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A diffractive ethnography of early childhood-nature relations in Scottish school-based outdoor learning

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Abstract

In response to the interconnected ecological and climate emergencies there are increasingly strident calls for a refiguring of dominant human-nature relations in global education and environmental policy. Experiences of nature in early childhood have been identified as potentially influential in how this relationality emerges throughout the life course.

In Scotland, policy and practice frameworks situate outdoor learning and play as central to early childhood education (from birth to 8 years-old) and as pedagogical approaches for delivering a purposeful and holistic curriculum capable of supporting transitions to healthier, more respectful relations with Earth. There is an increasing body of international research investigating children's experiences with nature in early learning and childcare settings, but there is limited understanding of how this is enacted in the first years of school.

Through multimodal, diffractive ethnography, this study investigated how teachers and children at two schools came to know their outdoor learning environments, and, following further analysis, identified implications for broader human-nature relationality. The guiding research approach drew respectfully and pragmatically on old ontologies, children's worldings and posthumanist critical theory to incorporate non-human actors into the investigation. It began with a mapping of how child-nature relations are implicated in education and sustainability discourses, which supported the development of a research assemblage capable of working against human-nature dualisms and the romanticisation of child-nature relations. Video and ethnographic observations were used to record the processes of outdoor learning in different contexts with 4–7 year-olds and their teachers, which form the basis of diffractive readings of the phenomenon 'human-nature relations in school-based outdoor learning'.

Rather than pursue one fixed understanding of key themes, these readings were used to create interference patterns around specific topics. Such patterns expressed the emergence of multiple natures through intra-action between indoor and outdoor learning environments; direct and indirect experience; and communication between teachers, children and non-human agents. Child-teacher commoning, collecting and play were identified as significant pedagogical processes which were all in relation with a spectrum of educational intention/attention. As such, the research shows that outdoor learning has potential as a site for meaningful commoning activity between teachers, children, and non-human nature, which will shape children's relations with the world. However, the findings also show that human-nature relations can be incoherent across socio-cultural and ecological contexts in schools, which may limit the potential for meaningful learning for sustainability. While practice guidance in Scotland appears to support outdoor learning pedagogies which could have positive impacts on human-nature relations in early childhood, capacity for this potential to emerge in schools is currently limited by structural elements such as class sizes, staff ratios and school design.

Keywords: outdoor learning; childhood-nature; learning for sustainability; early childhood education; ethnography

Lay Summary

The climate and biodiversity emergencies are at root caused by how humans in dominant societies relate to the Earth's systems and the rest of nature. One path to ways of living which are less ecologically damaging involves changing how we understand nature's contributions to people, and the ways that we understand our relationship with Earth. Experiences of nature in early childhood have been identified as potentially influential in how this relationality emerges throughout the life course.

In Scotland, outdoor learning and play are valued in early childhood education (from birth to 8 years-old) to deliver the curriculum and nurture healthy relationships with nature. There is an increasing body of international research investigating children's experiences with nature in early learning and childcare settings, and significant evidence of the instrumental benefits of outdoor learning but there is limited understanding of what happens in the first years of school in terms of children's relationships with nature.

This exploratory study involved using video and observations to record the everyday processes of outdoor learning in school grounds and local greenspace with 4–7 year-olds and their teachers at two schools in Scotland. Rather than just focus on the human interactions and meanings that emerged, data collection and analysis aimed to include the non-human things, beings and matter which were involved too. These observations were then read alongside policies, practice guidance and other research to create interference patterns around specific topics, like when you throw multiple stones into a pond. This process showed that the children in the study related to lots of different, sometimes conflicting forms of nature through direct and indirect experiences and communication between teachers, children and non-humans.

Processes including attending to things together, collecting and play were identified as important, but the findings also show that human-nature relations can be incoherent across socio-cultural and ecological contexts in schools, which may limit the potential for meaningful learning for sustainability. While practice guidance in Scotland appears to support ways of learning outdoors which could have positive impacts on human-nature relations in early childhood, capacity for this potential to emerge in schools is currently limited by things such as class sizes, staff ratios and school design.

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1. Introduction

This PhD thesis is about nature, childhood and the first years of school in Scotland.

1.1 Putting the school on the map

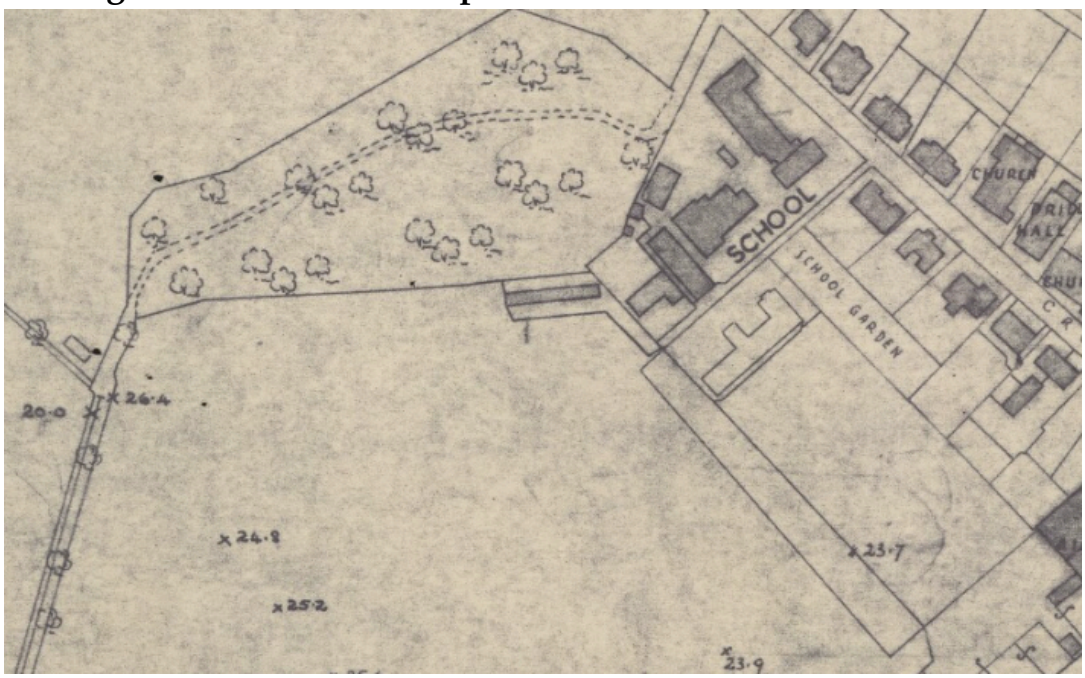

Image 1.1 a map showing the location of a school in a village.

This is a map from 1948. It is as good a place to start as any. There is a **SCHOOL**, and there is a SCHOOL GARDEN. There is open space, a path through mature woodland, fields, direct links to the local human and non-human communities of this small Scottish market town. Jump forward some seventy years, and it is pretty much all still there. The oaks are the same ones marked on the map. In the garden, the apple and ash trees have shaded multiple generations as the town grew and shifted with them. Vegetable beds have been re-arranged and re-painted as passionate teachers and parents came and went, and a small polytunnel has claimed one corner, but the sun moves across the garden at the same pace and the buildings are largely still the same, despite constant promises of a new school. Looking at it like this, 1948 does not feel that long ago. In archive pictures of the town square, I recognise the buildings in form if not function. I can match satellite images of the school buildings to this hand drawn paper map, and I could chat to folk in the coffee shop who played in those woods and ran around that playground as children. On the surface, the role that the school plays in the community has not shifted much. But at the same time, everything has changed.

Education has changed. The social conditions which were so shaken up in 1948 were at the heart of these changes, but arguably had less impact on the first years of formal education, where the daily routines of schools like this remained firmly rooted in Victorian ways of doing things well into the second half of the century (Anderson,

2018), maybe even up to the present day. Rising birth rates, expanded teacher training, the fading of industrial political economies and the introduction of more child-centred pedagogies made for a messy milieux where radical ways of thinking about the purposes and practices of education failed to fully shift the status quo. Now, we have national aspirations to ensure that "[o]ur schools are loving, respectful and encouraging places where everyone can learn, play and flourish" (Scottish Government, 2020a, para. 3) and a curriculum which has the potential to be a vehicle for transformative change, but is enacted by educators who are already stretched and yet perceived as responsible for an increasingly broad range of experiences in a high stakes system. This goes beyond individual life courses and career prospects: education in Scotland and beyond can and must play a role in responding to global crises. Even explicitly humanist institutions such as the United Nations Educational, Scientific and Cultural Organisation (UNESCO) state that "[e]ducation must be about learning to live on a planet under pressure" (2015, p.3) and that "radical change is needed in the design of education systems, the organization of schools and other educational institutions, and curriculum and pedagogical approaches" (UNESCO, 2021, p.5).

Childhoods have changed. Children are perceived as being less active, less connected to nature, and spending less time engaged in free play, particularly outdoors, with some evidence supporting these perspectives (Clements, 2004; England Marketing, 2009; Myers, 2012). There is an inherent tension in the ways that children's physical independent ranges seem to have constricted (England Marketing, 2009), while multiple worlds simultaneously open up to them through technology, media and globalisation. Based on these changes, we can assume that there would be some differences in the ways that at least some of the children of today relate to the places marked on that map - the trees, the school, the church, the park - but this also calls into question what remains consistent, and why, in children's experiences of place and environments. The ways in which childhoods are understood and investigated has also shifted drastically, due in part to developments in social and neuro- sciences. In principle, and increasingly in legislation (United Nations, 1989; Children and Young People (Scotland) Act, 2014; Scottish Parliament, 2021) and practice (Education Scotland 2020), children are no longer considered as mini, or developing adults, but the degree to which this plays out in children's lived experiences is open for debate. Recent developments in childhood studies push educators and researchers to think beyond universalising discourses towards the unique and rich ways that children come to know the world through their relations with specific socio-material contexts (Cutter-Mackenzie-Knowles, et al., 2018; Murris, 2016; Common Worlds Research Collective, 2021).

The planet has changed. The postwar archive photos show two cars passing through the central square of this town. Today, it is a constant flow, and the square is really just a road and a car park, made pretty by cherry blossom. That has implications beyond the emissions from internal combustion engines and takes us past the bounds

of the local. There are heavy lorries moving timber, gravel, animals; people are driving to work, to shop, to consume; gig-economy van drivers deliver next-day parcels containing consumer goods which are tiny nodes in vast global networks centred around profit; roadside verges and hedges are cut to privilege speed and safety over biodiversity; the tractors rumbling through hint at how the agricultural land is managed more intensely. The visible, local changes are nothing in comparison to the unseen, distant ones. In 1948, global atmospheric concentrations of carbon dioxide (CO_2) were 311.57 parts per million (ppm); by 2020 they have risen to 414.24 ppm, (Tans & Keeling, 2021), contributing to global heating and the disruption of multiple Earth systems with serious implications for life on our planet. Even since 1992, 49% of species in Scotland have decreased in abundance, and globally, there has been "an average 68% fall in monitored populations of mammals, birds, amphibians, reptiles and fish between 1970- and 2016" (World Wildlife Fund, 2020, p. 4). Humans are struggling even to measure the decline in insect abundance, diversity and biomass (Didham et al., 2020). There is potential to reverse biodiversity loss and mitigate, then adapt to climate change without negative impacts on social and environmental justice, but models suggest that this is only possible with transformational changes in the ways that we live on the planet (United Nations, 2015; IPBES, 2019a). This is especially true in dominant societies (WWF, 2020), which have been functioning with an ecological footprint far exceeding the regenerative capacity of Earth for many decades (Global Footprint Network, 2021). When we look back at that map, made 64 years ago, we must be mindful of how much has changed, and also of how fast things can change when dynamic systems are placed under strain. This can simultaneously be a source of fear and of hope.

Education "is directly implicated in the crises of the Anthropocene and our failure to imagine alternatives" (Common Worlds Research Collective, 2021, p. 2), but can still respond to these changes and act as an agent of transformative change itself. As UNESCO's International Commission on the Futures of Education is beginning to report in a global context, a significant shift in the way we do schooling is required in order for education to be approached as a common good which works to honour and promote human rights through care-full practices, "rethinking how we approach our interdependencies with one another, but also with the planet and with technology" (UNESCO, 2021, p.2).

Dominant considerations of education operate primarily in humanist frameworks, both in terms of processes and purpose. Within these, education broadly continues to function in three domains: qualification, socialisation and subjectification (Biesta, 2009). Biesta calls for critical consideration of the "multidimensionality of educational purpose" (2013, p. 128, italics in original) across these three domains, but if education is to play a significant role in transformative change for earthly survival, then shifting human-nature relations towards more sustainable, caring, healthy or regenerative ways of being must become a central purpose of education (Bai & Romanycia, 2016; Common Worlds Research Collective, 2021; UNESCO, 2021). Purpose is "a rare focus

area in the field of education" (Cook, 2018, p.2), but there are some examples of how purpose is foregrounded in educational responses to environmental and social justice crises, particularly in the socialisation domain, such as education for sustainable development, learning for sustainability, environmental education and global citizenship education (UNESCO, 2020). However, in practice, even well-intentioned responses can be co-opted by neo-liberal forces (Jickling & Wals, 2008; Ideland, 2018), meaning that shifts in educational purpose may be limited by tensions with dominant political economies and universalising values in the socialisation domain, or the shifting roles of early learning and childcare settings, the school and individual teachers in the subjectification domain. In education research, limited attention has been paid to how processes (e.g. of pedagogy, development, perception and becoming) change alongside purpose.

In tandem with the need to re-purpose formal education, as we deepen our understanding of (or re-member) the reciprocal relationships between humans and the rest of nature, increasing numbers of educators, researchers and policy makers are highlighting the limitations of exclusively humanist (and euro-centric) ways of thinking about education and childhoods (e.g. Cajete, 1994, 1999; Somerville, 2018; Mckenzie & Bieler, 2016; Myers, 2015; Lenz Taguchi & Palmer, 2013; Tesar & Arndt, 2016). Being able to take educational thinking beyond the bounds of a distinct human subject or how that human subject connects or interacts with the world around them, and instead focus on interspecies relationality, ethical entanglement and the emergence of different ways of being in the world holds significant potential, but is a challenging proposition for entrenched educational systems. As Donna Haraway suggests, thinking this way with education calls into question what 'matters', and what influences learning and development across and beyond those three domains:

> It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories.
>
> Haraway, 2016, p.12

1.2 Early childhood education and outdoor learning

So what has this got to do with that map? The position of the school and the 'greenspaces' around it hint at places where children and teachers in the here and now might explore those notions of planetary interdependency. As I have briefly outlined, even since 1948, times have changed: curricula and pedagogies have developed in response. How are children coming to know the world around them through their

experiences with these curricula, places and pedagogies?

One way of beginning to explore 'what matters' is to pay closer attention to the socio-material environments in which education takes place. Early childhood education (ECE) in particular has a significant lineage of research and practice which attends closely to how environments and materials affect learning and development. This may be because early childhood is more obviously situated and relational than other stages of development, or perhaps it is because it has long been analysed from ecological perspectives (Reed, 1997, Bronfenbrenner, 1996) and specific approaches have been intrinsically tied to specific learning environments (e.g. Froebel, Montessori, Reggio). Just by thinking literally with that Haraway quote, it is easy to envisage the materials (play dough, sticks, soil, plastic, farm toys, rabbit teddies, stones), stories (cat-police-officers driving cars, kelpies, origin stories, place-specific traditional stories about local ecologies, fairies) and relational ties (to friends, grandparents, carers, schools, places) that come together to create diverse childhoods.

Specifically, early childhood experiences of outdoor spaces and nature have emerged as one key node for thinking about how education, environment(s) and childhood(s) come together in ways which affect things like conservation behaviours (Chawla & Derr, 2012), identity, nature-connection through the life course (Wells & Leckie, 2006) and more recently, ways of living in the Anthropocene (Wolff, et al., 2020). This is important work, but tangible timescales help to highlight the implications of this type of research: The UNESCO commission was tasked with envisioning education in 2050. My son Seoras is 7 years old now, so in 2050 he will be 34, the age I am now. Are he and his peers having the sort of early childhood that will nurture the skills and values for "an interdependent, caring, common future" (UNESCO, 2021, p. 3)?

One of the central discourses at play in this research is related to children's direct experiences of the natural world and other contexts, which are generally perceived as limited in comparison to previous generations (Soga & Gaston, 2016). Importantly though, particularly in terms of developing pro-environmental or conservation behaviours, studies suggest that it is not just nature which yields these effects; social contexts and adult role models are key actuators (Reed, 1996; Chawla & Derr, 2012). Childhood development is figured in different ways around the world, but dominant (minority) models advocate holistic and ecological ways of understanding the process with the child at the centre, interacting with and learning from experiences with different social contexts and actors. In Scotland, a neoliberal policy landscape means that formal education settings such as schools and early learning and childcare (ELC) settings are seen as increasingly important sites in the educational domains of socialisation and subjectification. However, mass schooling like this has been largely ineffective in shifting social norms as fast or as far as is necessary towards a situation where citizens of dominant countries live within planetary boundaries (Bai & Romanycia, 2015). In these formal ECE contexts, experiences of 'nature' or outdoor

environments are increasingly perceived as valuable, contributing to effective learning (Kuo, Barnes & Jordan, 2019), health and wellbeing outcomes (Sando & Sandseter, 2020) and the development of children's environmental identity (Clayton, 2012). While the evidence supporting these perceptions is limited and motivations vary nationally and internationally (Waite, 2020), there is general consensus that time spent in natural environments should be a central part of childhood in Scotland (Scotland's Outdoor Play and Learning Coalition, 2019), and ELC settings and schools are already working to incorporate this in different ways (Care Inspectorate, 2016; Education Scotland, 2020; Scottish Government, 2020c).

Here in Scotland, the curriculum and an integrated approach of learning for sustainability (LfS) appear well positioned to deliver an education which might respond to the needs of the planet. In policy and practice terms, outdoor learning is often positioned as a key characteristic of 'Learning for Sustainability', alongside education for sustainable development and global citizenship education (Higgins & Christie, 2018). This is an entitlement of all learners (Scottish Government, 2016) and, as such, has potential to form a significant part of young children's experiences of the natural world. However, the term outdoor learning covers a lot of different experiences (Mannion, et al., 2015; Waite, 2020), and the diversity of settings, practice and purposes makes it hard to say whether, or how outdoor learning at school affects the ways young children come to know nature. While there is a growing evidence base around outcomes of time spent in greenspaces or connecting with nature at a more general level, little research has concentrated on the relationality of teachers, children and non-human actors during outdoor learning at school, particularly in Scotland. This means we know more about 'measurable' (correlational) outcomes than the processes that occur in relation to place, experience and pedagogies, all of which are valuable in informing and supporting practice.

There is also limited research which pays close attention to the *specifics* of outdoor environments as relational assemblages. In many studies, nature, outdoors, forest school or greenspace become synonymous and generalised, which may have unseen impacts on educators practice and children's experiences. This is especially true in ECE when it comes to learning for sustainability, as experiences in and about nature may be perceived by educators to be all that is needed to nurture healthy human-planet relations (Elliot, 2012; Elliot & Davis, 2009). While there is an argument that any time spent outside the classroom is beneficial, Sue Elliot and Tracy Young (2016) highlight the risk that this could lead to a "'nature by default paradigm'… potentially thwarting a fuller transformative engagement with sustainability" (p. 58).

Implications

In summary, it is becoming clear that education needs to be an agent of transformative social change which will help to mitigate and adapt to the multiple and interconnected planetary emergencies that we face. Part of this transformative change relates to shifting the ways in which we make sense of human-nature relations, as existing paradigms of both education and understanding human-nature relations

are insufficiently aligned with what is required for future multispecies flourishing. Early childhood, nature and education are all tied up in how we come to know the world as adults, and the children currently aged six will live with the consequences of previous generations' (in)actions. As such, formal ECE is an important but contested site for children to have formative experiences which shape how they relate to the world around them. Scotland has the frameworks and the will for transformative experiences of nature in formal ECE settings, but provision and children's experiences are mixed, especially in schools. These experiences represent a unique interstice where policy and practice from the fields of environmental sustainability, psychology and education form a potentially influential node in a complex system.

1.3 Research Objectives

In this thesis, I set out to explore all of these strands in everyday practice, looking at the relationality of young children, teachers and non-human actors during school-based outdoor learning. My intention was to better understand the reality of outdoor learning at school in order to see how - or whether - it acts as an agent of change for more sustainable, caring and generative human-nature relations. I began with the following objectives:

- Investigate how children and teachers come to know the outdoor environments in which they are learning.
- Identify potential pathways and barriers to learning for sustainability that emerge during school-based outdoor learning

Working towards these, I conducted multimodal ethnographic fieldwork in village and suburban schools with children and teachers from four Primary One and Two classes (ages 4-6). In order to work with the complexity of outdoor learning in early childhood and include socio-material and non-human actors into my analysis, I adopted a theoretical framework and methodology which uses tools from posthumanist and feminist materialist thinking. However, I make it clear that these ideas often have an under-acknowledged relationship to much older traditions of inquiry which can be cited more respectfully in dominant culture research. As I will go on to explain, this approach shapes the structure of the thesis and the way that I conducted the research.

1.4 Structure of the thesis

Different forms of relationality are central to my research, and I have tried to consider my own relational accountability in how I have conducted, written and

presented my work. I want to simultaneously honour the commitment of the funders, my supervisors, the children, teachers, non-human beings and places with whom I worked, but also the ideas that I have thought with. This means that while the thesis generally follows a conventional structure, the form of writing shifts in places depending on the purpose or who the content is intended to speak to. In my experience, the theoretical context in which my research is grounded often feels dense, overly-complicated and distant from the real world, so I have tried to balance my commitment to the ideas with a pragmatic approach to how they might be communicated and applied.

Chapter 2 introduces the concept of research assemblage and outlines the theoretical assemblage which shapes the project and the cartographic approach I use for the first part of the thesis.

Chapter 3 is a cartographic process which orients the project in more detail through multiple layers and scales in place of a conventional literature review. This mapping charts the landscape in which the research emerges and a range of existing knowledges that can contribute to our understanding of how humans and the rest of nature relate, particularly in terms of early childhood and environmental education. By drawing on approaches underpinned by Deleuzo-Guattarian rhizomatics (Lenz-Taguchi, 2016), I chart a range of contrasting knowledges which influence how young children and teachers come to know the world through outdoor learning at school, aiming for a productive mapping rather than a representational tracing of existing research (Martin & Kamberelis, 2013).

Chapter 4 outlines the research assemblage I used for my fieldwork. Based on the methodological needs stemming from the theoretical framework outlined in Chapter 2 I employed tools from multimodal (Pink 2015), multispecies (Pacini-Ketchabaw et al., 2016) and diffractive (Smartt Gullion, 2018) ethnography to make sense of the 'worlding' (Palmer & Hunter, 2018) that I was part of during outdoor learning at the collaborating schools.

In Chapter 5, I use the concepts of agential cuts and interference patterns to try and (re)present stories from the fieldwork without disentangling them from the complexity of the phenomenon at the heart of the inquiry. These patterns emerge around the topics of how nature is figured; commoning activities; collecting; play (and) pedagogy; intention/attention; synthetic materiality outside (or outdoor learning and fly-tipping) and Realising the Ambition (and LfS).

Chapter 6 concludes by outlining some potential implications of these readings for policy and practice.

2. Research Assemblage One

2.1 An insight into the complexity outdoor learning contexts

In order to explain the need to attend to theory and methodology so early in the thesis, I would like to start with a description of a typical morning back in that school garden on the map, this time in 2019.

On a cold, clear morning in November, there are twenty-two children, all aged between five and seven, playing before the teacher sets them a task. Many of them have slipped back into play they left off nearly a week ago, extracting resources from the storage units used by the school nursery, or returning to half-built structures which they are newly equipping with security beams and alarms. One child is taking the opportunity to play alone with a plastic replica hedge trimmer and chainsaw that were donated by a parent, while another is back to making cement from soil and water. Two boys play *Spy Ninjas*, enacting a series of amateur action-dramas made by 30-something Youtubers, battling the evil PZ-9. There are at least five or six police officers, slipping and sliding in and out of role as they move around the space and between other groups, jumping over the landlocked dinghy which lies in one corner. The patterns of baby-care (kiss, in buggy, walk, touch head) seem calming for one girl in particular until the babies need to be shared between the two playhouses.

These children are outside. At school. They are learning, moving, playing, being, growing, developing. There are trees, birds, soil, life around them, even on this crisp autumn morning. There is a teacher and a pupil support assistant with them. And me there, looking on, listening, joining in where I am invited to. This PhD thesis is about nature, childhood and the first years of school in Scotland. But where do I start with trying to understand what is happening, how they are coming to know nature and what it means for these children's (and this garden's) futures?

The teacher is setting them a challenge: to gather "natural objects" to freeze in a tub of water overnight. "…anything that's natural in our world, that we haven't made…"

Do I start here, with the task?

The curricular experiences (SCN 0-01a: *I have observed living things in the environment over time and am becoming aware of how they depend on each other* and SCN 0-05a: *By investigating how water can change from one form to another, I can relate my findings to everyday experiences*) and learning outcomes?

Or the language, the definition of 'natural', the planning-response to the weather forecast interpreted through mobile phone app?

Or the margarine and yoghurt pots and the supermarkets that they have come from and the cows whose milk was driven to be processed and the lorries that drove them to this part of the Highlands?

Or with the rosehips now finding their way into the pots, whose ancestors were gathered by schoolchildren across the country to fill the Vitamin C gap left by insecure citrus supplies during World War 2?

But if I focus on the teacher-initiated activity, how do I take into account the play and the way that the children themselves choose to be in this place?

Actually, how much choice do they have in their play?

Do I start with the lockable gate, or the plastic chainsaw, the builder's helmets or the spades?

Or do I go back to 'nature': to those trees, the ash and the apple, planted, battered and scratched, soil compacted, sap falling with the shortening days, the hazel that is older than it looks?

2.2 Chapter overview

There are no correct answers to these questions. My research objective is to investigate the different forms of relationality that emerge during outdoor learning at school and to explore how these might contribute to care for the world (sustainability). Any of these questions could be a valid point of entry to pursue this inquiry, but that choice has implications. In order to fulfil my objectives, my approach to research must be able to account for relations between the social, discursive *and* material actors which constitute school-based outdoor learning as a way of coming to know the world, as entangled. Representational, constructivist or positivist approaches to researching nature and childhood limit the ways in which either can be known.

Neither nature, nor childhood are just social constructions or biological phenomena - they are simultaneously both and more, and an educational research practice which can account for this will be all the richer for it.

In this chapter, I provide enough theoretical context to allow me to get on with things. I begin by showing that I am following in the wake of a broad transdisciplinary move towards monist ontological positions that try to reject distinctions such as social/natural, material/discursive, subjective/objective actors in a critical manner, broadly captured under the terms posthumanism and new materialisms. I explore my discomfort with the colonisation of traditional ways of thinking about the world, and try to chart a way to respectfully engage with multiple theoretical perspectives. Bradiotti's principles for posthumanist critical theory provide a useful starting point for understanding my approach to research, and I highlight cartographic accuracy and de-familiarisation as particularly important at this stage. Connected to this, I introduce how the figurations of rhizomes, patchwork and assemblage can be made to work as methodology before outlining how I put these to work in the following chapters of the thesis.

2.3 Persistent tensions in posthumanist educational research

> Posthuman research enactments are a practice of the plunge: letting go, diving, freefall, surfing, swimming, waving *and* drowning.
>
> Taylor, 2016, p.19, italics in original

I have spent quite some time resisting the pull of the posthuman, caught just on the edge of the riptide, paddling to stay in place, looking for ways to get back to shore safely. I have not found it easy to understand the ideas or the way they are articulated. Perhaps because of this, I have serious misgivings about how the European continental theory which is foundational to posthumanist thought engages with contemporary issues such as race and the perpetuation of colonising forces (Byrd, 2011; King, 2017). However, trying to make sense of the complexity and dynamism of the environments where outdoor learning emerges kept pushing me towards an onto-epistemological framework which would encourage me to "think beyond the exclusive, monogamous and romantic union of childhood and singular Nature" (Taylor, 2013, p.xiv). As I will show throughout the thesis, I needed to find ways to account for the influence of things like objects, plants, teachers, peers and multiple other agents on outdoor learning and individual people. There are increasing numbers of researchers in the related fields of outdoor learning, environmental and

sustainability education (e.g. Adsit Morris, 2017; Clarke & Mcphie, 2014; 2018; 2020; Gough, 2016; Lynch, 2018; Mannion, 2019; Riley, 2019); early childhood education (e.g. Fairchild, 2017; Lenz Taguchi, 2011; Mereweather, 2019; Taylor, et al., 2012) and children's geographies (e.g. Änggård, 2016; Horton & Kraftl, 2006; Malone, 2016;) who are similarly concerned with the role of the non-human and advocate for ontological standpoints which situate humans as *becoming with* the rest of nature rather than separate from it.

Much of this work is transdisciplinary, ranging across posthumanist, post-qualitative, feminist new-materialist, decolonial, Indigenous and ecological perspectives as showcased, for example, in the Research Handbook on Childhoodnature (Cutter-Mackenzie-Knowles, Malone & Barratt-Hacking, 2018) and connects with a broad range of inquiry concerned with the socio-material, particularly in education (Fenwick, Doyle, Michael & Scales, 2015) and environmental crises (Mcphie & Clarke, 2020). I do not want to spend this chapter describing the distinctions between individual theoretical perspectives (this is charted more effectively elsewhere, such as in the contributions of Snaza & Weaver (2015) and Taylor & Hughes (2016)). Instead, I want to highlight some common ethico-onto-epistem-ological assumptions which underpin the theoretical tools which I use and the implications of these for how I share my reading of other people's research and my own fieldwork. With these approaches, as Carol Taylor writes, the question of where to begin becomes less important, "because beginning in the *here* of posthuman research displaces the whole panoply of what arrives with one's 'choice' of research paradigm" (2016, p. 17).

This is why, rather than begin by setting boundaries on my area of inquiry and pointing to an intended direction of travel, I will first provide a brief overview of the theoretical approach I have (somewhat reluctantly) adopted and show why it offers an appropriate set of tools for me as researcher and you as reader or future collaborator. I do not get into the detail of how this affects my fieldwork methodology assemblage here; you can find that in Chapter 4.

Educational researchers working with the posthuman turn have faced challenges and critiques in regard to their focus on theory and lack of attention to methodological and practical concerns (Taylor & Hughes, 2016; Snaza & Weaver, 2015; Clarke & Mcphie, 2020), while Indigenous scholars who have always sought to include non-human agency in their work have been marginalised by racism and foundational differences in research purposes and process (Rosiek, Snyder & Pratt, 2020, p.332). Eve Tuck states that the ontological, material and spatial 'turns' are all "actually a turn to where Indigenous people have always been" (Tuhiwai Smith, et al., 2018, p. 15). It is my hope that this thesis can be part of the growing collective effort to show that these perspectives can in fact prove to be compatible and generative with policy and practice contexts across education and sustainability (Common Worlds Research Collective, 2021).

Throughout this section I will try to balance the need to explicate my own process of coming to know the theory with a pragmatic desire to concentrate more energy on the application of this process to the task at hand. Jerry Rosiek, Jimmy Snyder, and Scott Pratt point to what Paula Gunn Allen (1986) would call a preference for preachment over sacred utterance in the dominant posthumanist literature:

> "to someone already convinced of the ubiquity of non-human agency, the prevalent interest among Euro-centric scholars with justifying a departure from their inherited humanist ontologies seems like a highly provincial obsession, one that distracts from the more substantive work of shaping productive ontological relations with a world full of human and non-human agents"
>
> (Rosiek et al., 2020, p. 337)

As I *am* now convinced of the ubiquity of non-human agency, I want to quickly explain why, then get on with fulfilling my research objectives.

