behaviour for addressing climate change; in preparation for the 5th UN Environment Assembly*, Making Peace with Nature* (UNEP, 2021) highlighted the indigenous ontological perspective of the entwinement between human and environmental health; and, closer to home, a 'refresh' of a *The New Zealand Curriculum* (Ministry of Education, 2007) and *Te Marautanga o Aotearoa* (Ministry of Education, 2008) suggested the need for a more balanced approach toward the inclusion of mātauranga Māori (Māori knowledge) in teaching and learning.

3.4.2 My role as researcher

Qualitative inquiry is an interpretive act through which the researcher (i.e., human as instrument) has an omnipresent influence on the shape and outcomes of the study. Interpretivism's acknowledgement of the subjective construction of knowledge and meaning-making requires being reflexive about one's background and experiences in relation to shaping the direction of the study and final interpretation (Creswell & Creswell, 2018). A reflexive account of my role of researcher in the study is provided next.

From 2005 to 2020, I worked as an environmental educator for NGOs in the Taupō region, a township in the central North Island of Aotearoa New Zealand that is home to approximately 40,000 people. The size of the organisations that I worked for were small, limited to a handful of staff with an 'education' arm that employed one to two people at most. As often is the case with NGOs, my role entailed a broad scope, ranging from programme development, teaching, obtaining funding, and reporting.

During the early years of my career, I undertook this work predominantly on an individual basis, with my work in isolation to the work of other similar organisations. The siloed nature of my work significantly changed as a result of a study I undertook for a Master's degree in 2015. Through this research project, the 'Collaborative Community Education Model' (DePetris, 2016) was developed as a framework for building collaborative partnerships to assist schools with integrating real-life environmental and conservation contexts into their respective curricula. Working though this model significantly increased my liaisons and connections with other EEOs, both locally and nationally. During this period, I also

became involved with the NZAEE, which provided additional opportunities for networking and relationship-building. To assist with my PhD research, I drew on these connections and relationships in a number of ways. My contacts readily provided regional informants to help compile the EEO database, as well as being useful for obtaining access to interview participants through 'gatekeepers' – the individuals whose permission was required for allowing participation (Creswell & Creswell, 2018).

I believe that my interactions with regional informants, gatekeepers, and EEO representatives were enhanced through my lived experiences and understandings of EE and the EEO network. My background as a fellow environmental educator helped to establish rapport and trust through a shared language and mutual understandings of the EEO culture (Miller et al., 2012). I came into the study with awareness and knowledge of the issues and challenges that may be encountered by those working in these organisations, influencing the development of the questionnaire I would use in terms of the variables I inquired about, and the questions asked during the interviews.

To maintain good relationships, I regularly communicated with participants, providing progress updates about the study. As part of these updates, I also tried to reciprocate back to EEOs by including some items of interest relevant to EE. This strategy seemed to have worked in my favour as the response rates for the online questionnaires were ample, and I had no problems with recruiting participants for the interviews.

The direction of the study following stage one was most definitely steered by the gaps I perceived in my knowledge and personal interest. Aligned with this, I came into the study with a predisposition toward favouring outdoor learning contexts. One of my earliest memos also reveals my uncertainty about what constitutes an effective holistic approach to EE and questioning how the 'best' balance between cognitive and affective outcomes might be achieved. I have long been aware of my desire to develop EE praxis that incorporates more affective and embodied approaches. However, the education programmes I have developed over the years have predominantly focused on the cognitive domain due to organisational expectations and time limitations. Therefore, I perceive these interpersonal aspects as having influenced my choice of pursuing nature connection over other potential topics of inquiry.

3.4.3 Sampling

Before selecting a sample, it is essential to define who and what (sampling units) make up the population of a study. As no systematic study of the EEO network in Aotearoa New Zealand had previously been undertaken, my first step was to compile a database of the network (the population).

The database accounted for both governmental organisations and NGOs that provided EE programmes. Identifying relevant NGOs was undertaken through a rigorous web-based search of EEOs, and with assistance from regional informants. To focus my search, the NGOs had to meet the following criteria: 1) operating at least one EE programme, 2) specify at least one environmental learning outcome, and 3) that the programme was currently in operation at the time of undertaking the internet search. Eligible EEOs also needed to have a working email address. Based on these criteria, a total of 258 NGOs were listed on the database as EEOs.

Determining the number of governmental organisations that provided EE was more involved because some provide EE through their own organisational staff (i.e., in-house provision) while others simply contract NGOs as their respective EE provider. Demarcating the difference between governmental organisations that contract out EE versus in-house providers was important in order to avoid duplication of data collected through the questionnaire that I planned to distribute to the entire EEO population. To identify the governmental organisations that were in-house EE providers for inclusion in the database, I used the *Local Government* website (Local government in New Zealand, n.d.) to list all territorial, regional and unitary councils operating across the country (n = 77). Two central government agencies, the Department of Conservation and the Ministry of Business, Innovation and Enterprise, were also identified as potential in-house EE providers. I then phoned each of these governmental organisations to determine which organisations were in-house providers and met all three criteria as applied to the NGOs. This equated to 39 governmental organisations in total.

The EEO population (n = 297) was organised via Microsoft Excel spreadsheets, which served as the platform for the database. A separate spreadsheet was designated for each region in the country, as well as one 'multi-regional' spreadsheet. EEOs were listed on the spreadsheet according to which region they operated their educational programmes in, or in the multi-regional spreadsheet for programmes with outreach in more than one region (or nationally).The information compiled included the name of the organisation, name of their respective education programme(s), website and social media addresses and contact details of an organisational representative who was most directly involved with education. This population served as a sampling source that I repeatedly drew on throughout the study.

Non-probability sampling methods were sufficient because the overall intent of the study was to construct context-specific meanings of a social phenomenon of significance to the EEO network, rather than generalisability. Non-probability sampling techniques sees the researcher select sampling units (participants) from the population that will best help answer the research question(s) (Creswell &

Creswell, 2018). Convenience sampling and purposive sampling are the most common types of non-probability sampling (Meyer & Mayrhofer, 2022). A convenience sample is drawn from a population that is conveniently accessible to the researcher, such as in the case of the EEO representatives as identified in my database. Convenience sampling does not distinguish characteristics amongst the participants. On the other hand, purposive sampling operates on the basis that the best data generation occurs through focusing on a relatively small number of participants deliberately selected on the basis of their known attributes. With purposive sampling, the participants are hand-picked for research, often through specified criteria such as their knowledge about or experience with the topic of interest (Denscombe, 2014).

The extensive amount of time and effort that I put into developing the database and communicating with the EEO community served the study well with respect to both convenience and purposive sampling. The first two stages of the study were predominantly underpinned by a descriptive aim in relation to the pre-determined features of the EEO network. Utilising all the contacts as listed in the database, a convenience sampling strategy was employed for stages one and two with the goal of encouraging participation from as much as the population as possible (via an EEO representative). The nature of the closed questions asked through the quantitative instrument (stage one), and the brevity of only asking two open questions in the second questionnaire (stage two), were useful for 'casting a wide net' (Hesse-Biber, 2022). The sampling strategy resulted in 112 respondents for the stage one questionnaire (38% response rate) and 59 respondents for the stage two questionnaire (20% response rate). The second questionnaire also included a space for representatives to share contact details if they were interested in being interviewed about their understandings and lived experiences of educating for nature connection, through which 43 of the 59 stage two respondents indicated their interest.

The intent of the third stage looked to go well beyond exploration and description, toward explanation, conceptualisation and theorisation of the 'why' and 'how' in relation to fostering nature connection as a prioritised educational outcome by the EEO network. My familiarity and relationship with a wide range of EEOs helped maximise the potential for securing appropriate purposeful and theoretical samples based on the purposes and criteria as explained below. Importantly, all the EEO representatives selected for interviews (15/15) were known to have direct input into the development of their respective EEO programmes. Additionally, the majority of representatives (13/15) were identified as working in schools on a regular basis as part of their EEO role, and some (7/15) were identified as having previously been school teachers themselves.

In order to achieve such, my first sampling steps were undertaken through purposive selection of EEO representatives (n=7) who I believed would provide me with the most valuable information about the topic of nature connection as an educational outcome based on a broad representation of different types of EEOs and education programmes as identified through the database (i.e., the population). As shown in Table 2, my purposive selection was based on criteria associated with organisational type (i.e., governmental or non-governmental organisation in its various forms) and programme features including geographic location, demographic (i.e., rural, urban, etc.), and environmental focus (e.g., terrestrial, freshwater, etc.). Five of the initial seven EEO representatives selected for interviews had participated in stage two.

Table 2 *Respective organisational characteristics of EEO representatives selected via purposeful sampling*

Pseudonym (Interview number)	Organisational type	Regional outreach	Demographic	Environmental focus
Milka (1)	Community trust	Auckland	City, urban	Terrestrial, freshwater
Sandy(2)	Social enterprise	Northland	Urban	Terrestrial, marine
Sophie (3)	Not for profit	National	Urban, rural	Terrestrial, built
Jacob (4)	Not for profit	Auckland, Waikato	City, urban	Terrestrial, freshwater, built
Glenn (5)	Governmental organisation	Canterbury	City, urban	All environments
Tilly (6)	Partnership	Hawkes Bay	Urban	Terrestrial, freshwater, marine
Pernille (7)	Business	National	All demographics	All environments

As guided by grounded theory, theoretical sampling is influenced by emerging theory and the need to fill conceptual gaps in provisional categories (Meyer & Mayrhofer, 2022). Accordingly, research is an iterative process oscillating between sampling, data collection, coding, memo-ing and theorising (Timonen et al., 2018). Ideally, this continues until the theory is saturated (Charmaz, 2014; Glaser and Strauss, 1967). This meant that although my sampling process began via purposefully selecting EEO representatives who broadly aligned with the EEO population, it then transitioned to theoretical

sampling to build conceptual understanding in areas that I identified as needing to be probed and considered more deeply.

Following my analysis of data collected from the first seven interviewees, I deemed the following two categories as requiring more data through theoretical sampling: 1. the influence of the formal education system on students' connection with nature and 2. the integration of te ao Māori and mātauranga Māori as part of nature-based education. This saw me select additional EEO representatives (n = 8) who I believed would help me explore these provisional categories in greater depth, as listed in Table 3. Three of the eight participants selected through theoretical sampling had completed the stage two questionnaire. My criteria for theoretical sampling were based on potential participants who either self-identified as Māori, or having strong connections and/or affiliations with Māori culture through personal and/or professional backgrounds, and/or having worked as a classroom teacher.

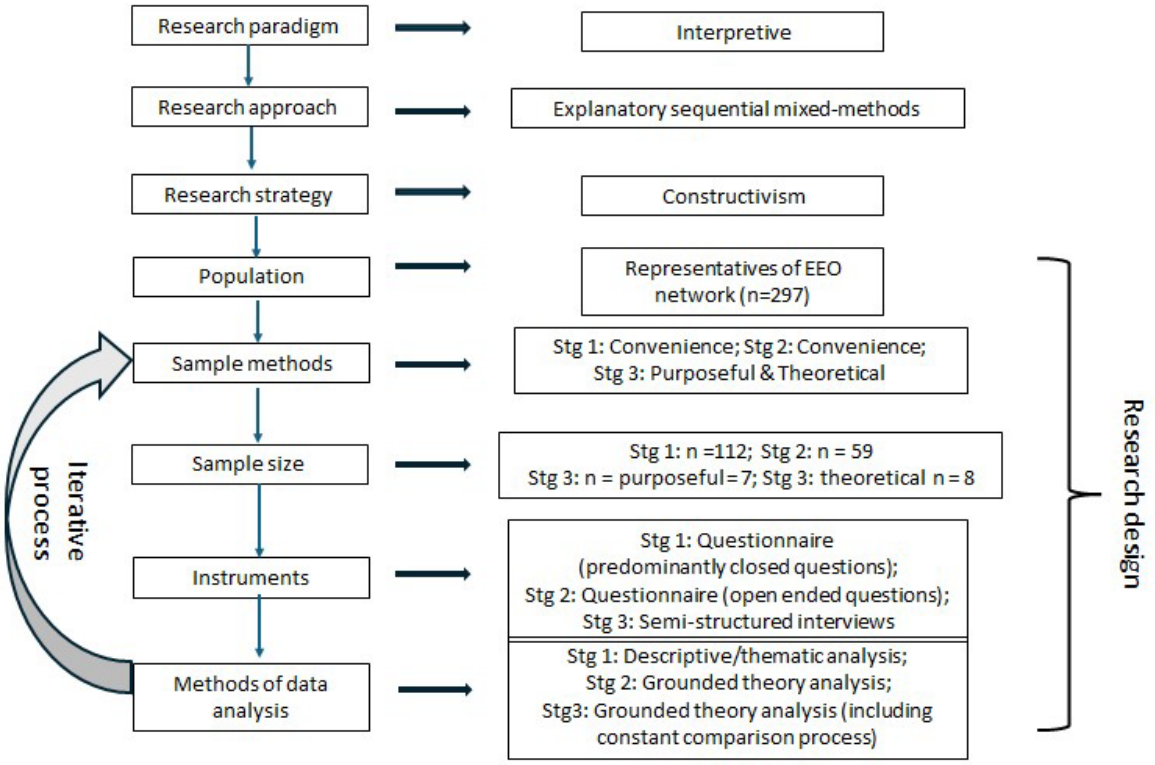
Table 3 *Personal/professional characteristics of EEO representatives selected via theoretical sampling*

Pseudonym (Interview number)	Ethnicity	Personal and/or professional experience strongly underpinned by te ao Māori	Work experience as school teacher
Atama (8)	Pākeha	Yes	No
Ian (9)	Pākeha	Yes	No
Annie (9)[11]	Māori	Yes	No
Kahu (10)	Māori	Yes	Yes
Harata (11)	Māori	Yes	No
Michelle (12)	Pākeha	Yes	Yes
Robyn (13)	Pākeha	No	Yes
Jenni (14)	Undeclared	Yes	Yes

[11] Stage three findings were reported based on data collection via 15 participants through 14 interviews. Although I had planned for conducting interviews through a one-to-one basis, Ian unexpectedly brought along his colleague Annie to our interview because he believed she would make useful contributions in addition to his own. As this was done with the best intentions, I went along with interviewing both as part of the one interview, which worked out fine as they both shared similar points of views about key discussion points in relation to their organisation and its education programmes.

To summarise this section, Figure 12 illustrates how these sampling strategies were integrated as part of the methodology and research design of the study.

Figure 12 *Overview of research methodology and design of the study*



3.5. Data collection methods

Data collection methods are used to gather information about the phenomenon being investigated. In order to answer the research questions as posed and achieve the aim of a study, it is necessary to choose the most appropriate method(s) for collecting data. As was explained in Section 3.4.2, the constructivist position of this study highlights human-as-instrument as a fundamental data collection method (Lincoln & Guba, 1985). This method recognises the consequences of the researcher's choice of methods on the outcomes of a study - "*How* you collect data affects *which* phenomena you will see; *how, where*, and *when* you will view them; and what sense you will make of them" (Charmaz, 2014, p. 26, original emphasis). The explanatory sequential mixed-methods design used in the present study aligned with the iterative nature of grounded theory and my pragmatic orientation as a researcher. This led me to collect both quantitative and qualitative data in an attempt to develop understandings of the

EEO network and nature connection as fully as possible. Qualitative approaches, like grounded theory, rely on methods that enable rich, detailed information to be collected through direct experiences with participants (Thornberg & Keane, 2022). Interviews are the most commonly selected instrument by grounded theorists (Charmaz, 2014) because of their usefulness for revealing the 'why' people do what they do – through the authenticity and candidness in relation to people's thoughts, experiences and actions (Cohen et al., 2018).

The ontological basis for the study was the need for improving understanding about some features of the EEO network, and deeply explore a phenomenon of significance to the network. With this goal in mind, I collected quantitative and qualitative data through three stages of inquiry between 2021 and 2022 (see Table 4). The data collection methods as utilised in each of the three stages are discussed next.

Table 4 *Summary of data collection methods*

Data collection methods	Purposes
Stage one Web-based field search & regional informants January to April 2021	-Create a database of known organisations that provide EE, comprised of both NGOs and governmental organisations.
Stage one Questionnaire - predominantly closed-ended questions May to October 2021	-Explore organisational and programme features of the EEO network; and -Assist with identifying a phenomenon of significance to the EEO network for further inquiry.
Stage two Questionnaire -open-ended questions November 2021 – February 2022	-Develop a broad understanding of the 'how' and 'why' of nature connection as a prioritised educational outcome of EEOs; and -Assist with the development of interview questions and purposeful selection of interviewees.
Stage three Semi- structured interviews March 2022 - April 2023	-Conceptualise 'nature connection' based on perspectives of representatives from participating EEOs; -Develop a detailed understanding the 'how' and 'why' of nature connection as a prioritised educational outcome of EEOs; and -Develop a nature-based education framework for the education system.

3.5.1 Stage one – Questionnaire (all closed questions except one open-ended text box)

In June 2021, I emailed all EEO representatives from the database a brief explanation of the study and an electronic link to the initial questionnaire (see Appendix 2). I selected a questionnaire for stage one because it is an efficient instrument for conducting research amongst populations that are spread out, as well as offering anonymity (Best & Chase, 2011).

Introductory documentation was emailed to all potential participants for each stage, providing an overview of critical points about the study and ethical considerations in relation to rights and responsibilities of the researcher and participants. A reminder about questionnaire participation was emailed to all potential respondents one week following the initial email. The questionnaire closed one week thereafter.

For those who chose to participate, the questionnaire took approximately 15-20 minutes to complete. Respondents were not required to answer every question. Of the total 112 respondents to the stage one questionnaire, 95 were representatives from NGOs and 17 from governmental organisations (equating to 85% and 15% respectively). These percentages of respondents were well aligned with the percentage of NGOs versus governmental organisations in relation to the total population of the database (equating to 87% and 13% respectively).

Questionnaires can collect both quantitative and qualitative data through structured questions (closed ended) and unstructured (open ended) questions, respectively. As guided by the first research question that sought to explore some of features of the EEO network, a quasi-type questionnaire, consisting of predominantly closed questions was developed and implemented using Qualtrics Survey software. The questionnaire was comprised of 23 questions for NGOs and 20 questions for governmental organisations; the reason for the difference in the number of questions asked is explained below as part of the discussion about Section C of the instrument. The question types included multi-choice, matrix types, a sliding scale, and a ranking-type question, and one open ended question as the last question, allowing participants to respond openly. The design of the matrix, sliding scale and ranking questions was very carefully considered because these question types are known to potentially increase measurement error due to their extra features compared to multi-choice type questions (Best & Chase, 2008; Taherdoost, 2022).

Like any data collection method, a questionnaire as instrument is shaped by the researcher in terms of their formulated research questions or hypothesis, the theoretical and conceptual frameworks used,

and the methodology of the study (Fowler & Cosenze, 2008). The pre-determined response options were developed through my own lived experiences of working as an environmental educator as part of the EEO network, and informed by a review of a priori themes highlighted in systematic reviews of EE pedagogy and outcomes (see, for example, Ardoin et al., 2018; Clark et al., 2020). My proposed response options were reviewed by my doctoral supervisors, both who have extensive experience in the field.

The questionnaire consisted of four sections for gathering information about the following topics: organisational contact details, programme characteristics, organisational structure, and an opportunity for open response. The purpose of each section is summarised below.

Section A: Organisational contact details

I gathered details about organisational and programme names and affiliated website and social media addresses. The contact details for an organisational representative who could speak on behalf of the organisation and about its education programmes were also asked for. These details added to or confirmed the programme contact details as I had previously recorded in my EEO database.

Section B: Programme characteristics

The next set of questions sought to understand the characteristics of the education programmes offered by participating EEOs. The questions collected information about the following variables: the regions that the programmes were delivered to, their target audiences, environmental areas of focus (e.g., built environment, climate/atmosphere, coastal, marine, etc.), themes of learning outcomes (e.g., biodiversity, climate change, energy, gardening, nature connection, etc.), and activities and opportunities offered by the programmes (e.g., awards and certifications, citizen science projects, community workshops, etc.).

A multi-choice question type was used for all the questions that pertained to programme characteristics. Participants could tick as many responses that applied to their organisation and programmes. A few of the multi-choice questions offered an open text box where respondents could include another response type that was not included in the original list. This was a way of overcoming the limitation imposed by the set of pre-determined responses. This feature was only integrated into questions that had a high number of potential responses and therefore made it difficult for me to list in entirety. For example, an open text box was included as part of question eight that asked about the target audiences of the respective programme.

Section C: Organisational structure

The final section asked a range of questions pertaining to the features of the organisational structure that underpinned the delivery of the respective education programme(s). Multi-choice type questions assessed the organisations in terms of the number of employees and volunteers involved in their EE programmes and the professional development opportunities offered to staff. Three matrix-type questions focused on the range of external support and assistance received by the organisations for educational purposes, and a sliding scale question sought information about the percentage of annual operational costs that had been secured for their programmes between 2021 and 2024. Lastly, all participants were asked to rank a range of pre-determined tools and assistance for supporting their education programmes, from most to least beneficial.

The questionnaire sent to NGOs differed slightly from the version sent to governmental organisations because, as part this section, three questions relating to organisational structure were asked only to NGOs. These questions related to features of organisational structure that only pertained to NGOs (i.e., established as a not-for-profit or for-profit entity), as well as the age or number of years their respective programmes had been operating. I chose to not ask governmental organisations about the age of their programme because of experiences whereby I witnessed 'in-house' programmes originating through the determination of these employees to 'find' space and resources to implement education as part of their more conventional role in the governmental organisation. I had seen how this often led to these programmes developing organically over time through a staff member who held an affinity for EE. Based on this rationale, I presumed that a question about programme age may have been difficult for some governmental representatives to answer.

Section D: Open response

At the end of the questionnaire, one open text box provided respondents with an opportunity to make comment about the survey and/or anything else they perceived as relevant to the EEO network in their own words. The open text box was introduced through this statement: "Please provide any ideas you have in relation to this survey and/or about the network of EE programmes across Aotearoa." This final question was purely exploratory, with an intent to determine whether any patterns or themes could be interpreted from the comments contributed.

The questionnaire was piloted by two PhD colleagues connected with EE from which their feedback was used to make wording adjustments and improve the flow of the instrument. Additional implications from the pilot are discussed in Section 3.7.1 in relation to validity and reliability.

3.5.2 Stage two – Questionnaire (two open-ended questions)

Over the course of 2022 and 2023, stages two and three of the study were undertaken through a qualitative approach based on the aim of developing an understanding of:

- why nature connection was reported as an educational outcome prioritised by such a large number of EEOs, including their conceptualisations of the term;
- what pedagogical approaches did they report as using to foster this outcome; and
- concepts/theory that explain their enactment of educating for nature connection in Aotearoa New Zealand.

I decided to employ a second questionnaire prior to conducting semi-structured interviews in order to canvas the broad perspectives held by EEO representatives about nature connection (see Appendix 3). My intention was to look for points of consensus and difference amongst the perspectives as shared in order to help inform avenues for questioning and probing. I was curious as to what patterns might emerge about the 'why' and 'how' of fostering nature connection through EE programmes, and how these themes compared to the literature reviewed. The questionnaire would also help me with purposeful sampling by identifying which EEO representatives seemed to have a particular interest in nature connection and who might be willing to be interviewed.

The second questionnaire was also distributed via Qualtrics Survey software to the total population (n = 297), along with a short introductory email that explained the emerging trajectory of the study. A total of 59 EEO representatives completed the second questionnaire (i.e., 20% response rate), with 43 of them indicating their interest in being interviewed in stage three.

As it was not my intention to dive too deeply into detail and nuances at this stage, the second questionnaire was simply comprised of two open-ended questions:

1. Why does your organisation believe it is important to develop nature connection?
2. How does your organisation develop nature connection and why does it do it in this way/these ways?

3.5.3 Stage three – Semi-structured interviews

I utilised interviews for stage three because I sought to gain authentic insight into the lived experiences of EEO representatives (Lincoln & Guba, 1985; Cohen, 2018) in relation to nature connection and nature-based education as part of their programmes delivered both in and outside of schools. It was through my interactions with interviewees that I hoped to gather in-depth, rich qualitative data and new insights about the perspectives and meanings they held, and the language and definitions they used, with respect to nature connection and nature-based education (Maykut & Moorehouse , 1994). The interviews were the foundation to constructing understandings about processes and actions related to the phenomenon of educating for nature connection as a social reality with underpinning cultural meanings (Kvale, 1996).

Since the participants were disbursed throughout Aotearoa New Zealand, all the interviews were conducted via Zoom (Best, 2009), except for two that were undertaken face to face due to the fact that I lived in close-enough proximity to visit them in person. I chose a semi-structured format, meaning that it utilised open-ended questions that focused on the topic at hand while providing the interactive space and time to enable the interviewee's views and insights to emerge. Semi-structured interviewing as a method is well suited to grounded theory because "it is open ended yet directed, shared yet emergent, and paced yet unrestricted" (Charmaz, 2014, p. 85).

The stage two findings, in conjunction with the literature, informed the questions for the stage three interviews (see Appendix 4). To help format questions, I utilised Patton's (2002) typology for defining the key purpose of each question, while also ordering the questions in ways that helped put the participants at ease (Kvale, 1996). Special consideration was given to developing the interview questions, which were then reviewed by my supervisors with respect to intent, clarity and the potential of bias in questioning (Cohen et al., 2018). The interview schedule was included as part of the documentation sent to potential interview candidates. When probing was required to explore themes more deeply, I used short open-ended questions for gaining depth and clarity. The interview schedule, in conjunction with the technique of probing, proved useful for obtaining rich and detailed data with adequate flexibility built-in for exploring more deeply as needed.

Disadvantages of the interview as an instrument include the potential for bias responses as caused by the researcher's presence and/or wording of questions, as well as the fact that not all people are equally articulate or perceptive (Creswell & Creswell, 2018). To improve trustworthiness, I piloted the interview

questions with two environmental educators, one whom I had previously worked with as part of a regional collaborative hub and the other whom I had met while developing the database. The aim of the pilot assessed the language, flow and timing of the interview, as well as being useful for practicing. Fine-tuning and modification of the questions was something that was not only undertaken after the pilot, but continued throughout stage three as I increasingly gained clarity about the information I was seeking and in line with the emergence of the theoretical direction of the study.

Based on a grounded theory approach, sampling in stage three consisted of two phases: a purposefully selected sampling phase followed by a theoretical sampling phase. As explained in Section 3.4.3, the purposeful sample consisted of EEO representatives (n = 7) from a diverse range of programmes who I believed could provide valuable information about nature connection based either on their responses to stage two or through my personal knowledge of their respective EEO. The theoretical sample (n = 8) was selected based on those who I thought might best help fill conceptual gaps and contribute to the evolving analytical development of the study. As a starting point for purposeful and theoretical selection, I looked to the stage two participants who showed interest in being interviewed. In the end, eight of the 15 interviewees were selected from the stage two cohort (n = 43). Although the other seven interviewees were not from this cohort, they represented EEOs as listed on the database and were aligned with stage three sampling criteria.

The length of interviews ranged from 60 to 75 minutes. During the interviews, I attempted to be involved through a non-judgmental and neutral approach, concentrating on what the participants said and encouraging rapport between myself and participants. I did take a few handwritten notes in case the recording of the interview proved faulty for some reason. I did not perceive any difference in the experience or quality of data obtained through the two different modes of conducting the interview (e.g., zoom versus face to face).

Memo-ing was important for reflexively considering the potential for bias through my EE experience and knowledge. By reflecting on my interview technique through memo-ing, I made adjustments to my technique where necessary, such as improving my articulation of questions and minimising extraneous comments that I made. As the number of interviews progressed, I found myself adapting questions to probe emerging categories and themes. As I gained confidence, I more readily followed topics as introduced by the interviewee rather than sticking closely to my interview schedule.

3.6 Data analysis methods

Data analysis involves drawing inferences, or making sense, from raw data (Wahyuni, 2012). Just as a researcher must choose an appropriate data collection method(s) that aligns with the research aims and questions of a study, so too does this apply to their choice of data analysis method(s). As highlighted in Section 3.3.3, this study used a mixed-methods approach that collected the data corpus, which included both quantitative and qualitative data types. Descriptive analysis was utilised for the stage one data set and grounded theory analysis for data sets collected in stages two and three. These two analysis methods are discussed next in Sections 3.6.1 and 3.6.2, respectively, and then followed by Section 3.6.3 which explains how analysis was undertaken in each of the three stages of the study.

3.6.1 Descriptive analysis

Descriptive analysis is a method for revealing patterns within a data set. The methods used for descriptive purposes depend on the type of data.

For quantitative data, the patterns, including regularities of a phenomenon are described in terms of variables, the measured characteristics or attributes of the subjects (e.g., individuals or organisations) under study (Creswell & Creswell, 2018). Descriptive statistics are used to summarise and describe a variable(s) from a population, while inferential statistics analyse a variable(s) within samples to make predictions about larger populations (Byrne, 2007). Some descriptive statistics commonly used to summarise data include frequency, percentage, mean, and standard deviation, amongst others. Descriptive findings can also be used to create graphs and charts to visualise the data.

For qualitative data, thematic analysis is essentially independent of theory and epistemology, and therefore can be applied across a range of qualitative approaches (Braun & Clarke, 2006). Thematic analysis draws on the process of coding to identify, analyse and report patterns (themes) within the data.

3.6.2 Grounded theory analysis

General heuristics and strategies for analysing qualitative data through CGT were briefly summarised in Section 3.3.4. Coding, memo-ing and theoretical sampling as critical methods of grounded theory analysis are explained in more detail next, followed by a discussion of their use in the present study in Section 3.6.3.

3.6.2.1 Coding

Essentially, grounded theory is a data-driven approach (Thornberg & Keane, 2022). This means that the approach prioritises an inductive process for examining the data in order to interpret patterns that are grounded in the data. Fundamental to this approach is the act of coding, when a researcher labels segments of data to depict what they perceive to be significant; as Charmaz (2014) says: "Codes sort, synthesise and, most significantly, *analyse* data" (p. 341, original emphasis). Coding can be performed either manually, for instance through the use of post it notes and coloured pens, or through a software programme like NVivo.

Because researchers do not live in an "epistemological vacuum" (Braun and Clarke, 2006, p. 84), CGT also accepts that other types of reasoning (e.g., deductive and abductive) play a minor role in coding. With this in mind, undertaking coding with an open mind as possible is vital through which grounded theorists constantly ask 'What is this data saying in relation to the inquiry?' (Timonen et al., 2018). Abduction is utilised when a researcher observes a surprising or puzzling finding through the inductive process that cannot be explained with conventional theoretical accounts. An abductive process sees the researcher developing new categories or forming hypotheses as plausible theoretical explanations (Thornberg and Keane, 2022), which are then tested for confirmation (or not) through theoretical sampling as explained more fully in Section 3.6.2.2.

CGT utilises two phases of coding: initial coding and focused coding (Charmaz, 2014, Thornberg and Keane, 2022), respectively referred to as first cycle and second cycle coding by Saldaña (2021). As part of initial coding, segments of data are given a short name that simultaneously summarises and accounts for each piece of data. The purpose of initial coding is to define what the data is about as based on the needs of the study, its data analysis process and interpretations by the researcher. Initial coding aligns with Glaser and Strauss' (1967) open coding technique of deliberately using multiple code types, helping the researcher remain as open as possible with respect to their interpretations. Miles et al. (2020) identify over 25 coding types while Saldaña (2021) profiles 29 types. For instance, a descriptive code assigns a word or short phrase, most often a noun, about the basic topic of the data segment, while an In Vivo coding type uses words or short phrases from the participant's own language in the data record. A type of coding prioritised by CGT is process coding, which uses gerunds (verbs) to highlight processes, actions and events as grounded in the data. Process coding explains what is happening in the data rather than merely describing what the data is about (Charmaz, 2014). This technique helps to move the

analysis forward, toward grounded theory's objective of identifying the things people do and their reasons for doing these things (Timonen et al., 2018).

Meanings constructed from data can differ depending on how the data is viewed (e.g., as a whole, through segments or line by line). CGT encourages line by line coding, or at least coding segmented parts of text (i.e., lumping text) as this helps reveal the nuances amongst the data as a whole (Miles et al., 2020). Charmaz (2014) explains the importance of process coding via a line-by-line approach:

> Line by line coding, […] with gerunds, is a *heuristic* device to bring the researcher into the data, interact with them, and study each fragment of them. This type of coding helps define implicit meanings and actions, gives researchers directions to explore, spurs making comparisons between data, and suggests emergent links between process in the data to pursue and check (p. 121).

The initial coding phase lays a foundation for considering possible paths to take for further analysis. As part of these early attempts to make analytical sense of the data, it is often a period when the researcher must grapple with and tolerate ambiguity (Thornberg & Charmaz, 2000).

The next phase of coding, focused coding, is employed as a means to advance the theoretical direction of the study. Focused coding serves to sift, sort and synthesis the initial codes and data in order to trim away the excess, advance some initial codes over others and devise categories that subsume some initial codes (Timonen et al., 2018). This is not simply to select the initial codes that appear most frequently in the data or go forward with the codes that are of most interest, but instead, it is about deciding which codes are most telling in terms of emerging patterns and themes as a whole. Focused coding is accomplished through a constant comparative process whereby the researcher looks for similarities and differences between data with data, data with codes, codes with codes, codes with categories/themes (Charmaz, 2014; Glaser & Strauss, 1967). The outcome of constant comparison is the construction of categories and themes that explain what the data is about from a more analytical level – in terms of actions, relationships, concepts, explanations and/or theoretical constructs. To help define focused codes, Charmaz (2014, p.140-141) poses these questions:

- What is found when initial codes are compared with data?
- What did comparisons between codes indicate?
- In which ways might your initial codes reveal patterns?
- Which codes best account for the data?

- Do the focused codes reveal gaps?

Through grounded theory, the constructed codes, categories and themes are always considered tentative and hypothetical, allowing for change through the iterative process of interviewing, transcribing, reading and memo-writing. As Thornberg and Charmaz (2014) claim, a construction as grounded in the data is "never a fixed endpoint nor an exact portrayal of the reality, but always remains provisional and open to later modification" (p.22).

3.6.2.2 Theoretical sampling

Upon construction of provisional categories as grounded in the data, CGT promotes theoretical sampling for furthering analytical and theory development. Theoretical sampling helps to define the properties, dimensions and relevance of a category: identifying the contexts in which it is relevant; exploring the conditions under which it arises, is maintained, and vary; and discovering its consequences (Charmaz, 2000).

Theoretical sampling is not about sampling randomly selected populations, nor is it to sample representative distributions of a particular population. Instead, through this sampling method, the researcher specifically seeks people, events or information that help illuminate and define the characteristics of a category (Thurgood and Keane, 2018). The goal is to collect pertinent data to explicate the category by refining and adding ideas, not increasing the size of the original sample (Charmaz, 2000). In these ways, theoretical sampling is a component of CGT's rigorous scrutiny of new theoretical interpretations.

As CGT sometimes involves abductive logic, theoretical sampling can provide a means to verify the hypothetical category or hypothesis devised by the researcher as part of theoretical construction. The method of memo-ing is a critical part of the abduction process as it informs the theoretical sampling as required and increases the level of abstraction of ideas.

3.6.2.3 Memo-ing

Writing memos is an essential method of CGT's iterative process of data collection and analysis (Glaser and Strauss, 1967; Thornberg & Charmaz, 2014; Timonen et al., 2018). Broadly, memo-writing provides a space for researchers to engage in the research process actively and reflexively through recording insights, asking questions, working through hunches and developing ideas (Maykut & Morehouse, 1994). More specifically, in relation to analytical development, grounded theorists use memos to explain their

rationales for their choices of code types and names; make comparisons between data and codes; and examine their reasoning for advancing certain code over others toward categorisation (Thornberg & Keane, 2022). Overall, memo-ing promotes analytical development early in the research process, encouraging researchers to think more deeply about the meanings they are constructing through their choices of sampling and coding.

Writing memos relies on spontaneity rather than formality. Memos are written in informal language for personal use, using whatever style of writing and/or drawing best advanced analytical thinking (Charmaz, 2014). Memos should be recorded throughout the entire research process, and digitally stored in a memo bank, filed by key topics (Saldaña, 2021). Early memos tend to be short and include analytical questions and hunches to follow up; over time, they become longer, more comprehensive and conceptual (Thornberg & Keane, 2022).

3.6.3 Data analysis methods as utilised

Stage one

I analysed the stage one data set to explore features of the EEO network in Aotearoa New Zealand. Descriptive analysis was selected because it allowed for the data set to be described and summarised in a meaningful way, and illuminate patterns within the data. As the stage one questionnaire collected both quantitative and qualitative data, these two data types were analysed separately. There was no attempt to make correlations between any of the data.

I commenced analysis by downloading the entire data set as collated by Qualtrics Survey software into Microsoft Excel spreadsheets. Data from each question was collated into an individual spreadsheet, which was then screened and cleaned for errors that may have occurred through transferring the data. Descriptive statistics were employed to analyse all responses (quantitative data) to the closed ended questions about programme characteristics and organisational structure. Microsoft Excel was used to tabulate frequencies and/or percentages in relation to the key variable pertaining to each question. The results were visually depicted via graphs.

The one open-ended question provided a space for participants to comment on any topic of relevance to the questionnaire. Their responses were copied into a Microsoft Word table, comprised of two columns and a row for each response. The left-hand column included each respondent's comment verbatim and the right-hand column used for coding. These qualitative data were analysed inductively

via thematic coding using a Descriptive Code type to summarise the inherent meaning of a passage of data through a word and/or short explanatory phrase (Saldaña, 2021).

As a way of familiarising myself with the data, I began by reading all responses and highlighting key words to generate a list of ideas (i.e., tentative codes). Then starting from the first row, I systematically coded each response. To assess inter-rater reliability, the qualitative data were also independently coded by my two supervisors. We used this exercise to evaluate the degree of consistency between our codes and determine consensus about potential code names. Two coded responses are shown in Table 5 as an example.

Findings from the quantitative and qualitative data illuminated some features of the EEO network that were significant to the participating organisations. As explained in Section 3.3.3, it was a subjective decision of mine to select the topic of nature connection for further inquiry, after which three new research questions were developed and used to guide the inquiry undertaken in stages two and three.

Stage two

Grounded theory analysis offered a more comprehensive and in-depth analysis process than compared to the descriptive analysis method used in stage one. For this reason, the approach was employed to develop context-specific theory about nature connection as an educational outcome prioritised by EEOs in Aotearoa New Zealand. The ways in which I used grounded theory analysis techniques and strategies are explained next.

For research guided by CGT to be considered trustworthy, the researcher must acknowledge the subjective nature of the research process. This starts by making an effort to tune into the ways their own biases and preconceptions may be influencing what they are trying to make sense of, and to strive for maintaining an open mind over the course of the entire study. In order to achieve this, I undertook an epoche process prior to analysis. According to (Katz 1987, as cited in Maykut & Morehouse, 1994):

> Epoche is a process that the researcher engages in to remove, or at least become aware of prejudices, viewpoints, or assumptions regarding the phenomenon under investigation. Epoche helps enable the researcher to investigate the phenomenon from a fresh and open view without prejudgement or imposing meaning too soon (p. 123).

Table 5 *Example of thematic analysis of data from the stage one questionnaire*

Please provide any ideas you have in relation to this survey and/or about the network of EE programmes across Aotearoa.	**Code name (in *italics*) and explanation**
The EE community currently benefits from passionate people who see the need and are therefore often prepared to receive considerably less financial remuneration than they would get in other areas of education or other industries. It would be helpful to have a formal network and greater recognition of the importance EE facilitation for the future health of our youth and our planet.	*Funding* - generosity of believers, prepared to work for less *Network* – community of providers need this *Visibility* - greater recognition of the importance of EE *Benefits* – health of youth and planet
Programmes vary from year to year; nothing carries over automatically as it depends on funding. Most schools level of participation [is] in [the] environment. Learning in coastal environments is very haphazard and ad hoc, no guarantee of participation. Be good to coordinate all the various groups and create a vision and plan with clear objectives, funding, and reaching out to involve a wider cross section of the community. Getting community buy in, and involvement does require a plan. Education of the community is required. Ultimately the target is to enhance our environment, maintain diversity and health.	*Funding* - programme sustainability varies year to year, depends on funding *Implementation* – school programmes in the environment *Network* – needing to coordinate/collaborate *Collaboration* – develop shared vision; objectives, funding strategy *Implementation* – impact wider cross section of community *Benefits* – environmental health and diversity

Through memo-ing, I documented my reflexivity through the epoche process. In a memo titled 'Epoche – stage two', I recorded these thoughts about my potential influence on the stage two findings:

> I am soon to begin initial coding of the data collected from 59 respondents. Prior to doing so, I am enacting a process called epoche or what Maykut and Morehouse (1994) refer to as a short reflection of my prejudices, viewpoints, assumptions regarding the phenomena of interest. My personal reflections about the two open-ended questions as part of the second questionnaire are as follows.
>
> In relation to the first question, I ask: Why does your organisation believe it is important to develop nature connection?, my assumption is that EEOs will focus on nature connection because they *believe* [original emphasis] that without experiencing nature, one cannot love nature, thus, one will not protect nature. For this reason, nature connection is a core of their work because they *value* [original emphasis] nature as demonstrated by the choice of what they do for a living. They might also identify the increasing urbanisation of New Zealand as a threat to nature connection. Something they must try to resolve?
>
> The second question asks: How does your organisation develop nature connection in learners and why does it do this in these ways? from which my assumption is that they will say they achieve this through a variety of hands-on experiences and that they do it in this way because hands-on is more engaging and memorable than learning information.

Through undertaking epoche, I became aware of my own assumptions about what themes I expected to identify in the data. This helped to foster open-mindedness by sharpening my interest about what other understandings and perspectives might be grounded in the data that differed from my own. It also encouraged me to be on guard when I did identify themes in the data that aligned with my own thinking. Consequently, I found myself repeatedly asking 'Is this *really what the data is saying*?'(Timonen et al., 2018, emphasis added).

Prior to coding, I once again transferred the data from Qualtrics Survey software to a Microsoft Word table where I entered my codes. This time though, instead of typing codes directly into the document, I manually wrote the codes into the right-hand column of a printed copy of the table. From this point, I decided to manually code the qualitative data because, to be honest, I was feeling slightly overwhelmed

coming to grips with the grounded theory analysis process that focused on an iterative process, going between interviewing, initial coding, memo-ing and reading; followed by a phase of focused coding, through which the constant comparison process compares data to code, code to code, code to category, category to category, category to theme, theme back to the data etc. (Saldaña, 2021). I decided that the last thing I wanted was for my "mental energies […] more focused on the software than the data" (Saldaña, 2021, p. 45).

I took heed from the grounded theory scholars (Charmaz, 2014; Glaser & Strauss, 1967; Miles et al., 2020; Saldaña, 2021) for using multiple code types during the initial coding phase. This saw me trialling seven different code types at the start of stage two; which helped to increase my understanding of the benefits of each code type and how they might assist (or not) with analysis. Eventually, I settled on predominantly using Process Coding, In Vivo coding, and Values Coding, in addition to the Descriptive Coding type I used in stage one. A summary explanation of these additional code types, as informed predominantly by Saldaña (2021), is as follows:

- Process Coding - Uses gerunds ("ing" words) exclusively to connote action in the data. Simple observable activity (e.g., learning, listening, doing) and more general conceptual action (e.g., encouraging, negotiating, feeling) are identified through this coding type;
- In Vivo Coding - Words or phrases from the actual language found in the qualitative record. By using the words of the participants themselves, researchers are more likely to capture the meanings inherent in people's experiences. In Vivo coding is always used for grounded theory as this helps to ensure data is grounded in the data; and
- Values Coding - Reflects a participant's values, attitudes and beliefs, representing his or her perspectives or worldview. Values coding distinguishes between values, attitudes and beliefs by the use of this format as part of coding - V: (value), A: (attitude), and B: (belief).

In line with Charmaz (2014), I found Process Coding to be particularly useful because it emphasised the meanings behind the lived experiences and actions of the EEO representatives. It felt to me that my data was enlivened by focusing on actions and processes. Tables 6 and 7 provides examples of coded excerpts from the stage two questionnaire, from questions one and two respectively.

Table 6 *Example of initial coding of data collected from stage two questionnaire (question one)*

Why does your organisation believe it is important develop nature connection?'	**Code**	**Coding Type**
We believe that people are more likely to care for nature when they have a relationship with it, or a sense of belonging.	Caring- arises from relationship with nature/sense of belonging	Process
Being in connection with nature is only way to feel we are part of nature. That we are one with nature.	"We are part of nature"	In Vivo
We believe that nature connection is important because most of the problems facing the world come from humanity's disconnection from nature. This disconnect has led to indifference toward other species and the planet and the climate crisis.	Disconnection is a cause of unsustainability	Values: (Belief)
Nature immersion provides a medium through which meaningful education can occur. Education in nature is relevant, engaging and more easily meets the key competencies of the NZ Curriculum that classroom-based education.	Nature immersion = engaging, relevant educational context	Description

Table 7 *Example of initial coding of data collected from stage two questionnaire (question two)*

How does your organisation develop nature connection in learners and why does it do it in this way/these ways?	**Code**	**Coding Type**
Here we have a strong connection to our moana and awa. With iwi collaboration we ensure we tell stories of the local whenua, flora and fauna.	Story telling - local iwi stories	Process
With open, honest communication and visiting animals and regenerating land and also going to the forest on the farm and taking the time to be still and listen to nature speak to us.	"Taking the time to be still and listen to nature speak to us"	In Vivo
We believe that nature connection is a complex endeavour related to a variety of social and environmental factors in a person's development. Not all people will connect with nature in the same way or to the same degree.	Fostering nature connection is a complex process	Values: (Belief)
We develop nature connection through hands-on experiences.	Hands-on experiences	Description

Because maintaining an open mind was prioritised as part of initial coding, I never specifically looked to pre-conceived concepts from the literature for code names, but instead, relied on my own words or words from the respondents to define what was happening in the data. Member checks of my

interpretation of code names and construction of analytical categories and themes (Lincoln and Guba, 1984) were undertaken by my doctoral supervisors at various stages of analysis for all qualitative data collected in the study.

The development of themes from the stage two data was expedited by limiting focused coding to a discovery mind mapping process (Maykut and Morehouse, 1994), and therefore, excluded the constant comparison process. Instead, I simply wrote each code on a sticky note and then organised them into thematic groups on poster paper. This mind-mapping process was my first attempt at constructing provisional categories and themes through the codes. These were memo-ed as follows:

- Human disconnection from nature is a significant cause of degradation and unsustainability. Therefore, nature connection is a key solution to promote regeneration and sustainability.
- Nature connection helps people 'know' nature.
- Nature connection develops a relationship with nature, e.g., sense of kinship with it.
- Nature connection results in outcomes, e.g., understanding issues, love/care of nature, a sense of oneness with nature, awareness of interconnectedness, feelings of awe, wonder, curiosity of nature.
- Relationships with nature also has direct benefits, for both the individual and community, e.g., wellbeing, socialisation
- Developing nature connection occurs through a variety of experiences. Most often hands-on, local experiences:
    - Connecting/being in/playing
    - Sensing/feeling
    - Learning/understanding
    - Exposing to issues/taking action/restoring
    - Relating/belonging
- Access to nature is critical for developing nature connection.

From these provisional themes and categories, I generated a list of questions to explore more deeply through the interviews with EEO representatives. Some of the questions memo-ed were:

1. What are the causes of the disconnection between humans and nature? Historical and present.
2. How does developing nature connection align with stages of childhood/adolescent development?

3. What educational experiences result in nature connection? And which ones disconnect? What equates to having access to nature?
4. What are the implications for schooling in terms of developing nature connection? How can nature connect be fostered continually throughout all levels of formal schooling?

Although not every question I memo-ed was included on the interview schedule, they served as ideas for prompts. Overall, I was satisfied that the stage two questionnaire had served its purpose: 1. identifying conceptual notions and ideas in relation to nature connection and nature-based education for further inquiry through the interviews, 2. obtaining contacts for potential interview participants and 3. enabling me to trial some strategies of grounded theory analysis.

Stage three

The interviews that I conducted in stage three were interspersed with transcription via Otter software (verbatim), initial coding and memo-writing (Thornberg &Charmaz, 2000). Whenever I could, I completed initial coding and memo-ing before undertaking the next interview.

I coded manually using the same code types as described for the stage two analysis. But instead of copying the data into a Microsoft Word table, each interview transcript was formatted to include a right-hand column, approximately five centimetres wide, for writing code names. Although Charmaz (2014) recommends coding transcripts line by line rather than lumps of data, I selected the latter technique due to the sheer amount of data that I expected to compile. I took on other coding tips from Charmaz such as keeping codes simple and precise, moving quickly through the data, and emphasising processes and actions.

After each transcript was coded in full, and I memo-ed a list of significant codes, concepts, categories or themes I perceived as 'telling' in relation to what the data was about, reflecting on 'What are the recurring words, phrases, and topics in the data?' and 'What concepts capture what the interviewees say they think or do?'. Figure 13 illustrates a word cloud that I generated from the recurring words and codes identified in the first five interviews. Lastly, as suggested by Saldaña (2016, p. 42), I completed a summary sheet of questions for synthesising key points of each interview, including subjective questions (e.g., what intrigued me about discussion points arising in the interview, what disturbed me etc.).

Figure 13 *Recurring codes: First five interviews*

The transcripts were emailed to the participants for their review over a two-week period, while I also clarified any questions that had arisen during transcription. By the seventh interview, few additional codes were being generated, suggesting data saturation (the point where no new content is emerging from the data (Thornberg & Keane, 2022). I prepared for focused coding by transcribing each code onto an individual, coloured sticky note, along with a numerical formula so that I could easily locate the code back to the interview excerpt. Like Maykut and Morehouse (1994), I refer to these notes herein as unitised cards. I also earmarked some of the unitised cards when the respective code was derived from a passage of data that held potential to be used as a direct quote, providing evidence of my interpretation. Through a constant comparison process (Glaser & Strauss, 1967; Lincoln & Guba, 1985; Thornberg and Keane, 2022), each unitised card was considered in relation to one another, aiming to construct conceptual categories and themes as grounded in the data.

Once I had collated approximately ten colour-coded cards for a provisional category/theme, the data and codes were used to write a propositional statement or rule for inclusion (Maykut and Morehouse, 1994). A propositional statement is one that conveys the meaning that is contained in a group of unitised cards; they help determine which additional cards can be added to the pile. These statements help to suggest what was being learned about nature connection and nature-based education, illuminating what participants experienced, believed, thought, and valued about these phenomena. For example, I constructed the theme ‘knowing nature’ as part of the ways in which participants

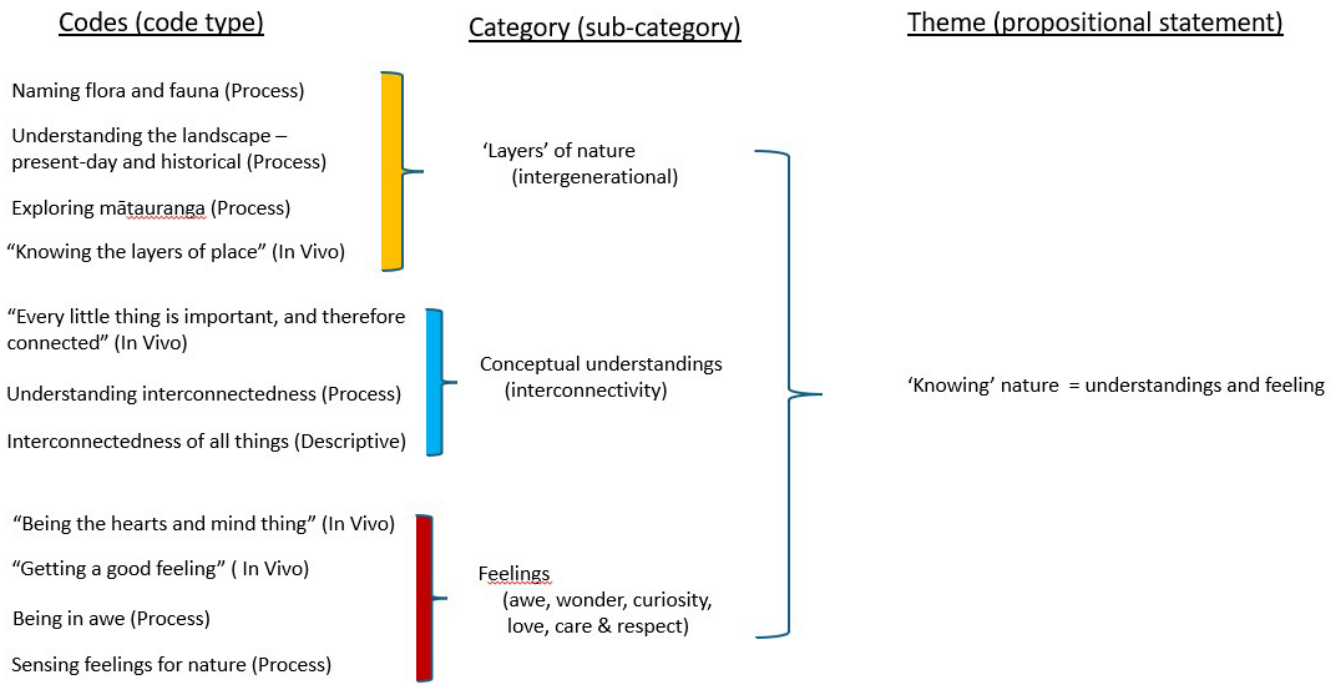
conceptualised nature connection and memo-ed its propositional statement as ‘through nature connection, people come to understand and feel for nature’. Figure 14 illustrates how this theme and its propositional statement were constructed through a selection of codes and categories. If a unitised card was deemed not to fit with a provisional category/theme, the card was temporarily set aside to be revisited for inclusion at a later time, or eventually explored as a negative case.

Once the constant comparison process was completed, discovery mind mapping helped to piece together the emerging provisional concepts, categories and themes and identify any gaps in the data set needing to be filled through theoretical sampling. Each theme was written on an individual sheet of poster paper with the relevant sticky notes roughly arranged in relation to key concepts/categories. As the mind mapping progressed, I developed a sequential outline of the themes and categories and added a numerical code to each unitised code to reference its place within the outline.

Two key areas of data gaps were identified. Firstly, six of the seven initial interviewees highlighted the integration of te ao Māori (Māori worldview) paramount to educating for nature connection in the Aotearoa New Zealand context. However, none of these participants were Māori nor were they willing to speak on behalf of Māori culture, which resulted in large gaps in the data set about the ‘why’ and ‘how’ of te ao Māori with respect to nature connection and nature-based education. Secondly, I abductivly generated the the theme ‘schools as mechanisms of disconnection’, as some of the data and emerging categories illuminated participants’ perceptions of negative impacts on students’ connection with nature through formal schooling. The data from the first seven interviews definitely supported this theme, but more detail was needed to build the theme’s properties and boundaries. Accordingly, theoretical sampling of eight other EEO representatives generated additional data to assist theory generation with respect to these two themes. Six of the eight EEO representatives selected as part of the theoretical sample either self-identifed as Māori or as having worked for EEOs with education programmes strongly underpinned by Māori ways of knowing and doing, while four of the eight had worked as classroom teachers as part of their careers in education. The following two questions were added into the original interview schedule:

1. How do you think the formal education system influences students’ beliefs, understandings of and relationship with the natural world, positively and/or negatively?
2. What can non-Māori learn from te ao Māori that might help increase their connection with nature?

Figure 14 *From codes to categories to themes*



I looked to further develop the two themes as highlighted above through the data collected from interviewing the participants selected as part of the theoretical sample.

Upon reflection, I now see ways in which I could have improved my analysis process. I definitely was slightly overwhelmed by the amount of data that I generated and worked with through the iterative process as described above. In hindsight, I made the mistake of repeating most of the original interview questions with interviewees from the theoretical sample in addition to the two new questions posed. Instead, I should have focused much more extensively, if not completely, on collecting data that would have more comprehensively filled the conceptual gaps around the two emerging themes of te ao Māori and schools as mechanisms of disconnection. Equally important, rather than writing memos whenever the mood struck, I would have scheduled specific time for memo-ing focused on analytical development. I think this more consistent approach would have better served my ultimate purpose of theorisation. Lastly, having now developed a clearer understanding about the CGT analysis process, I would also look to utilise software, like Nvivo, to help increase the breadth and depth of coding going forward.

3.7 Criteria of rigorous research

All research, whether undertaken through a quantitative, qualitative or mixed-methods approach, should be open to critique (Roberts et al., 2019). Authors must demonstrate that the data and subsequent findings were rigorously obtained and are an accurate portrayal of the phenomenon investigated because "without rigour, research is worthless, becomes fiction, and loses its utility" (Morse et al., 2002, p. 2). For mixed methods studies, the researcher demonstrates rigour through the criteria of reliability and validity of its quantitative measures, and the criteria of trustworthiness for qualitative results. In this section, I outline how these criteria were applied in the study.

3.7.1 Validity and reliability

The consideration of validity and reliability is crucial to ensuring accuracy and consistency of the research results derived through quantitative approaches (Cohen et al., 2018). Hence, validity and reliability were considered for the stage one questionnaire. Validity assesses whether what is meant to be measured is measured, while reliability refers to the degree of consistency and reproducibility of the data measurements (Knapp & Mueller, 2010). Cohen et al. (2011) highlight that "threats to validity and reliability can never be erased completely; rather the effects of these threats can be attenuated by attention to validity and reliability throughout a piece of research" (p. 133).

Several types of validity and reliability apply to different research designs (Wiersma & Jurs, 2009). In this study, construct validity and statistical validity were most applicable. Construct validity refers to the degree to which the instrument accurately measures the theoretical construct it set out to measure, while statistical validity refers to the accuracy of the statistical tests used to analyse the data (Knapp & Mueller, 2010). Reliability is best ensured when instrumentation is carefully considered and protocols established for consistent measurement (Wiersma & Jurs, 2009). An instrument is referred as reliable when it has the ability to produce consistent and reproducible results (Knapp & Mueller, 2010). Together, validity and reliability provide readers with confidence that the conclusions drawn from the quantitative data are reliable, accurate and align with what the study intends to measure.

The stage one questionnaire aimed to provide a snapshot of the EEO network through convenience sampling, a type of non-probability sampling from which reproducibility cannot be assured (Meyer and Mayrhofer, 2022). Nevertheless, strategies were put in place to enhance validity and reliability of the instrument for the purposes of capturing the reality of the EEO network at the time the research was

undertaken. Discussing and agreeing to key elements of the research design with my two doctoral supervisors was paramount, which included defining research questions clearly and logically, designing the questionnaire instrumentation carefully, and analysing data using appropriate statistical methods. Pilot testing the questionnaire and assessing for its inter-rater reliability were vital to framing the flow and questions of the instrument, during which time consensus was reached about how the questions were likely to be interpreted by respondents. Ongoing communication with regional informants and EEO representatives during the development of the database helped ensure an ample sample size.

Two limitations of the stage one questionnaire threatened measurement error. As part of designing the questionnaire, I attempted to balance encouraging participation with measures of validity and reliability. This led me to allow participants to skip questions that they did not wish to answer, which might have led to fewer respondents answering certain questions. In hindsight, respondents may have been encouraged to at least attempt to answer if they could not have simply skipped over a question; a 'not sure' pre-determined response option could have been included. Similarly, because I wanted as many EEOs as possible to participate, I chose to pilot the questionnaire on two colleagues who, although familiar with EE, had never worked for an EEO. Their feedback was useful with respect to the wording and flow of the instrument, but they, nor I, noticed that the questions focused on reporting about a singular education programme even though some EEOs operated multiple education programmes. As a consequence, not every EE programme of the participating EEOs would have been captured by the instrument.