2.4 Towards respectful, anti-colonial theories of non-human agency

> Extraction and assimilation go together. Colonialism and capitalism are based on extracting and assimilating. My land is seen as a resource. My relatives in the plant and animal worlds are seen as resources. My culture and knowledge is a resource. . . The alternative to extractivism is deep reciprocity. It's respect, it's relationship, it's responsibility, and it's local.
>
> (Leeanne Simpson, 2017, p.75)

Before I go any further in describing some of the theories I will work with, I want to further highlight and thus 'trouble' the Euro-centrism of dominant posthumanist and new materialist thought, which risks (further) ontological violence and colonisation of other folk's ways of knowing and being in the world (Rosiek et al., 2020; Todd, 2016; Tuhiwai Smith et al., 2018; Watts, 2013). As Rosiek et al note, new materialism, new feminist materialism, posthumanism, post-qualitative research and the 'ontological turn', are positioned as offering "an allegedly novel entry" (2020, p. 331) into debates about how to incorporate post-structural analysis with a focus on

materiality and the agency of things, which in different forms, have been at the heart of Indigenous thinking for thousands of years. In traditional societies, 'nature', 'biodiversity', 'place', 'outdoor' are *land* or *country*, and as Sandra Styres reminds me, "[l]and as first teacher is a contemporary engagement with Indigenous philosophies derived from a land-centred culture and based on *very old pedagogies*" (2011, p. 717, emphasis original). Perhaps if I had remembered this earlier in my research process I would have taken different paths to get to where I am going. Indeed, as I explore in section 3.4, this highlights how significant specific figurations of school, or even 'schooling' are in discourses of education in our country, a fact which is taken for granted, but not inherent.

Indigenous scholars (Sundberg, 2013; Todd, 2016; Watts, 2013) argue that by not seriously and respectfully engaging with parallel concepts from Indigenous writers, researchers and knowledge bearers, people working with new materialist and posthumanist concepts risk being complicit in further cultural erasure and academic colonisation (Tuck, 2014). Posthumanism is supposed to be inherently post-and anti-colonial (Braidotti, 2013), but does not always succeed at this, so I have to work out a way to go forward with respect, not appropriating knowledge which is not mine to use while still completing the task before me. As Eve Tuck (2014) and Tyson Yunkaporta (2020) among others state, there is a need for non-Indigenous scholars to put effort and time into learning and making connections across fields. This is particularly important in the fields of education and human-nature relations, as Indigenous knowledges hold many lessons about the forms of interdependence that can trouble anthropocentrism in (environmental/sustainability) education (Nxumalo, 2018). There are two main ways that I will try to practice this engagement in a respectful manner. The first is through working towards a relational, feminist citational practice; the second is through acknowledging and struggling with how my own relationality, positionality and privileges affect the ideas I think with and how I can use the right conceptual tools for the job in an anti-colonial manner.

Sara Ahmed states that "[c]itation is feminist memory. Citation is how we acknowledge our debt to those who came before; those who helped us find our way when the way was obscured because we deviated from the paths we were told to follow" (2017, pp. 15-16). Citational structures make knowledge visible and can also screen out others (Ahmed, 2013), reinforcing systemic white, cisgender, male privilege and perspectives. As I will explain further below, I am a beneficiary of that white cis male privilege and have previously been complicit in foregrounding dominant voices without using sufficient energy to seek out other, less visible knowledge. In this thesis, I cannot 'responsibly' map the extant literature and situate my own contribution without referring to and citing those dominant voices, but I will endeavour to read and visibly cite the scholars, thinkers and writers whose labour often goes unacknowledged (Smith, 2018) and by doing so, extend and deepen my own learning.

Following Taiaiake Alfred and Jeff Corntassel (2005), I use the term Indigenous to

refer to the wide range of peoples around the world whose cultural, spiritual and governmental traditions manifest place-based connections which belong to the lands they inhabit and who are conscious of "being in struggle against the dispossessing and demanding fact of colonisation by foreign peoples' (Alfred & Corntassel, 2005, p. 597). Indigenous scholarship and activism in the face of colonisation has a rich heritage, which, in the Anglophone sphere at least is most visible in but not limited to, Turtle Island (now called Canada and the United States of America), the multiple countries which make up Australia, and Aotearoa New Zealand, all of which have obvious (relatively) recent history of settler colonialism. There are many other perspectives from all over the world which I could learn from, but are not as accessible to me and that I do not know about, a fact which I find overwhelming.

So what does that have to do with me and my study of young children in Scottish schools? I am sitting here, not far from Inverness - what, how, why or *can* I seek to incorporate Indigenous voices into my work in a way that is anti-colonial and not damaging? Tuck and Yang are clear that decolonisation is not a metaphor (2012), and that the goal of decolonisation in settler contexts is "repatriation of Indigenous land and the abolition of slavery in all its forms" (Tuck & Yang, 2018, p. xii). In recent years, Indigenous authors have been read "extractively, for discovery" (Smith et al., 2018, p.15), and fear of getting it wrong can lead to a reluctance for non-Indigenous writers to cite Indigenous studies literature in different contexts, but Rosiek et al. call this out as "a performance of white privilege or white fragility" (2020, p. 334). It is with this in mind that I will try my best to consciously foreground Black, Indigenous and female writers as I go forward, but in a way that seeks to be relational, not extractive.

Even with my multiple forms of privilege (including just being able to sit here thinking about it) I feel kind of powerless to act in the face of colonisation. Despite my strong desire to do something, to be engaged, active and resistant, I can't deny that it 'feels' distant to me, a sure sign of that privilege. I know that on one level this is because the traditional ways of living that belonged to this place (and my ancestors, I guess) were themselves wiped out by different forms of colonisation. There is a small but vital resurgence of Nawken activists, campaigning for recognition of the Indigineity and the value of their traditional knowledge, culture and places (Donaldson, 202; Nawken, 2021) in Scotland, and I have tried, without much success, to write about this in the past (Mackie, 2014), articulating how Gaelic language and culture retains the characteristics of traditional societies. John Mohawk (1999) identifies these as inherency (belonging), time (in the form of intergenerational knowledge transfer about "living well where they are" (Orr, 1992, p. 130)) and ecological conservatism, but in Scotland, it's hard not to think of these as abstract and consigned to the past, to 'heritage' rather than something that belongs to me in the now. Is this what colonisation looks like after a couple of thousand years, rather than a few generations? Is it this form of late capitalism, or did it start with the agricultural revolution, the Romans, the coming of Christianity, or the Highland Clearances? If I can't do anything with this, then how do I learn from or support other people's anti-colonialism? If citing voices which are regularly silenced or marginalised in mainstream academic discourse is the minimum that I can do, then I guess that's where I have to start.

It doesn't take long for me to remember that I'm not as far from settler colonialism as I like to pretend. Just yesterday, we walked through land owned by the Lovat Frasers, a family whose young men just 220 years ago were notable plantation owners in Guyana (Alston, 2021a) and captained slave ships (Alston, 2021b). Their Highland properties were either enhanced using profits derived from slavery when things were going 'well', or, as in the case of the big house I can see from my window, mortgaged to purchase "333 acres, along with 33 enslaved people" (Alston, 2021c, para. 2). I'm not necessarily trying to single these families out for historically benefitting from slavery (I don't even know my own family history), and I know that for many people, hereditary wealth comes with feelings of obligation and responsibility. Their (literal) entitlement makes their history more visible than others, but this reminder serves two purposes as far as I am concerned. First, it highlights just how tied up Scottish history is in colonial forces, past and present; second, it shows that 'nature', in the land around me is still influenced by patterns of land-ownership which extended beyond clan (in)habitation and into colonisation. This operates on the local level - for example, in the policy woodlands around the big houses or field boundary oaks planted in the 1850s, still demarcating the landscape - and on a cultural level, in that land, nature, is largely seen as a resource to be used, mortgaged against. Coming into awareness of these two observations affects how I know nature, so I need to acknowledge them here.

As will become clear in the rest of this section, being able to articulate, examine and locate how things relate with each other is important throughout the thesis. Alongside silence about Indigenous knowledge, for Juanita Sundberg (2014, p.35), "silence about location" serves to cement the Eurocentrism of posthumanist thought in her field of geographies, a point also highlighted by Tuck & Mackenzie in qualitative research more broadly (2015). Sundberg draws on Walter Mignolo's (2006) concept of "loci of enunciation" to explain how this manifests through the performance of universalising (re)presentations of certain (European) epistemologies and politics, while demanding specificity of others. Mignolo states that "the introduction of geo-historical and bio-graphical configurations in processes of knowing and understanding allows for a radical re-framing (e.g. decolonization) of the original formal apparatus of enunciation" (2009, p. 162). By situating knowledge, the hegemonic myth of a universal human subject, neutral observer or 'right way of doing things' can be disrupted in what Mignolo calls *epistemic disobedience.*

In dominant research paradigms, ontology, epistemology and ethics or axiology are connected, but in a somewhat linear fashion. Ontology is the theory of what is real, epistemology is the study of how we 'know' that reality, and axiology is "the ethics or morals that guide the search for knowledge and judge what information is worthy of searching for" (Wilson, 2008, p. 34). I will go into this in more detail below, but posthumanist research involves attention to these three strands as simultaneous, relational, emergent and entangled - what Karen Barad calls an *ethico-onto-epistem-ology* (2007, p. 185). For Shawn Wilson (2008) who is Opaskwayak Cree and lives on Bundjalung land in northern Australia, the central guidelines of Indigenous research

paradigms should be *relationality* and *relational accountability.* Relations exist between all beings, matter and ideas, and researchers should act in ways which maintain an *ethic of reciprocity* (Cajete, 2016; Kovach, 2009). This requires humility - Wilson positions the researcher as a storyteller who, because they "cannot know the entirety of anyone else's relationship web" (2008, p. 134) should be humble and open about the fact that all they can do is share the relationships and connections that they are privy to. For Donna Haraway, these relations are always the smallest unit of analysis (1985), and constitute situated knowledges (1988). Thus, one form of epistemic disobedience that I can adopt is to try to attend to the situated nature of the relationships I chart through research literature, fieldwork and my own storying. Rosiek et al (2020) highlight this ethical responsiveness as something that researchers working with non-Indigenous agential realism struggle with, as it "is different than the familiar resistance/reproduction binary that has framed critical questions about social inquiry for nearly a century" (p. 336). I will incorporate stories of this into my diffractions in Chapter 5.

2.5 Introducing posthumanist critical theory

Feminist New Materialisms

The theoretical tools which I want to use come from trans-disciplinary research which is usually characterised as posthumanist and broadly part of (new) feminist materialisms, both of which evade fixed single definition (Mcphie & Clarke, 2020). Nick Fox and Pam Alldred (2015, p. 23-27), considering new materialism in relation to sociology, identify six key features that affect how researchers consider the world. First is a focus on 'matter', a distinct shift from post-structuralist and constructivist perspectives which privileged language, symbolism and subjective experience over the material and natural world (Coole & Frost, 2010). Matter in this context has the capacity to be 'vibrant' (Bennett, 2010), to have agency without necessarily being perceived as 'alive'. Second, and linked to this, is a call to focus on what matter *does*, not what it *is*: ontological significance emerges only through relations, of flows of *affect*, the links between matter in assemblages (see section 2.7). Thirdly, human agents are not inherently privileged in new materialist perspectives, disrupting the dominant anthropocentrism of social sciences, which in turn unpicks persistent dualisms such as agency/structure and social/natural. Somewhat counterintuitively, the fourth feature they identify shows that approaching all materiality on a universal plane still makes space for the social and discursive: "because thoughts, ideas, memories, feelings, desires and collective abstractions and 'constructions' can all materially affect and be affected by other relations in an assemblage, they can be treated in exactly the same way as other (seemingly more 'material') relations" (Fox & Alldred, 2015, p.26). This has significant implications for research when taken seriously, as it presents no distinction between the 'objective' and 'subjective' and thus minimises the attention to epistemological issues, of *how humans know* the world, instead focussing on what the world (which of course includes things like emotions and memories) *does*. Fox and

Alldred's fifth proposition is that power flows through these relational assemblages, not from the top-down, but continually (re)constituted in the macropolitics, which exert control, and micropolitics, which can offer new potential. Deleuze and Guattari said that "in short, everything is political" (1987, p. 249), but this means that "power has continuity as long as it is replicated in the next event and the one after that" (Fox & Allred's, 2015, p.27). Finally Fox and Alldred lay out the implications of working with new materialist theories for social researchers: the things that constitute research processes themselves must be considered as material assemblages which are subject to and exert material affect just as any other (Barad, 1996).

The ethical implications of these propositions push me to try and practice a specifically feminist new materialism: as Sarah Truman (2019, p. 2) states, "new materialisms without feminism - a feminism that attends to race, gender, sexuality, and ability - can recenter both humanism and Whiteness. There is nothing 'new' about recentering humanism or whiteness." Feminist new materialist approaches, often drawing on the work of Karen Barad and Donna Haraway tend to pay particularly attention to the situated nature of knowledges (Haraway, 1991) and the ethical actions which can affect change and create alter-worlds, attending to 'response-ability', which is "always experienced in the company of significant others… not within a set of universal principles, but in everyday practices and imaginative politics that rearticulate all kinds of relations" (Blaise, et al., 2016, p.32).

Posthumanism

According to Rosi Braidotti (2013), the multiple genealogies of posthumanism share two common starting points: a critique of normative, universalist and hegemonic humanism and a post-anthropocentric approach which decentres the human subject and affords agency to human and non-human actors alike. Snaza and Weaver argue that posthumanist thinking is anything which seeks to respond to the question "What if the human doesn't have to be the measure?" (2015, p. 3).

This is a key tension in posthumanist research practices, with critics arguing that it is impossible for human researchers to 'decentre' the human, and even advocates such as Snaza and Weaver admitting that dominant systems are so grounded in humanist paradigms that it is "not even remotely possible at the present moment to conceptually or practically lay out a theory of posthumanist education" (2015, p. 3). But this should not stop or limit attempts to do so, and that do*ing*, *becoming, or* ecologis*ing* is perhaps the point (Mcphie & Clarke, 2020). Rather than erase the human, this element of posthumanist research practices is intended to disrupt the dominant form of a universal (white) hu(man) subject which is formalised in isolation from other human and non-human agents (Braidotti, 2013) and does not account for the multiple forms that humans can take as they emerge in relation with other actors. There should be no assumption of a fixed "we", no "our" - it is only through closer attention to relationality can we identify how, where and with whom things emerge. This heterogeneity and performativity is seen by proponents as a strength, allowing

for "ways of researching that undo tired binaries such as theory/practice, body/mind, body/brain, emotion/reason, human/nature, human/animal" (Taylor, 2016, p. 7). These ways of researching are necessary, for, as Barad argues, "existence is not an individual affair" (2007, p. ix) - it emerges through entanglements.

For Braidotti, there are several identifying features of posthuman critical theory which are helpful in characterising my approach to research, but particularly this first half of the thesis. These are cartographic accuracy and the associated ethical accountability; trans-disciplinarity; a combination of critique and creative figurations; the principle of non-linearity; memory and imagination and the strategy of de-familiarisation (Braidotti, 2013, p. 163).

I am aware that I just said that I was going to try to avoid critique in the same way that Shawn Wilson does; hopefully as my writing unfolds, you will appreciate my attempts to be critically engaged without assuming knowledge which is not open to me, and will be able to follow your own lines of thought.

Cartographic accuracy

The first of Braidotti's characteristics is cartographic accuracy. From feminist materialist perspectives, this is important because the world is seen to come into being through the relationality of multiple agents and in order to better understand processes of becoming, researchers must be able to map these relationships to provide a "theoretically based and politically informed reading of the present" (Braidotti, 2013, p. 164). These should be specific but also figurative, to ensure that the process of subject *becoming* is not universalised, but emerges from the space between multiple binaries. Specificity is also important to Vine Deloria Jr and Daniel Wildcat, who emphasise that Indigenous metaphysics are concerned with *power* and *place* (2001). Multiple persons (not just humans) are interlocutors in these relations: "If, as Deloria argues, the universe is made up of persons, and if interactions among persons are moral relations, then all relations in the universe have a moral character" (Pratt, 2006, p. 7). Therefore, being able to chart these relationships in a generative manner holds potential as a means of understanding how humans can come into healthier, more respectful relation with the world.

In Traditional societies, place-knowledge is about understanding how power flows between persons (agents) and is (re)presented through cultural metaphors (Yunkaporta, 2020) - I think that what Braidotti and others are trying to do is (re)present the ways that power, or *affect* flows between agents in globalised, less culturally coherent contexts. In these forms, agents or actors must also include less concrete sources of power such as policy discourses and political economies. Deleuze and Guattari's writing on mapping (1987) has informed cartographic research practices which allow a "doubled movement of critique and innovative creation" (Lenz Taguchi, 2016, p.39). According to Adrian Martin and George Kamberelis, "mapping discloses potential organisations of reality rather than reproducing some

prior organisation of it" (2013, p. 671).

However, cartography has been, and continues to be an overtly colonising force (Byrd, 2011; Bellone et al., 2020), which is political even when used as a figuration to think and work with outside the mapping of land. So in order to map relations between material actors in a critical way requires and creates dialogue and ethical accountability - to put them in the right place, and then act in a way that honours them, beyond the boundaries of individual human subjects. Taylor (2016) states that posthuman ethics "must be situational, emergent and unique, located in capacity and action, play out as the point of ethical address, and be oriented to practices that are a positive affirmation of life" (p. 15). Chapter 3 is my attempt at a cartography of the relations which constitute the assemblage of school based outdoor learning as a way of learning care for the world.

De-familiarisation

The other feature of Braidotti's posthuman critical theory which I want to consider here is that of de-familiarisation, which is especially relevant for this project in terms of my methodology and my attempts to move beyond anthropocentric, representational understandings of how humans relate to the world around them. As I showed above, the first step in this de-familiarisation involves moving away from the dominant subject-form by adopting a monist stance, where actors are distinguished not by their difference, but in the processes of their relations. A post-anthropocentric ontology is often visualised as 'flat' (Delanda, 2002), where all actors or agents stand on an ontologically equal footing. As Timothy Morton puts it in their book on *Being Ecological*, a flat ontology is "a little weird at first, but it takes the pressure off, I can tell you" (2018, p. 101). Again, different thinkers get to this point by different routes: As mentioned above, in the worldviews of many Indigenous people, personhood is not limited to humans and relationality is figured this way; Barad (2007) approaches it via quantum physics to argue that matter is an intra-active becoming which disrupts the idea of object/subject distinctions; those working with new materialist approaches to sociology use this flat ontology to move past 'explanations' and instead focus on *events* where the material and the discursive are considered on an equal footing (Latour, 2005; Fox & Alldred, 2017). This has implications beyond the meaningful incorporation of non-human actors, as it requires me to ensure I do not 'neutralise' difference, but follow the ways that difference matters through relation.

De-familiarisation also requires the "loss of familiar habits of thought and representation in order to pave the way for creative alternatives" (Braidotti, 2013, p. 89). For example, when I started this project, as an outdoor educator, I 'knew' what outdoor learning at school was. I 'knew' what nature was, and where it might be found in the school day. Thanks to my training at school and university, I could even examine and interrogate these things using different theoretical lenses, with implications for how I went about looking for it, and what I then wrote about it. But a

critical posthumanist approach to these requires attention to these phenomena as ongoing, emergent processes, not as pre-existing subjects: constantly *trying* to de-centre the human and looking for ways to make sense of that those relational processes opens up the possibility of what Deleuze and Guattari (1987) call *deterritorialisation*. The application of this will perhaps be more obvious in the diffractive readings coming out of my time in schools, but is also part of how I approach the extant literature in the mapping chapter, where I find, as Barad (2007) argues, that the material and discursive are impossible to unpick, with implications for research that limits its enquiry to one or the other.

2.6 Rhizomes and patchwork

Gilles Deleuze and Felix Guattari's writing influences Braidotti's posthuman critical theory and much of the Euro-centric posthumanist research practice in education. There are three concepts from their work that I want to introduce and link to my own process at this stage: *thought as rhizome*, patchwork as an example of *smooth space* and *assemblage*. These sections will likely feel repetitive to anyone familiar with these approaches, and others have written more fully and beautifully than me (Riley, 2019; Strom, 2018; Taylor, 2016) but it is necessary and I hope to share my growing understanding as well as I can (Strom, 2018).

Deleuze and Guattari set out to provide a "metaphysics appropriate to contemporary science - a science based on non-linear mathematics, and sometimes referred to as complexity theory or dynamic systems theory" (Holland, 2013, p. 17). As such, this is a metaphysics that attempts to align with the ecological understandings of Earth systems and social systems which inform many contemporary approaches to sustainability and environmental education (Capra, 1997). Deleuze & Guattari critique dominant patterns of humanist thought (and writing) as 'arborescent', a model of thinking consisting of hierarchic binaries where ideas branch off from a central trunk of existing knowledge 'above ground'. This, they argue, implies a solid, linear conception of knowledge, which does not make space for new ideas or accommodate the characteristics of connection, heterogeneity or multiplicity required for understanding the world as we know it today. The alternative image of thought they suggest (acknowledging the need to distinguish a binary in order to argue against binaries) is the rhizome. The common botanical examples used to exemplify rhizomic systems are plants with horizontal, often underground growth patterns, including tubers and nodes like ginger, bamboos, flag iris or spider plants. You can enter the rhizome at any point and if you cut a bit off, a new node will start growing - it is simultaneously interconnected and emergent. For Deleuze and Guattari, the rhizome "has no beginning or end; it is always in the middle, between things, *intermezzo*" (2013, p. 26).

They characterised the philosophical principles of the rhizome as:

- **Connection**: any element of the rhizome can connect with any other element - what becomes important is following the flow of energy or affect through these connections.
- **Heterogeneity** There is space for conflicting, contrasting and emergent meaning, rather than fixed representation, as the rhizome "ceaselessly establishes connections between semiotic chains, organisations of power, and circumstances relative to the arts, sciences and social struggles" (2013, p.6)
- **Multiplicity:** The rhizome simultaneously challenges the notion of both subject and object. It is "not a unit to be measured, but produces varieties of measurement through its dynamic directions in motion" (Riley, 2019, p. 63), which requires attention to difference, relation and movement rather than trying to understand static representations.
- **Asignifying rupture:** A rhizome can be broken, but will always re-emerge in one of many ways. The task of thinking with rhizomes is to follow the rupture and see whether the emergence returns to old lines (hence reinforcing territorialised, stratified ways of being) or goes off in a new direction (lines of flight), which although deterritorialising and full of potential, are still intrinsically part of the rhizome.
- **Cartography and decalcomania:** The process of following, mapping these lines and differences can be understood as a cartographic process. A rhizome exists *as* relation with a situated context, and the process of mapping (rather than tracing) allows an understanding of this relation (and the power structures and potential sites of deterritorialisation inherent in it) to emerge. I explore this further in the mapping chapter.

I have pushed myself to work with the concept of rhizome because it allows (and forces) me to consider all of those *things* and their *thing-power* (Bennet, 2010) as part of the same plane, whether teacher, plastic toy or Education Scotland policy. Considering the agency of all socio-material actors and following flows of affect along lines is common across range of posthumanist perspectives which employ assemblage theory of one sort or another, from Tim Ingold's 'meshwork' (2007) to Barad's agential realism (2007). This obviously has implications for the form and function of research for, as Deleuze and Guattari state, "[t]he tree imposes the verb 'to be', but the fabric of the rhizome is the conjunction, 'and…and…and…'" (p.26).

One image in *A Thousand Plateaus* which I found explains this well is the distinction between weaving and patchwork which Deleuze and Guattari (2013, p. 553) use to distinguish between smooth and striated space. According to Deleuze and Guattari and their proponents, researchers working with the rhizome should aspire towards 'nomadic thought'. This is supposed to exist in smooth space, always moving between points, rather than forms of thought which are fixed and exist in striated space, bounded and tied down. I do not like the terminology, as Deleuze and Guattari's focus

on the etymology of nomadism hides what some scholars see as the colonial Orientalising and Othering which implies a universality to non-sedentary cultures (Byrd, 2011), but I do find the fabric figuration useful.

Weaving is figured as striated space: the two elements of warp and weft intersect regularly and predictably; the piece of fabric is bounded and limited on at least one side; the weft always turns back on itself, and the finished piece has a top and a bottom. In contrast, fabric can be 'smooth space' in the form of felt, with its entangled but heterogenous fibres, or patchwork. Patchwork is rhizomic, with no centre, no real edge and potentially infinite combinations or patterns. It is not necessarily as beautiful to look at or pleasurable to wear as fine woven wool or rich embroidery, but it works with what is to hand and allows for collective labour, meaning-making and juxtaposition. I aspire for my research to be effective patchwork.

When I first started writing, caught up in the idea of the rhizome, I thought this thesis would finish up like a quilt, consisting of multiple pieces of fabric, but held together by varied lines of thread so you could start anywhere and find different ways through it. Or in a digital analogy, like a database or webpage with lots of links running through it to allow you to navigate outwith a prescribed narrative. I thought that this would honour the principles of posthumanist critical theory that I have been trying to explain. However, in trying to articulate this part early on, I see that there's an ethical dimension to how I communicate my research: being open and attentive to all actors doesn't mean that I can present you, the reader, with something chaotic and impenetrable. This is something that I've found hard from the start, as it often feels like there is a requirement to include everything *in the thesis. It has taken me some time to realise that my response-ability is to try and attend to everything imbricated in the research, but then tell stories of what I observe in a way that is open, honest and respects and trusts your ability to make sense of them all together. Acknowledging the non-linearity of the world doesn't mean that I can't use more linear forms of communication in order to make sense of it.*

2.7 Assemblage as methodology

> "An assemblage isn't a thing - it is the *process* of making and unmaking the thing"
>
> (Jackson & Mazzei, 2012, p.1*).*

Assemblage is another term which comes from Deleuze and Guattari (1987). Brian Massumi, in translating *A Thousand Plateaus*, chose the word to capture the French verb *agencement*, which John Law states could have multiple meanings, including "to arrange, to dispose, to fit up, to combine, to order" (Law, 2004, p. 41). A Deleuzo-

Guattarian assemblage is "the productive intersection of a form of content (actions, bodies and things) and a form of expression (affects, words and ideas)" (Buchanan, 2015, p. 390). The concept of assemblage has been applied and developed in different ways across social science research, often (and perhaps inherently) ambiguously (Buchanan, 2015; Markus & Sata, 2006). However, it is proving to be particularly effective in research practices which must extend beyond representation or language, as it allows researchers to work with "an ensemble of objects, practices, experiences, and representations that make sense together" (Vanninni & Taggart, 2015, p. 70).

There are similarities between assemblages and Karen Barad's 'apparatuses', which "*are the material conditions of possibility and impossibility of mattering*; they enact what matters and what is excluded from mattering" (2007, p.148, italics in original). More clearly articulated in Barad's terms is the effect which the apparatus can have on how we come to know the phenomena which is the focus of research. This distinction becomes more important in the second half of the thesis, but it is important to note that the apparatus used to engage in the mapping chapters is one that is largely formed through the textual-digital-hypertext arrangement of scholarly inquiry in the second decade of the 21st century. What comes to matter in my cartography is determined by its availability to me through such components as digital archives, journal editorial boards, the Research Excellence Framework, social media, and downloadable government policy documents.

Education researchers are applying assemblage approaches in a range of contexts, but most notably in the intersection of (environmental) education/childhoods and nature (Clarke & McPhie, 2020). The factors driving this are multiple and will emerge throughout the thesis, but most significant is the recent consideration of both childhood and nature *as* assemblages, which responds to the ways that dominant (minority) public discourses on the parallel 'marginalisation' of nature and childhood reinforce a Cartesian binary between nature and culture (Cutter-Mackenzie-Knowles, Malone & Barratt-Hacking, 2018). Donna Haraway's (2003) formulation of *natureculture* and Bruno Latour's (1993) similar references to *nature-culture* signalled a desire to move beyond purely semiotic or scientific understandings of what constitutes nature, and, for Haraway at least, flag that 'nature' is always political (Merrick, 2017). Sundberg (2014), takes care to remind readers that while dominant, the nature/culture binary which posthumanist approaches seek to trouble is not universal, but "a reality localised to specific knowledge traditions" (Todd, 2016, p.9).

Implications for (this) research

Being able to approach research topics *as* assemblages or entanglements calls for research methods that look for difference and relations and are rhizomatic in themselves (Taylor & Hughes, 2016; Smartt Gullion, 2018). If entities "co-create each other through intra-action" then relationality should be the focus of research (Smartt Gullion, 2018, p.106), and in examining educational assemblages, researchers need to

"ask how and why particular elements became assembled, why some elements were included and others excluded, and how elements change as they come together, as they intra-act." (Fenwick, Doyle, Michael & Scoles, 2015, p.143). I have chosen to do this in two ways in the thesis. The first move is to apply a cartographic process of knowledge production to some of the extant knowledge about school-based outdoor learning in Scotland or similar contexts and its implications for bringing people into caring relations with the world around them. I explain my approach to this at the outset of the following chapter. The second way I enact a research practice in line with the theoretical framework I have just outlined is through a series of diffractive readings of data from my ethnographic fieldwork. The details of this part of the research assemblage are covered in Chapter 4.

3. Cartography

3.1 Introduction

This section involves a cartographic process with three main parts. First, I introduce the **principles of a cartographic process** informed by feminist posthuman critical theory. Second, I map out my own **relational accountability**, so that it is clear to the reader how the research project, and I as the researcher, relate to the networks that support and guide us. Then, in place of a conventional literature review, I map the **planetary and national contexts** necessary to understand where/how outdoor learning in Scotland is situated and some of the **existing knowledges** that are important to understanding how children and teachers come to know nature through school-based outdoor learning. These inter-related areas include education policies and purposes, different ways in which human-nature relations are valued, and how childhood and nature are variously positioned in discourses.

3.2 Principles of a cartographic process

> "Make a map, not a tracing" (Deleuze & Guattari, 1987, p.12)
>
> De Freitas 2012

I am trying to think of this chapter as a mapping process - charting how existing knowledges and my own journey with this research project intra-act. I want to present it this way because it allows me to get around some of the things that frustrate me with research practice. I cannot 'review' all of the 'literature' across the many fruitful intersections of outdoor learning-and-early childhood education-and-nature connection-and-human flourishing-and-conservation-and-identity-and-values-and-and-and… To say that I could would be to negate a wealth of other knowledge, deceive you and disrespect our relational obligation before we even got going. The received wisdom would suggest that then I ought to focus in on one specific intersection and try to systematically review that connection, funnelling, limiting, constraining the inquiry. I tried that, but as will hopefully become clear, my inability to isolate just one or two niches in the rich ecosystem of this field simultaneously led me to and supported the theoretical and methodological decision-making that underpins the whole thesis.

What I can do in this chapter is try to bring your attention to a range of different things within the 'landscape' (including for example, published research studies, international and Scottish policy and practice, global ecological changes, my experiences as a parent), and how

these affected my own inquiry. The purpose of this is twofold. First it ensures that you, as the reader, can identify the key features of this landscape and see some of the potential routes through it. Second, it allows me to articulate the route that I followed, and for you to evaluate that in context. Shawn Wilson describes his role as a researcher working within an Indigenous research paradigm as "not to draw conclusions for another or to make an argument. My role, based on the guidelines of relationality an relational accountability, is to share information or to make connections with ideas" (2008, p. 133). As I work towards relationality too, this means I can't know what understanding you will come to, but I trust that you will honour your responsibilities as a reader. This cartography is intended to act not as metaphor (like a map at the start of a fantasy novel), but as an emergent (methodological) figuration, which draws on Rosi Braidotti's reading of Deleuze and Guattari's writing on mapping.

One of the strengths of posthumanist approaches is the ability for researchers to take up a range of different tools which might sometimes seem incompatible, 'plug them in' to a research assemblage (Taylor, 2016) and see what comes out. I have been cautious of putting the work of Deleuze and Guattari to work directly, for fear of getting it wrong, putting off readers, contradicting myself, misinterpreting their (dense) writing or perpetuating colonising ways of thinking (Byrd, 2011). I also get frustrated that it *feels like* there are few other options available to me to try and articulate ideas like these in this academic context. Does the density of their writing just overcode what should/could be simple ideas? However, as Strom highlights, a Deleuzian approach explicitly encourages researchers to "[t]ake what connects with you and that you can use at that moment, asking if it (a concept) works within the particular problem you are grappling with, what it might do in the context of that problem, and what it might do for YOU" (Strom, 2018, p.106, author emphasis). It is in line with her attempts to 'shuffle' (Strom, 2018, p. 111) *status quo* systems through a pragmatic application of Deleuze and Guattari's work that I begin to reconfigure this literature review as a map.