3.7.2 Trustworthiness

For qualitative research approaches, trustworthiness is an umbrella concept aligned with the quantitative assessment criteria of validity and reliability. Introduced by Lincoln and Guba (1985) as a means of assessing the rigorous nature of interpretive inquiry through qualitative approaches, trustworthiness considers the following four criteria: credibility, transferability, dependability and confirmability. Each criterion is explained below, along with an overview of the ways each were utilised as contributing toward the trustworthiness of the study.

Credibility describes the congruence of findings with reality (i.e., whether the constructed realities of participants are authentically represented) (Coe et al., 2021). Prolonged engagement in a naturalistic setting is identified as a significant contributor of credibility because it helps to ensure that the researcher understands the context, minimising the chance of misinterpretation and misconstruction

(Lincoln and Guba, 1985). Through my prolonged engagement with the EEO network as developed through 15 years of working as an environmental educator, I had established relationships with many affiliated organisations and educators and became familiarised with the culture of the network. Additionally, the three-staged, sequential design of the study provided me with ample opportunity to research-the-entity-in-context. Credibility was also fostered through the methods and strategies utilised in the study. Triangulation of different data collection methods consistently demonstrated nature connection and nature-based education as phenomena of significance to the network. The inductive process ensured codes were interpreted from the data while the In Vivo Code type enabled me to directly report the written (stage two) and spoken words (stage three) of participants. Member checking involved returning the transcripts to participants to confirm that the transcription fully represented their perspectives and the key messages they had hoped to construe. Ten of the fifteen participants replied back to me post-interview, affirming the accuracy of the transcript or to make minor changes. A few interviewees maintained intermittent contact over the course of the study, corresponding about topics or events that related to the topic of nature connection. Through analysis I continued to take steps to increase credibility by looking for opportunities to pursue negative cases or aspects of the data and my interpretation that were not congruent with emerging findings. Examples of my interpretations were intermittently peer-reviewed by my doctoral supervisors and discussed with colleagues.

Transferability considers how easily the findings could be generalisable or applicable to other contexts, situations, times and populations (Coe et al., 2021), although generalisation is not the aim of interpretivism. As Lincoln and Guba (1985) state: “It is, in summary, *not* the naturalist’s task to provide an *index* of transferability; it *is* his or her responsibility to provide the *data base* that makes transferability judgements possible on the part of potential appliers” (p. 316, original emphasis). My interpretation and analysis of the data collected from a diverse and adequately-sized population of EEOs and respective representatives have been reported in the findings and conclusions. This included qualitative data collected from: 1) 59 EEO representatives to develop a broad understanding of the ‘why’ and ‘how’ of educating for nature connection through the stage two questionnaire, and 2) generating rich, detailed data about this phenomenon through interviewing 15 participants in stage three. Through my interactions with these participants, “thick descriptions” (Lincoln & Guba, 1985, p. 125) about nature connection and nature-based education were generated. These results, in conjunction with my own perspectives as shaped through my lived experiences as an environmental educator, suggest that the findings may be representative of the EEO network in Aotearoa New Zealand.

The criterion of dependability verifies the methodological detail and reflexivity in the research design and implementation (Coe et al., 2021). Presenting an audit trail demonstrates the processes used in the inquiry, and therefore, the plausibility of the researcher's interpretations and construction of meanings. An audit trail is comprised of physical records stemming from the inquiry. As informed by Lincoln and Guba (1995) my audit trail comprised:

1. raw data, including spreadsheets of questionnaire results, recordings of interviews and transcripts;
2. data reduction, including tables of coded qualitative data, unitised cards, and memos in relation to methodological objectives (i.e., reflexivity, methodology, emerging themes, etc.);
3. data reconstruction and synthesis products, including evidence of categorisation, a final report with findings and conclusions linked to existing literature and integration of concepts, relationships and interpretations; and
4. instrumentation development information, including questionnaire templates, interview schedules, pilot documentation and some examples of relevant correspondence undertaken with participants.

This audit trail evidence demonstrated my use of a consistent methodological approach as underpinned by the interpretive paradigm, and congruence between the research questions, methods and strategies (Morse et al., 2002). The dependability of the study was enhanced through being conscious of the reasons for my selection of different methodological components, in conjunction with continual discussion with my peers and doctoral supervisors.

Confirmability ascertains the extent to which the interpretations and meanings generated through a study are grounded in the data while also highlighting the influence of the researcher's subjectiveness (Lincoln and Guba, 1985). Reflexivity and memo-ing were two techniques I utilised to establish confirmability of the study (Morse et al., 2002). Firstly, reflexivity saw me strive for open-mindedness as well as reflecting on my own position and background with regards to how these might influence the research process and subsequent findings. Obviously, my background working for EEOs, and my passion for the outdoors and interacting with nature played a significant role in influencing how the study emerged over time. Undertaking inquiry about nature connection aligned with my ontological orientation that perceived education of a *holistic* nature as most important to securing a more sustainable, regenerative future. Undertaking epoche before coding increased my awareness of my presumptions about what I was likely to notice in the data, while also encouraging me to look for the

unexpected. Secondly, memo-ing as part of my audit trail documented both the research process (as described above in relation to dependability) and subjective aspects of the product itself (Lincoln and Guba, 1985). This included recording topics of interest to me during the data collection, and my personal rationales for coding and categorisation choices. My subjective influence on the study was most clearly evident in my choice to focus on nature connection over other phenomena of significance as reported through findings of the stage one questionnaire. Thereafter, the emergence of unanticipated themes over the course of analysis in stages two and three confirmed that the findings went beyond researcher bias to accurately represent the experiences and voices of the participants. Evidence of this is found in my attention to seeking negative cases to pursue aspects of the developing analysis that were less initially obvious, and utilisation of abduction and theoretical sampling for proposing themes not yet fully accounted for in the raw data.

3.7.3 Ethical considerations

Having discussed criteria of rigour pertaining to quantitative and qualitative approaches, ethical considerations are now discussed as a criterion paramount to all research. Munhall (1988) suggests rigour as founded "on a profound reverence for human beings and their experiences" (p. 1). It is through ethics that we protect the human subjects that are fundamental to interpretive inquiry. Ethical considerations shift the focus of the research process "from the needs of the project to those of the key stakeholders: the participants, the researcher, the research organisation and the scientific community, as well as the broader public" (Walter, 2013, p.73). As explained next, the ethical considerations as applied in the study accounted for the principles of respect, competence, responsibility and integrity (Braun & Clarke, 2021).

Before commencing the study, ethical approval was granted by Te Kura Toi Tangata Division of Education Ethics Committee on 11th January 2021 (see Appendix 5). As informed by The University of Waikato's ethical conduct guidelines, my ethical competency extended to ensuring the research process was conducted to the best of my ability, was culturally respectful, and worthy of the time given by individual participants, the academic community and the wider community. With the support from my doctoral supervisors, reflexivity heightened my awareness and practices of ethical matters.

The development of the EEO database provided an opportunity to gain access to potential participants. Contact details as recorded on the database were those that could be found through a web-based search, and therefore, were not sensitive information. However, I still emailed all database contacts via blind carbon copy the information about the study. The research information documentation always included

a summary of the study's purpose and aims, progress to date and an explanation of ways to participate, including rights and responsibilities of both researcher and participant. One of the most critical objectives of this information was to highlight the rigorous and transparent nature of the research process and that there was complete freedom to participate or decline.

For stages one and two, the rights and responsibilities of the participants were outlined on the information documentation as:

1. Your participation in this research project is voluntary.
2. If required, you will seek permission from your employer before participating.
3. Information (data) will be collected through completing the survey.
4. You will own the raw data, though the researcher, Thea DePetris, will own the interpretation and analysis of the data.
5. Once you complete the survey, you may withdraw any or all data within the following two weeks. To do this, contact me using the contact details provided below.

The information also explained that by submitting a completed survey, they were providing their informed consent to me for using any data, findings or conclusions for the specified use of my thesis, and any associated publications and presentations. A direct link to the respective questionnaire was included in the introductory email.

As part of the purposeful sampling undertaken in stage three, potential participants were initially contacted individually via email or phone. I specifically made mention to potential participants that they should feel absolutely no pressure to participate and acknowledged the likelihood that participating would be on top of already full schedules. Nevertheless, everyone who I contacted agreed to be interviewed. Following the initial contact, I emailed the research information documentation, which included an indicative interview guide of proposed questions. The rights and responsibilities as listed on the stage three information sheet were the same as outlined above for stage two, but also explained that they could withdraw from the interview process at any time and withdraw or amend their transcript up to two weeks after receiving it. The email correspondence between myself and the participants for the purposes of scheduling our interview was saved as their informed consent.

Respecting participants and protecting them from any harm that might occur through the research process was a significant component of my ethical considerations. Respecting participants takes into account their individual rights, cultural differences and the potential for any power dynamics (Braun,

2021). Addressing confidentiality and anonymity is significant to protecting individual rights. Confidentiality relates to keeping private the shared experiences and information exchanged between the researcher and participants, while anonymity are the actions the researcher uses to protect the identity of participants when speaking about the data or using it as quotes in the research outputs (Arifin, 2018). Participants were informed that information collected from both stage one and two questionnaires would be kept confidential and reported anonymously. In stage three, confidentiality was assured. However, although each participant was given a pseudonym, anonymity could not be promised. This was due to the small and connected nature of the EEO network, and therefore, there was a chance of a reader being able to recognise some detail about a representative or their respective organisation in my interpretation of the data or a verbatim quote. Participants were advised to take this into account when choosing what information they wanted to share.

The power dynamics that may be at play as part of the relationship between the research and participants is as an ethical consideration. The goals must be to ensure mutual respect between the researcher and the participants and also taking account of the authority over knowledge and the value of that knowledge (Miller et al., 2012). As discussed in Section 3.4.2, while I repeatedly drew on my professional contacts and relationships with different organisations and individuals from the EEO network for purposes of the study, I was aware of potential issues that can arise when one researches in their 'backyard'. The term backyard is explained by Glesne and Peshkin (1992) as referring to researching one's own organisation, friends or immediate work setting. As such, I aimed to minimise power dynamics by being sensitive and vigilant with respect to bias and perceptions of unequal relationships of power. Useful techniques included building rapport with interviewees through my on-going stream of dialogue that I prioritised as part of the study. Furthermore, I approached each interview with an open-mind and on the basis that the EEO representatives held knowledge through their lived-experiences that I sought to explore. I believe that the backyard participants knew me as a fellow colleague who held equal, or potentially even less knowledge and authority around matters of EE.

Cultural respect ensures respecting differences of one's worldview and ways of living (Miller et al., 2012). Aotearoa New Zealand is culturally diverse, and the participants, especially those selected through theoretical sampling, reflected Māori (the indigenous culture) and European as the predominant cultural influences in the country. Cultural respect was identified in my introductory statements during the interviews through which I acknowledged my gratitude for the diverse experiences and opinions that participants brought to the interviews; later, as part of theoretical sampling, I pointed to the emergence

of te ao Māori as significant to the analytical direction of the study. I approached each interview with intent to learn from and meaningfully apply the diverse voices of the interviewees (Pelzang & Hutchinson, 2018). The open-ended questions provided space for participants to reflect and answer in culturally appropriate ways.

In summary, based on the principle of integrity, my aim was to engender trust and confidence in the research process through the ways I conducted the study. This included not only the criteria of rigour as described in Section 3.7 as a whole, but also the safe storage of the participants' data. Hardcopies and written material were kept in my personal home office while electronic data was saved on my computer, the University of Waikato cloud and on an external hard drive, all password protected.

3.8 Chapter summary

As stated in the introduction to this chapter, credible research must demonstrate rigour, and rigorous research requires methodological transparency. For this reason, the methodological framework of the study was fully examined herein.

The chapter began by re-stating the overall aim of the study, which was to explore organisational and programme features of the network of EEOs operating in Aotearoa New Zealand. Next, the philosophical underpinnings of interpretivism were discussed as being those that most aligned with this aim, the research questions and my interpersonal reality at the start of research project. Interpretivism was deemed most appropriate because the focus was to develop socially-constructed knowledge through the understandings, perspectives and lived experiences of EEO representatives. As such, social reality in the study was framed as subjective, value-laden and context specific.

The research design of the study took into account the context from which the research was positioned, my influence as researcher, and practical and ethical considerations. By accounting for these factors, an explanatory sequential research design, based on mixed-methods, was employed. The design intentionally made space for emergence, from which three stages of inquiry evolved. Stage one of my inquiry commenced through a wide lens, developing a national database of EEOs from which I distributed a questionnaire to collect predominantly quantitative data. Descriptive analysis demonstrated some phenomena of significance to the EEO network, from which I narrowed my inquiry to EEO's prioritisation of nature connection as an educational outcome of their respective programmes. Subsequently, two new research questions were developed for deeply exploring with EEO representatives the 'how' and 'why' around the enactment of educating for nature connection.

These questions led me to iteratively collect and analyse qualitative data in stages two and three via a CGT approach, respectively through a second questionnaire (open-ended questions) and semi-structured interviews. Through a constructivist lens, reflexive strategies for acknowledging the influence-of-human as instrument were included as critical components to the methods employed through the study's research design. Two phases of coding were undertaken (manually) through CGT analysis, being initial and focused coding. After trialling a range of coding types in stage two, I proceeded to use Process Coding, In Vivo Coding, Values Coding and Description Coding. Discovery mind mapping and a constant comparison process served to sift, sort and synthesis the data and initial codes in order to trim away the excess, advance some initial code, and construct categories and themes. Theoretical sampling was utilised to further develop properties and boundaries of developing categories and themes, while memo-ing served as a crucial method in terms of both reflexivity and analytical development. The outcomes and outputs of the study were well suited to my pragmatic orientation that sought to contribute to the field both practically and theoretically.

The last section of the chapter described measures put in pace to enhance the validity and reliability of findings derived through quantitative data, trustworthiness of findings constructed from qualitative data, and ethical considerations as applied.

Next, Chapter Four presents findings in relation to the first research question that sought to describe some organisational and programmes features of the EEO network. Chapter Four is the first of four chapters dedicated to presenting the findings of the study.

Chapter Four - The landscape of environmental education organisations

4.1 Chapter introduction

Having presented my methodology in the previous chapter, the purpose of the next four chapters (Chapters Four - Seven) presents the findings of my inquiry. The findings as reported in this chapter were derived through the data collected and analysed in stage one and situate the study by answering the first research question: What are some organisational and programme features of the current environmental education organisation landscape in Aotearoa New Zealand? Aligned with the explanatory sequential research design of the study, I also demonstrate how I used the stage one outputs and findings to inform the direction of further inquiry.

I begin by providing an overview of a significant output of the study, a national database of EEOs in Section 4.2. The database identified a population (n = 297) of non-government organisations (NGOs) and governmental organisations that implement environmental education (EE) programmes at local, regional and national scales. The database represented the population from which I repeatedly drew samples over the course of the inquiry. I then present findings about some programmes and organisational features of the EEO landscape as identified through the stage one questionnaire. As described in Section 3.4.3, the questionnaire was designed and distributed through convenience sampling to encourage as widespread participation as possible. A total of 112 EEOs responded to the stage one questionnaire, equating to a 38% response rate from the identified population. Accordingly, the findings as presented, within reason, are representative of the total population, and provide a 'snapshot' of the EEO landscape at the time when the inquiry was undertaken.

The stage one questionnaire (see Appendix 2) comprised four sections from which data were collected for the following purposes: confirm contact details of EEOs (Section A); develop an understanding about the characteristics of their respective EE programmes (Section B) and underpinning organisational structures (Section C); and provide an opportunity for participants to make comment about the questionnaire and/or anything else they perceived as relevant to the EEO network and EE programmes (Section D). This questionnaire aimed to provide a systematic description of the EEO landscape and identify potential lines of future inquiry about the network itself and/or the ways these organisations might better support schools and communities. Accordingly, no effort was made to establish correlations during the analysis process.

Herein I report the results of the analysis of the data collected via the questionnaire that identify some defining features of the EEO landscape. Sections 4.3 and 4.4 respectively highlight the characteristics of EEOs' programmes and underpinning organisational structures, including summary statements at the end of each section. As part of presenting these results, I explain in Section 4.4.1 my reasoning as to why a couple of questions were asked to NGOs only but not to the governmental organisations. I also address in Section 4.4.5 some inconsistencies in the results derived through the data collected from question numbers 20 and 21, which pertained to EEO funding. Thereafter, Section 4.5 reports the findings that I interpreted from my analysis of the qualitative data collected through question number 23 about topics/issues of relevance to EEOs. Section 4.6 explains the reflective process I undertook as part of analysis to inform the rest of the inquiry. Chapter Four is summarised in Section 4.7.

4.2 Database of environmental education organisations

The national EEO database compiled through this study included both NGOs and governmental organisations identified for providing EE programmes in Aotearoa New Zealand. In total, 297 organisations met the criteria that I established for identifying appropriate organisations to be included as part of the study (as explained in Section 3.4.3). The population of EEOs as listed on the database consisted of 258 NGOs and 39 governmental organisations.

Microsoft Excel spreadsheets were used as the platform for the database, with a separate spreadsheet designated to each region in the country. The database also included a spreadsheet for programmes that operated across regions or at a national scale. Accordingly, 232 organisations were listed on a regional spreadsheet and 65 organisations listed on the multi-regional/national spreadsheet. The following information was recorded in the database for every EEO listed: name of the organisation, name of respective education programme(s), website and social media addresses, and contact details for an organisational representative who was most directly involved with its education and outreach programme(s).

Once the database reached saturation (i.e., no new organisations were consistently identified), I deemed it complete and proceeded to the next step: distributing the stage one questionnaire. Nevertheless, I continued to maintain the database throughout the study, adding newly identified organisations and noting any programmes that ceased its operations. I color-coded these amendments in the spreadsheet to keep track of the changes. From May 2021 to November 2023, an additional 59 programmes were listed on the database while six programmes previously listed were earmarked as ceasing operation - two of these six having operated at a national scale. In Appendix 6, the spreadsheet

of EEOs operating in the Northland region is provided as an example of the database. Although the contact information for the organisational representatives at the time was readily available through a web-based search, these details have been obscured as a matter of privacy to these individuals going forward.

As mentioned previously, the database not only served as a sampling source for the study, but was also used by the New Zealand Association of Environmental Education (NZAEE) in 2021 as the foundation for building their own database (New Zealand Association of Environmental Education, 2021).

Using the contacts as listed in the database, a link to an online questionnaire was sent to all EEOs. The findings as derived through the analysis of the data collected through this instrument (Sections B-D) are presented next.

4.3 EE programme characteristics

Section B of the stage one questionnaire sought information about the following characteristics of the EE programmes as operated by participating EEOs: regional outreach, target audience/s, number of participants, environmental area/s of focus, theme/s of learning outcomes and learning activities and opportunities. In total, 95 representatives from NGOs and 17 representatives from governmental organisations participated in the stage one questionnaire. The findings in relation to these characteristics of the programmes operated by participating EEOs are presented in this section. Not every organisation responded to every question in the questionnaire. The number of EEOs who responded to each question (e.g., n = #) is indicated in the notes below each graph.

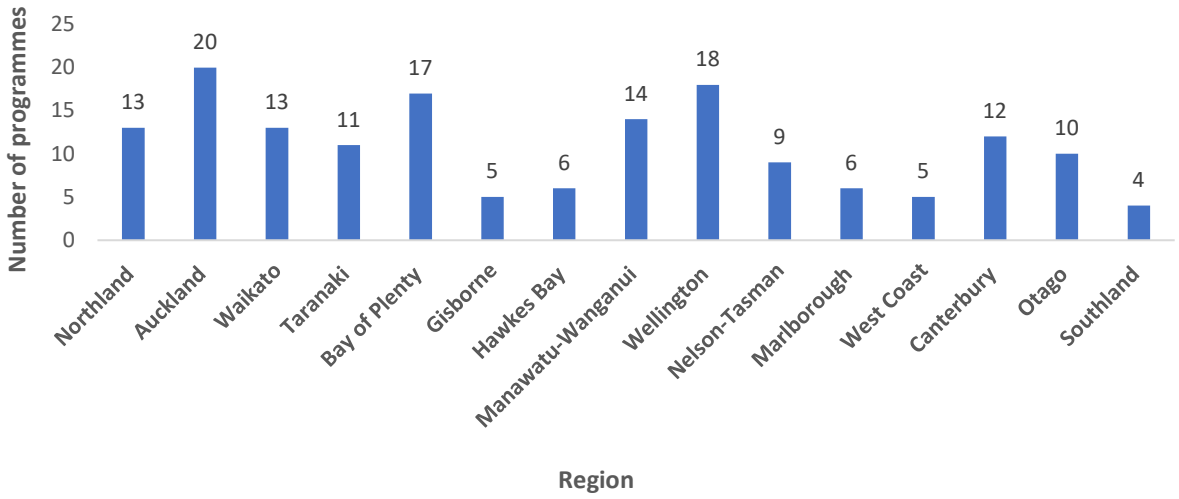
The sub-headings within this section are comprised of a phrase that summarises the theme of each question asked through the questionnaire, followed by the question stated verbatim; thereafter the key findings are discussed. Some findings are illustrated through only one figure of the data, pertaining to both NGOs and governmental organisations, while other findings are illustrated using two figures - one representing the data from the NGOs and the other for governmental organisations.

4.3.1 **Reported number of EE programmes per region**

Which region(s) in Aotearoa does your programme deliver to?

Figure 15 shows the number of EE programmes operating per region as reported by participating EEOs (both NGOs and governmental organisations). Although the total number of participating EEOs in the questionnaire was 112, the total number of reported EE programmes was 163, meaning some EEOs operate across multiple regions or at a national scale.

Figure 15 *Reported number of EE programmes operating per region*



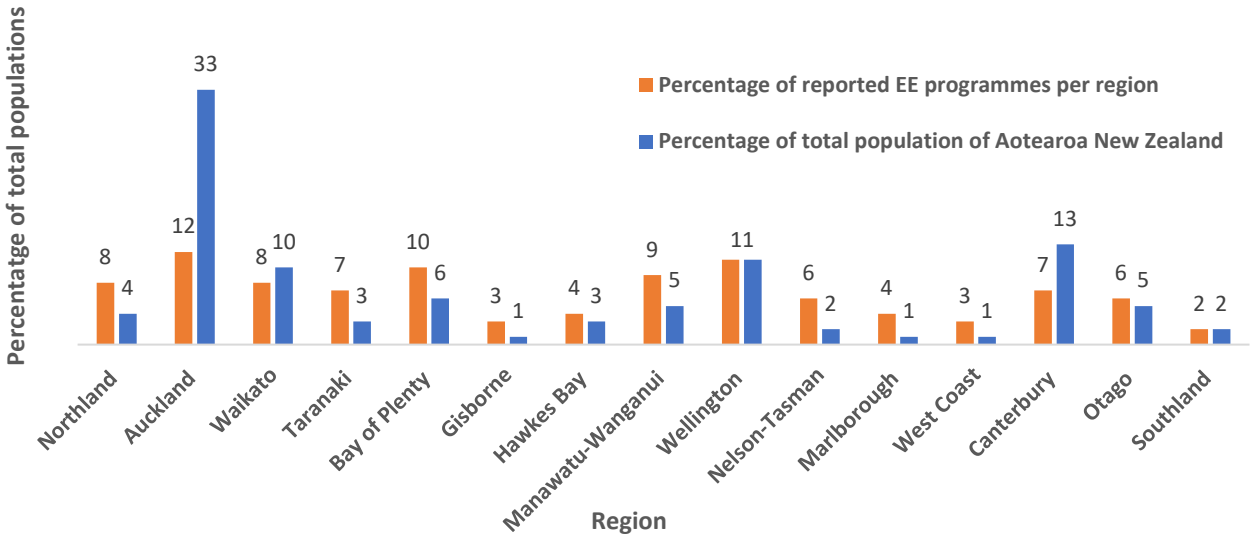
Note: Total number of reported EE programmes (n = 163), NGOs (n = 95), governmental organisations (n = 17)

The number of programmes reported per region was then calculated into a percentage in relation to the total reported number of programmes. Figure 16 provides a visual comparison between the percentage of EE programmes reported to operate per region versus the percentage of regional population in comparison with the total population of Aotearoa New Zealand (Census, 2018).

Figure 16 as a proportional graph demonstrates whether the number of EE programmes in a region were underrepresented, overrepresented, or equally represented in comparison with the regional population level. As an explanation, equal representation equates to when the percentage of EE programmes in a specific region is equal to the percentage of the region's population within Aotearoa New Zealand (e.g., Wellington); overrepresentation when the percentage of EE programmes is higher than the percentage of regional population (e.g., Bay of Plenty); and underrepresentation when the percentage of EE programmes is lower than the percentage of regional population (e.g., Auckland).

The results demonstrate that the EE programmes were underrepresented in Auckland, Waikato and Canterbury, three of the four most populated regions in the country; while Wellington (the other most populated region) and Southland (with one of the lowest population levels) had approximately equal representation between EE programmes and its population. The other ten regions were identified as having an overrepresentation of programmes in relation to their respective poplulations.

Figure 16 Reported percentage of EE programmes per region versus regional population



Note: Percentages derived from comparison of reported total EE programme population (n = 163) and total population of Aotearoa New Zealand (n = 4,699,755).

A limitation to these results is the fact that the impact of the reported programme outreach cannot be ascertained because no correlation was made between respective programmes with the number of participants. With this limitation recognised, the analysis of the data broadly suggests that the most populated regions have comparatively fewer EE programmes than regions with smaller populations, albeit Wellington and Southland being the exceptions. These results can also be considered in light of the fact that while developing and maintaining my database over an approximate one-and-a-half-year period, I identified the closure of eight EE programmes, two of which were known for significant national outreach. The impact of this uneven, and often fluctuating pattern of organisations and programmes in relation to the provision of EE across the country is discussed further in Chapter Eight.

4.3.2 Target audiences

Who are the target participant(s) of your programme, at which educational level(s)?

NGOs as a whole reported working with all four proposed audience types (e.g., students, teachers, school management, wider community) to some degree, whereas government organisations reported mainly targeting students and teachers. The results demonstrated that EE programmes of both NGOs and governmental organisations more frequently targeted the primary (5 – 10 years old) and

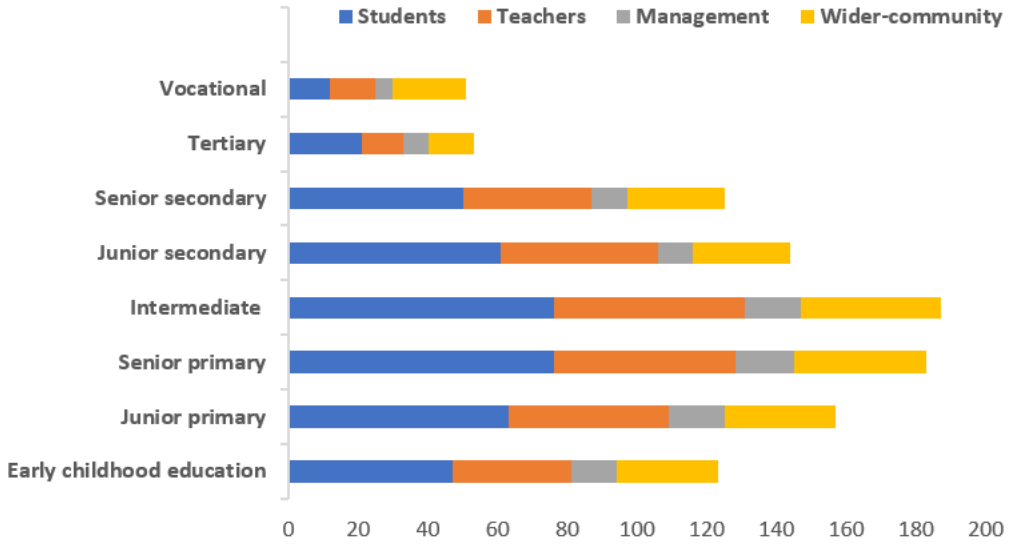
intermediate (11-12 years old) educational levels, as shown in Figures 17 and 18, respectively. Working at the tertiary and vocational levels was the least common for both types of organisations. These findings may be indicative of NGOs being underpinned by a more open organisational structure through which they have greater opportunity and/or freedom to work with a wider array of participants and contexts than their governmental counterparts.

4.3.3 Number of participants

For each year listed, approximately how many total participants were involved in your programme?

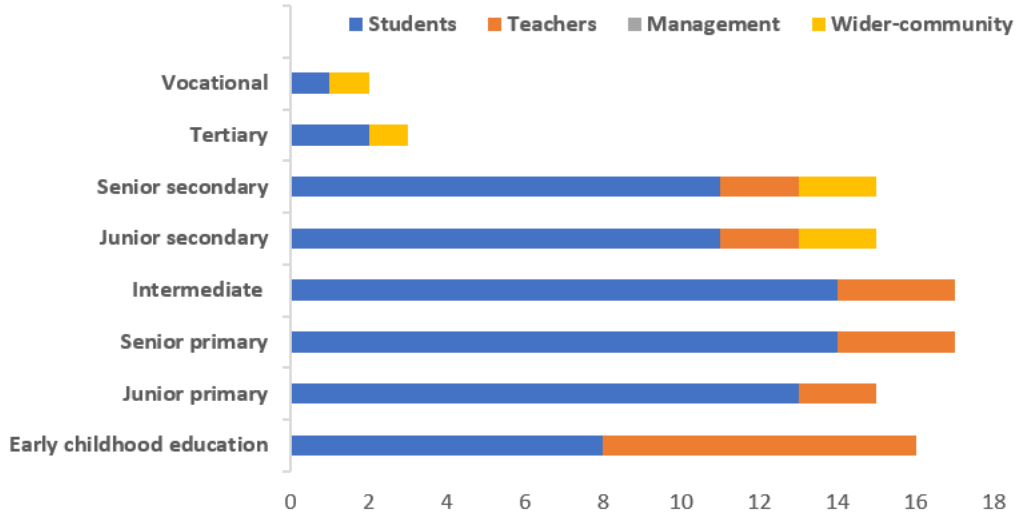
Figures 19 and 20 showcase the total number of participants in EE programmes per year, requested as between 2018 to 2020, as reported by respondents. From this point forward, I categorise the size of the programme with the reported number of participants per year (i.e., small programmes involving 1-500 students/year; medium programmes involving 501-1,500 students/year; and large programmes involving greater than 1,500 students/year). The majority of EEOs (both types) reported running small programs more frequently than medium or large ones. The data about programme size showed the greatest deviation in 2019 for NGO programmes, indicating a drop in the number of small programmes compared with an increase in medium-sized programmes. Considering the data, the deviation was presumably the result of some of the 2018 small programmes growing into medium programmes in 2019. The operation of programmes based on number and size did not look to have been negatively affected by the Covid-19 outbreak in 2020.

Figure 17 *Target participants of NGOs' at different educational levels*



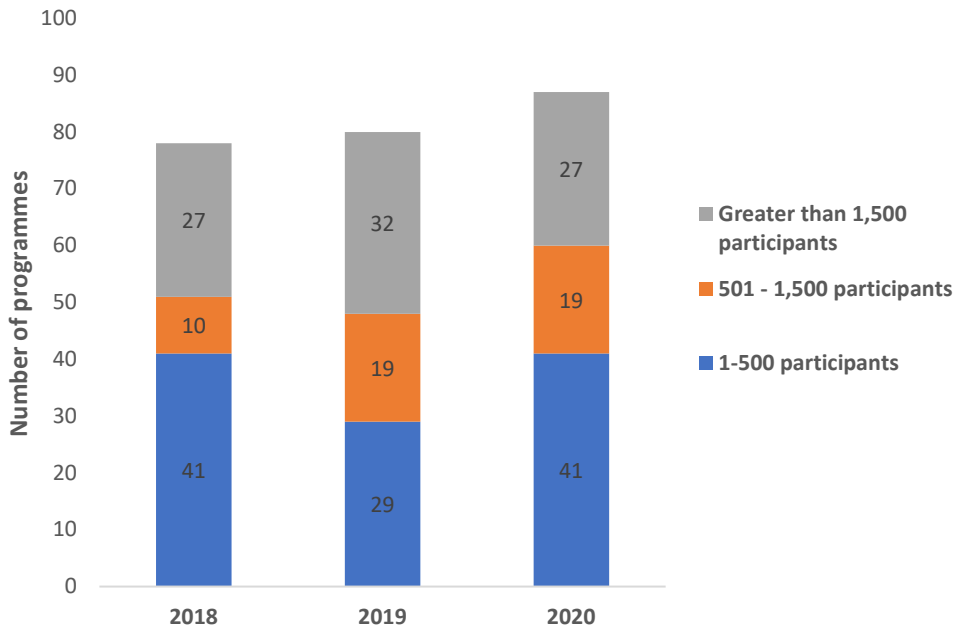
Note: NGOs (n = 95)

Figure 18 *Target participants of governmental organisations' at different educational levels*



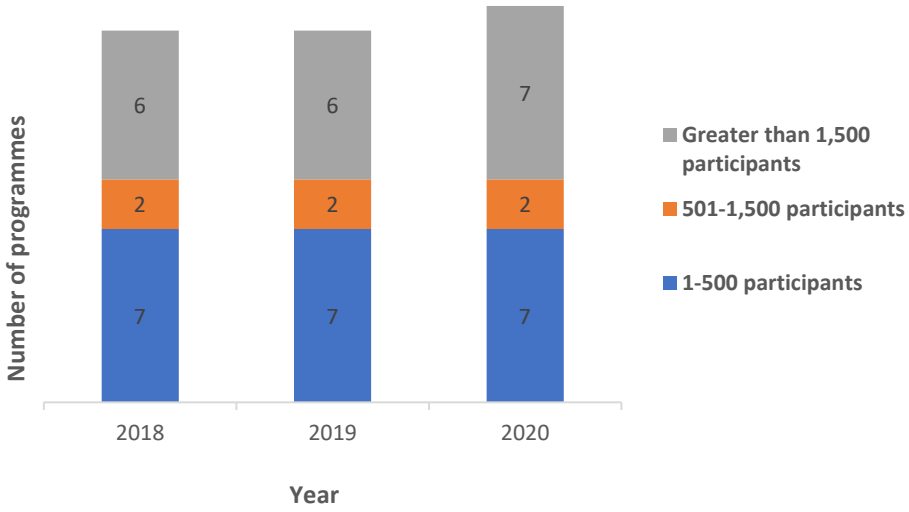
Note: Governmental organisations (n = 17)

Figure 19 *Reported number of annual participants in NGOs' EE programmes - 2018 to 2020*



Note: NGOs (n = 95)

Figure 20 *Reported number of participants of governmental organisations' EE programmes - 2018 to 2020*



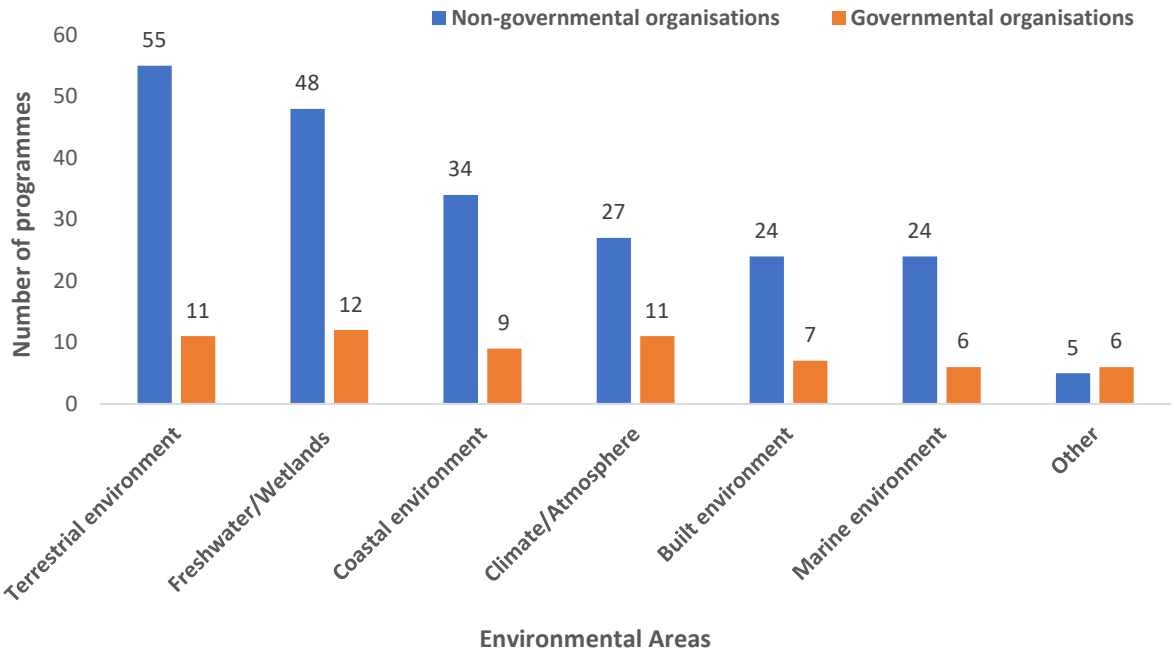
Note: Governmental organisations (n = 17)

4.3.4 Environmental areas of focus

Which environmental area(s) is a focus of your programme's learning outcomes?

Figure 21 demonstrates terrestrial and freshwater/wetland environments as the environmental areas focused on the most through the EE programmes of both types of organisations. The marine environment was focused on by the least number of programmes. Respondents who ticked the other option tended to give an example in the open text box that did not align with an environmental area of focus, but instead related to a sustainable living outcome (e.g., sustainable transport) or an educational theme (e.g., student-led action).

Figure 21 *Environmental areas of programme focus*



Note: NGOs (n = 94) and governmental organisations (n = 17)

4.3.5 Themes of learning outcomes

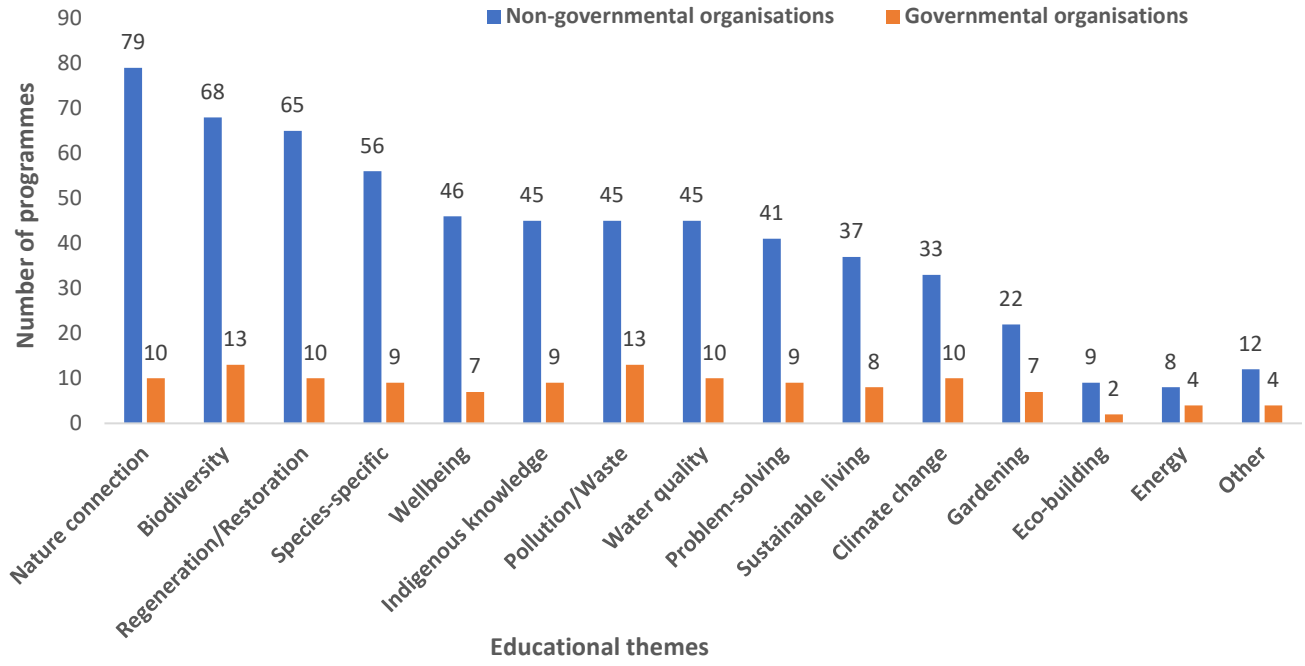
What theme(s) is a focus of your programme's learning outcomes?

As illustrated in Figure 22, the greatest number of NGOs prioritised the learning outcomes associated with nature connection, biodiversity, regeneration/restoration and species-specific as part of their programmes; all four learning themes can be considered as interrelated with respect to their association

with non-human nature species and elements of the natural environment. Similarly, biodiversity (as well as pollution) was prioritised by the most number of governmental programmes.

For both types of organisations, themes of gardening, eco-building and energy were prioritised the least. Respondents who ticked other tended to use this response option to include explanatory detail about the themes prioritised by their programme. For example, an organisation which ticked regeneration/restoration as an educational theme of their programme also ticked other and added "Predator Free 2050" in the accompanying open text box.

Figure 22 *Educational themes of learning outcomes*



Note: NGOs (n = 93) and governmental organisations (n = 17)

4.3.6 Learning activities and opportunities

What learning activities and opportunities are offered by your programme(s)?

Figure 23 shows in-school support, learning resources, field trips and teacher professional development opportunities were the types of learning support and activities offered by the most number of respondents, for both NGOs and governmental organisations. Significantly fewer programmes offered environmental clubs/teams, awards/certification, youth workshops, ecological audit/footprint

calculations and funding provision. Again, respondents who ticked other often included explanatory detail in the open text box about the learning support and activities offered through their respective programmes. One governmental organisation that ticked learning resources also ticked the other option and stated in the open text box that "engaging stakeholders is another type of support we undertake for ensuring that schools and the wider community are aware of the learning resources offered through our programme". Furthermore, in relation to learning resources, the analysis of data collected from the last question (open ended) of the questionnaire corroborated the development of learning resources as a significant endeavour for the EEO network.

Figure 23 *Learning support and activities offered by EE programmes*

Note: NGOs (n = 93) and governmental organisations (n = 17)

4.3.7 Summary of reported EE programme characteristics

The predominant characteristics of the EEO's EE programmes were as follows:

- A likelihood that the landscape and outreach of the programmes is unevenly distributed across the country;
- Primary and intermediate school-levels were the most targeted audiences, while tertiary and vocational levels the least targeted audiences;
- In relation to programme number and size, small programmes were more common than medium and large programmes. COVID-19 did not look to affect the number of programmes. In fact, the total number of reported programmes in 2020 increased by 14; mostly small programmes accounting for the increase.
- Terrestrial environments were the focus of the most number of programmes, while marine environments were the focus of the least number of programmes;
- Learning outcomes associated with the non-human nature species and elements of the natural world, like those associated with nature connection and biodiversity, were prioritised by the greatest number of NGOs and governmental organisations, respectively. Other educational outcomes that I had perceived as more prevalent in media and educational policy of recent times, like climate change and well-being, were prioritised by fewer programmes; and
- In-school support and development of learning resources were the types of learning activities offered by the most number of EEOs; while awards/certifications, audit/footprints and provision of funding were offered by the least number of EEOs.

4.4 EEO organisational structure

Data about the organisational structure of EEOs were also collected through the stage one questionnaire (Section C). This section begins by presenting information about organisational features that were only relevant to participating NGOs, such as whether they identified as a not-for-profit or a for-profit entity, Thereafter, the section reports on organisational features applicable to both NGOs and governmental organisations, which included the number of employees and volunteers involved in their respective EE programmes, professional development opportunities offered to staff, and external assistance and support received, including funding provision. Lastly, findings are presented in relation to a question that asked participants to rank tools and assistance for operating their EE programme(s), and their responses to an open-ended text box allowing for comments about any topic they deemed relevant to the EEO network and its respective programmes.

4.4.1 Organisational features asked only of NGOs

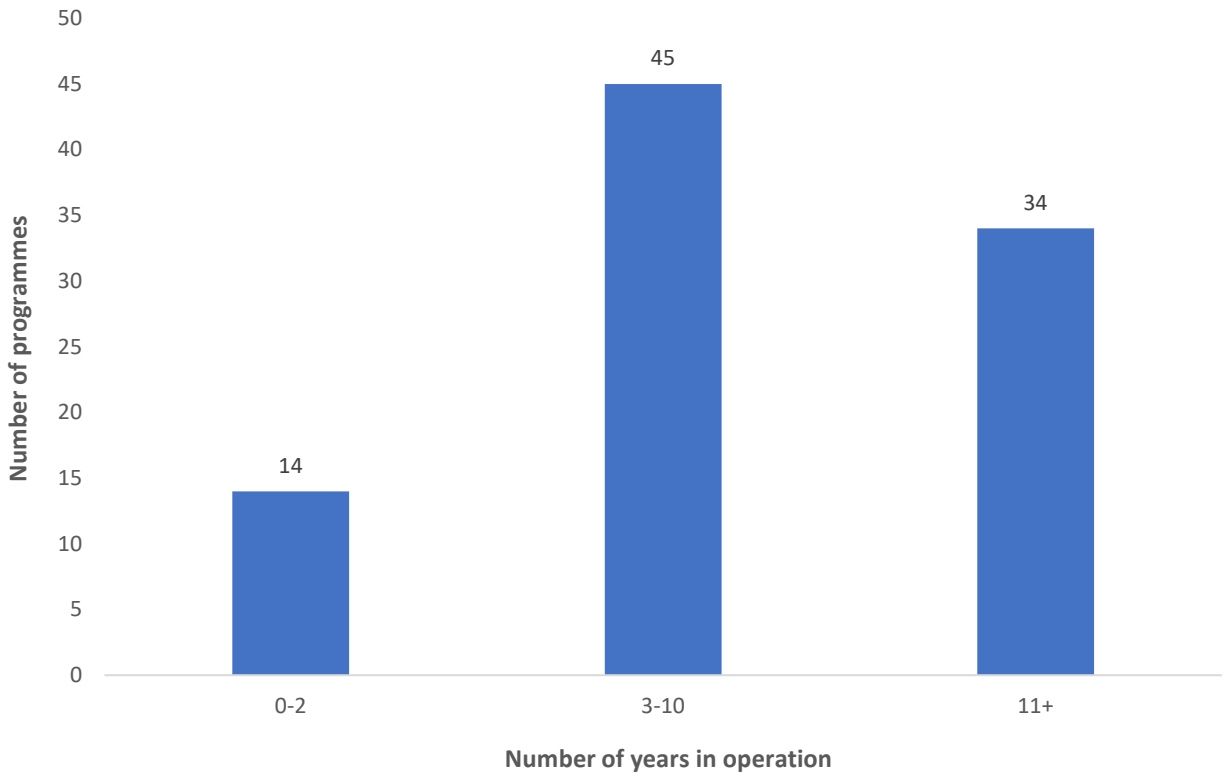
The questionnaire distributed to NGOs included three questions not included in the version distributed to governmental organisations. These questions asked NGOs:

Is your programme part of a larger 'umbrella' organisation?; Which legal structure(s) best applies to your programme?; and How many years has your programme been operating?

The number of NGOs who reported their EE programmes to be part of a larger umbrella organisation equated to 47, while equally, another 47 NGOs reported their programmes to not be part of an umbrella organisation. Only one EEO chose the option labelled as 'Not sure'. Over three-quarters of participating NGOs (n = 72) reported to operate as a not-for-profit entity, while a smaller number (n = 14) operated as a for-profit entity. A few NGOs (n = 3) reported being part of a larger educational institution (e.g., polytechnic, wānanga, and polytechnics). A minor number of EEOs (n = 4) selected the 'other' category. As typically found in the data collected through this questionnaire, the participants tended to select other when they wanted to provide additional explanatory detail. In relation to this question, participants explained their organisational structure to exist as either a 1) social enterprise or 2) partnership structure involving a combination of different programme types, such as not-for-profit, for-profit and governmental organisations.

Figure 24 shows the number of years NGOs reported their EE programme to have been in operation. Approximately 15% of the programmes were reported to have been in operation for up to two years, whereas the rest of the programmes were identified as operating for three or more years. In relation to these years of operation, I categorise the programmes as being young (e.g., up to two years of operation), developing (e.g., three to ten years of operation), or mature (e.g., 11 or more years in operation).

Figure 24 *Number of years in operation – NGOs' EE programmes*



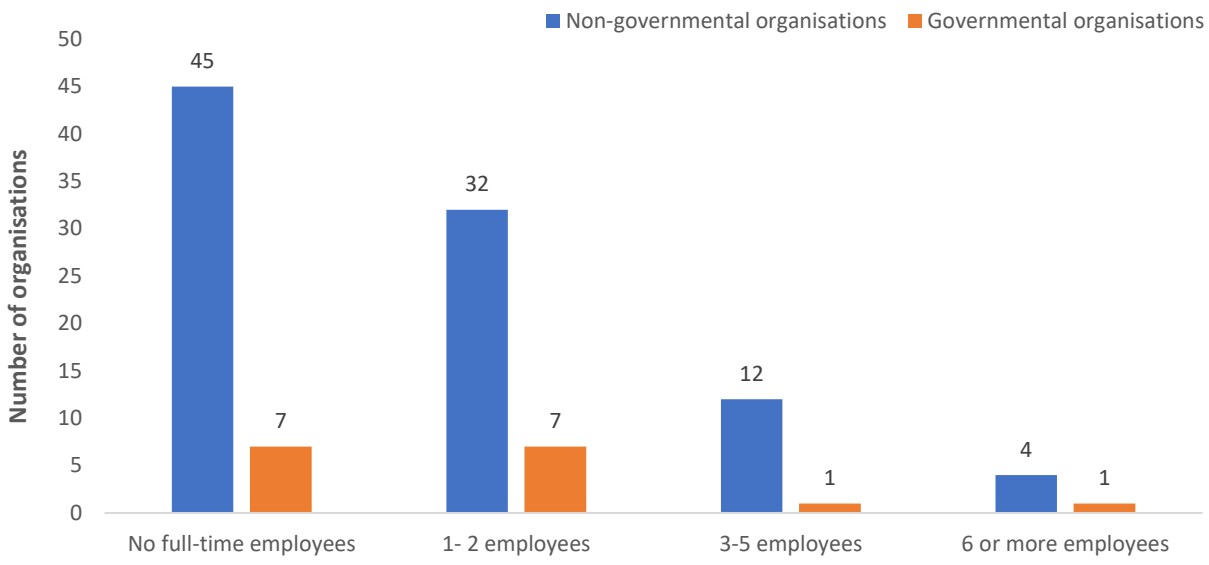
Note: NGOs (n = 93)

4.4.2 Number of employees and volunteers

At present, how many full-time employees (i.e., those who work 30 or more hrs/wk.), part-time employees (i.e., those who work less than 30 hrs/wk.) and volunteers contribute to your programme (i.e., those who volunteer at least 2 hr/month or 24 hr/annum)?

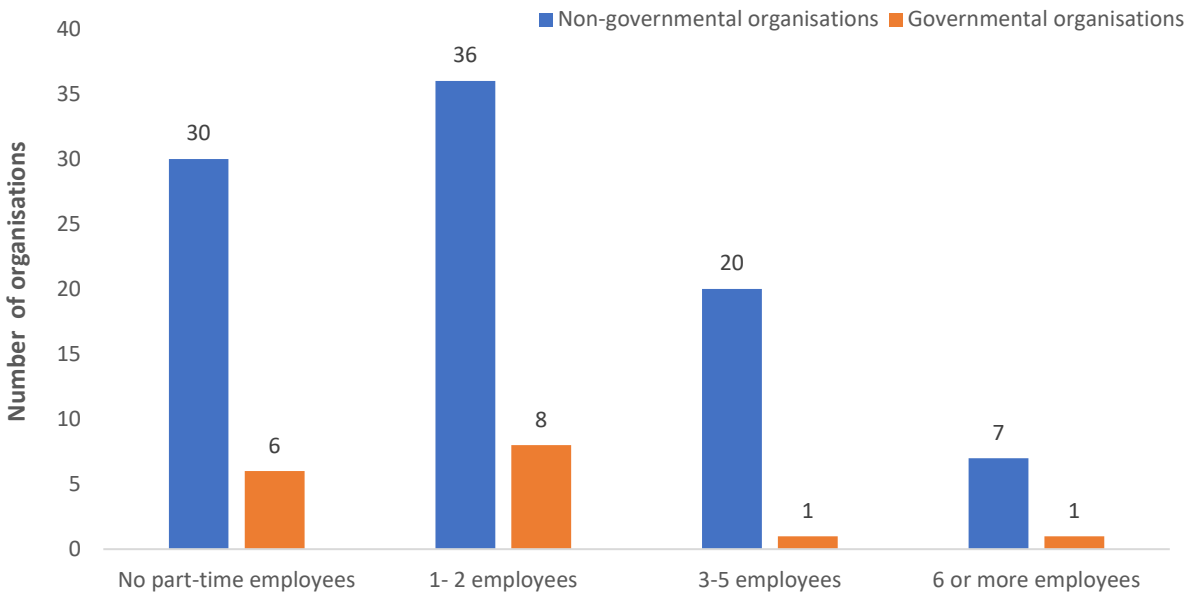
As shown in Figures 25 and 26, the data revealed that the majority of programmes, in respect to both NGOs and governmental programmes, operated through one to two full-time and/or part-time employees. Only a very small fraction of organisations reported as operating through six or more full-time and/or part time employees. With respect to the number of volunteers that contribute to EE programmes, Figure 27 illustrates that approximately three-quarters of NGOs reported utilising volunteers, with the greatest number of organisations involving six or more volunteers. This finding contrasts to almost no volunteers being used in the EE programmes implemented by governmental organisations. These results provide evidence of the EEO network being comprised of predominantly small entities based on the number of staff, and that NGOs are likely to be dependent on volunteers.

Figure 25 *Number of full-time employees contributing to EE programmes*



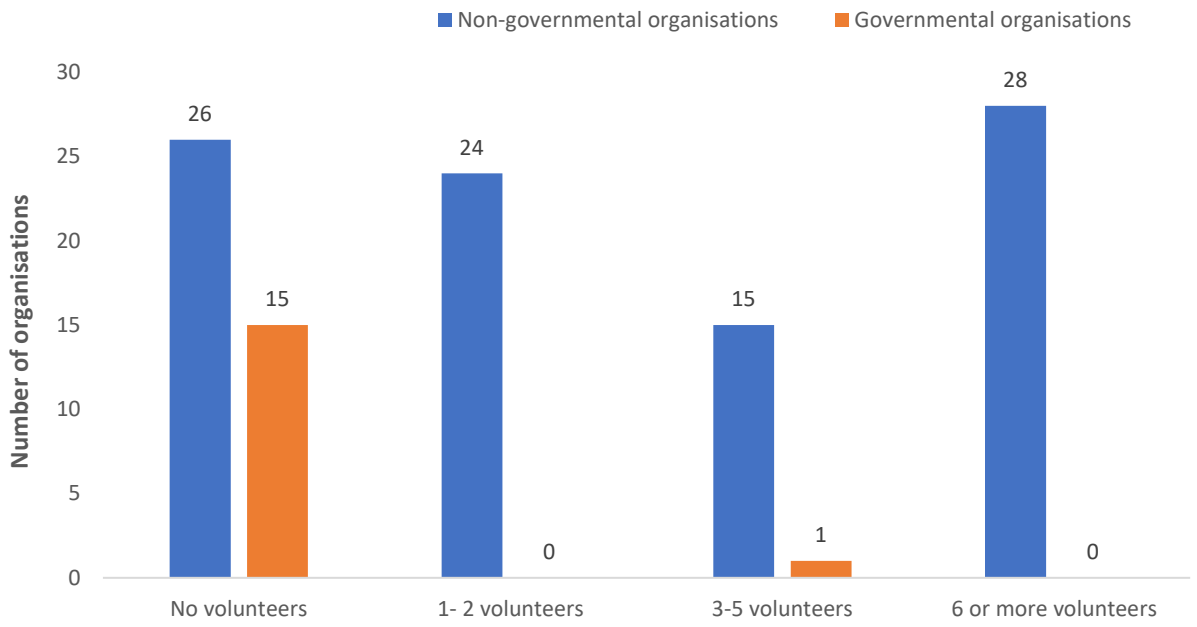
Note: NGOs (n = 93) and governmental organisations (n = 16)

Figure 26 *Number of part-time employees contributing to EE programmes*



Note: NGOs (n = 93) and governmental organisations (n = 16)

Figure 27 *Number of volunteers contributing to EE programmes*



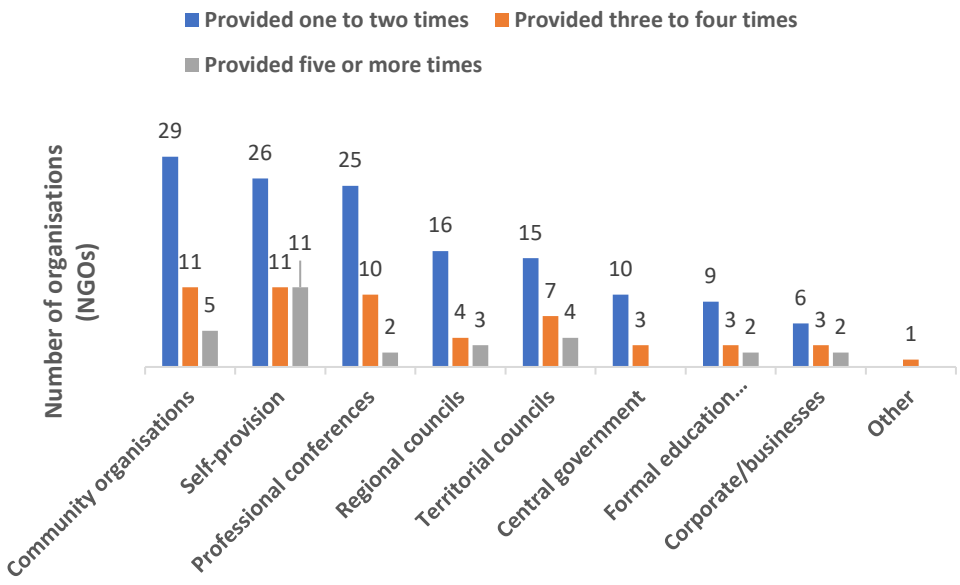
Note: NGOs (n = 93) and governmental organisations (n = 16)

4.4.3 Professional development opportunities

Are the employed practitioner(s) who deliver your programme offered formal professional development opportunities (e.g., workshops, conferences etc.)? If yes, please indicate how frequently each of the listed providers were used to support practitioner professional development for your programme over the past three years?

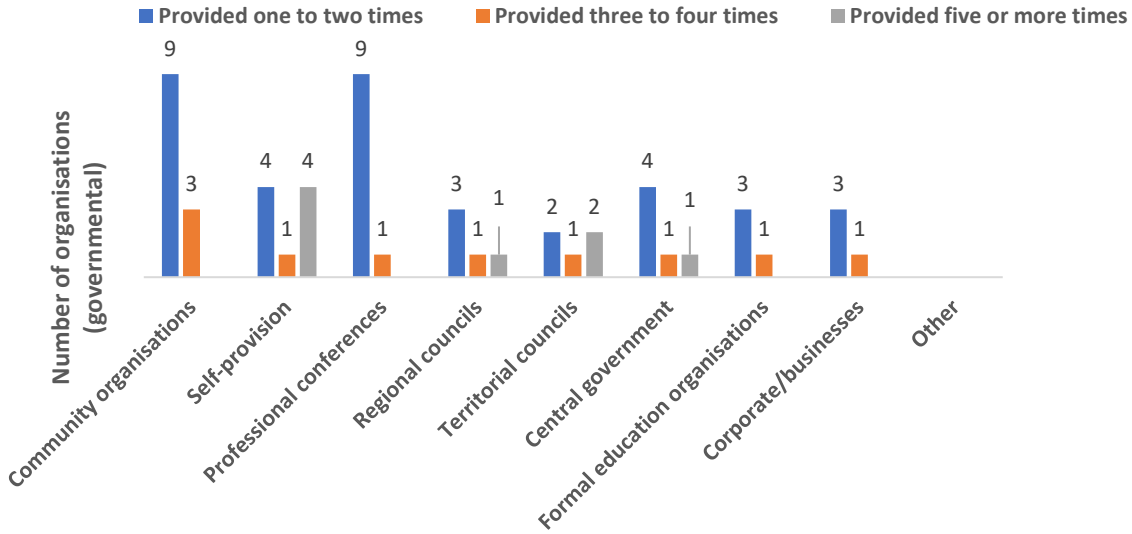
Between 2018 to 2020, approximately two-thirds of participating NGOs (n = 62) and almost all of the participating governmental organisations (n = 14) provided EE programme employees with professional development opportunities. The number of times that NGOs and governmental organisations utilised different types of professional development providers over this three-year period is shown in Figures 28 and 29, respectively. The types of providers used the most by all EEOs included other community organisations, self-provision and professional conferences; the next most frequently used providers were local, regional and central government agencies; and the least utilised providers were formal educational institutions and corporates/business types. The one NGO who selected other identified industry-related field trips as a professional development provider for their employees.

Figure 28 *Frequency of use by NGOs of professional development providers - 2018 to 2020*



Note: NGOs (n = 62)

Figure 29 *Frequency of use by governmental organisations of professional development providers - 2018 to 2020*



Note: Governmental organisations (n = 14)

4.4.4 External assistance/support

Has your programme(s) received any external assistance/support (e.g., funding, equipment, expert knowledge, etc.) over the past three years? If yes, what types of external assistance/support was received for your programme from each of these organisations over the past three years? Please select all that apply.

As shown in Figure 30, local community sources were identified as providing the most overall support (i.e., funding, equipment and resources, and expert knowledge) for NGOs' EE programmes, whereas central government agencies provided the least support. With specific regards to funding, philanthropic sources supported the greatest number of the NGOs' programmes. In comparison, Figure 31 revealed that governmental organisations reported receiving the most overall support for their EE programmes from territorial authorities, and the least amount of overall support from philanthropic sources.

4.4.5 Funding from external sources

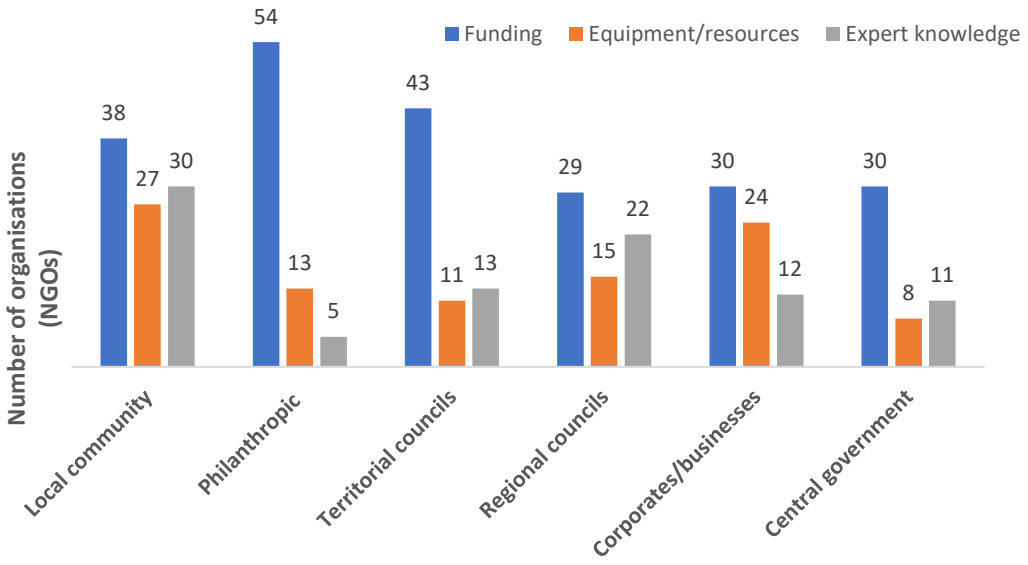
Please indicate approximately how much funding in total was received for your programme from each source over the past three financial years?

The aim of this question was to identify approximately how much programme funding was received in total from different sources between 2018 to 2020. However, data error was found when findings from this question were compared to the findings about funding from the previous question. To elaborate, as displayed on Figure 32 below, the data collected for this question indicated 76 NGOs were funded by the local community, yet data from the previous question (see Figure 30) indicated only 38 NGOs as funded by local community sources. Findings in relation to the other sources of funding are relatively consistent between the two questions for the other types of funding providers.

Nevertheless, the following broad finding can still be drawn by considering the data collectively – NGOs' EE programmes are funded through a wide range of sources, of which $1 to $10,000 over the three years is the most typical amount of funding received from each provider. As shown in Figure 33, findings about funding sources collected for EE in-house programmes of governmental organisations differed such that they were demonstrated to be supported by external funding of various amounts, predominantly sourced from other governmental organisations (e.g., territorial, regional and central government agencies). These results demonstrate how EEOs, particularly NGOs, must 'piece together' funding from a number of different sources in order to operate their EE programmes. This finding,

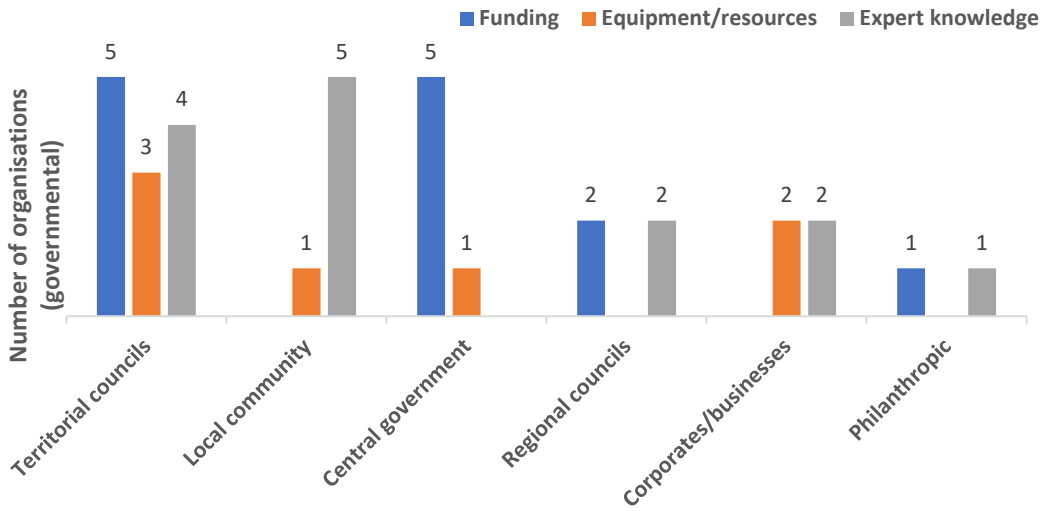
framed here as challenges faced by EEOs to sustain their EE programmes, is further supported through the analysis of the data collected via the last three questions of the questionnaire, as follows.

Figure 30 *Sources of external support received - 2018 to 2020*



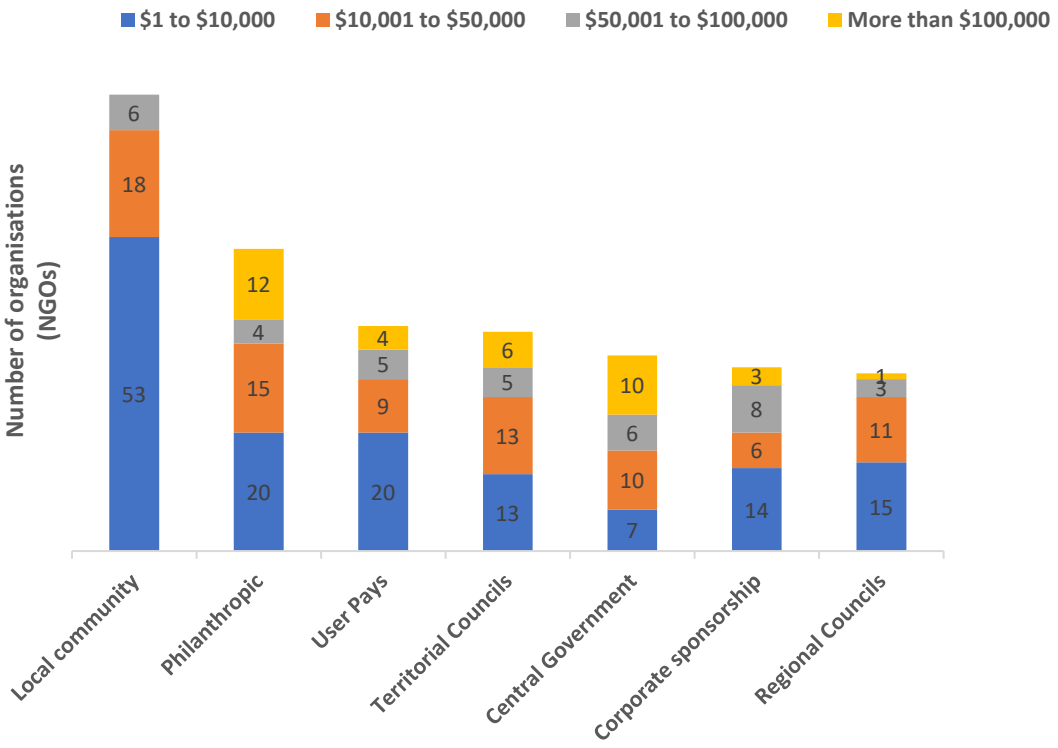
Note: NGOs (n = 92)

Figure 31 *Sources of external support received - 2018 to 2020*



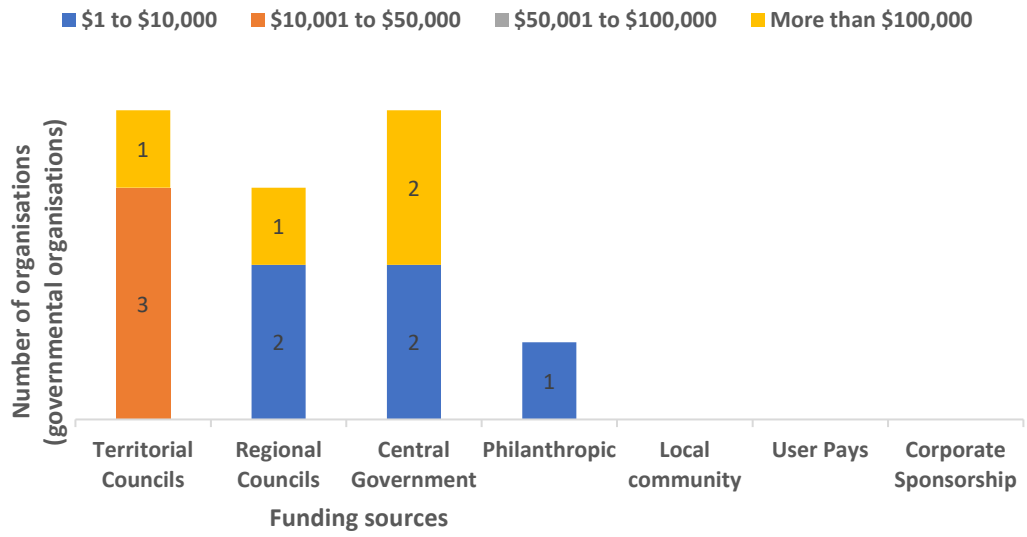
Note: Governmental organisations (n = 7)

Figure 32 *Sources and amounts of NGOs' EE programme funding -2018 to 2020*



Note: NGOs (n = 92)

Figure 33 *Sources and amounts of governmental organisations' EE programme funding - 2018 to 2020*



Note: Governmental organisations (n = 5)

4.4.6 Long-term funding for operational costs

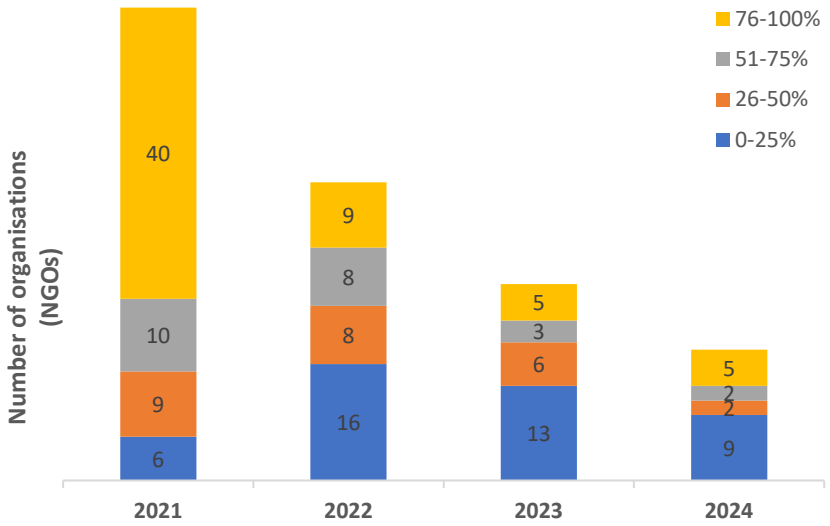
Approximately what percentage of your programme's operational costs for the following time periods have already been secured (i.e., through your organisation and/or via other external support)?

A relatively low number of EEOs responded to this question as compared to the other questions asked through this questionnaire. Furthermore, the number of EEOs who responded to this question reduced with each additional year that was asked about. For example, 65 NGOs provided an answer about the percentage of their respective operational costs that had been secured for 2021, while only 18 NGOs provided a response with regard to 2024. A similar pattern was revealed for the data collected from governmental organisations. Nevertheless, some broad patterns were identified from the data collected through those who choose to respond.

With respect to the data collected from NGOs as shown on Figure 34, over a third of the respondents had yet to obtain 25% or more of the necessary funding to cover their operational expenses *'*for the same year' in which the survey was undertaken. This suggests that these NGOs were implementing their EE programmes while at the same time trying to secure additional funding to cover their costs. The percentage of NGOs reporting to be in the same position of not having yet secured adequate funding was demonstrated to significantly increase over the next two years. Figure 35 demonstrates that funding for governmental programmes over this period of time looked to be slightly more sustainable as a greater relative proportion of respondents indicated that the majority of funding for their operational expenses had been secured.

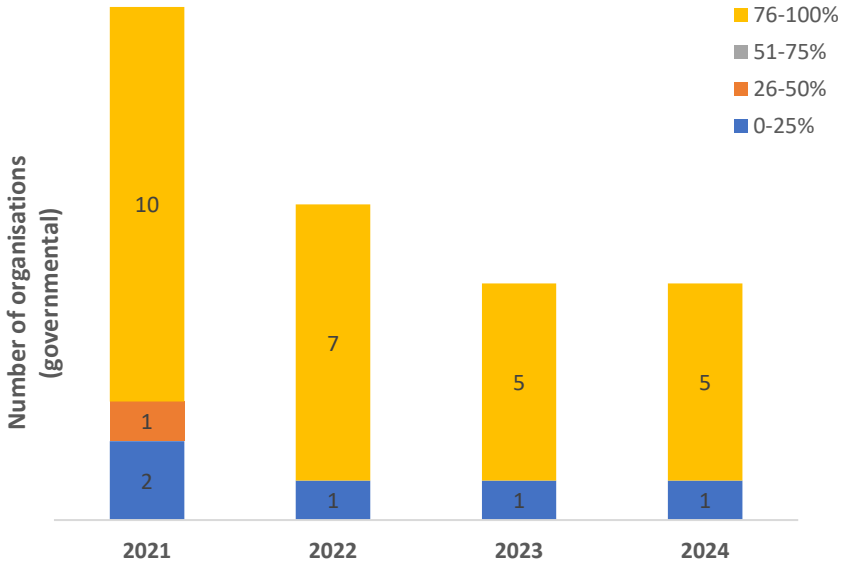
Overall, the results further supported the finding of funding challenges faced by the EEO network, particularly for NGOs to secure adequate funding in a timely fashion. The relatively low response rates of NGOs to this question may be associated with the precarious, and often competitive situation that these types of EEOs find themselves with regards to securing long-term funding. This claim is supported by additional evidence as provided by the results from the next two questions.

Figure 34 Percentage of annual operational costs of EE programmes secured to date by NGOs - 2021 to 2024



Note: NGOs (n = 65)

Figure 35 *Percentage of annual operational costs for EE programmes secured to date by governmental organisations- 2021 to 2024*



Note: Governmental organisations (n = 13)

4.4.7 Ranking of tools and assistance that benefit the network and programmes

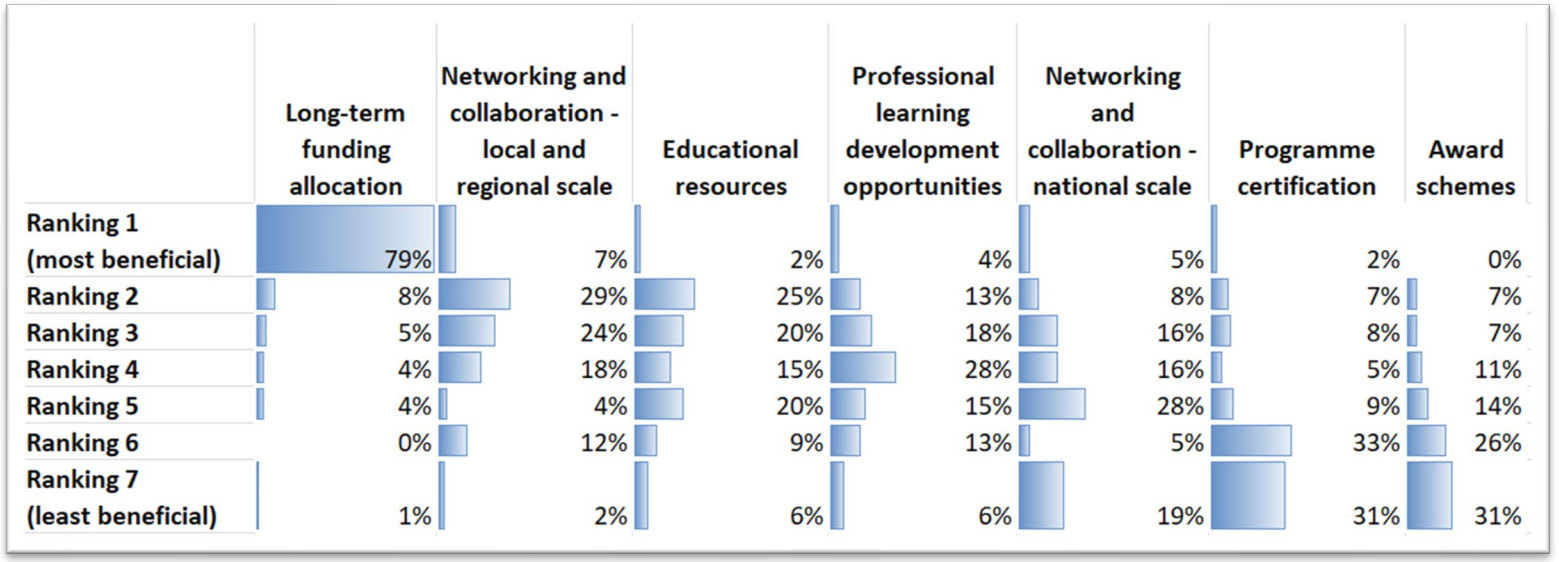
Listed below are some types of tools and assistance that might help EE programmes like yours, achieve their respective objectives and vision. By dragging and dropping, please rank these in terms of most to least beneficial for supporting EE programmes (i.e., drag the most beneficial to the top of the list and least beneficial to the bottom, etc).

The data collected through this question were analysed by calculating the percentage of respondents who selected each of the pre-determined types of tools/assistance for each rank. The data bars as displayed in Figures 36 and 37 are a visual representation of these percentages.

Overall, both NGOs' and governmental organisations' rankings of the tools/assistance were similar. The rankings demonstrate that the respondents perceived long-term funding allocation, networking at a local and regional scale, and educational resources as the three most beneficial tools/assistance to their respective programmes. Professional learning development opportunities ranked fourth, while networking and collaboration at a national scale, programme certification, and awards schemes were ranked the least beneficial. A significant proportion of respondents from both NGOs and governmental organisations (79% and 50%, respectively) ranked long term funding allocation as the type of assistance they perceived to be most beneficial to the EEO network. This result is further evidence of the challenges faced by EEOs, particularly NGOs, to sustain their EE programmes on an ongoing basis.

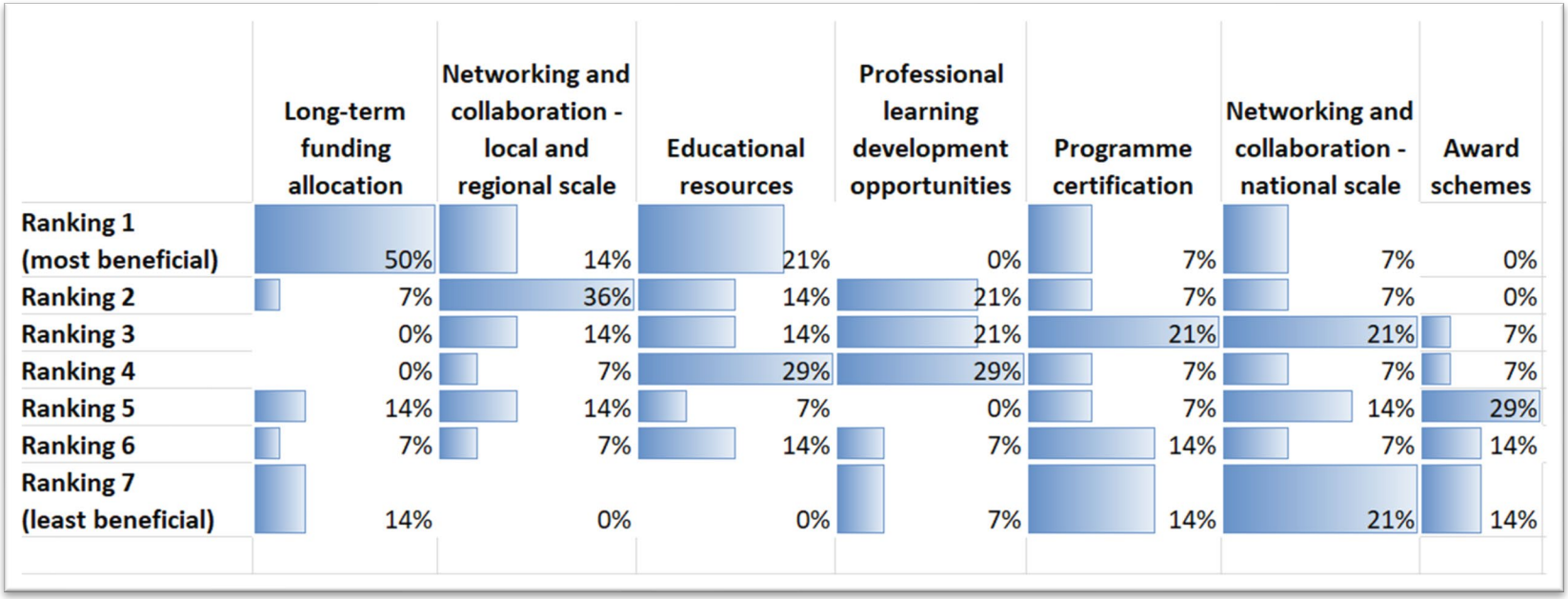
The one small difference in the findings between the two types of organisations is that governmental organisations ranked programme certification ahead of networking and collaboration at a national scale, whereas the opposite was true for NGOs. A certification programme may be more appealing to governmental organisations because of the potential for funding accountability and aligning programme delivery with best practice guidelines. In the face of the many challenges NGOs already face for keeping their programmes financially afloat, a certification programme may be perceived as another barrier to add to their onerous task of staying financially afloat.

Figure 36 *NGOs' ranking of tools/assistance for supporting the EEO network*



Note: NGOs (n = 86)

Figure 37 *Governmental organisations' ranking of tools/assistance for supporting the EEO network*



	Long-term funding allocation	Networking and collaboration - local and regional scale	Educational resources	Professional learning development opportunities	Programme certification	Networking and collaboration - national scale	Award schemes
Ranking 1 (most beneficial)	50%	14%	21%	0%	7%	7%	0%
Ranking 2	7%	36%	14%	21%	7%	7%	0%
Ranking 3	0%	14%	14%	21%	21%	21%	7%
Ranking 4	0%	7%	29%	29%	7%	7%	7%
Ranking 5	14%	14%	7%	0%	7%	14%	29%
Ranking 6	7%	7%	14%	7%	14%	7%	14%
Ranking 7 (least beneficial)	14%	0%	0%	7%	14%	21%	14%

Note: Governmental organisations (n = 10)

4.4.8 Summary of reported EEO organisational structure

Some organisational features of participating EEOs were demonstrated as follows:

- With respect to NGOs only, half reported to be part of a wider umbrella organisational structure; three-quarters identified as operating through a not-for-profit entity, and the majority stated their EE programmes to have been in operation for over three years;
- The majority of programmes implemented by both NGOs and governmental organisations employed one-to-two full-time and/or part-time employees, while very few reported employing six or more employees;
- Three-quarters of NGOs reported involving volunteers in their programmes, while very few governmental organisations claimed to utilise voluntary assistance;
- Approximately two-thirds of NGOs and almost all the governmental organisations provided professional development opportunities for staff, most often delivered through community organisations, self-provision and professional conferences;
- Local community sources provided NGOs with the most overall support (i.e., funding, equipment and knowledge), while programmes offered by governmental organisations were supported the most by territorial governmental agencies;
- With specific regards to funding, NGOs' EE programmes were supported the most by philanthropic sources, yet these organisations also tapped into a wide range of external sources, most commonly of amounts between $1 to $10,000 each. Programmes implemented through government organisations were predominantly funded by other governmental sources;
- Analysis demonstrated a challenge faced by NGOs to secure long-term funding as evident by the fact that just over a third of participating organisations reported not having yet secured the necessary funding to cover their operational expenses for the year in which the survey was undertaken, whereas data from governmental organisations demonstrated access to more sustainable funding; and
- Long-term funding allocation, networking at a local and regional scale and provision and sharing of educational resources were ranked as the top three most beneficial tools/assistance for the respective EE programmes of both types of organisations.

4.5 Perceived topics of significance

Please provide any ideas you have in relation to this survey and/or about the network of EE programmes across Aotearoa New Zealand.

The last section of the questionnaire provided participants with an opportunity to comment about any topic or issue they deemed relevant to the network and respective programmes. In total, 51 of the total 112 participants responded to this question.

Analysis of the qualitative data was undertaken via thematic analysis through an inductive approach. As shown in Table 8, two umbrella themes and a number of categories and sub-categories were identified via this approach. The most prevalent theme related to types of support needed for the EEO network as perceived by respondents. The categories associated with this theme were coded as funding, collaboration, networking, visibility, on-line platform and quality assurance. EE programme implementation was the other key theme as derived through analysis, which included the categories of programme outcomes/content, barriers and benefits. The number of times that each sub-category was identified within the 51 responses is also provided in Table 8, as is a direct quote that helps to illuminate the themes that underpinned my categorisation of the data.

The largest number of responses were related to funding (n = 25), a category identified as part of the theme about the support needed for the EEO network. This result strengthens a key finding that the EEO network, particularly NGOs, face significant challenges to sustain their EE programmes over an ongoing period through the current model of funding provision. Equally important, some of the other categories affiliated with this theme, such as collaboration and networking, were often described by participants as partial solutions to the funding issue. Evidence of this is provided in some of the respondents' quotes.

A significant proportion of respondents (n = 18) pointed to the importance of clarifying EE content and pedagogy as part of the other umbrella theme – implementation of EE programmes. The analysis highlighted a belief by some participants about a lack of definition/consensus regarding the appropriate content and pedagogy that constitutes EE. Some participants specifically mentioned nature connection (n = 3) and mātauranga Māori (n = 3) as fundamental to the implementation of EE programmes in the context of Aotearoa New Zealand. These two sub-categories were also linked to the categories of barriers, and benefits, of EE implementation; these phenomena were perceived as a benefit to students but a barrier due to a lack of funding and/or training for successfully implementing them as part of EE programmes.

Table 8 *Findings of perceived topics of significance to EEO network and respective EE programmes*

Themes	Categories	Sub-categories	Number of responses
Support needed for the EEO network	**Funding** "Programmes vary from year to year, nothing carries over automatically as it depends on funding." (stage one participant #32) "I set up my EE programme four years ago as a business. It has been an uphill battle to get any funding or allocation [...]. Consequently, in the last six months, I have changed to a charity, with the hope that we can receive some funding. Hopefully, in two years' time - the results will be different." (stage one participant #11)	On-going challenges to obtain adequate financial support	15
		Necessary for coordinating collaboration	5
		Lack of funding impacts programme sustainability	4
		Necessary for supporting the EE National Strategy	1
Support needed for the EEO network	**Collaboration** "Less competition more collaborations." (stage one participant #24) "To look at larger opportunities that connect grass roots businesses that are doing the work and not attaining the support. Let's look outside of the industry lens and be open to new avenues of collaboration - supporting	Needing to work together more	6
		Avoid duplication and contradictions of programmes	5

	businesses that have the experience to do so on a much more larger scale. We need to all work together and not just stay in a disconnected approach. It's starting but a lot more work to be done." (stage one participant #26)	In order to obtain funding	3
		Increase impact across a wider cross section of society	2
		Learn from one another	1
		Across multiple levels: local and national	1
		Innovative collaboration (i.e., look beyond our EEO network)	1
		Develop shared vision/purpose	1
Support needed for the EEO network	**Networking** "Knowing who is working in the same space so we are not all competing for the same funding. Networking at a local and national level to share knowledge and group together for funding opportunities." (stage one participant #46)	Increase connectivity between providers	10
		Improve understanding about the EEO landscape	2

	"The EE community definitely needs to be better connected and more obvious to those outside of the EE fold/network. My concern is about duplication of activities & the professionalism of the programmes offered particularly with regard to the use of best practice EE processes and principles. I also know that educators (mainly teachers in schools) are seeking improved support as they develop EE related programmes in their schools. They often don't know where to begin nor how far or deep they could go." (stage one participant #47)	Necessary for coordinating collaboration	2
		Across multiple levels: local and national	1
Support needed for the EEO network	**Online platform** "Provide a platform for schools and others to have access to what we do on a website. A place where teachers can go and have a look , pick up resources and apply them for their school camps. This would range from health and safety issues through to educational things that will flow from the classroom to the camp." (stage one participant #16)	Share learning resources	3
		Connect EEOs with other EEOs, and with schools	2
		Share/collaborate funding opportunities	1
		Demonstrate value of EE	1
		Has been needed for a long time	1

Support needed for the EEO network	**Visibility** "The EE community currently benefits from passionate people who see the need and are therefore often prepared to receive considerably less financial remuneration than they would get in other areas of education or other industries. It would be helpful to have a formal network and greater recognition of the importance EE facilitation is for the future health of our youth and our planet." (stage one participant #12) "Smaller environmental groups contribute hugely to general well-being by connecting people to nature, but often heard least from." (stage one participant #42)	Demonstrate value of EE and what it offers, especially to those not directly involved in the community	6
		Increase visibility of providers	4

Support needed for the EEO network	**Quality assurance** "I have heard from a number of EE providers that they would like to see some best practice guidelines - to be able to show that their practice was approved and meeting a standard, and also to pull into line other practitioners who are renegade! I think this would be useful for funders - to be able to make good funding decisions and direct resource into programmes that delivered across best practice EE, conservation education, youth development, youth engagement. This is an opportunity for the sector to collaborate and throw ideas into the ring, also to make the mahi more tangible and measurable, which gives us more reason to invest in the research, understanding benefits and outcomes so that we can justify more funding." (stage one participant #51)	Best practice guidelines	2
		Measure and monitor effective practice	2
		Recognise providers following best practice	2
EE programme implementation	**Programme content/outcomes** "Providers inherently connect students to nature by working IN the environment. This is so important for our children and communities and environments. But how do we showcase the importance of this? Of educational significance?" (stage one participant #9) "Mātauranga Māori is EE. And it is being asked for by schools but practitioners are low on the ground. It would be great to access funding to	Definitional issues (i.e., what constitutes EE-content/pedagogy)	6
		Inclusive of Mātauranga Māori	3
		Inclusive of nature connection	3

	employ experienced people who can provide this perspective to schools." (stage one participant #22)	Can happen through informal opportunities	2
		A legitimate and important curriculum choice	1
		An evolving endeavour	1
		Cross-curricula	1
		Needing to align with NCEA	1
EE programme implementation	**Barriers** (excluding long-term funding of EEOs) "Pre-service and in-service teachers require a lot more support and training to integrate EE across the curriculum" (stage one participant #50) "We are unable to develop and deliver a unique Mātauranga Māori based environmental education programme to students due to lack of funding to hire educators. Because of our rural location, transportation is very expensive for schools, so funding should be given to enable schools to bring students out on field trips." (stage one participant #3)	Schools: pre-service teachers, and in-service teachers need support and training for curriculum integration	4
		Challenges to integrating Mātauranga Māori	2
		EEOs working in 'silos'	1

		A learning discipline not valued	1
		Crowded curriculum	1
		Transport costs for field trips	1
EE programme implementation	**Benefits** "Our lives are made up of 'Life Experiences', these help us interact and make sense of the people around us and the world we live in [...] Think of some of the meaningful life experiences you have had. Did any of them occur at or part of your schooling, I doubt it! EE provides meaningful experiences." (stage one participant #14). "Our programme seems to provide a bit of climate anxiety relief by giving them something positive they can do --grow topsoil and grow food. Long term funding for this would be helpful, as well as training up many more facilitators and being able to hire a parent helper to assist with food scrap collection, composting and gardening at schools." (stage one participant #4)	Nature connection	2
		Meaningful, real-life experiences	1
		Climate anxiety relief via taking action	1

4.6 Reflections about stage one findings

As explained Section 1.3, following the analysis of the data collected from the stage one questionnaire, I reflected on the findings as presented above to help inform my next stage of inquiry as aligned with the study's explanatory sequential research design. This helped ensure that the findings of the study were relevant and meaningful to the EEO network.

Unsurprisingly, one of the two key findings from stage one demonstrated that sustainable funding was a significant issue for EEOs, and improving networking and collaboration was perceived as a means to help alleviate financial constraints. The second key finding illuminated that the greatest number of EEOs identified nature connection as an educational outcome of their programmes (see Figure 22). On reflecting upon these findings, I considered real-world events unfolding around me, themes in the EE literature, and the practicalities of what I could accomplish through my PhD programme. My decision about the next stage of inquiry was influenced by two main factors. First, I believed that a research project on networking and collaboration would likely be more beneficial once the NZAEE database, website, and strategic plan were fully in place. Second, nature connection was a topic that deeply interested me, and from the start of my study, I had noticed the concept being increasingly advocated for in the sustainability literature.

With nature connection eventually decided upon as the next topic of inquiry, three new research questions were developed, which focused on the phenomenon of educating for nature connection. These questions and their affiliated findings are discussed in the next three chapters.

4.7 Chapter summary

A national database of EEOs was a significant output of the first stage of the study. The database consisted of a population of 297 EEOs, which comprised both NGOs and governmental organisations; this population was repeatedly drawn on through the study for the purposes of data collection. My database was also used by NZAEE as part the organisation's revamp of their website.

Following the completion of the database, a questionnaire was emailed to all EEO contacts as listed, which sought information about some features of the EEO landscape in terms of characteristics of their respective EE programmes and organisational structures. This instrument was comprised predominantly of closed questions and pre-determined response options that were subjectively derived through my lived experiences as an environmental educator, and a priori themes from the literature. When appropriate, an open-response option was included as part of the pre-determined options, which

participants tended to use for providing explanatory detail about the answers they had selected. The last question of the instrument asked one open-ended question that gave participants an opportunity to provide a detailed response about any topics or issues they perceived to be significant to the network and respective programmes.

Descriptive analysis of the data demonstrated that EEO programmes prioritised learning outcomes associated with nature connection and affiliated themes of non-human nature species and elements of the natural world (e.g., biodiversity, restoration and species-specific outcomes), particularly in relation to terrestrial and freshwater/wetland environments. NGOs most often worked with a wide range of target audiences at the primary and intermediate educational levels (e.g., students, teachers and wider community), while governmental organisations predominantly targeted students and teachers at these same levels. In-school support, learning resources, field trips and teacher professional learning development opportunities were the types of support and activities offered by the most number of NGOs and governmental organisations. The reported number of EE programmes operating per region was not directly proportional to the region's population level. Regions with larger populations tended to have comparatively fewer EE programmes than regions with smaller populations. Based on this pattern, EE programmes were underrepresented in three of the four most populated regions (e.g., Auckland, Christchurch and Hamilton) as compared to the country's 12 other regions whereby EEOs were almost always overrepresented. A limitation to these results is the fact that the outreach of the reported EE programmes cannot be ascertained because no correlation was made between the number of programmes with the number of students, including the outreach achieved through programmes that were reported to operate at a national scale. This is an inquiry topic that should be pursued in future research in order to better gauge the impact potential of the network.

In terms of the organisational structure, three-quarters of participating NGOs identified as operating through a not-for-profit entity; half identified their programme as being part of larger, umbrella organisation. Analysis indicated that NGOs were supported the most by community sources for the provision of funding, equipment and expert knowledge, and that collectively, they faced significant challenges to secure long-term funding for their programmes. On the other hand, governmental organisations demonstrated access to more sustainable funding, predominantly through territorial, regional and central governmental agencies. The majority of programmes operated by both NGOs and governmental organisations were reported to employ a small number of staff (one to two full-time and/or part-time employees), and approximately three-quarters of NGOs reported utilising volunteers.

Both types of organisations ranked long-term funding allocation, networking at a local and regional scale and educational resources as the top three most beneficial types of tools/assistance for supporting their respective EE programmes.

Overall, the findings as presented here situated the study in the context of the EEO landscape and informed the next steps of my inquiry. The landscape was found to consist of an unevenly dispersed pattern of EEOs across Aotearoa New Zealand with more populated regions having proportionally fewer EE programmes. This is a significant issue for the fact that more urbanised regions have a higher potential for human impacts that lead to unsustainability. Furthermore, the landscape was also demonstrated to be comprised of relatively small entities based on the reported number of employees that implement EE programmes for the EEOs. In particular to NGOs, the data suggests that their EE programmes are financially supported in an ad hoc manner to undertake what was established through my literature review as the paramount work of supporting teachers, schools and communities to educate in ways that help resolve our sustainability crisis.

Through reflecting on these findings, in conjunction with the literature and real-world events, I decided to further inquire about the stage one finding that identified nature connection as an educational outcome prioritised by the EEO network. The findings in relation to this phenomenon are presented in the next three chapters.

Chapter Five - Unpacking nature connection

5.1 Chapter introduction

As highlighted in Chapters Three and Four, the focus of the study progressively evolved as the findings of each stage of research informed the next stage. To recap, the stage one questionnaire demonstrated nature connection as an educational outcome prioritised by the network of environmental education organisations (EEOs) in Aotearoa New Zealand (see Figure 22). Based on this finding, and in conjunction with what I perceived as a growing momentum in the literature and real-world events around the phenomenon of nature connection (see Section 1.3), I employed a second questionnaire (stage two) using a convenience sampling method of the population of EEOs as defined by the database. Comprised of only two open-ended questions, this instrument intended to broadly explore the 'why' and 'how' in relation to EEOs' prioritisation of nature connection as part of their environmental education (EE) programmes. Stage two was a key component of the study's explanatory sequential research design for seeking points of consensus and differences amongst the participants' perspectives of the topic, constructing provisional categories for further exploration, and identifying potential candidates to interview (stage three).

Analysis of the stage two data, as informed by grounded theory, indicated consensus amongst EEO representatives (n = 59) of nature connection as fundamental for resolving our sustainability crisis while simultaneously demonstrating a range of rationales underpinning this belief. Additionally, although the stage two findings clearly indicated EEOs' reliance on nature-based education approaches for fostering nature connection, participants' descriptions of their respective learning contexts and pedagogies were highly varied. This broad set of findings led me to formulate interview questions and probes to deeply explore provisional categories about nature connection as a solution to unsustainability and the ways in which education serves to either diminish or foster students' connection with nature. Ultimately, the study aimed to develop context-specific theory in relation to educating for nature connection through the English-medium education system in Aotearoa New Zealand (hereafter, referred to as the education system).

Following the elicitation of these broad findings, the third and final stage of the study saw me conduct semi-structured interviews with 15 EEO representatives. The interviews were imperative for collecting rich, detailed data to gain clarity and depth in relation to the provisional categories constructed from stage two data collection and analysis.

The next three chapters (five to seven) report on the stage two and three findings. Where possible, I attempt to demonstrate how the stage two findings informed the trajectory of the study and were progressively built upon via the stage three interviews. This chapter is comprised of three main sections: Section 5.2 discusses the 'why' nature connection was prioritised by the EEO network as an educational outcome, framing the phenomenon as fundamental to resolving root causes of our sustainability crisis; Sections 5.3 and 5.4 unpack participants' conceptualisations of nature connection, which is vital for understanding what educating for nature connection implicitly meant to participants; and a chapter summary follows in Section 5.5.

Thereafter, Chapter Six examines the participants' beliefs about how the education system contributes to students' disconnection from nature. It then outlines key principles of nature-based education praxis, derived from participants' lived experiences as educators, which provide a foundation for understanding how nature connection can be fostered through EEO programmes and schools. Finally, Chapter Seven presents findings on the significance of fostering nature connection as an educational outcome.

5.2 Root causes of unsustainability

One of two questions posed in the second stage questionnaire asked: Why does your organisation believe it is important to develop nature connection?. Through the analysis of data collected from this question, a key finding about EEOs' 'why' was based on their belief that disconnection is a cause of our unsustainability crisis. As stage two participant #24 responded:

> We believe that nature connection is important because most of the problems facing the world today come from humanity's disconnection from nature. This disconnect has led to indifference toward other species and the planet and created the climate crisis. Disconnect from nature and other species is also associated with increased materialism which further drives consumption, the climate crisis and a host of environmental and social problems.

Through the interview process, the participants' understanding of disconnection as a concept became clearer. As explained below, analysis of the rich interview data demonstrated an understanding of the relationship between disconnection, unsustainability and colonisation.

During the interviews, 14 of the 15 participants referred to the disconnection as a result of societal norms, structures, beliefs and/or values with "Western" culture. Sandy summed up, "Our Western ways of living simply equate to disconnection." Ten of these interviewees (three who self-identified as Māori

and the two other participants who self-identified as having a strong affiliation with Māori culture)[12] went further, discussing ways they believe disconnection to have evolved and spread globally through colonisation and its imposition of a Western worldview and capitalistic system. As Annie stated:

> Understanding that presently the colonial [Westernised] system is driven by capitalism. And so to understand the logic, perhaps the illogical nature of that. You know that it privileges the very minimal amount of people, it extracts, it's harmful to not only the people but the planet.

Through analysis, three key aspects emerged as cultural causes of disconnection, as follows: anthropocentric beliefs, a predominant utilitarian value of the natural world and prioritisation of money, and contemporary lifestyles that inhibit people from being outdoors and engaging with nature. The term 'anthropocentric' was not specifically used by any of the participants in the study and the term 'utilitarian' referred to by just one participant only. However, I use these terms herein because I believe they effectively describe the consensual meanings and perspectives held by the participants. Evidence of their appropriateness is demonstrated by the interview excerpts as provided in this chapter. As shown below, the findings pointed to interviewees' beliefs that these aspects of Western culture are drivers of disconnection that negatively influence humanity's interactions and relationships with nature.

Eleven interviewees expressed human-centric beliefs, or anthropocentricism, as a driver of disconnection. Sandy explains:

> As we have progressed in the Western world, *humans are always placed on the top of the pyramid*, and we only care for the environment as for the impact that it has on us for our wellbeing, not for the environment itself, not for the value it has for itself, or the rights that the environment has. [emphasis added]

Like Sandy, the other participants understood anthropocentricism as a belief that the human species is superior, or even separate, to nature.

Interviewees often linked anthropocentric beliefs with a utilitarian value of the natural world. Two thirds of interviewees (10/15) linked Western culture with people primarily seeing the value of the natural world through a utilitarian lens, or in other words, the benefits it affords the human species. Some of

[12] The ethnicity of participants is noted when I deemed it to be pertinent to the themes of the findings and discussion points.

these participants, as demonstrated in Sandy's quote above, explained utilitarianism as giving little or no consideration to the welfare of other species or the intrinsic worth of nature. Seven of the 10 interviewees specifically linked valuing nature in this way with a linear system of extraction from, and destruction of, the environment. For example, Robyn expressed her opinion of colonial settlers looking to the landscape through a utilitarian lens upon arriving in Aotearoa New Zealand:

> When you had colonisation happen, you had people turning up and just saying, what can I get from this land? These trees are in the way of good farmland, we'll just cut them all down […] That was probably the biggest difference, rather than using the land in a sustainable way. It was just all about making money, right now.

Like Robyn, five other interviewees linked utilitarianism with peoples' prioritisation of making money and profit above all else. Ian commented, "From the broken linear colonial system, I can take whatever I want from wherever I want, if I can afford it. It's actually just about money." Additionally, Ian highlighted his belief that money equates to rights in contemporary society: "So if I have the money, and I own it, I can have it. You know, there's no limitation. There's no limiting factor. There's no relationship involved. It's just, I can do it. So I will." Ian's mention of relationship foreshadows human-nature relationality as an important theme in the findings, explored in more detail in Section 5.3.2.

Almost all the interviewees (14/15) highlighted indigenous cultures as different to Western culture with regards to the way indigenous perspectives think about and value nature in non-instrumental ways. For example, 13 participants specifically pointed to Māori culture and te ao Māori (Māori worldview) as underpinned by more sustainable ways of interacting with and using nature to support human livelihoods. Namely, participants explained the reasoning for this difference between Western and Indigenous cultures as a result of an underpinning indigenous perspectives that "people belong to the land, not the land belonging to the people" (Robyn, interview).

All six interview participants who either self-identified as Māori or as having strong affiliations with the culture spoke about anthropocentric beliefs and utilitarian value of nature as marginalising and disempowering traditional cultures (i.e., pre-Westernised or non-Westernised) whose livelihoods are based (both historically and presently) on different ways of thinking, doing and being. For example, referring to *Te Tiriti o Waitangi* (Aotearoa New Zealand's partnership agreement between Māori and the British Crown), Ian said, "And the very beginning of it is the breaches of the Treaty obligations where Māori have been disconnected and disempowered of having control over their own resources, natural

resources, their land, their water." Atama recalled how the intimate knowledge and livelihoods of his affiliated iwi (tribe) were lost alongside the wide-spread deforestation undertaken by colonisers:

> So when Pākehā [New Zealanders of European descent] arrived, they were like 'Wow, look at all this space'. There were quite a lot of wetlands, and in the north, it was a huge forest, like enormous forest. I mean, it makes me pretty emotional to think what we lost, you know, the ancient bush that we once had…But Māori, you know, they knew it intimately. They had names for all the places and also ancient tracks that traversed east and west, north to south.

Kahu recalled a recent conversation she had with a friend from a local hapū (sub-tribe) who told her about her marae's orchard where she had regularly collected kai (food) as a hine (young girl) until it was cut down to construct the present-day marina. Kahu perceived this as an example of the disempowerment of Māori from local sources of kai for achieving the goal of making money: "So again, that was taken away from us, nature was there. People could go and harvest. But through commercialisation, we've lost that connection. Because we need to make money. Money, money, money. That's the drive."

The third and final theme elicited through the data about cultural causes of disconnection pointed to contemporary lifestyles. All 15 interviewees made points connected with this theme. Some descriptors of these lifestyles as offered by participants included: "indoor", "sedentary", "consumeristic", "busy", and "technologically-based" ways of living. Participants suggested that living in these ways reduced the contact that people have with other non-human species, geographies and cycles. As Sandy explained:

> You know, we're just disconnected in so many ways […] I think in the West, our families are fragmented. And the way we live is really siloed, we live in our indoor capsules. We don't live intergenerationally, like other cultures. We get everything plastic wrapped; we have no idea where it comes from. Everything's so piecemeal and disconnected.

Fewer outdoor experiences and less contact was linked by all interviewees with people no longer 'knowing' nature. Participants aligned the concept of knowing nature with six types of connection being physical, cognitive, affective, material, spiritual and philosophical. These types of nature connection are discussed in relation to EEO representatives' perspectives in more detail in Section 5.3.

Two thirds of interviewees (10/15) specifically linked not knowing nature with a lack of value, care and respect for the natural world. For example, Sophie reflected how people have been so drawn away from

the rest of nature, that for some, even being in the rain or having a beetle land on them has become foreign and uncomfortable. To which she added, “It’s vital to remember that those are pivotal parts of life … I think without understanding it’s hard to care about something”. Similarly, Tilly commented: “It’s the hearts and minds thing, right? You know, you don’t take action for what you don’t care about”.

In summary, data collected through both stages two and three demonstrated participants’ belief of disconnection as a key drive of unsustainability. As evidenced above, participants perceived three aspects they linked to Western culture as causes of disconnection by negatively influencing humanity’s interactions and relationships with non-human. Through the analysis of the interview data, these aspects were identified as:

- anthropocentric beliefs positioning humans as separate and superior to the rest of nature;
- a predominant utilitarian value of non-human nature prioritising the benefits and rights derived for humans; and
- contemporary lifestyles that disconnect people from contact with the rest of nature, resulting in a collective societal loss of knowing nature.

The following sections in this chapter explore participants’ conceptualisations of nature connection. Understanding these conceptualisations help to illuminate the ways participants perceived nature connection as a means to repair disconnection, and hence, unsustainability. Furthermore, these conceptualisations are also fundamental to understanding what participants meant when they referred to fostering nature connection as a sought outcome of their respective education programmes.

5.3 Conceptualisations of nature connection

The findings presented in this section were predominantly derived through the analysis of stage three data collected through the interview question that asked all interviewees to describe what the term nature connection meant to them. Nevertheless, some stage two data still contributed to these findings. Although the second questionnaire focused participants on the ‘why’ nature connection is important and ‘how’ it can be fostered, respondents’ perceptions of ‘what’ nature connection meant to them was embedded within their responses. Therefore, some stage two evidence is intermittently discussed as part of the findings below.

Broadly, three conceptualisations were elicited through the analysis. They were: experiences of engaging with nature; a way of being, knowing and becoming; and as an empowering impetus. The participants’ conceptualisations pointed to nature connection as affiliated with experiences, and

outcomes and competencies that help resolve unsustainability. Although each conceptualisation is unpacked separately in the next three sections (Sections 5.3.1 – 5.3.3), Section 5.4 demonstrates how participants perceived these meanings of nature connection as interrelated.

5.3.1 Experiences of engaging 'with' nature

Unsurprisingly, all 15 interviewees conceptualised nature connection with experiences through which people directly interact with nature. Interviewees described experiences of interacting with non-human nature in a wide range of ways, most often in association with being outdoors. For example, Sophie described nature connection as the simple experience of "getting out there [outdoors] and moving and flowing with the natural energy of it." The stage two data also support this finding as evident in Appendix 7, which highlights a large number of process codes related to experiential connection with non-human species, local geographies and cycles of the Earth system.

In almost all of the data collected from stages two and three, participants consistently referred to "humans and nature", which seems to suggest the human species as an entity are different and separate to nature. However, as explained in Section 5.3.2.2, the majority of interviewees (13/15) like Glenn made clear, "humans are just one part of nature as an interconnected whole". This tension between language and worldview is an important aspect of the findings, and is discussed more in Section 8.3.

A second point of consensus amongst all interviewees was that nature connection experiences enable people to be "with" nature, rather than just be 'in' nature. The theme of being with nature was articulated by participants in a few different ways, which included "engaging with", "connecting with" and "focusing on" nature and/or the wider environment. Milka explicitly distinguished 'being in' nature from 'being with' nature through this example that illuminates her belief that trampers (hikers) tend to be focused on their destination rather than focused on their surrounding environment:

> I'm sorry to say this, but trampers do not actually engage with nature. All they're doing is going from Point A to Point B. And for me, if you're in the bush, you need to engage with nature. To us, the education is actually learning to engage with nature.

Five interviewees specifically aligned nature connection experiences as having adequate "space" and "time" to engage with nature at one's own pace and in one's own way. Glenn described this theme while reflecting on some dialogue he recently had with some colleagues from his EEO:

> We talk a lot as a staff about sometimes just letting the experience [being in a green space] speak for itself, and letting people find their own way through that. So we might

> give them some tools or a bit of a head start on a direction that they could take [in the green space]. But really letting people, the importance of letting the experience just sit with that person.

Analysis indicated that participants believed that the experiences of engagement aligned mainly with four types of connection between people and the natural world – physical, affective, cognitive and/or spiritual connections. The points below broadly describe each type of connection and identifies the number of interviewees who mentioned each:

- Physical connections with the natural world were mentioned by all interviewees (n = 15). Most typically, this connection type was associated with a person's direct interaction with nature that lead to sensory connections, like Tilly described as "everything you are seeing, feeling [touching], hearing, smelling";
- Affective connections were also described by all interviewees referring to a person's feelings and emotions for the natural world (n = 15);
- Cognitive connections were referred to by approximately half of the interviewees (n = 7) as a person's understandings about the natural world; and lastly,
- Spiritual connections were identified by approximately half of interviewees (n = 7) including all six participants who self-identified as Māori or having a strong affiliation with the culture. Kahu spoke about paddling her waka (boat) as a physical experience that provided her with spiritual connection: "There's the physical [water], right here, right now. And then you go into a different space where I am alone but not alone on the water. It is a spiritual space and that's quite hard to describe if you're not spiritually connected".

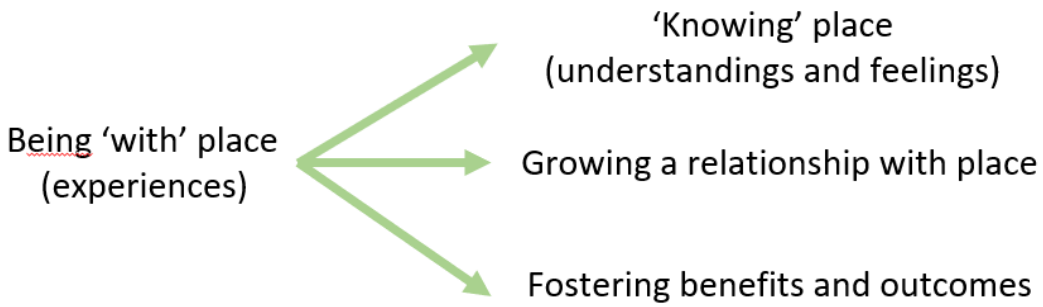
In summary, participants conceptualised nature connection with experiences that engage and holistically connect a person with the natural world, most often undertaken via an outdoor context.

5.3.2 A way of being, knowing and becoming

This section discusses a second way participants conceptualised nature connection. In this regard, nature connection was aligned with a way of being, knowing and becoming through a person's holistic connections with nature. Three sub-themes emerged as constituting this conceptualisation of nature connection: 1. knowing nature, 2. realising humans as part of nature and 3. appreciating the benefits of nature connection.

The origins of these themes can be traced back to some process codes that I interpreted from the stage two data. At the time, I had perceived these process codes as being particularly important to my analytical development, which led me to write a memo about them. Figure 38 is an excerpt from this memo that shows some of the themes that were emerging as part of this early process of analysis. The stage three interviews enabled me the opportunity to explore these codes more deeply, from which the theme of knowing, being and becoming was eventually constructed. Each theme is discussed separately in the following sub-sections.

Figure 38 *Memo excerpt about process code interpretation (stage two)*



5.3.2.1 Knowing nature

Twelve of the 15 interviewees referred to nature connection as knowing the nature that exists in proximity to the place someone occupies: the geographies, species of plants and animals, natural cycles and rhythms, and environmental indicators. For example, Sophie aligned knowing local nature with an awareness and understanding of the "layers" of the natural world, which she described as including:

> The different species of trees or animals out there, the plants that grow there, the landforms around that space, and how they came to be both through an indigenous lens and also through the way that geologically they were formed.

Seven other interviewees (all six who self-identified as Māori or strongly affiliated with Māori culture, and one Pākehā) identified mātauranga as important to knowing local nature. Atama distinguished between two types of mātauranga: one type being "mātauranga Māori" or the collective knowledge affiliated with te ao Māori; and the second type he called "mātauranga-a-iwi" or place-based knowledge.

Almost all interviewees (13/15) associated this theme of nature connection with a conceptual understanding of "interconnectivity", also referred to by some participants as the "interconnections" or "interrelationships" between all of nature. Robyn provided a useful synopsis of her "mind-blowing" realisation of interconnectivity through developing her own knowing of local nature via her educator role:

> Until I started this job, you know, I was always hearing you need trees for oxygen, trees are good for us. But a tree was just a tree. I didn't really differentiate between one tree and another. Probably knew what a Kōwhai and Pōhutukawa were, but that was it. Whereas now, learning things like the fact that Kōhūhū has little flowers that only release a smell at night, and that the Kōhūhū tree does that because it wants to attract night flying insects like moths for pollination. That just blows my mind. How does that tree know when it's night or day? How does it know that it wants night flying insects, so it needs to release its scent at night? And so they are the kind of conversations that we have with kids and you can just see their understanding [develop] that every tree is not the same, and that every tree is part of this wider network and system.

Through the excitement in Robyn's voice, it was clear that coming to understand interconnectivity had also positively impacted her feelings for nature. Likewise, data from every interview indicated that

participants associated nature connection with the feelings and emotions a person has for the natural world. Feelings of awe, wonder, curiosity, love, care and respect for the natural world were highlighted as affective outcomes of nature connection. Similar to Robyn's mind-blowing experiences, Atama recalled exploring the network of fungi and mycelium that exists just beneath the forest subsurface:

> Discovering the small connections, you know, the little, little nature. Not just the big kahikatea but the little things: the micro-organisms, the kōura [freshwater crayfish], or the invertebrates. […] And at this time of year, we go into the forest and look at the fungi and mycelium and all those sorts of things. And the kids are just blown away by that stuff, you know, they can't quite believe that network [is there]. […] So even though it's microscopic, it's sort of like so big when you think about it, and so that connecting through that kind of wonderment of life, it's really beautiful.