I want the focus of this chapter to be on sharing the journey with you, but I will briefly introduce some of the key terms and tools required to proceed. For Deleuze and Guattari,

> a map … is open and connectable in all of its dimensions; it is detachable, reversible, susceptible to constant modification. It can be torn, reversed, adapted to any kind of mounting, reworked by an individual, group, or social formation. It can be drawn on a wall, conceived of as a work of art, constructed as a political action or as a meditation.
>
> 1987, p. 12

Braidotti (2019 describes a cartography as "a theoretically-based and politically-informed account of the present that aims at tracking the production of knowledge and subjectivity [which aims to] expose power both as entrapment (potestas) and as

empowerment (potentia)" (p.33). This figuration of the map allows us to approach the landscape of inquiry as a rhizome, characterised by the four principles of *connection, heterogeneity, multiplicity and the asignifying rupture (*Lenz Taguchi, 2016). The principles of connection and heterogeneity mean that you can enter into the rhizome at any point, and find it connected to any other point. I could start with biodiversity, or I could start with early childhood education. Rather than plotting the points in a structure, the task becomes following the different ways that affect flows along the lines of the rhizome. From a Deleuzian perspective, affect can be understood as the "processes of transition one body goes through when encountering another and the implications such encounters have for a body's capacity to act" (Simpson & Brigstocke, 2019, para 1). Mapping the flow of affect (whether through human bodies or other actors) generates *lines of articulation,* which can be traced and mapped, perhaps exposing (power) structures or dynamic relations.

The fact that those lines of articulation are many, varied and simultaneously emergent enacts the third principle of multiplicity; the landscape at hand can be understood in any number of ways dependent upon which line is followed. Deleuze and Guattari suggest that rhizomes consist of three types of lines: molar lines, molecular lines and lines of flight. *Molar lines* are characterised as dominant, institutionalised, and working to support the status quo. They can be structural or discursive (Strom, 2018). In the context of this research and the interplay of nature, ECE and sustainability, molar lines might include, but are not limited to, such things as dominant binary understandings of human/nature and nature/culture; the UN's Sustainable Development Goals (United Nations, 2015); Scotland's Curriculum for Excellence (CfE) (2020a); the primacy of certain research practices in understanding human-nature relationships; romantic conceptions of children's outdoor play; faith in technological 'fixes' for the global climate crisis.

Molecular lines are more supple and chart everyday flows as influenced by the molar. In this mapping of existing knowledges, molecular lines might chart national, local or individual enactments of policy; the ways that researchers understand 'environmental identities' or 'connection to nature'; how outdoor learning at school is enacted, etc. etc. etc. In addition to supporting the molar, these lines can send off runners in different directions, in *lines of flight*. Lines of flight create potential for new, surprising or deterritorialising processes. In this context, lines of flight might be associated with unexpected, potentially radical shifts in how we perceive the world around us or how education is purposed - for example when the reality of the Anthropocene, or evidence supporting the embodied nature of cognition are taken seriously, where might they lead us? Being open to these lines of flight through "actively engaging in a practice of estrangement to get away from taken-for-granted and common sense significations" (Lenz Taguchi, 2016, p. 45) relates to the fourth principle of the rhizome, *the asignifying rupture*. The rupture is how the rhizome reorganises itself and the non-linearity of these ruptures "allows for multiple connections and lines of interaction that necessarily connect the text to its many

outsides" (Braidotti, p.165)

The mapping process is not objective, nor politically neutral, but instead is "a theoretically based and politically informed reading of the present. Cartographies aim at epistemic and ethical accountability by unveiling the power locations which structure our subject-position" (Braidotti, 2013, p. 164). This is what Deleuze and Guattari refer to in their call to "make a map, not a tracing" (1987, p.12). Tracings reproduce the dominant and arborescent forms of knowing, and while "*The tracing should always be put back on the map*" (Deleuze & Guattari, 1987, p.13, italics in original), I aim to include multiple and more than tracings here. There will be things that I miss and areas that I do not know about - acknowledging this is what Braidotti (2006, p. 115), drawing on Gruen (1994), calls "epistemological humility, or the assumption that we cannot immediately comprehend everything." Acknowledging that I am implicated in the *doing* of the map affirms the attempt to move beyond representation towards alternative figurations or conceptual personae for the kind of knowing subjects currently constructed (Braidotti, 2019, p.33). Decolonial scholars argue that maps have long been used as agents of ontological and physical violence (Shapiro, 1993), and while Deleuze and Guattari propose mapping as a way to *resist* territorialisation some, such as Jodi Byrd (2011) contend that truly removing the notion of the frontier from the process of mapping is infeasible. In acknowledging this, I aim to share something that is a "grounded complex singularit[y] not [a] universal claim" (Braidotti, 2019, p. 33).

3.3 Relational accountability

> "Posthumanist thought tends to be silent about its 'loci of enunciation,' a term offered by Walter Mignolo (2009) to address the 'geohistorical and bio-graphic' location of authors as well as bodies of thought"
>
> Sundberg, 2014, p. 36

3.3.1 Introduction

I have read a lot (probably not enough) while trying to complete this PhD, but there are lots of concepts that I do not fully understand and things that I just can't remember. The knowledge which tends to stick with me is often that which is presented in stories or through dialogue, and this is particularly the case with the concepts of relationality and relational accountability, both of which I return to throughout the thesis in different forms. While, as I said in the previous chapter, I have no claim to the specific knowledge or cultural traditions their insights come from, the articulation of these two concepts by several scholars writing about Indigenous research methods and resurgence, including Shawn Wilson (2008) and Leeanne Betasamosake Simpson (2018) resonated with me both in terms of how I wish I could

go about research and how I make sense of sustainability or living well. Similar ideas manifest in contemporary Buddhist traditions in Thich Nhat Hahn's concept of interbeing , the understanding that "this is, because that is" (Lim, 2012, p. 428).

For Wilson, relational accountability is a feature of oral cultures which does not transfer easily into written discourse. The term captures the principles of authenticity, credibility and reciprocity which should be the foundation of Indigenous research methods rather than validity or reliability which are hard to (re)present abstracted from the contexts in which they manifest. As Naadli Todd Lee Ormiston, reflecting on how he experienced these principles in relations with human and non-human communities during a canoe journey, states, "[t]hese terms really are universal; they serve as the basis of living a good life" (2018, p.45).

The network of relations locates knowledge and the ways in which it can come to be known, similar to Haraway's 'situated knowledges' (1988), a form of feminist objectivity which she argued is "about limited location and situated knowledge, not about transcendence and splitting of subject and object. It allows us to become answerable for what we learn how to see" (Haraway, 1988, p. 583). What later forms of feminist materialism brought to this (Puig de la Bellacasa, 2017) through attention to difference and becoming with, and what already exists in Wilson's approach is the ethical and moral accountability and obligation that comes with situating those relations.

In this short section I try to tell you the stories of some of the important relations that bring this project into being. In other ethnographies this might be articulated at least partly through reflexive positionality, which has been a core element of feminist and poststructuralist qualitative research for over three decades (McDowell, 1992). This normally involves the researcher attempting to be transparent about how their identities, experiences and actions throughout the research process might affect knowledge production both through their interactions with research participants and in the act of writing (da Silva & Webster, 2018). However, the potential for this process to do what it sets out to in a meaningful way has long been disputed (Rose, 1997), and from the perspectives that inform my approach to research, I am not a fixed individual subject, but constituted through relations. Rosiek, Snyder and Pratt argue that a respectful agential realist approach should acknowledge and honour an ethic of reciprocity, the "practice of attending to the way our existence is interdependent with networks of relations of other humans… of considering the consequences of our actions - including our research - for all the communities with which we are in relation and on which our being depends" (p. 340). I'm not saying that I will or have managed to fulfil that ethic of reciprocity, but I should at least try to acknowledge it.

3.3.2 My child, the world's future, our education

This project is about nature, childhood and education. Now, more than ever in human history, time is a critical part of each of these things. This presence can be felt

in different ways; the urgency of time slipping away, the over-filling of limited time with activity, the speed of changes across and within generations, the past and the future as things to learn about, from and for. We know that human activity is affecting the natural world both in geological time, and faster than Earth's systems can respond, with drastic consequences to come.

Childhood and education can both be seen as interlocutors between pasts and futures, that happen very much in the now. However, children's experiences are perceived as dramatically different from their parents', and their education is supposed to prepare them for futures that are hard to imagine. As humans scrabble to deal with the fall-out of our hydrocarbon-based expansion, it is humbling to think how future generations and historians will reflect on the choices we make and the actions we take to protect the planet that nurtures us.

When I started out on this doctoral research, my son Seoras (we call him Seori for short) was two and a half years old. Of course I did the maths and worked out how old he would be when I was supposed to finish, but only recently has the passage of time, its various scales, and connections with education become more visible to me, not just because the PhD has taken me a lot longer than I had hoped. Perhaps it is a common experience of parent-hood, but suddenly, Seoras was the one starting school, entering formal education, the same age as the children who I spent time with during my fieldwork. Whether I like it or not, it is *his* childhood, and the childhoods of his peers that I am writing about, and that scares me. It scares me because I always thought there would be more time to get parenting for the uncertain future right, while also knowing how quickly and radically things will need to change. So I feel accountable to him, and the other children who, when it comes down to it, have little choice or agency in what form their education takes; this is our response-ability as adult members of our society.

3.3.3 NatureScot

My doctoral study has been generously supported by the NatureScot (formerly Scottish Natural Heritage) Magnus Magnusson Studentship. Both the organisation's and its founder chairperson's belief in the importance of childhood nature experiences ground my work in the real world, for which I am grateful. Without the financial support of the studentship, I would not even have been able to start this process.

NatureScot is Scotland's nature agency and is responsible for promoting, caring for and improving Scotland's natural heritage through both advising the Scottish Government and supporting it to achieve its objectives. When I started my doctorate, NatureScot's plan and vision centred around 'connecting people and nature' (SNH,

2018), and education was positioned as having a core function in achieving this. One part of its broad remit has always concerned supporting educators working in a variety of contexts, a role which has evolved over time. Initially this involved providing resources and opportunities for field visits, but has subsequently shifted to building teachers' capacity and desire to take learning outdoors for a range of reasons, whether at National Nature Reserves or in local greenspace through career-long professional learning, project grant funding and research. This represents efforts to enhance children, young people and adults' connections to nature *through* a range of experiences in addition to learning *about* nature.

This PhD studentship continues NatureScot's commitment to better understand how children come to know nature in Scotland and to investigate how education and nature can contribute to transformative change. In the context of the global climate and biodiversity emergencies, and in particular with regard to the indirect drivers of biodiversity loss, such as social values and lack of connection to nature (Hayhow *et al.* 2019), educational responses must go beyond conservation and environmental education. The Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) suggests that '[l]ong-term societal transformation through continuous education, knowledge-sharing and participatory decision-making characterize the most effective pathways for moving towards sustainable futures' (2018, p.12). Over the medium to long-term, nature-rich education can connect the other key leverage points for transformative change identified by the IPBES (2019): visions of a good life; total consumption and waste; values and action; inequalities; justice and inclusion in conservation; externalities and telecouplings; and technology, innovation and investment. NatureScot is one public body very well positioned to support this transformation in Scotland.

Thinking with an ethic of reciprocity, NatureScot have given me the agency and time to guide the project away from the original starting point to a form that I believe has value. In return, I endeavour to make this project useful to the organisation and the individuals who it might support without taking the path of least resistance and compromising in terms of form or content. Dr Peter Rawcliffe, my supervisor from NatureScot, was instrumental in developing the opportunity for a funded PhD on this topic, and has been supportive and pragmatic throughout. He has always managed to remind me at the right times about the purpose of this research, but never pushed me in one direction. I hope that I can honour his trust in me.

3.3.4 The University

All of my university learning has been connected to the city of Edinburgh, since I arrived as an 18-year-old to study at Edinburgh College of Art. After four years of the sort of open-ended thinking and playing that I think is unique to an art school education I left with the seeds of some of the ideas I can see growing in this thesis, but with not much idea of what to do with them. Edinburgh is a good city for pretending you are not in a city, and I had it easy, with the Water of Leith running by the end of

our street, a garden, and a growing passion for the hills which took me out into the Pentlands and beyond. Looking back, I can identify my experiences at ECA as a site of significant privilege and see that I felt out of place trying to make art because I did not have the ability to do what I am trying to do now: to find a role and situate myself culturally or ecologically.

I returned to Edinburgh to study for my MSc in outdoor, environmental and sustainability education at the Moray House School of Education and Sport (MHSES) in 2013. After deciding to apply, I met Prof. Pete Higgins and Prof. Robbie Nicol while working in the office at Glenmore Lodge, Scotland's national outdoor training centre. I think they were both there as part of a Europe-wide collaborative project. I stuck around one evening to listen to Pete speak, and when I heard him presenting his belief that outdoor learning is a process through which place, ecology, global citizenship and sustainability can come together (Higgins, 2008), I felt I was going to be in the right place. Outdoor education programmes have been delivered in one form or another at the Moray House School of Education for over 50 years, and it is fair to say that the research, teaching and professional practice associated with the outdoor and environmental education unit has had a significant impact on outdoor learning in Scotland and beyond. This is particularly relevant as it manifests in the development of *Learning for Sustainability* (LfS) as an approach to developing values-based holistic responses to global issues. I cover LfS in more detail in section 3.4, but the integration of LfS (including outdoor learning) into Curriculum for Excellence (Education Scotland, 2010), core Education Scotland policies (Education Scotland 2011b) and the professional standards of the General Teaching Council of Scotland (GTCS, 2020) were supported by members of the staff team and the broad membership working group on LfS. These ways of working continue to be supported by Learning for Sustainability Scotland, Scotland's Regional Centre of Expertise on Education for Sustainable Development (ESD) through a variety of ways including in-service CPD training for teachers, such as the Connecting Classrooms Through Global Learning programme (LfS Scotland, 2021).

Like Pete, my supervisor Dr Beth Christie has worked closely with teachers and other folk over the years on a range of influential projects, including the development of an MSc programme in Learning for Sustainability which attracts many teachers as part-time students and more recently on youth climate justice (McGregor & Christie, 2021). The point I am making here is that there is a significant lineage of research and teaching at Moray House that attempts to go beyond outdoor learning as a 'specialism' and connect to the lived experience and practice of teachers and outdoor practitioners in Scotland. The project brief for my PhD, the partnership with NatureScot and the supervision of Beth, Pete and Pete was part of this line and brought me back to Moray House three years after completing my MSc.

One of the things that struck me about the project brief when I first read it was the citation of a chapter from the *International Handbook of Research on Environmental*

Education called "Learning from hermit crabs, mycelia and banyan" by Heesoon Bai and Serenna Romanycia (2015). In this chapter Bai and Romanycia explicitly state their belief that, "schools *should* indeed be committed to changing the norms of society and civilisation" (p. 101, italics in original) and that they "see no other institution that has the potential to commit to and implement this large-scale project of re-normatizing the culture so as to avert the modern civilisation's socio-ecological collision course" (p.102). In short, schools need to "become leaders in the *re-normatization* of humanity" (Bai & Romanycia, 2015, p. 102., italics in original). This resonated with me because I felt it was honest. It faced up to the reality and the scale of change needed in order to affect changes that might impact on the prospects of a lot of humans and other beings.

3.3.5 Teachers, and one in particular

Scottish society, and the dominant political economy which it is rooted in, asks a lot of teachers and other educators. As I will chart in the next section and through my own diffractive readings, schools are (amongst many other things) expected to simultaneously prepare future citizens for the world of work, provide safe spaces where children's basic needs and care are provided, support the socialisation of children into a set of shared values that align with local and national aspirations and develop the wellbeing, knowledge and skills which will allow them to navigate unknown futures (Scottish Government, 2020a). Teachers and the other folk working in schools and early childhood education and care (ECEC) are often at the uncomfortable intersection of many other people's agendas, and they try to enact them all to the best of their abilities in sometimes challenging conditions. In Scotland, most teachers are women. In primary schools, 89% of teachers identified as female (Scottish Government, 2020c). In 2020, 17% of all teachers were employed part-time, with women more likely to work part-time than men. While the gender pay gap in Scotland is closing (Scottish Government, 2021a), this still means that female teachers are subject to pay gaps, particularly when working part-time, and more likely to take on the major share of informal care (Engender, 2017).

My wife Grace is a primary school teacher. She works with children in primaries one and two, the same stage I am interested in here. For a year following my fieldwork, while I was writing up this thesis, our son was in her class and I had the privilege of getting to hear about the school day from all sides, or even being part of it through the two COVID-19 lockdowns where schools were closed. Grace and I have been together since we were sixteen, and over that time she has grown into an experienced, skilled and passionate educator, but alongside the pride at a job well done, I have watched her deal with feelings of compromise, of coming to terms with not being able to fully realise ideas because of overstretched support systems, limited budgets or shifting agendas. Over the last two years, as she studies for an MSc part-time alongside her work, we have been fortunate to have each other to riff off, and

those feelings have crystallised (or compressed) into a shared critical awareness of educational praxis and the constraints of schooling, particularly in early childhood. I am so grateful for her love and everything that I have learned from and with her. I wanted to make something that respected the tensions and the energy that she and her colleagues bring to their work.

I wanted my relationships with teachers involved in the project to be built on trust, judgement free and generative in ways that were accessible and might support them in the future without being seen as 'just another thing we have to do'. This was hard to do on multiple levels, which I explore further in section 4.7 and whilst I am not fully comfortable with how I have honoured this commitment, I have learned a lot from the process. I am grateful for the four teachers who gave up their time and allowed me access to their practice.

3.3.6 Places and experiences

My fieldwork was conducted in the Highlands, on land with long human and non-human histories, which are not often visible. My ties to places emerge through kin relations (human and non-human) and experience. You don't need to know my life story, but I do think it is helpful to know some of what I bring when I intra-act with ideas of outdoor learning, schooling and non-human nature.

When I was born, both my parents were outdoor instructors working for a Christian charity with several residential outdoor centres. Until the age of eleven, I grew up surrounded by people who had committed their lives to their faith and their belief in the transformative potential of the outdoors. For me, the outdoors bit stuck more than the religion. Aged four, we moved to the west coast to start a new centre on a 3000-acre estate which ran from the rock and sand beaches of Loch Linnhe up on to the hills above, land originally inhabited by the Macleans of Kingairloch. We lived at Kilmalieu until I was ten, years that I now know are thought to be formative in the development of environmental identity. The smells of my early childhood were drying rooms, neoprene, waterproofs, chalk bags, sheep shit and salt on the wind. We lived 20 minutes of single track road from the nearest village and my school, and for most of that time, my sister and I were the only kids for several miles each way. The centre and our house were clustered around a farm that was first recorded in 1509 (Kirby, 2014) and is still worked by the Cameron family who have hardy cattle, sheep and ponies out all year. I spent a lot of time playing outside and a lot of time on my own. If I was indoors, it was often on the periphery of the day-to-day work of the centre. Hanging around the stores or the workshop, helping with changeovers, watching TV in the staff lounge or drawing in the office while my mum worked. If

she was indoors, she was drinking instant coffee from one of those smoked glass Duralex mugs, made with water from the urn in the Servery - small-scale institutionalisation manifest.

When I started school I was the only child my age. I can't remember much about my first two years of school, but I do remember summer break times when the whole school (all 25 of us) would cross the road to play in a huge field of bracken rather than in the limited playground of the soon to be upgraded school. The vivid plants towered over my head: we bent them into tunnels, nests and houses and the primary sevens picked me up and bodily threw me into the pool of green. When the new school was built in that field a year or two later, we planned and developed vegetable gardens, moving from scale drawings on graph paper to forking manure and lifting potatoes. Those first few years, our sports days took place 'up the avenue' on the lawn at The Big House, a short walk past the School Loch, or Lochan Eoin Mhic Alastair, a kettle lochan formed by retreating glaciers. I remember our headteacher Brian Turnbull (a talented artist, who drew cartoon group portraits of the whole school for our Christmas cards) encouraging us to keep nature diaries alongside our 'news' diaries. I willingly tried to draw the oystercatchers, ringed plovers and golden eagles that I could see around our home and the red deer stags that we saw rutting by the side of the road on the way to school in autumn.

Writing now, some thirty years later, is a complicated experience. I know that in terms of opportunities for nature 'connection' I was privileged. I remember some parts of my early childhood outdoor experiences very clearly, and others not at all; for example, I had forgotten that there was a lochan right behind the school until looking at the map just there - a pretty unique geographical feature that I would be sure to note as an adult researcher. A lot of what I do remember is likely from out of the ordinary experiences, like watching the moonlight form a shimmering path across Loch Linnhe while I sat outside a bothy (a rough hut) with my dad, listening to him tell stories before bed, or scrambling up Allt Coire na Cille *(burn from the coire of the hermit's cell)* to find plunge pools to swim in during high summer. Equally, I remember small everyday things, mostly alone: building dams across the burn; climbing trees and rhododendron bushes by the road so cars would pass by without noticing me; hiding up a big old beech tree in the grounds of the centre while visiting kids played games; scraping out the soft, pungent earth below the root plate of a fallen pine to make a den on the hillside; constantly coming home with wet trainers after falling in water or a bog somewhere, stripping down to my pants on the concrete steps. I vividly remember getting a snorkel and diving mask when I was about nine, and spending as long as I could swimming in the tidal estuary at Camus na Croise (*Bay of the Cross)*, entranced by the movement of the seagrasses, all quietly sequestering carbon and stabilising sediment unbeknownst to me (Kent et al., 2021).

It sounds idyllic, and largely it was, but then there are tensions that I'm aware of now, looking back: a feeling that I could have had *more*, and an acknowledgement that

most of my significant experiences with nature were not facilitated through formal education, even with the relatively unique schooling context that I had. As I hinted when thinking about Seori's experiences, family life rarely goes to plan, and I know that both of my parents worked hard to give me a wide range of opportunities as a child through considerable personal and professional hardship: I am grateful for this and do not judge them negatively. Looking back though, I can't help but feel a subtle sense of loss. Not for lack of experience *per se*, but more for potential richness and depth, both culturally and ecologically. I feel that as a child and as a family, we *made* place(s), rather than inhabited or came to know them - there was little sense of continuity across time-space, and a fragility to any potential intergenerational knowledge transfer. My parents' frame of engaging with the outdoors came largely from an instrumental adventure paradigm, where the environment was a venue for transformative experience rather than a partner who could enable them, or something they could learn *from*. My mum's experience in particular had always been tied to faith-based communities; she started climbing and mountaineering with a church youth group. This was different to my auntie and uncle, keen naturalists and hillwalkers who would visit us fairly regularly, bringing a different form of enthusiasm for the landscape, a desire to learn *about* the plants and animals, enhanced for them, I suppose by the contrast to their urban work-lives in Glasgow. I don't know why we didn't fish more, or eat more venison - superficially ironic questions to ponder in a thesis about care for nature, but telling, perhaps particularly about the disconnect between food and land which I remember being significant at that time, tied into geopolitical systems as well as local ones.

We were incomers, and my Gàidhlig language learning was never really applied beyond school or song, or connected to the land and non-humans around me. I was on the periphery of farm-life, watching the gather and the shearing, bottle feeding the odd orphaned lambs, but not involved with lambing or the cows. I learned a lot from Alan Cameron who had the farm, a quiet true west coast man in his shirt, green dungarees, work jacket, and cap, but now I can see that he didn't quite know what to make of us, or where we fit; I had no real rights to be part of his world, but he and his wife Louie did what they could. I see also that we were all complicit in a racist culture, still largely ingrained across Scotland and the UK (The Traveller Movement, 2017), which marginalised and judged Nawken and other traveling folk, whose kin had travelled those roads for generations. I feel a sense of loss for the impoverished ecology of that place too: long histories of overgrazing by deer and sheep have limited other species' opportunities to flourish here. He's had pretty varied life, but one of the things that my dad is most proud of is the native woodland regeneration scheme that was initiated on the estate before we moved in 1998.

The second place and landscape that I feel accountable to is Strathspey and Am Monadh Ruadh (The Cairngorms). From Kilmalieu, we moved to Carrbridge, a small village far from the sea, but with a potential for stillness across the seasons, even during a blizzard. This is where running and mountain biking provided me with

teenage solace and I had my first experiences of stewardship and conservation orientations towards the environment through working with the RSPB. However, during this phase of my life, I feel our family lost some of its connection to the natural environments around us: street lights, pavements and different forms of work for my parents shifted how, when and where we came into relation with nature, even though our garden still bordered open pine woods. As an adult, I have lived in Ullapool, Edinburgh, Lewis, Strathspey, Easter Ross and, for the last six years, on the south side of the Beauly Firth, but Strathspey still feels like home. My mum, remarried now, still lives in the area, just a mile from the house she lived in when I was born, and is an elder in the church that welcomed her over forty years ago.

On reflection, I had a privileged childhood in terms of nature experiences in some of the grandest landscapes in our country and was raised in a (sub)culture which highly valued experiential outdoor learning and adventure. My experience of formal early childhood education was rooted in a small school community with relatively easy access to natural places. In my adult roles as partner, father, friend, and occasional educator, I am trying to nurture meaningful relations with the land around me with minimal negative impacts.

3.3.7 The reader(s)

I am, of course, also in relation with, and accountable to you, the reader. I never wanted to write just for assessment or for the theory, which is why I have struggled for so long with the theoretical framework I have adopted, and what I perceive as the inaccessibility of some of the posthumanist and feminist materialist literature. This is especially relevant given that I wanted my research to focus on real-life practice and experience, partly in order to ensure any meaningful findings could be applied in concrete ways. Relational accountability here means paying attention to where, how and in what form my words can be most useful, given that I cannot fully know who you, the reader are. It also means accepting that while this text needs to meet the assessment requirements for the doctorate degree, to honour these relations more fully, I will need to put work into transferring my learning into other forms and arenas, such as with the project funder through workshops, for example.

On a functional level, throughout this thesis I have tried to incorporate different tones, forms of address and text in order to make my process as clear and open to you as possible. The cartography chapter is my attempt to lay a lot of it out for you to see, and in other sections you will find more diffractions which come from my own experience in the ethnographic process. This means that for some readers, there will be sections which can be skimmed or skipped quickly depending on what you already know. To honour the complexity of the subject and contemporary human-nature relations I feel it necessary to acknowledge a lot of what can go under-acknowledged

in research. For example, the section on planetary context is intended to act as a reminder of the reality and timeframes of the climate and ecological emergencies we face, so that the scale and speed of societal response can be remembered when considering educational and sustainability policies and the classroom practice which features in the fieldwork. To make it clear when I change the form of address I use different fonts. The main body text represents my efforts to meet the conventions of the PhD thesis.

Reflections and diffractions, whether on the research process or specific concepts or events are italicised, usually in this font.

Descriptive data from my fieldwork is presented like this.

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Where there are more speculative ideas or suggestions, which
are not necessarily grounded in empirical data, I present them
like this.
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I took a lot of my learning on this from Shawn Wilson's (2008) approach in *Research is Ceremony,* which Beth recommended to me. I lack a cultural framework to make sense of it in the way he does, but I try to centre the values of respect, reciprocity and responsibility which he and others (Steinhauer, 2001; Weber-Pillwax, 2003) position as important for telling research stories.

3.4 Planetary context

3.4.1 Introduction

When we open up this map, whether it is paper, Javascript or imagined, we can see the planet. Our planet. Earth. And we can see that nothing is static; everything is moving, changing, emerging. One strong line of articulation that can be used to describe this is the modern story of human progress, growth, technology and development. Air routes connecting a globalised citizenry, blockchains aggregating instantaneously across oceans, streaming time lapses of cities at night. This is a line with an upward curve, which can be read as growth and progress, as indicative of the Great Acceleration (International Geosphere-Biosphere Programme, 2015). This is a line that privileges some humans over others and often ignores the nonhuman altogether except as context or resource for human activity.

I am reluctant to start with the long shot and zoom in, but to provide the planetary context for this study and support the methodological approach I employ, I will first

chart a line of articulation which provides one alternative to that 'progress and development' one. It can be called The Anthropocene. We can know it by other names such as Capitalocene (Moore, 2015; Malm, 2015), Chthulucene (Haraway, 2016), Plantationocene (Haraway, et al. 2015) or The Great Unravelling (Macy & Brown, 2014) but I will use Anthropocene here, following that line towards a posthuman understanding of the term which is useful in relation to the other sections of this project.

This is primarily a pragmatic decision, as the term and some of the ways of thinking associated with it have been adopted in policy and research, including in the fields of biodiversity (Wyborn et al., 2020), earth sciences (Steffen et al., 2004), geography (Lorimer, 2015) and education (Jickling et al. 2018; Cutter Mackenzie-Knowles, Malone & Barrat Hacking, 2020) while also overlapping with the theoretical framework that I laid out in Chapter 2. The value in this overlap comes from the fact that however the concept of the Anthropocene is used (or the critiques applied), the significance of human-nature entanglement is unequivocal. For example, according to Wyborn et al. (2020) in the context of biodiversity, the Anthropocene "provides a framing for thinking about sustainable futures because it makes the prominent place of humans in nature explicit and draws attention to the novel scale, scope, and sources of recent social and ecological change" (p.14). When used critically and in service of transformation, the term can "open a space for constructive circumspection and thoughtful response" (Instone & Taylor, 2015, p. 139) or "do some useful work" (Jickling et al., 2018).

This molecular line of articulation allows us to acknowledge the global situation in relation to interconnected Earth systems, but also creates space to highlight the limitations of the concept and the implications for education. The rest of this thesis will concentrate on the connections with education rather than ecology and climate science, but briefly charting some of the Earth science knowledge here is important, as it shows that all contemporary educational processes are taking place in a globally unprecedented, precarious and dangerous time. Responses to the multiple crises unfolding should surely be foregrounded in education systems. This sounds dramatic, but these are lines which are not always traced back onto research maps, omitting significant forces which can, could and should affect both our education systems and our processes of inquiry into them. You might have listened to this story before, but perhaps today you will hear it differently.

3.4.2 Anthropocene time

As a proposed geological epoch, "Anthropocene" articulates the fact that humans have, relatively recently in our species history, fundamentally altered the planet's core systems in a way that will be etched in geological time. In addition to human activity

causing geophysical and ecological changes that might normally occur over hundreds of thousands of years, Earth-time changes are now experienced in the contexts of human lifetimes. Andri Snær Magnason (2020) captures this so clearly when he asks his daughter, who is sitting eating pancakes at the kitchen table with his grandmother to calculate the year that she could be sitting in a similar setting with her own great-granddaughter:

> "'Imagine that. Two hundred and sixty-two years. That's the length of time you connect across. You'll know people who span this time. Your time is the time of the people you know and love, the time that moulds you. And your time is also the time of the people you will know and love. The time that you will shape. You can touch 262 years with your bare hands. Your grandma taught you, you will teach your great-granddaughter. You can have a direct impact on the future, right up to the year 2186.'"
>
> Snaer Magnason, 2020, p.21-22

This way of orienting human lives in ecological time is not new to some peoples, and is even more present in many Indigenous ontologies, which often contrast with settler temporalities (Hatfield et al., 2018). Michi Saagig Nishnaabeg writer, academic and musician Leanne Betasamosake Simpson recounts how in her language there is a specific word for what Magnason talks of:

> "The idea of my arms embracing my grandchildren, and their arms embracing their grandchildren is communicated in the Nishnaabeg word *kobade*. According to elder Edna Manitowabi, kobade is a word we use to refer to our great-grandparents and our great-grandchildren. It means a link in a chain - a link in the chain between generations, between nations, between states of being, between individuals. I am a link in a chain. We are all links in a chain."
>
> 2018, p.8

In Indigenous temporalities, time is often framed as circular or spiralling rather than linear (Whyte, 2018), situated in relation to place or seasonality (Hatfield et al., 2018), and ancestors may be either present in non-physical form or simultaneously present as younger members of a family (Yunkaporta, 2020). Would those of us in settler or non-traditional communities act differently if we could say that more than a hundred generations of our ancestors had lived in place before us and that we ourselves would experience the world again in three generations? Unless there is significant global action, when my son is sitting eating pancakes with his great grandchild, or even just his grandchild, the world will be a very different place, characterised by increasingly acidic oceans, reduced biodiversity, higher sea levels and unseen traces of atomic bombs and microplastics amongst the potential human-

scale dramas. As Callison (2014) and Whyte (2018), remind us, "the hardships many non-Indigenous people dread most of the climate crisis are ones that Indigenous peoples have endured already due to different forms of colonialism: ecosystem collapse, species loss, economic crash, drastic relocation, and cultural disintegration" (p.226).

In 2019, the Anthropocene Working Group (AWG) of the International Commission on Stratigraphy voted in favour of formalising the Anthropocene as a geological epoch (Subramanian, 2019). The beginning of that epoch has been placed at several different points in history (Smith and Zeder, 2013), but in Earth-time, the difference is inconsequential - never has one species altered its supporting systems so fast or on such a scale. However, in human-time the Anthropocene line does have a range of gradients depending on where you begin. Some researchers argue we should start at the Pleistocene-Holocene boundary some 10,000 years ago, when the first human niche-construction activities, coupled with climate change led to the decline of megafauna (Smith & Zeder, 2013), or the rise in human population and net methane emissions associated with the Neolithic agricultural revolution (Ruddiman & Thomson, 2001), and its shifts in how humans relate to land and each other. The boundary line proposed in the initial publications on the Anthropocene was the coming of steam power, the extraction and burning of many-million year old fossil fuels (Cruetzen & Stoermer, 2000) and the associated changes in atmospheric composition. Alternatively, in search of a definitive geological marker, researchers concerned with a stratigraphic understanding of the epoch propose the post-1945 appearance of artificial radio-neuclides from nuclear bomb explosions (Zalasiewicz et al., 2010). All of these are criticised by those who want the Anthropocene to be considered in political context, arguing that as the principal causes, the multiple processes of colonisation should be acknowledged in the timeline for the period, and decolonisation incorporated into future mitigating action (Davis & Todd, 2017).

3.4.3 Characteristics of the Anthropocene

Regardless of the starting point or disciplinary framing, the Anthropocene is characterised by mass extinction and Earth's varied and interconnected systems being pushed beyond their normal capacity to self-regulate. There have been five previous mass extinction events that we know about in the last 540 million years, and evidence increasingly suggests that we are living through the sixth (Ceballos et al. 2015). This is a location on our map which multiple lines will connect to and overlay. One of the challenges of Earth-time and human-time coalescing in this way is that it is hard for us to make sense of the multiple interconnected timescales and networks. Even 'measuring' and understanding what is changing or being lost is challenging, with increasing acknowledgement that biodiversity cannot be fully understood outwith the human and Earth systems that it interrelates with (Wyborn et al., 2020).

In spite of this, understanding of human impacts on Earth systems is growing,

particularly in terms of climate change and biodiversity loss. At a global level, species population and biodiversity declines are caused by multiple interconnected and reinforcing factors, including habitat loss, ocean acidification and other shifts directly linked with human activity (IPBES, 2019b). Rapid anthropogenic climate change is a significant driver of these, and future scenarios for Earth's changing climate and are becoming clearer, as are the potential effects of slow responses. The estimates of the Intergovernmental Panel on Climate Change's (IPCC) special report in 2018 highlight the difference between 1.5°C and 2°C of global temperature rise (compared to pre-industrial levels) and show the potential effects of positive feedback loops even without considering other drivers of change. For example, the projected scale of habitat loss doubles if global temperatures rise by 2° rather than 1.5°, with 18% of insects, 16% of plants and 8% of vertebrates projected to lose over half of their climactically determined habitats (IPCC, 2018, p.8). Considering that the IPCC projections for the rate of temperature change are seen by some as conservative (Xu, Ramanathan & Victor, 2018), it is clear that global systems changes are occurring at unprecedented rates.

The evidence of species population and biodiversity decline is equally unequivocal about the scale of what is being lost due to these anthropogenic changes. The World Wildlife Fund's (WWF) Living Planet Index (2020), shows an average "68% fall in populations of mammals, birds, amphibians, reptiles and fish between 1970 and 2016" (p.10), while the International Panel on Biodiversity and Ecosystem Services's (IPBES, 2019) Global Assessment Report states that most of nature across the world is subject to multiple human impacts, "with the great majority of indicators of ecosystems and biodiversity showing rapid decline" (p.11). The most recent update on progress from the United Nations Convention on Biodiversity (CBD) shows that while individual countries are making some progress in some specific areas, none of the Aichi biodiversity targets will be met (Secretariat of the CBD, 2020) on deadline. These reports also conclude that it is possible to slow and even reverse biodiversity loss, but only through transformative, system-wide changes to how we live together on the planet, which it could be argued that the United Nations are working towards under the framework of the Sustainable Development Goals (Secretatiat of the CBD, 2020). Formal and non-formal education has a key role to play in these transitions, as will be further explored by following the lines that emerge from the Scottish primary school context briefly introduced below. However, the tension humming along this Anthropocene line comes from the current situation where policy and science acknowledges how inexorably intertwined human lives, non-human lives, social systems and non-human systems are, while simultaneously approaching them in ways that are deeply rooted in humanist ways of thinking and being (Bridle, 2022).

Like its beginnings, how long the Anthropocene lasts and what it will look like depends on human activity and how we respond to multiple interlinked crises. Haraway (2016) proposes that we think of this period as a pseudo- or transitional

epoch, too sudden and dramatic to be more than a boundary line in geological time, but one where the other side is set to be very different, one way or another. Our role as responsible Earthlings is to make that boundary line as thin as possible. For Joanna Macy and Molly Brown (2014) alongside other hopeful folk, this might be the time of the Great Turning, where those of us humans who are causing the most damage make significant changes to our ways of being in the world. This understanding of the Anthropocene as transition or threshold time is an important distinction between humanist and posthumanist approaches to the epoch. One of Haraway's (2016) key arguments against the use of the term 'Anthropocene' is that foregrounding the activities of some (not all) humans which has led to the situation does not help us to make the most of our awareness of inter-relation, think in ways that may be more generative, and make this transition period as short has possible. Cutter-Mackenzie-Knowles et al. (2020), propose socioecological learning as a way of educating for a short as possible, transitional Anthropocene, "a more ethical, critical and proactive process of dissembling, de-learning and de-imaging human dominance in education, dwelling in useful, imaginative and uncomfortable tensions and living relationships with the more-than- human" (p. 23). Along with Posthumanism and Common Worlds as Creative Milieux, they consider the Anthropocene as a touchstone for deterritorialising the socioecological learner.

Many humanist framings of the Anthropocene are universalising, in that *all* humans are seen to be the cause of the problem, and that human innovation and techno-fixes, extending even to geo-engineering, have the capacity to deal with the challenges ahead (e.g. Lomborg, 2010). This ignores the systemic and global inequality which has led to the richest 1% of the world's human population (c. 63 million people) accounting for more than twice the cumulative carbon emissions as the poorest 50% c. 3.1 billion people) (Gore, 2020). The Anthropocene is seen as a species act, when it is not. Some humans are subject to colonising forces and experience in-ordinate consequences which serve to reinforce systemic inequalities. Non-human actors in the systems concerned, whether they are pollinators, minerals or Earth systems are generally considered only in terms of human use or experience. In response, posthumanist and feminist understandings of the Anthropocene try to actively move away from an all-encompassing anthropocentrism (and androcentrism) which privileges certain actors. These approaches start from the assertion that not all humans or human activities are equally implicated in the causes of anthropogenic system collapse, nor equally equipped to deal with the effects of it (Braidotti, 2013).

Reading back through this, I can see how this applies to children too: children and the ways that they live in the world are, of course, implicated to varying degrees in the biodiversity and climate emergencies, but are not necessarily response-able in the same way as adults. That response-ability manifests in different ways, related to global population and the role of adults in education. To explore this more fully is beyond what I can do here, but Mattheis (2022) provides a critical childhood studies position on Haraway's provocative call to 'make kin not babies' (Haraway, 2016; Clarke & Haraway, 2018) which ends with a call for children to be

active, not passive in making kin - something which needs action from adults to happen.

3.4.4 Synergies between the Anthropocene and posthuman research approaches

There are several key characteristics of posthuman research approaches associated with critical posthumanist figurings of the Anthropocene which I explore further in the research assemblage sections, but which are worth highlighting here as they are tangled with the Anthropocene line and can re-emerge in relationality with childhood and education as a line of flight. The first is non-linearity. As Yunkaporta tells us, this English word is not the most helpful: it "immediately slams a big line right across your synapses. You don't register the 'non' - only the 'linear'"(Yunkaporta, 2019, p. 21). He goes on to say that no Indigenous languages from his Country have a word for the concept, because traditionally, "nobody would consider travelling in a straight line in the first place. The winding path is just how a path is, and therefore it needs no name." In the absence of a better word, in Earth-sciences-contexts, this manifests in features such as tipping points, fractals and the dynamic network models that underpin predictions of global climate change, the impacts associated with it and the impacts of mitigation and adaption interventions (IPCC, 2022). In critical posthuman theory, acknowledging non-linearity is necessary to understand subjects 'structured by multi-directional relationality' (Braidotti, 2013, p.165).

Second, posthumanist ways of thinking with the Anthropocene encourage the troubling of binaries. Rather than thinking of either nature/culture, human/nature, ecological/technological, ecology/economy, entangled and inter-related human and non-human processes and time-scales suggest that we need to think differently. This applies equally whether thinking about processes of production and consumption, education or ecological change. This has implications for how we think, *and* how we act. For example, Latour's 'nature-culture' (1993), Haraway's 'naturecultures' (2008), Tsing's notion of 'contaminated diversity' (2012a,2015), and emerging assemblages like childhoodnature (Cutter-Mackenzie-Knowles, Malone & Barratt Hacking, 2020) all represent attempts to think with entanglement rather than in disciplinary silos. The work of Karen Barad (2007) informs a range of posthuman scholars, and as I stated before, her proposal that working with *ethico-onto-epistem-ology* is a challenge to consider how acting, being and knowing can and must occur simultaneously. In some ways, this is *the* challenge for the Anthropocene: we cannot claim ignorance any longer; we know that our ways of being in the world have consequences; we are searching around for the ethical ways to act.

The third synergy between the Anthropocene line and posthumanist methodology relates to how we incorporate non-human actors and their agency into our understandings of dynamic systems. Truly ecological thinking and holism, argues

Timothy Morton, requires an acknowledgement that

> 'The whole isn't greater than its parts. In fact the whole is *less* than the sum of its parts… because the whole is one, and the parts are many, and things exist in the same kind of way, if they exist at all."
>
> Morton, 2018, p.98-99

Morton makes this point more bluntly and in a clearer fashion than others do in different contexts, but the central idea, that examining the intra-acting actors in a system without privileging certain actors over others is emerging as an important tool for making sense of the Anthropocene in a variety of fields. I have explored this briefly in the theoretical assemblage section, but it is worth noting again that the notion that things, objects, animals, people, geo-physical systems, socio-cultural discourses (and, and, and…) can all demonstrate agency when in relation with each other is increasingly common across disciplines, including geography (Thrift, 2007), anthropology (Ingold, 2000, 2018), sociology (Fox & Alldred, 2017), philosophy (Harman, 2018) and education (Taylor & Hughes, 2016; Weaver and Snaza, 2016; Fenwick & Edwards, 2010). The 'flat ontologies' associated with this way of thinking about the world require researchers to decentre privileged subjects and look at flows of affect between actors, regardless of what those actors are.

If the Anthropocene is an important line running through the cartography of this project, beyond the links with methodology, what does it have to do with education and coming to care for the natural world? When taken seriously, this line of articulation calls into question some fairly foundational aspects of how we do education, and environmental education in particular (Jickling et al. 2018; Jickling & Sterling, 2017; Corcoran, Weakland & Wals, 2017). It makes us question the type of futures, skills or values our communities are trying to educate for, the methods by which we hope to reach them, and the nature of the timescales that education must relate to. For some, this reinforces the assertion that simply learning 'about' or 'in' natural environments is insufficient to affect the sort of changes required by the challenge (Siegel et al., 2018). The UN SGDs (2015) provide one framework of outcomes to teach for and about, but pedagogies which can work with the scale of (human) global citizenship without being reductionist, or 'box-ticking' present significant challenges for already stretched educators (Elliot & Young, 2015; Ideland, 2018). Others argue for a 'post-sustainability' framing of education (Jickling & Sterling, 2017) which looks at reworking the fundamental purposes of education more holistically rather than adding on further demands to a system which is incompatible with the future health of Earth.

3.4.5 Section Summary

In this section we have followed a line of articulation called the Anthropocene. I have argued that it is emerging as both a molar (dominant) line and a potential line of flight when navigated with the help of posthumanist ways of thinking. As a way of providing planetary context for this project and for education more widely, the Anthropocene is useful because it acknowledges how entangled humans are with the rest of nature, and does not allow us to shy away from the reality of the multiple global crises we face. A posthumanist understanding of the epoch makes it more likely that social and environmental justice (not just for humans) is at the heart of responses to the Anthropocene and encourages ecological ways of thinking that incorporate non-linearity, disrupt binaries and attribute agency to non-human and human actors.

One of the challenges that comes with giving this line prominence on the map that you and I hold between us is that it seems to make conceptualising human-nature relations far more complicated, particularly when approached with posthumanist ways of being in the world. There are tensions between humans *as* nature, and humans as the only species capable of *changing* nature on the scale that I have just sketched, which has occurred largely due to human exceptionalism. So where does that leave us? When talking about connection to nature, perception of nature, or conservation behaviours, nothing is as clear cut as it might be if we were working with distinct human subjects, static objects and cultures separate from biological natures. In later sections I will map some of the different ways that human-nature relations are conceptualised, researched and understood in relation with early childhood. Some of these are more compatible with my research approach than others, but locating these existing knowledges, even those that seem to contradict other lines is a necessary part of the mapping which helps make sense of the practice and policy context as well as this specific research process. Holding on to the Anthropocene line while navigating these next sections will remind me that the next part of the map needs to take us to somewhere we can make sense of relationality, and what it means to our experience of and education with the natural world.

3.5 The Scottish context

3.5.1 Introduction

This section of the map provides more specific detail about the Scottish context. It started life as part of a broader gazetteer to accompany the map - providing names, numbers and specific context for cartographic features, but is now intended to provide enough information about the various systems which are included on the map to allow me to continue. This includes a brief overview of the landscapes, habitats and

people which constitute 'Scotland'; some of the structural forces which shape human-nature relations in Scotland; some key national policies and values which are connected to human-nature relations, sustainability and childhoods; and key elements of the education system which affect early childhood education in Scotland.

3.5.2 Landscapes, habitats and people

Scotland is a country of around 5.4 million people (National Records of Scotland, 2020a), and along with England, Wales and Northern Ireland is part of the United Kingdom of Great Britain and Ireland (UK). Our land makes up 32.6% of the total area of the UK, while our people constitute 8.4% of the total population (UK Government, 2019). 71% of Scotland's population (over 3.8 million people) live in urban areas (National Records of Scotland, 2020b). There is a wide diversity of places across Scotland, characterised at a national level as *landscapes* and *habitats*. Landscapes are areas "as perceived by people, whose character is the result of the action and interaction of natural/and/or human factors" (Council of Europe, 2000, p.2). Working with this definition, 79 distinct landscapes have been identified in Scotland (Scottish Natural Heritage, 2012), including subalpine massifs, peatlands, woodlands, modern cities and a range of landscapes shaped by different forms of agriculture. This molar line of articulation shows that human perception of environment is central to what landscapes or environments can do socially, culturally and psychologically when in relation with humans. This in turn shapes the molecular lines on the map, the ways that ecologies are individually or collectively lived, experienced and enacted in policy; this is where we start to see how these lines might connect educational experiences, perceptions and relations with the more-than-human world.

Within those 79 landscapes are a wide range of habitats, formed of diverse, but often embattled non-human beings. Habitats can be simultaneously valuable to different actors in a multiplicity of ways. For non-human beings they provide ecological niches and networks essential to their thriving; for humans they can prop up our unsustainable ways or suggest potential ways of living more lightly on the planet. They gift us with energy in the form of food, oxygen, clean water and attention restoration, support our health and wellbeing and can be a source of wonder. To many humans, they have extrinsic and intrinsic value. In Scotland we are still in the process of establishing how to characterise that value and work out what to do with it, and who benefits most from it. At a national and international level, these are often considered in terms of nature's benefits and gifts or ecosystems services and natural capital. This increasingly includes moves to acknowledge the cultural value of ecosystems (SNH, 2015) and integrate people's emotional connections into the ways we relate to habitats.

Our woodland habitats range from internationally significant coastal Atlantic oakwoods with their lichen and bryophyte symbionts, nurtured both by the Gulf Stream and historic management (Quelch, 2005), to montane scrub growing slow and small above the treeline (Scottish Natural Heritage, 2000). Scotland's coastline

constitutes 8% of Europe's seaboard, and our seas now include 231 Marine Protected Areas developed to protect specific habitats and ecosystems (NatureScot, 2020a). Due to our temperate climate and steep mountains, fresh water supports habitats across 30,000 lochs, constantly changing and characteristically short rivers, and lowland wetlands which are essential to the wellbeing of mammals, invertebrates, fish, plants, and resident and migratory bird species. Scotland's water is also captured to be used in electricity generation and in 2018, 690 million cubic metres of water was abstracted to provision the public supply (Scottish Government, 2020d). Lowland wetlands are important for moderating water levels including during floods. These instrumental uses make Scotland's freshwater an important national asset for human futures where water is valued for renewable energy, for its potential scarcity (Visser-Quinn, Beevers, Lou & Gosling, 2021) and for its role in mitigating the effects of rapid anthropogenic climate change.

Scotland's upland habitats - mountain and upland heath, blanket bog, grassland and inland rock - are also seen as being of national and international importance. This applies in terms of recreation, renewable energy, social and individual identity, 'wild land', biodiversity and carbon capture. While not unaffected by human changes, our mountains and moorlands form Britain's "largest remaining area of largely undeveloped wildlife habitat" (NatureScot, 2020a, para. 1). These habitats make up some of the iconic landscapes that draw in visitors, with nature-based tourism contributing nearly 40% of all tourism spending (Scottish Natural Heritage, 2019). They also act as a massive carbon sink, with Scotland's peat bogs holding about 1.7 billion tonnes of carbon (NatureScot, 2019). They are capable of capturing more if kept in good condition, but if drained or burnt, the net carbon release is significant. No habitat is unaffected by humans, but human crafting of the landscape is most evident in Scotland's extensive farmland and croft land habitats, shaped by shifts in consumption, technology, agricultural policy and landownership. Some modes of agriculture protect and enhance habitats and foster stewardship of the land, but intensive production that does not foreground biodiversity has negative impacts on agricultural habitats such as arable fields, hedgerows and field margins, lowland grassland, heathland and orchards.

Scotland's diverse habitats are present in varied forms across those 79 distinct landscapes, and rural nature is clearly socially, culturally, economically and ecologically important, but most of Scotland's human citizens live in urban areas. Seventy percent of land area is classified as 'remote rural', and 28% as 'accessible rural', but in 2019, 83% of Scotland's population lived in the other 2% of land area (Scottish Government, 2021b). This is a key point to note in terms of how it might affect equitable access to different forms of nature, understanding and nurturing of ecosystem health, and how people of all ages, but particularly children experience nature.

3.5.3 Structural forces which shape human-nature relations in Scotland

Scotland has a very concentrated pattern of land ownership, considered inequitable by many (Peacock, 2018), particularly in rural areas, where just over 400

individuals own 50% of private land (Wightman, 2013). This is a site of developing tensions and opportunities in relation to biodiversity conservation and restoration, particularly in the Highlands, where individuals and organisations committed to the ideas of rewilding and ecological restoration are leveraging this model of landownership in pursuit of landscape-scale interventions (Highlands Rewilding, 2022; Wildland, n.d.; Alladale Wilderness Reserve, n.d.). Concentrated private land ownership in rural areas and the privatisation of hunting for elites in the 18th Century also means that Scotland does not have accessible hunting cultures equivalent to Scandinavian countries with similar habitats (Watts, Matilainen, Kurki, Keskinarkaus, & Hunter, 2017).

In spite (and because) of this pattern of land ownership, Scotland has some of the most enlightened access legislation in the world, in the form of the Land Reform (Scotland) Act 2003, which lays out a statutory framework for access rights to most land and inland water. What this means in practice is that people can freely access most land (with some common-sense exceptions) by non-motorised means, provided they follow the Scottish Outdoor Access Code. The code is based on the three key principles of "respect the interests of others; care for the environment and take responsibility for your own actions" (Scottish Outdoor Access Code, 2005). These rights and responsibilities can be seen as foundational to how and where humans come into contact with non-human natures in Scotland.

However, even with an empowering statutory framework such as this in place, access to Scotland's landscapes is not necessarily equitable. For example, travel by car is not inherently necessary to experience many of Scotland's landscapes, and more sustainable transport is often encouraged by national agencies, but cars remain the main mode of transport for the majority of tourism day visits in Scotland (Great Britain Day Visits Survey, 2019; Visit Scotland, 2016), one potential indicator of how people are experiencing (particularly extra-urban) Scottish landscapes. In Scotland, access to a car is positively linked to both household income and rurality; the Transport and Travel in Scotland Survey (Transport Scotland, 2018) states that "forty one per cent of households with an annual income up to £10,000 had access to one or more cars, compared to ninety six per cent of households with an annual income of more than £50,000" (p. 19) and that 39% of residents in large urban areas do not have access to a car (p.45). Data from Scotland's last census in 2011 shows that the areas with the highest proportion of citizens from minority ethnic groups are centred around the four large cities of Glasgow, Edinburgh, Aberdeen and Dundee (Scotland's Census, 2018). People who identify themselves as from ethnic communities other than White Scottish and White British are also less likely to hold a driving licence (Transport Scotland, 2018). In some ways, reduced car use is a very positive thing, and cars are not and should not be a prerequisite to experiencing Scotland's nature, but this passing analysis of just two factors, car access and ethnic diversity in urban/rural communities shows that material (and inequitable) realities suggest that not all Scottish citizens are likely to exercise their access rights and responsibilities in the same landscapes and places.

This is one reason that urban green and blue spaces, such as gardens, public parks and canals are important. As the primary landscapes that urban residents come into

contact with, they play a vital role in supporting human residents' health and wellbeing, encouraging sustainable travel choices and enabling social connections. However, inequitable access to quality greenspace exists *within* local urban landscapes. For example, in England, the "the most affluent 20 per cent of wards have five times the amount of parks or general green space (excluding gardens) per person than the most deprived 10 per cent of wards" (CABE, 2010, p.13). These same communities experience shorter life expectancies and lower levels of physical activity which appear to correlate with physical environments and restricted access to quality local greenspace. According to last comparable national performance indicators for access to green and blue space (Scottish Government, 2019), people living in the most deprived areas and people from ethic minorities are "less likely to live within a 5 minute walk of their nearest greenspace than people in less deprived areas". I will consider the evidence for the health and wellbeing benefits of natural environments in more detail in section 3.7.

Urban greenspace is also important for non-human ecosystem functioning, particularly in terms of supporting biodiversity and addressing the climate emergency. It can link up fragmented habitat, increasing species resilience and creating space for native species, with one meta-analysis suggesting that corridors linking habitats can increase species by 50% (Gilbert-Norton, Wilson, Stevens & Beard, 2010). Urban greenspace also acts to manage water, moderate temperature, enhance air quality and reduce environmental noise (O'Neil, 2004). However, holistic approaches to greenspaces can be complex in both urban and rural places, requiring joined up thinking, trans-sector alignment and landscape-level initiatives. When considering equitable access to greenspace and time in nature, schools, as a consistent and supposedly equitable place for children to develop, can be understood as key enablers in human-nature relations.

3.5.4 Policies, purposes and values

Many matters, including education and the environment are devolved from the UK Government to the Scottish Government. The link between legislative capacity and contemporary Scottish society has facilitated the development of distinct curricula, access rights, responsibilities and outdoor cultures that are unique within the United Kingdom. The impact of this on early childhood education in Scotland is explored in more detail in sections 3.5.5-3.5.8, but a brief overview of several key features will help to show how this research project is in relationality with wider civic structures in Scotland.

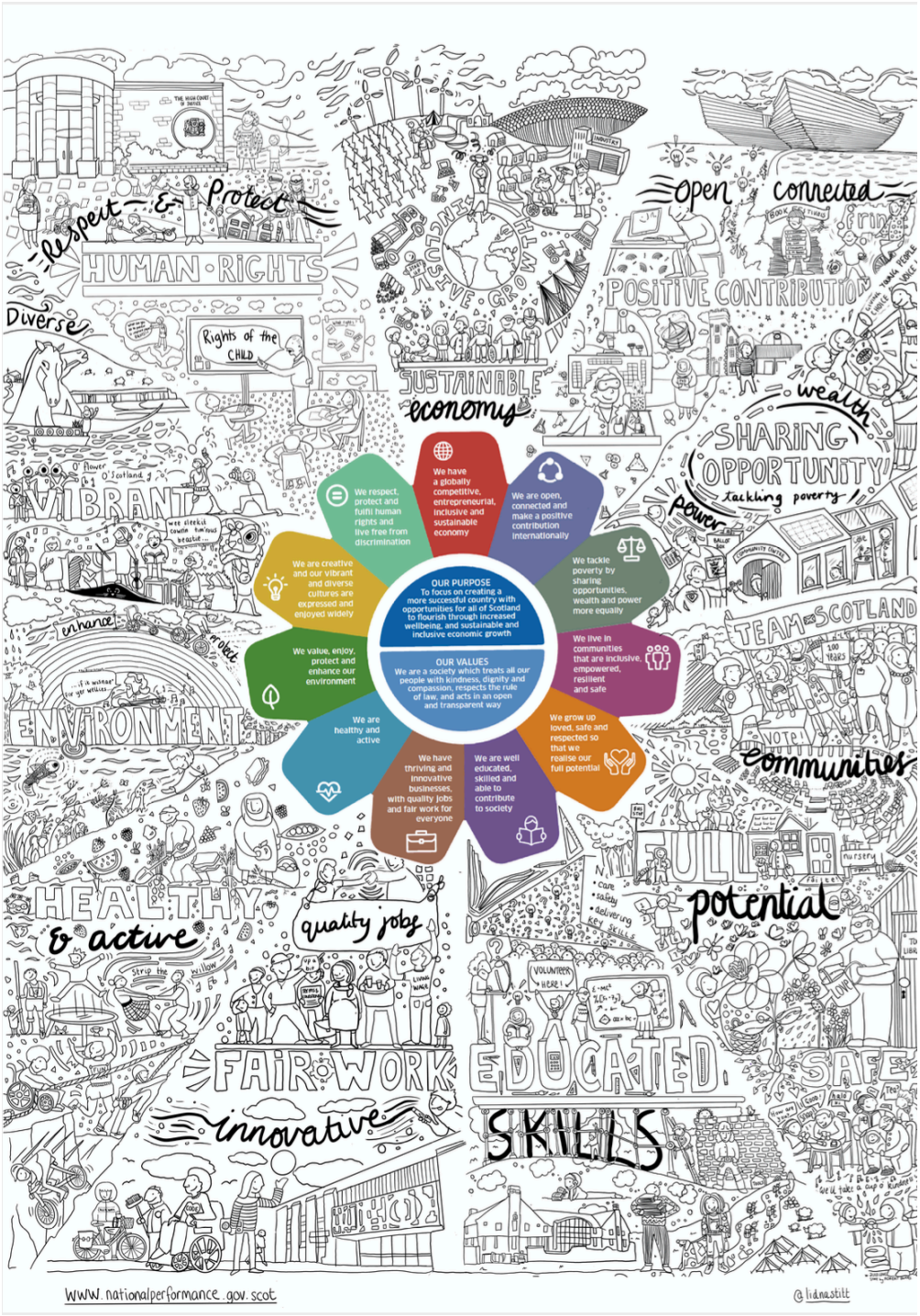

Image 2.1 Scotland's National Performance Framework (Scottish Government, n.d.a)

The National Performance Framework (NPF) (Scottish Government, n.d.b) provides an insight into the type of country that Scotland aspires to be, and, importantly, is aligned with the United Nation's Sustainable Development Goals, which can be identified as a molar line of articulation of human-nature relations. The central statement of the NPF is that our national purpose is "To focus on creating a more successful country with opportunities for all of Scotland to flourish through increased wellbeing, and sustainable and inclusive economic growth", while our

values state that "We are a society which treats all our people with kindness, dignity and compassion, respects the rule of law, and acts in an open and transparent way" (Scottish Government, n.d.b). "All of Scotland" leaves space for non-human flourishing, but alongside the tension inherent in the term "sustainable growth" which can be interpreted in a range of ways and has specific political implications related to independence in Scotland (Sustainable Growth Commission, 2018). The molar articulations of our national values appear distinctly anthropocentric, but through their emphasis on relationships (and, perhaps, even love) imply ways of acting which can and are being applied to both education and Scotland's nature in potential lines of flight.

There are several national outcomes and related visions which have particularly strong links to this project. In line with the recent moves to incorporate the United Nation's Convention on the Rights of the Child (UNCRC) into domestic law (Scottish Government, 2020e) the vision for children and young people calls for childhoods characterised by happiness, love and understanding, nurtured by quality early years care and where children are involved in decisions relating to them. One passage stands out in relation to this project, indicating collective responsibility for childhoods:

> Our communities are safe places where children are valued, nurtured and treated with kindness. We provide stimulating activities and encourage children to engage positively with the built and natural environment and to play their part in its care. We provide the conditions in which all children can be healthy and active. Our schools are loving, respectful and encouraging places where everyone can learn, play and flourish. We provide children and young people with hope for the future and create opportunities for them to fulfil their dreams.
>
> Scottish Government, 2020f, para. 3

The wider (aspirational) education outcome is that as a nation, we "are well educated, skilled and able to contribute to society", while the environment and health outcomes are that we "value, enjoy, protect and enhance their environment"; and "are healthy and active". National indicators can provide evidence of national economic, environmental and social wellbeing, but for me, there is significant power in the vision sections of the NPF, which can be read as lines of flight which hold transformational potential if pursued wholeheartedly. For example, in the vision for the outcome "we value, enjoy, protect and enhance our environment", "natural landscape and wilderness" are seen as essential to Scottish people's identities, and there is a strong commitment to environmental justice through ethical consumption, carbon reduction, renewable energy and biodiversity enhancement. The education outcome acknowledges that we can "find knowledge in varied and sometimes surprising places" and "grow as individuals and as a nation" through learning. Taken with the vision for childhood, these aspirations hint at how integrated and fruitful approaches

to health, wellbeing, childhood, education and ecology might emerge through direct experience with nature.

These are visions, shared imaginings of the future, informed by present challenges. You might say that they are 'just' imaginings, but Donnella Meadows called vision "the most vital step in the policy process" (1984, p.1), and the examples above show how nature and education can be synergistically tangled up in our action-based striving for these visions. I consider this in more detail and from different perspectives elsewhere in the thesis, but for now it is worth remembering that Gert Biesta (2013) argues there are three domains which explain the *purpose* of education. The first is *qualification*, equipping learners with knowledge, skills, capacity to do things. The second and third, which are more important to this thesis, and arguably to achieving some of the National Outcomes are *socialisation* and *subjectification,* which have been increasingly incorporated into schooling, as other informal processes of education have become weakened (Biesta, 2013). Socialisation is about incorporating individuals into the structures, practices and cultures of a society, while subjectification relates to the development of the individual identities and values which drive that engagement. Thinking with these three domains, the role that education must play in achieving the visions laid out in Scotland's National Outcomes becomes clearer.

The way in which Scotland's nature is positioned as an asset reflects wider shifts in international policy towards integrating biodiversity into economics and economic change, which I explore further in Section 3.6 As this has been a peripheral approach to economics, but is increasingly integrated into mainstream policy, this is a molar line if engaged with superficially by government. It does, however, offer multi-dimensional tools for looking at both nature's contributions to people and ways of fostering care for nature, Sir Partha Dasgupta chose to close his report on the economics of biodiversity with a call (written with environmentalist Mary Colwell) to establish the natural world within education policy and weave connection with nature throughout our daily lives (Dasgupta, 2021, p. 496).

Section summary

In the intersecting fields of health, childhood, communities and environment Scotland already has visionary policy frameworks in place. While there are a range of indicators for assessing progress, designing and implementing transformational change is challenging, and current approaches are primarily organised around economic strategy and in pursuit of a "wellbeing economy" (Scottish Government, 2022a), likely leading to weak sustainability. In terms of how society relates to biodiversity, these follow the molar line articulated in the Dasgupta Report (Dasgupta, 2021) which argues for nature's contributions to people to be viewed as assets, but also highlights the central role that education must play in developing healthier human-nature relations. The NPF is an aspirational approach to civic life and governance, but it, along with Biesta's unabashedly humanist understanding of education also highlights tensions (and synergies) that will re-emerge throughout this thesis between humanist, rights-based approaches to social and environmental change and calls for ecological, relational approaches which extend care beyond the human and provoke shifting priorities.