Some participants (8/15) specifically described coming to know nature through an entwinement of understandings and feelings. For example, Sophie reflected on how her own sense of nature connection changed during an extended tramping trip:

> Yeah I think it [connection] comes from feelings and understandings. The more I understood from the walk about the rivers and the snow melt in spring, the impacts that this had on the different trees that I was walking through, the more I knew which birds were nesting and where, the more I held respect and care for nature. These [feelings and understandings] really impacted my nature connectedness.

5.3.2.2 Realising humans as part of nature

Thirteen of the 15 interviewees explicitly associated nature connection with the realisation that humans do not exist separately to nature, but instead, are an integral part of it. Like Michelle said, "From a scientific point of view, we are all related [to nature] as we're physically made of the same things [that nature is made of]."

The Māori concept of whakapapa (ancestral linkages based on the connectedness of all things in the world) was identified by five interviewees (all Māori or who strongly affiliated with the culture) as fundamental to realising humans as part of the nature. Ian explained whakapapa in this way:

> To a Pākehā brain, whakapapa is a bit of a mystery. The closest thing is genealogy, which is just talking about people in your family line. But whakapapa is so much more than that, it's [humanity's] connection to everything, connection to the environment,

> connection to natural resources, connecting to climate, the world, the atua [deities][13], the water, that land, you know, everything. And we're [humans] related and interconnected to every aspect of that.

Building on Ian's definition, I draw on an article that he suggested I might read prior to our interview. Here, Burgess and Te Kahuratai-Painting (2020) explain whakapapa as follows:

> Whakapapa weaves all of existence together into an ever-expanding web of intimate relationships, forming the basis of Māori ways of being, knowing, and doing. Connected by our origin stories, whakapapa reveals that this web of relationships is whānau [family], existing in a state of whanaungatanga[14] [relationship]. With whakapapa, past and future generations, our *mokopuna* [grandchildren] and tūpuna [ancestors] are intimately related. Mokopuna are reflections of tūpuna. (p. 208)

Through this excerpt, Burgess and Te Kahuratai-Painting describe whakapapa as the foundation to Māori ways of "being, knowing and doing" which arise through connection and relationship between all things past, present and future.

The realisation of a relational existence amongst all things was described by some participants as relevant to everyone, not just Māori. Harata, who self-identified as Māori, provided two such examples. In one example, he used the analogy of birth amongst elements of the natural world, "At birth, it's first the water, second the child, third the whenua [dual meaning for placenta and land in the language Māori]. So that's the intimate relationship all humans have [with the natural world]." Later in our interview, he highlighted maramataka (local environmental cycles and indicators based on the Māori lunar calendar) as another example of connection and relationship between a person and their local environment:

> I always like to remind people that your maramataka is you. You are te Taiao [the natural environment]. Ko wai au, Ko au wai - I am the water, the water is me. Everyone

[13]Many Māori trace their ancestry from atua in their whakapapa. Atua are regarded as ancestors with influence over particular domains of the natural world. They were and continue to be a way that Māori rationalise and perceive the world.

[14] 'Whanaungatanga' and 'whakawhanaungatanga' are two similar terms that are often used in ways that are interchangeable. The latter term having a greater focus on the ongoing process of establishing relationships and relations to all things.

> is water. And having that intimate relationship that we have with high tides and low tides, with full moons and new moons. I am trying to create that understanding too.

Through both examples, Harata emphasised connection and relationship as something that "all humans have with all of life". Seven of the 15 interviewees linked connection and relationship with a sense of kinship between humanity and the rest of nature. Their references to kinship often highlighted feelings of care, love, and/or respect, similarly to how Jacob perceived the outcomes of the environmental restoration work undertaken by his organisation as "fostering love and spiritual connection with the environment and with each other." With respect to kinship, the concept of whakapapa was again referred to by Atama:

> If you think of species and people, animals and stuff as your family, you're protecting your family. I think that's what's missing from our Western ideals. It's not like you're just protecting nature in that sphere, you're protecting your connection to your heritage, or your whakapapa.

Michelle linked the realisation of humans as part of nature with a philosophical aspect of nature connection, which she described as being:

> Your philosophy and your view of the world and your place in the world. So that if you're truly connected to nature, you feel that relationship, you respect on an equal level other living things. But I truly believe that you're not actually really there, in full nature connectedness level, until you are respecting even like the landscape, the soil, the mountains, the rivers, like in indigenous views. You know, there is no hierarchy, or even if there's a hierarchy, it's flipped, right? Like this idea that trees, mountains are able to literally be our ancestors. And you're like, we can be respectful and learn from them.

Michelle's comments highlight the significance of indigenous perspectives to nature connection, particularly as a means to one's understanding and feelings of being part of a greater whole. This theme was elicited as a way through which individuals and societies alike may 'become' through nature connection.

5.3.2.3 Appreciating the benefits of nature

Appreciating the benefits of nature was elicited as the third and final sub-theme associated with the conceptualisation of nature connection as a way of being, knowing and becoming. The discussion below firstly pertains to how participants linked this conceptualisation with appreciating benefits of nature as

derived by individuals, followed by exploring how some participants also highlighted the appreciation of the benefits to a wider societal context.

Six interviewees conceptualised nature connection with awareness and appreciation of the benefits derived through humanity's use of nature for everyday essentials, and most importantly, our survival. During her interview, Robyn emphasised how contemporary lifestyles have resulted in people typically buying general necessities, like food and medicine, from shops rather than directly obtaining them from the source, such as the ngahere (forest and bush). Robyn spoke of contemporary society as inherently dependent on the natural world, but ignorant of their reliance on it, and therefore, holding little appreciation and value for nature. In this way, people have lost "the value of them [plants and trees], the importance of them and why they are unique and special and different".

Nature connection was also linked by the majority of interviewees (13/15) with appreciating other benefits that arise for individuals through connection and relationship with nature. Some participants, like Sophie, aligned this with a "connectedness on a physical level, that being out in the bush and realising you feel good"; while other participants highlighted the mental wellness benefits of nature connection, such as Pernille explained:

> I think we're in such a busy time in our lives, like we're so, life is so over-scheduled with so many different facets…That people are just not stopping and being where their feet are and not being present in the moment. And that is creating busyness, stress and anxiety and other mental health presentations….There's not much calm, and then we've got the media. So you know, nature connection is important for our physical health, but absolutely for our emotional health, our wellbeing and mental health, our social development. It's an absolute necessity for us in our lives in the current age.

Two thirds of interviewees (10/15) specifically associated nature connection with fostering a sense of belonging for the individual. For example, when asked what nature connection meant to her, Sophie initially spoke of connectedness as appreciating the physical health benefits as noted above, but then added:

> But also, knowing this is the place that I connect to the most, it's almost through a pepeha [oral tradition describing ancestral linkages] lens. That connectedness to things greater than you, the mountains, the rivers, and looking through te ao Māori lens of respect for the natural feature. The connectedness I'm thinking of at the moment comes from tūrangawaewae (the place where one has rights of residence and belonging

> through kinship and whakapapa), a sense of place, standing in a place, knowing who your tūpuna were, where they came from.

Similarly, Michelle expressed the benefits realised through nature connection as:

> Like when you go I am part of this wider, really interconnected, important living thing. You know? I think it makes people feel less lonely. […]That joy you get from knowing that you're part of something. I think that's again the element of wellness that you get from having the connectedness.

The benefit of belonging correlates with the themes discussed in Section 5.3.2.2, pertaining to people coming to understand they are just one part of a greater whole.

Lastly, this theme was expanded to a wider context by a smaller number of interviewees (7/15). For example, Michelle explained the benefits she associated with nature connection as:

> Not about that personal, just me wellness, you know, the whole health craze that the Western world has on 'my' diet and 'my' exercise. No, it's not that, it's the communal wellness that arises. So if the people are healthy, that shows the environment is healthy, right?

Five participants, all who identified as Māori or as having strong-affiliations with the culture, specifically linked wellness with a reciprocal relationship between the health of people with the health of nature. As Atama stated, "When the land is healthy , the people are healthy."

Towards the end of my interview with Michelle, she concluded that nature connection is "good for everyone…it's a solution to the colonial project that has damaged us all", which has only benefited "the small group of people who built the [colonised] world this way". This comment foreshadows a key finding of nature connection as positively impacting transformational societal change as presented in Chapter Seven.

5.3.2.4 Section summary

To recap, Section 5.3.2 outlined participants' conceptualisation of nature connection – as a way of being, knowing and becoming in relation to everything in the world. This conceptualisation was comprised of three sub-themes being: 1. knowing nature, 2. realising humans as part of nature, and 3. appreciating the benefits of nature connection. Underpinning nature connection as a way of being, knowing and becoming, and all three of its associated sub-themes, was the notion that humans are only one part of a

greater interconnected whole. Next I discuss the participants' third and final conceptualisation of nature connection as an empowering impetus.

5.3.3 An empowering impetus

Almost all interviewees (14/15) identified an organisational aim of their respective education programmes as empowerment through nature connection. Empowerment for taking care of nature was perceived by participants as resulting from the different types of connections that arise through nature connection experiences. As Jenni explained:

> Through becoming more connected with the environment, with all the natural energies around us, we're seeing students, you know, leaning toward them [energies, cycles, and species of nature], acting instinctively, looking at ways to care and to protect them.

Although Jenni did not explicitly refer to the term 'empowerment', the words she chose to use, such as "leaning towards", "acting" and "looking for ways to care and protect", were interpreted by me as having similar connotations. Approximately two thirds of interviewees (10/15) specifically used the word empower in association with nature connection, while like Jenni, four other participants utilised words with similar connotations. None of the respondents from stage two used the word empower in association with nature connection, however some did use similar wording like those above. For instance, stage two participant #19 said, "Connection to nature encourages self efficacy for environmental action."

Through analysis, I considered the specific words that participants used to describe 'what' their respective programmes sought to empower. Findings demonstrated the fostering of nature connection through the EEOs' programmes as a means of empowering environmentally-friendly actions and behaviours (Section 5.3.3.1) and empowering Māori (Section 5.3.3.2). These two themes are discussed in the next two sections.

5.3.3.1 Empowering environmentally friendly actions and behaviours

Environmentally-friendly actions and behaviours are closely associated. However, the findings about the outcomes of actions and behaviours as sought by the EEOs' programmes are reported separately because participants tended to distinguish one from the other. For instance, this separation of taking action and behaviour change is evident in the excerpt below where Tilly speaks about the progression of outcomes developed through her programme:

> From the inspiration, the emotional connection and the excitement that can come from seeing those animals. And from that, you sort of get into the harder area around action and then behaviour change, right? Which is the golden good sort of stuff. […] So off the back of all the awe, wonder, excitement, inspiration, and what issues they are facing, to, 'I'm motivated to help them', or more aligned to help. So at a very basic level, this is what it [the aim of her programme] is about.

In general, participants spoke of taking action as related to intermittent or one-off events, while behaviour change referred to a way of becoming. The analysis demonstrated that the majority of participants (14/15) aligned nature connection with empowering environmentally-friendly actions, while two thirds of interviewees (10/15) linked the term with empowering pro-environmental behaviour. Additionally, approximately one third of interviewees (6/15) spoke of nature connection as empowering kaitiaki (guardians). This theme is evident in Sandy's explanation of an aim of her EEO:

> So the greatest outcome was to increase kaitiaki in the local community with the idea that kids were to go home and talk about making [pest] traps. We'll always give each school two traps to take back with them and encourage them to try and set up a trapping programme. Some schools and the kids I know, started trapping at their home, in their own home and liked the idea of planting trees. So it was absolutely about empowering kaitiaki. That's what we wanted for the outcomes.

Kaitiaki[15] is affiliated with the Māori concept 'kaitiakitanga' that refers to a disposition characterised by an active guardianship of the elements and species of the natural world. Kaitiakitanga is derived from the ontology of te ao Māori that denotes the universal connection amongst all things, from which it is humanity's obligation to nurture and protect the physical and spiritual wellbeing of the natural systems that humanity's survival depends upon (Paul-Burke & Rameka, 2015). In this sense, kaitiakitanga is

[15] Only one of the six participants who referred to empowering kaitiaki was Māori. This is important to note because although the use of the term has and continues to be used by some Māori in relation to educational outcomes, such as in the case of Paul-Burke & Rameka (2015), there are different interpretations as to what are appropriate uses and contexts of the term (Malcolm, 2022).

representative of the reciprocal relationship between people and nature necessary for improving the wellness of both people and nature.

5.3.3.2 Empowering Māori

This section highlights firstly the finding that the majority of participants (14/15) believe that nature connection is embedded within Māori culture, similar to other indigenous cultures, and secondly, that Māori are increasingly empowered through their culture's connection with nature.

Evidence of the first finding is found in the many references made by participants that linked nature connection with traditional (pre-Westernised) ways of being, knowing and doing. The excerpt below from Sophie's interview illustrates this sentiment:

> It's [nature connection is] quite a buzzword, a popular word. A popular set of words at the moment, but what that actually looks like is something really quite different in my opinion. It's ancient, like an old mentality, right? Think of it how our ancestors used to think regarding nature, rather than humans being bigger than nature, you know, just having respect for nature again.

Another example is found in my interview with Harata (self-identified as Māori) who introduced himself to me through a mihi (greeting), a common practice of tikanga Māori (Māori custom). Although a translation of Harata's mihi cannot be included as part of these findings in order to protect his anonymity, he described his whakapapa that linked his ancestry with a number of specific maunga (mountains) and an awa (river). Harata's mihi clearly illustrated the way he perceived his identity as intrinsically linked with these geographic features. Further evidence of Māori culture's implicit connection with nature is found in Ian's commentary, who laughed while saying, "If you talk to Māori about reconnecting to nature, it's like, "Well, yeahhhh [laughs]" - his laughter alluding to his belief in this cultural connection with nature.

Nine interviewees specifically mentioned their belief that resolving sustainability issues requires the application of such perspectives. As argued by Atama:

> I really, really feel like if we're going to move forward and improve environmental outcomes, that's where we start. We've got enough Western science graduates, and you know, they're wonderful people, but it's out of balance.[…] It's a responsibility for us [in Aotearoa New Zealand] to see mātauranga [Māori knowledge] and Western science as equal.

Ian referred to the potentiality of nature connection in this respect as “renormalising indigenous worldviews and perspectives.” Through analysis of the data, nature connection was aligned with increasing societal awareness, understanding and receptiveness to the paramount role that indigenous perspectives can offer to resolving our sustainability crisis.

By no means did any participants perceive the application of indigenous perspectives as the mere integration of these wisdoms into Western solutions to socio-ecological problems. Instead, all the participants who either self-identified as Māori or identified as having a strong affiliation with Māori culture argued similarly to Ian that “It’s got to be about Māori leading this work in the first place” (in the context of Aotearoa New Zealand). Kahu’s commentary added further insight:

> It's about us (Māori and non-Māori] working together, keeping each other safe [culturally], each learning off each other about our different world views. […] We [mana whenua] can share this space, the knowledge that we know. […] It would just make my heart so happy to have our own people out there telling our own [cultural] stories, sharing our mātauranga. Whereas now, we’ve got non-Māori speaking on our behalf. Why are we not doing it? Why can’t we work in that space and get paid the same as science degrees? Actually, we are the experts of our environment.

It is through these ways in which interviewees believed that tangata whenua (people of the land), and more locally mana whenua (Māori sub-tribes) will be increasingly empowered through their culture’s connection with nature.

5.4 The interconnectedness between participants’ conceptualisations

Up to this point, this chapter has discussed three conceptualisations of nature connection in a way that suggests participants perceived each of these as independent of one another. This was an intentional approach on my account, as the researcher, for wanting to focus the reader on one conceptualisation at a time. However, with each conceptualisation now unpacked independently, this section is required to illuminate how interviewees’ understanding of nature connection tended to link two or three of these conceptualisations together.

The way in which interviewees related each conceptualisation with the others is best illuminated in an excerpt, taken from Tilly’s interview. Responding to a question about her opinion of the purpose of education in today’s age, Tilly’s answer spoke to all three conceptualisations of nature connection. For transparency sake, I have included my interpretation of Tilly’s words in the square brackets:

> When you think about things like nature connection, and the engagement that comes with it, and the relationship that one develops with this big giant thing [nature], they're all so inextricably linked really. Aren't they? I mean because nature connection does tap into so much in terms of engagement with the environment in the first place [1. experiences], let alone one's personal relationship with it [2. way of being, knowing and becoming], let alone the action one can take [3. empowerment] on a smaller scale.

An excerpt from Sophie's interview provides another example of how participants expressed these conceptualisations collectively. While explaining nature connection as an outcome of her programme, Sophie linked experiences, knowing and empowerment toward action taking when she said, "It is only through these experiences that one comes to know nature, wanting to care for it by taking action."

The meanings that the stage three interviewees expressed about these conceptualisations were rich in detail and, as evident in the data, shown to be interconnected. The findings as presented in Sections 5.3 and 5.4 are useful for understanding what participants meant with regards to educating for nature connection, as focused on in Chapter 6.

5.5 Chapter summary

Findings as elicited through data collected in stages two and three pointed to the following three aspects of Western culture as root causes of unsustainability: anthropocentric beliefs, utilitarian value of nature and contemporary lifestyles. Furthermore, the findings point to participants' beliefs that fostering nature connection holds much potential for evolving these cultural aspects toward a more sustainable future. Understanding the participants' conceptualisations of nature connection was important for illuminating the rationale that underpinned the EEO prioritisation of nature connection as an educational outcome for the formal education sector in Aotearoa New Zealand.

The three conceptualisations of nature connection elicited through analysis were: experiences of engaging 'with' nature; a way of being, knowing and becoming in connection; and as an empowering impetus. The conceptualisation of experiences of engaging 'with' nature refers to the opportunities through which people focus on nature through their direct interactions with it. Participants believed that unstructured time and space in a person's life allows for such opportunities. Nature connection was also conceptualised by interviewees as a way of being, knowing and becoming through which people come to know themselves as just one part of the interconnected whole of nature. The realisation of one's life as dependent on nature was perceived as emerging through the being, knowing and becoming in

reciprocal relationship between one's self and nature as kin. Finally, the concept of nature connection was also perceived to empower environmentally friendly action and behaviours. Somewhat related was another finding that nature connection, as an embedded part of Māori culture, was perceived by some participants as empowering Māori, given the right circumstances, to lead toward more sustainable futures.

Although I initially explained these conceptualisations individually, Section 5.4 illuminated how interviewees often discussed these conceptualisations as interconnected. Also of significance to this chapter was the fact that interviewees rarely verbalised the positionality and relationality of humans as just one part of nature as a whole, which they so commonly spoke about. This is interesting given the finding demonstrating participants' perceptions of a perceived human nature dichotomy as a major cause of unsustainability.

In conjunction with the paramount role education plays in addressing unsustainability as argued in my literature review (Chapter Two), nature connection has significant implications for teaching and learning in today's age as characterised by our sustainability crisis. In Chapter Six, I explore findings about firstly, participants' perspectives for prioritising nature connection as critical outcome for the education system, and secondly, the pedagogies and approaches used by their respective EEOs to achieve this outcome.

Chapter Six - Educating for nature connection Test

6.1 Chapter introduction

A key finding from stage one demonstrated that nature connection, as an educational outcome, was prioritised by the greatest number of participating environmental education organisations (EEOs). Chapter Five then established EEO representatives' rationale for prioritising nature connection as critical to resolving unsustainability, as well as their conceptualisations of nature connection. This chapter now explores findings related to nature-based education as an approach to fostering nature connection within the education system in Aotearoa New Zealand. As in Chapter Five, I continue to draw on data from both stages two and three, explaining how each stage contributed to key findings.

I set the scene in Section 6.2 by examining how interviewees perceived school norms, priorities and structures as contributing to students' disconnection from nature. As identified previously in the methodology chapter (Section 3.4.3), the criteria for selecting interviewees ensured that, collectively, EEO representatives had significant lived-experience of working in schools. The majority of EEO representatives (13/15) regularly delivered programmes both within schools and in wider community settings, while seven of the 15 interviewees previously held teaching roles in schools prior to their current role. Their experiences and understandings justify the EEO representatives' views of schools as contributors to disconnection.

I then briefly outline ways participants have previously used the term 'nature-based education' in the context of delivering their respective environmental education (EE) programmes (Section 6.3). This is followed by an in-depth examination of key principles and associated pedagogies of nature-based education as perceived by participants (Section 6.4), including specific examples of praxis and their ideas about learning progressions. The data collected about nature-based education pertained to EEOs programmes, many of which were directly undertaken within the school environment.

6.2 Schools as contributors to disconnection

It was only through data collected via the stage three interviews that the theme, schools as contributors of disconnection, originated. This was likely prompted by the interview schedule which included the following question: Do you think the formal education system influences nature connection? If so, in what ways? This is an example of how I, the researcher, had an omnipresent influence on the research

process and findings through subjective factors, such as in this instance, through the questions that I chose to ask.

In one way or another, all the interviewees spoke about the current education system as a whole contributing to unsustainability by progressively diminishing students' connection with nature and reinforcing aspects of Westernised culture that lead to environmental degradation and social injustices, as explored in Section 5.2. As Michelle summarised:

> Young children will inherently have a connection [to nature]. When they go through the mainstream school system [education system in Aotearoa New Zealand], they're going to have that taught out of them in our current structure. That then leads to the majority of the population living unsustainably. Right, it's that simple. So, if we're talking about wellness of the whole living Earth, and the people within it, we have no choice but to make sure that generations coming through don't get that taught out of them.

Based on their lived experiences as educators working alongside teachers and students within schools, the EEO representatives provided examples of ways they perceived the education system to negatively influence students' interactions and relationships with nature and impact what they presumed as children's inherent connection with the natural world. By and large, analysis of the stage three data clearly indicated a collective belief amongst participants that connection with nature is negatively impacted through the modus operandi of most classrooms and schools. However, a few interviewees (3/15) shared experiences of working with teachers who they perceived as committed to intentionally fostering nature connection, albeit identifying these as one-off cases with individual teachers who they suggested had a passion for EE.

This section explores findings that illuminate schools as contributors of disconnection, and therefore, unsustainability. Through analysis of the stage three data, three broad themes relating to schools as contributors of disconnection were identified. These were: (1) norms underpinning the operation of schools, particularly in relation to organisational culture and rules that influence students' interactions with the natural world; (2) learning experiences and curriculum content as prioritised by school administrators, teachers and parents; and (3) curriculum structure and external assessment regimes. These three themes are discussed below.

6.2.1 School norms

Just over two-thirds of interviewees (11/15) shared examples of school norms that restrict the number of, or eliminate, opportunities students have to engage with local nature. As perceived by the interviewees, these norms pertained to the organisational culture and rules of schools. For example, Pernille explained that she had frequently observed school rules prohibiting children of a certain age from interacting with natural elements, like sand and water. As she explained:

> What I find in schools is that in the junior classes, they usually get the use of a sandpit and mud play area and all that stuff. And then, when they get to like eight or nine [years of age], it just all stops. They're no longer allowed in that play area, and they just get the field [to play on] and maybe an adventure playground. But they don't get the sand pit, the stuff that they still really like, and they would continue playing with. So, they are kind of conditioned [for disconnection] through schools.

Four of these eleven participants linked school rules like these, that minimise students' interactions with the natural world, with health and safety policies. For example, Milka commented:

> Now everybody is just so protective about things - like 'Oh, you can't touch this, do that, somebody might fall, somebody might get hurt.' I think we have gotten to the stage where everything is just so sanitised, including schools.

Five participants also highlighted their belief of the negative impact that digital technologies have on children and adolescents' level of nature connection. Whether schools allow regular use of devices therefore has implications. As Sophie said:

> Yeah, students at the high school level, from what I've noticed, are really getting quite addicted to technology and to cell phones and that's been a big barrier [to] trying to get students excited about nature at that age with their kind of addiction to social media.

Interviewees also spoke about aspects of school culture as influencing nature connection. For example, seven participants spoke about how school culture can impact the way teachers, students and parents perceive the benefits of learning opportunities in classrooms versus outdoor environments. In Robyn's experiences of working with schools, going outside during class time was typically perceived as "a bit of fun" compared to the "real learning" that happens inside the classroom.

6.2.2 Learning experiences and curriculum content

A second theme in relation to schools as contributors of disconnection pertained to the prioritisation of certain learning experiences and curriculum content over others. For instance, Jacob described schools as places that prioritise "learning from someone else's imagination" through text-and-digital-based resources, rather than "in their [students'] own imaginations [...] there is too much learning about and not enough learning with [nature]."

Eight interviewees identified text-and-digital-based learning resources as adversely impacting students' connection with nature. Two of these eight participants specifically hypothesised an inverse relationship between a student's year level in the education system with how curious they are about the natural world and their connection with nature. Their basic tenet was: as indoor, text-and-digital-based teaching and learning approaches are increasingly utilised with each progressive year a student spends in the education system, students' connection with nature, and hence their curiosity about it, decreases. While interviewing Sandy, she reflected on her beliefs in relation to this hypothesis:

> So, I remember this lovely quote from David Attenborough, which is, you know, it's not how to get kids curious but how to not let them lose it. They love looking at what is under a rock, for any five-year-old, it's so easy to engage them outside. What the extraordinary thing is how do they lose that curiosity? And I suspect education has quite a big role to play in that loss of curiosity, sadly enough, yeah, I do.

Sandy then discussed different learning experiences she believed the education system should be using more often to foster nature connection, such as encouraging students to get their hands dirty, inquiring about nature, and taking action for the environment. These ideas and others are explored further as part of the discussion about nature-based education in Section 6.4.

Another way that interviewees perceived schools as contributors of disconnection related to the prioritisation of curriculum content focused on socio-ecological issues like climate change. With respect to this theme, almost half of the interviewees (7/15) highlighted their belief that education focused on learning about socio-ecological issues, without prioritising nature connection as an educational outcome, can negatively affect children and young people. For instance, Jacob described the sentiment that he and his EEO colleagues felt in relation to the potential for climate change education to adversely impact children's wellbeing and sense of agency. He stated:

> We found that too much emphasis on that [human impacts] isn't particularly helpful. [...] Some people within our organisation have pretty, [speaker pauses] I'm going to use the word anger about how much of the education occurs surrounding climate challenges. And they're angry, because what they've seen is that this thread of education has created such tensions in young people, that we're seeing higher levels of depression and anxiety than we really need to. So that the outcome of that kind of education is perverse, and people are not doing more, we're not getting the outcome from that type of education.

Along similar lines, having recently watched the film *Rise* (Feast, 2022), an Aotearoa New Zealand documentary about climate change student activists, Atama commented:

> I really felt for a couple of the individuals that kind of led the [the climate change activism] charge in that doco. Some [of the student activists] seemed like they weren't equipped with the kind of resilience, emotional resilience. That burden of feeling like they had to change the world, you know. And I've had feelings like that on a number of occasions in my life, and it's heavy, heavy shit, you know. And you see a 14-or 15-year-old feeling like that? Remembering my time as a teenager, and just thinking, wow, that's pretty heavy stuff.

There is no doubt that if unsustainability is to be resolved, every human on the planet must develop awareness and understanding of the socio-ecological issues of our time and actions that can contribute to transformational change. But also, as these seven participants emphasised, there is the need for fostering nature connection as a paramount precursor to positively gearing issue-based learning around topics like climate change.

Two other themes relating to the ways schools can contribute to disconnection through learning experiences and curriculum content were elicited through the analysis of the stage three data. Firstly, budgeting for school-wide renovations of indoor classrooms without allocating funding for developing outdoor learning spaces was one theme as identified by a few interviewees (4/15). Alternatively, Michelle spoke of reversing this trend, "It doesn't have to cost much money. So, let's just actually pay attention to the school grounds, just like we do the buildings. Plant tiny forests, have school gardens, right? Pay attention to the physical grounds".

Secondly, four interviewees identified that school administrators and teachers are themselves often disconnected from nature, and therefore do not have the awareness, understanding or skills for

educating in ways that foster nature connection. This was best illustrated by Harata reflecting on teacher professional development opportunities he facilitated through his EEO:

> Some of our teachers were driving over rivers, about 20 rivers every morning, to go to school. And I asked those teachers to name me one of those rivers. Unfortunately, they didn't know one. And some other things. We had a pow-wow in the local ngahere [bush and forest] and I pulled out a Pohutukawa and Rātā flower [types of native trees], I put up a Shortjaw Kōkopu and Longjaw Kōkopu [types of native fish], showed them a Tōtara and Rimu [types of native trees]. And when I asked the teachers which one [was which], they just don't know. Yeah, so this really enabled me to come up with a base foundation of where the teachers were at in terms of their relationship with the local environment. Putting it nicely, they failed [laughs].

The disconnection of teachers and others working in schools was perceived by these four interviewees as a significant barrier to addressing unsustainability through the education system. This points to the need for prioritising nature connection not only for students, but for teachers and school administrators too. As Harata observed, "Not many teachers get dirty hands these days. [...] But you know, once we get our hands dirty, that's when the learning starts."

6.2.3 Curriculum structure and assessment regimes

Based on the participants' lived experiences working within the education system, all interviewees perceived that students' disconnection from nature increases as they progress from early childhood years through to the end of secondary schooling. Eight of the 15 interviewees identified the secondary school years (ages 13 – 17) as the period when disconnection through schools is most significant. Pernille described trying to foster nature connection through the secondary education sector like hitting "a bit of a brick wall."

All eight participants who explicitly spoke about barriers to fostering nature connection in the secondary school sector highlighted the focus on assessment-driven, educational objectives as the major contributor of disconnection. As Sandy explained:

> Your priority is the exams at the end of the year. And if what you're doing doesn't feed into those exams, the management's not interested, the kids are not interested, the parents are not interested. [...] And that [the exams] become the holy grail.

Interviewees described a couple of ways in which they had witnessed assessment objectives influencing disconnection. Firstly, they explained how assessment objectives lend themselves to the prioritisation of text-and-digital learning materials in conjunction with short class periods (typically of 60-minute duration), and secondly, the way in which assessment criteria restricts teachers and students to the goal of mastering abstract knowledge in the cognitive dimension. Overall, these eight participants were adamant that current external assessment regimes leave limited or no time for learning beyond the classroom walls[16], inhibiting the number of experiences students have to holistically connect with nature at place (as discussed in Section 5.3.1).

Three interviewees also identified the subject silos that typically characterise the secondary school curriculum as another significant contributor to disconnection from nature. Sandy explained how siloing curriculum causes "students to lose sight of the interconnected wholeness of our world"; followed by a related comment later in her interview: "Our [sustainability] problems aren't going to be solved by a single fix, and instead, students need to be learning more systems-type thinking that is multidisciplinary." Correspondingly, Michelle highlighted issues she perceived with teaching the physical sciences completely devoid of the social sciences; her main concern being that subject silos denote the natural world as separate to humanity. As Michelle mused:

> That's where, you know, we must consider breaking down these subject silos. The more I read about indigenous worldviews and how we can move forward, that the thinking about the social sciences and [physical] sciences […] that they're built on a colonial view of humans being separate so that we can dominate nature. So, to me, I'm like, the extreme would be you don't even have those two different subjects anymore, because they are only reinforcing the fact. It's almost dangerous I think to keep these unique disciplines.

[16] To be clear, there are some subjects of the National Certificate of Educational Achievement (NCEA, Aotearoa New Zealand's senior secondary school examination framework) that allow for learning experiences outside the classroom (LEOTC). Because the physical and natural world is the landscape of science, and associated subjects like biology and chemistry, some of the relevant achievement standards are well aligned with data collection that engages students with the nature at place. (e.g., Achievement Standard 92020 for biology/chemistry -Level 1). But whether or not teachers take advantage of this opportunity is another question. Education for Sustainability is another NCEA subject with some standards that also align with LEOTC; however, the uptake of Education for Sustainability has been relatively low across the country (Shepard et. al, 2024). Often, students who sign up for this NCEA subject must enrol individually through an on-line, satellite course catering to students from multiple schools. Educators often cite parental influence, university entrance demands and a lack of societal prioritisation about sustainability as some reasons for the low uptake of this subject.

6.2.4 Section summary

The section outlined some features within many current school norms, priorities and structures that interviewees claim to be contributors to disconnection. Through their lived experiences of working in schools, these EEO representatives had witnessed these features as progressively reducing the number of opportunities for students to experience and connect with nature, between early childhood through to secondary school. Of particular significance to some interviewees was the assessment-driven objectives of the secondary school years, which they viewed as inhibiting students' insight into a systems-thinking approach for resolving problems, while also perpetuating the human-nature dichotomy. Identifying these contributors of disconnection are important if schools are to evolve into places that prioritise educational objectives that contribute to nature connection, and equally, a regenerative, more sustainable future. The rest of this chapter reports on the findings relevant to the utilisation of a nature-based education approach to achieving such ends.

6.3 Familiarity and use of the term 'nature-based education'

Findings as elicited through the analysis of data collected in stage two demonstrated that EEOs utilised a range of experiential learning approaches in nature-based contexts for fostering nature connection. As part of this study, I described these approaches and contexts as 'nature-based education'.

This section provides an overview of the ways in which the participants understood and utilised the term 'nature-based education', through their professional roles as environmental educators, and more specifically as part of this study. In Section 6.3.1, I outline my rationale for using this term to frame the educational approaches proposed by EEOs for fostering nature connection. Then, in Section 6.3.2, I highlight some of the themes elicited through the data analysis about participants' familiarity with and use of the term as part of their respective education programmes.

6.3.1 My use of the term

As part of this study, I used the term 'nature-based education' in the Research Information Sheet (Appendix 4) that I sent to participants in preparation for the semi-structured interviews. My research topic was identified on the information sheet as "nature-based education" and defined as "learning through exposure to nature and nature-based activities, and occurs in natural settings and in other places where elements of nature have been brought into built environments, such as plants, animals and water" (Jordan & Chawla, 2019, p. 2).

Admittedly, prior to this study, I had never intentionally used the term nature-based education in my role as an environmental educator. Instead, I used a number of other terms, such as EE, education for sustainability, and place-based education: the term I used depending on the context. Most often, I referred to EE because it is commonly used as an 'umbrella' term for a wide range of educational initiatives underpinned by the goals of educating for environmental protection and social justice (Ardoin et al., 2018).

As part of the interview process, I purposely referred to nature-based education for three reasons. The first reason was based on the findings derived from one of the two questions that I asked as part of the second questionnaire: How does your organisation develop nature connection in learners? Why does it do it in this way/these ways? As evident by the findings discussed in Section 5.3.1, EEOs relied on experiences whereby students physically connect with the natural world for fostering nature connection, of which the majority were through outdoor, nature-based contexts. Secondly, I had observed an increased use of the term in international literature that was published around the same time the study commenced (see, for example, Faber Taylor et al., 2022; Harwood et al., 2020; Jordan & Chawla, 2019), and thirdly, 'Nature Education Aotearoa', a not-for-profit foundation was established with the aim to promote nature-based education programmes and excursions across the country (Nature Education Aotearoa, n.d). By noticing the prevalence of the term's usage both nationally and internationally, and in conjunction with the findings from stage two, I became interested in the meanings that environmental educators in Aotearoa New Zealand held of the learning approach, and developing a deeper understanding of its relationship with nature connection as an educational outcome.

6.3.2 Participants' use of the term

As noted above, stage two participants provided numerous examples of utilising physical experiences through nature-based contexts for fostering nature connection. However, none of them made reference to the term nature-based education in their stage two questionnaire responses. During stage three, all interviewees were asked how they defined nature-based education. In response to this question, participants discussed both their level of familiarity and comfort for using the term. Similar to my professional experience, none of the participants reported using the term as an official descriptor of their education programmes. Nevertheless, they all identified aspects of their programmes that aligned with educating through nature-based contexts. Key themes in relation to the meanings that some interviewees associated with the term are presented below. These meanings highlight confusion or

reluctance around using the term as part of their education programmes, and a perception that nature-based education is not typically prioritised through the education system.

Five interviewees reported tensions they experienced around correctly defining the term nature-based education and/or using it as part of their respective education programmes. For example, Jenni highlighted the challenge she perceived in relation to understanding the many similarities and overlaps between the wide range of terms that are used in the field of EE. She said that if she was forced to define nature-based education she "would kind of probably go back, around and around in circles". Another two interviewees discussed some perceived bias in relation to the term. For example, Robyn matter-of-factly stated her opinion that environmental education is a term more widely accepted and respected than nature-based education. As she explained:

> If you said to me, 'What's nature-based education?' My initial thought would be of those schools, you know, the whole unschooling movement or those bush schools. And I guess that kind of idea is a little bit alternative. So I probably wouldn't use the term for what we do because I'm like, 'No, we do the real work on the ground. We're not just out playing in the trees'. Yeah, which is an interesting thought, and I don't necessarily think that's right. But it's probably just the way it is. Maybe part of it is to make us feel more valued. Like, I feel like if we are trying to sell our programme to the general public and we said we're nature-based educators, we are less likely to get buy-in than if we say we're environmental educators. [...] I just think that if you say you're nature-based, then probably people think 'Oh, that's lovely' but you won't get the same support for your work.

A further four interviewees referred to an understanding of nature-based education as an approach more commonly implemented through alternative education programmes rather than through the formal education system, like Michelle, who described it as:

> Probably something that still refers to stuff happening outside the mainstream [English-medium, education system in Aotearoa New Zealand]. So, yeah, whether it's a one-day bush school or a nature school, my sense is that is where the definition would be most applied by most people.

Three of these four participants highlighted the inequity that arises when nature-based education can only be accessed through user-pays programmes. The concern with this model is inequitable access to nature connection, resulting in only the children with parents who can afford to pay - and who value

such an approach - as participating in these types of learning experiences. Milka summarised the scenario like this:

> Not everyone [every school] is doing it. You still very much have a classroom-bound system. And now with devices and bring your own device, that's gotten even worse. […] So maybe you can send your kid off to a green, nature type school thing. But most people won't do it. Ninety-nine percent of parents will not do it because that's another thing that parents have to pay for, take time off for, drive their kids there to a different school. You know, it's just too much hassle. So it has got to come from the schools, all schools.

These findings about the participants' familiarity and use of the term 'nature-based education' bring up some considerations about naming the educational praxis for fostering nature connection, a point taken up in Chapter Eight. Next, some key characteristics of nature-based education praxis as envisioned by participants are explored.

6.4 Nature-based education – principles of praxis

A key finding from stage two demonstrated that EEOs utilised a range of experiential approaches in nature-based contexts to foster nature connection (see Appendix 7). However, also identified through the stage two analysis was an array of pedagogies, approaches and contexts that underpinned these experiences as part of their responses. In a stage two memo, I broadly grouped this diversity of educational approaches into four groups:

1. connecting, bonding, loving;
2. learning, understanding;
3. exposing to and taking acting on issues, restoring; and
4. being with, relating, belonging.

EEOs' rationale for such a diverse range learning approaches for fostering nature connection was explained by stage two participant #24:

> We believe that nature connection is complex, related to variety of social and environmental factors in a person's development and that not all people will connect with nature in the same way or to the same degree.

In response to the stage two findings, I knew that I wanted to use the in-depth exploration opportunity as provided by the interviews to develop a more comprehensive understanding of the praxis utilised by

EEOs for fostering nature connection. Hence, all EEO representatives were asked to describe the nature-based learning experiences offered through their respective programmes (both in and outside of schools), from which five key principles of the praxis were constructed. These included:

- outdoor, place-based education approaches;
- engaging with nature at place;
- nature as teacher;
- meaningful nature-based experiences; and
- honouring Māori perspectives.

Additionally, the pedagogies participants reported using as part of their programmes were thematically categorised in relation to these principles, and three broad levels of nature-based education identified. An approach to nature-based education, as characterised by these principles, pedagogies and learning progressions, are explained within the sub-sections below.

6.4.1 Principle one: Outdoor, place-based approaches

All 15 interviewees associated the praxis of nature-based education with teaching and learning outdoors. As Michelle stated, nature-based education means "the literal sense of being in nature, learning." The analysis demonstrated the participants' collective belief that learning through outdoor experiences is, as Tilly coined, "the gold standard" of nature-based praxis. The significance that participants placed on the experiential connections made with the nature was explained by Pernille in this way:

> Like, it's the experience of being in nature which really gives the real learning. It's like, you know, reading a book about the weather, but never going outside. You just won't know. You will think you know. Even if you create some kind of rain thing in the classroom. It will be like, 'Oh wow, that's cool'. But it's not, it's just not the same. The deep, connected learning happens outdoors, in the real environment.

Analysis of the data also aligned nature-based education with place-based teaching and learning approaches that ground praxis in local contexts and associated phenomena. Two thirds of interviewees (10/15) identified the school grounds as a useful starting point for undertaking nature-based education. Michelle described this principle of praxis as "super-localised, specific to place and ongoing;" and one that is about "blurring the line between school and community." Pernille emphasised the importance of

providing students with regular learning opportunities in these local, outdoor places, no matter the weather or season:

> So it's about dressing for the seasons and the weather, and really experiencing the seasons and the change of seasons. I think that's where the amazing stuff comes from, like when children are there for a full year, they see the site change so much. Children are a lot more attentive to things, and they see things that we don't necessarily always see.

Four of these ten participants described nature-based praxis as a learning approach that prioritises regular visits to the same place(s) beyond the classroom walls. Recalling a key message she took away from a nature education conference, Sophie said:

> It's [nature-based education] about using the closest areas. You don't need to go on a trip to the other side of town to show nature. It's all around and right outside. Getting kids familiar with that and exciting them with, you know, the walk from their school to the park. There's parts of nature everywhere, wherever you are.

A few interviewees (3/15) noted that nature-based education should be careful not to promote the idea that one has to go somewhere to find nature. In order to circumvent this, these three participants perceived it critical to teach through a perspective that nature is everywhere. As Atama described, "It [nature] is everywhere and everyone. So it is not just in the reserve or in the park, but it's like everywhere. It's on your skin, it's in your driveway. You know, there are opportunities for biodiversity everywhere."

Although all interviewees pointed to outdoor experiences as foundational to the praxis, six participants also encouraged bringing local nature indoors whenever possible. For instance, Harata's EEO aimed not only to support teachers and students with learning through outdoor contexts, but also helping schools integrate locally relevant and meaningful themes of te taiao (the environment) into the built form of their classrooms and learning experiences. As Harata acknowledged, "When you're in a classroom and you're talking about the sky and everyone looks up, you know, all you see is the roof. So there's this disconnection."

For Harata and his team of educators, this has involved supporting schools in the following ways:

- Naming classrooms after different types of local rākau (trees) and manu (birds);

- Identifying different age-based syndicate levels based on the names and lengths of the local awa (rivers) - with the junior syndicate named after the longest awa because they have the greatest number of years left at the school, and vice versa for the senior syndicate;
- Allocating some of the school building renovation budget for including elements of building design that reflect features of nearby nature, which included placing windows to offer vantages of local geographies and illuminating local rākau through stained-glass windows.

EEO representatives prioritised and enabled place-based approaches as described above, undertaken outdoors whenever possible. Helping students to make physical connection with nature, whether it was intentional or incidental, seemed to be the underlying objective of this principle of praxis.

6.4.2 Principle two: Engagement with nature at place

As elicited through analysis, engaging with nature is a second key principle of nature-based education praxis. This principle aligns with the way in which all interviewees explained their respective education programmes as enabling students to be 'with nature at place' rather than just learn 'in' or 'about' nature (see Section 5.3.1). Jacob explained learning through engagement with nature as, "You're learning directly, rather than learning from someone else's imagination [through books]. So if you want to learn about the plants, then be with the plants. If you want to learn about the wind, then be with the wind."

Although a plethora of research studies demonstrate the health and wellness outcomes for people that are associated with simply being in contact with nature (Kuo et al., 2019; Miller et al., 2021), all interviewees to varying degrees perceived engagement with nature as differing from a 'surface-level' interpretation of the EE adage of 'educating in the environment'. In relation to this theme, Ian explained his worries about the potential for nature to be used for education purely through a utilitarian perspective (see Section 5.2 – predominant focus on nature for meeting human needs):

> There's someone local doing forest school, forest learning. Yeah, like 'Come and have your kids run around the forest and play games in the forest, this is nature-based learning, connecting to nature.' But I have alarm bells going off in my head, thinking - Do you know that forest? Do you know what grows there? Do you know its systems, cycles and its stories? And its whakapapa [genealogy of the connection between all things]? And everything else? Or are you just using it to run around in? [...] and making use of it without any understanding of it.

Through analysis of the interview data, three pedagogies for helping students to engage with nature at place were elicited. These were: 1. grounding by questioning, 2. holistic approaches and 3. reflection.

With respect to the method of grounding by questioning, four participants highlighted how their respective programmes begin by asking students a series of questions that focus their attention on the nature at place. Jenni offered some examples of questions used by her organisation: "Where are we? What does this place look like? Who lives here now and how might I share this place with them? Who might have been here before us?" For participants like Jenni, these questions were not only an important tool for engaging students with the nature at place, but also for acknowledging and honouring the species and geographies that have been and/or continue to be part of the place. Glenn spoke about the importance of asking open ended, 'why' questions (e.g., why is this important?) in relation to the space. He believed this to be important because "we really want them [students] to have an opportunity to kōrero [speak] and share their ideas and talk about what they feel about being in that space." Glenn's remark highlighted the way grounding through questioning can support students to reflect on the meanings that they hold for the nature at place.

Almost all interviewees (13/15) associated engaging with nature via holistic pedagogies. For example, Sophie described this approach as utilising "multisensory experiences that encourage kids to be curious of nature and the world around them. It's about engaging all the senses, encouraging observing, smelling, thinking, feeling [through touch] and even tasting." A smaller number of participants (4/15) also spoke of a whole-child holistic approach, like Jenni said, "Yeah, to really engage children [with nature], it's got to be connecting the head, heart and hands." A couple of these participants linked this approach with developing place-specific skills (i.e., connecting the hands), explained by Pernille as:

> Having opportunities to experience it [nature] in a purposeful way, you know, we light the fire to stay warm because it's cold, we light the fire to cook, heat our food, to eat … we're whittling a stick so we can put our damper on it, or to make a peg to hold up our hut.

As this example demonstrates, humanity's existence is dependent on our use of nature, and therefore, some principles of nature-based education, like developing place-specific skills, promote more utilitarian perspectives than others. Yet, Pernille's description of her programme's learning activities exhibited a balance between increasing student's appreciation of the ways in which they depend on nature as per the example above, while also empowering them to reciprocate back to nature, such as by concluding each programme with karakia (prayer) and a general tidy up of the land.

Additionally, eleven interviewees specifically affiliated holistic pedagogies with developing students' affective connection with nature (e.g., connecting the heart). Tilly provided a useful summary description of holistic engagement in this way: "It is about the senses, it is emotion, in addition to being about all the cognitive outcomes around knowledge, understanding and skill development with the thing that you're doing and the place you are in."

The process of reflection is the third and final pedagogical approach for engaging students with nature as identified through analysis. This process explains opportunities as part of the EEO programmes that allow students to recognise and contemplate all that they have seen, felt and sensed as part of a nature-based learning experience. Reflection was discussed by four interviewees as something that happens organically through 'unstructured' exploration and play (as discussed next in Section 6.4.3), while six other interviewees explained reflection undertaken through more direct instruction of meaningful learning activities. Atama described providing students with a range of "creative outlets" for reflection:

> So we do sort of moments, *karakia* [to recite ritual chants or prayer] kind of moments. But I don't mean reciting a sort of memorised set of words. Nah. I'm more talking about running around and playing, and also having quiet time where we find a space by ourselves, or sometimes all together as a group. And we do this thing where we sort of just spend time recognising what we're sensing. Then we might reflect on the Māori words [and concepts] that are associated with the experiences [we have had], and also the name of the place [we are in]. And we're like trying to put all these things together and do something creative out of it. That might be clay work, might be writing, there's quite a number of creeks that don't have names or all the names have disappeared, or whatever. [...] So that's the part of the empowerment thing that I was talking about before, not only are we, you know, seeing the landscape, the good parts, and the bad parts, the nature and the pollution, but we're also doing a lot of imagination kind of work [to bring about change].

Atama's programme provided students with opportunities to both reflect and act on their connection with nature. In sum, this section demonstrated some ways EEO programmes enabled students to engage with nature in multiple ways, fostering experiential, cognitive, affective material and spiritual connections.

6.4.3 Principle three: Nature as teacher

A third principle of nature-based education praxis was specifically referred to by some interviewees as either “nature as teacher” (3/15) or “learning through the natural world” (4/15). Michelle explained this principle as “more than just learning in nature. If it’s actually nature-based, it's that you’re learning from nature.” Through my analysis, I identified three themes that underpin participants’ meanings of nature as teacher.

The first theme relates to how all interviewees spoke of the land as informing the learning experiences and curriculum offered by their respective programmes. As Sophie explained:

> Nature-based, for me, comes through symbols and pūrākau [narratives]. So knowing, understanding the history of the land, understanding the reasons where they [symbols and pūrākau] situate. [...] It’s as if you're carving curriculum through the symbols that are already in front of us. I’ve been working with a lot of primary students lately. And I think that symbols through nature are the most effective and beautiful way that we can show numeracy, literacy, and understandings of place.

A second theme underpinning the principle of nature as teacher related to the prioritisation of ‘unstructured’ time and space for child-led play and exploration of nature at place. This theme was referred to by one-third of the participants (5/15). Jenni explained this theme of praxis as follows:

> I think that there has to be a little bit of an element of freedom. And when I say that, I think it’s about not always being so structured when you're taking a class outside. I think there needs to be some time built in where, yeah, there’s a little bit of freedom for exploration, a freedom to just sit and be, to you know, have a laugh, do an activity together which engages all your senses. You know, it’s not just about getting out there and listening to a teacher and being told how to do something.

Pernille believed that unstructured time with nature allows “children the time they need to master the skills that they want to, and to learn about themselves in their own way and in their own time.” Her programme prioritised unstructured opportunities in outdoor spaces for developing a broad range of skills, competencies and dispositions such as hand eye coordination (physical skills); problem-solving (competency); and perseverance (disposition).

The third theme of nature as teacher was aligned with teaching and learning about social systems through a systems-thinking approach and healthy ecosystem functioning. In this respect, Michelle said:

> Learning from nature, it is about taking a kind of systems level view of things and using that to inform how people live. [...] So if we take a philosophical worldview kind of definition of what nature-based education could be, then you move away from it just being in, doing activities kind of definition. For me, the ideal is that nature-based education is taking that really wide view of us [humans] in nature, and using that to inform how we make decisions and how we live basically.

Although this theme was only elicited from Michelle's data, it was worthy of reporting on because it was well aligned with two significant findings of the study, as previously discussed. Firstly, learning from nature in ways that introduce systems thinking and integrates the natural and social sciences offers an alternative to siloed curriculum as discussed in Section 6.2.3. Secondly, Michelle's commentary speaks to nature-based education as offering a philosophical connection like the relational onto-epistemology as described in Section 5.3.2. Therefore, framed through the theme nature as teacher, nature-based education is, as in Michelle's words, much more than "just being in, doing activities", and with outcomes that tap into student's philosophical connection with nature in relation to why nature matters and how humans might interact with nature.

6.4.4 Principle four: Meaningful nature-based experiences

Meaningful experiences through nature-based contexts were identified as a fourth principle of praxis. With respect to this principle, Tilly drew attention to the meaningfulness to be found in nature-based learning contexts in today's age:

> So the content has got to focus around some of the stuff we know that these future generations are going to be dealing with [...] and you cannot escape the environment, nature, whatever words you want to use to describe the world that we live in. Nature and environment have got to be used as the context for a lot of learning opportunities within formal education. [...] And that includes going out into them [real-life, nature-based contexts] and empowering teachers, and the risk management processes of schools to get students out there.

The majority of interviewees (13/15) identified a key role of their organisation as supporting schools to provide students with meaningful, nature-based experiences through a range of pedagogies, including play, inquiry, taking action and/or relationship building. These four pedagogies as part of this principle are explored next.

Five interviewees highlighted their EEO programmes as providing meaningful nature-based experiences through play-based pedagogies, citing examples of both unstructured free play and play that incorporated some degree of direct instruction. For example, Atama described incorporating play into programmes run by his EEO that aimed to facilitate experiences of environmental monitoring:

> So we are looking for environmental indicators, tohu or signs, looking for signs in our environment that tell us stuff. And then we whakatewhatewha, which I love that word, which is exploration. And that's all about being in the environment, and partly, just having fun and playing. Playing games and you know, getting dirty or whatever, as part of the experience.

Atama's example was in relation to intermediate aged students (ages 11-13), showcasing how pedagogies of play can cater for a range of ages, not just small children. Two other participants mentioned the importance of integrating play as part of nature-based education across age groups.

Although only three interviewees specifically aligned meaningful experiences with an inquiry process, the analysis identified inquiry as often implicit in descriptions of EEO's programmes. For instance, I perceived inquiry as underpinning Jacob's example of ways that his EEO supports schools:

> We begin by asking them [teachers and students] a series of questions such as 'What do you know about your surroundings? What do you know about the local things that are happening?'. So they often say that they don't know too much. So we might do a walk around, just walking around the schools' grounds. […] We identify some things together that might support connections for the students [with nature], […] deepen their knowledge of the organisms living around them, do some things that might give them a sense of pride that they're helping.

Jacob's commentary highlights meaningful learning experiences as helping students channel their learning into taking positive action. Similarly, seven other interviewees linked taking action with meaningful, nature-based experiences, like Sandy explained:

> I think that to be connected with nature, I do feel it helps that kids feel that they can somehow impact [nature] positively, you know, take action. So it's doing something that has a consequence, has the feel-good factor. I think this helps with engagement rather

> than just being in nature. It's being interactive in nature, in a positive way, that is important.

Of these eight interviewees, three warned against repeatedly doing one-off, take-action activities. Michelle suggested that nature-based education is "more about what you do all the time in places close to school, and less about a big field trip to a place that often has no connection [for students]." In this sense, Harata gave an example of the way his EEO provided guidance to a school, helping transform what was initially offered to them as a one-off, take action opportunity to a more meaningful and on-going experience based on the full cycle of growing and nurturing plants:

> An opportunity presented itself for us to work in collaboration with a stakeholder around growing plants. They [the stakeholder] wanted to give the school plants and they wanted the children to water them and grow them. But then they wanted to take them [the plants] back, and give these free plants to rich landowners. And I actually said 'No, it's not going to work like that. We don't want to be part of that. I want the tamariki [children] to grow the seeds. I want them to actually hold the seeds in their hands and actually understand how these things come to life. And then grow them and water them and nurture them and look after them. But not only that, I want them to take the plants out to the whenua [land], put them into the whenua, and then have a relationship with the whenua, and actually get to know the landowners. And then go back and do the weed release. Go back and keep going back.' And that's the one thing I want is to build relationships.

Like Harata, all interviewees identified relationship-building as a third component of meaningful, nature-based experiences. As Jenni said "Ultimately, it's [nature-based education] around the building and development of relationships, whether it's relationships with people or relationships with your environment." Six participants spoke about supporting relationships between students and non-human elements and/or species, such as with trees, birds and waterways, while all participants mentioned developing relationships between students and other people associated with the learning experience. Atama described such people as "special people who, they themselves, have a strong relationship with te taiao." Types of 'special' people that EEOs and schools may look to build relationships with as part of nature-based education were referred as "green-fingered-type community members", "stakeholders from environmental organisations" and/ or "mana whenua" [locally based, sub-group of a Māori tribe].

All interviewees prioritised relationship-building with Māori as part of nature-based education praxis in the Aotearoa New Zealand context, which is discussed in the next in Section 6.4.5.

To sum up, a vignette shared by Sophie is a useful example this principle of nature-based education praxis:

> At the moment, on my Fridays, I have been supporting a school to go out to the local community garden. Here we conduct class, starting by looking at the phase of the moon and depicting how we should be feeling and moving during this time. So the other day we were out there, and it [the moon] was in whiro , so the new moon, and we did some seed work. And we stayed really low energy and just respected how our bodies were feeling at that time. And then we moved into hulling some corn and one of the kids asked, 'Why is this corn purple?'. It was maize corn that we'd harvested and hulled. And we talked about the Mayans, and why the corn was purple. And then it [the discussion] moved into 'Let's make tortillas.' So through the students' ideas and questions, we are now learning how to make tortillas. So we hulled all these corn cobs and now we are soaking them. They [students] are researching and figuring out how to grind it and go through these processes to make tortillas on a woodfire. […] So doing inquiry-based, hands-on, sustainability is the context. I give them a direction, which in this case was the community garden and the moon. And we start using the tools around us, we start discovering what's available, and then the ideas spark from there.

Here we see meaningful learning experiences derived through the place-and-nature based context of the local community garden in conjunction with the integration of the maramataka (local environmental cycles and indicators based on the Māori lunar calendar). Through these experiences, teachers and students were afforded opportunities for inquiry, taking action and relationship building, allowing for multiple types of connections with nature to be made.

6.4.5 Principle five: Honouring Māori perspectives

All interviewees highlighted the integration of Māori perspectives into their respective programmes as a principle of nature-based education praxis.

I refer to this principle as 'honouring Māori perspectives' because of the way in which the majority of these EEO representatives explained this principle as both a professional and personal priority, as Glenn said:

> I think it's really, really important that we encourage them [students] to explore and learn through a bi-cultural lens. Because as an educator, you bring your own experiences and learnings and ways of doing things to that experience. So it's really important that as educators, we become aware of te ao Māori (Māori worldview) and learn as much as we can about that, because that's such an important part of our country and who we are as a people. So I kind of feel like I'm personally and professionally obliged to do that. No, it's not really an obligation. That's not the right word at all. It's a desire to do that. Yeah, it's really, really important.

The significance of indigenous perspectives for resolving unsustainability as part of EE, as initially highlighted in Section 5.2, was explained like this by Ian:

> The best way forward, for true environmental restoration, is through an indigenous perspectives. And so that takes it to many other levels which regular mainstream or status quo environmental education just doesn't have. […] I can't see any other environmental education that is of more value, I guess, than when working through a Māori point of view.

This rest of this section outlines findings about three sub-themes that were associated with this principle. These are: 1. Māori perspectives applicable to nature-based education; 2. approaches for integrating Māori perspectives; and 3. honouring through culturally-appropriate ways.

6.4.5.1 Māori perspectives

Participants referred to Māori beliefs, values and ways of living that underpin te ao Māori, mātauranga Māori (Māori cultural knowledge) and tikanga Māori (Māori cultural practices) as highly aligned with nature-based education. As shared in Chapter Five, Atama's explanation of two types of mātauranga (see Section 5.3.2.1), Harata's mihi (greeting) and Ian's definitions of Māori concepts like whakapapa and whanaungatanga (see Section 5.3.2.2 for both) are examples through which the intrinsic link between Māori culture and nature were made clear. As Kahu (who self-identified as Māori) asserted, "In te ao Māori space, and an iwi [tribe] space, it all links back to nature being in our DNA. We are nature!" Kahu's statement speaks to a Māori way of knowing and being as fundamentally based on the cultural notion of humanity's kinship with the rest of nature. Essentially, by honouring Māori perspectives through nature-based education, students have opportunities to experience seeing and being in the world based on their intrinsic connection with non-human nature.

6.4.5.2 Integrating Māori perspectives

Analysis pointed to the following three approaches for learning in ways that honour Māori perspectives: being guided by mana whenua (local Māori), exploring Māori narratives, and incorporating maramataka into school routines.

Firstly, two thirds of interviewees (10/15) highlighted the paramount importance they placed on enabling mana whenua to guide the integration of Māori perspectives into their programmes. To support such an approach, four of these ten participants specifically identified ways in which their organisation provided schools with opportunities to kōrero (talk) with uri (descendants). Harata described this way of working and its benefits like this:

> If we're out in the environment, say down at the beach, or up in the ngahere [bush], and we've got schools coming along, how do we get those local uri or descendants to come along and support? Some of the things that have been happening, like kiwi releases, our kaumatua [elders] are always coming along. They're always sharing kōrero. They're inspiring and pushing the kids who they know. And it's great, it's amazing, like the kids actually know who the local mana whenua are, by face, by name.