3.5.5 Curriculum for Excellence

Education in Scotland has always been perceived as unique in relation to the rest of the UK, and "generally regarded as a key indicator of national identity" (Humes, 2014, p.14). Young people's education between the ages of three and eighteen is guided by Curriculum for Excellence (CfE), which should provide "opportunities to develop the knowledge, skills and attributes they need to adapt, think critically and flourish in today's world" (Scotland's CfE, 2020a). The development of CfE began in 2004 in response to political and educational shifts nationally and internationally. These centred on the perceived need to develop individuals (framed primarily as economic contributors) able participate in economies and ways of working that were still emerging (Humes, 2014). While other education systems responded with increased uniformity and accountability, the group tasked with Scotland's response called for a curriculum featuring active learning; coherent content and connected stages from 3 to 18; a rich range of experiences linked with children's individual needs and interests and where assessment supports learning (Scottish Executive, 2004). Most of the children involved in the fieldwork in this thesis were engaged in the Early and First levels of the curriculum. CfE was implemented nationally in 2010. A wide range of documents support the curriculum assemblage, consisting of experiences and outcomes, the *Building the Curriculum* series, and more recently, a set of benchmarks for tracking learners' progress.

The development and roll-out of CfE was far from smooth, partly due the complexity of the policymaking and implementation processes and the wide range of stakeholders involved. Humes (2014) identifies three factors that were particularly challenging: resistance to the reform agenda from some Scottish education institutions; the failure to meaningfully engage the majority of in-service teachers in how CfE could and should be enacted; and crucially, a "lack of conceptual clarity" (Priestley and Humes, 2010, p.358), particularly on the way that knowledge was conceived, which limited the ability of teachers and other agents to articulate the 'why' of the curriculum. There are a range of ways in which CfE could be considered here (see Cassidy, 2018 and Priestley and Biesta, 2014 for more detailed analysis of implementation), but I will restrict myself to outlining the current manifestation of CfE and suggesting how the structural components of the curriculum might relate to the goal of nurturing citizens who care for the world.

In 2015, CfE was the subject of an Organisation for Economic Co-operation and Development (OECD) policy review, commissioned by the Scottish Government. This stimulated several governmental responses, including the National Improvement Framework (NIF) and Plan which is now revisited annually and captures how CfE is being enacted and improved. Since its first iteration, the key priorities of the NIF have been on attainment, particularly in numeracy and literacy; closing the attainment gap

between the most and least disadvantaged children and young people; improving children and young people's health and wellbeing; and employability (Scottish Government, 2020f). The OECD review also recommended a refreshed narrative for communicating the curriculum, the result of which can be considered as the (re)presentation of CfE most relevant for the context of this study, available at www.scotlandscurriculum.scot.

In this, curriculum is characterised as "the totality of all that is planned for children and young people throughout their education" (Scotland's Curriculum for Excellence, 2020a, para. 2). This should feature opportunities for personal achievement; active participation in the ethos and life of the school as a community; interdisciplinary learning; and experiences that span the curriculum areas and subjects. (Scotland's Curriculum for Excellence, 2020a). Young children's outdoor learning and experiences of nature at school can be a tool for integrated curriculum making (Scotland's Curriculum for Excellence, 2020b), or perhaps a disruptive flow in segmented practice. It is worth noting that curriculum entitlements during the broad general education phase (ELC - the third year of secondary school) include "understanding the world, Scotland's place in it and the environment, referred to as Learning for Sustainability" (Scotland's Curriculum for Excellence, 2020a, para. 6). This is explored further in the sections below onLfS and outdoor learning.

Image 2.2 The four capacities of CfE (Scotland's Curriculum for Excellence, 2020a)

CfE is structured around four fundamental capacities: Successful Learners, Confident Individuals, Responsible Citizens and Effective Contributors (Scotland's Curriculum for Excellence, 2020a). The placing of these four capacities at the centre

marks CfE out as an example of "the turn from curriculum as a description of the content of learning, to curriculum as a description of what the student should be and become" (Priestley & Biesta, 2014, p.42). Contemporary curricula structured around capacities work well when students' learning will be applied in specific (often work-based) contexts, but it could be argued that historic models of education which aimed to develop the learner as subject rather than knowledge-holder were developed for rather less complicated, uncertain and equitable times. For example, Priestley and Biesta (2014) argue that the education of the Ancient Greek elite through *paideia* (cultivating subject knowledge alongside civic virtue) and the European Renaissance idea of *Bildung* (the formation of the individual through dynamic relation with society and culture) both represent forms of education where the priorities were socialisation and the cultivation of specific virtues and ways of being in the world. In both cases though, the ideal citizens that emerged represented only a small subsection of societies which were characterised by far less malleable social structures and ways of making a living, where (for better or worse) there was less capacity to contest what it meant to be a virtuous citizen.

The vagueness of various elements, but particularly of the virtues and values that should be promoted, can be considered as a site of potential tension in CfE. This is particularly relevant to this thesis in terms of how the curriculum affects the emergence (or not) of 'environmental citizens', or perhaps even the type of citizens with the will and ability to act for radical change. CfE was developed as an alternative to what Sahlberg (2011) calls the Global Education Reform Movement in other countries, characterised by standardised teaching and learning, a focus on literacy and numeracy, prescribed curriculum, market-based models of change and performance-related testing. In contrast, CfE is intended to give teachers and schools agency to craft a range of educational experiences as part of individual children's learner journey across four contexts: opportunities for personal achievement, interdisciplinary learning, curriculum areas and subjects, and the ethos and life of the school as community. Nurturing the four fundamental capacities across these contexts is intended to enable young people from age 3 to 18 to develop skills, attributes and values with which they can navigate our rapidly changing times in ways that embody the national values central to the NPF. However, there has long been criticism that these capacities can be perceived as fairly arbitrary, difficult to evaluate and hard to define in practice (Priestley & Biesta, 2014), restricting the CfE's potential to act as a line of flight in this map. In practice, who decides what makes for a 'responsible citizen'? How is 'success' evaluated in learning? The socialising function of the curriculum which holds so much potential for transformative cultural change is also a limiting factor. As ELC settings and schools take on more responsibility for socialisation, pressure continues to build in other areas of the system, particularly in literacy and numeracy. When combined with the risk of creeping prescriptiveness in terms of benchmarks which relate to experiences and outcomes, this leaves space for significant variation in how curriculum is enacted.

The OECD carried out a follow up report in 2020 which assessed the implementation of CfE. While CfE is assessed as having significant positive characteristics and rich potential, the report identifies the need for better structures to enable shared ownership and effective leadership, stating that: "schools and the profession should hold responsibility for the conception, implementation and outcomes of their own curriculum, provided the rest of the system fulfil their own responsibilities to support schools and the profession within a clear policy framework" (OECD, 2021). The report also highlighted a lack of coherence in the broader policy landscape, and a lack of structure and long-term perspective to the implementation of CfE, which has been particularly obvious in the upper stages of the curriculum. The implications of this for the subjects of this thesis are that many schools and teachers already feel like a lot is being asked of them (Educational Institute for Scotland, 2021) without structural support to implement changes and interventions which come from multiple stakeholders. At present, learning for sustainability and outdoor learning as pedagogical approaches are just two of many priorities across the work of schools. Although it is presented as a holistic and effective way to integrate multiple outcomes by its advocates (Higgins & Christie, 2020), this likely means that the ways in which they are enacted will vary considerably across contexts.

Section Summary

In summary, CfE has the potential to be a vehicle for the type of transformative education that is called for by UNESCO (2021), and for developing the aspirational national values at the heart of Scotland's own NPF. However, the national commitments to improving attainment, health and wellbeing and employability, while entirely justified and necessary, leave little room for already stretched educators to critically consider how the four fundamental capacities at the centre of the curriculum relate to the wider policy framework hoping to steer Scotland towards more sustainable futures.

3.5.6 Early learning and childcare in Scotland

Just as the goals of curriculum-making do not exist in a vacuum to be presented or enacted in isolation, apolitically or without privileging certain agendas, how a society makes sense of child development and child-care can be disputed fields. I write more specifically about how this manifests in terms of early-childhood-natures in section 3.7, but in here I will sketch out what pre-school early learning and childcare (commonly referred to as ELC) provision looks like in Scotland at the time of writing. Aline-Wendy Dunlop (2018) provides a much richer consideration of the history, current form and future of early years curriculum through her own experience should you want to explore this in more detail.

The focus of my research is on what happens at primary school, but some information on children's pre-school experiences will provide context to aid understanding of how and where children might start their learner journeys before

school, and chart moves which are influencing pedagogy in ELC settings and the first years of school. Two supplementary sections provide more detail on *Realising the Ambition: Being Me*, the new national practice guidance for early years, and how the role of outdoor spaces in ELC has developed in Scotland in recent years.

Throughout this thesis, I tend to use the term early childhood education (ECE) when writing about young children's formal education at school. This is because it generally covers educational experiences between birth and 8 years of age (UNESCO, n.d.). While children in Scotland usually start school between the ages of 4.5 and 5.5 years old, much of the international research and practice that I refer to comes from countries where formal schooling begins later. In Scotland, children's experiences from pre-birth through to age eight (where most children will be experiencing the CfE at Early and First levels) are formally defined as 'early years' (Scottish Government, 2009). The Scottish framing of 'early learning and childcare' is positioned to emphasise the perception that children and their families need not rely on external (formal) education or care, instead bringing their own capacities into relation with other important individuals and learning as a process that unfolds from pre-birth. While the age range is contiguous and sometimes overlapping, perceptions and resources mean that in practice, school(ing) can be quite starkly different from other early years contexts in Scotland, which is why I use ECE when referring to schools.

ELC, and childcare more broadly, is going through an extended period of change in Scotland. It is a priority for the Scottish Government, driven by children's rights agendas, efforts to close the poverty-related attainment gap and the economic and civic impacts that high quality ELC can have for both parents and children (Scottish Government, 2008). The Children and Young People Act (2014) together with the publication of Building the Ambition to guide national practice (Scottish Government, 2014) introduced the terminology and approaches which characterise this period. Changes to national policy were informed by a range of sources including recommendations from an independent review of the ELC and out of School Care (OSC) workforce (Siraj & Kingston, 2015), the report of The Commission for Childcare Reform (2015) and a review of how childcare quality influences outcomes (Scobie & Scott, 2017). Key considerations in this process of change include flexibility of provision, staff quality, conditions and professional development and pedagogy. Recent structural features to implement these changes include the Early Years Framework, the development of a National Standard, and investment in a Funding Follows the Child model (Scottish Government, 2018b) which is intended to ensure that all families have access to equitable and quality childcare.

This means that in Scotland, all three- and four-year-old children (and some two-year-olds) are entitled to state-funded ELC provision, which can be used with ELC providers who meet the National Standard and contract with local authorities. In 2014 this entitlement was set at 600 hours a year (about 16 hours a week during term time), and there was a commitment to increase this to 1140 hours by August 2020. The statutory obligation on local authorities to provide this was shifted to August 2021 due to delays caused by COVID-19. By April 2021 72% of eligible children were registered for 1140 hours a year (Scottish Government, 2021c)

Uptake of funded ELC places is very high, with an estimated 98% of eligible three- and four-year-olds registered to claim at least some funding (Scottish Government, 2019). These funded hours are fulfilled in a range of settings, including local authority ELC centres, school nurseries, and private, voluntary and independent providers, including some childminders. The diversity of settings is generally seen as a strength of the 'funding follows the child' model, which should provide parents with the ability to choose ELC provision that meets their needs. This makes for a rich, but potentially challenging patchwork in both educational and societal terms, with the early learning and childcare of many three and four year-olds (up to 30 hours a week) fulfilled in a variety of contexts. Evidence shows that ELC provision must be of high quality to yield benefits; poor quality ELC can have detrimental effects (Scobie & Scott, 2017). All settings are subject to evaluation by both Education Scotland and the Care Inspectorate, and CfE and Getting it Right For Every Child (GIRFEC) guide children's experiences, but this still leaves room for childcare experiences to take many different forms.

The investment in ELC shows how potentially influential early childhood interventions are across individual's life course in terms of experiences and outcomes. Most relevant to this thesis are the molecular lines which connect ELC experiences to the shaping of early childhood-nature relations, how the more-than-human world is figured in processes of social development and the transition into school.

3.5.7 Realising the Ambition

As part of the efforts to ensure consistent and equitable quality in ELC, *Realising the Ambition: Being Me* (RtA) was published in February 2020 (Education Scotland, 2020), to update national practice guidance for early years. While the publication came after most of my fieldwork took place it is important to consider the impact that this guidance is already having and will have on how early years is conceptualised and enacted in the future. The document lays out the rationale for the changes emerging in early years provision, provides a clear characterisation of what it means to be a young child growing up in Scotland, how child development is understood and how professional practitioners should be supporting this. It highlights the importance of play and suggests pathways to improving quality through pedagogy, curriculum, leadership, critically reflective practice, improving transitions and learning from other curriculum approaches.

As it (re)presents the model for national practice with our youngest learners from birth to the first years of primary school, there are several parts of RtA that are particularly relevant in terms of understanding how young children come into relation with outdoor and natural environments in ELC and early years settings. While I cannot provide a detailed analysis here, the elements that I want to signpost are: the image of the developing child; the influence of early childhood curriculum; the importance of play; learning environments; how and which pedagogies are enacted; and how transitions affect learners.

While no specific models of child development are singled out in RtA, the child is figured as an individual in dynamic relation with surrounding environments and cultures (Education Scotland, 2020, p. 15). This suggests an understanding of childhood informed by ecological (e.g. Bronfenbrenner, 1979; Hayes, O'Toole & Halpenny, 2017) and sociocultural perspectives (e.g. Rogoff, 2003). From these perspectives, children's development is influenced by the different physical and social environments (or settings) that they and their families interact with, alongside culturally specific and constructed contexts. RtA makes it clear that:

> "Curriculum for Excellence 'early level' is intended to support the implementation of a responsive, continuous play-based curriculum, for children aged three to six. It is important then that practitioners and teachers provide, through responsive and intentional planning, a blend of child-initiated and adult-initiated learning experiences. The emphasis should be on child-centred play pedagogy to ensure continuity in children's curriculum experiences.
>
> Education Scotland, 2020, p.52

Play, and play pedagogy is given a whole section in RtA, and it is considered in the context of how effective learning environments are designed through consideration of *interaction*, *experiences* and *spaces*. These three touchstones encourage practitioners to think about the role that adults, peers and physical spaces play in how children play and learn. There are explicit links made to how different environments afford children different ways to engage on their own terms through play, a strand of human-environment psychology which is explored in section. In RtA, the early childhood curriculum is holistic and is made through "quality interactions, interesting spaces" and experiences that are "set in meaningful contexts" (Education Scotland, 2020, p. 52). It is

> also about **what** the child wants to learn within a caring, nurturing environment. While the intentional promotion of specific experiences and interaction are important for young children to learn, so too is a curriculum which values and upholds the rights of the child.
>
> Education Scotland, 2020 p. 52 (emphasis in original)

Outdoor play is positioned as having a unique role in these processes, and in this document is almost synonymous with the term outdoor learning. The role that ELC plays in facilitating and mediating children's outdoor experiences is made explicit, with "a need for all settings to consider the quality and frequency of outdoor play provision as a priority" (Education Scotland, 2020, p. 55). In this context, settings can be understood to apply to early years classrooms in schools as well as ELC settings.

More often than not, when spaces are referred to throughout the document, the phrasing is "outdoor and indoor", suggesting a deliberate effort to prioritise the use of outdoor environments. While outdoor play is primarily valued in terms of child development (through its contributions to health and wellbeing, physical literacy, risk-management), RtA also suggests that regular contact with local nature "can engender an appreciation and respect for biodiversity. It can also connect them to their local community and sense of place, helping them to develop as responsible citizens committed to sustainability" (Education Scotland, 2020, p. 55). The child's voice in one of the learning environment sections calls on practitioners to "afford me daily opportunities to learn from nature and living things both outdoors and in" (Education Scotland, p.31). Investigating the assumptions that inform these positions and how these practices are enacted are central to the purposes of this research.

The child-centred pedagogy modelled in RtA is a cycle of observation, interpretation and documentation of learning; responsive and intentional planning; and facilitation. This is important as a way to understand the ways in which teachers enter into the dynamic interrelationship of child, curriculum and natural environments. In the agential cuts sections around play pedagogy and attention, I consider how the opportunities and challenges associated with this cycle manifested throughout my fieldwork.

Transitions are a central theme that run throughout RtA, defined as "an adjustment over time to new contexts outside the family, where babies and children experience changes to their social environment, to their routines, to what is expected of them and to the relationships they have with others in new situations" (Education Scotland, 2020, p. 89). The privileging of indoor learning experiences at school means that taking learning outdoors inevitably entails at least a 'horizontal' transition (vertical transitions are those that involve major change for families, such as from nursery to school). How these transitions are facilitated and experienced has the potential to say a lot about how spaces are valued, used or experienced, and also about how children and practitioners are expected to act in different spaces, particularly when 'others' is extended to include non-human nature.

In summary, RtA offers a time and context-specific insight into how the early years in Scotland could, and should look at the time this research was conducted. Child development, curriculum and pedagogy are all figured as relational, but centred on and around the individual child and the settings that they come into contact with. Outdoor learning and play are prominent features of the discourses clustered around early years, education, sustainability and health and wellbeing in Scotland, but are primarily evaluated in terms of individual development rather than systemic or cultural change.

3.5.8 Outdoor spaces in ELC

The recent structural shifts, practice guidance and parental choice summarised above influence the role(s) that outdoor environments play in ELC, to the extent that it is hard to unpick how they all relate. I want to briefly explore this, looking at a few of the strands that we will examine more closely as we progress with the mapping section and the implications they might have for children as they begin school. The features that I want to point out here are as follows.

Outdoor spaces have always been part of formal ELC, but are now instrumental to the delivery of expansion, a cornerstone policy of Scottish Government. This matters because adult:child ratios (indoors and outdoors) change with age throughout the early years, affording different opportunities and challenges at different stages, particularly in terms of horizontal and vertical transitions into and within the first years at school. Finally, I briefly introduce the ways in which outdoor settings can (re)present performative identity construction at individual and national levels.

It's hard to keep myself on track here. I'm supposed to just be describing the lay of the land, not telling you the different stories I know about each spot - that comes next. But I worry I'll get carried away by the time we get there and miss something important. In this section, I'm not setting out to critique well-intentioned and informed practice, and I know it might seem like I'm focussing on younger children's experiences, but I want to show you how I see some of it, so we can get into more detail later. Outdoor environments are central to young children's experiences of ELC, but this is due to a lot of push and pull factors - cost, health and wellbeing, parental values, wider social value judgements and on and on. These don't always have much or anything to do with non-human nature, and are often different to their experiences when they move on to primary school.

The expansion of funded childcare in Scotland requires increased capacity, delivered through new providers and adaptations to existing settings (Scottish Government, 2021c). The Care Inspectorate identify four different models for ELC, and use these to calculate the number of registered places available to providers (which obviously affects income) and therefore each local authority's ability to meet community needs. *Indoor settings* have "adequate outdoor space that enables children to freely access indoor and outdoor play and learning opportunities every day" (Care Inspectorate, 2018, p. 3), but their capacity is based on indoor space. At *outdoor settings*, children are outdoors nearly all the time, with shelter available in permanent or temporary structures. *Dispersed settings* use an "outdoor satellite space" (Care Inspectorate, 2018, p. 4), in the local area, for some children to spend some of their placement outdoors, often allowing for more registered places across the two spaces. *Indoor/outdoor settings* are indoor settings, but with suitable infrastructure and outdoor spaces that are big enough and of a high enough quality to allow for up to 20% additional capacity (Scottish Government, 2020b). Alongside other drivers, making use of outdoor spaces is explicitly framed as a cost-effective way of fulfilling the

expansion of funded ELC, due to the potential for reduced capital expenditure on buildings (Scottish Government, 2020b).

Regardless of setting, the adult:child ratio for children aged three to eight in formal ELC or out of school care should not exceed 1:8 (unless the placement is for less than four hours, in which case it can be 1:10). In contrast, when children start school (usually aged between 4.5 and 5.5), the maximum class size is set at 25, with the average P1 class when I began fieldwork in 2019 having 21 children. The maximum size for a single stage P2 or P3 class is 30, or 25 for composite classes - the average P2 class was 23.9 children (Scottish Government, 2019, p.13). I am not trying to make a like-for-like comparison here, because there are clear differences between early years provision in ELC settings and early years at school, in terms of children, parents, staff qualifications and pay, and a multitude of other factors. However, at a time when national guidance specifically aims to provide a coherent early years curriculum across ELC settings and the first years of school, characterised by smooth vertical transitions, high quality interactions and rich spaces and experiences (Education Scotland, 2020), the distinction needs to be noted.

Schools across Scotland are evaluated annually in terms of condition (the fabric of the school building in terms of safety and security) and suitability (how fit the school is for delivering the curriculum) annually. While there is a general improving trend in both condition and suitability, in April 2020, more than 12% of primary schools were still rated either poor or bad in terms of suitability (Scottish Government, 2020g). Outdoor space is considered in this analysis, but the dataset does not provide specific detail on what contributes to a school's grading. I note this here because even in school settings where there is easy access to outdoor spaces from indoor spaces, it may prove logistically challenging for individual teachers to manage up to 25 children across more than one space, even with support. I think it is fair to assume that even if this does not act as a barrier to teachers spending time outside with children, it affects pedagogical practices and may create marked distinctions in the vertical transitions for young children between 'nursery' (where many have free access to outdoor space during play-based learning) and 'school'. The same may apply to horizontal transitions during the day, between 'classroom' and 'play-time', or even 'indoor' and 'outdoor' learning. This is why 'suitability' relates to my own fieldwork, as the children that I spent time with were all in P1 or 2 classes - how much do we, as a country *want* outdoor space to be to their curriculum? The questions associated with vertical transitions, ratios and physical environments inform the arguments of groups like Give Them Time (who campaign for additional funded ELC provision for children to legally defer the start of P1) and Upstart Scotland who, among other aims, lobby for a statutory play-based kindergarten stage similar to other European countries (Upstart Scotland, 2020).

With ELC expansion has come diversification, and the policy narrative supports the importance of outdoor spaces across ECE, but there are still only 31 registered fully

outdoor ELC settings in Scotland (Cowper & Irving, 2020). In RtA, this approach is characterised as 'nature-based learning' or 'nature kindergarten', which, according to Claire Nugent (2017), captures a deceptively broad range of practice and settings. As we will see as we go on, using 'nature' to try to pin down diverse concepts or practices can be tricky. Eva Gulløv (2003) provides insight into this when considering the popularity of outdoor kindergartens in urban, middle class Danish communities. She suggests that parental choice of nature kindergarten and the material reality of many settings says a lot more about how *childhood* is figured than the specifics of human-nature relations: childhood in nature is positioned as distant from the 'real', urban post-industrial adult world which necessitates out of home childcare in the first place.

I should note here that over 18 months during the first part of my PhD, including the fieldwork, our son attended an outdoor ELC setting for two days a week. For a short time, I was also a board member of the social enterprise which operated the setting. At the time, we had a petrol car and I really dislike driving, primarily due to the environmental costs associated with it; wherever I can, I stubbornly choose to cycle or minimise the number of trips I make in the car. We live in a semi-rural village, and the only outdoor setting which was available to us was even more rural, about 20 minutes drive away, with no other feasible travel option. Thus, I found it really interesting that my most significant mileage in the car most weeks was driving Seori to and from nursery, especially when he was young and car-sharing with other parents was trickier. This was not an unconscious, or easy, decision - I weighed up what I perceived to be the benefits for Seori in terms of his developing values and identity, and accepted the compromise in my values, identity and time. Articulating this process also flags multiple privileges which reinforce critical issues around access to certain forms of ELC - we had the time, money, vehicle and social capital to allow us to choose *the form of ELC that our child experienced. Even with universally funded hours, this is not available equitably.*

Outdoor nurseries and organised outdoor play in Scotland are often discursively linked with Nordic models of ECE, sometimes in ways that do not take account of cultural differences in how childhood, the role of the state and outdoor life are understood (Nugent, 2017). I cannot explore this fully here, but there is a growing body of literature examining the synergies and differences in outdoor ECE across Northern European cultures (e.g. Borge, Nodhagen & Lie, 2003; Gulløv, 2003; Nilsen, 2008; Nugent, 2017). Scandinavian countries have distinct ways of being in the outdoors, most clearly captured in the Norwegian term *friluftsliv* which Nils Faarlund defines as a "tradition for seeking the joy of identification with free nature" (2007, p.56). Friluftsliv usually involves simple outdoor living or non-motorised recreation in nature (such as walking, skiing, foraging and camping) and is strongly linked to cultural antecedents over the last 150 years which inform individuals' sense of place, community, relationships with nature and individual and national identity. However simple it sounds, it is a complex socio-cultural phenomenon, which "extends from the most prosaic daily activities to the most sacred feelings of identity bonding with nature" (Pederson Gurholt, 2016, p.290). Incorporating friluftsliv or its equivalent into ELC is a way for Scandinavian countries to nurture children who value friluftsliv and

have the skills and attributes that allow them to become active citizens as they grow older.

In the UK, children's gardens, access to outdoor play and local greenspace have been a part of formalised early childhood education since its beginnings in the educational reforms of the 19th Century, but for different reasons and emerging from the melting pot of Romantic and Enlightenment thinking and urbanisation in a different form than in Norway. For example, at Robert Owen's nursery school in New Lanark, the first of its kind, the teachers were encouraged to "take the children for short walks so that their attention would be drawn to the beauty and uses of nature" (O'Hagan, 2011, p.83), and playgrounds were integral to the design of the urban infant schools developed by Samuel Wilderspin (McCann & Young, 1982).

Froebel's 'children's gardens' are eponymous with the kindergarten approach that has been influential in Scotland since 1873. In Froebellian practice, beyond learning 'about' food or ecology, children's activity in the individual and communal garden plots acted as a metaphor for wider systems of nurture and community, while regular excursions into surrounding landscapes afforded opportunities for exploring and learning about different agricultural and ecological contexts (Read, 2012). Early examples of kindergartens in Scotland were primarily in urban areas which meant that integrating outdoor play and visits to the countryside was more challenging (Read, 2012). As Dunlop describes, in early 20th Century Edinburgh, the

> "tradition was to open the early nursery schools in the Old Town, where housing was crowded and there were many young children. It was here that the child gardens were seen to be most needed and were expected to have the most impact."
>
> Dunlop, 2018, p. 215

From examples of both historic ECE provision and contemporary Nordic practice and its growing influence in Scotland, it is clear that indoor/outdoor and dispersed settings are not new, but also that practices in ECE (re)present how nature and childhood are framed, guided by dominant discourses and social changes. In Owen's New Lanark, nature was to be experienced aesthetically and valued in terms of its functional use to industrial society as resource and for maintaining the health of the future workforce; in Froebellian kindergartens, nature is both 'teacher' (Taylor, 2014) and a context for human activity: through activity in that context comes learning and connection with wider natural and social systems. While outdoor recreation for adults began to take more varied forms and access to the countryside became a political issue, outdoor life in Scotland remained a mainly middle- and upper- class privilege (Smout, 2009) until the interwar years. Although we share some common socio-cultural components with our Scandinavian neighbours (such as access rights) and live in a globalising world, social structures and actors are situated. Acknowledging this will

allow us to better understand relations between ECE and nature. Perlman and Howe (2020) provide a comprehensive overview of how outdoor play gained such prominence in ELC setting.

What do the ways in which outdoor spaces and practices are enacted in contemporary ECE say about our wider understandings of natures and childhoods? In her efforts to trouble the Romantic linkages of childhood and nature, Affrica Taylor (2014) refers specifically to the ways in which nature kindergartens simultaneously seek to (re)connect children with the 'real', natural world while effectively partitioning them off from the rest of the world. The increasing emphasis on outdoor play and learning in ECE, whether in the form of loose parts play, gardening, forest school or nature kindergartens, is undoubtedly positive, for a range of valid reasons, but it does not exist in a cultural vacuum and must be considered critically if it is to deliver its full potential. This section has provided an outline of some of the underlying frameworks which affect policy and practice, which will be developed further in Section 3.6

3.6 Education

3.6.1 Introduction

Even obvious features on a map require orientation and attention to be useful. Once, I parked at entirely the wrong place and convinced myself, my wife and the one year-old on my back that we were at least 3km away from where actually were. It was a lovely walk, but not the one that we thought we were doing, and by the time we worked it out at the watershed, there was not much we could do about it. To be able to use a map in pursuit of a purpose or journey we need to be clear about where we are starting from. In this cartography, what forms can the seemingly obvious features of education, pedagogy, learning and development take? It is necessary to follow the outlines of these different forms in order to interrogate which forms of pedagogy, in the pursuit of which type(s) of education, might hold the most promise for fostering caring human-nature relations.

Education is a basic human right, but also serves specific social functions, transcending, reproducing or shifting socio-cultural values. As such, it has long been identified as a locus of change for more sustainable relations with Earth as well as social justice, but as David Orr wrote, "more of the same kind of education will only compound our problems" (2011, p. 238). Indeed, the nature and purpose of education has become harder to articulate as societies ask more of education systems in response to our rapidly changing world. Some scholars argue that this has led to the instrumentalisation of education processes, which can become defined by specific outcomes and aims, leading to 'strong' or territorialised forms of experience, leaving little space for transcendence or transformation at individual or collective levels. The

acknowledgement that local education systems can (and must) be part of global shifts has led to a call for a "new social contract for education", founded on the principles of "the right to education and a commitment to education as a public societal endeavour and a common good" (UNESCO, 2021, p. 11). Cynics would suggest that this is most likely to manifest as the instrumentalisation of education in pursuit of weak 'sustainability', a molar line of articulation, but shifts in educational policy and research discourses make the case for education as a whole to be (re)figured (and in many ways it is a re-turn to older ways of thinking about education) as an emergent, relational process. In addition to changing the way that we think about education, this line of flight could allow educators to develop pedagogical ways of *being-with* and *attending-to* both human and non-human actors which are particularly well-suited to developing relations of care, especially in early childhood. Whether this can happen with the speed and scale to respond to the Anthropocene remains to be seen; the diffractions coming in the fieldwork associated with this study aim to give some insight into what might be happening in Scottish schools at present.

3.6.2 Aims and purposes of education

According to Dewey (1916, p.1), education is a process of renewal, the means of the "social continuity of life." Gregory Cajete describes Indigenous education as "education for life's sake", which is "at its essence, learning about life through participation and relationship in community, including not only people, but plants, animals, and the whole of Nature" (1994, p. 25). This is a figuration which has been long appropriated and reworked by more radical thinkers within dominant education systems (Berry, 2011; Orr, 1992), particularly in relation to environmental and outdoor education, but is rarely manifest in the majority of educational experiences. While coming from different traditions, both positions frame education as a process, an active way of engaging with and being in an ongoing world without necessarily focussing on final outcomes. However, dominant education systems in advanced capitalist societies tend to be outcome-focussed, prioritising certain forms of knowledge and ways of being in the world as well as a limited range of pedagogies (Biesta, 2010).

Education is a universal human right (UN, 1948), and the UNCRC, "the most widely-ratified international human rights treaty in history" (UNICEF, 2022), recognises this right to education for children in Articles 28 and 29 (UNICEF, 1992). Article 29 in particular lays out the expectations that the child's education should be directed towards:

> (a) The development of the child's personality, talents, and mental and physical abilities to their fullest potential;
>
> (b) The development of respect for human rights and fundamental freedoms, and for the principles enshrined in the Charter of the United Nations;

> (c) The development of respect for the child's parents, his or her own cultural identity, language and values, for the national values of the country in which the child is living, the country from which he or she may originate, and for civilisations different from his or her own;
>
> (d) The preparation of the child for responsible life in a free society, in the spirit of understanding peace, tolerance, equality of sexes, and friendship among all peoples, ethnic, national and religious groups and persons of indigenous origin;
>
> (e) The development of respect for the natural environment.
>
> (UNICEF, 1989, p. 9)

This can be identified as a molar line articulating what (children's) education in general should *be*, and what it should *do*. It provides an overarching global vision for education in childhood, but shows that it takes place *in* and *for* specific socio-cultural systems, consisting of (implicitly shared) social values, norms and power structures. This can work for or against the broader aspirations of a human-rights-based education, and evidence in the continued inequity of educational experiences globally shows how this plays out (UNESCO, 2021) dependent on the aims of education in given societies.

Clearly the UNCRC is rooted in an anthropocentric paradigm, but it is "one of the few human rights instruments that explicitly require States to take steps to protect the environment" (Committee on the Rights of the Child, 2016, p.6). Children's connection with nature is increasingly positioned in policy as "an underlying determinant of the rights of the child to development, health, cultural participation, education, the rights of minorities and indigenous (sic) children, the enjoyment of family life and the right to play and leisure" (Committee on the Rights of the Child, 2016, p.14). Directing education towards 'the development of respect for the natural environment' can be read as a right to environmental education, and connects to the UN SDG target 4.7 but, as we will explore, this leaves a lot of room for interpretation and implementation in local contexts. Some activists argue that universalising discourses such as human rights (Baxi, 2009), sustainable development (James, 2017), and even nature connection (Sedawi et al., 2021) can obscure relations of exploitation and inequality, compounding framings of environmental and sustainability crises as 'species acts' rather than the effects of these damaging relations (Braidotti, 2013) or the power of profit.

Osberg and Biesta (2020), see the framing of *education as basic human right* as an example of how education's focus has been broadened (i.e. in pursuit of global metanarratives), which contrasts with a simultaneous narrowing of purpose in how education is enacted (in pursuit of specific and measurable learning outcomes or competencies). They present both as examples of how education has been

instrumentalised in pursuit of different aims, which they see as reductive and restricting. Molar articulations of education *for* any purpose, such as the preparation of an effective workforce, the environment or sustainable development require a critical consideration of the aims of education. Burbules (2004) identifies two main different types of educational aims: *transcendent* aims, which relate to "values that do not depend on particular cultural or societal norms" (p. 4) and may even work against the dominant values of the society in which education takes place, and *socio-cultural reproduction* aims, where incorporation of the individual and maintenance of a community's norms, values and identity is primary. This distinction is useful to bear in mind as we go on to consider how different forms of environmental and sustainability education fit into these terms and the (apparent) values of Scottish society.

Both of these forms of educational aims, and the ways in which they may be pursued simultaneously, can be characterised as *teleological:* "because they evaluate educational activities in relation to a set of ultimate ends (the *teloi*) that education ought to serve" (Burbules, 2004, p.5). Burbules further distinguishes between strong teleological views (where specific types of knowledge or individual characteristics are valued as 'ideal') and weaker teleological views, which focus on capacities, skills and dispositions that can be developed to be applied in a broader range of contexts - *knowing how*, rather than *knowing that* (Ryle, 2009). In theory both can (and should) be simultaneously present in education. However, as I outline in the section on CfE, tensions between these two types of teleological aims can arise in curriculum enactment when, for example, the molecular lines (the everyday flows as influenced by the molar) might tend towards strong teleological views (such as through standardised testing of numeracy and literacy or benchmarking of experiences), but the vision of the curriculum in its entirety is based on weaker teleological views of educational quality. There are also arguments for educational aims to be anti-teleological, most commonly rooted in a distrust of universalist, prescriptive attempts to pin down what education can and should do. This tends to be down to critical awareness of the hegemonic effects that this normalising process can have on diversity of knowledges, norms and values (Burbules, 2004).

3.6.3 Education as process: transmission and communication

In contrast to both teleological and anti-teleological approaches, pragmatic philosophies of education seek to consider ends and activities as simultaneous and co-constituted through emergent processes (Dewey, 1916), which can allow for education to function in all three domains of qualification, socialisation and subjectification (Biesta, 2013). Biesta argues that 'strong' education, with predictable, measurable processes and outcomes quickly becomes about prescribed learning and limits the

potential for risk, which he sees as essential for dialogic and meaningful, 'weak' education (2013). This (minor) line of thinking has also been taken up by Tim Ingold (2018) in his arguments for *education as attention* and *education in the minor key,* which potentially offer connections between humanist formations of educational relationality, the non-human environment and education as a common good which will be useful in this thesis.

Following Dewey, Biesta (2013) and Ingold (2018) argue against education as transmission, directly from one knowing subject to another unknowing subject, where true communication is stifled. At first glance this is contradictory, as Dewey characterised social life as existing "*in* transmission, *by* communication" (Dewey, 1916, p6), but Ingold highlights that 'communication can be better understood as the act of 'commoning', which he describes as

an attentive stretch whereby every participant casts their experience forward in ways that can answer to the experience of others, and they likewise, so as to achieve a correspondence that goes beyond what any of them could have imagined at the outset, and that in turn allows them to carry on their lives together

(2018, p. 39).

This process of commoning shapes the nature of transmission to be one of overlap, of flow, of (risky) participation on both sides, rather than the transportation of information from one person to another with the assumption that it will not change. Biesta characterises this as deconstructive pragmatism. Biesta (2013, p. 29) also argues that for Dewey, "education does not simply follow from *being in* a social environment. Education follows from *having* a social environment, and to have a social environment means to be in a situation in which one's activities "are associated with others" (Dewey, 1916, p. 15, italics in original)". Ingold similarly contests that,

the first place to find education is not in pedagogy, but in participatory practice: not in the ways persons and things are symbolically represented in their absence, but in the ways they are made present, and above all, answerable to one another, in the correspondences of social life.

(Ingold, 2018, p. 17)

Thus, Ingold argues for education as a process of attention, of being-with. I shall not explore this fully here, instead considering it in more detail in Chapter 5, but in summary, both Biesta and Ingold argue that this type of commoning creates the possibility of *response-ability* (Haraway, 2008), of care (Noddings, 1984), of *co-respondence* with others. I return to this line of educational relationality throughout the thesis, but in dialogue with posthumanist ways of thinking. Biesta's theorising of educational relationality is primarily humanist (Ceder, 2018). Dewey positioned his work as "naturalistic humanism" (1925, p.1), and the metaphysics that his philosophy

was built upon is distinctly secular and rooted in the dominant worldview of his time, but his ideas, particularly in terms of communication and experience, can still be sensitively taken up in thinking with the role of the non-human in education as well (Ingold, 2018; Snaza, 2017). Ingold, for example, highlights 'environment' as a third component in Dewey's philosophy of education, and subtly suggests that this is not limited to human social environment, instead stating that "what makes an environment is the way in which these conditions are drawn, over time, into a pattern of conjoint activity" (2018, p.5), and that the "achievement of commonality is not the discovery of what individuals have in common to begin with: it is a continual creation, not a regress to an origin" (2018, p.5).

Until relatively recently, both relationality and aims in majoritarian education systems have been figured primarily in humanist, anthropocentric terms, with little attention paid to non-human actors (Ceder, 2018) or Earth systems. This is beginning to change in educational research (Cutter-Mackenzie-Knowles et al., 2020), but also in policy calls for educational transformations, albeit within the constraints of humanistic development models. For example, in *Rethinking Education: Towards a Global Common Good?* (UNESCO, 2015) UNESCO proposed that education should be figured as a global common good, but still firmly within a humanistic, sustainable development framework, while in their 2021 report, *Reimagining our futures together*, the International Commission on the Futures of Education "proposes a new social contract for education - one that aims to rebuild our relationships with each other, *the planet, and with technology*" (UNESCO, 2022, p. v, italics added). In this updated vision, pedagogy is positioned as relational, but extending beyond the classic teacher-learner dyad to include both knowledge commons and the more-than-human world, with a call for pedagogies to "be based on ethics of reciprocity and care and recognise interdependencies among individuals, groups and among species" in order to "encourage us to understand the importance of what we share in common and the systemic interdependencies that bind us to one another and the planet" (UNESCO, p. 51).

Since the publication of the 2015 report, the concept of education as a global common good has been critiqued and developed, particularly in relation to post-sustainability framings of environmental education. Heila Lotz-Sisitka (2017) argues that when the commons at hand is seen to cross boundaries and nations and operate at the level of Earth systems, traditional ways of managing commons are insufficient. Instead, figuring *commoning activity* (Amin & Howell, 2016) as education (and education as a commoning activity) creates possibilities for education to be considered as an emergent entity rather than a fixed event. For Osberg and Biesta (2020), this holds potential for "design and purpose (or value) [to] emerge together. Such entities, that 'come into being' in this way, cannot be understood in instrumental terms" (p.3). Arguably, it is the meaningful development of this way of thinking about education in general which allows forms of education to emerge which specifically support less damaging ways of living on Earth. However, this is fundamentally different from the

molar line of articulation which starts with the desired outcome (however well-intentioned that may be) and attempts to design a strong form of education to reliably produce it. The Common Worlds Research Collective, in their background paper for the FOE report, position this as "learning to become with the world" (2020, p.1).

Expecting education systems (globally and locally) to respond to planetary crises while also upholding human rights and ensuring environmental and social justice is a big ask. There is a wide range of perspectives on the purpose and aims of education, but some critical perspectives suggest that conceptualising education as a process of relations emerging between learners, teachers and environments offers one way of developing education as a democratic practice, a way of being-in-the world. To me, this appears to be a potentially generative armature on which to build educational experiences, especially in early childhood, but as we will see along the way, there is significant space between higher level purpose and how this might be enacted through curriculum and pedagogy.

3.6.4 Outdoor Learning and Learning for Sustainability.

Introduction

Learning outdoors in Scotland has a significant genealogy across both formal and informal education contexts and has been used in pursuit of a broad range of goals (Higgins, 2002; Baker, 2016, Higgins & Nicol, 2018). As such, outdoor learning is positioned as a set of diverse pedagogical practices (Higgins & Nicol, 2018), used to enact the curriculum, rather than an educational project, subject, or goal in and of itself. This is identified in research literature and Scottish policy as a strength, but the openness inherent in this approach in terms of *purpose*, also creates space for a very broad range of educational experiences. Both molar and molecular articulations of outdoor learning are affected by historic practices, cultures and policy (Baker, 2016), and how these manifest has the potential to significantly influence the scope for the processes inherent in outdoor learning to affect human-nature relations.

This section includes minimal historical context of how formalised outdoor activities, education and learning developed in Scotland, which is well documented elsewhere, but focusses on the forms of outdoor learning which are closely connected to schools, curriculum, 'sustainability' or healthier human-nature entanglements. First, I briefly point to where the outdoor learning line comes from, before showing how, in policy at least, it is interwoven with curriculum and pedagogy and recent moves to integrate this into practice. Second, I try to chart what happens when outdoor learning is (re)positioned as a core strand of Learning for Sustainability, and the implications that this has for my study. While this is a potentially rich location in terms of nurturing healthier, more respectful human-nature relations, there is a risk of potentially transformative, concrete experiences and practices being suppressed or

diluted by molar, more abstract lines of articulation, such as those represented by certain (re)presentations of the UN Sustainable Development Goals.

Finally, I outline the nexus of outdoor learning and the development of human-nature entanglements which has been investigated in a range of ways, pointing ahead to the human-nature relations section.

Outdoor Learning in Scotland

Again, there is a balance to strike here. I don't want to spend too much time working over old ground, defining terms where others, who were often involved in the actual development of those terms, have done it more clearly than I can. However, conceptions, figurations, or enactments of outdoor learning - by both teachers and children - are guided and shaped by what they think outdoor learning is, and that comes from many places, which I will try to map here.

Molar Lines

While it is now characterised as a distinct pedagogical approach, what we call *outdoor learning* in Scotland is still partly shaped by historic cultural conceptions of European and colonial traditions of formal and informal 'outdoor education', going back to the late 19th century (Loynes, 2007). These waypoints include the emergence of the Scouting movement (Rosenthal, 1986; MacDonald, 1993), Patrick Geddes's influence on the experiential and outdoor education at a series of progressive new schools across the UK through his framework of "Heart, Hand, Head" (Higgins & Nicol, 2010; van Der Eyken & Turner, 1969), Outward Bound (Freeman, 2011), and then the influential 1944 Education Act which called for all children to have a "taste of public school life… associated with outdoor activities, residential experiences, character-building, widening the horizons of children and improving their health" (Cook, 1999, p. 166). Nicol (2002) provides a comprehensive account of the post-war emergence of formalised outdoor education in Scotland, which led to a tripartite classification of outdoor education which was dominant in the late 20th century, consisting of personal growth, learning about the environment and skill acquisition (Beames, Higgins & Nicol, 2012) - not always separately, and not always together. More recently, the discourses related to children's extinction of experience, play, biophilia and connection to nature which I discuss in later sections have also started to shape outdoor learning experiences. This section concentrates on the specifics of outdoor learning in Scotland as a practice.

Molar lines of outdoor learning in curriculum, policy and guidance

Outdoor learning has been incorporated into curriculum and policy documents across the UK to varying degrees. In England this manifests principally as *learning outside the classroom (LOtC),* implying strong connections and synergy across learning environments, but not always involving natural settings or outdoor environments (Children Schools & Families Select Committee, 2010; Department for Education and Skills, 2006; OFSTED, 2008); in Northern Ireland, teachers are required to provide out of classroom experiences and there is a strong rationale for outdoor play in the early years (Bratton, Crossey, Crosby & McKeown, 2005), but integration into schooling appears limited; in Wales, the requirements for schools to design and implement their own curriculum based on national guidance specifically mentions 'being outdoors' as a key feature of successful pedagogy (Curriculum for Wales, 2020).

I have already mentioned how outdoor learning is positioned in the current articulation of Curriculum for Excellence, but it was *Taking learning outdoors: partnerships for excellence* (Learning & Teaching Scotland [LTS], 2007) which marked the beginning of concerted efforts to integrate outdoor learning into the development and implementation of CfE. In this document, "the *outdoor classroom* is a setting, *outdoor education* is a process in which educators, students and others take part, and *outdoor learning* is the learning which accues as a result" (LTS, 2007, p.5). Previous policy, such as the action plans that the Scottish Executive (2005) and then the Scottish Government (2010) developed for the UN Decade of Education for Sustainable Development (ESD) mentioned the value of real world and outdoor learning in ESD, but *Taking learning outdoors* clarified the linkages that would connect the outdoors to the values that underpin school-based LfS and human-nature relations as well as knowledge, stating that:

> Direct outdoor experiences help people develop the knowledge and understanding necessary to help them to make these changes. The values necessary to equip the current and future generations to meet these challenges can be developed by re-engaging children and young people with their planet through learning outdoors – frequently throughout their school life and in a variety of contexts and settings.
>
> (LTS, 2007, p.7)

Since then, outdoor learning has featured prominently in policy and curriculum documents in Scotland, and *should* thus shape educators' training and professional practice, which in turn affects learners' experiences at school and beyond. *Curriculum for Excellence through outdoor learning* (Education Scotland, 2010) made it clear that all children should experience "opportunities for a **series of planned quality** outdoor learning experiences" (p. 5, emphasis added), with staff at all levels sharing responsibility to "make the most of the outdoor environment to support the delivery

of the experiences and outcomes of CfE" (p.6). In this guidance, outdoor learning is positioned more as a pedagogical approach through which to deliver cross-curricular and interdisciplinary learning, consisting of progressive experiences which are embedded in the curriculum, rather than separate or stand-alone. In addition to progressive opportunities for learning, it is clear by this point that progression of place can and should also include the four 'zones' for outdoor learning developed in Higgins Nicol & Beames (2011): school grounds, local neighbourhood, day trips further afield and residential experiences.

Guidance for how educators should integrate outdoor learning into their practice was provided in the form of practical publications with concrete examples (Education Scotland, 2011a) and more strategic guidance for schools and centres (Education Scotland, 2011b), which is broad reaching, covering all curricular areas. *Building the Curriculum: Outdoors and In* (Education Scotland 2011b) goes as far as stating that "[a]lmost every initiative or development can be enhanced by the contribution of taking learning outdoors" (p.4), which, while valid, is indicative of the breadth of educational experiences that can be covered by the term 'outdoor learning'. In these documents, reference is made to the broad range of potential benefits of childhood experiences of nature outdoors, including the development of 'pro-environmental' behaviours and attitudes and opportunities for sustainable development and citizenship education: these themes coalesced in the publication of the report of The One Planet Schools Working Group (2012), which I will consider in more detail in the next section.

In the most recent publication of *How Good is Our School? (HGIOS4)*, the self-evaluation framework which informs school improvement in Scotland, outdoor learning is defined as

> "an approach to learning embedded within the curriculum. It takes place in a range of contexts such as the school grounds, local areas, on day excursions or field trips and residential experiences. Its purposes include developing environmental understanding, encouraging physical activity, health and wellbeing and personal and social development."
>
> Education Scotland, 2015 , p. 59

This clearly specifies the contexts in which schools should consider outdoor learning taking place, but it could also be argued that it represents a distinct shift in how outdoor learning is figured since 2007. In HGIOS 4, *outdoor learning* is presented as more of a 'thing' in and of itself, rather than the learning that accrues through educative experiences outdoors, and in other reports (Education Scotland, 2014; Scottish Government, 2016) it is figured as a distinct pedagogical approach. In the English context, the report from the Natural Connections project makes this explicit,

stating that, "[o]utdoor learning isn't a subject or topic; **it's a way of teaching**" (Natural England, 2016, emphasis in original). This is an important line to map in terms of how outdoor learning is 'storied' in research and policy, and enacted in practice: as a pedagogical approach it is presented as having the capacity to be used across the curriculum, and by all educators, but this creates an inherent tension whereby the term and approach encompasses a hugely varied range of educational experiences shaped by multiple variables and actors depending on what is happening, with whom, where and for what purpose.

Biesta (2013) raises two issues with the dominance of the language of 'learning' in education more generally, which he argues diverts attention from what constitutes good education. From his perspective, learning is framed as individualistic, whereas education implies a relationship, "someone educating someone else and the person educating having a certain sense of the purpose of his or her activities" (p. 18). Learning, for Biesta, also "denotes processes and activities but is open - if not empty - with regard to content and direction" (p.18), creating the risk that the 'what' and 'why' of students' learning is lost. Learning is essentially a neutral process; while it is usually perceived as a good thing, we can of course learn to damage our natural environment as well as care for it. The need to attend simultaneously to purpose, knowledges and pedagogical means seems obvious, but is especially important when attempting to draw conclusions about how outdoor learning might affect human-nature relations. To articulate it at a basic level, because of the breadth of practice and contexts, not all outdoor learning (as it is represented at this point on the map) inherently involves 'connecting with nature', developing knowledge and understanding of the environment, or values and attitudes which contribute to learning for sustainability. Of course, at its best, outdoor learning *can* do all of this and more, but the pedagogical challenge comes in trying to incorporate that while the primary learning outcome for the planned session relates to numeracy, for example. This is why Beames, Higgins and Nicol (2012) emphasise the need to attend to "people, place, activity" (p.7) in the planning and delivery of outdoor learning, and why I prefaced this Scottish context with a broader consideration of what 'we', as a species, a community, or a nation want or need 'education' to 'do' and for what purpose. I will come back to the implications that this has in terms of reading and applying research on the intersections of outdoor learning and human-nature relations in due course, but first I want to consider what little information we have about how outdoor learning is enacted in schools, a molecular line about how the (molar) policy and guidance affects learners and teachers' lived experiences.

Molecular lines of outdoor learning in practice

While there is a clear and explicit commitment to outdoor learning in Scottish educational policy, there is limited evidence to show how this actually manifests in terms of learning and teaching in schools. What evidence there is suggests mixed

provision which is limited in scope and consistency (Higgins & Nicol, 2018), implying that teachers may be experiencing challenges enacting policy. Previous research identified concerns about health and safety, teachers' confidence taking learning outdoors, demanding curricula and shortages of time, resources and support (Rickinson et al, 2004; Higgins, Nicol & Ross, 2006) as constraints for teachers, but more recent studies have shown that a shift towards local and school grounds activities has limited the effects of some of these, at least in primary schools (Christie, Beames, Higgins, Nicol & Ross, 2014). The lack of any reporting specifically about outdoor learning makes it challenging to say anything concrete about how it is enacted in schools across Scotland right now, with publications tending to focus on success stories and case studies of effective practice (e.g. Education Scotland, 2022). In an effort to show how limited reporting and quality assurance of outdoor learning in schools is, Simon Beames and Natalie Polack (2019) attempted an initial benchmark analysis of how outdoor learning was mentioned in school inspection reports, but, as they highlight themselves to make their point on reporting, the dataset and methodology available to them limits the value of their findings. We know from previous studies that primary schools were more likely to be further on in the journey of integrating outdoor learning into curriculum delivery (Christie, Beames, Higgins, Nicol & Ross, 2014) compared to secondary schools, which is one reason that I will concentrate here on primary schools, but it is important to remember that in 2019 there were 25,027 primary teachers working across 2004 schools in Scotland (Scottish Government, 2019); any conclusions that can or have been drawn need to be considered in this context.

One of the most comprehensive insights into how outdoor learning is enacted in Scottish schools comes from Mannion, Mattu & Wilson's study (2015), which compared data gathered in 2006 and 2014, capturing some of the implementation of CfEtOL mentioned above. Their 2014 random sample included pre-schools and secondary schools, and provides insights into a range of factors, but I will concentrate on the findings relating to the 26 primary schools. Teachers' reporting of outdoor learning events over the summer terms in each year (arguably the most favourable time of year for outdoor learning in Scotland) showed that on average, schools were using the outdoors more in 2014 than in 2006, but that this was not consistent across all locations or schools and that there was scope for provision to be increased significantly. Even so, these increases were modest: in 2014, primary school pupils involved in the study spent an average of 30 minutes per week involved in outdoor learning, broken down to just over a third of the time in the school grounds, about a third of the time beyond the school grounds, and a quarter away on residential trips. When only considering non-residential experiences, 52% of outdoor learning at primary schools took place in the school grounds, showing that outdoor environments at school constitute an important actor in outdoor learning. Teachers were asked to record the focus of each outdoor learning event, which changed little between 2006 and 2014; in primary schools these were "teamwork, practical skills and play" (p. 17), and the prevalent curriculum areas were health and wellbeing and sciences.

Overall, Mannion, Mattu & Wilson noted the broad range in duration of outdoor learning events in primary schools across the survey period, highlighted the increase in school-grounds use, and signposted local places such as parks, woodlands and green spaces as holding scope for significant growth with limited costs. Encouraging teachers to continue working in school grounds and increase the use of local greenspaces is one approach which has been advocated by national organisations (NatureScot, 2017; Learning Through Landscapes 2021). This is driven by pragmatic and social justice considerations, as well as the role that place can have in multiple learning and development processes. However, this calls for the same critical attention to people, place and activity as mentioned above. When, for example, teachers are rightly encouraged to pursue 'learning in local greenspace', is there a risk that both 'learning' and 'greenspace' may be homogenised, abstracted away from the complex socioecological processes of education and living place? As I have shown, in education policy, outdoor learning is clearly positioned as being useful or effective in achieving specific desirable educational outcomes, but with the evidence available we can draw few conclusions about how this is enacted in Scotland at present.

There is limited literature on what might encourage teachers to integrate outdoor learning into their practice, and how appropriate pedagogies can be developed to ensure that outdoor learning complements indoor learning (MacQuarrie, 2018). Considering supporting this shift fully is beyond the scope of this thesis, but the policy moves charted above are informed by significant advocacy of outdoor learning from multiple positions which must exert affect on teacher's decision-making and practice. For example, outdoor learning (often as proxy for *time spent in natural environments* or *connection to nature*) is variously presented as having potential to improve attainment (Higgins & Christie, 2020; Richardson et al., 2015; Hamilton, 2017; Harvie, Rankine & Jenssen, 2017; Quibble et al., 2018), increase physical activity (Gray et al., 2015), foster connection to nature (Liefländer, Fröhlich, Bogner & Schulz, 2013), and correlate with 'pro-environmental' behaviour later in life (Gill, 2014). However, as is the case with the broader field of human-nature research, much of the research which supports this is either small in scale, correlational or concentrates on limited processes which form a complex whole (i.e. on residential outdoor learning experiences in teenagers, which are very different from school grounds experiences at Early level). This is usually presented with appropriate caveats identifying limitations, but inevitably sends reverberations down the lines with which it relates. A systematic review of academic and practice literature (Fiennes, et al., 2015) found that UK primary research studies were spread thinly across a wide range of topics and thus, while many of the benefits of outdoor learning appear clear, research tends to focus on areas and populations that are not necessarily the most useful and that there is little fine-grained evidence to support understanding of what might lead to the broader outcomes.

I explore this literature in more depth in Section 3.7, but in the context of outdoor learning, when the research, policy and practice discourse lines intersect, there is a

risk that certain forms of evidence may guide practice more than others. Biesta flags the risk of depending solely on factual information, instead of values when making decisions about education: he asks "whether we are indeed measuring what we value, or whether we are just measuring what we can easily measure, and thus end up valuing what we (can) measure" (2010, p. 13).

Molecular line - Environmental education outdoors

Alongside that tripartite model of personal growth, learning about the environment and skill acquisition, outdoor learning has also been figured by various thinkers and practitioners as learning 'in, about, for and with' the natural environment (Lucas, 1972; Fien, 1993). Holistic, land-based education systems tend to intrinsically integrate all four (Styres, 2011), but dominant curricular forms have faced critique for isolating learning and knowledge from lived (and natural) contexts, as well as from critical, normative or political goals (Stevenson, 2007). Outdoor learning can act to combat the lack of direct experience, but a simplistic characterisation demonstrates how these strands may continue to be considered in isolation. For example, developing skills and teamwork through canoeing, or an early level maths lesson on information handling requiring learners to sort natural objects by shape, length or colour could be considered as learning *in* the natural environment. Learning *about* the natural environment in formal education has predominantly been facilitated through forms of environmental education which lack a normative dimension, while learning *for* natural environments might be characterised as more holistic environmental education or conservation education (Jacobson, McDuff & Monroe, 2015; Stevenson, Wals, Dillon & Brodie, 2013). Both of these may, but do not necessarily involve direct experiences of nature; we can of course learn about the natural environment in the classroom or through media, but this is different from learning *with* nature, which Warden (2015) characterises as *nature-based learning*, where the natural setting is intrinsic to the socio-cultural processes involved in learning. However, nature-based learning may still lack the normative element and skills for affecting change called for by some educators. While it does not always involve direct experience of nature, well rounded environmental education attempts to integrate some of these elements, and I want to make sure it is on this map, so that we can see how and where it might fade and re-emerge. This will be particularly relevant in considering how it relates (or does not relate) to direct experience with natural environments.

Since the UNESCO-United Nations Environmental Programme (UNESCO-UNEP) Conference in Tbilisi in 1977, environmental education has been considered "an indispensable instrument for improving the environment" (Kyburz-Graber, 2013, p. 23). The goals of environmental education articulated as result of that conference were:

a. To foster clear awareness of, and concern about economic, social, political

and ecological interdependence in urban and rural areas;

b. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment;

c. To create new patterns of behavior of individuals, groups and society as a whole towards the environment.

(UNESCO-UNEP, 1978, p.24)

There are multiple definitions of environmental education from its significant lineage, but Stevenson, Wals, Dillon & Brody (2013) identify five characteristics as foundational. First is a normative element: it intrinsically requires consideration of value-judgements; of what is desirable and undesirable in relation to our interface with the environment, not just 'facts' (Jickling & Wals, 2013). Second is an interdisciplinarity, which, in dominant conceptions of sustainability, has primarily been figured as involving environmental, social and economic factors. Third, environmental education should go beyond knowledge and understanding and nurture the skills, capacities and desire to be able to act in the world based on those attitudes and values, a social, psychological and political agency. The final characteristics they identify are that environmental education happens not just in formal settings, and that it is oriented to both local and global contexts.

This field has been the site of critical debate throughout its development. The main sites of contention, especially in North American discourses, have been around behaviour change processes, how or whether normative elements can or should be integrated into environmental education, and the implications that this has for developing (political) agency in learners, particularly in terms of the educator's role (Hungerford, 2009). Early theories of behaviour change, which assumed linear causality between environmental knowledge and awareness (what we know) and behaviour (how we act based on that knowledge) have proved insufficiently nuanced to account for the complexity of how and why humans act or change how we act (Kollmus & Agyeman, 2002), as well as the complexity of pinning down what is 'good' or 'bad' for 'the environment' (Siegel et al., 2018). Environmental knowledge has been found to contribute only a small degree to ecological behaviour (Frick et al., 2004), whereas attitudes towards nature and the environment seem to be more influential drivers in pro-environmental behaviour (Roczen et al., 2014). This strand of research has refigured environmental knowledge as more of a pre-requisite to other psychological constructs relations and processes which have been observed to

influence pro-environmental behaviour more significantly, which in turn shifts the form of environmental education which might be most effective (Roczen et al., 2014; Otto & Pensini, 2017).

However, these are more molar lines, grounded in an ontology where humans and nature/environment are separate and bounded and pro-environmental behaviour is something which can be identified and measured, often in terms of resource use or consumption behaviours (see Section 3.6). I seek to avoid this later in the thesis by following pathways which embrace that complexity and try to figure human and non-human flourishing as co-emergent. Lisa Siegel, Amy Cutter-Mackenzie-Knowles and Anne Bellert (2018, p.195-6) propose a definition of pro-environmental behaviour informed by posthuman thought as: *"Behaviour that is enacted by an individual or collective of companion species that diminishes harm and contributes to the ecological health of the Earth."*

There have been various responses to those molar lines which look to support behaviour change in children and youth, informed by research in environmental psychology and critical education practices. In her earlier work, Louise Chawla, alongside collaborators like Debra Flanders Cushing (Chawla & Cushing, 2007), advocated for environmental education which explicitly developed a sense of personal and collective competence. Other meta-analyses of educational approaches from psychological perspectives suggested that no one approach to behaviour change through environmental education has been observed to be more effective across a range of pro-environmental behaviours or populations (Osbaldiston & Scott, 2012; Brauihn, Cottrell & Dierkes, 2018), but it seems clear that internal and external influences both likely play a role in how we relate to the world around us. This is a line which connects to learning for sustainability under the *global citizenship* strand, as well as the idea of "learning to live well with each other and other species" (Leask, Christie & Murray, 2020, p. 185), which I explore in the next section. However, in schools, there is a history of tension between how educators draw on values to develop (political) agency and educate for social justice without being criticised for 'imposing' their views, values and attitudes on children or 'politicising' the education process. This has primarily been investigated in relation to social justice issues (Wooley, 2010; Arshad, Wrigley and Pratt, 2020), but is increasingly relevant to how teachers communicate with children about climate change, environmental justice and sustainability while developing action competency (Bamber, 2020; Leask et al., 2020; Sharma, 2020).

As I will cover in more detail elsewhere, more recent research on behaviour change in relation to environmental education has focussed on the development of environmental identity (Thomashow, 1990; Clayton, 2003, 2012; Blatt, 2012; Green, Kalvaitis & Worster; Tugurian & Carrier, 2017) and connection to nature (Chawla, 2020) as internal mediators of behaviour change. The scope for investigating causality is limited in both of these constructs (and available evidence is heavily biased towards

adults from industrialised, minority contexts), but correlational studies show that connectedness to nature can be a significant mediator in ecological behaviour (Otto & Pensini, 2017) and recent meta-analyses of studies in adults and children suggest that human-nature connection is important as a pathway to sustainability (Mackay & Schmitt, 2019; Barragan-Jason et al., 2020).

These strands hold particular implications and value for conceptualising what effective environmental education might look like, especially in early childhood (Davis, 2010), which is a time of significant identity development (Erikson, 1980; Clayton & Opotow, 2003; Green et al., 2016). For some time, other scholars have been calling for a fundamental restorying of environmental education which focusses on *becoming with* the environment through socioecological processes (Sauvé, 2009; Hart et al., 2009) and place-connection (Stevenson & Mannion, 2018). It is at this interstice that outdoor learning, learning for sustainability and environmental education connect. Not *all* outdoor learning is environmental education or learning for sustainability, nor does *all* environmental education take place outdoors or contribute much to healthier human-nature relations. However, when the intentions from all three are focussed on how children relate to the non-human world around them, there is significant potential for educational, psychological and behavioural impacts.

In summary, while environmental education offers significant potential for learning in, about, for and with non-human environments, it has historically been limited in achieving the transformative changes which it aspires to in some forms. There is broad acknowledgement that environmental knowledge and understanding alone is insufficient to change behaviours. It is clear that alongside environmental knowledge, both competencies for engaging in socio-political systems and individual connection and identification with the nonhuman world could be valuable. From some perspectives however, it looks as if environmental education has been marginalised and co-opted as part of a molar articulation of education for sustainable development, with 'pro-environmental behaviour' figured in shallow ways. However, more hopeful scholars see potential in re-figurings of the purpose of environmental education as learning to become with or live as part of non-human communities. Early childhood is a potentially fruitful stage of development to concentrate on these approaches, but as identified before, a well-balanced articulation of educational purpose is an important precursor to pedagogy.