Another example of being guided by mana whenua was described through Ian's recollection of working with a local kaumātua (an elder of status), helping a school to develop a learning experience that integrated the local landscape and Māori perspectives. The kaumātua suggested that the students should be provided with the opportunity to become familiarised with the geographical features of significance to the school, which he aligned with the Māori concept of a pepeha (oral tradition of Māori culture for describing ancestral linkages). The excerpt below was the way in which Ian recalled the kaumātua explaining the potential of this experience to the teachers as part of the planning process:

> Engaging tamariki is just going and being with your pepeha. Like go to the awa. What's happening there? Do the students even know this river is there? Do they know where the water is coming from? Have they walked down the river? Do they know these places? Go and see them with the tamariki because knowing them will create a relationship, which will create care and concern, which will create action.

Engaging with mana whenua in ways like these links back to Section 6.4.4 that highlighted the importance of building relationships with 'special people' as part of meaningful, nature-based experiences. While this sub-section simply explains some of the ways Māori perspectives might be

integrated as part of nature-based praxis, culturally-appropriate ways to approach relationship-building with mana whenua is discussed in the next section (6.4.5.3).

Secondly, utilising Māori narratives was described by six interviewees as a second approach for integrating Māori perspectives. Exploring pūrākau (stories) and whakataukī (proverbs) provides one example of learning through Māori narratives. For instance, Sandy spoke of the pūrākau shared by a Māori educator working in her EEO:

> He introduced stories, Māori stories and narratives of the different birds. And I think that enriched the programmes. So it went beyond the here and now, into the future and considering the past. And those past stories being about why these things are important and how they came to be, but from a Māori perspective. And the kids love it. He really engaged them.

Two of these six interviewees also referred to interpreting the kupu Māori (Māori words) used as place names in Aotearoa New Zealand as another approach of learning through narratives. Atama explained this approach in this way:

> Māori words are really, really interesting. They hold a lot of different stuff within one word. It's generally a story or a connection to something that happened or something someone did. So it's a really nice experience to go through that process with kids and dissect the reo [language] and just sort of apply that to what we're actually experiencing.

Harata explained the importance of learning through narratives, such as in the ways presented above, as being important because they:

> Enable a better understanding for our mokopuna [grandchildren], for future generations. And they provide more meaningful environmental spaces to learn from. […] And I think that's all the old [Māori] people wanted, they wanted a safe space for all of the tamariki (children) that live underneath our maunga [mountains], and around our awa [rivers] to have a better understanding. We're seeing these tamariki growing up in our environment, and having children in second and third generations, to who these stories will start becoming a part of us, a part of our community.

Thirdly, a few interviewees (3/15) discussed supporting schools to integrate maramataka into the planning process and rhythm of school learning and activities as part of honouring Māori perspectives.

As previously highlighted in Section 6.4.4, maramataka refers to observable environmental cycles and indicators that can be linked to the Māori lunar calendar. Analysis identified how EEOs had supported schools to integrate maramataka as part of their curriculum, leading to learning experiences that enabled students to:

- witness the different cycles of natural world over the course of the school year;
- reflect on their connection with environmental changes, and how these may influence their personal energy levels and emotions; and
- plan school-related schedules and events that align with maramataka, and consider the differences between living by the maramataka versus the Gregorian solar calendar.

6.4.5.3 Honouring through culturally appropriate ways

Ten interviewees discussed ways of honouring Māori perspectives in culturally appropriate ways. Four of the ten interviewees were Pākeha who all emphasised their belief that it is not right for just anyone to integrate Māori perspectives in education programmes. For example, Glenn spoke about the support he sought to help him and his Pākehā colleagues consciously consider the integration of Māori perspectives in their respective programmes:

> We're very conscious that we're not tangtata whenua [indigenous people of Aotearoa New Zealand] or mana whenua. So we work with that as best we can and we get a lot of guidance around that. We try to be very, very respectful about how we talk about that and how we educate around that [Māori perspectives].

Similarly, Robyn discussed how the Pākehā educators in her programme tried to not "overstep the mark" in terms of what it meant for them to educate through a culturally sensitive lens:

> We're not Māori. So a lot of it for us is upskilling, which is fine, we can do that. […] But knowledge is one thing. Yeah. But that doesn't mean that you're the right person to share that knowledge. And you have to be very careful about how you do share it. We've had a lot of conversations about that recently. So yes, we can share what we've learned about how people traditionally used plants and trees. But we can't go in and say 'I'll teach you rongoā [traditional Māori medicine] because to be able to teach about

> rongoā you have to have been trained by specific people and accepted by iwi as the right person to do that.

Eight of these ten interviewees asserted that the most culturally appropriate way of integrating Māori perspectives into nature-based education praxis was to build relationships with mana whenua and secure opportunities for Māori to lead this work themselves. Two key reasons were elicited through analysis as underpinning this perspective. First, mana whenua as the tangata whenua of a rohe (region) hold an extensive body of intergenerational knowledge about the nature at place. Therefore, learning from these first people of the land is critical to genuinely engaging with nature at place. As Kahu explained:

> Yeah, we definitely need to encourage people to engage with mana whenua, because kōrero will change depending on where they are [located], and it [Māori perspectives] will be different. So as an educator, with my education hat on, if I'm going into a space, the whenua, te Taiao, then I acknowledge where the land is. Yeah, and that's what I mean by connecting with mana whenua.

Second, participants suggested that creating opportunities for mana whenua to lead the integration of Māori perspectives as part of nature-based education would help ensure that the mātauranga (Māori knowledge) is not "commodified," "appropriated," or "recolonised" (i.e., the latter two terms referring to other cultures absorbing this cultural knowledge as their own). In this respect, Annie forewarned about the dangers of haphazardly applying nature-based solutions like nature-based education:

> Nature-based solutions in the past have appropriated indigenous ways which have always been based on living with the natural world. Nature-based solutions don't acknowledge that Indigenous and Māori people have actually always been nature-based. And it doesn't acknowledge the root fact that colonial systems, which have displaced Indigenous Peoples [from the natural world], now come to say 'Oh and there's actually like value in being like that [nature-based]. We don't all need to sit inside a classroom and stare at one person [the teacher] and have these dominant hierarchies.' Like, Māori already knew this. Now they're coming out with this new thing called nature-based learning. Yeah, there are problems with it because it's being called a new thing when actually it's something that was stripped away from Indigenous Peoples and largely disallowed.

Ian relayed similar thoughts and believed that undertaking nature-based education without creating opportunities for Māori to lead the approach is "taking what you like from indigenous culture, without giving them any resource, acknowledgement or power."

Kahu, along with five other interviewees, specifically placed the onus on EEOs for involving mana whenua in culturally appropriate and culturally safe ways:

> You [the EEO] need to do your homework. Make a relationship. […] And don't go in there with your hands open like give me, give me, give me. It's more like: What can we [the EEO] do for you, in your space? How can we support you? What do we need to know? Is this place wāhi tapu [sacred place]? Why is it sacred? [...] What's the history here? What's happened here? How can we help you protect it?'

After which she spoke of this mahi (work) as eventually leading to a reciprocal relationship that benefits both Māori and the EEO: "How can you [EEO] empower me and my hapū [sub-tribe]? How can we [my hapū] empower your knowledge in this space?" Similarly, Jenni suggested that EEOs reach out to mana whenua without initially seeking anything in return:

> You know, we talk a lot in our programme around reciprocal relationships, but also not asking anything of mana whenua. You know, we're saying, reach out to your marae, to your kaumatua in your rohe. But don't necessarily ask them for anything. Maybe you want to be offering first.

From Atama's experiences of working as a liaison between EEOs and mana whenua, he explained that he was often disappointed by the way EEOs typically interacted with mana whenua when looking to secure iwi support for their education programmes. In this respect, he said:

> You guys [EEOs] are just sort of ticking boxes. You're not starting at hapū level, you know. You're not starting with Māori. Like, you're making all these wonderful programmes and then you go to Māori and say 'What do you think?' You go to an iwi office, and they're just like two or three people stretched in huge, different directions. So it's probably obvious that you need to resource Māori. It's not just the iwi, the organisation is one part, but the people. You need to build the capacity.

Five interviewees noted that honouring Māori perspectives also included attempts by EEOs to build in funding mechanisms through which mana whenua are renumerated for their time and effort.

Finally, three interviewees highlighted the need for everyone involved with nature-based education to be kept "culturally safe." In this respect, Atama highlighted this was sometimes about recognising and handling the trauma Māori faced, and continue to face, because of colonisation. When working with mana whenua, he explained that there will be times when "we need to recognise the trauma and the past before we push individuals into these kind of like spotlight positions."

6.4.5.4 Sub-section summary

Participants aligned Māori perspectives with beliefs, values and ways of living that underpin te ao Māori, mātauranga Māori and tikanga Māori. Honouring Māori perspectives as a principle of nature-based education calls for the integration of these perspectives as part of praxis, offering students the opportunity to experience ways of knowing and being based on te ao Māori's intrinsic connection with the rest of nature.

Three main approaches for integrating Māori perspectives into education programmes were elicited through analysis, which included: being guided by mana whenua, exploring Māori narratives, and incorporating maramataka into school routines. In summary, a key finding of this study points to the responsibility of EEOs for taking the lead to build relationships with mana whenua. This means prioritising effective relationship-building right from the start of developing nature-based education programmes, and includes finding ways to support and remunerate mana whenua for guiding the integration of Māori perspectives.

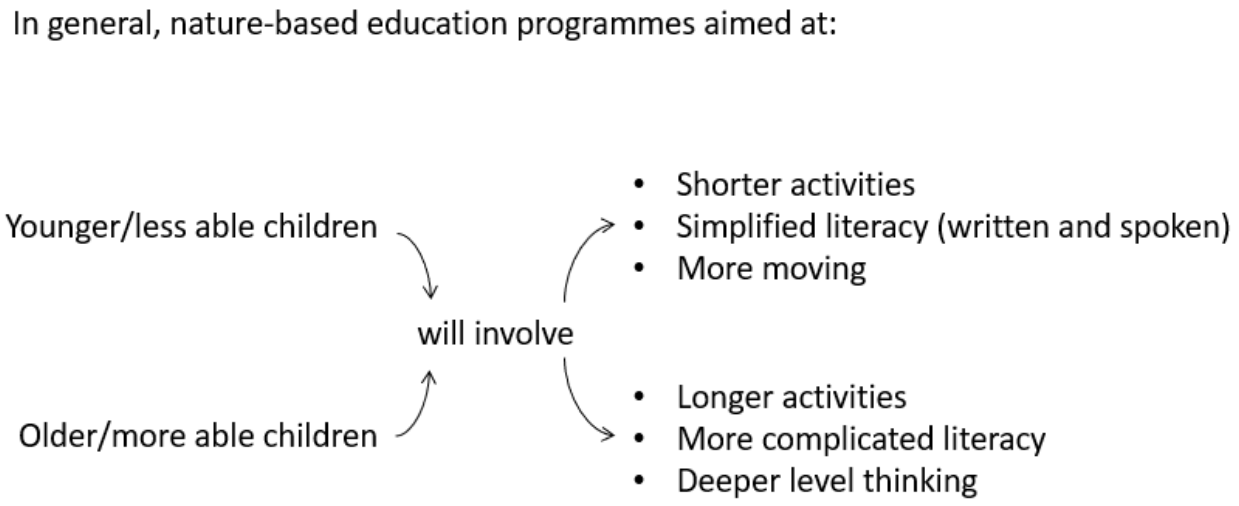
6.4.6 Age-appropriate learning

Chapter Three highlighted the nature of the semi-structured interviews, explaining how I 'followed' topics and themes that emerged through my questions. Sometimes, a participant and I spent a lengthy amount of time on a certain question which meant that I did not always ask the same set of questions to every participant. Consequently, some findings were not always elicited from data collected by every participant. My questions around age-appropriate nature-based learning is one such example because I only asked nine interviewees about this aspect of educating for nature connection.

In these nine interviews, I asked participants about whether their nature-based education praxis changed to cater for learners of different ages, and if so, in what ways. Here, I have framed the findings around what participants believed to be effective praxis for different educational levels, which they defined as early childhood, primary school and secondary school.

The praxis of nature-based education across these three levels was described by Pernille as being "the same, but different." Essentially, the similarity between the three progressions drew from the fact that participants' programmes integrated, to some degree, all five of the previously discussed principles and associated pedagogies at each educational level. The clearest difference between the levels was the way in which most of the participants (7/9) commented about needing to lengthen the duration of learning activities and/or increase the complexity of the key concepts and language used as part of the programmes with increasing of educational level. Glenn explained the progressions in exactly this way, specifically referring to a summary diagram (Figure 39). that he had handwritten as part of the notes he made in preparation for the interview.

Figure 39 *Glenn's synopsis of learning progressions for nature-based education*



Note: Text and configuration in this figures is reproduced verbatim from Glenn's handwritten notes that he provided me in preparation for our interview.

In sum, the elicited findings suggested that, with increasing educational level, nature-based education would:

- increase the complexity of conceptual learning (3/9);
- lengthen the duration of projects based on meaningful experiences (5/9);
- utilise cross-curricula approaches more frequently (7/9);
- reduce the amount of teacher "scaffolding" (i.e., support) (2/9); and
- apply learning outcomes from local projects to a wider global context (3/9).

All nine participants perceived the norms, structure and curriculum prioritised by schools (Section 6.2) as significantly influencing how conducive these sites were for implementing nature-based education at each level. Just as participants perceived a progressive disconnection of children from the nature between early childhood through to the end of secondary schooling, so too did participants perceive a progressive increase in the number of constraints within schools, like those associated with limited time and siloed curriculum, that inhibit the implementation of nature-based learning across levels.

Five of the nine participants spoke specifically about the constraint of the available time for nature-based education during the school day. According to Pernille:

> There's not enough time in the school system. It's all very - 'You've got this amount of time to do it in, and if you haven't finished, we'll hurry you along or we'll just stop you and pack up, and that's it'.

The most pressing concern for Pernille was that limited time prevents children from having adequate unstructured opportunities for experiencing and gaining the benefits she and other participants associated with the principle of nature as teacher (Section 6.4.3).

Four of the nine participants spoke about a siloed curriculum through which learning is undertaken via separate learning subjects as a constraint. Tilly spoke at length about the ways she had witnessed a siloed curriculum structure as severely inhibiting cross-curricula, nature-based inquiry at the secondary level:

> Cross-curricula learning just works so well to motivate all sorts of learners in primary school, right? And then we just get shoved into all these [siloed] classrooms in secondary school. We carve up life into subjects, which in reality don't exist, because everything is just layered upon layer. I understand sort of, you know, why we did that. It just made it all easier. But we probably, particularly for secondary students, need to go back to, at least a bit, to a topic-based approach. And you would get teachers with their specific areas of expertise, all working collaboratively together to make sure that the kids are getting what they need out of their learning. Environmental topics and nature-based opportunities, like climate change, good lord, they offer so much in terms of a core topic. So I think if we just did a bit of a 180 on some of that thinking and thought about how the cross-curricula approach could be taken all through the schooling years.

The third and last constraint that a few participants (3/9) identified related to how they perceived changes in students' attitudes toward engaging with nature between the early childhood and secondary school levels. Participants highlighted their experiences of finding it increasingly difficult to undertake nature-based education as students grow older. Robyn described the broad nature of this progressive change that she perceived in this way:

> Our early childhood kids are just happy to be out there. […] Then you've got primary school age and we start to get a few reluctant ones. […] But generally, most of them are still keen to get out there. And then you get to intermediate and suddenly the focus is more on their friends, I think. If their friends are into it, then they will be too. But if their friends are not, then they don't want to be seen to be into it either. And then you get to high school and a lot of kids just actually can't be bothered [laughs].

All three participants who made reference to the ways students' attitudes toward nature progressively change discussed some potential reasons for this change. These causes included:

- impact of social media addiction (3/3),
- decreasing physical fitness (1/3),
- the influence of peer pressure (3/3), and/or
- as a developmental stage of identity formation (2/3).

With respect to the potential causes of adolescents' changing relationship with nature, Robyn questioned the role and value that different cultures place on young people's connection with the natural world:

> I wonder [if] in indigenous cultures whether generally being out in nature is more valued because that's what you need to do to get food? You have to do that [go out in nature] to get the things that you need. So it's part of life, an important part of life. So you just do it. Whereas we [in Western culture] have gotten to that stage where we don't have to go into nature to do anything. Because we can just whip to the shop and get the things we need. We can whip home and cook up food in our warm kitchen. So being out in nature is seen as something that's not important. It's not a necessity. So maybe when you're in your teenage years, and there's all that pressure and stress on, it drops off the list as being something not valued or important to you? […] And so maybe that's part of our [societal] structure? We're putting this idea on to our children.

As was identified at the start of this chapter, all participants perceived a progressive disconnection from nature as part of a young person's life in Aotearoa New Zealand. With no other data pertaining to the theme of how adolescent's relationship with nature might be influenced by culture, it is difficult to draw any further correlation. This finding points to the question of whether disconnection is, to a certain extent, a 'natural' part of the life stage of adolescence and/or a consequence of the dominant social paradigm and its resultant structures like the education system. No matter the answer, children and adolescents deserve to be physically and mentally well, which implies a prioritisation on nature connection as a necessity rather than something that is a nice to have. This theme is taken up again in Chapter Eight.

6.4.6.1 Re-imagining secondary schools

As part of the interviewees' responses about the challenges of integrating nature-based education in schools, some of them offered suggestions for re-imagining school norms, structure and priorities in ways that might improve adolescent's connection with nature. Based on participant's concern about secondary schooling in particular, four excerpts offering ideas of change are provided below.

Milka:

> Imagine if every secondary school, every school for that matter, had a staff member whose sole responsibility was to coordinate wider community involvement as part of cross-curricula learning that is relevant to the students and their place in this world. How great would it be to have a go to person like this at ever school who has solid, on-going relationships with the iwi, with the local council, with the gardening and trapping retirees? This person would also understand that nature is part of these community connections too and put an emphasis on wellness through nature connection.

Sophie:

> I see a nature-based curriculum in secondary schools as offering an alternative way of bundling credits and getting assessment credentials, by being outside the classroom, in the outdoors. And as a lead teacher in that space, you would not be expected to be a specialist in everything, but being able to have other teachers come in and take specialised learning sessions, and having the resources available too. […] And this needs to also encourage students to know that there's a future and jobs in sustainability,

rather than being deterred because, you know, thinking that you need to be in the classroom to get all your credits to get a job.

Sandy:

Having a school-wide focus is really important, too. I think inquiry-based seems really important, but it has to come from the students. […] So an idea is that for the first three terms [of the school year], you do regular classes – science, math, English, technology, whatever. Then in the final term, you take all your learning and put it into a project. So your final learning is a passion project. […] It would be in that fourth term, suddenly teachers are talking to students about their projects, and we are focused on the kids and their interests rather than the content for assessment.

Michelle:

We need specialists, but more and more we need generalists, like holistic thinkers. So how do we create space for that in secondary schools? Student choice is really important. But I have seen some secondary schools do this [give choice] and it's failed miserably, because there was no underpinning pedagogy behind it. And I also think it failed because the adults just decided to do it. There was no consultation with the young people. […]

In secondary, you're gonna get all these different types [of kids], you know, just like when they do all the research on adults and nature connection, and they have different biophilic tendencies and stuff. I think you need to approach adolescence in the same way and go - there's sort of these different categories, and one pathway might be stronger for one group [than another], like really introverted kids, really sporty kids, ones who are naturally leaders. You know, all that sort of stuff, different pathways for them to access nature connection.

And this is where we need an intervention for our teachers to do their own personal work. Because they are never going to be able to facilitate a course that's breaking down silos, that is connecting with place, until they have space and opportunity to re-connect themselves.

In summary, these four interviewees identified some ways in which secondary schools could more effectively educate for nature connection. In summary, these ideas included:

- Focus on nature connectedness of teachers through professional learning development opportunities;
- School wide, passion projects grounded in place-and nature-based experiences;
- Educational approaches prioritising student-led choice and autonomy;
- Staff dedicated to coordinating community relationships and expertise that put nature at the fore of learning; and
- Cross-curricula learning is facilitated by teachers in ways that provide both holistic and expert knowledge.

These ideas require organisational change and commitment that prioritises learning focused on much more than simply NCEA success.

6.5 Chapter summary

A key finding of the study as presented in Section 6.2 frames schools as contributing to disconnection. Through their lived experiences of working in the field of EE, both in and outside of schools, interviewees perceived school norms, priorities and structures as negatively influencing student's interaction and relationship with nature in ways that contribute to the human-nature dichotomy. The findings point to disconnection as progressively increasing through the schooling years and culminating in the adolescent stage. Some school norms, curriculum and structures, particularly those at the secondary school level, were identified as significant challenges that prevented teachers from educating in ways that foster nature connection. Timetabling and curriculum constraints were often brought up by participants.

Nature-based education was framed in this study as an educational approach for repairing disconnection and resolving our unsustainability crisis. Questions were asked about what components specifically comprise nature-based education praxis.. Analysis of the stage two data demonstrated EEOs' programmes as being predominantly underpinned by experiential connections with nature, which included the utilisation of a diverse array of pedagogies and learning contexts. Stage three interviews provided me with an opportunity to explore this educational approach more deeply. Through the analysis of the interview data, five principles of nature-based education praxis were elicited as:

- outdoor, placed-based approaches;
- engaging with nature at place;
- nature as teacher;

- meaningful, nature-based experiences; and
- and honouring Māori perspectives.

The participants perceived nature-based education praxis as underpinned by regular learning opportunities in local, outdoor surrounds. Although being 'in' the environment was definitely considered an important component of praxis, this did not simply qualify teaching and learning outdoors as effective praxis. Instead, the evidence demonstrated that participants prioritised student engagement 'with' the nature at place. Engaging students with nature was described as delivering regular, place-based opportunities that are grounded through holistic approaches and reflection.

According to interviewees, praxis also entailed opportunities for students to experience what was conceptually constructed as nature as a teacher. The analysis elicited three different meanings that they held of this construct, which included: using the landscape to inform curriculum planning, offering some unstructured opportunities for child-led play and exploration (even for older students), and learning through a systems-thinking approach.

Honouring Māori perspectives was the final principle of praxis identified through analysis. Māori perspectives were linked to beliefs, values and ways of living that underpin te ao Māori. Through integrating this principle into curriculum, students come to know Māori ways of knowing and being, which are intrinsically connected with nature. The findings also highlighted some culturally appropriate ways for honouring Māori perspectives through nature-based education.

Age-appropriate progressions for nature-based education were also elicited through analysis, broadly based on the educational levels of early childhood, primary school and secondary school. A similarity between all levels drew from the fact that all five principles and associated pedagogies were integrated to some degree for all ages. The clearest difference between the educational levels was associated with increasing duration and complexity of learning activities as student age increased.

Based on the interviewees perspectives that disconnection culminates in the adolescence, some interviewees provided ideas for changing school structures in ways that better foster nature connection. In this way, nature connection as an educational outcome seeks to resolve disconnection as a root cause of unsustainability. Building on this, Chapter Seven outlines findings elicited through the analysis of the interview data that points to nature-based education as a mechanism of transformational change.

Chapter Seven – Perceived outcomes and impacts

7.1 Chapter introduction

Chapter Four demonstrates that EEOs' prioritised educating for nature connection. Findings discussed in Chapter Five explain EEOs' rationale for prioritising nature connection and describe their conceptualisations of the phenomenon. Drawing on EEO representatives lived-experiences of delivering environmental education (EE) both within schools and in wider community settings, Chapter Six explores approaches and pedagogies used in their respective education programmes to foster nature connection. Findings discussed in this chapter continue to build on these themes, drawing largely from data collected in response to the interview question: What is the significance of nature connection and nature-based education in today's age? (Appendix 4, question #B4).

The findings presented in this chapter provide deeper insight into the potential of nature connection to help secure a more sustainable future. As Tilly suggested, "There's so much wrapped up in those experiences when you're using nature connection as a frame. It meets so many of the outcomes that we're aiming for [through our education programme]." The significance of the interviewees' perceived outcomes of nature connection and nature-based education for individuals is discussed first (Section 7.2), and then at the systemic level in relation to the impacts on the wider societal context (Section 7.3). Finally, Section 7.4 considers these outcomes and impacts in light of some additional findings, ultimately highlighting nature connection via nature-based education as a lever of transformational change toward more sustainable trajectories.

7.2 Outcomes for individuals

This section outlines EEO representatives' perspectives about outcomes for individuals through fostering nature connection via nature-based education. The relevant findings build on some of the key themes underpinning EEO representatives' conceptualisations of nature connection as provided in Chapter Five, thematically categorised below as outcomes associated with health and wellbeing, cognitive, affective and empowerment.

7.2.1 Health and wellbeing

All 15 interview participants identified health and wellbeing benefits, like increased physical fitness and improved mental health, for individuals as an outcome of fostering nature connection via nature-based education. Most often, discussion around health and wellbeing benefits was brief in comparison to their

dialogue about other outcomes. It is my supposition that participants tended to not emphasise these benefits to a greater extent because they believed them to be well understood by most. As Glenn explained, "I just think that the [health and wellness] benefits of it [nature connection] have been really clearly demonstrated and proven." In noting this, there were a few participants (4/15) who elaborated on the positive health and wellness impacts as significant in the face of children's and adolescents' awareness of the issues and challenges arising through unsustainability. Again, Glenn offered a pertinent comment, saying:

> I often think about the challenges that I faced as a kid compared to the challenges that my children face now. And it's just different universes. And a lot of that is to do with connectedness through the internet, whether it's the social media aspect, or just the ease of finding out what's happening in the world. So I think it's even more important now that we look after the wellbeing of ourselves and tamariki [children]. And nature is just such a great way to do that.

The finding points to these participants' perspective that the health and wellbeing benefits derived through nature-based education are significant not only for helping children and young people cope with the sustainability crisis, but for ensuring that they are capable of making a contribution to the necessary solutions as well. As Tilly explained:

> What else is more important than social wellbeing? It's massive, because none of these young people are going to be capable of doing anything on the sorts of scales that they're going to need to if we're not raising them as healthy, happy, stable young people who can work well and empathetically with each other.

A few interviewees (3/15) also spoke of experiences they have had that demonstrate the benefits of nature-based education for students who are not well-suited to the confines of learning indoors. For instance, Sandy said:

> Often teachers tell me of how the tables are flipped [in nature-based settings]. The kids who are really good in class don't always do so well outside. And for the kids who tend to be not so good in class, they get excited, and they often become leaders by the end of the programme. We get teachers and parents coming up to say, 'That person is just so different in the classroom'.

The significance of nature-based education in this sense means that a greater proportion of students achieve success as part of the education system, and as aligned with Tilly's thinking, that they develop as individuals who are healthy, well and capable of contributing towards the efforts needed to resolve unsustainability.

Although it seemed that interviewees perceived health and wellbeing benefits as generally well understood by most, one-third of interviewees (5/15) mentioned that school communities (e.g., students, teachers, principals and parents) often did not perceive a role for the education system in this respect. Pernille said, "With schools, they don't necessarily see – from a traditional school perspective – their role to be around some of this stuff [nature connection and nature-based education]." In this respect, Robyn suggested needing to help teachers and wider school communities understand that learning outcomes and health and wellbeing benefits that result through nature connection can coincide:

> We need to change the mindset of teachers so that they don't see getting outside is like a waste of valuable learning time. And parents as well. Especially the parents that say 'Oh, you were just outside today. You weren't doing real work or real learning'. You know, that sort of attitude. But also understanding that it's not one or the other. You don't have to do reading or go outside. You can do reading outside. You don't have to do writing or go outside. You can go outside, look at leaves and write poems about nature. You can integrate nature with everything else that you integrate. There's smarter ways of doing things. But I think there are still a lot of teachers that struggle with that and see everything as quite siloed.

7.2.2 Cognitive

All interviewees aligned nature connection and nature-based education with the development of knowledge, like key concepts (e.g., interconnectivity) and skills (e.g., pest trapping), that enable individuals to make decisions and take action to protect the environment. Robyn provided an example around the importance of cognitive outcomes such as these:

> I think that knowledge leads to the broader understanding of the connections between everything, which leads to the importance of biodiversity. And then what comes with that is the understanding of why each little creature is important. Because, you know, I hear all the time from even members of my own family, like 'Oh why does it matter if

> that one frog disappears? Or that one insect? […] Because what are they good for anyways?'

Seven interviewees also spoke about developing intra-and-interpersonal competencies, like collaboration and creative-problem solving, through nature-based education. These outcomes were discussed as fundamental to a person's capability to contribute to resolving the wicked problems that underpin unsustainability. In this respect, Sophie explained:

> I think nature-based education promotes curiosity. It promotes change. There are these clear systems and connections [in nature], which I think we have been drawn away from through colonisation and other avenues that have pushed us away from nature, and urbanised us. So much of this is deep entrenched learning, and yeah, we need a turning point. It's a big battle of pushing uphill. […] So seeing those systems in nature for moving forward, and creating new things based on these systems. Yeah, like creating types of new jobs that don't even exist yet.

In sum, cognitive outcomes like these help explain how interviewees perceived fostering nature connection via nature-based education as contributing to students' understandings about what needs to be done for greater environmental protection and restoration.

7.2.3 Affective

All interviewees perceived the development of positive emotions and feelings toward nature as a significant outcome of nature-based education. As Glenn remarked about the impact of his programmes:

> I know that, even if they [students] go away not really having consciously learned anything, but if they go away just thinking this [place] is actually quite a nice place to be – and whether they're thinking that up here [Glenn points to his head] or feeling it here [Glenn points to his heart] - then that's a good outcome as far as we're concerned.

Embedded within the data were a wealth of examples illuminating affective outcomes that participants perceived as resulting from fostering nature connection via nature-based education. These included love, care, awe, wonder of nature and a sense of belonging with the natural world. In almost all cases, participants perceived these feelings as significant because they associated them with positively influencing the respect and value people have for nature and their motivations to protect the natural

world. For example, while speaking about the outcomes sought by her education programme, Robyn explained the programme to be about:

> Doing something that really cements your place here. […] And this is important to conservation because no one wants to conserve something unless they value it. And an easy way to have people valuing something is for them to feel a sense of belonging to it.

Atama described a similar idea, with his programme seeking to develop "deep emotions" within students "because these make that memory that connects you to a place and will stay with you forever, so you always remember that place and want to take care of it."

7.2.4 Empowerment

As reported in Section 5.3.3, all interviewees in one way or another conceptualised nature connection as an empowering impetus. Two themes of empowerment were discussed: one theme relating to empowering environmentally-friendly actions and behaviours, and the other theme as empowering Māori. This section builds on these findings, highlighting interviewees' beliefs about empowerment as an outcome of their respective nature-based education programmes for children and adolescents.

Fourteen interviewees aligned fostering nature connection via nature-based education with empowering students to take action for nature. Interviewees offered ideas about the ways they perceived the outcome of empowerment playing out beyond their programmes. Some examples include Sophie describing students, "Taking their learnings home, taking ownership and pride in the places they live"; Milka suggesting students, "Gain a sense of efficacy in relation to creating change"; and Atama believing the impact of empowerment enables, "Students to create their own stories of their future." Some of these participants (7/15) highlighted empowerment through nature connection as a vital component to issues-based learning, like climate change education. As Tilly explained, "Nature connection empowers our community to take that love [of nature] and the understanding [of the issues] and not want to bury their head in the sand because they're overwhelmed."

In order to take advantage of the empowerment developed through nature-based education, just over half of the participants (8/15) reported having adequate organisational capacity to offer take-action opportunities directly through their programmes, while seven reported having no to very little organisational capacity for providing such opportunities. For some of the interviewees without programme capacity for taking-action, they spoke of reflecting on next steps with students at the conclusion of their programmes. For example, Glenn talked about using questions like "So what? or

What next?", believing that reflective questions like these are pivotal to "Getting them [students] to commit emotionally and mentally to contributing to a better world."

As discussed in Section 5.3.2.2, empowerment as an outcome of nature connection was also linked to Māori for taking the lead to apply indigenous perspectives as part of resolving unsustainability. This is the basis for understanding how nature-based education might empower Māori tamariki and rangatahi (young people), with four participants highlighting how this could increase the likelihood of Māori youth engaging in tertiary education and/or vocational pathways that contribute to a more sustainable future. In this regard, Harata described how his education programme sought to empower Māori tamariki:

> It's about creating a pathway for tamariki from schools into environmental jobs. [...] I've been looking at the idea of setting up a student leadership group so that I can stairway them from the kura [school] to the high schools and then on to university. [...] I've always said I want the next environmental lawyer to be from my hapū (sub-tribe).

7.2.5 Section summary

As discussed above, the outcomes for individuals through fostering nature connection, as perceived by interviewees, were grouped into four categories of outcomes: health and wellbeing, cognition, affective, and empowerment. Participants believed these outcomes as developed through nature-based education contribute to a more sustainable future by:

- safeguarding individual health and wellness, ensuring individuals are physically and mentally capable of contributing;
- developing knowledge, skills and competencies that enable individuals to make decisions and take action to protect the environment;
- fostering positive feelings for nature that underpin their value and respect for the natural world;
- empowering taking-action for nature; and
- empowering Māori toward vocations and educational pathways through which they can lead to their application of indigenous perspectives.

These outcomes and associated impacts provide further explanation of EEOs' prioritisation of nature connection as an educational outcome of their respective programmes. Now I turn to explain how some interviewees perceived the significance of nature connection and nature-based education as impacting beyond the individual to wider society.

7.3 Systemic impacts

During the interviews, seven of the fifteen interviewees specifically mentioned that a more sustainable future requires more than just change at the individual level. As summarised by Ian:

> I was in a hui [meeting] yesterday with a whole bunch of environmental educators and everybody in the room was talking about creating behaviour change, behaviour change, behaviour change. And, you know, yes, but behaviour change is putting all the onus and the responsibility on the people and not the systems that are creating the problem in the first place. And so I piped up and said, 'We need systemic change'. I mean, yes, we can get people to, you know, reconnect to their values, and have some behaviours that come out of that. But with the systems, the dominant systems in place, and the status quo, […] the extractive colonial capitalist systems, I mean, with all of those in place, the [same, unsustainable] outcomes are always going to be there. You can have all the behaviour change you like, but [...] the systems are still piling up the outcomes that we're seeking to address.

When asked about the significance of fostering nature connection via nature-based education in today's age, just over two-thirds of interviewees (12/15) discussed associated impacts they perceived for wider society. The relevant findings demonstrate that EEOs prioritised this educational approach because it holds potential for challenging and transforming the dominant social paradigm, a root cause of unsustainability as discussed in Section 5.2. For this reason, this section highlights perceived systemic impacts around the themes of anthropocentric beliefs, utilitarian value of nature, and contemporary lifestyles (Sections 7.3.1 – 7.3.3, respectively).

7.3.1 Anthropocentric beliefs

Participants perceived anthropocentric beliefs as an aspect of the dominant social paradigm that causes unsustainability through positioning humans as separate and superior to all other species. Six participants specifically identified an impact of nature connection and nature-based education to equate to, in Sophie's words, "Taking our heads away from human-centric notions." Likewise, Tilly expanded on the importance of de-centring humans in this way:

> It's incredibly important because it is arrogant of the human race to think that they are separate to nature. We are well and truly a part of nature. And the more opportunities that we have to strengthen our relationship with nature and be empowered, that word

again, for effective action against some of the stuff that we have caused, without overwhelming everybody, the better.

Milka spoke of the impact of nature connection as "Cultivating an understanding of humanity's place in the universe as one part of an interconnected whole." Similarly, Atama expressed his opinion that "Nature-based education is more about the people and how we fit into nature, you know, like how we value it. So, it's not about nature at all, really. It's about people (humanity's perceived positionality amongst the rest of nature)." Overall, the data offered by these six participants highlighted nature-based education as an opportunity to reflect on the positionality of the human species amongst the rest of nature, as well as to reconsider the value(s) that humans hold of the natural world as described next.

7.3.2 Utilitarian value of nature

A predominant focus on a utilitarian perspective of nature was elicited as a second aspect of the dominant social paradigm that causes unsustainability. Interviewees perceived this as valuing and using nature in ways that prioritise the benefits derived for humans only. Additionally, some participants specifically perceived "Western" ways of thinking and doing as singularly focused on the sole objective of making money. In this regard, four participants spoke about the impact of nature connection and nature-based education to be about, as Robyn put it, "Helping society understand that the land isn't just an asset to be used for economic reasons, but as having value in so many other ways."

Section 5.2 also highlighted utilitarianism as a social justice issue because of the ways this perspective can negatively impact the more sustainable livelihoods of indigenous cultures through social marginalisation, disempowerment and land degradation. Six interviewees highlighted an impact of nature connection and nature-based education as providing insight into indigenous paradigms, and potentially increasing the receptiveness of a wider proportion of society to "Connect with and return back to paradigms and ways of thinking that honour whakapapa [...] in ways that nourish and regenerate Papatūānuku [Earth Mother], rather than extract and deplete from her." Through encouraging beliefs and values that seek to replenish Papatūānuku rather than exploit her, nature-based education could promote a different way of living than those offered by contemporary lifestyles.

7.3.3 Contemporary lifestyles

The third and final cultural cause of disconnection and unsustainability as derived through the findings of the study pointed to the effects of the contemporary lifestyles, which were described in Section 5.2 to include "indoor", "sedentary", "consumeristic", "busy", and "technologically-based" ways of living.

Contemporary lifestyles were perceived by all interviewees as ways of living that diminish opportunities for holistically connecting with nature, and correlated with a collective loss of societal awareness of, understandings about, and feelings for the natural world as an interconnected whole. Analysis established nature-based education as helping transform contemporary lifestyles through the impact of what nine participants referred to as activities that help "re-connect." As Sandy described, "So with today's world as fragmented in so many ways, nature-based education starts bringing pieces together and re-connects us."

Approximately half of the interviewees (7/15) discussed ways their programmes aim to re-connect students through educational opportunities that promote the system-level changes necessary for regeneration and greater sustainability. These opportunities are based on acts that nourish Papatūānuku instead of solely taking from her. For one participant, an education programme objective focused on "How we relate to our stuff [i.e., everything from food, houses, cars etc.], our relationship with our stuff, how we engage with our stuff, and how we take stuff, make stuff, use stuff and get rid of it." Another participant's programme aimed to re-connect through educating about growing food, as she described:

> I think in today's age we need to continue to look back at the simple things in life. […] Yeah, it's just those simple things. It's around kai [food] sovereignty, kai resilience, you know getting back to how the whenua [land] nourishes us. Yeah, like paying attention to the simple principles of connection in order to be able to live in harmony with te taiao (the environment) going forward. Yeah, simplifying life.

Fostering nature connection through nature-based education was also aligned with intangible aspects such as, "Remembering the things that have been forgotten and are no longer passed down [...] like the relationship between all living things, even across time." Sophie's point reflected the intent of her EEO's programme to increase societal awareness and understanding about indigenous perspectives. More specific to the Aotearoa New Zealand context, the elicited findings also aligned the impact of fostering nature connection with increasing awareness and understanding about Māori concepts that evoke similar sentiments. For example, Annie suggested "Change [through education] starts at the very beginning with introducing whakapapa (genealogy, with respect to the connectedness of all things in the world), while Jenni highlighted educating about the importance of whanaungatanga (relationships):

> You know, creating a sustainable, physical environment is an ongoing journey, it's an ongoing exercise. And it all centres around fostering understanding of whanaungatanga,

which is the interrelationship of all living things, and you know, the care and concern for the particular places we live in.

7.3.4 Section summary

The start of this chapter highlighted interviewees' understanding that achieving more sustainable trajectories requires both individual and systemic change. Through examples of their own education programmes, interviewees highlighted learning contexts that re-connect students with the Earth system, providing opportunities for reflection about humanity's positionality in relation to the rest of nature and the values we hold of the natural world. In this respect, findings from this section explained how interviewees perceived the act of fostering nature connection as helping to challenge and transform anthropocentric beliefs, a predominant focus on a utilitarian value of nature, and contemporary lifestyles – all perceived as root causes of disconnection and unsustainability (see Section 5.2).

7.4 A lever of transformational change

The outcomes and impacts as summarised in Section 7.2 and Section 7.3 provided greater in-depth understanding about EEOs' rationales for their prioritisation of nature connection as an educational outcome. This section illuminates one final finding in relation to their rationales, which points to nature connection and nature-based education as enabling people to "Learn to see and be in the world in ways that are different from the dominant colonial messaging," as explained by Kahu. Given interviewees' belief that the global spread of the dominant social paradigm is a key driver of disconnection and unsustainability, participants considered learning to see and be differently in the world as critical to achieving more sustainable futures. This intention was alluded to by Atama, who explained the consequences of Westernisation as "So pervasive. It has become like an invisible force degrading the environment and harming people [...] to the extent that we all have been colonised in one way or another. We are all children of colonisation."

Based on this intention and using terminology from Meadows (1999) as introduced in Section 2.3.1, fostering nature connection via nature-based education is referred as a "lever" of transformational change toward a more ecologically sustainable and socially just world. Three explanations as presented below demonstrate EEO representatives' belief that this educational approach holds significant potential for shifting societal beliefs, values and structures in ways that improve human-nature relations.

First, students may come to see and be in the world differently through opportunities of engaging with non-human nature (see Section 5.3.1). Jason implied through his rhetorical question, "How can we expect our students to act differently toward nature, more gently, if they don't even know who nature is?" Building on this, Sandy highlighted the transformative potential of nature connection for 'flipping' societal priorities:

> The Western industrialised society's priorities have been the economy, probably then people, and then the environment. I think nature-based education can flip that on its head, so the most important thing is the environment, then people, and then the economy. […] When you're not connected to the environment in any way it's difficult to see the importance of it [nature].

Second, nature connection, understood as a relational onto-epistemology (see Section 5.3.2), involves cultivating holistic and relational ways of knowing. Through nature-based education, EEOs sought to nurture students' intellectual and emotional understanding of the layers of nature at place. This includes fostering awareness of the interconnectedness of all aspects of the natural world—its geographies, plant and animal species, natural cycles and rhythms—as well as an appreciation of the reciprocal relationship between human health and planetary health. Interviewees aligned these ways of knowing with developing a sense of belonging as part of the Earth system. As Annie explained, holding potential to empower students "To act and behave in ways that nourish our environment rather than just depleting and continuously taking from it."

Third, nature connection can provide students with insight into indigenous paradigms, such as te ao Māori (the Māori world) (see Section 5.3.3.2). Sophie explained this as students being in relation with nature in "new, yet old" ways. The transformative potential of nature-based education in this respect may increase societal awareness, understanding and receptiveness to the significance of indigenous perspectives as part of the solution to unsustainability. In this sense, Michelle referred to educating for nature connection as an "act of decolonisation", as she explained:

> Connection to nature is an act of decolonisation. I wonder if [knowing] that would be confronting to teachers and principals, or be of help? Because they're currently trying to decolonise the idea of the history of people, right? Well, what if we explained to them [...] that going back to being connected to nature, that is the biggest thing you can do to

> undo the colonial process. […] You know, because it's like racism and plant blindness[17] as coming from a similar place, right? They come from people not respecting others [nature and certain groups of humans].

All six interviewees who either self identified as Māori or as being strongly affiliated with the culture highlighted the potential of educating for nature connection with bringing into existence a more sustainable future as well as more equitable relationship between Māori and Pākehā in the Aotearoa New Zealand context. As Kahu expressed:

> And so we do have two worlds. You share with us what you got, and we will share what we've got.[…] How do we achieve equity? It's a partnership. We are working together, keeping each other safe, each learning off each other about our different worldviews. Success through two worlds.

Hence, the findings of the present study elevated nature connection to something greater than simply a learning experience or outcome, but more toward what Michelle described as "Quite a philosophical worldview kind of definition that moves it away from just 'being in [nature] and doing activities' kind of definition." These findings, in conjunction to the finding of schools as contributors to disconnection, have implications for the education system with respect to resolving our sustainability crisis, which are presented Chapter Eight (see Section 8.8).

7.5 Chapter summary

I asked all interviewees about the significance of nature connection and nature-based education in today's age. The elicited findings associated with this question illuminated outcomes for individuals, as well as systemic impacts, that contribute to more sustainable trajectories. At the individual level, nature connection and nature-based education was perceived as enabling students to take action and protect the environment by safeguarding their personal health and wellness, and developing critical knowledge, feelings and competencies, including empowerment. At a systemic level, the findings pointed to nature-based education as increasing societal awareness, understanding and receptivity to different beliefs and values of nature, and offering opportunities for re-connection. These systemic impacts aligned with

[17] Plant blindness is defined by Wandersee and Schussler (1999) as the inability to notice plants in one's everyday life, recognise their importance or appreciate their unique biological features. Michelle's comment refers to plant blindness as a consequence of a lack of respect through the human-nature dichotomy.

shifting anthropocentric beliefs, a predominant focus on utilitarianism and contemporary lifestyles, all previously identified as root causes of unsustainability.

In these ways, fostering nature connection through nature-based education was positioned as a means of countering the ill effects of the dominant social paradigm by creating opportunities for students to see and be with the world differently. Taken together, the findings highlight nature connection and nature-based education as levers for transformational societal change toward a more ecologically sustainable and socially just future. As developed further in Chapter Eight, the synthesis of the literature review (Chapter Two) and the findings (Chapters Four to Seven) provides a compelling case for prioritising nature connection as a central educational outcome for a sustainable Aotearoa New Zealand

Chapter Eight - Discussion

8.1 Chapter introduction

This study was informed through a systems thinking perspective that speaks to the transformational change needed to address the root causes of unsustainability in order to sustain the life-giving capacity of the planet (Abson, 2017; Meadows, 1999). As discussed in the literature review, the dominant social paradigm has fundamentally shaped the ways large swathes of the human population understand, value, relate to, and interact with the world around it. Shifting the paradigm in ways that improve human-nature relations is required to achieve a more sustainable future because beliefs and values are the "source" of the social systems (Meadows, 2008, p. 18) that inflict ecological degradation.

Education is argued to play an indispensable role in achieving transformational change (Everth, 2023; Irwin, 2020; Orr, 1992). The present study commenced with a focus on environmental education organisations (EEOs) in Aotearoa New Zealand because this network is known to support the formal education sector to deliver environmental education (EE). Through an explanatory sequential research design, nature connection became the focus of inquiry because it was shown to be prioritised by the greatest number of participating EEOs. This chapter provides a synthesis of the research findings and relevant literature as a response to the following research questions:

i. What are some organisational and programme features of the current EEO landscape in Aotearoa New Zealand?
ii. What conceptualisations of nature connection do EEOs hold?
iii. Why do EEOs prioritise nature connection?
iv. How do EEOs foster nature connection as part of their education programmes?

8.2 Defining features of the network of environmental education organisations (EEOs)

Meaningful and effective EE within the formal education sector often relies on partnerships between schools and EEOs (DePetris & Eames, 2018; Eames & Bolstad, 2004b; Papprill, 2016). This study illuminates the diverse EEO network of non-government organisations (NGOs) and government organisations that support schools with EE across Aotearoa New Zealand (Bolstad et al., 2015). The following discussion integrates findings from the stage one questionnaire with relevant literature to address the first research question: What are some organisational and programme features of the current EEO landscape in Aotearoa New Zealand? To my knowledge, these findings offer the first systematic description of the EEO network.

Well over one half of the NGOs (72/112) that participated in stage one reported operating as not-for-profit entities, indicating their reliance on external funding for operational costs. The analysis of their responses to the funding-related questions confirmed this dependency. While there was some discrepancy in relation to the number of NGOs funded by local community sources, the data unequivocally highlighted that these organisations face significant funding challenges. As detailed in Section 4.4.5, the participating NGOs were shown as relying on 'pieced together' funding, most typically in the amounts less than $10,000, from multiple sources. This precarious funding landscape was reflected in a comment from Participant #32: *"*[Our] programmes vary from year to year, nothing carries over automatically as it depends on funding*."*

Two additional findings underscore NGOs' funding challenges. First, over a third of NGOs reported that they had yet to secure 25% or more of the funding required to cover operational expenses for the year in which the questionnaire was completed. Second, almost 80% of participating NGOs ranked long-term funding allocation as the most beneficial form of support required by the EEO network. In contrast, EE programmes implemented through government organisations seemed to have access to more sustainable funding streams. This disparity in funding sustainability, between NGOs and government organisations, was highlighted in a recent report about educational opportunities in Aotearoa New Zealand's changing climate (Bolstad, 2020a). The report noted interviewees' frustration that NGOs face resource and funding shortages more consistently than other types of organisations, despite "community-led and grassroots organisations [being] often ahead of governments and large institutions in terms of localised, systemic, sustainability and climate solutions" (p. 27).

While national curricula have provided, to some extent, an enabling framework for EE (see Section 2.8.1), their implementation has fluctuated with shifting governmental priorities. Eames and Barker (2011) highlight EE's long-standing vulnerability to political changes, funding cuts, and local support variations. For example, following the election of a right-leaning government in 2008, central government funding for EE declined significantly, including the removal of funding for the Enviroschools programme (Chapman, 2011).

A number of participant responses (36/112) to the stage one questionnaire's open-ended response box drew attention to the need to improve high-level coordination to enhance collaboration and networking as partial solutions to these funding challenges. The establishment of the New Zealand Association of Environmental Education (NZAEE) as a Network of Expertise provider has helped address this need (see Section 1.3). However, while improving collaboration and funding is important, these improvements will not be sufficient to adequately support schools with EE. A key

finding of this study is that EEOs require more consistent funding to fulfil their role effectively. This challenge reflects broader issues within the NGO sector in Aotearoa New Zealand, which, despite offering essential services and opportunities, is often undervalued and overlooked (Centre for Social Impact, 2019). Within this context, some defining features of EEO programmes are presented next.

Over the requested three-year period (2018–2020), respondents primarily operated small programmes (1-500 students) with a focus on terrestrial and freshwater environments. The marine environment was the least focused on by participating EEOs. Most NGOs and governmental organisations reported employing one-to-two full-time and/or part-time employees. Additionally, three-quarters of NGOs engaged volunteers in their programmes, whereas few governmental organisations reported utilising voluntary assistance. The majority of EEO programmes had been in operation between three to ten years.

Section 4.3.1 demonstrated that EE programme distribution across regions is uneven, with some areas underrepresented and others overrepresented relative to their respective populations. As a result, access to EEO support is not guaranteed or consistent across the country. A recent national survey found that only 42% of primary and intermediate schools reported engaging with EEOs despite 88% having a school wide focus on kaitiakitanga (guardianship) and care for the environment (Bolstad, 2020b). Furthermore, findings of the present study indicate that EEO programmes primarily target students and teachers at the primary and intermediate levels, with a strong focus on providing in-school support, such as educational resources, field trips, and teacher professional development. Early childhood and secondary education receive less attention, while tertiary and vocational levels are the least targeted. Increased EEO support at the secondary school level is paramount given the systemic barriers to implementing EE in secondary schools (Brignall-Theyer et al., 2009), the low uptake of national assessment standards in sustainability (Shephard et al., 2024), and the empirically demonstrated 'teenage dip' (see Section 2.5.3) in levels of nature connectedness (Richardson et. al., 2019).

Section 4.3.5 identified that EEOs prioritise learning outcomes related to non-human nature (e.g., nature connection, biodiversity, species-specific, etc.) over other common EE themes, such as environmental issues and sustainable living. This emphasis on non-human nature provides a strong foundation for fostering eco-centric beliefs that recognise humans as part of nature. This key finding aligns with the growing body of literature emphasising the need to improve human-nature relationships as a key lever for transformation toward more sustainable trajectories (Artmann, 2023; Chapin et al., 2022; Fischer & Reicher, 2019). As Barragán-Jason et al. (2022) suggest, cultivating

sustainability is more effective when thinking encompasses all of life, rather than focusing solely on the human realm.

Nature connection as a learning outcome was prioritised by the greatest number of participating EEOs (89/112). However, as Whitburn (2020b) highlights, while EEOs in Aotearoa New Zealand actively promote nature connection and invest significant time, effort and resources into implementing nature connection interventions, there is little evidence of the effectiveness of their programmes. Moreover, robust studies measuring the impact of nature connection interventions in children and adolescents are limited (Barrable & Booth, 2020). Nonetheless, prioritising this learning outcome across all levels of formal education, including early childhood and secondary levels, is essential given the potential benefits of nature connection (see Section 2.5.2) and the understanding that childhood is a critical period for developing lifelong nature connectedness (Chawla, 1999; 2007).

The next stages of the present study aimed to deeply explore EEOs understanding of the phenomenon of nature connection, their rationale for its prioritisation as part of their programmes and to address the gap in understanding how nature connection and nature-based education (NBE) can be integrated into education programmes, including those of the formal education sector, within the Aotearoa New Zealand context.

8.3 Conceptualisations of nature connection

This section responds to the second research question: What conceptualisations of nature connection do EEOs hold? The findings were drawn predominantly from the stage three interviews with the 15 purposefully and theoretically-selected EEO representatives. There are a few exceptions when the findings were derived through the stage two questionnaire, and these are specifically noted as appropriate. This organisational approach pertains to the rest of this chapter.

Section 5.3 identified three conceptualisations of nature connection as: experiences of engaging ‘with’ nature; a way of being, knowing and becoming in relationship; and an empowering impetus. The wording used to describe the three conceptualisations of nature connection in this chapter has been slightly altered to increase clarity of the EEO representatives’ meanings and key themes from the literature. For instance, the title of the conceptualisation ‘Experiences of engaging ‘with’ nature’ has been slightly adjusted to ‘Experiences of engaging ‘with’ non-human nature’. This change accounts for the recent ‘relational turn’ in scholarship, as discussed in Section 2.3.1.1, suggesting dichotomous wording as problematic and identifying a need to advance thinking around communicating differently (West et al., 2020).

As explained in Section 5.3.1, EEO representatives typically used the word 'nature' in ways that excluded humans, speaking of humans and nature as two separate entities, while simultaneously emphasising their belief that humans are part of nature (see Section 5.3.2.2). Here, the idea that language has power becomes important: the words we choose to communicate with may inadvertently increase our connection/disconnection with non-human species, local geographies and cycles of the Earth system (Fletcher, 2017). Fortunately, there are alternative ways of communicating that may positively influence humanity's relationship with non-human nature. Albrecht's (2019) *Earth emotions: New words for a new world* explores conscious language construction for fostering emotions and relationships that are "compatible with human flourishing, and a whole Earth that is rich, bountiful, and beautiful" (p. 11). Albrecht's promotion of the "Symbiocene" (p. 102) is one such example of a new word for a new world. The Symbiocene refers to the period when human intelligence and praxis will nurture the mutual interdependence and health of the community of all of life.

While none of the interviewees highlighted any issues they had with the words they chose to use during the interviews, personally, the literature provoked me to become more conscious of my word choice. As I progressed with writing, I decided to refer to 'humans and non-human nature' as a reminder to readers that humans are indeed part of nature. Then, I found myself hesitating when conventional language would have seen me refer to the Earth or nature by the impersonal pronoun 'it'. As an alternative, I began to use the feminine pronouns 'she' and 'her' as this personification felt much more appropriate for acknowledging these entities as givers and sustainers of life rather than simply 'objects'. My shift in language reflects the impact that undertaking this study has had on me, deepening my connection to the planet as a relational entity.

Below, each of the three conceptualisations of nature conceptions held by EEO representatives are discussed in relation to the literature. Overall, their conceptualisations of nature connection were rich in description and reflected the complexity and subjectivity through which the concept is understood and applied in the literature across disciplinary boundaries (Ives et al; 2017). Similar to the human-nature connection framework as conceived by Ives et al. (2018), EEO representatives' conceptualisations emphasised nature connection at the individual scale. However, when these conceptualisations were considered together, and in relation to the dataset in full, including EEO representatives' perspectives about NBE, the present study supports the promotion of educating for nature connection as an important lever of transformational change (SEI & CEEW; 2022). This finding acknowledges that peoples' experiences of connection with non-human nature is embedded in

larger, social, institutional and political contexts that influence opportunities for, and expressions of, connection with nature (Beery et al; 2023).

8.3.1 Engaging 'with' non-human nature

As reported in Section 5.3.1, the conceptualisation of nature connection as experiences of engaging 'with' nature was elicited as referring to experiences that offer students opportunities to focus on non-human nature through their direct interactions with her. As shown in Appendix 7, data collected through the stage two questionnaire demonstrated these experiences comprised a wide range of opportunities offered by EEOs, the majority of those taking place outdoors. This finding aligns with the way I, and other EE practitioners I had observed over the years, had interpreted and enacted the pedagogical principle of 'education in the environment'. However, through the in-depth inquiry as offered through the stage three interviews, the findings showed that the EEO representatives linked these experiences with enabling students to be 'with' non-human nature through their bodies, mind, heart and spirit. In relation to this holistic intent, the 15 interviewees identified the following connection types as important to their respective EEO programmes: experiential (15/15), affective (15/15), cognitive (7/15), spiritual (7/15), material (4/15), and philosophical (1/15).

An important finding of the present study is the understanding that there are many ways through which people connect with non-human nature. The nature connection framework from Ives et al. (2018) identifies five of the six types/dimensions of connection raised by the interviewees, but does not discuss spiritual connection. EEO representatives discussed physical (i.e., experiential), cognitive and emotional connections with nature the most, and material and philosophical connections the least. Seven of the EEO representatives, including all six participants who self-identified as Māori or having a strong affiliation with the culture, identified a spiritual connection as pertaining to nature connection. I probed only one interviewee, Kahu, more deeply about the spiritual connection she acknowledged as part of her personal connection with nature. She described spiritual connection as a space that differs from the physical realm and found it difficult to put into other words. Since the setting of my study focused on the English-medium education system in Aotearoa New Zealand, which predominantly abides by a secular orientation, I intentionally held back on inquiring into this theme. Through my research, I have come to understand, to some small degree, the alignment between a spiritual connection with non-human nature and an indigenous paradigm. This insight reveals the potential for educational praxis that genuinely honours *Te Tiriti o Waitangi* to remain open to recognising spiritual connection with non-human nature as a legitimate component of educating for nature connection.

Different disciplines and agenda prioritise certain types of nature connection over others. For example, Richardson (2023) notes that sustainability research and policy has mainly pursued experiential connection based on a simplistic assumption that spending time in nature is good for humans. Yet, as the empirical evidence clearly demonstrates, fostering affective connection is vital for improving human-nature relations, while physical contact with non-human nature on its own doesn't lead to pro-environmental behaviour (PEB). For instance, Barragan-Jason et al.'s (2023) systematic review of over 800 studies of the impacts of nature connection confirmed that although physical connection (i.e., experiential connection) with nature benefits human wellness and psychological connection (i.e., affective connection), it is the psychological connection that is beneficial to both human wellness and what they term nature conservation. In other words, it is through developing an emotional bond with non-human nature that nature connection becomes a lever of transformational change toward more sustainable trajectories. Further justification for the significance of affective connection was found by Martin et al. (2020) who simultaneously measured the impact of nature contact and nature connectedness on human wellbeing, which demonstrated nature connectedness as making a bigger contribution to human wellbeing compared to nature contact. Hence, the research clearly points to greater impacts on both human and non-human nature wellness via affective connection in comparison to nature contact only.

Finally, as part of the findings associated with this first conceptualisation of nature connection, one-third of EEO representatives suggested that in order for people to connect with nature, they require adequate space and time to engage with non-human nature at one's own pace and in one's own way. Speaking of the work his EEO does in the nature connection space, Glenn spoke about the importance of "letting people find their own way through". This finding aligns well with the "unplanned encounters" with non-human nature discussed by Ruck and Mannion (2021, p. 1502) and has implications for the design of NBE programmes.

In summary, this first conceptualisation – engaging with non-human nature – points to nature connection as experiences, typically in the outdoors, that provide opportunities for holistic connection with the non-human species, geographies and cycles of the Earth system. This interpretation is generally consistent with the nature connection framework as proposed by Ives et al. (2018), although some interviewees also perceived spiritual connection as fundamental to nature connection.

8.3.2 Being, knowing and becoming in relationship with non-human nature

As explored in Section 5.3.2, a way of being, knowing and becoming was another conceptualisation of nature connection perceived by participants. The findings relating to this conceptualisation were

organised through three sub-themes, summarised as: (1) knowing the interconnected layers of nature; (2) realising humans as part of nature; and (3) appreciating the benefits of nature. All three sub-themes were shown to be associated, to some degree, with a way of being, knowing and becoming that is underpinned by the notion of the Earth system as an interconnected whole. This understanding aligns with te ao Māori (Māori worldview) and the concept of 'whakapapa' (Bolstad & Durie, 2024). Whakapapa is the foundation to Māori ontology and epistemology that views the world through a kinship system. As Burgess and Te Kahuratai-Painting (2020) explain: "Connected by our origin stories, whakapapa reveals that this web of relationships is whānau [family], existing in a state of whanaungatanga [relationship]" (p. 208). The words 'in relationship with non-human nature' were later added to the title of this conceptualisation to ensure being, knowing and becoming focused on humanity's relationality with the interconnected wholeness of our world.

Inspired by the concept of whakapapa, I refer to this second conceptualisation of nature connection as a relational onto-epistemology. This construct combines ontology and epistemology to emphasise that being, knowing and becoming are all fundamentally interrelated (Latulippe & Klenk, 2019) and linked to what was established in Section 2.7.3 as a holistic knowing of the network of relationships at place (Kumar, 2012). The findings suggest that learning to know and be in kinship relations with all of life is to feel a profound sense of belonging with the Earth, which may drive a deeper motivation of care and reverence for non-human entities. As Michelle said, "In full nature connectedness level [...] you are respecting even like the landscape, the soil, the mountains, rivers, like in indigenous views."

The perceptions of EEO representatives are supported by the extension of interpersonal relationship theory to human-nature relationships (Schultz, 2002) and the development of nature connectedness as a metric for measuring relational closeness between humans and non-human nature. Section 2.5.2 highlights some of the empirical evidence that nature connectedness science has accumulated, demonstrating profound benefits associated with nature connectedness, including outcomes related to health and wellness (Martin et al., 2021), PEB (Miller et al., 2021) and learning (Kuo et al., 2019). These benefits are discussed more in association with EEO representatives' perceptions of outcomes and impacts of nature connection (see Sections 8.4.2.1 and 8.4.2.2), which are foundational to their personal and respective organisation's reasons for prioritising nature connection as an educational outcome.

8.3.3 Acting as an empowering impetus

Nature connection acting as an empowering impetus is the third and final conceptualisation elicited through the analysis process (see Section 5.3.3). This conceptualisation explains EEO

representatives' beliefs that nature connection is a motivational force (Roczen et al., 2014), empowering pro-environmental actions and behaviours in general, and empowering Māori as leaders elevating indigenous paradigms. The word 'acting' was added to the title of this conceptualisation in order to transform its meaning from a mere description of the data (i.e., nature connection as an empowering impetus) to emphasising the role of nature connection in facilitating empowerment.

There are two aspects through which nature connection acts as an empowering impetus. First, nature connection may empower environmentally-friendly actions and behaviours that lead to positive environmental change. Based on the theory of relational closeness as part of an interpersonal relationship with non-human nature, as discussed previously, nature connection has been shown to be a formidable motivational force for directly influencing self-reported PEB (Kaiser et al., 2013; Otto & Pensini, 2017; Roczen et al., 2014; Whitburn, 2020). Almost all EEO representatives recalled lived experiences that exemplified nature connection as empowering actions and PEB, like this excerpt from Jenni: "Through becoming more connected [...] we're seeing students [...] acting instinctively, looking for ways to care and protect them [energies, cycles and species of nature]."

The second aspect of nature connection acting as an empowering impetus relates to indigenous paradigms contributing to transformational change. Transformational theory proposes that new meanings and frames of reference hold potential for shifting behaviour patterns (Kokkos, 2019; Sterling, 2001). While not 'new' in and of themselves, indigenous paradigms are new (or at least not well understood or represented) within the dominant social paradigm. Consistent with the literature explored in Section 2.7.7, almost all interviewees highlighted indigenous paradigms and ways of living as underpinned by an implicit connection with nature, of which holistic and relational perspectives are an embedded part (Williams, 2021). Indigenous paradigms and ways of living therefore offer a window to 'see and be' in the world differently than espoused through the dominant social paradigm (Osborn et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2022). Essentially, indigenous perspectives are characterised by eco-centric beliefs and an intrinsic value of non-human nature, which align with belief and value systems deemed paramount for achieving the paradigm shift necessary for transformational change toward sustainability (Marsden, 2003).

Indigenous Peoples, like Māori of Aotearoa New Zealand, are increasingly elevating indigenous paradigms (SEI & CEEW, 2022), or as explained by Ian, "renormalising indigenous worldviews and perspectives". Almost two-thirds of the EEO representatives (9/15) perceived Māori as empowered

by their culture's intrinsic connection with non-human nature that underpinned their societal norms in the times before colonisation.

In sum, this third and final conceptualisation positions nature connection as an impetus that motivates PEB in general. Additionally, this conceptualisation empowers Indigenous Peoples, bringing to the fore their cultural insights as alternative ways of knowing and being that may help humanity, as a whole, become differently in ways that encourage living more sustainably as part of the Earth system.

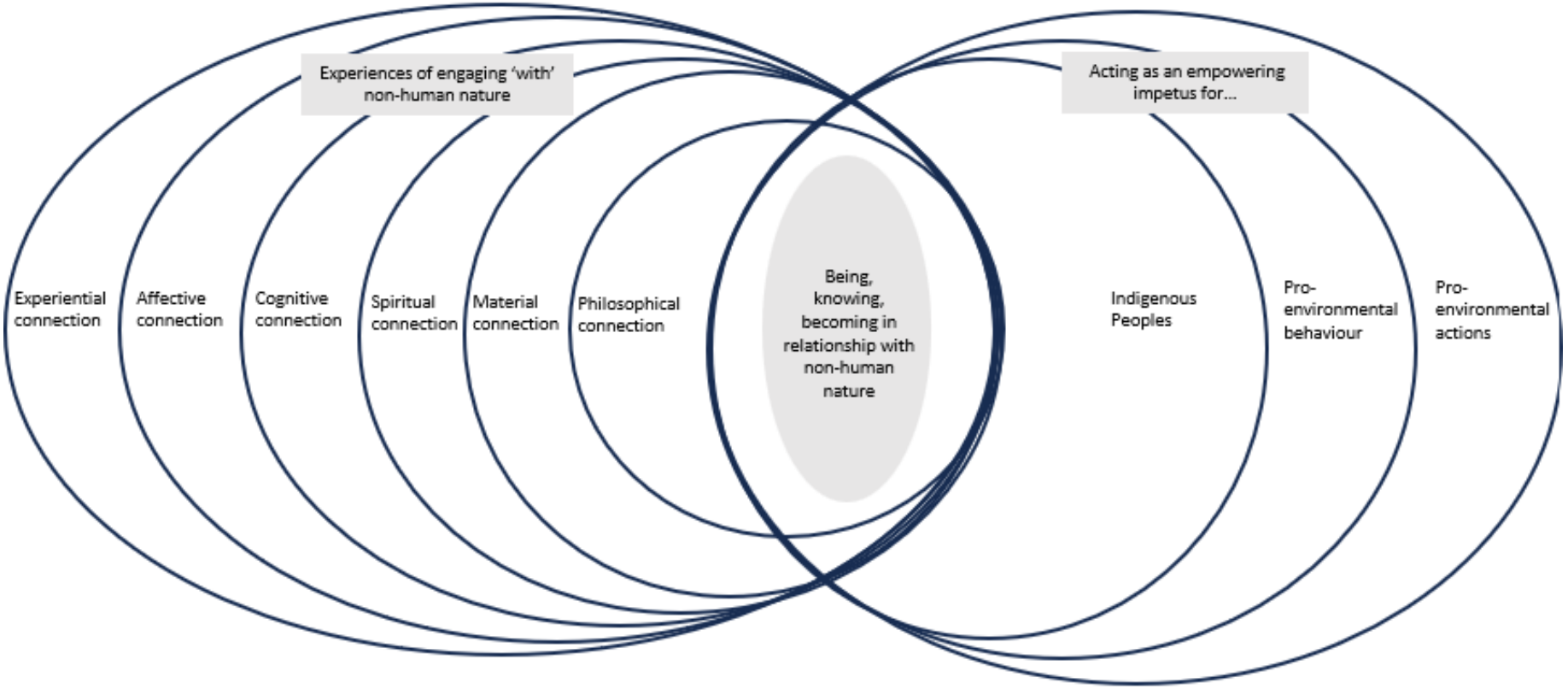
8.3.4 The interrelatedness of the participants' conceptualisations about nature connection

This section has discussed EEO representatives' conceptualisations and deeper meanings of nature connection based on a synthesis of the present study's findings and the reviewed literature. While the discussion up to this point considers these conceptualisations as if they were perceived by the EEO representatives separately, just as everything in the world is interconnected, so too are these conceptualisations of nature connection. Tilly summed this up as:

> When you think about things like nature connection, and the engagement that comes with it, and the relationship that one develops with this big giant thing [nature], they're all so inextricably linked really. Aren't they? I mean because nature connection does tap into so much in terms of engagement with the environment in the first place [i.e., engaging with non-human nature], let alone one's personal relationship with it [i.e., being, knowing and becoming], let alone the action one can take [i.e., acting as an empowering impetus].

Through the analysis, the concept of nature connection was shown to be more than merely referring to physical contact with nature. The findings of the present study suggest nature connection as a phenomenon of interrelated experiences and outcomes that collectively empower a state of being, knowing and becoming in relationship with non-human nature. Figure 40 attempts to illustrate the interrelationship between the three conceptualisations and affiliated sub-themes as elicited through analysis. The circles represent different ways people engage with non-human nature. Their order, and therefore the size of the circle that each sits within, corresponds to the number of participants who spoke about each connection type: experiential (15/15), affective (15/15), cognitive (7/15), spiritual (7/15), material (4/15), and philosophical (1/15). The realisation of the interconnection between oneself and the rest of nature was found to underpin each of the three conceptualisations. This understanding of the EEO representatives' conceptualisations of nature connection provides a foundation from which nature connection as an educational outcome is further examined in association with the existing literature.

Figure 40 *Conceptual framework of nature connection for the Aotearoa New Zealand context*



Note: EEO representatives' three conceptualisations (as shaded) and affiliated sub-themes of nature connection.

8.4 Prioritising nature connection as an educational outcome

The findings discussed in this section answer the research question: Why do EEOs prioritise nature connection? Analysis of the stage two data showed participants and their respective organisations prioritised nature connection as an educational outcome based on the broad belief that disconnection, as a root cause of unsustainability, must be resolved if we are to regenerate and sustain the life-giving capacity of the Earth. This rationale is clearly evident in this comment from stage two participant #24: "We believe that nature connection is important because most of the problems facing the world today come from humanity's disconnection from nature". This section examines the finding of disconnection as the problem that EEOs intend to address through nature connection in relation to the literature.

8.4.1 Disconnection: An underlying cause of unsustainability

As the focus of this study was nature connection, the term disconnection was not used extensively by stage two/three participants, nor by me. Furthermore, I did not specifically ask participants what they meant by their use of the term 'disconnection'. However, a few broad findings about disconnection are worthy of discussion in relation to the literature.

As highlighted at the start of this section, a widely-held belief among participants was that disconnection from non-human nature is a root cause of the socio-ecological crises that characterise the Anthropocene (Barry, 2010). Disconnection, also referred to in the literature as the human-nature dichotomy, refers to a psychological and physical separation between people and the rest of nature, respectively explained as a loss of regular direct contact and meaningful cognitive and/or emotional connection with non-human nature (Zylstra et al., 2014).

Almost all EEO representatives (14/15) referred to "Western culture" as a key cause of disconnection and unsustainability, while two-thirds (10/15) also highlighted "colonisation" as a contributor. Although social justice movements have long recognised the interrelationship between colonialism[18], human-nature disconnection, and socio-ecological issues like climate change and biodiversity loss (Whyte, 2018), this reality is only now becoming more readily accepted. For example, the language of colonialism

[18] Noting the difference between the reference to colonisation and colonialism in this section. Participants' only used the term colonisation, referring to it as a both a historical and present-day act of disempowerment of Māori. In comparison, colonialism is a term more frequently used by literature to describe an ongoing ideology that justifies and maintains the ongoing political, economic and cultural domination of one group by another.

has finally made its way into the latest IPCC report (2022), 30 years since the release of its first report in 1990.

A consequence of colonialism is the nullification of Indigenous People's ways of being, knowing and doing (Thornton, 2019). This is a loss not only for Indigenous Peoples, but for humanity as a whole since indigenous paradigms offer alternative, more sustainable ways to be in the world (O'Sullivan, 2018). The findings presented in Section 5.2 clearly indicated that almost all EEO representatives (14/15) had views on the socio-ecological impacts of colonialism and the significant role that Indigenous Peoples and their perspectives play in resolving unsustainability,

As almost all interviewees linked their perceived causes of disconnection and unsustainability with Western culture, I came to question whether this notion was fair or even correct. As discussed in the literature review, particular people, events, and ontologies affiliated with Eurocentric history can be shown to have contributed significantly to the dominant social paradigm of modernity and its ill effects. Yet scholarship also identifies multiple and diverse narratives that have also been of influence (Marks, 2024). From this perspective, the focus of this discussion is less on assigning blame to a single culture, but instead, to illuminate some of the hegemonic influences that emerged through this study.

Through the analysis of the interview data, the causes of disconnection were aligned with three key drivers: anthropocentric beliefs, a predominant focus on a utilitarian value of nature, and contemporary lifestyles. Anthropocentric beliefs that perceive the human species as separate, and even superior, to non-human nature were raised by 11 EEO representatives, while 10 representatives raised concern about the predominant focus of a utilitarian value of non-human nature that prioritise the benefits non-human nature affords humans.

As explored in Section 2.4, the literature traces the embedding of anthropocentrism and utilitarianism as part of the dominant social paradigm from around the sixteenth century (Capra & Luisi, 2014; Merchant, 2019; Pirages & Ehrlich, 1974). I align this belief and value system with psychological drivers of disconnection that have had, and continue to have, profound effects on societal values, attitudes and behaviours in ways that prioritise human needs and interests over those of non-human nature (Muhar & Böck, 2017). Such ways of thinking result in adversarial human-nature relations (Barry, 2010; Beery et al., 2023) and are devastating to the human sense of belonging and mutualism with the Earth as a whole (Keniger et al., 2013).

Section 5.2 also demonstrated that all EEO representatives associated features of contemporary lifestyles with physical drivers contributing to the human-nature dichotomy. Contemporary lifestyles, described by Sandy as “indoor capsules” with “everything plastic wrapped”, were discussed by participants as reducing the direct contact that people have with non-human species, geographies and Earth system cycles. Physical disconnection from non-human nature via contemporary lifestyles aligns with extinction of experience (Pyle, 1993) and nature deficit disorder (Louv, 2005), two theories that focus on the consequences of the loss of direct interactions with non-human nature. Zylstra et al. (2014) also point to contemporary lifestyles as associated with psychological drivers of disconnection, like electronic media and advertising material, which place constant demands on attention and the sensory field of consciousness that create an illusion of distance from nature.

Disconnection results in a lack of knowing (cognitively and emotionally) of non-human nature, a consequence Zylstra et al. (2014) referred to as “inattention nature blindness” (p.123). This consequence is highly concerning with respect to our sustainability crisis because of the potential for disconnection to be reinforced as non-human nature becomes less and less part of the experiences that shape consciousness. Theory around the outcomes of disconnection focus on some fundamental and interrelated phenomena, including an enlarged ‘blind spot’ where people no longer realise their dependence on non-human nature (Nisbet et al., 2009; Vining, 2008); cognitive dissonance and apathy towards the destruction of non-human nature (Beery et al., 2023); and the onset of ‘shifting baseline syndrome’ whereby people’s thresholds of awareness and understanding about non-human nature and environmental issues are continuously lowered (Soga & Gatson, 2018). Although the terms blind spot, cognitive dissonance, and shifting baseline syndrome terms were not specifically mentioned by interviewees themselves, the findings highlight participants’ awareness of these outcomes. For example, Robyn indirectly referred to the blind spot when expressing her belief that people are increasingly “losing sight” of the value that plants and trees hold for humanity’s wellbeing and survival (see Section 5.3.2.3).

The phenomena of blind spot, cognitive dissonance and apathy, and shifting baseline syndrome are not only outcomes of disconnection, but secondary drivers that perpetuate and accelerate the cycle of disconnection from non-human nature and ecological degradation (Soga & Gatson, 2018). Interrelationship analysis suggests that to solve an issue (e.g., disconnection), interventions should focus on resolving the strongest drivers (or root causes) while measuring the effectiveness of the intervention through monitoring changes in the outcomes (i.e., least strong drivers) (Shehab, 2020). Therefore, an

intervention strategy should focus on shifting anthropocentric beliefs, the predominant focus on a utilitarian value of nature, and contemporary lifestyles as root causes of disconnection, and evaluate its effectiveness through measuring change in relation to blindspot, cognitive dissonance and apathy, and shifting baseline syndrome. Section 8.4.2 discusses nature connection as such an intervention but first, the next section takes a closer look at EEO representative's perception of schools as contemporary phenomena that contribute to disconnection.

8.4.1.1 Schools as contributors of disconnection

As reported in Section 6.2, interviewees identified schools in Aotearoa New Zealand as a specific example of a societal structure that contributes to disconnection. As Michelle summarised:

> Young children will inherently have a connection [to non-human nature]. When they go through the mainstream school system [English-medium system in Aotearoa New Zealand], they're going to have that taught out of them in our current structure. That then leads to the majority of the population living unsustainably. Right, it's that simple.

Michelle's statement seems to hold merit based on the overview provided in Section 2.6.1 of education as a mechanism of cultural reproduction. Orr's (1992) description of the dominant education system as one that "alienates us from life in the name of human domination, fragments instead of unifies, overemphasises successes and careers, separates feelings from intellect and the practical from the theoretical" (p. 220) helps to illuminate Michelle's presumption.

A range of school norms, priorities and structures that were identified by participants for contributing to disconnection. All interviewees perceived disconnection as progressively increasing from the early childhood years through to the end of secondary schooling. Pernille's description of the secondary school system as analogous to "hitting a brick wall" was reflective of her belief that the inherent structure and processes at the upper levels of education more greatly impact disconnection compared to those at the early childhood and primary levels. This is well aligned with empirical studies that report a sharp drop in nature connectedness in adolescence (Krettenauer et al., 2019; Piccininni et al., 2018; Price et al., 2018), known as the "teenage dip" (Richardson, 2019).

Educating through school norms, priorities and structures like these that contribute to disconnection is untenable. In the face of our unsustainability crisis, it is no wonder that education systems are increasingly being called out for being not fit for purpose with respect to protecting the life-giving

capacity of the Earth (Everth and Bright, 2023; Irwin, 2020; Jones & Jenkins, 2008;). Section 8.5 discusses principles of praxis that could be adopted into schools for fostering nature connection, but first, the next section explores nature connection as a solution to disconnection.

8.4.2 Nature connection: A solution to unsustainability

From here, the discussion moves on to more deeply explore a second key finding in relation to: Why do EEOs prioritise nature connection? Herein, the conceptualisations of nature connection as presented in Section 8.3 are referred to as they help specify some ways nature connection may help resolve unsustainability.

When EEO representatives discussed their personal and respective organisational rationales for prioritising nature connection, they highlighted outcomes for individual students (see Section 7.2) and systemic impacts for wider society (see Section 7.3). Here the perceived outcomes and impacts are examined in relation to the literature about the benefits of nature connection for individuals as established in Section 2.5.2, and the transformative potential of education, particularly environmental education (EE), as explored in Section 2.6.2. This section shows that both individual outcomes and systemic impacts were sought by EEOs because of their potential for contributing to a more sustainable future through resolving disconnection, which links to the notion of nature connection as a "treatment" to unsustainability (Ives et al., 2018, p. 1392).

8.4.2.1 Outcomes for individual students TEST

As reported in Section 7.2.1, all 15 EEO representatives perceived personal health and wellness benefits resulting through nature connection. This finding aligns with a growing body of interdisciplinary research that demonstrates nature connection makes a more significant contribution to health and wellness benefits in comparison to simply nature contact (Martin et al., 2020; Richardson et al., 2021). Four participants particularly reflected on the significance of personal health and wellness for enabling students to contribute to resolving unsustainability, which Tilly summed up in this way:

> What else is more important than social wellbeing? It's massive, because none of these young people are going to be capable of doing anything on the sorts of scales that they're going to need to if we're not raising them as healthy, happy, stable young people who can work well and empathetically with each other.

When considering the purpose of education, successful learning that prepares students for their futures is unlikely if their health and wellness, including their sense of belonging, is not intact. This justifies the enshrinement of the holistic development of every student, which includes their health and wellness, as an educational objective - as framed by Section 4 of the New Zealand Education and Training Act 2020 (Parliamentary Council Office, 2020). As depicted in Figure 42, the objectives of the EE national strategy - *Mātauranga Whakauka Taiao* (Department of Conservation, 2017), including *Te Whare Tapawhā*'s four dimensions of health (Durie, 1985), aligns well with this purpose.

Figure 41 *The EE objectives for the Aotearoa New Zealand context*

Furthermore, resolving the wicked problems of the Anthropocene requires interdisciplinary problem solving led by teams of people who are not only sound in mind and body, but as Tilly said, capable of working well and empathetically with one another. As argued in Section 2.3, resolving unsustainability can only arise through system thinking approaches that pertain to the Earth system as a whole, which requires the development of holistic thinkers and effective collaborators. Michelle acknowledged this when she said,

> Having worked in the secondary space, I know that there are really specific skills that go with each discipline [e.g., science, social sciences, etc]. And we need specialists. But

> more and more we need generalists as well, like holistic thinkers and people who can work well together.

Although this may seem to infer that our sustainability crisis requires greater focus on social connectedness (i.e., fostering positive and meaningful relationship between people as a basis for working well together), findings from a recent study by Stinus et al.(2024) suggest otherwise. Using validated methods for measuring nature and social connectedness, and biospheric and altruistic values, Stinus et al. found nature connectedness, rather than social connectedness, to be a better predictor of altruistic values that promote socio-responsible behaviour. Furthermore, social connectedness showed a negative correlation with biospheric values, which hinders eco-responsible behaviour. Based on theory of in-group/out-group dynamics, Stinus et al. suggest that the negative correlation may arise when humanity frames non-human nature as an "out-group". Or in other words, an exclusive focus on humanity may lead people to perceive non-human nature as an 'Other' and potentially reject her values. These findings are important given the wicked problems that children and young people face and justifies a focus on nature connectedness as a foundational intervention for connecting with and benefiting both the human species and non-human nature.

Some EEO representatives (7/15) perceived types of intra- and interpersonal competencies as developing through nature connection. For instance, Sophie spoke of students' levels of curiosity and creativity being nurtured through "Seeing those systems in nature for moving forward, and creating new things based on these [natural] systems, like, Yeah, like creating types of new jobs that don't even exist yet." This finding broadly aligns with Kuo et al.'s (2019) findings that demonstrate a strong correlation, and causal relationship in some cases, between learning outcomes (e.g., academic success, personal development and environmental stewardship) and nature-based learning experiences. Although Kuo et al.'s study did not focus on the outcomes developed through nature connection per se, but instead nature contact, their findings are still relevant to this study since nature experiences are a precursor to nature connection.

Findings presented in Sections 7.2.2 and 7.2.3 demonstrate participants' and their organisations' prioritisation of NBE for developing cognitive and affective ways of knowing non-human nature, respectively. To some extent, these dual ways of knowing as sought by EEOs aligns with an indigenous way of knowing the world that is founded on an empirical relationship with non-human nature through seeing, sensing, hearing, appreciating, relating and feeling (Krupp, 2015). A cognitive and affective way

of knowing non-human nature is discussed below in relation to pro-environmental action-taking and behaviour.

With respect to cognitive ways of knowing, almost all of the interviewees (13/15) highlighted the importance of developing students' understanding of the concept of interconnectivity. As Milka said, "We think the interconnectivity of everything is just so vital, [it's about] understanding that every living thing, every specie is unique and part of this wider network and system". The concept of interconnectivity underpins Earth system science (Steffen et al., 2018) and indigenous paradigms (Williams, 2021), both of which frame the human species as just one part of the interconnected web of life. An intellectual understanding of the interconnectivity of all things is the foundation to developing eco-centric perspectives that may improve human-nature relations and lead to PEB (SEI & CEEW, 2022). Four EEO representatives spoke about an understanding of interconnectivity as leading to students' awareness of a reciprocal relationship between the health of people and the health of the wider environment. Like Ian said, "The importance of understanding that you just can't have healthy people without healthy environments. It's one and the same".

Cognitive outcomes ensure that students understand what needs to change for a more sustainable future and how this might be achieved. However, as explained in Section 2.6.2.1, it is an affective connection, or in other words one's emotional bond with non-human nature, that fosters a person's empathy for and a willingness to help all of life. This is supported by empirical evidence that demonstrates nature connectedness as strongly associated with PEB for both children (Miller et al., 2021; Whitburn, 2020b) and adults (Barrable & Booth, 2020), and corroborated as a formidable motivational force (i.e., empowerment) that directly influences self-reported PEB (Kaiser et al., 2013; Otto & Pensini, 2017; Roczen et al., 2013). In contrast, empirical studies show no, or limited, direct positive association between environmental knowledge and PEB (Hungerford 7 Volk, 1990; Kollmus & Agyeman, 2002; Steg & Vlek, 2009).

Section 7.2.3 showed that all EEO representatives and their respective organisations also prioritised fostering an affective connection with non-human nature through their programmes. As Glenn explained, "Even if they [students] go away not really having consciously learned anything, but if they go away just thinking this is actually quite a nice place to be […] then that's a good outcome as far as we're concerned." Almost all of the EEO representatives (14/15) linked positive emotions, like love, care, awe and wonder, with students' levels of respect for and motivation to protect non-human nature. For

instance, Atama explained a focus of his EEO as “developing a deep connection through awe and wonder from which action is spurred”.

Almost half of the interviewees (7/15) highlighted the empowerment they aligned with positive emotions for non-human nature as a paramount co-requisite to issues-based learning such as climate change learning. As Tilly explained, “Nature connection empowers our community to take that love [of nature] and the understanding [of the issues] and not want to bury their head in the sand because they’re overwhelmed.” The connection between nature connection and issues-based learning is an important finding that I did not explicitly come across in the literature. This sent me looking for evidence of the promotion of nature connection in a recently published climate education guide (Future Curious, 2022) that I knew to be recognised as a reputable educational resource in Aotearoa New Zealand.

Surprisingly, I found no specific reference to nature connection in either the climate education resource itself, or its accompanying wellness guide designed to help teachers look after the emotional wellness of students as part of the learning process. Both of these documents highlight educational approaches, such as including mātauranga Māori, action-orientated approaches and art-based pedagogies, that this study links with fostering nature connection via NBE (see Section 2.7). However, what I believe tends to be missing in EE resources like these this is an explicit explanation of the link between these approaches and nature connection, including an explanation of the significance of nature connection with respect to issues-based learning.

Given the possibility that some teachers are likely to have minimal understanding about nature connection and its relevance to education (as highlighted in Section 6.2.2), some ‘unpacking’ of nature connection, especially in relation to developing the affective domain, would be helpful. For instance, what does a relationship with non-human nature have to do with issues-based learning around topics like climate education and loss of biodiversity? What are the benefits that come from positive human-nature relations? How might these relationships be developed in schools? Explanations for questions like these are important given the fact that growing one’s capacity to feel is not yet prioritised by the education system (Verlie, 2019).

Further justification for fostering nature connection is found in participants’ perceptions of a progressive decline in children’s and adolescents’ connection with non-human nature over the formal schooling years, which Section 2.5.3.3 linked to the empirically demonstrated ‘teenage dip’. Around the onset of this dip in nature connectedness, many children also reach a cognitive milestone associated with

abstract reasoning and hypothetical thinking (Piaget, 1972). This means that they begin to grasp complex thinking and cause-and-effect relationships required to recognise the consequences of anthropogenic impacts on the environment. As part of this cognitive shift, children around this age begin to show moral consideration and concern about environmental responsibility (Kahn, 1999). The present study casts light on the paradox of this developmental stage and some norms of the dominant social paradigm. It is possible that just as children and adolescents are becoming cognitively capable of grasping the personal and societal implications of anthropogenic change, the beliefs and values of broader society lead to establishing structures and practices that increasingly diminish opportunities for nature connection (e.g., schools as contributors to disconnection).

Although participants did not specifically link this cognitive developmental stage with the teenage dip, the synchronicity between the two offers an intriguing avenue to explore with regards to the interrelationship between environmental awareness/understanding, affective connection/disconnection and societal norms and values. Tackling the teenage dip by sustaining nature connection through the childhood and adolescence life stages holds potential for maintaining higher levels of nature connectedness at an earlier age in a greater proportion of the adult population (Price et al., 2022), and therefore, ensuring people of all ages benefit from their relationship with non-human nature.

The next section turns from a focus on individual outcomes to exploring nature connection and NBE as pivotal to transformational societal change.

8.4.2.2 Systemic impacts toward transformation

When asked about the significance of fostering nature connection via NBE today, over two-thirds of interviewees (12/15) discussed systemic impacts. As was explained in Section 2.3, systemic impacts are associated with transformational change because they help resolve socio-ecological issues by addressing the root causes of the problems rather than merely treating the symptoms. Ian explained his EEO's rationale for prioritising systemic impacts over behavioural change, saying:

> Behaviour change is putting all the onus and the responsibility on the people and not the systems that are creating the problem in the first place […] You can have all the behaviour change you like, but [...] the systems are still piling up the outcomes that we're seeking to address.

Humanity's long-term survival on the planet depends on society as a whole relearning how to live in greater harmony with non-human nature and one another (Barragan-Jason, 2022). Essentially, this requires shifting societal views, structures and practices in ways that improve relationships (Artmann, 2023; Riechers et al., 2021). Findings from the present study support the scholarly framing of nature connection as a mechanism of transformation that improves human-nature relations (SEI & CWWN, 2020) and even relationships between people (Stinus et al., 2024) in three ways.

First, all EEO representatives spoke about their organisation's prioritisation for shifting contemporary lifestyles (e.g., societal structures and practices). The findings from Section 7.3.3 highlighted the significance of NBE for reconnecting students with non-human nature through actions that "nourish and regenerate Papatūānuku [Earth Mother], rather than extract and deplete from her" (Annie). Interviewees provided specific examples from their programmes that connect students with non-human nature through learning opportunities based on ways of living differently in comparison to contemporary lifestyles. Key themes of these programmes focused on waste minimisation, food production and te ao Māori.

Second, EEOs' and their representatives' prioritisation of nature connection also related to shifting societal views. Tilly described this shift as "Taking heads away from human-centric notions" while Milka spoke about "Cultivating an understanding of humanity's place in the universe as one part of an interconnected whole". In *Metanoia: The hardwork of changing our minds*, Hopkinson (n.d.) highlights the importance of addressing societal views as part of transformational change, quoting her mentor, Emeritus Professor Wally Penetito, who said:

> The word, transform, it comes from the Greek word, "metanoia", which means system change, but it also means changes in the mind. It is a really important concept, metanoia, a terrific word – this idea that it is not just about structural change, but too the changes in the mind. (para 8)

As discussed in Sections 7.3.1 and 7.3.2 respectively, NBE provides students with reflective opportunities regarding their interconnectedness with all life on Earth and the values they attribute to non-human beings. In contrast to anthropocentricism and utilitarianism, nature connection fosters eco-centric beliefs and recognises the intrinsic value and agency of non-human nature (Fein, 1993; Huckle, 1993; Milbraith, 1989; Orr, 1992; Sterling, 2001). Recognising agency beyond the human realm is also pertinent for shifting paradigms towards the flourishment of all life, highlighting that non-human

entities are active agents in the ecological web (Whatmore, 2002). However, the analysis revealed little evidence that this theme was integrated into the EEOs' programmes, except in the few examples where non-human nature was given the opportunity to be teacher (see Section 8.5.2.3).

Third, the findings of the present study highlighted nature connection and NBE as providing insight into indigenous ways of knowing and being, such as te ao Māori. Section 5.3.2 demonstrated nature connection as affiliated with local knowledges, interconnectivity and the reciprocal relationship between humans and non-human nature. These aspects align with concepts that underpin te ao Māori, such as mātauranga-a-iwi (i.e., local knowledges), whakapapa (i.e., ancestral linkages based on the interconnectedness of all things), and whanaungatanga (i.e., the relationships we have with one another and non-human nature), as well as participants' prioritisation of place-based, holistic and relational approaches for NBE (Section 6.4). Experiencing these aspects may open up possibilities for knowing and being in the world differently and lead to alternative solutions to the socio-ecological problems caused by colonisation (Smith, 2021).

In this light, nature connection may potentially increase societal awareness and receptiveness toward indigenous paradigms. As discussed in Section 7.4, all six EEO representatives who either self-identified as Māori, or as being strongly affiliated with the culture, highlighted the potential of nature connection and NBE with bringing into existence a more equitable relationship between Māori and Pākehā. It is through respecting different ways of knowing and being that we grow richer as a society (Wilson & Osmond, 2024). As Kahu expressed:

> And so we do have two worlds. You share with us what you got, and we will share what we've got.[…] How do we achieve equity? It's a partnership. We are working together, keeping each other safe, each learning off each other about our different worldviews. Success through two worlds.

Michelle proclaimed that educating for nature connection is "an act of decolonisation", a remark that grabbed my attention during analysis. Based on the definition of decolonisation as a process that seeks to embody pre-colonial, indigenous and non-colonial thinking (Elkington, 2020), Michelle's statement illuminated nature connection as a mechanism of transformation. Yet, over the course of the study, I came to prefer 'nature connection as an act of indigenisation' for articulating Michelle's idea. My rationale is predominantly based on Hoskins and Jones' (2022) comparison between the notions of 'indigenous inclusion' and 'indigenising' the tertiary sector. These authors explain indigenisation as the

"normalisation of indigenous ways of being and knowing" (p. 307), which differs from the principle of inclusion that results in Indigenous Peoples, and their values and knowledges, being incorporated as part of institutional structures which remain largely unchanged (i.e., operating through the dominant social paradigm). Hoskins and Jones suggest that a focus on decolonisation can inadvertently turn "attention towards the coloniser, and invites preoccupation with criticising the 'colonised system' rather than focusing on what might be possible" (p. 309).

The highly political nature of the education sector in Aotearoa New Zealand was made evident in Section 2.8 through the exemplification of the recent rewrites of the national curriculum in unprecedented quick succession. Imagining the benefits of indigenisation is perhaps a preferable 'selling' point than a decolonising framing and may more readily gain traction. As Hoskins and Jones see it, focusing on indigenisation in lieu of decolonisation in educational institutions is a win-win since "indigenisation leads to decolonisation anyways" (p. 309).

As we are all living faces of ancestors who at some point in time were indigenous to place, nature connection as an act of indigenisation is relevant to all of us. For most, colonisation has disconnected us from our history and relationship with the land. However, taken seriously enough, nature connection can help heal the human-nature dichotomy, providing a path for reclaiming our indigenous ways of knowing, being and connection with the Earth system.

From here, the discussion moves specifically to nature connection as a legitimate educational outcome for the formal education sector in Aotearoa New Zealand, including a broad NBE framework that provides instruction for the 'how to'.

8.5 Educating for nature connection

This section aims to inform NBE praxis for fostering nature connection in response to the fourth research question: How do EEOs foster nature connection as part of their education programmes? The discussion begins by considering findings in relation to EEOs' familiarity with the term 'nature-based education'. Thereafter, five principles of praxis as elicited through the analysis of the stage two and three data, in conjunction with the literature, are discussed. Relevant to this discussion is literature relating to the antecedents and factors of nature connection (see Section 2.5.3) and educational approaches that hold promise for strengthening the human-nature bond (see Section 2.7). This discussion contributes to the scholarly gap about NBE approaches for fostering nature connection (Barragan-Jason et al., 2022).

8.5.1 EEO representatives' familiarity with the term 'nature-based education'

The present study used the term 'nature-based education' (NBE) to describe approaches undertaken by EEOs to foster nature connection through their programmes. Even though I had never intentionally used the term in my own work as an environmental educator, I employed the term in this research project for several reasons. Firstly, over the course of my review of the literature, I noticed an increasing prevalence of the term NBE being used both nationally and internationally. Secondly, this definition of the term – "learning through exposure to nature and nature-based activities, and occurs in natural settings and in other places where elements of nature have been brought into built environments, such as plants, animals and water" (Jordan & Chawla, 2019, p.2) – was well aligned with the stage two finding that showed EEOs utilised experiential learning opportunities via nature-based contexts as their primary approach to fostering nature connection. Because none of the stage two participants made specific reference to the term NBE in their responses to the question: How does your organisation develop nature connection?, I decided to probe the interviewees about their familiarity and comfort of the term with respect to their programmes.

In parallel with my own professional experience, none of the interviewees reported officially using the term, but all agreed that many aspects of their programmes aligned with its definition. Interestingly, over two-thirds of the EEO representatives (11/15) spoke of a reluctance to use the term because of the potential for misrepresenting their education programmes. In this respect, Robyn said,

> If you said to me, 'What's NBE?' my initial thought would be of those schools, you know, the whole unschooling movement. […] that kind of idea is a little bit alternative. So I probably wouldn't use the term for what we do because I'm like, 'No, we do the real work on the ground. We're not just out playing in the trees'. Yeah, which is an interesting thought, and I don't necessarily think that's right. But I feel like if we are trying to sell our programme to the general public and we said we're nature-based educators, we are less likely to get buy-in than if we say we're environmental educators.

I didn't come across any themes in the literature that specifically advocated for or contested the use of the term NBE and/or its definition, which may be due to the early maturation stage of the field of NBE (Kuo et al., 2019). Yet, the finding described above paints a compelling picture that the majority of EEO representatives believed that using the term would be misrepresentative of their programme's educational intentions, and that positioning 'nature' as a focal point might be a disservice to the long-

term financial sustainability of their programmes. Given the disconnection that underpins the dominant social paradigm, their rationale seems reasonable for the time being and it may be pragmatic to continue to use EE as the umbrella term while simultaneously emphasising nature connection as a critical educational objective. However, for clarity and to distinguish between the multiple forms of EE, the term NBE continues to be used in this chapter. Next, five principles of NBE praxis as elicited through the stage three data are explored.

8.5.2 Principles of NBE praxis

Five principles of NBE praxis based on the intention of fostering nature connection were elicited through analysis. These include: outdoor, place-based approaches; engagement with the non-human nature at place; non-human nature as teacher; meaningful, nature-based experiences, and honouring Māori perspectives. The names of these principles as first reported in Section 6.4 have been slightly modified in this section by using the term 'non-human nature' in lieu of simply 'nature'.

8.5.2.1 Outdoor, place-based approaches

The principle of NBE as occurring through outdoor, place-based approaches was derived through interview data that pointed to the following characteristics as integrated in the EEOs' programmes:

- Teaching and learning outdoors (15/15);
- Grounded in local authentic contexts (10/15);
- Integrating non-human nature indoors wherever possible (6/10);
- Regular visits to the same places beyond the classroom walls (4/10); and
- Opportunities that help students see non-human nature everywhere (3/10).

EEOs' use of outdoor, place-based approaches aligns with literature highlighting that nature contact (including visits and exposure, both intentional and unintentional) is a precursor to fostering nature connection (Richardson, 2023). Importantly, this principle on its own does not suffice for fostering nature connection through NBE because, as was established in Section 2.5.3.1, nature contact and nature connection are not the same thing, nor are their respective outcomes. This implies that the benefits of fostering nature connection cannot be realised in full simply by learning outdoors. In fact, as Ian perceived, outdoor learning without a focus on connection may potentially foster a utilitarian perspective, as per his commentary about a newly opened forest school near his home. As he explained:

> Yeah, like, 'Come and have your kids run around the forest and play games in the forest, this is nature-based learning, connecting to nature'. But I have alarm bells going off in

> my head, thinking, 'Do you know that forest? Do you know what grows there? Do you know its systems, cycles and its stories? And its whakapapa [genealogy of the connection between all things]? And everything else? Or are you just using it to run around in [...] and making use of it without any understanding of it?'

In a similar vein, some EEO representatives gave examples from their respective programmes that prioritised the development of place-specific skills that may be perceived as strengthening students' focus on a utilitarian value of nature. For instance, Pernille explained that during a cold winter's day, students participating in her programme will collect kindling for a fire to warm up food and drink, a learning activity that exemplifies human's use of non-human nature. The key question becomes whether NBE programmes reinforce a view of nature solely as a resource for human benefit or as a relationship partner in our existence to whom we both give to and take from. In other words, our use of non-human nature must be balanced with acts of reciprocity. Some routines of Pernille's programme, which included karakia (prayer) and a general tidy up of the land at the close of each session, were interpreted as offering reciprocity.

According to the theoretical foundation of nature connection (see Section 2.5.1), empathy for non-human nature, the motivation for caring and PEB emerges from the relational closeness and sense of oneness that is nurtured through the human-nature relationship (Barragan et al., 2022; Martin et al., 2020; Schultz, 2000). It is essential to recognise that fostering this closeness and sense of oneness depends not only on time spent in nature, but crucially on how that time is spent (Lengieza et al., 2023).

Prioritising nature connection as an objective underscores the need for a deeper examination of EE's pedagogical foundation of education 'in, about and for' the environment (Tilbury, 1995). In the case of this NBE principle, it is the realisation of the need to go beyond the simplistic interpretation of 'education in the environment'.

The next four principles of NBE offer insight into EEO representatives' perspectives on key aspects of NBE praxis that encourage meaningful, positive interactions between students and non-human nature as a means to fostering nature connection.

8.5.2.2 Engaging with non-human nature

All EEO representatives used wording and phrases that I interpreted as meaning that their respective programmes enable students to be 'with' non-human nature rather than just be 'in' the environment.

Findings discussed in Section 6.4.2 point to three pedagogies used by EEOs for engaging students with non-human nature: grounding by questioning, holistic approaches, and reflection. Pedagogies of grounding by questioning and reflection were explained by interviewees as positively influencing nature connection by focusing the students' attention on "where their feet stand" (Penetito, 2008, 6:06), while also acknowledging and honouring the species and geographies that have been and/or continue to be part of that place. Grounding by questioning and reflection promotes mindfulness: a focus on one's self and one's environment in the present moment. In Barragan-Jason et al.'s (2022) study, mindfulness interventions were demonstrated as having had the greatest positive effect on nature connectedness in comparison to five other intervention types, including two interventions based on conventional EE approaches (i.e., one based on knowledge inquiry only and the other a combination of knowledge inquiry and nature contact) (see Section 2.5.3.2).

Almost all EEO representatives (13/15) discussed incorporating holistic pedagogies as part of their programmes for connecting with non-human nature across multiple dimensions (Ives et al., 2017), primarily through the experiential, cognitive and affective domains. The holistic pedagogies as discussed by participants reflect similarities to *The Five Pathways to Nature Connection* (senses, beauty, emotions, meaning and compassion) (see Table 1), which have been demonstrated as increasing levels of nature connectedness in adults (Lumber et al., 2017). For example, Tilly characterised holistic engagement through her programme as being "about the senses, [and] it is emotion, in addition to being about all the cognitive outcomes around knowledge, understanding and skill development". The findings illuminated the importance interviewees placed on fostering emotional connection, which Atama described as "that really kind of deep connection" with non-human nature.

Taylor (2017) frames nature connection as an educational outcome to be "nothing like the rational quest to know about the world from a distance that characterises Western epistemologies" (p. 1426). Instead, it is presented as a means to embody non-technical ways of relating to and being with other species. Taylor's framing calls for a reconsideration of how different components of EE's holistic approach are balanced, particularly in ways that elevate non-cognitive ways of knowing. This has implications for EE's tendency to prioritise pedagogies and outcomes associated with 'education about the environment'.

There are few studies about children's and adolescents' engagement with non-human nature beyond the approaches of nature contact and knowledge inquiry, and studies that have robustly measured such interventions are even more nascent (Barrable & Booth, 2020). One clear predictor of a child's nature connectedness has been identified as the level of nature connectedness of a significant adult in their life

(e.g., parent, guardian, or mentor) (Passmore et al., 2020). Passmore et al.'s finding supports the substantial body of research outlined in Section 2.5.3.1 on the 'significant life experiences' of adults who have demonstrated commitment to environmental protection and/or education. Research into these life experiences suggest that regular nature-based experiences alongside role-modelling by a nature-loving adult is an antecedent of nature connection in children.

This brings the discussion toward the next principle of NBE, which explores the potential of non-human nature herself as also influencing children's and adolescents' connection with nature.

8.5.2.3 Non-human nature as teacher

Seven of the fifteen EEO representatives made reference to their respective EEO programmes as offering opportunities for 'non-human nature as teacher'. As Michelle explained, NBE is "more than just learning in nature. If it's actually nature-based, it's that you're learning from nature […] then you move away from it just being in, doing activities, kind of definition". In this way, Michelle perceived non-human nature as playing an active role in the learning process rather than existing as a passive object.

Michelle's perspective aligns with posthuman orientations (see Section 2.7.5) and indigenous wisdoms (see Section 2.7.7), both of which emphasise a relational perspective as an alternative to the anthropocentric perspective that underpins the dominant social paradigm. These philosophies challenge anthropocentricism by decentring the human subject and recognising the agency of non-human nature, offering potential for reimagining humanity's place in the world. The connection between non-human nature as teacher and indigenous wisdoms is described in Kimmerer's (2024) book *The Serviceberry*, where she states:

> The practice of observing the living world and taking inspiration for human ways of living from its model is an essential element of indigenous science. It embraces the reality that there are intelligences other than our own, from who we might learn. (p. 67)

Further detail of the present study's findings about NBE praxis and indigenous wisdoms, as from te ao Māori, are discussed in Section 8.5.2.5, while the rest of this section focuses on nature as teacher in relation to posthumanism.

Posthumanism calls for educational approaches that allow non-human nature to come to the fore as a teacher (Ruck & Mannion, 2021). Based on this notion, an implication for schools is the required allocation of some unstructured space and time for a 'lived' curriculum to complement the education

system's prescribed curriculum. Findings presented in Section 6.4.2 show evidence of similar thinking by almost half of the interviewees (7/15), such as Jenni who said:

> I think it's about not always being so structured when you're taking a class outside. I think there needs to be some time built in where, yeah, there's a little bit of freedom for exploration, a freedom to just sit and be, to you know, have a laugh, do an activity together which engages all your senses. You know, it's not just about getting out there and listening to a teacher and being told how to do something.

Section 6.4.3 detailed interviewees' perceptions about the affective and cognitive outcomes that arise when curriculum allows for non-human nature as teacher. Examples of these outcomes included students' increased awareness of the rhythms and interconnectedness of non-human nature at place and the manifestation of feelings like joy, excitement and wonder. It is the generation of emotions like these that Glenn referred to as the "aha" moments that his programme sought to achieve.

The data provided little insight into the role of unstructured learning opportunities as effectively fostering nature connection. However, some posthuman scholars advocate integrating unstructured opportunities as part of stewardship pedagogies (akin to 'education for the environment') to counter the potential for positioning students as masters of a non-agentic environment who 'save' nature through narrow solution-based approaches (Taylor, 2017).

In their study of a national conservation education initiative across the United Kingdom for creating pollinator-friendly habitats in schools, Ruck and Mannion (2021) highlight "unplanned encounters" with non-human nature as an important component of stewardship pedagogies (p. 1505). These encounters not only foster students' affective connections but also help shift their perceptions beyond seeing themselves as the sole stewards of the Earth system. This consideration may be valuable for EEOs in programme development, particularly given that none of the interviewees expressed any concerns about their use of stewardship pedagogies. This understanding requires reflection from environmental educators' about their use of 'educating for the environment'.

Allowing adequate space and time for non-human nature as teacher may be problematic for schools where prescribed learning and direct instruction by teachers tends to be the norm. Ruck and Mannion (2021) see this as something that can be worked through, as I summarised in Section 2.7.5:

> They [Ruck and Mannion] suggest using conservation opportunities as an overarching task, while adhering to the provision of learning opportunities that are not too

> prescriptive, nor place too much emphasis on quick and efficient completion. Regular involvement in the project through loosely structured groups and slow pedagogies all help to enact a lived curriculum rather than the simple reproduction of curriculum as planned.

Nevertheless, allowing adequate time for implementing this principle may remain an ongoing challenge for schools. In the present study, one-third of EEO representatives (5/15) highlighted school time constraints as presenting barriers to implementing their programmes. As Pernille explained, "There's not enough time in the school system […] You've got this amount of time to do it in, and if you haven't finished […] we'll just stop you and pack up, and that's it".

This principle of nature as teacher may seem to contradict the study's finding that nature contact is not enough. A response to this quandary is found in Ruck and Mannion's reference to NBE as offering a balanced approach between structured and unstructured learning opportunities. In this regard, the next principle for NBE praxis takes the discussion to the other side of the pedagogical spectrum, characterised by stage appropriate direct instruction.

8.5.2.4 Stage-appropriate pedagogies

A key finding from stage two was that EEOs utilised a wide range of experiential pedagogies in nature-based contexts. The reason for this diversity of pedagogies was perhaps best explained by stage two participant #24, who said "We believe nature connection is complex, […] not all people will connect with nature in the same way or to the same degree". The stage three interviews allowed me to inquire more deeply into this range of pedagogies, from which four main themes of pedagogies were elicited including play, inquiry, taking action and relationship building (see Section 6.4.4). Additionally, the interviews allowed for exploring EEO representatives' perspectives about the appropriateness of using different pedagogies at different ages and stages of development (see Section 6.4.6). A key finding showed that interviewees believed that play, inquiry, taking action and relationship building are relevant to all age groups, but that the duration of learning activities and the complexity of the language used in association with these pedagogies requires close consideration. In this section, discussion around these pedagogies and stage appropriateness is discussed in relation to the literature, particularly Sobel's (2008) three-staged nature-based education framework.

Play as a key component of NBE praxis was identified by one-third of participants (5/15). In this context, play as a pedagogy aligns with free exploration of the outdoors and unimpeded interactions with non-

human nature (Mullenbach et al., 2019). Learning through play focuses on enhancing the developmental tendency toward empathy for non-human nature and encouraging kindred feelings for all species. This pedagogy aims to provide children with "The opportunity to bond with the natural world, to learn love it and feel comfortable in it, before being asked to heal its wounds" (Sobel, 2008, p. 181). Although Sobel associates a need for play at early childhood (ages 4-7), three of the EEO representatives provided examples of play pedagogies used as part of their programmes that cater across a range of ages.

Although only three interviewees specifically mentioned inquiry as prioritised pedagogy, the analysis identified inquiry as implicit in many of the interviewees' descriptions of their respective programmes. For example, grounding through questioning and reflection (as discussed in Section 8.5.2.2) are pedagogies associated with the inquiry learning process (Ministry of Education, 2007). In general, participants' references to the inquiry process as a whole, or a specific pedagogy of the process, emphasised children's interactions with, and exploration and reflection of the non-human nature embedded within the local landscape. NBE inquiry is described as a means for students to see themselves as one part of the interconnected Earth system and as active participants in their place in the world (Linnemanstons & Jordan, 2017). Sobel (2008) suggests that inquiry-based learning should typically commence in the middle years of childhood (ages 8 -11).

Eight interviewees spoke about the significance of taking action (referred to in Section 8.5.2.2 as stewardship pedagogies) as channelling student learning into positive action for non-human nature. A few participants mentioned that taking action through NBE was "more about what you do all the time in places close to school, and less about a big, one-off field trip to a place that often has no connection [for students]" (Michelle). Taking action aligns with the need for living through reciprocal relationship with non-human nature. With respect to the aim of fostering nature connection, Sandy believed that "Doing something that has a consequence […] I think this helps with engagement rather than just being in nature". Sandy's comment resonates with Ruck and Mannion's (2021) call to implement NBE praxis through a balanced approach, whether that pertains to structured and unstructured learning opportunities or between deliberately using non-human nature and reciprocating back to her.

Lastly, all interviewees identified relationship building as a fundamental pedagogy of NBE, which referred to students' relationships with non-human nature and with other humans who have a strong relationship with non-human nature. Although participants referred to taking action and relationship building as independent pedagogies in themselves, both pedagogies align with the third and final stage of Sobel's (2008) NBE framework. Sobel's third stage utilises project-based opportunities for building

connections with wider society, including non-human nature, and is proposed for early adolescence (ages 12 -15+). The ability for more abstract thinking develops as part of this developmental stage and, therefore, eco-pedagogies that focus on themes of ecological sustainability and social justice are also relevant (Kahn, 2010). Eco-pedagogies are relevant to the present study because they invite learners to critically examine humanity's moral obligation to non-human nature.

8.5.2.5 Honouring Māori perspectives

Through the findings of the present study and relevant literature, indigenous paradigms, like those of Māori, were identified as paramount to learning to live more sustainably. As Ian commented, "The best way forward, for true environmental restoration, is through an indigenous perspective". All interviewees acknowledged Māori perspectives as a principle of NBE praxis for fostering nature connection in the Aotearoa New Zealand context. Section 6.4.5.2 provided some examples of ways EEOs integrated Māori perspectives into their programmes, such as through relationships with mana whenua (locally-based sub-tribe/s) and learning through Māori narratives and tikanga (Māori cultural practices).

The rationale of EEOs and their representatives for prioritising these perspectives was based on their understanding of Māori ways of knowing and being as intrinsically linked to humanity's connection with non-human nature through kinship and reciprocal relationship. Honouring Māori perspectives offers an educational mechanism for confronting the interrelationship between colonisation, disconnection and socio-ecological issues (IPCC, 2022) and contributing to the bicultural intent of *Te Tiriti o Waitangi* (Ministry of Education, 1999; Smith, 2021).

Ten EEO representatives discussed the need for EEOs to carefully consider the 'how to' for integrating Māori perspectives as part of their programme. Section 6.4.5.3 explored achieving this goal through ways that are culturally respectful and safe, including the need for building relationships with mana whenua and securing opportunities for Māori to lead this work themselves. This way of working differs from a 'tick box' approach to securing iwi support for EEO programmes, like Atama had experienced as an iwi representative (a role he held in addition to being an environmental educator himself). In this respect, he said, "You guys [EEOs] are just sort of ticking boxes. You're not starting at hapū (sub-tribe) level. You're not starting with Māori. Like, you're making all these wonderful programmes and then you go to Māori and say, 'What do you think?'". In other words, the findings place onus on EEOs to create opportunities for Māori to lead the integration of indigenous perspectives as part of programme development, and ensure they are remunerated for their time and effort.

Learning through indigenous paradigms is not only good for everyone's insight about how we may live more harmoniously with all of life, but also because this approach has the potential to empower Indigenous Peoples. This opportunity presents additional challenges for the funding models of EEOs, which Chapter Four showed as already being under-resourced. Nevertheless, this is all part of working through the challenges of transformational change.

8.6 Limitations and reflections

The breadth of this study was extensive. The stage one systematic description of the EEO network, including the development of the national database, was a significant undertaking in itself, which impacted the time available for subsequent stages. Consequently, I was limited in how fully I could develop the analytical potential of grounded theory in stages two and three.

As discussed in Section 3.3.4, I was drawn to grounded theory for its systematic yet flexible approach. Wanting to stay true to the heuristics of the approach, such as memo'ing and two cycles of coding (see Section 3.6.2), I found it took more time than I expected to fully grasp the principles and strategies. In addition, the study generated a substantial amount of qualitative data, including memos (n = 86), in response to the three research questions on the 'what, why, and how' of educating for nature connection. In one of my memos reflecting on the iterative analysis process, I noted feeling overwhelmed by the volume of data, making it challenging to do the analysis justice:

> Feeling overwhelmed by the sheer amount of data I have collected. Challenging to find enough time to analyse it early enough, and reflect on it adequately in ways that allow emerging themes to guide what detail I drill into during the interviews. I have no doubt that the act of memo'ing has been beneficial to some extent for making apparent my thoughts, hunches and insights. But connecting all the dots and following leads has been really difficult in the time I have - would definitely be easier if I had a smaller data set!

The scope of the study resulted in a more descriptive analysis than I had initially anticipated. A narrower focus, such as exclusively focusing on EEOs' conceptualisations of nature connection, might have allowed for deeper and more critical engagement with the data. Nearing the end of this study, I am cognisant of themes that emerged during the initial coding process that warranted deeper examination had I had more time and thinking space. Some examples of these include exploring the singular focus by participants on Western culture as a root cause of ecological degradation, the balance between protecting ecosystems by isolating them from human interference versus increasingly connecting people

with non-human nature, and spiritual connection as a potential pathway to nature connection. Regardless, from a positive perspective, this study provides a foundational understanding of nature connection as an educational outcome. However, the study was based on a small sample of the EEO network, which may limit the breadth of perspectives represented, nor did it account for children's or teacher's views. Future research can expand on these findings and explore related themes such as these.

As explained in Section 3.3.1, this study was positioned within the interpretive paradigm, meaning the findings are inherently subjective, value-laden and context specific. Without reflexivity, an interpretive study's findings may be constrained by the researcher's own perspectives and assumptions. Consequently, I sought to remain reflexive via various methods like the epoche process (see Section 3.6.3), while also acknowledging throughout the thesis how certain choices and decisions of mine impacted the direction and outcomes of the study. For instance, I highlighted my decision to focus on nature connection rather than networking and collaboration as a topic of significance to the EEO network. Additionally, as an environmental educator, my prior knowledge of the field influenced the questions I asked through the stage one questionnaire and the selection of stage three interviewees, many of whom I knew personally. While I aimed for a representative sample, these relationships may have introduced a degree of bias in favour of some EEO representatives over others.

Ironically, another limitation of this study arises from its anthropocentric lens. As discussed in Section 3.3.2, interpretivism is rooted in a conventional humanistic approach that views social reality as emerging through human interactions. Accordingly, the study focused on nature connection as a means of fostering human potential to protect the life-giving capacity of the planet. Only the theme of nature as teacher (see Section 6.4.3) hinted at alternative ways of understanding and implementing EE beyond human-centred narratives. Coming towards the completion of my study, I recognise how an exclusive focus on humanity risks reinforcing the very human-nature dichotomy this research aimed to challenge. Framing the study through posthumanism, rather than interpretivism, may have offered more potential.

With these limitations and reflections made transparent, I now present the key conclusions drawn from the study.

8.7 Conclusions

The following conclusions can be drawn from this study.