Learning for Sustainability

Introduction

Learning for Sustainability (LfS) is one approach which purports to better integrate values and purpose. As I explored briefly earlier, learning can be considered as an essentially a neutral process: here at least, the learning is explicitly *for* something. However, that 'something' is open to a broad spectrum of interpretations and there

are those who argue for and against normative figurations of education. LfS is the Scottish articulation of recent international shifts in Education for Sustainable Development (ESD), and brings together ESD, Global Citizenship Education (GCE) and outdoor learning, all of which have their own significant lineage in Scotland and internationally. Because of the integration of those three stands and the potential it has to guide a broad range of agents (learners, educators, policy makers) across Scottish education systems and communities, LfS has been described as a "globally unique" policy-practice interstice (Higgins & Christie, 2020, p. iii). Proponents of LfS argue that it has the potential to be effective across cognitive, affective and behavioural domains of learning. This framework and synergy clearly has potential to be both radical and critical (and thus a significant line of flight on this map), but the strength of territorialising forces held in concepts such as sustainable development and the enactment of LfS within pre-existing educational frameworks without broader transformative change risk pushing the line away from the stark realities of our planetary context. I think that as we explore how childhoods, natures and education come together, it will become increasingly clear that direct experience of living ecologies can play an important part of this. If LfS can feature outdoor learning, with a clear vision for ecological citizenship beyond the human, then perhaps it offers one way to maintain transformative potential.

The other two lines - Education for Sustainable Development and Global Citizenship Education.

The need for formalised 'learning for sustainability' is specific to societies disconnected from traditional ways of living in place, where learning inherently contributes to the ongoingness of ecological community (Betasamosake Simpson, 2017; Cajete, 1994; Kimmerer, 2014). In the ecologically and culturally extractive social systems which use the most resources and cause the most ecological damage, there have been attempts to make any figuring of 'sustainability' fit with the pre-requisite for growth and profit inherent in capitalism. This creates a tension between a desire for infinite growth and the finite ecological limits of Earth, which has been acknowledged in public discourse for at least fifty years (Meadows et al., 1972).

Since being first articulated by the president of the World Bank in 1981 (Clausen, 1982), 'sustainable development' has been the framework which dominant institutions have invested in to resolve this tension. It is most commonly defined in the terms of the Brundtland report as "the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 16). Sustainable development has been critiqued from multiple perspectives since its conception (Kopnina, 2016), and according to Sachs (2019), the idea of development as a promise of equality for all people in all societies has been quietly eroded or buried to the stage where "*development* is more often about survival now, not progress" (Sachs, 2019, p. xii, italics in original). From this perspective, the

contemporary discourse of sustainable development is fundamentally tied to a form of globalisation which creates a myth of a universal global (human) citizen (and their 'needs') while still failing to fully acknowledge the externalised social and ecological consequences which contribute to and perpetuate unequal distribution of wealth not only in the super-rich, but also in a global, increasingly homogenous middle-class (Brand & Wissen, 2021).

ESD is the molar articulation of education towards this purpose - aiming to develop the skills, capacities, attitudes and values to bring that form of development into the world. At first take, this seems counter-intuitive; it should be a minor line, resisting because that state of 'sustainable development' seems so far from the reality of ecological breakdown that I articulated in Section 3.3. However, while there are significant crossovers and blurred boundaries between EE and ESD (Payne, 2016), ESD is firmly connected to discourses of global citizenship which are in turn tied to status quo structures. This has been the case since it was included as a means of implementing sustainable development in Agenda 21, (United Nations, 1992), and it maintains a key position in the UN's 2030 Agenda: Goal 4 is "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UN, 2015). Initially, education was figured by UNESCO and other agencies as a means to develop skills and values *for* sustainable development, particularly up to the Decade for ESD (DESD 2005-2014), which had four major thrusts, three of which attempted to address *sustainability* directly. In contrast, the targets for Goal 4 are (quite rightly, some would argue) oriented more towards equitable access to quality education; only 4.7 refers to the knowledge and skills required to make sustainable development a reality.

ESD, and the forms of ESD promoted by international organisations like UNESCO in particular, have been and continue to be molar lines of articulation. They have been critiqued by some scholars from the outset as unclear, normative and often formulated without criticality (Jickling, 1992), or limiting freedom to enact transformation through the impression of agency within bounded limits (Jickling & Wals, 2008), while others argue that ESD is an important way to stimulate value-led changes in mainstream education at a necessarily global scale (Bamber, 2020; Thoresen, 2020). The direction of critical voices has shifted over the years, and now largely focusses on the need for more concrete engagement with the economic and ecological inequalities which limit equitable flourishing (including challenging discourses of growth in favour of alternatives) and what an education for an ecologically damaged planet or even 'education for the end of the world as we know it' (Stein et al., 2022) might look like. Huckle & Wals (2015), in their evaluation of the DESD argue that while there was sufficient consideration of normative elements such as attitudes, behaviours and lifestyle shifts, ESD features

> too little attention to power, politics and citizenship; the ways in which neoliberalism has made the adoption of sustainable behaviours and lifestyles

> less likely; what alternative forms of social and environmental relations (political economy) would aid their realisation; and whether students should consider liberal and radical views of social change alongside the reformist, and sometimes idealist views reflected in the literature of DESD. (Huckle & Wals, 2015, p. 492)

Some contemporary literature on ESD highlights the stark reality of the lack of progress in radical transformations, but often this does not extend beyond special issues in niche academic journals and into practice. For example, in one such special issue, Helena Pedersen and colleagues (2022) identify a demarcation between those who are hopeful of education acting as an agent of change (Bamber, 2020) while acknowledging the reality of the Anthropocene (most visibly articulated in the UNESCO report *Reimagining our futures together* (2022)), and those whose orientation runs more towards 'dark green' or less hopeful visions of educational futures (e.g. Peters, 2020; Stein et al., 2022). Where ESD in dominant societies does not critically engage with the reality of ecological breakdown and social inequality, it can be seen as complicit in perpetuating imperial modes of being. González-Gaudiano & Meira-Cartea (2019, p. 397) argue that this is limited by "the optimistic and idealistic nature of pedagogical thinking and of the educational practices to which it gives rise", particularly on the back of enlightenment thinking. The discourses which inform the ways that molar and molecular lines of ESD and GCE are articulated make it hard for educators in dominant societies to identify skills, actions and capacities which might positively impact global social and environmental justice without fundamentally undermining the Neo-liberal systems in which they operate. Historically, this has led to uncertainty about how public education can engage with moral issues on a global scale critically, without being "open to the charge of indoctrination" (Alexander, 2010. p 15). To me, this shows that the ESD line, where it connects with SDGs in particular, has limited relevance to an education which aims to shift human-nature relations and reduce the ecological impacts of humans in dominant countries to the degree that seems to be necessary. Instead, its value lies in working for equitable educational experiences - what happens though, if those educational experiences continue to lead to unsustainable forms of development and consumption without reducing the unequal distribution of wealth and wellbeing?

Alongside, ESD and OL, the other strand of the LfS line as figured in Scottish policy and practice is Global Citizenship Education (GCE). Like ESD, this line is shaped by transnational forces both in terms of purpose and the actors who articulate and promote it, and seeks to incorporate other approaches such as peace education, human rights education and ESD. A definition in UNESCO's introductory document is useful, as it states that GCE is "*a framing paradigm* which encapsulates how education can develop the skills, values and attitudes learners need for securing a world which is more just, peaceful, tolerant, inclusive, secure and sustainable" (UNESCO, 2014 p.9, italics added). A "framing paradigm" is not pedagogy, nor

curriculum, but an overarching positioning of educational purpose, which aims to be transformative and is presented as operating across three core conceptual dimensions: cognitive, socio-emotional and behavioural (UNESCO, 2015, p. 15). GCE is presented as being about learning to be an active and responsible member of global communities and use this community membership to work towards more just and sustainable futures (Oxfam, 2015). While there is an aspiration towards transformative change, again, critical readings of the turn towards the global have raised issues of how this may manifest as homogenising and colonialist in environmental education (Gough, 2002) and citizenship education (Mannion et al., 2011). When homogenised and globalised, or figured as emerging through individual competencies rather than system changes, the scope for meaningful transformation is limited.

Writing in 2011, Mannion et. al identified two risks of the global citizenship discourse in education, the first being that in early articulations of policy, responsible citizenship was primarily figured in relation to economic and cultural activity, with (social and environmental) justice citizenship - arguably a potential site of resistance - under-emphasised. Their second concern was that responsible global citizenship was largely understood as a competence rather than a practice or process, which "individualises citizenship by seeing it in terms of what individuals have, rather than in terms of what individuals do together" (Mannion et al., p. 453). This leads them to advocate for a process approach which starts first with citizenship practices that can be enacted in schools and more widely, before asking what learning might come from students engaging in these; a process that, for Biesta (2010), creates space for democracy and education to emerge together rather than (moral) education being seen as prerequisite to participation in democracy.

Returning to *Reimagining Our Futures Together,* the recently published report from the ICFE, there are obvious shifts in the direction of how the GCE and ESD lines interact, particularly in relation to the non-human. This is of interest here because, as we have seen above, previous education policy articulations from UNESCO are molar in terms of how they relate to relatively neo-liberal forms of sustainable development. This contrasts with how education is figured in *Reimagining Our Futures Together,* as a process which can contribute to a common good, beyond just human development, with curricula that "enable re-learning how we are interconnected with a living, damaged planet and unlearning the human arrogance that has resulted in massive biodiversity loss, the destruction of entire ecosystems, and irreversible climate change" (UNESCO, 2022, p.66). The report explicitly states that "for education to support just and sustainable futures we must promote a consciousness of the planetary…" and that "[g]lobal citizenship education in particular must become keenly attuned to this " (UNESCO, 2022, p. 113), with one way to learn good planetary citizenship being through curricula that include "caring-about, caring-for, care-giving and care-receiving" (p.67). This contrasts with the anthropocentric figurings of citizenship such as those promoted by organisations like Oxfam (2015), and even the tone of *Rethinking education: towards a global common good?* (UNESCO, 2015), which

stated that "sustaining and enhancing the dignity, capacity and welfare of the human person in relation to others, and to nature, should be the fundamental purpose of education in the twenty-first century" (p.38)

As I have laid out already, the feature on this map which is labelled Learning for Sustainability notionally consists of the three lines of ESD, GCE and OL, but clearly how they are configured or emerge shapes the form that LfS takes. I would argue that forms of GCE which are repositioned towards the non-human and consciousness of the planetary imply at least a partial incompatibility with dominant manifestations of ESD, which remain implicated in growth paradigms and are complicit in strategies of triangulation (big picture goals; incremental, near-term, non-disruptive action; framing such actions as commitment to those goals (Steffen, 2022).

Learning for Sustainability in context.

It will be obvious from the citations in the following section that two of my supervisors, Dr Beth Christie and Prof Pete Higgins have invested significant professional and personal time and energy into the development, promotion and research of LfS. Pete is the Director of LfS Scotland, the United Nations recognised Regional Centre of Expertise on ESD in Scotland and chaired the LfS Advisory and Implementation Groups between 2012 and 2016. Beth is the programme director of an MSc in Learning for Sustainability at our university and works across climate justice education and teacher education for sustainability. They have collaborated for over ten years, contributing numerous articles, briefing papers and conference presentations to academic discourse and inspired many educators engaged in practice. I will do my best to imagine this section as the sort of lively conversation I often have with them. I don't always agree with them, but their optimism and pragmatism often complements my cynicism/criticality, so I hope that comes through in what I write. I think they do believe in the possibility of change, and respect that whole-heartedly.

From its starting point in the outputs of the One Planet Schools Ministerial Advisory Group (Scottish Government, 2012), LfS as a concept is now explicitly integrated into quality assurance and improvement frameworks for schools (Education Scotland, 2015a) as well as professional standards and in-service learning for teachers (GTCS, 2020). Higgins and Christie (2018) outline the emergence of LfS in detail and, in the context of Scottish schools, define it as "a holistic approach that seeks to build the values, skills, and knowledge necessary to develop practices within schools, communities, and at governance levels within teacher education, that accord with the collective aim of taking action for a sustainable future" (p. 554).

The advisory group made five high level recommendations in 2012: all learners should receive their entitlement to LfS; LfS should be demonstrated by and required of practitioners, leaders and organisations throughout the education system; all schools should have a coherent whole-school approach to LfS; physical infrastructure and policies should support LfS at a school-level; and a strategic approach at a

national level should underpin all of the above (Scottish Government, 2012, p.11). These, and the thirty-one sub-recommendations, were accepted by the Scottish Government in 2013, within a policy context informed by the UN DESD and Scottish Government's commitment to implement to the UN's SDGs. The LfS National Implementation Group was established to align national efforts to define and develop LfS with this international policy, and their report (2016) lays out the pathway to realising the vision on the same timescale as the UN SDGs, locating LfS as a key way in which Scotland can enact Education Goal 4.7, which I mentioned above. This target requires that

> "learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development"
>
> United Nations, 2015, p.19

Considering LfS in relation to this target simultaneously highlights the approach's strengths and weaknesses, and again shows the difference between educational projects which incorporate normative or critical purpose and those which are largely competency or knowledge-based. LfS purports to go beyond both the 'knowledge and skills' and the end goal of 'sustainable development' articulated in the SDG target, instead emphasising the role that *values* and *community practices* can play in "the collective aim of taking action for a sustainable future" (Higgins & Christie, 2018, p. 554), decentring development or growth discourses, acknowledging the need for democratic engagement at the individual and societal level, and emphasising action:

> "content knowledge alone is not sufficient, there must be opportunity afforded for consciousness-raising pedagogical experiences that enable teachers and learners to reflect upon their personal ethics; such personal examination provides a starting point or context for the flourishing of care, which may lead to positive action and behaviour change."
>
> (King, et al., 2016, p.2)

LfS is framed as a holistic process that can take place across various levels and communities, not just through schooling or through the efforts of professionals. Recently, in an educational landscape where outcomes and a focus on closing the poverty-related attainment gap are significant policy drivers, some research has emphasised the utility of LfS and the pedagogical approaches associated with it

(Laurie et al. 2016; Christie & Higgins, 2020). In a review of the literature Christie & Higgins (2020) identified the key educational outcomes which LfS and similar approaches may be effective in delivering. These were personal development (through action competency and knowledge of self and community) and forms of citizenship which are well-suited to equitable participation in complex and interdisciplinary systems, which is sometimes framed as sustainability competence (Barth et al., 2007). Less clear are the impacts on academic attainment, with most associated evidence stemming from the potentially positive influence of outdoor environments on academic learning and health and wellbeing (Christie & Higgins, 2020), raising questions about how OL is integrated into meaningful LfS. The interdisciplinary nature and community orientation (whether whole-school community or otherwise) of LfS is identified as under-researched, but potentially transformative. In short, LfS is positioned as being closely aligned to the four capacities and interdisciplinary intent at the heart of CfE, and there is evident policy intent to integrate it into all levels of education in Scotland.

However, as advocates of LfS including Christie and Higgins alongside Mary Collacott, Katie Kirk and Heidi Smith admit, "such comprehensiveness has the potential to render the term and its purpose equivocal and perfunctory" (2019, p.44). Their consideration of the policy practice rhetoric gap in Scottish LfS highlighted two tensions, which have been previously been identified in sustainability education (Sterling, 2001) and curriculum making (Priestley & Philippou, 2018) in different contexts. First is the way in which sustainability education *needs* to be transformative, critical and engage with complexity and values, but is (for now at least) largely taking place in a schooling system which feels resistant to those elements. In practice, this dissonance can result in a return to more familiar forms of practice (i.e. continuing to work in subject silos rather than with interdisciplinary approaches) or disassociation (when teachers do not see specific parts of policy or curriculum as their responsibility to implement. The second tension is the perception of LfS as a top-down intervention in which teachers have limited agency, both at an implementation level (in the school system) and in the face of wider socio-cultural systems which continue to make the potential for change appear limited.

LfS Scotland, the UN RCE continues to do significant work to create and support conditions for this to change, and their programme of activities shows that some educators *are* engaging with professional learning, research and change. However, as we saw with outdoor learning, there is little evidence to suggest how widely and in what ways the recommendations of the LfS National Implementation Group are actually being implemented across the broader schooling system, beyond individual teachers and schools opting in to initiatives 'on top' of their existing practice. In 2019, the Scottish Government published an Action Plan for LfS (Scottish Government 2019b), which laid out the intention to implement these recommendations over 3-5 years. There has been limited visible progress or reporting on this action plan, perhaps due to the demands put on Scottish education systems by COVID-19, but the key

challenges to meeting these goals were identified by the LfS implementation group, and have likely not changed but been exacerbated in the intervening years. These were:

- Promoting awareness of LfS as a concept and process so it is universally understood
- Taking LfS forward at a time of financial constraint with growing pressures on staff at school level and system leaders at local and national level
- Embedding LfS in professional review and development (PRD) processes at school level or through self-evaluations to ensure it is not treated superficially but rather than it brings about more profound and deeper change
- Ensuring that LfS is not crowded out of school, local and national improvement plans due to tother priorities and initiatives
- (Scottish Government, 2016, p. 5)

3.7 Human-nature relations

3.7.1 Introduction

In this section, I will map some contrasting ways of understanding human-nature relations and begin to explore how they relate to childhoods and processes of education. This is where it gets messy. Some of the research or thinking I cover may seem a bit distant from children and teachers playing and learning outdoors, but it sends ripples down those interconnected lines and affects what is happening in our schools.

How we figure the relationality of humans with the world around us dictates much of the theory, methodology and politics of social sciences and (environmental) humanities, but some ways of doing this are more visible than others in policy and research. This often limits understanding to how humans relate to other humans and how we construct, communicate and exploit the forms and functions of that relationality. These approaches to social science have in turn influenced the dominant ways in which research understands human-nature relationships, creating either molar lines of articulation that privilege the human side of the relation and try to understand specific traits or behaviours in isolation, or 'deep green' minor lines which have so far proven to hold limited scope for affecting change.

This part of the map has some clear lines, where multiple hands and implements

have traced over the same paths, mostly going in the same direction. In many ways this is good - these lines are 'developing the evidence base' or providing critical takes. We know where things are, and have some ideas of where we would end up if we were to follow those paths in research or practice. These are pathways that most likely lead to increased connection to nature, better health and wellbeing, increased willingness to engage in 'pro-environmental behaviours' and other good things. This is necessary and valuable research, but there are potential hazards in this area. First, the way that dominant social science research seems to work means that understanding is increasingly deep, but fragmented and exists in disciplinary silos. Take, for example, psychology research into how noticing nature contributes to nature connectedness (Richardson, Hamlin, Butler, Thomas & Hunt, 2021) and by association, pro-environmental behaviours (Mackay & Schmitt, 2019). This work can acknowledge the global biodiversity crisis, but focuses on small-scale conservation interventions like feeding birds over winter without really considering the complex global realities and the interlinked issues of consumption, governance and so on. There is an implicit assumption that small interventions can scale up, but if one of the people surveyed eats unsustainable meat and palm oil, drives 20,000 miles a year or flies regularly, what sort of impact is feeding the birds having? Is it just making them feel better? Is that enough? It might be changing their relationship with the birds, but in what way is it 'conservation' behaviour, and is conservation of a damaged ecosystem helpful? What do the birds make of it? In response to this, Nielsen, Cologna, Lange, Brick and Stern (2021) call for environmental psychology to embrace inductive, impact-focussed models rather than the dominant deductive, theory-based approaches.

The second hazard I can see coming is that many of the lines have been drawn very carefully, on flat surfaces, with rulers and marker pens, but with lots of annotations made in very fine, water-based ink. They chart correlations and linear relations, rather than networks, and often draw conclusions from relatively homogeneous samples (like undergraduate psychology students at liberal universities in the USA for example). This poses problems, particularly for education. When we take the map out into the field and give it to practitioners to use in the rain with culturally diverse young people, or in ways that respond to the socio-economic setting of those learners, all the context in the annotations is promptly washed away, leaving them only that strong, straight line to work with. This is like the Twitter clickbait version of the research - "Spending Time In Nature Leads To Pro-Environmental Behaviour" - leaving nuance and context behind. Perhaps this is enough. Given the right circumstances, educators or parents who know their children well and rich environments, there will no-doubt be 'positive' outcomes. We can see some of these in the research on benefits of time spent in nature. But this also comes with the risks of assuming that a one-size-fits-all approach will work (and the potentially hegemonic, colonising baggage that comes with that) or that by, for example, providing a weekly forest school session, the educational obligations related to healthy human-earth relations have been honoured. Box-ticked.

The final hazards that some of the molar lines push us towards relate to dominant framings of human-nature relations. As we will see, 'humans', 'nature' and 'children' are often (re)presented as bounded, separate subjects which are in transactional relation. In addition to maintaining the legitimacy of linear and correlational modes of analysis, this makes it easier to slip into deficit models of thinking about both nature-relations and childhoods and about how certain forms of nature are valued over others. Which figurations of childhood and which figurations of nature are privileged, promoted or most important and for whom? The 'wild' but degraded landscape; the rural child able to guddle in the burn within view of their house; the pollinator meadows alongside urban canals; the outdoor nursery in the country park?

To trace some of these molar lines I start section 3.7 by considering how values and the processes of valuing nature inform research thinking and, in turn, research into human-nature relations. Values also manifest as principles which have long been positioned as important in determining how people act in the world, and are intended to inform a holistic approach to Learning for Sustainability. This leads on to the next section which maps how nature is valued in childhoods and school-based outdoor learning specifically.

3.7.2 Valuing Nature

On this map of children, education, natural environments and their relations, where the word 'value' is written, it has interconnected meanings which do not always appear closely linked to early childhood. These meanings do, however, influence research, theory and practice in this field - indeed, the starting point for this project was identifying the 'value' of nature in learning and development. The value of nature and values associated with nature are central to human-nature relations whatever the context, and understanding them will be essential for meaningful responses to the climate and biodiversity crisis. This is demonstrable in how values are positioned in the work of the IPBES, who have developed a comprehensive standalone guide focussed specifically on the diversity of multiple values of nature (2015; 2022) to be applied at a global level. In contrast, I must constrain myself to the minimum coverage required to map how these connections relate to school-based outdoor learning in early childhood, but I will adopt some of the IPBES terminology because it holds potential to point towards relationality and incorporate complexity. During early childhood, children learn how the other members of their community assess the *value* of nature and develop the *values* that contribute to their individual and collective identities and may guide attitudes, orientations and actions into the future. These two processes - valuing/evaluating nature and developing/enacting values - will form the basis of this section, identifying some of the foundational patterns which

reappear in more specific literature throughout the rest of the cartography and areas of research which will help me meet the objectives of this project. First, I will outline some contested ways of evaluating nature's contributions to people, and consider how affect flows from these to influence how nature is perceived and 'framed' at multiple levels of Scottish society. Second, I will follow the different lines of articulation that have been traced in recent years by research on how individuals develop, hold and act on environmental values.

Evaluating Nature's contributions to people.

Nature's contributions to people can be defined as "all the positive contributions, or benefits, and occasionally negative contributions, losses or detriments, that people obtain from nature" (Pascual et al., 2017, p.9), but are evaluated in diverse and sometimes contrasting ways (Daily et al., 2000). In the terms of the IPBES, 'value' has four different meanings: it can be "a principle associated with a given worldview or cultural context, a preference someone has for a particular state of the world, the importance of something for itself or for others, or simply a measure" (Pascual et al., 2017, p.9). These different meanings can all be activated and connected together, guiding individual or collective perception and decision-making, but the molar lines of social sciences research into human-nature relations and sustainability have tended to be uni-dimensional (Chan et al., 2016) in the past.

Values as principles function as socio-cultural forces which guide judgements and influence social norms, but individuals within or across different cultures may or may not share the same values. For example, in Scotland, people might make different decisions about what to eat dependent on how they enact the principle that 'animals have a right to a good life': one person might not eat any animal products; another might only eat free-range meat and eggs, while to someone else, animal welfare may be of little consequence in their decision making. Rarely can values be considered in this isolated way in applied settings, though: what about organic certification, climate impacts, local food, socio-economic deprivation? This complexity is at the heart of LfS and our education systems need to engage with it, but doing so meaningfully presents unique challenges.

Values as preferences are value judgements, whether implicit or explicit, and are often points of synergy or conflict in conservation and sustainability discourses. For example, what is the preferred option: regular mowing of local authority greenspaces, or leaving grass long for invertebrates and other non-human species? Land as golf course or for breeding birds? Different members of the same community may value each differently based on their preference for aesthetics or biodiversity, therefore effective interventions either seek to change preferences or find compromises and alternatives.

On the surface, **value as the importance** of something in relation to nature appears to be the simplest meaning, but has dominated discussions in modern environmental

philosophy since its inception and now exerts considerable force in political-economic decision making. At a macro, philosophical level, this has often concentrated on whether 'Nature' (however that might be defined) has intrinsic or instrumental value: is it important in and of itself, or because of how it can be used (by humans)? Curry (2011) makes the valid point that following this thought pattern through to its conclusion, neither intrinsic nor instrumental value can exist without the other: "if there was only intrinsic value, it is not at all clear how it would be actually possible to live, i.e. without using anything or anyone" (p. 53). Accordingly, contemporary conceptions of value as importance attempt to be more pluralistic than binary, incorporating subjective experience, the ways in which something meets objective needs and intrinsic value (IPBES, 2015). Because instrumental or utilitarian importance often feels more tangible to humans, it has been foregrounded in anthropocentric evaluations of nature, often at the cost of other species.

Value as measure refers to the application of appropriate tools to make sense of a given context. This could involve using ecological surveys to measure the number of species to attribute a value to the biodiversity of an ecosystem or trying to measure nature's contributions to people in monetary terms. Aldo Leopold, writing in 1949, stated that "[t]he land-relation is still strictly economic, entailing privileges but not obligations" (1949, p.203), and as I will show, there is a strong argument that not much has changed even in the face of crisis. However, alternative ways of figuring nature's value in its inherent relationality outlined above do have more capacity to hold the tension of pluralist value judgements. These are not yet the dominant lines on the map though, so let us start by mapping the molar lines of articulation here; the lines of flight might become visible later.

3.7.3 Molar lines: Value as importance and value as measure

The four meanings of value outlined above interact in often contrasting ways (Daily et al., 2000; Pascual et al., 2017), which the IPBES conceptual framework tries to tie together with three strands: nature (non-anthropocentric or intrinsic values); nature's benefits to people (anthropocentric, instrumental values); and good quality of life (anthropocentric, but relational values) (IPBES, 2017, p.3). Integrating these meanings and different types of values is a challenge to dominant policy discourses which suffer from values-monism (Pascual et al., 2017). I am trying to avoid what Morton calls a "*record-store approach*" (2018, p. 192, italics in original) to labelling and re-circulating ways of thinking, but we can also see hints of this values monism in (environmental) education, conservation and human-nature relations research and practice. In some cases the intrinsic value of nature is prioritised, while others focus principally on nature's benefits to people and their links with good quality of life in a more transactional than relational manner.

Dominant discourses frame nature's value primarily in utilitarian, anthropocentric and instrumental terms (O'Neill et al., 2008). Beyond the utilitarian or exchange value of natural commodities or products, this often involves using specific *measures* to evaluate the *importance* of natural 'things' in terms which translate or transpose efficiently into the political economies where power is held. This might come through trying to understand the frames, "*nature is valuable because it supports human health and wellbeing"* or "*spending time in nature is valuable because people who spend more time in nature are more likely to enact pro-environmental behaviours",* by developing measures in an attempt to describe such instrumental relationships. Connection to nature is one example of a measure which is related to importance values, which I explore below. Alternatively, nature's contributions to people can be evaluated against pre-existing measures. Scotland has been prominent in its adoption of one such approach, the evaluation of natural capital as a range of assets from which people derive ecosystem services. Natural capital is described as "the environmental resources (such as plants, animals, air, water and soils) that combine to generate a flow of benefits to people" (NatureScot, 2020b, para 10). Ecosystem services are quite clearly defined as the "benefits provided by ecosystems that contribute to making human life both possible and worth living" (UK National Ecosystem Assessment, n.d., para. 1), usually classified as provisioning services (e.g. food, raw materials), regulating and maintenance services (e.g. climate regulation, pollination, nutrient and water cycling) and cultural services (e.g. spiritual connection, tourism and recreation). Proponents argue that natural capital and ecosystem services "bridge the environment/economy gap by phrasing nature's value to society in economic terms to make it more explicit" (Claretet al., 2018, p. 32), suggesting that natural systems will be better protected and enhanced if they are evaluated in the same, often financial, frameworks as the rest of the systems which exploit them. However, critics argue that "powerful institutions have prominently promoted a neoliberal notion of ecosystem services focused on their implementation in markets and transactions, payment schemes, and cost-benefit analyses" (Chan et al., 2016, p. 1463) and that these tools can be easily co-opted beyond their specific focus on nature's contributions to people to measure and frame nature in monetary terms at the exclusion of other forms of value and without becoming truly ecological forms of economics.

Even when not directly monetised, ecosystems services and biodiversity can be treated as assets to be managed, a way of thinking that is becoming firmly embedded in mainstream politics and business (Dasgupta, 2021, Capitals Coalition 2022). As I will show in relation to ecolinguistics, framing affects perception, and framing the natural environment in broadly utilitarian terms suggests that while it may support or enable human flourishing, nature is something separate from human society; something which can 'do things', yield 'benefits' and have 'impacts'. Within this paradigm, these impacts are presented as measurable, quantifiable and replicable. This, I would argue, strengthens discourses and research paradigms that foreground *value as measure* and *value as importance* in ways that may reinforce the extractive and

utilitarian ways of relating to nature which are at the heart of our problems. Contrastingly, positioning humans as part of nature, or in dynamic (and ethical) relationality with other natural systems, as the Anthropocene line suggests we need to, shifts how nature might be evaluated and integrated in education and wellbeing.

3.7.4. Minor line intersecting/re-directing: ecolinguistics and framing values

Scholars like Chet Bowers have, for decades, been arguing that language manifests culture and that the ecological crisis is a cultural crisis (Dentith et al. 2022; Lupinacci 2019), thus calling for greater consideration of the role that language plays in environmental education (Bowers, 1997; 2001; Stables, 2001) and the classroom (Bower & Flinders, 1990). Their work uses the tools of linguistics to examine the existing ideologies, discourses, metaphors and frames that influence environmental education and human nature relations.

In the 1990s, foregrounding qualitative accounts and the languaging of the classroom was seen to challenge a largely quantitative and Cartesian paradigm of education research. This was necessary and important work, but as I will recount further in section 3.8, many researchers and practitioners, particularly in the field of ECE, propose that this has created methodological and philosophical limitations due to approaches that privilege language-based, representative ways of knowing or communication over others. I initially set out expecting to focus on language, but identified four elements which coalesced in my research, forcing me to question how much I could depend on that alone to yield insight: the embodied nature of cognition at all ages; the importance of early-childhood experiences of nature; the fact that young children develop, engage with, learn from and communicate in social, physical and environmental contexts which do not always involve verbal language; and the need to incorporate the non-human into my understandings of educational intra-actions.

One of the qualitative threads I try to hold onto and weave into my research assemblage is connected to the field of ecolinguistics, which involves "critiquing forms of language that contribute to ecological destruction, and aiding in the search for new forms of language that inspire people to protect the natural world" (Stibbe, 2015, p. 1). Ecolinguistics is valuable in this research because it offers tools to critically understand how the influence of language extends beyond the bounds of its specific context to shift people's behaviour and values. In relation to feminist new materialisms, it can inform my understandings of how nature is figured and create space for creative reconfigurations (Adsit-Morris, 2017). There are several key concepts from ecolinguistics that I want to chart at this stage in the cartography: evaluations or appraisal patterns, framing, metaphor and discourse. The discussions above regarding evaluating nature and natural capital can be used to exemplify all four concepts, as can other discourses or lines on this map, such as nature connection.

Evaluations are how people story whether something is good or bad, and an appraisal pattern is the collection of linguistic features which gives voice (internally or collectively) to that evaluation. For example, in the natural capital 'story', which sits within a discourse of 'growth is good', investing, developing or growing natural capital is appraised positively. Ecosystems 'provide benefits' or 'yield services' (positive) rather than 'entail costs' or 'obligations' to humans (negative). Blackmore and Holmes (2013) show that the ways in which people evaluate nature can activate either intrinsic or extrinsic values, affecting their behaviour.