In the first stage of its explanatory sequential research design, the study revealed that the EEO network

across Aotearoa New Zealand consists of a diverse array of NGOs and governmental organisations. Funding challenges constrain the network's ability to support the formal education sector with EE. These are often shaped by shifts in political climate, funding regimes, and local support. The distribution of school's access to EEOs is not equitable across the country. As a partial response, participants called for improving networking, collaboration and sharing amongst affiliated organisations for minimising the duplication of such resources.

EEOs prioritise nature connection as an educational outcome because more sustainable trajectories require transformational change in the dominant social paradigm and affiliated structures and processes. EEOs actively promote nature connection through their respective programmes to counteract psychological and physical disconnection from non-human nature caused by anthropocentric beliefs, utilitarian values and contemporary lifestyles. This is crucial because the human-nature dichotomy perpetuates a vicious cycle of increasing disconnection and ecological degradation.

EEO representatives position nature connection as a deep, multi-dimensional relationship with non-human nature, similar to the eco-centric mindsets that underpin indigenous paradigms. They believe human-nature relationships share many parallel associations with interpersonal relationships, including personal health and wellness and willingness to care for and sacrifice for the other. In this way, nature connection acts as a motivational impetus that empowers pro-environmental actions and behaviours.

EEO representatives perceived schools as places that contribute to human-nature disconnection rather than nature connection. This implies that if education is to help shift our current unsustainable trajectory, EE must be mandated as part of the formal education system and include intentional, targeted praxis for fostering nature connection. Place-based, holistic and relational approaches are seen as critical to fostering nature connection through formal education settings. EEOs foster five principles of praxis which provide a framework for developing meaningful, positive interactions between students and non-human nature that extend beyond nature contact and knowledge acquisition.

The nature-based education framework enriches EE's tenet of 'education in, about and for the environment' in the following ways. First, interpretations of 'education in the environment' are insufficient based on the recognition that nature contact does not necessarily lead to nature connection. A focus on connection rather than merely contact will help ensure education communities fully benefit from their interactions with non-human nature. Second, while 'education about the environment'

emphasises cognitive ways of knowing, this must be balanced by elevating non-cognitive ways of knowing through holistic engagement with non-human nature. Third, 'education for the environment' is not limited to stewardship pedagogies that position humans as the ultimate saviours of a passive non-human realm; instead, educators should allow space for non-human nature to emerge as teacher. Lastly, because language influences beliefs and values, educators should consciously construct language that reflects the interconnectedness, interrelatedness, interdependence of all life's wellbeing.

Participants were clear that we need nature connection today more than ever. The dominant social paradigm has given rise to ways of thinking, doing and being that are high paced, technologically driven and competitive. These patterns are reflected in societal structures and norms rooted in exploitative, extractive and destructive practices. Since this trajectory is, and never was, sustainable, we must become differently as part of the planet. The claims and contributions presented in this study are significant because fostering and maintaining nature connection in children and adolescents cultivates the psychological bonds necessary to support individual health and wellbeing, while also shaping lifelong pro-environmental behaviours. For issue-based learning around topics like climate change, nature connection is a paramount co-requisite.

Given the significant time children spend in school, these institutions hold immense potential to equitably foster nature connection, ensuring all students have the opportunity to reclaim their relationship with the non-human world. Prioritising nature connection as part of the education system is not about adding yet another topic to fit in an already overcrowded curriculum. Rather, it represents a philosophical shift in the purpose of education, one that acknowledges that learning is essential to becoming differently. This study positions educating for nature connection as an act of indigenisation, one that challenges unsustainable paradigms and norms, honours diverse ways of knowing, and reimagines education as a pathway toward reciprocal flourishing for both people and planet.

8.8 Implications and recommendations

The conclusions drawn from this study have important implications, outlined next in relation to four broad themes. Because addressing unsustainability requires collective action, some implications are relevant to everyone who has the understanding and capacity to contribute, while others are directed toward specific groups of people. Thereafter, recommendations for future research follow.

Recognise our sustainability crisis as an existential crisis. Our sustainability crisis is an existential threat requiring urgent, systemic action. Addressing its root causes, particularly the human-nature dichotomy,

demands a shift from symptom-focused interventions to a holistic, systems-thinking approach that embraces complexity.

- **Educational institutions** should offer learning opportunities that critically examine the historical events, paradigms and societal norms that perpetuate human-nature disconnection and the socio-ecological crises of our time. Such learning should emphasise the interconnectedness of all life and the Earth system.
- **Anyone who recognises this crisis** should actively engage in dialogue and action that promotes holistic, systems-based solutions toward living more sustainably. This requires embodying the principle of 'thinking globally while acting locally'.

Centring ecological sustainability and regeneration in decision-making. Sustainability and ecological regeneration must guide decision-making across all sectors. An eco-centric perspective that prioritises planetary and human wellbeing should underpin all disciplines. This necessitates rethinking the fundamental purpose(s) of education.

- **Anyone who recognises this need** should engage in dialogue and action that emphasises the significance of the human-nature relationship. Language should reflect the mutual wellbeing of people and planet, highlighting the reciprocity inherent in a relationship with non-human nature. Additionally, it is essential to distinguish between nature contact and nature connection**.**
- **Policymakers across all disciplines** should integrate nature connectedness as a focal point for targeted and effective policy action. This includes drawing on theory and empirical evidence associated with interpersonal relationship research to operationalise positive/reciprocal human-nature relationships.
- **Social science researchers** should lead systematic evaluation of nature connectedness across disciplines to monitor effectiveness.
- **EE advocates** should push for legislation that defines an overarching educational purpose aligned with the collective flourishing of both people and planet.
- **Elected government officials in collaboration with the Ministry of Education** should mandate EE through national policy and significantly increase funding for EE and the EEO network. This should include ongoing and adequate funding provision to the New Zealand Association of Environmental Education and investing in the priority areas outlined in *Mātauranga Whakauka*

Taiao: Environmental Education for Sustainability Strategy and Action Plan (Department of Conservation, 2017).

Prioritising nature connection as a core educational outcome. Nature connection must be explicitly recognised as essential to sustainable futures. Embedding it within educational policies and whole school approaches is critical for restoring human-nature relationships and countering ecological degradation.

- **Educational policymakers and curriculum developers** should explicitly incorporate nature connection in educational policies and curriculum statements. This should reflect an integrated perspective on education, learning development, personal health and wellness, and planetary wellbeing.
- **Curriculum developers** should provide exemplars of stage-appropriate nature connection praxis within the national curriculum, integrating it across subject areas and educational levels. Learning contexts and pedagogies should emphasise place-based, holistic, and relational approaches. Special attention should be given to linking nature connection principles with credits for the National Certificate of Educational Achievement to ensure such learning is prioritised and valued.
- **Local authorities, urban planners, and architects** should prioritise creating greener, more biodiverse environments around schools, including transport routes. Greater emphasis should be placed on designing spaces that actively engage students with non-human nature**,** rather than simply providing access and exposure.
- **Educational researchers, in collaboration with the New Zealand Association of Environmental Education** should lead systematic evaluation of educating for nature connection to monitor effectiveness. The interrelationships between social paradigms and norms, developmental life stages, and nature connection/disconnection present a rich area for further exploration.

Empowering educators and communities to foster nature connection. As we navigate an era defined by complex socio-ecological issues, school communities will require support in recognising their role in fostering nature connection as a vital aspect of education. School leaders, teachers, and communities need knowledge, resources, and capacity-building to implement whole-school approaches that effectively foster nature connection. Securing their buy-in and equipping them with practical strategies is essential to transformation.

- **The Ministry of Education** should support educational leaders, teachers, whānau (families) and students to understand the benefits of nature connection. Without mandate and clear guidance, most of the education community is unlikely to prioritise nature connection in school settings.
- **School leaders** should embed nature connection through whole-school approaches at all levels, including school health and safety policies. Particular emphasis must be made at the secondary education level, where engagement with non-human nature often declines.
- **School leaders** should support the building of teacher confidence in nature connection and nature-based education through ongoing professional development.
- **Schools** should provide lessons for adolescents (and families) on the importance of engaging with non-human nature for personal and planetary wellness, intrapersonal development and academic performance.
- **Teachers** can enhance wellbeing by providing students with regular and local opportunities based on the nature-based education principles described herein. On-going collaboration with EEOs can offer valuable guidance and support.

Future research opportunities

- Research on nature connection is disproportionately focused on adults in northern regions of the world. There is a pressing need to explore multiple measures of the factors and conditions that influence nature connection across diverse populations, life spans and geographic contexts.
- Investigating children's conceptualisations of nature connection and targeted nature connection interventions that go beyond nature contact and knowledge acquisition is needed. This study's conceptualisation of nature connection provides a theoretical foundation for the Aotearoa New Zealand context, upon which future research can build.
- There is a notable gap in research examining the relationship between formal education and nature connection. Empirical evidence (including the use of control groups) in relation to the following questions would be particularly valuable:

  -What are children's and teachers' views of the influence of schooling on nature connection? And how do different aspects of formal education settings influence disconnection/connection?

  -What are the key elements of engaging with non-human nature that are most important at different ages and developmental stages?

-Are there critical windows in childhood or adolescence when fostering nature connection is most impactful?

-How does nature-based education affect students from diverse backgrounds, including cultural and ethnic groups, socioeconomic contexts, and neurodiverse learners?

8.9 Epilogue

I conclude this thesis at a time when the far-right geopolitical movement is gaining momentum across the world. The reality we now face, along with the potential consequences of arrogance and ignorance toward everything beyond the human, feels surreal.

Sitting with this reality, I feel profoundly grateful for my PhD journey. It has helped me make better sense of the crises our planet faces and the pathways that have led us here. I have also become more aware of the sorrow, and at times fear, I hold for those who have not had the chance to experience an education that connects the dots beyond phone algorithms or nightly news. This realisation has only strengthened my unwavering commitment to public education.

Focusing on nature connection as the heart of my thesis has been a gift. It has invited me to reflect on my own relationship with non-human nature, and in doing so, I have come to see, and be, in the world differently. I find solace in an ever-deepening sense of belonging among all life forms, and I am more certain than ever of the paramount importance of indigenous paradigms.

I feel fortunate to complete this body of work in the same year that I turned fifty. Both milestones mark the beginning of a new phase in my life — one centred on revitalising my connections with land, place, and all that dwells here. This thesis is not an ending but a threshold, guiding me toward the next stage of my reciprocal relationship with all of life.

References

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., von Wehrden, H., Abernethy, P., Ives, C. D., Jager, N. W., & Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio, 46*(1), 30-39. https://doi.org/10.1007/s13280-016-0800-y

Akomolafe, B. (2022). *Báyo Akómoláfé*. https://www.bayoakomolafe.net/

Albrecht, G. A. (2019). *Earth emotions: New words for a new world* (1 ed.). Cornell University Press.

Andersson, E., Elmqvist, T., Haase, D., Kronenberg, J., Langemeyer, J., Mascarenhas, A., & Wolff, M. (2022). Based on nature, enabled by social-ecological-technological context: Deriving benefit from urban green and blue infrastructure. *Ecology and Society, 27*(4), 1-8.

Antal, M., & Drews, S. (2015). Nature as relationship partner: An old frame revisited. *Environmental Education Research, 21*(7), 1056-1078. https://doi.org/10.1080/13504622.2014.971715

Arbuthnott, K. D., & Sutter, G. C. (2019). Songwriting for nature: Increasing nature connection and well-being through musical creativity. *Environmental Education Research, 25*(9), 1300-1318. https://doi.org/10.1080/13504622.2019.1608425

Ardoin, N. C., Bowers, A. W., & Gaillard, E. (2020). Environmental education outcomes for conservation: A systematic review. *Biological Conservation, 241*(108224), 119-143.

Ardoin, N. M., Bowers, A. W., Roth, N. W., & Holthuis, N. (2018). Environmental education and K-12 student outcomes: A review and analysis of research. *The Journal of Environmental Education, 49*(1), 1-17. https://doi.org/10.1080/00958964.2017.1366155

Ardoin, N. M., & Heimlich, J. E. (2021). Environmental learning in everyday life: Foundations of meaning and a context for change. *Environmental Education Research, 27*(12), 1681-1699. https://doi.org/10.1080/13504622.2021.1992354

Arifin, S. R. (2018). Ethical considerations in qualitative study. *International Journal of Care Scholars 1*(2), 30-33. https://journals.iium.edu.my/ijcs/index.php/ijcs/article/view/82/27

Armstrong, A., Krasny, M., & Schuldt, P. (2018). *Communicating climate change. A guide for educators*. Cornell University Press.

Aron, A., Aron, E. N., Tudor, M., & Nelson, G. (1991). Close relationships as including other in the self. *Journal of Personality and Social Psychology, 60*(2), 241-253. https://doi.org/10.1037/0022-3514.60.2.241

Artmann, M. (2023). Human-nature resonance in times of social-ecological crisis - a relational account for sustainability transformation. *Ecosystems and People, 19*(1), 1-15. https://doi.org/10.1080/26395916.2023.2168760

Auckland City Council. (2020). *Taiao*. https://www.aucklandcouncil.govt.nz/environment/educationsustainability/Pages/default.aspx

Barker, M. (2001). Learning for the environment: How can science educators contribute? *New Zealand Science Teacher, 98*, 7-14.

Barnett, J., & Pauling, J. (2005). The environmental effects of New Zealand's free-market reforms. *Environment, Development and Sustainability, 7*(2), 271-289. https://doi.org/10.1007/s10668-005-7316-0

Barrable, A., & Booth, D. (2020). Increasing nature connection in children: A mini review of interventions. *Frontiers in Psychology, 11*(492), 1-9. https://doi.org/10.3389/fpsyg.2020.00492

Barragan-Jason, G., Loreau, M., de Mazancourt, C., Singer, M. C., & Parmesan, C. (2023). Psychological and physical connections with nature improve both human well-being and nature conservation: A systematic review of meta-analyses. *Biological Conservation, 277*, 1-10. https://doi.org/10.1016/j.biocon.2022.109842

Barragan-Jason, G., de Mazancourt, C., Parmesan, C., Singer, M. C., & Loreau, M. (2022). Human–nature connectedness as a pathway to sustainability: A global meta-analysis. *Conservation letters, 15*(1), 1-7. https://doi.org/10.1111/conl.12852

Barrera-Hernández, L. F., Sotelo-Castillo, M. A., Echeverría-Castro, S. B., & Tapia-Fonllem, C. O. (2020). Connectedness to nature: Its impact on sustainable behaviors and happiness in children [Original Research]. *Frontiers in Psychology, 11*, 1-7. https://doi.org/10.3389/fpsyg.2020.00276

Barry, C. (2010). The environment/society disconnect: An overview of a concept tetrad of environment. *The Journal of Environmental Education 41*(2), 116-132. https://doi.org/10.1080/00958960903295241

Beery, T., Fridberg, M., Præstholm, S., Uhnger Wünsche, T., & Bølling, M. (2024). Connectedness to nature: A tale of three scales. *Environmental Education Research*, *30*(10), 1-23. https://doi.org/10.1080/13504622.2024.2320342

Berman, M. (1981). *The reenchatment of the world*. Cornell University Press.

Best, S., & Chase, H. (2009). Internet survey methods. In L. Bickman & D. Rogers (Eds.), *The SAGE handbook of applied social research methods* (pp. 413-434). SAGE Publications.

Birdsall, S. (2010). Empowering students to act: Learning about, through and from the nature of action. *Australian Journal of Environmental Education, 26*(2010), 65-84. https://doi.org/10.1017/S0814062600000835

Birdsall, S., & Glasgow, B. (2014). Creating a new pathway for learning using education for sustainability. *SET: Research Information for Teachers, 2, 41-47*. https://doi.org/10.18296/set.0318

Bolstad, R. (2004). Environmental education: A place in the curriculum? *New Zealand Annual Review of Education, 14*, 215-235. https://doi.org/10.26686/nzaroe.v0i14.1496

Bolstad, R. (2020a). *Opportunities for education in a changing climate*. New Zealand Council of Educational Research. https://www.nzcer.org.nz/research/publications/opportunities-education-changing-climate-themes-key-informant-interviews

Bolstad, R. (2020b). *Climate change and sustainability in primary and intermediate schools report*. New Zealand Council of Educational Research. https://www.nzcer.org.nz/research/publications/climate-change-and-sustainability-primary-and-intermediate-schools

Bolstad, R. (2020c). *Climate change and sustainability in secondary schools: Findings from a 2020 survey of English-medium secondary and composite schools.* New Zealand Council of Educational Research. https://www.nzcer.org.nz/research/publications/climate-change-and-sustainability-secondary-schools-report

Bolstad, R., Cowie, B., Eames, C., Barker, M., Keown, P., Edwards, R., Coll, R., & Rogers, N. (2004). *Environmental education in New Zealand schools: Research into current practice and future*

possibilities. New Zealand Council for Educational Research. http://www.nzcer.org.nz/system/files/ee-exec-sum.pdf

Bolstad, R., & Durie, M. (2024). *Ki te ako āhuarangi tōnui ki Aotearoa | Towards flourishing climate education in Aotearoa New Zealand*. New Zealand Council for Educational Research. https://www.nzcer.org.nz/research/publications/ki-te-ako-huarangi-tonui-ki-aotearoa-towards-flourishing-climate-education

Bolstad, R., Eames, C., & Roberston, M. (2008). *The state of environmental education in New Zealand: A baseline assessment of provision in the formal education sector in 2006*. WWF – New Zealand. http://awsassets.wwfnz.panda.org/downloads/state_environmental_education_nzschools.pdf

Bolstad, R., Joyce, C., & Hipkins, R. (2015). *Environmental education in New Zealand schools: Research update 2015*. Ministry of Education. https://www.nzcer.org.nz/research/publications/environmental-education-new-zealand-schools-research-update-2015-0

Bowra, A., Mashford-Pringle, A., & Poland, B. (2021). Indigenous learning on Turtle Island: A review of the literature on land-based learning. *The Canadian geographer, 65*(2), 132-140. https://doi.org/10.1111/cag.12659

Braun, T., Cottrell, R., & Dierkes, P. (2018). Fostering changes in attitude, knowledge and behavior: Demographic variation in environmental education effects. *Environmental Education Research, 24*(6), 899-920. https://doi.org/10.1080/13504622.2017.1343279

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021, 2021/07/03). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology, 18*(3), 328-352. https://doi.org/10.1080/14780887.2020.1769238

Brignall-Theyer, M., Allen, W., & Taylor, R. (2009). *Education for sustainability in the New Zealand school system: A scoping study*. Landcare Research. https://www.landcareresearch.co.nz/uploads/public/researchpubs/education_report_allen.pdf

Brügger, 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

Bruni, C. M., Winter, P. L., Schultz, P. W., Omoto, A. M., & Tabanico, J. J. (2017). Getting to know nature: Evaluating the effects of the Get to Know Program on children's connectedness with nature. *Environmental Education Research, 23*(1), 43-62. https://doi.org/10.1080/13504622.2015.1074659

Bryant, A. (2017). *Grounded theory and grounded theorizing: Pragmatism in research practice*. Oxford University Press.

Bueddefeld, J., Ostrem, J., Murphy, M., Halpenny, E., & Orr, B. (2022). Petting bees or building bee boxes? Strategies for transformative learning. *Environmental Education Research, 28*(4), 560-580. https://doi.org/10.1080/13504622.2022.2045905

Burgess, H., & Painting, T. K. (2020). Māori futurisms. In A. M. Murtola (Ed.), *Whose futures?* (pp. 207-233). Economic and Social Research Aotearoa.

Byrne, G. (2007). A statistical primer: Understanding descriptive and inferential statistics. *Evidence-Based Information Practice, 2*(1), 1-10. https://journals.library.ualberta.ca/eblip/index.php/EBLIP/article/view/168/239

Cajete, G., A. (1999). *Igniting the sparkle: An indigenous science education model*. Kivaki Press.

Capaldi, A., Colin, A., Dopko, L., Raelyne, L., & Zelenski, J. M. (2014). The relationship between nature connectedness and happiness: A meta-analysis. *Frontiers in Psychology, 5*, 1-28. https://doi.org/10.3389/fpsyg.2014.00976

Capaldi, C., Passmore, H.-A., Nisbet, E., Zelenski, J., & Dopko, R. (2015). Flourishing in nature: A review of the benefits of connecting with nature and its application as a wellbeing intervention. *International Journal Of Wellbeing, 5*(4), 1-16. https://doi.org/10.5502/ijw.v5i4.449

Capra, F., & Luisi, P. L. (2014). *The systems view of life: A unifying vision*. Cambridge University Press.

Carmargo, L. (2022). *Education for regeneration—Why EE Is natural for personal growth and understanding: Part 2*. EEPro - NAAEE. https://eepro.naaee.org/community/blog/education-regeneration-why-ee-natural-personal-growth-and-understanding-part-2

Carrington, D. (2024, March 24). Geologists reject declaration of Anthropocene epoch. *The Guardian*. https://www.theguardian.com/science/2024/mar/22/geologists-reject-declaration-of-anthropocene-epoch

Carson, R. (1962). *A silent spring*. Houghton Mifflin.

Castree, N. (2014). *Making sense of nature: Representation, politics and democracy*. Routledge. https://doi.org/10.4324/9780203503461

Ceballos, G., Ehrlich, P. R., & Raven, P. H. (2020). Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction. *Proceedings of the National Academy of Sciences*, *117*(24), 13596-13602. https://doi.org/10.1073/pnas.1922686117

Centre for Social Impact. (2019). *What is the future for NGO governance?* https://www.centreforsocialimpact.org.nz/downloads/assets/3c32/What%20is%20the%20future%20for%20NGO%20Governance.pdf

Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2022). *World inequality report 2022*. World Inequality Lab. https://wir2022.wid.world/www-site/uploads/2021/12/WorldInequalityReport2022_Full_Report.pdf

Chapin, F. S., Weber, E. U., Bennett, E. M., Biggs, R., van den Bergh, J., Adger, W. N., Crépin, A.-S., Polasky, S., Folke, C., Scheffer, M., Segerson, K., Anderies, J. M., Barrett, S., Cardenas, J.-C., Carpenter, S. R., Fischer, J., Kautsky, N., Levin, S. A., Shogren, J. F., Walker, B., Wilen, J., & de Zeeuw, A. (2022). Earth stewardship: Shaping a sustainable future through interacting policy and norm shifts. *Ambio, 51*(9), 1907-1920. https://doi.org/10.1007/s13280-022-01721-3

Chapman, D. J. (2011). Environmental education and the politics of curriculum: A national case study. *The Journal of Environmental Education, 42*(3), 193-202. https://doi.org/10.1080/00958964.2010.526153

Charmaz, K. (2000). Constructivist and objectivist grounded theory. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 509-535). SAGE Publications.

Charmaz, K. (2014). *Constructing grounded theory* (2 ed.). SAGE Publications.

Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *The Journal of Environmental Education, 29*(3), 11-21. https://doi.org/10.1080/00958969809599114

Chawla, L. (2007). Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. *Children, Youth and Environments, 17*(4), 144-170. http://www.jstor.org.ezproxy.waikato.ac.nz/stable/10.7721/chilyoutenvi.17.4.0144

Chawla, L. (2009). Growing up green: Becoming an agent of care for the natural world. *The Journal of Developmental Processes, 4*(1), 6-23.

Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research, 13*(4), 437-452. https://doi.org/10.1080/13504620701581539

Children and Nature Network. (2016). *Nature can improve health and wellbeing*. https://www.childrenandnature.org/wp-content/uploads/CNN_NatureImprove_16-10-27_O_newlogo.pdf

Children and Nature Network. (2022). *Global lessons for green schoolyard design and pedagogy*. https://www.childrenandnature.org/resources/research-digest-global-lessons-for-green-schoolyard-design-and-pedagogy/

Children and Nature Network. (2024). *Biophilic design in schools*. https://www.childrenandnature/biophilic.org

Christchurch City Council. (n.d.). *Learning through action*. https://ccc.govt.nz/the-council/learning-resources/learning-through-action/

Cialdini, R. B., Brown, S. L., Lewis, B. P., Luce, C., & Neuberg, S. L. (1997). Reinterpreting the empathy-altruism relationship: When one into one equals oneness. *Journal of Personality and Social Psychology, 73*(3), 481-494. https://doi.org/10.1037/0022-3514.73.3.481

Clark, C. R., Heimlich, J. E., Ardoin, N. M., & Braus, J. (2020). Using a Delphi study to clarify the landscape and core outcomes in environmental education. *Environmental Education Research, 26*(3), 381-399. https://doi.org/10.1080/13504622.2020.1727859

Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature*. Wiley-Blackwell.

Coe, R., Waring, M., Hedges, L. V., & Ashley, L. D. (2021). *Research methods & methodologies in education* (3 ed.). SAGE Publications.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8 ed.). Routledge.

Cole, D. R. (2024). Anti-Oedipus in the Anthropocene: Education and the deterritorializing machine. *Educational Philosophy and Theory, 56*(3), 285-297. https://doi.org/10.1080/00131857.2022.2129006

Convention on Biological Diversity. (2022). *Kunming-Montreal Global biodiversity framework*. United Nations Environmental Programme. https://www.unep.org/resources/kunming-montreal-global-biodiversity-framework

Corley, K. G., & Gioia, D. A. (2011). Building theory about theory building: What constitutes a theoretical contribution? *Academy of Management Review, 36*(1), 12-32. https://doi.org/10.5465/AMR.2011.55662499

Cowie, B., & Eames, C. (2004). Environmental education in New Zealand schools: Challenges for sustainability. *SET: Research Information for Teachers, 3*, 19-23. https://doi.org/10.18296/set.0650

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

Croft, A. (2018). *Pre-service early childhood teachers' preparedness to teach education for sustainability* [Master's Thesis, University of Waikato]. https://researchcommons.waikato.ac.nz/handle/10289/10293

Crotty, M. (2003). *The foundations of social research: meaning and perspectives in the research process*. SAGE Publications.

Crutzen, P. J., & Stoermer, E. F. (2000). The "Anthropocene". Global Change Newsletters, *41*, 17-18. http://www.igbp.net/publications/globalchangemagazine/globalchangemagazine/globalchangenewslettersno4159.5.5831d9ad13275d51c098000309.html

Cuadrado, E., Macias-Zambrano, L., J. Carpio, A., & Tabernero, C. (2023). The ABC connectedness to nature scale: Development and validation of a scale with an approach to affective, behavioural, and cognitive aspects. *Environmental Education Research, 29*(2), 308-329. https://doi.org/10.1080/13504622.2022.2111407

Cumming, G. S., Buerkert, A., Hoffmann, E. M., Schlecht, E., Von Cramon-Taubadel, S., & Tscharntke, T. (2014). Implications of agricultural transitions and urbanization for ecosystem services. *Nature, 515*(7525), 50-57. https://doi.org/10.1038/nature13945

Cumming, G. S., & Peterson, G. D. (2017). Unifying research on social-ecological resilience and collapse. *Trends in Ecology & Evolution 32*, 695-713.

Cutter-Mackenzie-Knowles, A. (2019). *Touchstones for deterritorializing socioecological learning: The Anthropocene, posthumanism and common worlds as creative milieux.* Springer. https://doi.org/10.1007/978-3-030-12212-6

Dada, D. O., Eames, C. W., & Calder, N. S. (2018). Impact of environmental education on beginning preservice teachers' environmental literacy. *Australian Journal of Environmental Education, 33*(3), 201-222. https://doi.org/10.1017/aee.2017.27

Davis, J. L., Le, B., & Coy, A. E. (2011, 2011/09/01/). 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/https://doi.org/10.1016/j.jenvp.2011.01.004

De Young, R. (2000). Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues, 56*(3), 509-526. https://doi.org/10.1111/0022-4537.00181

Denscombe, M. (2014). *The Good Research Guide: For small-scale social research projects*. Open University Press.

Denzin, N. K., Lincoln, Y. S., Giardina, M. D., & Cannella, G. S. (2023). Introduction: The discipline and practice of qualitative research. In N. K. Denzin, Y. S. Lincoln, M. D. Giardina, & G. S. Cannella (Eds.), *The SAGE handbook of qualitative research* (6th ed., pp. 1-27). SAGE Publications.

Department of Conservation. (2017). *Mātauranga whakauka taiao: Environmental education for sustainability*. https://www.doc.govt.nz/Documents/getting-involved/students-and-teachers/environmental-education-for-sustainability-strategy-and-action-plan.pdf

Department of Conservation. (n.d). National education programmes. https://www.doc.govt.nz/get-involved/conservation-education/national-programmes/

DePetris, T. (2016). *Kids Greening Taupō: Conservation Education Based on a Collaborative Community Model.* [Master's Thesis, University of Waikato]. https://hdl.handle.net/10289/10729

DePetris, T., & Eames, C. (2018). A collaborative community education model: Developing effective school-community partnerships. *Australian Journal of Environmental Education, 33*(3), 171-188. https://doi.org/doi.org/10.1017/aee.2017.26

Dickson, A., Akwasi, Y., & Attah, K. (2016). Constructivism philosophical paradigm: Implications for research, teaching and learning. *Global Journal of Arts Humanities and Social Sciences, 4*(10), 1-9.

Discovery through nature. (n.d.). *Inquiry science and conservation education in the Bay of Plenty*. https://www.discoverythroughnature.co.nz

Division of the United Nation's Department of Economic and Social Affairs. (2018). *The 2018 revision of world urbanization prospects*. https://www.un.org/en/desa/2018-revision-world-urbanization-prospects

Duhn, I., Bachmann, M., & Harris, K. (2010). Becoming ecologically sustainable in early childhood education. *Early Childhood Folio, 14*, 1-10. https://doi.org/10.18296/ecf.0174

Durie, M. H. (1985, 1985/01/01/). A Māori perspective of health. *Social Science & Medicine, 20*(5), 483-486. https://doi.org/https://doi.org/10.1016/0277-9536(85)90363-6

Eames, C., & Barker, M. (2011). Understanding student learning in environmental education in Aotearoa New Zealand. *Australian Journal of Environmental Education, 27*(1), 186-191. https://doi.org/10.1017/S0814062600000173

Eames, C., Barker, M., Wilson-Hill, F., Law, B., Iles, H., McKenzie, J., Patterson, R., & Williams, P. (2006). *Investigating teachers' pedagogical approaches in environmental education that promote students' action competence*. Ministry of Education. http://www.tlri.org.nz/tlri-research/research-completed/school-sector/investigating-teachers%E2%80%99-pedagogical-approaches

Eames, C., & Bolstad, R. (2004b). *The role of partnerships in environmental education in New Zealand schools*. New Zealand Council for Educational Research. https://www.nzcer.org.nz/system/files/12819.pdf

Eames, C., Bolstad, R., & Cowie, B. (2004a). *Evaluation of the practice of environmental education in New Zealand schools.* New Zealand Council for Educational Research. https://www.nzcer.org.nz/research/publications/evaluation-practice-environmental-education-new-zealand-schools

Eames, C., Wilson-Hill, F., & Barker, M. (2013). Exploring whole-school approaches to education for sustainability. *SET: Research information for teachers, 1*, 12-19. https://doi-org.ezproxy.waikato.ac.nz/10.18296/set.0344

Eckersley, R. (2013). The mixed blessings of material progress: Diminishing returns in the pursuit of happiness. In A. Delle Fave (Ed.), *The exploration of happiness* (pp. 267-292). Springer.

Education Gazette. (2019). *Adventurous play and independence help kotahitanga flourish*. https://gazette.education.govt.nz/articles/adventurous-play-and-independence-help-kotahitanga-flourish/

Education Gazette. (2021). *Curriculum refresh to enhance learning*. https://gazette.education.govt.nz/articles/curriculum-refresh-to-enhance-learning/

Education Gazette. (2023). *Noticing, recognising and responding to learning progress*. https://gazette.education.govt.nz/articles/noticing-recognising-and-responding-to-learning-progress/

Education Gazette Editors. (2020). *Back to nature - and an authentic local curriculum*. Ministry of Education. https://gazette.education.govt.nz/articles/back-to-nature-and-an-authentic-local-curriculum/

Eisenstein, C. (2007). *The ascent of humanity*. Panenthea Press.

Elhacham, E., Ben-Uri, L., Grozovski, J., Bar-On, Y. M., & Milo, M. (2020). Global human-made mass exceeds all living biomass. *Nature, 588*, 442-444. https://doi.org/10.1038/s41586-020-3010-5

Elkington, B., Jackson, M., Kiddle, R., Ocean, M. R., Ross, M., Smeaton, J., & Thomas, A. (2020). *Imagining decolonisation*. Bridget Williams Books.

Enviroschools. (2017). *Key results of the 2017 Enviroschools nationwide census*. https://enviroschools.org.nz/wp-content/uploads/2019/04/Enviroschools_Census_2017.pdf

Enviroschools. (n.d.). *About Enviroschools*. https://enviroschools.org.nz/

Ernst, J., & Theimer, S. (2011). Evaluating the effects of environmental education programming on connectedness to nature. *Environmental Education Research, 17*(5), 577-598. https://doi.org/10.1080/13504622.2011.565119

Lövbrand, E., Beck, S., Chilvers, J., Forsyth, T., Hedrén, J., Hulme, M., Lidskog, R., & Vasileiadou, E. (2015). Who speaks for the future of Earth? How critical social science can extend the conversation on the Anthropocene. *Global Environmental Change, 32*, 211-218. https://doi.org/10.1016/j.gloenvcha.2015.03.012

Everth, T. (2022). Stop tinkering around the edges: A call for the deterritorialisation of assessment praxis in the age of Anthropocene predicaments. *Assessment Matters, 16*, 45-61. https://doi.org/10.18296/am.0057

Everth, T. (2023). *Teacher identity, activism, and empowerment: Entanglements with climate in Aotearoa, New Zealand* [PhD, University of Waikato]. https://hdl.handle.net/10289/16523

Everth, T., & Bright, R. (2023). Climate change and the assemblages of school leaderships. *Australian Journal of Environmental Education, 39*(1), 17-36. https://doi.org/10.1017/aee.2022.8

Faber Taylor, A., Butts-Wilmsmeyer, C., & Jordan, C. (2022). Nature-based instruction for science learning – a good fit for all: A controlled comparison of classroom versus nature. *Environmental Education Research, 28*(10), 1527-1546. https://doi.org/10.1080/13504622.2022.2076811

Feast, J. (Director) (2022) Rise [Film] StoryBox.

Fein, J. (1993). *Education for the environment: Critical curriculum theorising and environmental education*. Deakin University Press.

Figueres, C., & Adarve, I. C. (2024). Our story of nature: From rupture to reconnection [Audio podcast]. *Outrage and Optimism, 230.* https://www.outrageandoptimism.org/episodes/our-story-of-nature-from-rupture-to-reconnection-one?hsLang=en

Fischer, J., & Riechers, M. (2019). A leverage points perspective on sustainability. *People and Nature, 1*(1), 115-120. https://doi.org/10.1002/pan3.13

Fisher, K. (2024). The biophilic school: A critical synthesis of evidence-based systematic literature reviews. *Architecture, 4*, 457-478. https://doi.org/https://doi.org/10.3390/architecture4030025

Fletcher, R. (2017, 2017/08/08). Connection with nature is an oxymoron: A political ecology of "nature-deficit disorder". *The Journal of Environmental Education, 48*(4), 226-233. https://doi.org/10.1080/00958964.2016.1139534

Flick, U. (2022). Setting the agenda – roles of design(ing) in qualitative research. In U. Flick (Ed.), *The SAGE handbook of qualitative research design* (pp. 1-20). SAGE Publications. https://doi.org/10.4135/9781529770278

Flint, C. G., Kunze, I., Muhar, A., Yoshida, Y., & Penker, M. (2013). Exploring empirical typologies of human–nature relationships and linkages to the ecosystem services concept. *Landscape and Urban Planning, 120*, 208-217. https://doi.org/10.1016/j.landurbplan.2013.09.002

Flood, S. (2018). *The Cape to City education programme: An internal review*. Manaaki Whenua Landcare Research. https://www.pfhb.nz/assets/Article-Documents/Cape-to-City-education-programme-review-final.pdf

Folke, C., Jansson, Å., Rockström, J., Olsson, P., Carpenter, S. R., Stuart Chapin, F., Crépin, A.-S., Daily, G., Danell, K., Ebbesson, J., Elmqvist, T., Galaz, V., Moberg, F., Nilsson, M., Österblom, H., Ostrom, E., Persson, Å., Peterson, G., Polasky, S., Steffen, W., Walker, B., & Westley, F. (2011). Reconnecting to the biosphere. *Ambio, 40*(7), 719-738. https://doi.org/10.1007/s13280-011-0184-y

Folke, C., Polasky, S., Rockstrom, J., Galaz, V., Westley, F., Lamont, M., Scheffer, M., Osterblom, H., Carpenter, S., Chapin III, F. S., Seto, K., Weber, E. U., Crona, B., Daily, G. C., Dasgupta, P., Gaffney, O., Gordon, L. J., Hoff, H., A., L. S., Lubchenco, J., Steffen, W., & Walker, B. (2021). Our future in the Anthropocene biosphere. *AMBIO A Journal of the Human Environment, 50*(2), 1-37. https://doi.org/10.1007/s13280-021-01544-8

Fowler, J. F., & Cosenze, C. (2009). Design and evaluation of survey questions. In L. Bickman & D. J. Rog (Eds.), *The SAGE handbook of applied social research methods* (pp. 375-412). SAGE Publications.

Fox, H., Gessler, M., Higgens, A., Meade, A., Warden, C., & Ridge, S. (2022). *Children's environmental kinship guide: A holistic approach to teaching and learning about, in, with and for the whole of the natural world*. https://environmentalkinship.org/

Frick, J., Kaiser, F. G., & Wilson, M. (2004). Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample. *Personality and Individual Differences, 37*(8), 1597-1613. https://doi.org/10.1016/j.paid.2004.02.015

Fromm, E. (1964). *The heart of man, its genius for good and evil.* Harper and Row.

Future Curious. (2022). *Huringa āhuarangi: Whakareri mai kia haumaru āpōpō. Climate Change: Prepare today, live well tomorrow*. https://futurecurious.co.nz/resources/

Gameau, D. (2022). The story that shapes your relationship with nature. *TEDxSydney*. https://www.ted.com/talks/damon_gameau_the_story_that_shapes_your_relationship_with_nature?subtitle=en

Glaser, B. G. (1992). *Basics of grounded theory analysis*. Sociology Press.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory*. Aldine.

Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers*. Longman.

Global tipping points. (2024). *Earth System Tipping Points*. https://global-tipping-points.org/section1/1-earth-system-tipping-points/

Gómez-Baggethun, E., & Ruiz, M. (2011). Economic valuation and the commodification of ecosystem services. *Progressive Physical Geography*, *35*(5), 1-16. https://doi.org/10.1177/0309133311421708

Gruenewald, D. A. (2003). Foundations of place: A multidisciplinary framework for place-conscious education. *American Educational Research Journal, 40*(3), 619-654. https://doi.org/10.3102/00028312040003619

Hallam, J., Gallagher, M. L., & Owen, K. (2022). "I'm not the best at art": An exploration of children's growing sense of artistry within an outdoor, arts-based intervention. *Thinking Skills and Creativity, 44*, 2-13.

Hamann, M., Berry, K., Chaigneau, T., Curry, T., Heilmayr, R., Henriksson, P. J. G., Hentati-Sundberg, J., Jina, A., Lindkvist, E., Lopez-Maldonado, Y., Nieminen, E., Piaggio, M., Qiu, J., Rocha, J. C., Schill, C., Shepon, A., Tilman, A. R., van den Bijgaart, I., & Wu, T. (2018). Inequality and the biosphere. *Annual Review of Environment and Resources, 43*, 61-83. https://doi.org/https://doi.org/10.1146/annurev-environ-102017-025949

Hamilton, C. (2002). Dualism and sustainability. *Ecological Economics, 42*, 89-99. https://doi.org/10.1016/S0921-8009(02)00051-4

Hammersley, M. (2008). *The SAGE handbook of social research methods*. SAGE Publications.

Hardin, G. (1968). The tragedy of the commons. *Science, 162*(3859), 1243-1248.

Harrington, M. C. R. (2009). An ethnographic comparison of real and virtual reality field trips to Trillium Trail: The salamander find as a salient event. *Children, Youth and Environments, 19*(1), 74-101. https://doi.org/10.1353/cye.2009.0028

Harwood, D., Boileau, E., Dabaja, Z., F., & Julien, K. (2020). Exploring the national scope of outdoor nature-based early learning programmes in Canada: Findings from a large-scale study. *The International Journal of Holistic Learning and Development, 6,* 1-24. https://ijheld.lakeheadu.ca/article/view/1761

Heidegger, M., & Rojcewicz, R. (2015). *The beginning of western philosophy: Interpretation of Anaximander and Parmenides* (1st ed.). Indiana University Press.

Helbing, D. (2013). Globally networked risks and how to respond. *Nature, 497*(7447), 51-59. http://doi.org /10.1038/nature12047

Henderson, J. (2000). Ayukpachi: Empowering Aboriginal thought. In M. Battiste (Ed.), *Reclaiming indigenous voice and vision* (pp. 248-278). UBC Press.

Hesse-Biber, S. (2022). Mixed methods research in qualitatively driven research. In U. Flick (Ed.), *The SAGE handbook of qualitative research design* (pp. 618-635). SAGE Publications.

Heyman, S., Jansen, T., Sass, W., Michels, N., Pauw, J. B.-d., Van Petegem, P., & Keune, H. (2023). How education can be leveraged to foster adolescents' nature connection. In J. Činčera, B. Johnson, D. Goldman, I. Alkaher, & M. Medek (Eds.), *Outdoor Environmental Education in the Contemporary World* (pp. 83-94). Springer.

Hickman, C. (2020). We need to (find a way to) talk about ....Eco-anxiety. *Journal of Social Work Practice, 34*(4), 411-424. https://doi.org/10.1080/02650533.2020.1844166

Hipkins, R., Eames, C., Roberts, J., & Garrick, C. (2010). *Education for sustainability in New Zealand schools: Full report.* Ministry of Education. https://thehub.swa.govt.nz/assets/documents/41130_EvalSustain_Completev2_0.pdf

Holland, T. G., Peterson, G. D., & Gonzalez, A. (2009). Cross-national analysis of how economic inequality predicts biodiversity loss. *Conservation biology, 23*(5), 1304-1313. https://doi.org/10.1111/j.1523-1739.2009.01207.x

Hood, J. (2007). Orthodoxy versus power: The defining trails of grounded theory. In A. Bryant & K. Charmaz (Eds.), *Handbook of grounded theory* (pp. 151-164). SAGE Publications.

Hopkinson, S. A. (2020). Sea change: Designing curriculum for a bright and optimistic future. *Set: Research Information for Teachers, 3*, 61-66. https://doi.org/10.18296/set.0188

Hopkinson, S. A. (n.d.). Metanoia: The hard work of changing our minds. *Stone soup*. https://stonesoupsyndicate.com/articles/metanoia-the-hard-work-of-changing-our-minds

Hoskins, T., & Jones, A. (2022). Indigenous inclusion and indigenising the university. *New Zealand Journal of Educational Studies, 57*, 305-320. https://doi.org/https://doi.org/10.1007/s40841-022-00264-1

Huckle, J. (1993). Enviromental education and sustainability: A view from critical theory. In J. Fein (Ed.), *Enviromental education: A pathway to sustainability* (pp. 43-68). Deaken University.

Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21. https://doi.org/10.1080/00958964.1990.10753743

Inwood, H., & Taylor, R. (2012). Creative approaches to environmental learning: Two perspectives on teaching environmental art education. *International Electronic Journal of Environmental Education, 2*(1), 1-11.

IPBES. (2024). *Summary for policymakers of the thematic assessment report on the underlying causes of biodiversity loss and the determinants of transformative change and options for achieving the 2050 vision for biodiversity of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. IPBES secretariat. https://zenodo.org/records/14513975

IPCC. (2022). *Climate change 2022: Impacts, adaptation and vulnerability. Working group II contribution to the IPCC sixth assessment report.* https://www.ipcc.ch/report/ar6/wg2/about/factsheets

Irwin, R. (2020). Climate change and education. *Educational Philosophy and Theory, 52*(5), 492-507. https://doi.org/10.1080/00131857.2019.1642196

Ison, M., & Bramwell-Lalor, S. (2023). The arts in environmental education: Connecting learners with their talents and nature. *Environmental Education Research, 29*(7), 964-979. https://doi.org/10.1080/13504622.2023.2205062

Ives, C. D., Abson, D. J., von Wehrden, H., Dorninger, C., Klaniecki, K., & Fischer, J. (2018). Reconnecting with nature for sustainability. *Sustainability Science, 13*(5), 1389-1397. https://doi.org/10.1007/s11625-018-0542-9

Ives, C. D., Giusti, M., Fischer, J., Abson, D. J., Klaniecki, K., Dorninger, C., Laudan, J., Barthel, S., Abernethy, P., Martín-López, B., Raymond, C. M., Kendal, D., & von Wehrden, H. (2017, 2017/06/01/). Human–nature connection: A multidisciplinary review. *Current Opinion In Environmental Sustainability, 26-27*, 106-113. https://doi.org/https://doi.org/10.1016/j.cosust.2017.05.005

Jensen, B. B., & Schnack, K. (1997). The action competence approach in environmental education. *Environmental Education Research, 3*(2), 163-178. https://doi.org/10.1080/1350462970030205

Jickling, B., & Sterling, S. (2017). *Post-sustainability and environmental education*. Palgrave Macmillan. https://doi.org/10.1007/978-3-319-51322-5

Jones, A., & Jenkins, K. (2008). Invitation and refusal: A reading of the beginnings of schooling in Aotearoa New Zealand. *History of Education, 37*(2), 187-206. https://doi.org/10.1080/00467600701727698

Jordan, C., & Chawla, L. (2019). A coordinated research agenda for nature-based learning. *Frontiers in Psychology, 10*(266), 1-10. https://doi.org/10.3389/fpsyg.2019.00766

Jørgensen, P. S., Folke, C., & Carroll, S. P. (2019). Evolution in the Anthropocene: Informing governance and policy. *Annual Review of Ecology, Evolution, and Systematics 50*, 527-546.

Kahn, P. H. (1999). *The human relationship with nature: Development and culture*. MIT Press.

Kahn, R. V. (2010). *Critical pedagogy, ecoliteracy, & planetary crisis: The ecopedagogy movement*. Peter Lang Publishing.

Kaiser, F. G., Byrka, K., & Hartig, T. (2010). Reviving Campbell's Paradigm for attitude research. *Personality and social psychology review, 14*(4), 351-367. https://doi.org/10.1177/1088868310366452

Kaiser, F. G., Hartig, T., Brügger, A., & Duvier, C. (2013). 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

Kashik, V., & Walsh, C. (2019). Pragmatism as a research paradigm and its implications for social research. *Social Sciences, 8*(9), 1-18. https://doi.org/DOI:10.3390/socsci8090255

Keane, E. (2015). Considering the practical implementation of constructivist grounded theory in a study of widening participation in Irish higher education. *International Journal of Social Research Methodology, 18*(4), 415-431. https://doi.org/10.1080/13645579.2014.923622

Kellert, S. R., & Wilson, E. O. (1993). *The biophilia hypothesis*. Island Press.

Kendall, H., W. (1992). *World scientists' warning to humanity*. https://www.ucsusa.org/resources/1992-world-scientists-warning-humanity

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

Kids Greening Taupō. (2022). *Learning through nature*. https://www.kidsgreeningtaupo.org.nz/

Kimmerer, R. (2020). *Braiding sweetgrass: Indigenous wisdoms, scientific knowledge, and teachings of plants*. Milkweed Editions.

Kimmerer, R. W. (2024). *The serviceberry: Abundance and reciprocity in the natural world*. Simon & Schuster.

Kokkos, A. (2019). Introducing the method transformation theory in educational practice. In T. Fleming, A. Kokkos, & F. Finnegan (Eds.), *European Perspectives on Transformation Theory* (pp. 129-144). Springer International Publishing.

Kollmuss, A., & Agyeman, J. (2010). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239-260. https://doi.org/10.1080/13504620220145401

Krettenauer, T. (2017). Pro-environmental behavior and adolescent moral development. *Journal of Research on Adolescence, 27*(3), 581-593. https://doi.org/https://doi.org/10.1111/jora.12300

Krettenauer, T., Wang, W., Jia, F., & Yao, Y. (2020). Connectedness with nature and the decline of pro-environmental behavior in adolescence: A comparison of Canada and China. *Journal of Environmental Psychology, 71*, 1-7. https://doi.org/10.1016/j.jenvp.2019.101348

Krupp, E. C. (2015). Native American cosmology and other worlds. In M. Gargaud, R. Amils, J. Cernicharo, H. J. Cleaves II, W. M. Irvine, D. L. Pinti, & M. Viso (Eds.), *Encyclopedia of astrobiology* (pp. 1659-1667). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-44185-5_5222

Kuhn, T. S. (1922-1996. (1977)). *The essential tension: Selected studies in scientific tradition and change*. University of Chicago Press.

Kumar, S. (2012). Networking together for a better world. *Resurgence*, 273.

Kuo, M., Barnes, M., & Jordan, C. (2019). Do experiences with nature promote learning? Converging evidence of a cause-and-effect relationship. *Frontiers in Psychology, 10*, 305-315. https://doi.org/10.3389/fpsyg.2019.00305

Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. SAGE Publications.

Kwauk, C. (2020). *Roadblocks to quality education in a time of climate change*. Centre for Universal Education at The Brookings Institution. https://eric.ed.gov/?id=ED607008

Lade, S. J., Norberg, J., Anderies, J., Beer, C., Cornell, S., Donges, J., Fetzer, I., Gasser, T., Richardson, K., Rockström, R., & Steffen, W. (2019). Potential feedbacks between loss of biosphere integrity and climate change. *Global Sustainability, 2*, 1-15.

Law, B. (2004). *Environmental education/Education for sustainability.* Asia Pacific Environmental Education Research Seminar. http://www.eec.miyakyo-u.ac.jp/APEID2004/pdf/Barry.pdf

Lawrence, M. (2024). Polycrisis in the Anthropocene: An invitation to contributions and debates. *Global Sustainability, 7*, 1-5. https://doi.org/10.1017/sus.2024.2

Leach, M., Reyers, B., Bai, X., Brondizio, E. S., Cook, C., Díaz, S., Espindola, G., Scobie, M., Stafford-Smith, M., & Subramanian, S. M. (2018). Equity and sustainability in the Anthropocene: A social–

ecological systems perspective on their intertwined futures. *Global Sustainability, 1*, 1-14. https://doi.org/https://doi.org/10.1017/sus.2018.12

Leif, K., & Loftness, V. (2024). A toolkit of biophilic interventions for existing schools to enhance student and faculty health and performance. *Architecture, 4*, 445–456. https://doi.org/10.3390/architecture4020024

Lengieza, M. L., Aviste, R., & Richardson, M. (2023). The human–nature relationship as a tangible target for pro-environmental behaviour—Guidance from interpersonal relationships. *Sustainability, 15*(16), 1-28. https://www.mdpi.com/2071-1050/15/16/12175

Leopold, A. (1966). *A sand almanac county*. Oxford University Press.

Leventon, J., Duşe, I. A., & Horcea-Milcu, A. I. (2021). Leveraging biodiversity action from plural values: Transformations of governance systems. *Frontiers in ecology and evolution, 9*, 1-8. https://doi.org/10.3389/fevo.2021.609853

Lewicki, D. (1997). *Cooperative ecology and place: Development of a pedagogy of place curriuclum*. U.S. Department of Education. https://eric.ed.gov/?id=ED461461

Lewis, J. A., Zipperer, W. C., Ernstson, H., Bernik, B., Hazen, R., Elmqvist, T., & Blum, M. J. (2017). Socioecological disparities in New Orleans following Hurricane Katrina. *Ecosphere, 8*(9), 1-24. https://doi.org/10.1002/ecs2.1922

Liefländer, A. K., Bogner, F. X., Kibbe, A., & Kaiser, F. G. (2015, 2015/03/04). Evaluating environmental knowledge dimension convergence to assess educational programme effectiveness. *International Journal of Science Education, 37*(4), 684-702. https://doi.org/10.1080/09500693.2015.1010628

Limburg, K. E., Breitburg, D., Swaney, D. P., & G., J. (2020). Ocean deoxygenation: A primer. *One Earth, 2*, 24-29.

Lin, B. B., Fuller, R. A., Bush, R., Gaston, K. J., & Shanahan, D. F. (2014). Opportunity or orientation? Who uses urban parks and why [Article]. *PLoS ONE, 9*(1), 1-7. http://doi.org/10.1371/journal.pone.0087422

Lincoln, Y. S., & Guba, E. (1985). *Naturalistic inquiry*. SAGE Publications.

Linnemanstons, P., & Jordan, C. (2017). Teaching with nature: Strategies for inquiry-based learning. *The Science Teacher, 84*(6), 22-27.

Local government in New Zealand. (n.d.). *Councils in Aotearoa*. https://www.lgnz.co.nz/local-government-in-nz/councils-in-aotearoa/

Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Algonquin Books.

Louv, R. (2012). *The nature principle: Reconnecting with life in a virtual age*. Algonquin Books.

Lövbrand, E., Beck, S., Chilvers, J., Forsyth, T., Hedrén, J., Hulme, M., Lidskog, R., & Vasileiadou, E. (2015). Who speaks for the future of Earth? How critical social science can extend the conversation on the Anthropocene. *Global Environmental Change, 32*, 211-218. https://doi.org/https://doi.org/10.1016/j.gloenvcha.2015.03.012

Lovelock, J. E. (1972). Gaia as seen through the atmosphere. *Atmospheric environment, 6*(8), 579-580. https://doi.org/10.1016/0004-6981(72)90076-5

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), 1-24. https://doi.org/10.1371/journal.pone.0177186

Mackay, C. M., & Schmitt, M. T. (2019). Do people who feel connected to nature do more to protect it? A meta-analysis. *Journal of Environmental Psychology, 65*, 1013-1023. https://doi.org/https://doi.org/10.1016/j.jenvp.2019.101323

Malm, A., & Hornborg, A. (2014). The geology of mankind? A critique of the Anthropocene narrative. *The Anthropocene Review, 1*(1), 62-69. https://doi.org/10.1177/2053019613516291

Margulis, L., & Lovelock, J. E. (1974). Biological modulation of the Earth's atmosphere. *Icarus, 21*(4), 471-489. https://doi.org/10.1016/0019-1035(74)90150-X

Marine Metre^2. (2024). *Marine Metre^2*. https://mm2.net.nz/

Marks, R. (2024). *The origins of the modern world: A global and environmental narrative from the fifteenth to the twenty-first century*. Rowman and Littlefield.

Marsden, M. (2003). *The woven universe: Selected writings from Rev. Māori Marsden*. The estate of Rev. Māori Marsden.

Martin, L., White, M. P., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *Journal of Environmental Psychology, 68*, 1-12. https://doi.org/10.1016/j.jenvp.2020.101389

Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*(4), 503-515. https://doi.org/10.1016/j.jenvp.2004.10.001

Maykut, P., & Morehouse, R. (1994). *Beginning qualitative research*. Falmer Press.

McFarland, A. L., Glover, B. J., Waliczek, T. M., & Zajicek, J. M. (2013, 01 Apr. 2013). The effectiveness of the National Wildlife Federation's Schoolyard Habitat Program: Fourth-grade students' standardized science test scores and science grades. *HortTechnology, 23*(2), 187-193. https://doi.org/10.21273/horttech.23.2.187

McKay, D. A., Staal, A., Abrams, J. F., Winkelmann, R., Sakschewski, B., Loriani, S., Fetzer, I., Cornell, S. E., Rockström, J., & Lenton, T. M. (2022). Updated assessment suggests > 1.5° C global warming could trigger multiple climate tipping points. *Authorea Preprints*, 1-3. https://doi.org/10.1002/essoar.10509769.1

McKeon, M. (2012). Two-eyed seeing into environmental education: Revealing its "natural" readiness to indigenize. *Canadian Journal of Environmental Education, 17*, 131-147.

MEA. (2005). *Ecosystems and human wellbeing: A framework for assessment*. https://www.millenniumassessment.org/en/Framework.html

Meadows, D. (1999). *Leverage points: Places to intervene in a system*. https://mchwdc.unc.edu/wp-content/uploads/2022/04/Leverage-Points_Places-to-Intervene-in-a-System-Meadows.pdf

Meadows, D., Rander, J., Behrens, W. W., & Meadows, D. (1972). *The limits to growth: A report for the Club of Rome's project on the predicament of mankind*. Universe Books.

Meadows, D. H., Randers, J., & Meadows, D. L. (2004). *The limits to growth: The 30-year update.* Chelsea Green Publishing.

Meadows, D. H., & Wright, D. (2008). *Thinking in systems : A primer*. Chelsea Green Publishers.

Merchant, C. (1992). *Radical ecology: The search for a liveable world*. Routledge.

Merchant, C. (2018). *Science and nature: Past, present and future*. Routledge.

Meyer, M., & Mayrhofer, W. (2022). The SAGE Handbook of Qualitative Research Design. SAGE Publications.

Milbraith, L. (1989). *Envisioning a sustainable society: Learning our way out*. State University of New York Press.

Miles, M., Huberman, A. M., & Saldaña, J. (2020). *Qualitative data analysis: A methods sourcebook* (4th ed.). SAGE Publications.

Miller, N. C., Kumar, S., Pearce, K. L., & Baldock, K. L. (2021). The outcomes of nature-based learning for primary school aged children: A systematic review of quantitative research. *Environmental Education Research, 27*(8), 1115-1140. https://doi.org/10.1080/13504622.2021.1921117

Miller, T., Birch, M., Mauthner, M., & Jessop, J. (2012). *Ethics in Qualitative Research* (2nd ed.). SAGE Publications.

Ministry for the Environment & Statistics NZ. (2022). *New Zealand's environmental reporting series: Environment Aotearoa 2022*. https://environment.govt.nz/publications/environment-aotearoa-2022/#environment-aotearoa-2022-summary

Ministry of Education. (1993). *The New Zealand curriculum framework*. Learning Media.

Ministry of Education. (1997). *Te whāriki: He whāriki mātauranga mō ngā mokopuna o Aotearoa: Early childhood curriculum*. Ministry of Education.

Ministry of Education. (1999). *Guidelines for environmental education in New Zealand schools*. Learning Media.

Ministry of Education. (2007). *The New Zealand Curriculum*. Learning Media Limited.

Ministry of Education. (2008). *Te mārautanga o Aotearoa*. Learning Media Limited.

Ministry of Education. (2020). *Sustainability contestable fund*. https://www.education.govt.nz/school/funding-and-financials/funding/sustainability-contestable-fund/

Ministry of Education. (2021). *Strengthening local curriculum*. Retrieved 21 January 2023 from https://nzcurriculum.tki.org.nz/Strengthening-local-curriculum/Leading-local-curriculum-guide-series

Moorefield, J. (2025). *Te Aka Māori Dictionary*. https://www.maoridictionary.co.nz/

Morse, J. M., M., B., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods, 1* (2), 13-22. https://doi.org/10.1177/160940690200100202

Muhar, A., & Böck, K. (2018). Mastery over nature as a paradox: Societally implemented but individually rejected. *Journal of Environmental Planning and Management, 61*(5-6), 994-1010. https://doi.org/10.1080/09640568.2017.1334633

Mullenbach, L. E., Andrejewski, R. G., & Mowen, A. J. (2019). Connecting children to nature through residential outdoor environmental education. *Environmental Education Research, 25*(3), 365-374. https://doi.org/10.1080/13504622.2018.1458215

Munhall, P. L. (1988, 1988/04/01). Ethical considerations in qualitative research. *Western Journal of Nursing Research, 10*(2), 150-162. https://doi.org/10.1177/019394598801000204

Muradian, R., & Gómez-Baggethun, E. (2021, 2021/07/01/). Beyond ecosystem services and nature's contributions: Is it time to leave utilitarian environmentalism behind? *Ecological Economics, 185*(107038), 1-9. https://doi.org/https://doi.org/10.1016/j.ecolecon.2021.107038

Mustonen, T., Harper, S. L., Rivera Ferre, M., Postigo, J., Ayanlade, A., Benjaminsen, T., Morgan, R., & Okem, A. (2021). *2021 compendium of indigenous knowledge and local knowledge: Towards inclusion of indigenous knowledge and local knowledge in global reports on climate change*. University of Vienna.

Naess, A. (1973). The shallow and deep ecology movements. *Inquiry, 16*, 95-100.

NASA. (2013). *Earthrise*. https://www.nasa.gov/image-article/earthrise-3/

Nature Education Aotearoa. (n.d.). *Home [Facebook page].* Facebook. https://www.facebook.com/natureeducationaotearoa/

Naveh, D., & Bird-David, N. (2014). How persons become things: Economic and epistemological changes among Nayaka hunter-gatherers. *The Journal of the Royal Anthropological Institute, 20*(1), 74-92. https://doi.org/10.1111/1467-9655.12080

Ngata, T. (2019). *Kia mau: Resisting colonial fictions*. https://tinangata.com/wp-content/uploads/2020/06/kia-mau-resisting-colonial-fictions.pdf

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

New Zealand Parliament. (2017) Innovative bill protects Whanganui River with legal personhood. https://www.parliament.nz/en/get-involved/features/innovative-bill-protects-whanganui-river-with-legal-personhood/

NZAEE. (2021). *Inspiring resources: Specialist providers*. https://www.nzaee.org.nz

NZAEE. (2023a). *Curriculum news #1 Sept 2023*. https://www.nzaee.org.nz/news-and-publications/curriculum-news-1-sept-2023

NZAEE. (2023b). *Curriculum news #2 Sept 2023*. https://www.nzaee.org.nz/news-and-publications/curriculum-news-2-sept-2023

NZAEE. (2024c). *Curriculum news #4 April 2024*. https://www.nzaee.org.nz/news-and-publications/curriculum-news-4-april-2024

Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. State University of New York Press.

Osborn, M., Blom, S., Quinton, H., & Aguayo, C. (2019). Deimagining and reinvigorating learning with/in/as/for community, through self, other and place. In A. Cutter-Mackenzie-Knowles (Ed.), *Touchstones for deterritorializing socioecological learning: The Anthropocene, posthumanism*

and common worlds as creative milieux (1 ed., pp. 180-230). Springer International Publishing. https://doi.org/10.1007/978-3-030-12212-6

Otto, S., Kaiser, F. G., & Arnold, O. (2014). The critical challenge of climate change for psychology: Preventing rebound and promoting more individual irrationality. *European Psychologist, 19*(2), 96-106. https://doi.org/10.1027/1016-9040/a000182

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/https://doi.org/10.1016/j.gloenvcha.2017.09.009

Oxford Languages. (2025). Know. In Oxford Languages dictionary Retrieved June 20, 2024, from https://www.google.com/search?q=online+dictionary&oq=online+dictionary&gs_lcrp=EgZjaHJvbWUqBwgAEAAYjwIyBwgAEAAYjwIyCQgBEAAYChiABDIJCAIQABgKGIAEMgkIAxAAGAoYgAQyCQgEEAAYChiABDIJCAUQABgKGIAEMgcIBhAAGIAEMgcIBxAAGIAEMgcICBAAGIAEMgcICRAAGIAE0gEJMzg5M2owajE1qAIIsAIB8QVr21F1jBvV8Q&sourceid=chrome&ie=UTF-8#dobs=know

CPalmer, J. (2002). *Environmental education in the 21st century: Theory, practice, progress and promise*. Routledge. https://doi.org/10.4324/9780203012659

Palmer, R. (2024, 8 November). *The Treaty Principles Bill has been released: Here's what's in it.* Radio New Zealand. https://www.rnz.co.nz/news/political/533115/the-treaty-principles-bill-has-been-released-here-s-what-s-in-it

Papprill, J. (2016). Active citizenship for a sustainable future: Beyond school learning. *SET: Research Information for Teachers, 3*, 51-56.

Parliamentary Council Office. (2020). *Education and Training Act 2020*. https://www.legislation.govt.nz/act/public/2020/0038/latest/lms170676.html

Passmore, H.-A., Martin, L., Richardson, M., White, M., Hunt, A., & Pahl, S. (2021). Parental/guardians' connection to nature better predicts children's nature connectedness than visits or area-level characteristics. *Ecopsychology, 13*(2), 103-113. https://doi.org/10.1089/eco.2020.0033

Patton, M. Q. (2002). *Qualitative evaluation and research methods* (3rd ed.). SAGE Publications.

Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review, 14*, 47-61. https://doi.org/10.1016/j.edurev.2015.02.003

Pelzang, R., & Hutchinson, A. (2018). Establishing cultural integrity in qualitative research: Reflections from a cross-cultural study. *International Journal of Qualitative Methods, 17*(1), 1-9. https://doi.org/10.1177/1609406917749702

Penetito, W. (2008). Place-based education: Catering for curriculum, culture and community. *New Zealand Annual Review of Education, 18*(18), 5-29. https://doi.org/10.26686/nzaroe.v0i18.1544

Pergams, O. R. W., & Zaradic, P. A. (2006, 2006/09/01/). Is love of nature in the US becoming love of electronic media? 16-year downtrend in national park visits explained by watching movies, playing video games, internet use, and oil prices. *Journal of Environmental Management, 80*(4), 387-393. https://doi.org/10.1016/j.jenvman.2006.02.001

Piaget, J. (1972). *The psychology of intelligence*. Routledge & Paul.

Piccininni, C., Michaelson, V., Janssen, I., & Pickett, W. (2018). Outdoor play and nature connectedness as potential correlates of internalized mental health symptoms among Canadian adolescents. *Preventive Medicine, 112*, 168-175. https://doi.org/https://doi.org/10.1016/j.ypmed.2018.04.020

Piketty, T., & Saez, E. (2014). Inequality in the long run. *Science 344*(6186), 838-843. https://doi.org/10.1126/science.1251936

Pirages, D., & Ehrlich, P. R. (1974). *Ark II: Social responses to environmental imperatives*. W.H. Freeman.

Plumwood, V. (2002). *The ecological crisis of reason*. Routledge. https://doi.org/10.4324/9780203996430-2

Price, E., Maguire, S., Firth, C., Lumber, R., Richardson, M., & Young, R. (2022). Factors associated with nature connectedness in school-aged children. *Current Research in Ecological and Social Psychology, 3*(100037), 1-13. https://doi.org/https://doi.org/10.1016/j.cresp.2022.100037

Pritchard, A., & Richardson, M. (2022). The relationship between nature connectedness and human and planetary wellbeing: Implications for promoting wellbeing, tackling anthropogenic climate change and overcoming biodiversity loss. In A. H. Kemp & D. J. Edwards (Eds.), *Broadening the scope of wellbeing science: Multidisciplinary and interdisciplinary perspectives on human flourishing and wellbeing* (pp. 71-84). Springer International Publishing. https://doi.org/10.1007/978-3-031-18329-4_6

Pritchard, A., Richardson, M., Sheffield, D., & McEwan, K. (2019). The relationship between nature connectedness and eudaimonic well-being: A meta-analysis. *Journal of Happiness Studies, 21*(3), 1145-1167. https://doi.org/10.1007/s10902-019-00118-6

Pyle, R. M. (2003). Nature matrix: Reconnecting people and nature. *Oryx, 37*(2), 206-214. https://doi.org/10.1017/S0030605303000383

Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., Drüke, M., Fetzer, I., Bala, G., von Bloh, W., Feulner, G., Fiedler, S., Gerten, D., Gleeson, T., Hofmann, M., Huiskamp, W., Kummu, M., Mohan, C., Nogués-Bravo, D., Petri, S., Porkka, M., Rahmstorf, S., Schaphoff, S., Thonicke, K., Tobian, A., Virkki, V., Wang-Erlandsson, L., Weber, L., & Rockström, J. (2023). Earth beyond six of nine planetary boundaries. *Science Advances, 9*(37), 1-16. https://doi.org/doi:10.1126/sciadv.adh2458

Richardson, M. (2023). *Reconnection: Fixing our broken relationship with nature*. Pelagic Publishing.

Richardson, M., Dobson, J., Abson, D. J., Lumber, R., Hunt, A., Young, R., & Moorhouse, B. (2020). Applying the pathways to nature connectedness at a societal scale: A leverage points perspective. *Ecosystems and People, 16*(1), 387-401. https://doi.org/http://dx.doi.org/10.1080/26395916.2020.1844296

Richardson, M., Hamlin, I., Elliott, L. R., & White, M. P. (2022). Country-level factors in a failing relationship with nature: Nature connectedness as a key metric for a sustainable future. *Ambio, 51*(11), 2201-2213. https://doi.org/10.1007/s13280-022-01744-w

Richardson, M., Hunt, A., Hinds, J., Bragg, R., Fido, D., Petronzi, D., Barbett, L., Clitherow, T., & White, M. (2019). A measure of nature connectedness for children and adults: Validation, performance, and insights. *Sustainability, 11*(12), 1-16. https://www.mdpi.com/2071-1050/11/12/3250

Richardson, M., Passmore, H. A., Lumber, R., Thomas, R., & Hunt, A. (2021). Moments, not minutes: The nature-wellbeing relationship. *International Journal of Wellbeing, 11*(1), 8-33. https://doi.org/10.5502/ijw.v11i1.1267

Rickinson, M. (2001, 2001/08/01). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research, 7*(3), 207-320. https://doi.org/10.1080/13504620120065230

Riechers, M., Balázsi, Á., García-Llorente, M., & Loos, J. (2021). Human-nature connectedness as leverage point. *Ecosystems and People 17*(1), 215-221. https://doi.org/10.1080/26395916.2021.1912830

Ripple, W. J., Wolf, C., Newsome, T. M., Galetti, M., Alamgir, M., Crist, E., Mahmoud, M., I., & Laurance, W., F. (2017). World scientists' warning to humanity: A second notice. *Bioscience, 67*(12), 1026-1028. https://doi.org/10.1093/biosci/bix125

Ritchie, H. (2021). *Forests and deforestation. Our world in data.* https://ourworldindata.org/forests-and-deforestation

Rittel, H. W. J., & Webber, M. M. (2017). Dilemmas in a general theory of planning. In P. Healey & J. Hillier (Eds.), *Foundations of the planning enterprise: Critical essays in planning theory* (Vol. 1, pp. 155-169). https://doi.org/10.4324/9781315255101-12

Roberts, K., Dowell, A., & Jing-Bao, N. (2019). Attempting rigour and replicability in thematic analysis of qualitative research data; a case study of codebook development. *BMC Medical Research Methodology, 19*(66), 1-8. https://doi.org/http://dx.doi.org/10.1186/s12874-019-0707-y

Robinson, K., & Aronica, L. (2015). *Creative schools: The grassroots revolution that's transforming education*. Penguin Publishing Group.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., & Schellnhuber, H. J. (2009). A safe operating space for humanity. *Nature, 461*(7263), 472-475.

Roczen, N., Kaiser, F. G., Bogner, F. X., & Wilson, M. (2014). A competence model for environmental education. *Environment and Behavior, 46*(8), 972-992. https://doi.org/10.1177/0013916513492416

Rousell, D., & Cutter-Mackenzie-Knowles, A. (2022). *Posthuman research playspaces: Climate child imaginaries*. Routledge. https://doi.org/10.4324/9781003336006

Ruck, A., & Mannion, G. (2021, 2021/10/03). Stewardship and beyond? Young people's lived experience of conservation activities in school grounds. *Environmental Education Research, 27*(10), 1502-1516. https://doi.org/10.1080/13504622.2021.1964439

Salazar, G., Kunkle, K., & Monroe, M. C. (2020). *Practitioner guide to assessing connection to nature*. https://eepro.naaee.org/resource/practitioner-guide-assessing-connection-nature

Saldaña, J. (2021). *The coding manual for qualitative researchers*. SAGE Publications.

Santone, S. (2018) *Reframing the curriculum: Design for social justice and sustainability.* Routledge. http://doi.org/10.4324/9780203728680

Sauve, L. (2010). Being here together. In P. H. M. McKenzie, H. Bai, & B. Jickling (Ed.), *Fields of green: Restorying culture, environment and education* (pp. 325-337). Hampton.

Saylan, C., & Blumstein, D. (2011). *The failure of environmental education (And how we can fix it)* (1st ed.). University of California Press. https://doi.org/10.1525/9780520948723

Schlaepfer, S. (2024, 03 May 2024,). *Fast-track bill is a lolly scramble for deep pocketed applicants* https://newsroom.co.nz/2024/05/03/fast-track-bill-is-a-lolly-scramble-for-deep-pocketed-applicants/

Schultz, P. W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues, 56*, 391-406.

Schultz, P. W., Shriver, C., Tabanico, J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology, 24*, 31-42. https://doi.org/10.1016/S0272-4944(03)00022-7

Schultz, P. W., & Tabanico, J. (2007). Self, identity, and the natural environment: Exploring implicit connections with nature. *Journal of Applied Social Psychology, 37*(6), 1219-1247. https://doi.org/10.1111/j.1559-1816.2007.00210.x

SEI & CEEW. (2022). *Stockholm+50: Unlocking a Better Future*. https://www.stockholm50.report/unlocking-a-better-future.pd f

Sheffield, D., Butler C.W., & Richardson, M. (2022). Improving nature connectedness in adults: A meta-analysis, review and agenda. *Sustainability, 14*(19), 1-23. https://doi.org/https://doi.org/10.3390/su141912494

Shehab, E. (2020). *Interrelationship diagrams: How to prepare and use*. https://www.youtube.com/watch?v=1EblSy8V_ps

Shephard, K., Birdsall, S., Eames, C., & Ritchie, J. (2024). Environmental and sustainability education in Aotearoa New Zealand. In M. Rieckmann & R. T. Muñoz (Eds.), *World review: Environmental and sustainability education in the context of the Sustainable Development Goals* (1st ed., pp. 318-337). CRC Press. https://doi.org/10.1201/9781003145202

Silva, S. A., Silva, S. U., Ronca, D. B., Gonçalves, V. S. S., Dutra, E. S., & Carvalho, K. M. B. (2020). Common mental disorders prevalence in adolescents: A systematic review and meta-analyses. *PLoS ONE, 15*(4), 1-19. https://doi.org./10.1371/journal.pone.0232007

Simpson, L. R. (2004). Anticolonial strategies for the recovery and maintenance of indigenous knowledge. *American Indian Quarterly, 28*(3), 373-384. https://doi.org/10.1353/aiq.2004.0107

Smith, G. A. (2002). Place-based education: Learning to be where we are. *Phi Delta Kappan, 83*, 51-56. https://doi.org/10.1177/003172170208300806v

Smith, L. T. (2021). *Decolonizing methodologies: Research and indigenous peoples* (3rd ed.). Zed.

Sobel, D. (1996). *Beyond ecophobia: Reclaiming the heart in nature education*. (Vol 1). Orion Society.

Soga, M., & Gaston, K. J. (2018). Shifting baseline syndrome: Causes, consequences, and implications. *Frontiers in Ecology and the Environment, 16*(4), 222-230. https://doi.org/https://doi.org/10.1002/fee.1794

Soga, M., & Gaston, K. J. (2020). The ecology of human-nature interactions. *Proceedings of the Royal Society. Biological sciences, 287*(1918), 1-10. https://doi.org/10.1098/rspb.2019.1882

Steel, Z., Marnane, C., Iranpour, C., Chey, T., Jackson, J. W., Patel, V., & Silove, D. (2014). The global prevalence of common mental disorders: A systematic review and meta-analysis 1980–2013. *International Journal of Epidemiology, 43*(2), 476-493. https://doi.org/10.1093/ije/dyu038

Steffen, W. (2004). *Global change and the Earth system: A planet under pressure*. Springer.

Steffen, W. (2019). The Anthropocene: Where on Earth are we going? *The Ecological Citizen, 2*(2), 129-130.

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). The trajectory of the Anthropocene: The great acceleration. *The Anthropocene Review, 2*(1), 81-98. https://doi.org/10.1177/2053019614564785

Steffen, W., Richardson, K., Rockström, J., Schellnhuber, H. J., Dube, O. P., Dutreuil, S., Lenton, T. M., & Lubchenco, J. (2020). The emergence and evolution of Earth System science. *Nature Reviews Earth & Environment, 1*(1), 54-63. https://doi.org/10.1038/s43017-019-0005-6

Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., Summerhayes, C. P., Barnosky, A. D., Cornell, S. E., Crucifix, M., Donges, J. F., Fetzer, I., Lade, S. J., Scheffer, M., Winkelmann, R., & Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences, 115*(33), 8252-8259. https://doi.org/10.1073/pnas.1810141115

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*(3), 309-317. https://doi.org/10.1016/j.jenvp.2008.10.004

Stein, Z. (2019). *Education in a time between two worlds*. Bright Alliance.

Sterling, S. (2001). *Sustainable education: Re-visioning learning and change*. Arrowsmith.

Stern, M. J., Powell, R. B., & Hill, D. (2014, 2014/09/03). Environmental education program evaluation in the new millennium: What do we measure and what have we learned? *Environmental Education Research, 20*(5), 581-611. https://doi.org/10.1080/13504622.2013.838749

Stinus, C., Shankland, R., & Berjot, S. (2024, 2024/10/01). Connectedness to humanity and connectedness to nature as a leverage point for eco and socio-responsible consumption. *Current Psychology, 43*(38), 30429-30445. https://doi.org/10.1007/s12144-024-06621-1

Strauss, A. L., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. SAGE Publications.

Taherdoost, H. (2022). Designing a questionnaire for a research paper: A comprehensive guide to design and develop an effective questionnaire. *Asian Journal of Managerial Science, 11*(1), 8-16.

Tal, G., Dishon, G., & Vedder-Weiss, D. (2023). 'I know how to say it, but I still don't know it in my hands': Examining practices and epistemology in Forest Education. *Environmental Education Research*, *29*(10), 1502-1514. https://doi.org/10.1080/13504622.2023.2241681

Tanner, T. (1980). Significant life experiences: a new research area in environmental education. *Journal of Environmental Education, 11*(4), 20-24. https://doi.org/10.1080/00958964.1980.9941386

Taupō Environmental Education Collaborative. (2023). *Taupō Environmental Education Collaborative*. https://www.eectaupo.co.nz/

Taylor, A. (2017). Beyond stewardship: Common world pedagogies for the Anthropocene. *Environmental Education Research, 23*(10), 1448-1461. https://doi.org/10.1080/13504622.2017.1325452

Taylor, S., & Taylor, A. (2023). The socialist feminist case for animal liberation. *Lux, 3*. https://lux-magazine.com/article/our-animals-ourselves/

Te Ara - the Encyclopaedia of New Zealand. (n.d.). *Story: Te Ao Mārama - the natural world*. https://teara.govt.nz/en/te-ao-marama-the-natural-world/1-6

The Nature Education Network. (2024). *The Nature Education Conference*. https://natureeducationnetwork.co.nz/the-natural-phenomena-conference/

Thornberg, R., & Keane, E. (2022). Designing grounded theory studies. In U. Flick (Ed.), *The SAGE handbook of qualitative research design* (Vol. 2, pp. 452-466). SAGE Publications. https://doi.org/10.4135/9781529770278

Thornton, S., Graham, M., & Burgh, G. (2019). Reflecting on place: Environmental education as decolonisation. *Australian Journal of Environmental Education, 35*(3), 239-249. https://doi.org/10.1017/aee.2019.31

Tilbury, D. (1995). Environmental Education for Sustainability: defining the new focus of environmental education in the 1990s. *Environmental Education Research, 1*(2), 195-212. https://doi.org/10.1080/1350462950010206

Timonen, V., Foley, G., & Conlon, C. (2018). Challenges when using grounded theory: A pragmatic introduction to doing GT research. *International Journal of Qualitative Methods, 17*(1), 1-10. https://doi.org/10.1177/1609406918758086

UNEP. (2020). *Global assessments synthesis report: Landmark UNEP report lighting the path to a sustainable future*. https://www.unenvironment.org/resources/global-assessments-sythesis-report-path-to-sustainable-future

UNEP. (2021). *Making peace with nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies*. www.unep.org/resources/making-peace-nature

UNESCO. (1975). *The Belgrade Charter: A framework for environmental education*. https://unesdoc.unesco.org/ark:/48223/pf0000017772?posInSet=1&queryId=2d4a3dba-75ba-4c01-a11e-1daccdd63935

UNESCO. (1977). *Final report: Intergovernmental conference on environmental education, Tbilisi (USSR) 14-26 October 1977*. https://www.gdrc.org/uem/ee/EE-Tbilisi_1977.pdf

UNESCO. (1992). *Agenda 21 – Report of the United Nations conference on environment and development. Chapter 36 'Promoting education, public awareness and training'*. https://sustainabledevelopment.un.org/content/dsd/agenda21/res_agenda21_36.shtml

UNESCO. (2005). *UN decade of education for sustainable development*. https://unesdoc.unesco.org/ark:/48223/pf0000141629

UNESCO. (2014). *UNESCO roadmap for implementing the global action programme on education for sustainable development*. https://sustainabledevelopment.un.org/content/documents/1674unescoroadmap.pdf

UNESCO. (2021). *Learn for our planet: A global review of how environmental issues are integrated in education*. https://unesdoc.unesco.org/ark:/48223/pf0000377362

UNESCO. (2023). *The declaration on the common agenda for education and climate change* https://www.unesco.org/en/articles/declaration-common-agenda-education-and-climate-change-cop28

UNESCO, University of Sussex, Institute of Development Studies, & International Social Science Council. (2016). *World social science report, 2016: Challenging inequalities; pathways to a just world*. https://unesdoc.unesco.org/ark:/48223/pf0000245825

University of Derby. (n.d.). *Pathways to Nature Connectedness Postcard*. https://findingnature.org.uk/wp-content/uploads/2019/10/pathways-nature-connectedness-postcard-a5.pdf

Vaealiki, S., & Mackey, G. (2008). Ripples of action: Strengthening environmental competency in an early childhood centre. *Early Childhood Folio, 12*, 7-11. https://doi.org/10.18296/ecf.0193

Verlie, B. (2019). Bearing worlds: Learning to live-with climate change. *Environmental Education Research, 25*(5), 751-766. https://doi.org/10.1080/13504622.2019.1637823

Vining, J. (2003). The connection to other animals and caring for nature. *Human ecology review, 10*(2), 87-99.

Wahyuni, D. (2012). The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research, 10*(1), 69-80.

Waite, J. (2019). *"Earthrise" - The photograph that changed the world*. Good humans, technology & climate change. https://jeremy.earth/2019/07/11/earth-rise-the-photograph-that-changed-the-world/

Wandersee, J. H., & Schussler, E. E. (1999). Preventing plant blindness. The American biology teacher. 61(2), 82-86. https://doi.org/10.2307/4450624

Webb, S., Schirato, T., & Danaher, G. (2020). *Understanding Bourdieu*. Routledge.

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

West, S., Haider, L. J., Stålhammar, S., & Woroniecki, S. (2020). A relational turn for sustainability science? Relational thinking, leverage points and transformations. *Ecosystems and People 16*(1), 304-325. https://doi.org/10.1080/26395916.2020.1814417

Whatmore, S. (2002). *Hybrid geographies: Natures, cultures, spaces*. SAGE Publications.

Whitburn, J. (2020b). *Children's environmental psychology, behaviour and education and wellbeing: The role of connection to nature* [PhD, Victoria University of Wellington]. https://openaccess.wgtn.ac.nz/articles/thesis/Children_s_environmental_psychology_behaviour_and_education_and_wellbeing_The_role_of_connection_to_nature/17145590?file=31702574

Whitburn, J., Linklater, W., & Abrahamse, W. (2020a). Meta-analysis of human connection to nature and pro-environmental behavior. *Conservation Biology, 34*(1), 180-193. https://doi.org/10.1111/cobi.13381

Whitburn, J., Linklater, W. L., & Milfont, T. L. (2019). Exposure to urban nature and tree planting are related to pro-environmental behavior via connection to nature, the use of nature for psychological restoration, and environmental attitudes. *Environment and Behavior, 51*(7), 787-810. https://doi.org/10.1177/0013916517751009

White, L. (1967). The historical roots of our ecologic crisis. *Science, 155*(3767), 1203-1207. https://doi.org/10.1126/science.155.3767.1203

White, M. P., Elliott, L. R., Grellier, J., Economou, T., Bell, S., Bratman, G. N., Cirach, M., Gascon, M., Lima, M. L., Lõhmus, M., Nieuwenhuijsen, M., Ojala, A., Roiko, A., Schultz, P. W., van den Bosch, M., & Fleming, L. E. (2021). Associations between green/blue spaces and mental health across 18 countries. *Scientific Reports, 11*(1), 8903-8912. https://doi.org/10.1038/s41598-021-87675-0

Whyte, K. P. (2018). Indigenous science (fiction) for the Anthropocene: Ancestral dystopias and fantasies of climate change crises. *Environment and Planning: Nature and Space, 1*(1-2), 224-242. https://doi.org/10.1177/2514848618777621

Wiedmann, T., Lenzen, M., Keyber, L. T., & Steinberger, J. K. (2020). Scientists' warning on affluence. *Nature Communications, 11*(1), 1-10. https://doi.org/10.1038/s41467-020-16941-y

Wiersma, W., & Jurs, S. (2009). *Research design in quantitative research* (8th ed.). Pearson Education.

Williams, D. (2024). *DoC spends $2.8m on reduncdancies before budget cut demand* https://newsroom.co.nz/2024/04/02/doc-spends-2-8m-on-redundancies-before-budget-cut-demand/

Williams, P. (2021). *Between the harbour and the mountain: Reflections on the ordinary and the profound*. Calico Publishing.

Wilson, A., & Osmond, J. (2024). *Rongoā Māori: Healing people and place.* Happens Films. https://happenfilms.com/film/rongoa-maori

Wilson, E. O. (1984). *Biophilia: The human bond with other species*. Harvard University Press.

Windhorst, E., & Williams, A. (2015). Growing up, naturally: The mental health legacy of early nature affiliation. *Ecopsychology, 7*(3), 115-125. https://doi.org/10.1089/eco.2015.0040

World Bank. (2024). *Poverty*. https://www.worldbank.org/en/topic/poverty/overview

World Commission on Environment and Development. (1987). *Our common future*. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Wulf, A. (2016). *The invention of nature*. Vintage.

Zalasiewicz, J., Thomas, J. A., Waters, C. N., Turner, S., & Head, M. J. (2024). The meaning of the Anthropocene: Why it matters even without a oformal geological definition. *Nature, 632*, 980-984. https://doi.org/10.1038/d41586-024-02712-y

Zealand, E. O. N. (n.d.). *Revisioning school camps PLD & DIY camping PLD*. https://eonz.org.nz/professional-development/pedagogy-and-curriculum-focus-pld/pedagogy-and-curriculum-focus-pld-2/

Zhang, Z., Stevenson, K. T., & Martin, K. L. (2022). Use of nature-based schoolyards predicts students' perceptions of schoolyards as places to support learning, play, and mental health. *Environmental Education Research*, *28*(9), 1-12. https://doi.org/10.1080/13504622.2022.2032612

Zylstra, M. J., Knight, A. T., Esler, K. J., & Le Grange, L. L. (2014). Connectedness as a core conservation concern: An interdisciplinary review of theory and a call for practice. *Springer Science Reviews, 2*, 119-143. https://doi.org/10.1007/s40362-014-0021-3

Appendix 1 – Email from NZAEE: Offer of inclusion on national database

From: [redacted] **Sent:** Thursday, 20 January 2022 2:29 PM

To: [redacted]

Subject: Environmental Education listing on NZAEE website

Kia ora

I am contacting you because you are an environmental education provider that Thea DePetris has been in contact with as part of her PhD research on Environmental Education and the practitioner community. NZ Association for Environmental Education is currently creating a new website which aims to better connect teachers, educators and providers to resources, training opportunities and each other.

With Ministry of Education funding, we are able to employ a staff member who will ensure that content is current and relevant, and our aim is for the website to become a central point for teachers and providers to go for:

- materials and resources (catalogued and collated, but often linking to external sites and providers)
- visibility of NZ-based providers and specialists, and their offers in particular areas
- events
- connection to local groups (not just NZAEE branches)

As Thea has previously outlined, we would like to incorporate the database of providers and programmes that she has developed in her study into our new website. This will make up the bulk of our provider listings, and will provide a name, region that you operate in, and a link to your website or Facebook page. **Please get in touch with me via return email by 8 February if you DO NOT want to be listed.**

Members of NZAEE have the opportunity to add extra information to their listing – adding a logo, banner photo, outline of the programme, and more information about the type of experience, issues covered, and educational levels. If you are interested in exploring this as an option, membership for small NGOs begins at $50. You can read more about NZAEE membership (on our old website) here, and use this form to join.

With our new funding and staffing, we are planning a more active programme for 2022, with termly webinars, more local networking opportunities, and our conference in the October holidays. We look forward to having you as part of the journey.

Ngā mihi nui

Appendix 2 – Questionnaire documentation (stage one)

Survey on Environmental Education for Sustainability Programmes

I invite you to participate in this online survey that is part of my PhD programme through Te Kura Toi Tangata School of Education. Part of my research is to improve our understanding of organisations that currently support the early childhood and school sectors with environmental and sustainability education.

Overview of research
There are a network of individuals, organisations and businesses that support communities and educational organisations across Aotearoa with respect to Environmental Education for Sustainability (EEfS). This includes programmes like Papa Taiao Earthcare, Enviroschools, Whitebait Connection, and Kids Greening Taupō, all working tirelessly to ensure New Zealanders are provided with environmental and sustainability educational opportunities. However, although this network is a known and valued resource by many, very little information has been systematically documented about it.

By participating in this survey, you will help identify the types and distribution of EEfS programmes across the country, including some of their respective characteristics in terms of available learning opportunities and intended outcomes (e.g., target audiences, key learning themes, etc.). Information about affiliated organisational structures and funding mechanisms will also be sought as this will be useful for developing future strategies to improve the long-term sustainability of these programmes.

Taking the survey
This survey is comprised of 23 questions and should take approximately 15 - 20 minutes of your time to complete. Some of the questions are based on outcomes achieved by your EEfS programme over the past three years. For example, Question #14 seeks information about the number of programme participants in 2018, 2019 and 2020. If you need to seek further information for questions such as this, you can close the survey and come back to it later. Your answers will be automatically saved as you complete each page of the survey and go to the next page. If you cannot source an exact answer, please take a best guess or leave it blank.

Outputs and confidentiality
The questions of this survey are organised into the following sections:
Section A - Programme Contact Details,
Section B - Programme Characteristics,
Section C - Organisational Information.

The information collected from these questions will contribute to the outputs of this research project, including a thesis, publications and presentations. I also intend to use some information from Sections A and B to inform the development of a publicly accessible database of EEfS programmes. Once decisions are made with respect to the development and ongoing maintenance of the database, you will be contacted to seek further consent for the inclusion of your respective programme. Any EEfS programme that provides consent will be included in the database, which will include contact details and some characteristics of the learning programme (i.e., similarly to what might be described in affiliated

advertising materials). All information and findings related to Section C will be kept confidential and reported anonymously, unless permission is otherwise specifically provided by the appropriate representative from your organisation.

Your rights and responsibilities as a participant

1. Your participation in this research project is voluntary.
2. If required, you will seek permission from your employer before participating.
3. Information (data) will be collected through completing the survey.
4. You will own the raw data, though the researcher, Thea DePetris, will own the interpretation and analysis of the data.
5. Once you complete the survey, you may withdraw any or all data within the following two weeks. To do this, contact me using the contact details provided below.

Consent

By submitting your completed survey, you are officially consenting to the use of any information you provide for the specified uses as described above. If you or anyone in your organisation would like further information about this research project, or have any concerns, please contact me or my research supervisor, Associate Professor Chris Eames.

Ngā mihi maioha,

Thea DePetris, PhD Candidate
School of Education
University of Waikato
Email: aad12@students.waikato.ac.nz
Phone: 0274 127 145

Assoc. Prof. Chris Eames, Supervisor
School of Education
University of Waikato
Email: chris.eames@waikato.ac.nz
Phone: 07 838 4357

SECTION A: PROGRAMME CONTACT DETAILS

Answers from all questions in this section (Q1-Q6) may be displayed on the proposed environmental education for sustainability (EEfS) database.

Q1 What is the name of the EEfS programme that you work for?

Q2 Please provide a contact email address for your programme.

Q3 Please provide a contact phone number for your programme.

Q4 Please provide the website address for your programme (if applicable).

Q5 Please provide a Facebook address for your programme (if applicable).

Q6 Is your programme part of a larger 'umbrella' organisation?

☐ Yes ☐ No ☐ Don't know

Q6b (If Yes) What is the name of your umbrella organisation?

Q6c (If Yes) What are the names of any additional EEfS programmes affiliated with your umbrella organisation (if applicable)?

SECTION B: PROGRAMME CHARACTERISTICS

The next set of questions relate to some key characteristics of the learning opportunities offered by your programme. In answering, please select all the answers that apply.

Answers from all questions in this Section (Q7 - Q11) may be displayed on the proposed EEfS database.

Q7 Which region(s) in Aotearoa does your programme deliver to?

Please select all that apply.

☐ All regions as listed below

☐ Northland ☐ Auckland ☐ Waikato ☐ Taranaki ☐ Bay of Plenty

☐ Gisborne ☐ Hawkes Bay ☐ Manawatu-Wanganui ☐ Wellington

☐ Nelson ☐ Marlborough ☐ West Coast ☐ Canterbury ☐ Otago

☐ Southland

Q8 Who are the target participant(s) of your programme and at which educational level(s)?

Please select all that apply.

	Students/tauira	Teachers/kaiako	Management	Wider community
Early childhood	☐	☐	☐	☐
Junior primary (Yrs 0-3)	☐	☐	☐	☐
Senior primary (Yrs 4-6)	☐	☐	☐	☐
Intermediate (Yrs 7-8)	☐	☐	☐	☐
Junior secondary (Yrs 9-10)	☐	☐	☐	☐
Senior secondary (Yrs 11-13)	☐	☐	☐	☐
Tertiary	☐	☐	☐	☐
Vocational	☐	☐	☐	☐
Other (please describe)	☐	☐	☐	☐

Q9 Which area(s) are a focus of your programme's learning outcomes?

Please select all that apply.

- ☐ Built environments (i.e., human settlements)
- ☐ Climate/atmosphere
- ☐ Coastal environments
- ☐ Marine environments
- ☐ Freshwater/wetland environments
- ☐ Terrestrial environments
- ☐ Other

Q10 What theme(s) are a focus of your programme's learning outcomes?

Please select all that apply.

- ☐ Biodiversity (loss or restoration of)
- ☐ Eco-building
- ☐ Climate change
- ☐ Energy
- ☐ Gardening (including food production and distribution)
- ☐ Indigenous knowledge (including mātauranga Māori)

- [ ] Nature connection
- [ ] Pollution/waste (including creation of, minimisation, elimination and clean-up)
- [ ] Problem-solving/technological solutions to environmental issues
- [ ] Regeneration and restoration
- [ ] Species-specific (including endemic, native, introduced and pests)
- [ ] Sustainable living
- [ ] Water
- [ ] Well-being
- [ ] Other (please describe)

Q11 What learning activities and opportunities are offered by your programme? Please select all that apply.

- [ ] Awards and certification programmes (including NCEA/vocational unit standards)
- [ ] Citizen science projects
- [ ] Community workshops
- [ ] Environmental audits and footprint measurements
- [ ] Environmental clubs/youth teams
- [ ] Field trips/camps/residential programmes
- [ ] In-school support (i.e., facilitation, hands-on activities, etc.)
- [ ] Learning resources
- [ ] Provision of funding
- [ ] Take action projects
- [ ] Teacher professional learning development
- [ ] Youth workshops
- [ ] Other (please describe)

SECTION C: ORGANISATIONAL INFORMATION

The next section asks questions about the features of your programme's underpinning organisational structure such as the number of years it has been in operation, staff numbers, and funding mechanisms. I will make every attempt to report the data from this Section anonymously, for example, through presenting aggregated data or using codes. No answers from the questions in this section (Q12 - Q23) will be displayed on the proposed EEfS database.

Q12 How many years has your programme been operating? (asked only to NGOs)

- ○ Zero (programme commenced in 2021)
- ○ One to two
- ○ Three to five
- ○ Six to ten
- ○ Eleven or more years

Q13 Is your programme part of a larger 'umbrella' organisation? If so, which legal structure(s) best applies to your programme? Please select all that apply. (asked only to NGOs)

- ☐ For-profit business (e.g., sole-trader, limited liability, etc.)
- ☐ Not-for-profit organisation (e.g., charity, incorporated society, etc.)
- ☐ Part of an educational institution (e.g., polytechnic, university, wānanga, etc.)
- ☐ ⊘ Don't know
- ☐ Other

Q14 For each year listed, approximately how many total participants were involved in your programme?

	⊘ Zero	1 to 500	501 to 1,500	Greater than 1,500
2018	○	○	○	○
2019	○	○	○	○
2020	○	○	○	○

Q15 At present, how many full-time employees (i.e., those who work 30 or more hrs/wk) are employed by your programme?

○ Zero ○ Three to five

○ One to two ○ Six or more

Q16 At present, how many part-time employees (i.e., those who work less than 30 hrs/wk) are employed by your programme?

○ Zero ○ Three to five

○ One to two ○ Six or more

Q17 At present, how many volunteers contribute to your programme on a regular basis (i.e., those who volunteer at least 2 hr/month or 24 hr/annum)?

○ Zero ○ Three to five

○ One to two ○ Six or more

Q18 Are the employed practitioner(s) who deliver your programme offered formal professional development opportunities (e.g., workshops, conferences, courses, etc.)?

☐ Yes ☐ No ☐ Don't know

Q18b (If Yes) Please indicate how frequently each of the listed providers were used to support practitioner professional development for your programme **over the past three years.**

	Never	One to two	Three to four	Five or more
Professional conferences (e.g., Natural Phenomena Conference)	○	○	○	○
Non-governmental and/or community organisations	○	○	○	○
Formal education organisations (e.g., tertiary providers)	○	○	○	○
Corporate/businesses	○	○	○	○
Local/territorial councils	○	○	○	○
Regional councils	○	○	○	○
Central goverment agencies	○	○	○	○
Self-provision (i.e., organised/led by internal staff)	○	○	○	○
Other (please describe)	○	○	○	○

Q18c Please specify which central government agencies supported the professional development provision for your programme. Please select all that apply.

- ☐ Department of Conservation / Te Papa Atawhi
- ☐ Ministry of Business, Innovation and Employment / Hīkina Whakatutuki
- ☐ Ministry for Children / Oranga Tamariki
- ☐ Ministry of Education / Te Tāhuhu o te Mātauranga
- ☐ Ministry for the Environment / Manatū mō te Taiao
- ☐ Ministry of Health / Manatū Hauora
- ☐ Ministry of Māori Development / Te Puni Kōkiri
- ☐ Ministry for Pacific Peoples / Te Manatū mō ngā Iwi o te Moana-nui-ā-Kiwa
- ☐ Ministry of Primary Industries / Manatū Ahu Matua
- ☐ Ministry of Social Development / Te Manatū Whakahiato Ora
- ☐ Other (please describe)

Q19 What types of external assistance/support was received for your programme from each of these organisations **over the past three years**? Please select all that apply.

	No support was received	Funding	Equipment/Resources	Expert knowledge and advice
Community-supported (i.e., supported by local donations)	☐	☐	☐	☐
Philanthropic trusts/foundations/grants	☐	☐	☐	☐
Local/territorial councils	☐	☐	☐	☐
Regional councils	☐	☐	☐	☐
Central government agencies	☐	☐	☐	☐
Corporate /businesses	☐	☐	☐	☐
Other	☐	☐	☐	☐

Q19b (If Yes) Please specify which central government agencies provided external assistance/support (including funding) for your programme. Select all that apply.

- ☐ Department of Conservation / Te Papa Atawhi
- ☐ Ministry of Business, Innovation and Employment / Hīkina Whakatutuki
- ☐ Ministry for Children / Oranga Tamariki
- ☐ Ministry of Education / Te Tāhuhu o te Mātauranga
- ☐ Ministry for the Environment / Manatū mō te Taiao
- ☐ Ministry of Health / Manatū Hauora
- ☐ Ministry of Māori Development / Te Puni Kōkiri
- ☐ Ministry for Pacific Peoples / Te Manatū mō ngā Iwi o te Moana-nui-ā-Kiwa
- ☐ Ministry of Primary Industries / Manatū Ahu Matua
- ☐ Ministry of Social Development / Te Manatū Whakahiato Ora
- ☐ Other (please describe)

Q20 Please indicate approximately how much **actual** funding (i.e., excluding in-kind donations) have you received for your programme from each these sources over **your past three financial years**. Note: for programmes operating less than three years, please provide total amounts received from each source to date.

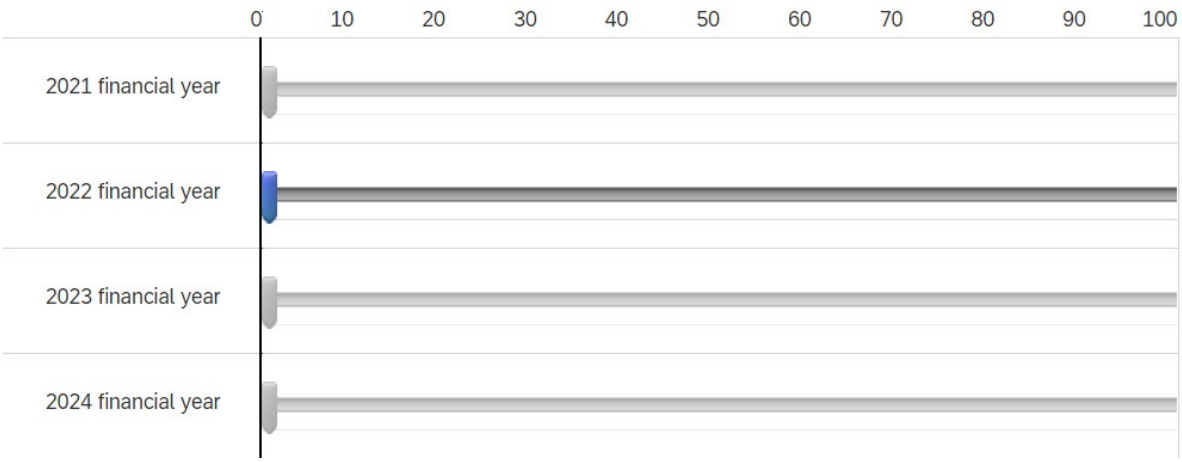
	No funding was received	$1 to $10,000	$10,001 to $50,000	$50,001 to $100,000	Greater than $100,000
User pays	○	○	○	○	○
Community-funded (i.e., supported by local donations)	○	○	○	○	○
Philanthropic trusts/foundations/grants	○	○	○	○	○
Local/territorial councils	○	○	○	○	○
Regional councils	○	○	○	○	○
Central government agencies	○	○	○	○	○
Corporate /businesses	○	○	○	○	○
Other	○	○	○	○	○

Q20b Please specify which central government agencies provided **funding** to your programme.

Select all that apply.

- ☐ Department of Conservation / Te Papa Atawhi
- ☐ Ministry of Business, Innovation and Employment / Hīkina Whakatutuki
- ☐ Ministry for Children / Oranga Tamariki
- ☐ Ministry of Education / Te Tāhuhu o te Mātauranga
- ☐ Ministry for the Environment / Manatū mō te Taiao
- ☐ Ministry of Health / Manatū Hauora
- ☐ Ministry of Māori Development / Te Puni Kōkiri
- ☐ Ministry for Pacific Peoples / Te Manatū mō ngā Iwi o te Moana-nui-ā-Kiwa
- ☐ Ministry of Primary Industries / Manatū Ahu Matua
- ☐ Ministry of Social Development / Te Manatū Whakahiato Ora
- ☐ Other (please describe)

Q21 Approximately what percentage of your programme's operational costs for the following time periods have already been secured (i.e., through your organisation and/or via other external support)?



Q22 Listed below are some types of tools and assistance that might help EEfS programmes like yours, achieve their respective objectives and vision. By dragging and dropping, please rank these in terms of most to least beneficial for supporting EEfS programmes (i.e., drag the most beneficial to the top of the list and least beneficial to the bottom, etc).

Award schemes (e.g. programme recognition schemes)	1
Long-term funding allocation	2
Professional development opportunities	3
Programme certification	4
Educational resource provision/sharing	5
Support for networking/collaboration at a local/regional scale	6
Support for networking/collaboration at a national scale	7

SECTION D: OPEN RESPONSE OPPORTUNITY

Q23 Please provide any ideas you have in relation to this survey and/or about the network of EEfS programmes across Aotearoa.

Thank you so much for your contributions.
Your responses have been recorded.
If you have any other comments, questions or concerns, please feel free to email me:
aad12@students.waikato.ac.nz

Appendix 3 – Questionnaire documentation (stage two)

From: Thea DePetris <aad12@students.waikato.ac.nz>
Sent: Monday, 22 November 2021 9:53 am
To: Thea DePetris <aad12@students.waikato.ac.nz>
Subject: Research about Nature Connection

Kia ora koutou

Many of you participated in a survey I recently undertook about the network of environmental and sustainability organisations that support educational organisations across Aotearoa New Zealand. One of the most interesting findings to have emerged from your feedback was that **80% of participating environmental education organisations (non-governmental) identified nature connection as an important aspect of their programmes**. As part of this on-going study, I am hoping you, as a representative of your organisation, will answer just two questions here about nature connection by Monday, 6th December 2021. You can write as little or as much as you like. This link also includes a short introduction, including your rights as a participant and matters of confidentiality. If you are willing to participate in an interview with me about nature connection, there is a place in the above link to provide your contact details.

Nature connection is a well-established concept describing a person's perceived connection to the non-human world. There is a wide range of information about the benefits of nature connection, particularly in relation to childhood development, but less evidence and advice about how to effectively develop nature connection. Due to the demonstrated interest in nature connection by environmental education organisations across the country, as well as the known relationship between connecting to and caring for the environment, the next stage of my research will explore understandings and beliefs in relation to this concept and ways used to develop it across Aotearoa New Zealand.

Thank you for connecting with me and offering your insights through the course of this project! Plans are being laid to incorporate the database of environmental and sustainability education programmes that many of you have helped co-construct into the New Zealand Association of Environmental Education's website. Your continued contributions of additional programmes not yet included on the database are highly useful, so please feel free to continue to connect.

--

Ngā mihi nui…

Appendix 4– Interview schedule and research information sheet (stage three)

PhD Research Topic: Nature-based education

An outline of the study to date

This study aims to improve understanding of organisations that support the early childhood and school sectors with respect to environmental and sustainability education across Aotearoa New Zealand. As part of this study, two questionnaires were sent out to organisations working with ECE and schools/kura to support environmental and sustainability education. Findings from the first questionnaire provided an understanding about the structure of these organisations, the ways through which they are funded and the outreach, content and delivery mode of their educational programmes. It was of particular interest to me that 80% of participating organisations reported that connecting learners to nature was a priority learning outcome with respect to their education programmes. This learning outcome was selected by the greatest number of organisations, even outnumbering those that prioritised wellbeing and climate change outcomes which have received much attention in media and education policy of recent times. Thereafter, analysis of the data collected through the second questionnaire illuminated a collective belief amongst participating organisations that fostering a feeling of kinship with nature (i.e., nature connectedness) through a nature-based approach is a critical component to educating for a more sustainable future.

Why get involved?

The next stage of this study will involve interviewing selected representatives from these organisations to explore how nature-based education may currently be being used across the country to develop environmental and sustainability education outcomes in children and adolescents. Nature-based education, or learning through exposure to nature and nature-based activities, occurs in natural settings and in other places where elements of nature have been brought into built environments, such as plants, animals, and water.

The findings from this study will provide a comprehensive baseline of understanding about current nature-based practices and perceived outcomes. The interviews will provide a foundation for future research to evaluate the teaching and learning strategies used through a nature-based approach for developing the critical outcomes that underpin sustainable ways of knowing, living and being.

The interview

If you would like to be involved, I would appreciate approximately one hour of your time for participation in an online interview via Zoom (or via Teams if you prefer). An outline of the main questions that will guide our discussion during the interview process is provided at the end of this document. Please note that other questions may be asked depending on where our conversation takes us. With your permission, I will record the interview so that I can transcribe our conversation and send it to you for verification and making amendments where you see fit.

Confidentiality

Information collected during the study will be used for a PhD thesis and journal publications. Additional outputs may include reports, online blogs and/or presentations at the likes of community events, conferences etc. In efforts to maintain confidentiality, your name and your organisation will not be used in any of these outputs, but instead, referred to simply through a generic label such as "a non-governmental representative". However, due to the small and connected nature of the community of environmental and sustainability education organisations, confidentiality cannot be guaranteed because some of the reporting detail (e.g., a specific example) may mean that a participant/organisation can nonetheless be recognised. You may wish to consider this when reviewing your transcript. All information gathered from you will be securely stored. Your rights and responsibilities as a participant are as follow:

1. Your participation in this research project is voluntary.
2. If required, you will seek permission from your employer before participating.
3. Information (data) will be in the form of the interview transcript.
4. You can stop the interview at any time, and you may choose not to answer any question/s.
5. You will own the raw data, though the researcher, Thea DePetris, will own the interpretation and analysis of the data.

6. Once you have received the transcription of our interview, you may amend or withdraw any or all data within the following two weeks. To do this, please contact me using the contact details provided below.

Your consent

The email correspondence between us will serve as your consent to be interviewed in accordance with the information as set out in this Research Information Sheet. If you would like more details about the project or have any questions or concerns about your involvement in it, please don't hesitate to contact me. If I am not able to resolve any concerns you may have about the study, you can contact my research supervisor, Associate Professor Chris Eames.

Yours sincerely

Thea DePetris

Contact details

Thea DePetris, PhD candidate	Assoc. Prof Dr. Chris Eames, Supervisor
School of Education	School of Education
University of Waikato	University of Waikato
Email: aad12@students.waikato.ac.nz	Email: chris.eames@waikato.ac.nz
Phone: 0274 127 145	Phone 07 838 4357

Indicative Interview Questions

A. General questions about your organisation(s) and affiliated education programme(s)

A1. Please tell me about yourself in relation to your work with environmental and sustainability education.

A2. So we can share a common language during this interview, please tell me how your organisation refers to learning and teaching about the environment and sustainability? (E.g., environmental education, environmental and sustainability education, etc.)

A3. Please tell me a bit more about the environmental and education programme(s) that your organisation offers?

-Would you say any of these programmes are nature-based?

-In your opinion, what defines a nature-based programme?

A4. What does nature connection mean to you? Is developing nature connection an important outcome of your programmes? Tell me more.

A5. In your opinion, what is the purpose of education?

A6. Do you think the formal education system influences nature connection? If so, in what ways?

B. Nature-based education programmes

B1. With respect to your nature-based programme(s), what happens during these programmes and who is involved? Do the ways in which your organisation use a nature-based approach change according to the age of the learners?

B2. What outcomes does your organisation most hope to achieve through its nature-based programmes?

B3. Do you think the integration of nature-based education is feasible across all levels of the formal school context (i.e., early childhood - senior secondary)? What might a nature-based approach look like between the different levels of schooling?

B4. What is the significance of nature connection and nature-based education in today's age?

C. Increasing awareness and evaluation

C1. Does your organisation evaluate its nature-based programmes? If yes, how is this evaluation undertaken and what has it demonstrated? If not, what prevents your organisation from doing so?

C2. Do you think there is a need to increase awareness about the benefits of nature connection and nature-based education? If so, to whom? Please explain your reasoning.

Appendix 5 - Confirmation of Ethics Approval

Te Wānanga Toi Tangata
Division of Education
The University of Waikato
Private Bag 3105
Hamilton,
New Zealand, 3240

Division of Education Research
Ethics Committee (DEREC)
fedu.ethics@waikato.ac.nz
www.waikato.ac.nz

THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

11/1/2021

Dear Thea DePetris

Division of Education Research Ethics Committee Application Approved
FEDU001/21

I am pleased to advise you that your ethics application for the project entitled "A learning progression for sustainability: As seen through the 'eyes' of a practitioner community in Aotearoa New Zealand" was approved by Te Wānanga Toi Tangata Division of Education Research Ethics Committee on January 11th, 2021.

Please be aware that the Te Wānanga Toi Tangata Division of Education Research Ethics Committee must be advised (by memo) of any changes to the details recorded in your ethics application. Please send any such advice to fedu.ethics@waikato.ac.nz. You will receive a memo of approval once the change(s) has been considered.

Kind regards

Co-chairs
Te Wānanga Toi Tangata Division of Education Research Ethics Committee (DEREC)

Appendix 6 – Example from Database: EEOs identified for the Northland region

Programme Name	Organisational Name	Website	FaceBook	Contact Person	Email	Phone Number
Aroha Island	Aroha Island	www.arohaisland.co.nz	@Aroha Island Eco Centre & Holiday Accommodation			
Bream Bay Coastal Care Trust	Bream Bay Coastal Care Trust	www.coastalrestorationtrust.org.nz/coast-care-groups	@Bream Bay Coastal Care Trust			
Breamhead Conservation Trust	Breamhead Conservation Trus	www.breamheadtrust.nz	@coastalkaitiaki			
Coastal Kaitiaki	Ngunguru School and Tutukal	www.ngunguru.school.nz				
Dragonfly Springs Wetlands Reserve	Dragonfly Springs Wetlands Reserve	www.dragonflysprings.co.nz	@Dragonfly Springs Wetland Sanctuary			
Ecosolutions	CBEC Enterprise	www.ecosolutions.org.nz	@cbec.ecosolutions			
Far North REAP Environmental	Far North Reap	www.farnorthreap.org.nz	@FNREAP			
FishForever	FishForever	www.fishforever.org.nz	@fishforever.northland			
Green Footed Kiwi	Trefoil Park	www.kiwibusinesslisting.com/greenfootedkiw	@greenfootedkiwi			
Integrated Field Trips	Integrated Field Trips					
Junior Fisheries Officers	Junior Fisheries Officers	N/A				
Kaitiaki Whangaroa	Kaitiaki Whangaroa	www.whangaroakaitiaki.co.nz/	@kaitiakiwhangaroa			
Kayak Tours	Pacific Coast Kayaks	www.nzseakayaking.co.nz	@Pacific Coast Kayaks NZ			
Kiwi Coast	Kiwi Coast	www.kiwicoast.org.nz/education	@kiwi coast			
KiwiNorth	Kiwi North	www.kiwinorth.co.nz	@kiwinorth			
Kukupa Education Programme	Kukupa Education Programme	N/A				
Matakohe Limestone Island	Matakohe Limestone Island	www.limestoneisland.org.nz	@MatakoheLimestoneIsland			
Miro Tapui	Miro Tapui	N/A				
Ocean Spirit	Ocean Spirit Hauora Moana	www.oceanspirit.org	@Ocean-Spirit			
ōnuku	ōnuku	https://www.onukuaotearoa.co.nz/	@Onuku			
Project Island Song	Project Island Song	www.projectislandsong.co.nz	@Project.IslandSong			
Pukenui Western Hills	Pukenui Western Hills Charital	www.pukenuitrust.org.nz	@pukenuiforest			
Russell Orongo Bay Holiday Pa	Russell Orongo Bay Holiday P.	www.russellaccommodation.co.nz				
Safe Outdoors NZ Ltd	Safe Outdoors NZ Ltd	www.safeoutdoors.co.nz	@Sae Outdoors NZ Ltd			
Tangihua Lions Lodge Trust Incorporated	Tangihua Lions Lodge Trust Incorporated	www.thelionslodge.co.nz	@Russell-Orongo Bay Holiday Park			
Tahi Nature Sanctuary	Tahi Nature Sanctuary	www.tahinz.com	@TahiHoneyNewZealand			
Te Tai Tokerau Debris Monitori	Te Tai Tokerau Debris Monitor	www.tttdmp-northtec.hub.arcgis.com	@tttdmp			
Tiakina Whangarei	Tiakina Whangarei	www.tiakinawhangarei.co.nz	@TiakinaWhangarei			
TriOceans	TriOceans	www.trioceans.org	@TriOceans			
Tutukaka Land Care	Tutukaka Land Care	www.tutukakalandcare.org.nz	@TutukakaLandCare			

Programmes highlighted yellow have been added since the questionnaire was distributed in June 2021

Programmes highlighted in red have closed since the questionnaire was distributed in June 2021

Note: No governmental organisations in Northland were included in this spreadsheet because Northland council authorities were identified as contracting external EEOs for the provision of EE programmes.

Appendix 7 – Stage two process codes aligning with experiential connection

The list below is comprised of process codes developed through analysis of stage two data that aligned with physical experiences of connecting with nature. These codes were applied to responses from the EEOs (n = 59) who responded to the question 'How does your organisation develop nature connection in learners and why does it do it in this way/these ways?' Some other responses of a more general nature, that may not have fully aligned with physical experiences, have been removed from this list, such as 'learning from indigenous people' and 'taking action'. Although responses like these can and often do relate to physical experiences, they could have also implied more cognitive experiences like listening to narratives from indigenous people or taking action for nature by writing submissions.

1. Learning in the environment
2. Gardening
3. Walking in the forest with experts
4. Doing and touching in nature
5. Engaging with all things Papatūānuku
6. Getting up close to non-human species
7. Experiencing flora and fauna
8. Playing freely in nature
9. Restoring nature
10. Utilising a local outdoor learning experience
11. Immersing in nature
12. Tapping into multiple senses outdoors
13. Spending time outside exploring interconnections
14. Looking after Te Taiao
15. Taking hands-on action on issues
16. Participating in restoration projects to see the impact
17. Gaining an appreciation of how everything in nature is connected
18. Being with nature, restoring nature, learning from nature (and self)
19. Being in nature
20. Being in nature for a week at time
21. Being in places with a strong mauri (national parks)
22. Exploring different environments, in different ways
23. Implementing local curriculum e.g., being in, understanding, connecting to
24. Demonstrate kaitiakitanga through restoration
25. Providing opportunities and inspiration to use nature spaces
26. Promoting health and wellbeing through nature access
27. Visiting the Taio everyday
28. Giving multisensory experiences
29. Observing waste turn into composts

30. Equipping [teachers] with resources to get outside
31. Providing immersive experiences
32. Experiencing hands-on, outdoor activities
33. Playing in nature
34. Encouraging young to play in nature
35. Restoring nature
36. Planting seeds
37. Getting out in nature and doing something positive
38. Removing all obstacles to outdoor conservation experiences
39. Visiting animals and regeneration lands
40. Taking time to be still and listen to nature speak to us
41. Getting students to actively care for it.
42. Doing real stuff outside the classroom
43. Looking after Papatuanuku through hands-on gardening
44. Providing events to connect families in nature
45. Designing programmes where students are immersed in nature
46. Spending time in nature in positive ways to develop connection and appreciation
47. Connecting to and touching the soil
48. Providing connection opportunities in nature spaces and with species to connect
49. Creating mindful moments for listening and noticing the sounds of nature.