Framing also connects to the cognitive science and ecological psychology lines running through this cartography, as research in neuroscience has shown that frames and metaphors actively affect how we relate to the world through neurological processes (Lakoff, 2010). Frames that we regularly think in rapidly become 'common sense', and hard to argue with. Thinking with frames has a long heritage (Goffman, 1974) and the terminology has been applied in contexts ranging from sociology to linguistics and cognitive science, but Arran Stibbe provides a concise definition which is useful for my research:

> A *frame* is a story about an area of life that is brought to mind by particular trigger words.
>
> *Framing* is the use of a story from one area of life (a frame) to structure how another area of life is conceptualised.
>
> *Reframing* is the act of framing a concept in a way that is different from its typical framing in culture.
>
> Stibbe, 2015, p.47

Framing, nature and sustainability

The influence of narratives and frames has been identified in several areas related to this study, including values (Crompton, 2010), biodiversity conservation (Louder, 2019), behaviour change (Blackmore & Holmes, 2013), ecological identity, nature connectedness (Andrews, 2018), and early childhood (Edwards et al., 2010; Harwood & Collier, 2017). Framing affects values as principles, which in turn have been implicated in environmental attitudes and identity (Schwartz, 2012; Schultz, 2000). Awareness of the importance of framing in conservation and education is growing because "what people do is not based entirely on what they know, [so] the way educators frame sustainability concepts is critical" (Cachelin & Ruddell, 2013, p. 306). According to this view of cognition, language influences how we relate to the world around us, often in ways that we are not consciously aware of (Lakoff & Johnson, 2008) and activates neural pathways that make it easier for us to make sense of what

we experience in different contexts.

There are lots of ways we can frame nature – threat, wild, home, magic, machine – and this affects how we perceive the world. For example, (in English) if we talk with children about '*our* bees', or how '*we have* lots of wildflowers in the fields around us', we inadvertently frame nature as a resource of which we imply ownership. While this is an intuitive way to create connections, it may have unexpected impacts on perception. In this framing, nature is referred to mainly in relation to humans, and is of value in relation to our 'needs'. This opens up cognitive pathways that make it easier to use or exploit nature in the same way as other (economic) resources. If we frame ecosystems as machines, we open up the idea that one component can simply be replaced with another which pushes against understandings of holistic ecology as laid out in the planetary context section.

One of the primary framings of human-nature relations in Scotland at a national policy level is asset-based. In the NPF, the main outcome relating to environment is "*We value, protect and enhance our environment*" (n.d.b). The human 'we' has agency in the possessive 'our' relation, and the environment is something subject to broad brush human influence. That outcome includes references to nature as an asset and uses the Natural Capital Asset Index to track "changes in the capacity of Scotland's terrestrial ecosystems to provide benefits to people" (NatureScot, 2020b, para. 3). NatureScot's 2018 corporate plan featured similar framing: Scotland's nature is "a national asset that provides us with a strong sense of identity and national pride. It's a big part of what makes Scotland special" (NatureScot, 2018, p.3), and natural capital and asset framing features even more prominently the 2022 corporate plan (NatureScot, 2022).

While assets can be part of a *stewardship* frame (Dasgupta, 2021), natural capital is an obvious example of a *market* frame, which stimulates responses in the same frame. This does not mean that it will not be effective in conservation, but the market frame may act as a blocker to the activation of other frames which connect to different values. Other potentially problematic frames common within environmental education or conservation discourses might include *deficit* frames, triggered by discussions of 'disconnection' or 'lack' of contact with natural environments (Dickinson, 2013; Fletcher, 2017); *problem* frames, which suggest the possibility of a solution, often without grappling with the scale and complexity of issues; and (sustainable) *development* frames which reinforce status quo conceptions of 'progress' and growth. Framing can also affect learning processes and learner agency in environmental education, whether at the level of specific ecological concepts (Cachelin, Norvell & Darling, 2010); positioning the locus of change at an individual rather than institutional level; or more generally in the ways that humans are positioned in relation to the rest of nature and how the purpose of education is framed. As Adrienne Cachelin & Edward Ruddell (2013) state, learners might develop an "academic understanding that they are included in natural systems, but language and underlying metaphors inhibit students from consistently internalizing this knowledge

and seeing themselves and their actions as ecologically relevant" (p. 310).

The potential utility of critically analysing which frames are being activated in discourses lies not just in identifying which dominant frames are acting as barriers to transformative change. As understanding of this field grows, conservation organisations and activists working in other sectors are actively *re*framing messaging to engage values which are more likely to motivate change (Blackmore & Holmes, 2013; Frameworks Institute, 2021; Underhill, 2018), which I explore further in Section 3.6.5. Metaphors can exert significant force in these processes. They "use a frame from a specific, concrete and imaginable area of life to structure how a clearly distinct area of life is conceptualised" (Stibbe, 2015, p.64) and may influence policy, lived experience and even planetary outcomes, as exemplified by the natural capital metaphor above (Nerlich & Jaspal, 2012; Reed, 2005). As Foster (2003) states, "to think of natural systems as capital is to think metaphorically, extending a form of discourse from one area of experience where it works straightforwardly to one where its application is exploratory, illuminating but also, perhaps, problematic". The role of metaphor is particularly obvious in hard to perceive environmental crises like biodiversity loss (e.g. 'fighting' to save endangered species) and climate change: "There are hothouses and greenhouses, atmospheric blankets and holes, sinks and drains…"(Russill, 2010, p.115). Metaphor is one way that we are brought into relation with the invisible.

Education

In education contexts, analogic metaphor is regularly used to structure the incorporation of new knowledge in learners' pre-existing schema (Bowers & Flinders, 1990). For example, even though I now have a slightly more nuanced understanding of natural selection and evolutionary biology, it is hard to get past the 'survival of the fittest' battle metaphor which may frame children's first encounter with these concepts, skewing their perception of the ecosystems towards combative rather than relational or synergistic. For these reasons, educators should be concerned with how metaphor manifests in their settings and what it does. As with frames, metaphors regularly used in dominant cultures and discourses reinforce that dominance, and also potentially exclude minoritised cultures (Bowers & Flinders, 1990). This is painfully ironic, as the value of metaphor and story in world-making, communication and learning is particularly clear in Indigenous cultures and aesthetics, and a core part of moves to decolonise research methodologies and education (Cajete & Williams, 2018; Kulnieks et al., 2033; Wilson, 2003). Metaphor is already there in our classrooms and the ways that nature is (re)presented in culture, and has been examined by childhood researchers interested in how scientific learning emerges communication with adults and through play (Fleer & Pramling, 2014; Gustavsson & Pramling, 2013; Pramling, 2010).

There are multiple tensions with the broad range of work on language and

framing, including the risk of underplaying the realities or structural factors in the climate and ecological crises through trying to activate or avoid specific frames, but the evidence linking framing, values and willingness to take action seems powerful. Because languaging (Maturana & Varela, 1992) is such an integral part of how we experience and construct the world, it is both important and challenging to examine this in research, particularly in early childhood. As Lupinacci (2019) suggests, a "lack of attention to core language issues in education... reproduces damaging misunderstandings like the naturalization of an autonomous individual, a human-centered world, and unlimited progress and growth" (p. 3)

There are some research and practice recommendations on using the language of framing sustainability and nature in education contexts (Armstrong, Krasny & Schuldt, 2018), but they mainly focus on older learners. As environmental educators, particularly those working in ECE, increasingly acknowledge the multimodality of young children's embodied literacies (Hacket & Somerville, 2017) and the need to go beyond semiotic representation, more are adopting socio-material or worlding approaches (Taylor, 2017; Ward, 2017; Ward-Smith, Olvitt & Akhurst, 2019) to both research and practice. Extending how we might think about framing beyond purely linguistic structures aligns with recent turns towards embodiment and broader ontological considerations. If cognition is distributed across and situated in transactions between the agent's body, actions and material settings (Roth & Jornet, 2013), then framing must influence cognition in specific socio-material (and embodied) contexts. As we get towards the feminist new materialist approaches, I will make the case for extending analysis of cognition beyond transactional metatheories of ecological psychology (Heft, 2012) to focus on the intra-actions of all the socio-material actors in a given context, but you can hopefully already see connections/intersections with socio-cultural models of development (Rogoff, 2003).

(Re)framing, figuring or fabulating (Haraway, 2016) or (re)storying (Adsit Morris, 2017) through educational practice creates opportunities and challenges for educators. As Hart et al (2009) state, "[e]ven where existing categories or frames no longer work, we have not learned to think our way out of them. It is as if we have been taught how to think the world apart, and have not learned how to think it back together" (p. 347). This brings me to the final aspect of ecolinguistic analysis that I want to mark here: discourses, the ways that all of the above come together and are used in standardised ways by specific groups in society, in this context, to organise understandings of nature. For Foucault, discourses are "practices that systematically form the objects of which they speak" (2013, p.54), beyond just words and semiotic representation and into political force (Braidotti, 2013). This is the discursive component of the 'material-discursive' practices and research at the heart of recent feminist efforts to critique dominant analyses of childhoods and identify how socio-material environments influence young children's learning and development (e.g. Clark, 2019; Ejlertsen, 2020; Kuby & Rowsell, 2017; Lenz-Taguchi & Palmer, 2013; Hultman & Lenz-Taguchi 2010; Waters, 2017).

3.7.5 Values as principles - a questioning reading

As I get my eye in to pick out the *value as principles* line on this map, it becomes clear there is another molar line well and truly entangled with it, connecting values to attitudes, beliefs, norms, identity and 'pro-environmental behaviour'. The line that sets out to tie these together comes primarily from the field of psychology, with its "double goal, the understanding of human behaviour and the promotion of human well-being" (Clayton & Myers, 2009, p. 3). From these goals, we can identify dominant modes of psychology as distinctly anthropocentric and humanist, and distinguish what sets this type of inquiry apart from what I aspire to do. Even though environmental and conservation psychology have emerged as distinct subject areas, they belong to a paradigm which presumes - albeit to varying degrees - that individual human behaviour can be objectively understood and reliably predicted based on methodological generalisations of one form or another. The dominance of social psychology in particular means that the default level of analysis tends to be actions of and interactions between bounded individuals, who are assumed to be mostly rational actors within broader social systems. This leads to the assumption that, through empirical observation, you can understand what happens to lots of individuals in similar conditions, and then make predictions about how others who share certain characteristics might act or be affected.

Environmental psychology claims distinction from its wider disciplinary field on three main points. It attempts to understand people in specific contexts, not just laboratories; it starts from the position that relations between people and their environments are reciprocal; and it sets out to be interdisciplinary (Clayton & Saunders, 2012). These are important distinctions, but a critical reading of how environmental values are researched and utilised shows how paradigmatic ways of doing, thinking and being can influence interconnected research, such as in the field of learning for sustainability. Based on other social scientific theory and inquiry (Schwartz, 2012), understanding values in a psychological context is seen as important in making sense of how people relate to non-human nature and how they might act in ways that protect, enhance or conserve the world around them (Schultz, 2004). As I have demonstrated with *value as importance* and *value as measure*, research into environmental values (*values as principles*) extends beyond environmental psychology into multiple fields. However, this has led to a somewhat disjointed account in research literature (Dietz, Fitzgerald & Shwom, 2005).

The dominant theory of values which has been applied to environmental issues comes primarily from the research of Shalom Schwartz and colleagues (Schwartz, 2012) who argue that there are "basic values that people in all cultures recognize" (Schwartz, 2012, p. 3), values which are generally defined as "fundamental orientations, life goals, or guiding principles, which serve as the basis for organising an individual's beliefs and attitudes and guiding their behaviour" (Dutcher et al p. 475). Schwartz's approach is one of the most widely used but is part of a broader forty-

year effort to develop empirical understanding of cross-cultural values through the use of quantitative models (Hofstede, 1980; Schwartz, 1994; Inglehart, 1997; House et al., 2004). Schwartz and colleagues identify six main features of individual values:

1) Values are beliefs linked inextricably to affect…
2) Values refer to desirable goals that motivate action…
3) Values transcend specific actions and situations…
4) Values serve as standards or criteria…
5) Values are ordered by importance relative to one another…
6) The *relative* importance of multiple values guides action…

Schwartz, 2012, p. 3-4

In line with the paradigmatic conventions of dominant social sciences, the primary way that these theories of universal human values are tested and observed is through the development, use and refinement of survey tools to measure variables (in this case the types of value). The Schwartz Value Survey consists of 57 items, which respondents rate in order to distinguish value priorities. These measurements are then analysed using various statistical tools in order to confirm that the initial hypothesis or theory stands and in this case, to plot the relations between the values that respondents hold as more or less important. Schwartz's theory is presented as a model with up to nineteen (Shwartz et al, 2012) motivational types of value arranged in a circle which is intended to show how adjacent values work in support of each other, while values across the circle can operate in opposition: "[t]he closer any two values in either direction around the circle, the more similar their underlying motivations; the more distant, the more antagonistic their motivations" (Schwartz, 2012, p.10). The two dimensions of the model allow values to be plotted between *self-enhancement* and *self-transcendence* values on one plane and *openness to change* and *conservation values* on the other. Schwartz and colleagues argue that this means that values are structured in the same way across cultures, but may be prioritised differently.

In pursuit of the epistemic humility that I committed to earlier in this thesis, I must make it clear (if it is not already self-evident) that I'm still striving to better understand the application of these statistical tools and the maths which drives them. It might sound obvious, and perhaps is always implicit in work of this kind, but this is an important point in the mapping: it shows how this molar line (and others) can go on to influence other lines including the molecular (how we put this 'research knowledge' into practice in daily life or policy implementation) or open up other ways for thinking/being. When I read the published research (as I am supposed to in pursuit of a literature 'review'), in order to apply knowledge from diverse contexts, I become part of a knowledge-production/consumption assemblage which is made up of academic journals, editorial boards, methodologies, REF submissions, etc. I place my trust in the ability of others to evaluate and make sense of the statistical analysis used and then do my bit to interpret and apply the findings in a way that

honours the source material. This process sits on foundations of linearity and predictability: take one thing from here, apply it to there, and expect it to stay the same. Design a tool to measure whether it does, draw conclusions, repeat. In many contexts, this works well and yields deeper understanding, but in others it reinforces specific discourses by continuing to use what does work, leading to fragmentation where disciplinary knowledges are very specific but loosely connected. This can have political affect. I have a feeling that this is happening with the values line as it gets extended into 'environment' or 'sustainability'. This is not to say that the research which I am going to cover next is not valid, useful or important; rather what I will try to do is acknowledge the "and…and…and…" of the assemblages to a greater extent in order to make space for the other lines to split off.

One of the first nodes in that flow of assumptions is the belief that pan-cultural, universal values are something that can (and should) be identified by a survey tool, before we move on to environmental values specifically. This is the position taken by Schwartz (2012), Hofstede (2001), Inglehart (1997) and House et al (2004), but these approaches have been critiqued on the basis of how the tools were developed (Allison et al., 2021) and the generalisability of the findings based on sample representativeness and the ways in which measures of individual values are equated to national or cultural values (Baskerville, 2003). The World Values Survey seeks to use representative samples (2020), but some of its key findings centre around the two dimensions of traditional values versus secular-rational values and survival values versus self-expression values, which in light of conversations about the need for de-growth (Garcia, et al., 2017; Kallis, Paulson, D'Alisa & Demaria, 2020) and voluntary simplicity in over-'developed' cultures seem reductive and value-laden themselves.

3.7.6 Values influence environmental attitudes

Schwartz's value theory has informed a number of researchers investigating environmental values and attitudes in particular. Attitudes are more specific than values, and are "[a]n enduring pattern of evaluative responses towards a person, object, or issue" (Colman, 2015, para. 1), often described as having cognitive (belief), affective (feeling) and conative (behavioural) components. Researchers working on environmental behavioural change and nurturing closer connections to nature have been interested in value theory because of an apparent link between values in the self-enhancement and self-transcendence domain and environmental attitudes (de Groot & Stegg, 2012). Self-transcendent values have also been shown to correlate positively with altruistic and biospheric orientations as part of a tri-partite modelling of environmental attitudes which also includes an egoistic dimension (Stern & Dietz, 1994; Schultz, 2000; Schultz & Zelezny, 1999). Stern and colleagues sought to explain how this plays out with a Value-Belief-Norm (VBN) model (Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, 2000). This shows how

concerns (or action) for the environment can be rooted in different value orientations: Someone who holds egoistic environmental attitudes, might be concerned about air pollution because of the impacts on themselves; those with social-altruistic environmental attitudes are concerned about the harm to other humans, especially those close to them; people with a biospheric orientation are most concerned about the impacts on all living things.

The research seems to suggest that those who hold distinctly altruistic and biospheric values are more likely to enact pro-environmental behaviours than those with clearly egoistic orientations, but many of these studies refer to specific environmental issues or behaviours that are positioned as 'pro-environmental' in general, e.g. attitudes towards genetically modified food (Honkanen & Verplanken, 2004), vegetarian diets, (Kale, Dietz & Stern, 1990), car use (Steg, 2005) or household energy use (Poortinga, Steg & Vlek, 2004). While many studies in this area depend on data from non-representative samples (e.g. psychology students at universities) there does appear to be support for the thesis that values "underlie environmental concerns and environmental worldview" (Schultz et al, 2004, p.459). However, by trying to understand values through aggregating data from individuals, there is a risk that problems and solutions are more easily situated in the individual or the socio-cultural domains, rather than the structural. The need for a foundational shift in the worldviews that inform values, beliefs and norms is not new, and has been central to the mission of environmental education since its formal inception. Over thirty years ago, in *Caring for the Earth: a strategy for sustainable living,* the International Union for Conservation of Nature and Natural Resources (IUCN), the United Nations Environment Programme (UNEP) and the World Wildlife Fund (WWF) articulated this explicitly:

> Only a new world view and morality can change the basic relation of people to the earth. People's behaviour is a matter of choice based upon values… The need for a world ethic of sustainability - an ethic that helps people cooperate with one another and nature for the survival and well-being of all individuals and the biosphere - could not be greater.
>
> IUCN, UNEP, & WWF, 1990, p. 20

Biospheric values and perception of self in relation to nature

One of the key findings to emerge from this research agenda seems to link biospheric values, perceptions of self in relation to the natural environment and pro-environmental behaviour in a way which provides the basis for one strand of research into nature-connection. Working with the concept of *inclusion*, Schultz and his colleagues developed a model and a measure of 'inclusion of self in nature' (Schultz, 2002) to investigate connectedness to nature in similar ways that researchers have investigated the closeness of human relationships (Aron, Aron, Tudor & Nelson,

1991). Schultz (2000) showed that perspective taking (which served to bring human and animal closer together) increased concern, and as I will cover in section 3.8, environmental identity is influential in people's willingness to act in more environmentally friendly ways (Clayton, 2003; Clayton, 2012). As Schultz puts it, his "results suggest that any activity that reduces an individual's perceived separation between self and nature will lead to an increase in that individual's biospheric concern" (2000, p. 403). These findings have been taken up by researchers working across human-nature relations in different contexts, and have implications for, among other things, how humans enact care for non-human natures, especially when read through Nel Noddings's (1984) argument that sense of *proximity* is a central factor in how care is understood and performed (Fien, 2003; Martin, 2007). We will come back to this line elsewhere on the journey.

What I want to take from mapping this (molar) line of *values as principles* is that our values influence our actions at multiple levels. They guide our attitudes towards specific value objects, our behaviours, and play a part in shaping our identity, including how we relate to the natural environment. Research shaped by the paradigmatic conventions of psychology and other social sciences shows that values can play a part in shifting our relationship with nature, but the influential understandings of this are still largely based on the dominant, post-industrial societies which create the most consequential negative impacts on biodiverisity and Earth systems. The dominance of these discourses means that problems and solutions tend to be situated in the individual or the socio-cultural without full consideration of the structural elements which contribute to the development of and ability to act in line with values. In parallel, until recently, studies of how healthier human-nature relations affect values have primarily been restricted to the anthropology of Indigenous or alternative worldviews without engaging seriously with the associated need for structural changes in dominant systems in order to learn from them.

This line will connect all over our map - what is important to remember is where it comes from and what sort of evidence the position statements which influence those other lines are based upon. In particular, this molar line of research is not particularly well connected to research knowledges about early childhood to the Anthropocene line charted in the Planetary Context section. How might we approach research into values, nature and how we act in the world in ways that acknowledge the serious and urgent nature of our situation, the globally interconnected character of ecological risks and consumption and the invisible bonds of human-nature? What implications does trying to answer that question have for early childhood education and outdoor learning?

3.8 The value of natures in childhoods and school-based outdoor learning.

3.8.1 Introduction

That molar figuration of *value as importance* takes shape in four places on this map of childhood-natures and school-based outdoor learning. Why (and how) is nature seen to be important in childhoods, and particularly in schools?

The first line that I explore relates to the concept of connection to nature and the power that molar articulations of this are developing in relation to childhoods and environmental education. The second line relates to the health and wellbeing benefits of children being outdoors and in natural environments. These are increasingly clear, but are not always well connected to the normative elements of environmental education or social changes which might contribute to Earthly flourishing. The third line maps the molar articulation of 'Nature's Child' which discursively links wild nature and innocent children, and shows how other researchers and practitioners have set about disrupting this, connecting it to the Anthropocene line in a way that accepts and acknowledges the complexity of contemporary childhoods. This line highlights the importance of experience and perception of environments in childhoods, and considers how this might affect how children come to relate and care for the world in later life.

3.8.2 Connection narratives and the troubles they may cause.
Introduction

The idea that the closer we feel to or identify with nature, the more likely we are to act in environmentally responsible ways, as proposed by Schultz (2000) is a compelling one, and psychologists have invested in finding different ways to theorise and measure connection to nature (CTN), what might foster or disrupt CTN and what it correlates with. As I will show in the following sections, it can be hard to think about connection, without thinking about *dis*connection or a need to *re*connect with something, which is inherently a deficit framing. These measures also depend on respondents having a clear conception of what "nature" is, which is sometimes problematic when connected to the Anthropocene line, and in relation to childhoods. Human-Nature Connection (HNC) is a growing field of research, including in childhood and education, but I identify several limitations in terms of how useful a figuration it is for *this* research.

Connection to nature

Human Nature Connection, connection to nature (CTN) or nature-connectedness (NC) are terms used by some folk to capture the complexity of people's subjective relationships with the natural world. This is different from nature contact, which refers to "any human interaction with a biophysical system" (Martin et al., 2020, p.2). Nature contact or exposure can be investigated through observational studies (e.g. neighbourhood greenspace, time spent engaged in specific activities), but nature connectedness is a subjective state which has predominantly been investigated through various psychological constructs or qualitative accounts.

A range of tools have been developed to try and quantitatively measure these constructs, and as I will consider below, these have been used in attempts to make sense of the health and wellbeing and sustainability values (*importance*) of feeling connected nature, mostly through correlational studies. Kim-Pong Tam's (2013) review of methodological concepts and measures provides a comprehensive overview of the development of the related psychological constructs and mostly quantitative methods for investigating them. He found that one strand of measures focussed on emotions towards nature either through affinity (Kals, Schumacher & Montada, 1999) or respondents's feelings of connection and belonging to the natural world (Mayer & Frantz, 2004). Other concepts, such as *inclusion of nature in self* (Schultz, 2001) and *commitment to nature* (Davis, Green & Reed, 2009) apply psychological theories about how cognitive representations of interpersonal relationships (between humans) affect attitudes, values and behaviours to respondents' relationships with nature.

Tam argues that environmental or ecological identity (Clayton & Opotow, 2003; Weigert, 1997; Thomashow, 1995), nature-relatedness (Nisbet, Zelinksy & Murphy, 2009) and connectivity with nature (Dutcher et al., 2007) are multidimensional concepts, but that all nine measures and concepts he identified "can be considered markers of the same underlying construct" (Tam, 2013, p.74). His findings encouraged researchers to work with the broader construct of CTN and showed that while the concepts are not identical there was enough convergent validity that for many situations, the choice of measure should not affect the outcome of the research.

A systematic review of research from 1984-2015 (Ives et al., 2017) used the umbrella term Human Nature Connection to cover some of those diverse terms used in research, such as connectedness with nature, nature connectedness or nature relatedness. Through this process, Ives et al (2017) identified three clusters of research, which they called *HNC as mind* (concentrating on individual level cognitive and philosophical constructs), *HNC as experience* (mostly qualitative observations of experiences in local areas) and *HNC as place* (quantitative evaluations of connection to specific landscapes and places). Their review showed that interest in HNC had increased rapidly, but that evidence was "highly heterogeneous" (p.108) and limited by a lack of cross-cultural research, all of which other reviews have also shown (Restall & Conrad, 2005; Zylstra et al., 2014).

Connection to nature has been found to be positively associated with wellbeing, both in terms of feeling good (hedonic wellbeing) and healthy functioning (eudaemonic wellbeing) (Howell, et al., 2011; Capaldi et al., 2014; Nisbett & Zelenski, 2013; Pensini et al., 2016). Meta-analysis also shows a "strong and robust association" (Mackay & Schmitt, 2019, p.1) between nature connection and what are termed 'pro-environmental behaviours' (Mackay & Schmitt, 2019; Whitburn, Linklater and Abrahamase, 2019). However, both of these relationships have so far been shown to be correlational rather than causal, and measurement of pro-environmental behaviours is notoriously difficult (Lange & Dewitt, 2019). Measures of pro-environmental behaviour in research are often based on self-report, which some researchers argue has limited validity (Kormos & Gifford, 2019), and even observational or laboratory studies struggle to capture the complexity of what it means to act in environmentally responsible ways given the ecological footprint of many citizens of dominant societies (Global Footprint Network, 2021). When pragmatic researchers take this into account though, research can still draw finer conclusions about processes and outcomes by comparing these more nuanced variables. For example, some research shows that nature connectedness predicts pro-environmental conservation and household behaviours better than frequency of nature contact and that emotional and aesthetic experiences were more effective in nurturing nature connectedness than fact-based science communications (Martin et al., 2020). I could provide a lot more detail on studies that put CTN to work, but to fully consider all of the existing research would be a significant literature review in and of itself, and would perpetuate the prominence of an epistemological framework which is already dominant in this field, and will be somewhat disrupted by the rest of this cartographic process.

Researching connection to nature and children

You would expect to see connection to nature on this map, because there are implicit and explicit assumptions that children engaged in outdoor learning are going to be engaged in a process of *connecting to nature*, which in turn might shape their *subjective* and lasting connection to nature. Conservation organisations are increasingly turning to CTN as a goal for interventions and projects involving children, and to CTN measures as evaluation tools (Richardson et al., 2015; Richardson et al., 2016), so it is visible in the related discourses of conservation, sustainability and childhoods. As well as being a pragmatic response to the desire to support children to be ready for the future, this is linked to the molecular line which has been labelled 'extinction of experience', and the romantic idea of an idyllic child-nature relation which I cover in section 3.8.4. What evidence there is within this discourse does offer one route onwards, but there are risks associated with bounding inquiry, and as with the adult research, the idea of CTN in this body of work often refers to a very specific construct or measure.

Most research in this field relates to adults, and what work there is on childhood nature connection is just as heterogeneous. Generally, it concentrates on the value that nature connection has for children's health and wellbeing; children's reported actions to care for nature; and links between connection to nature and time spent in nature. This research has recently been comprehensively reviewed by Louise Chawla (2020) in a paper on child-nature connection and coping with environmental loss. There have been efforts to develop multidimensional quantitative measures of nature connection for children, which cover affective, cognitive and experience spheres. Most of the research is based on environmental education interventions (Cheng & Monroe, 2012; Enrst & Thiemer, 2011) or pre-school settings (Elliot et al., 2014; Giusti, Barthel & Marcus, 2014; Rice & Torquati, 2013). Some of the research conducted with older children measured connection to nature in the context of visits to nature reserves (Bragg et al., 2013), while Miles Richardson and colleagues (2015) surveyed 775 10-11 year-olds at school, and developed the new Nature Connection Index (NCI) to apply to a sample of both adults and children (Richardson et al., 2019). Chawla identifies patterns in the measurement tools which shift with age. In particular, there has been limited attention to measuring or describing connection to nature with very young children, aged 2-5 (Beery, et al., 2020; Barrable & Booth, 2020), even though there is a general consensus that this is an influential time in the development of attitudes, values and identity. Quantitative items for use in early childhood tend to "consider enjoyment in nature, a desire to engage in nature-based activities, empathy and interest in nature" (Chawla, 2020, p. 622), primarily using interviews, games (Eliot et al., 2014; Giusti, Barthel & Marcus, 2014), simplified surveys (Larson, Green & Castleberry, 2011) with children under 7, or structured interviews with parents (Sobko, Jia & Brown, 2018). Questions of environmental identity or kinship with nature are left for older children who are presumed to have developed a stronger sense of identity to consider in relation to others. A key finding from quantitative measures of CTN across age ranges, is that mean scores for CTN seem to decrease with age, to a low during teenage years, then rise to the early twenties, where it remains relatively fixed (Hughes et al., 2019; Richardson et al., 2019).

Connection to Nature in early childhood

There is a significant and growing body of work examining the CTN of young people and how interventions or experiences affect this, but I am limiting myself to concentrating mainly on early childhood. Early childhood is discursively linked with CTN and the development of identity, values and attitudes within the socio-ecological contexts of childhood, but the dominant ways of defining and measuring CTN are hard to apply to this stage of development. Molar lines shift understandings of child development too: depending on the research paradigm (or the funding), specific studies might refer to 'pre-school' or kindergarten children, which I argue over-simplifies the distinctions and contexts which early childhood might span and neglects the changes which occur in the child's socio-ecological context during this

time (including the role and availability of adults and perceptions of independence). This is why I have chosen to concentrate my research on early childhood but at school, particularly in the Scottish context, where Realising the Ambition is intended to guide practice in the early years. There is little CTN research which relates to this context specifically, which shows a gap on this map, but also highlights some reasons to use alternative methods to investigate it.

Quantitative studies

Thomas Beery, Louise Chawla and Peter Levin (2020) propose a description of connection to nature in young children based on semi-structured interviews and surveys with a panel of experts. The definition of CTN in 2-5 year-olds that they present consists of six features based on their analysis of this data. CTN at this age was seen by their respondents to be inherently linked to the *special qualities of very young children*, including the fluidity of developing self-identity and the vibrancy or 'aliveness' of agents which are typically seen by adults as lacking agency. The example that I often use to demonstrate this relates not to nature, but to diggers and is one I may come back to consider in more detail. When my son was younger, there was a lot of building work around our house, and when we talked about the machines moving around, the diggers always had agency: it was not the humans in the cab controlling the machine; our talk was about how "The digger is moving" or "What's the dumper doing now?" This is an intuitive form for adult-young-child communicating to take, which is also easily observed in representational modes, such as children's books and toys where 'objects' have character, agency and vibrancy. Participants in Beery, Halwa and Levin's study argued that understanding this unique and emergent way of making sense of the world requires close and inductive observation.

The second feature, which aligns with adult definitions, is that CTN is *multidimensional*, typically understood at this age as consisting of cognitive, emotional, bodily movement and multisensory experience elements. The third feature they offer, is that CTN is *place-based*: it does not develop in relation to abstract ideas of 'Nature', but with specific and concrete experiences in places. Chawla touches on this in the findings of her broader literature review too (2020), and it is particularly relevant in terms of thinking about how young children might identify what 'Nature' is in order to 'feel connected to it'. The fourth feature, which I find somewhat problematic given the power dynamics at play in many ELC settings and schools is the importance of *children's agency* or free choice, the capacity to be drawn to natural features and be able to engage with them on their own terms. *Empathy*, for both human and non-human actors is presented as the fifth feature, with the final element being that young children's CTN is *context-dependent* and based on cultural and spatial experiences. Beery, Chawla and Levin present a tripartite model for the development of CTN in children age 2-5, consisting of sociocultural influences, quality and quantity of time in nature and interactions with animals and other species.

These descriptions, while based on responses from a panel of just nine experts, are important, particularly as some of these respondents are invested in the discourse of CTN, but still advocate for increased critical attention to how quantitative tools are used with children. The findings suggest that for young children, while there are ways of measuring CTN quantitatively, these may be limited in the richness of information they can provide about the processes of connecting to nature. Beery et al. argue for mixed methods approaches to research, and encourage researchers to pay attention to socio-cultural and place context, consider CTN as a standalone construct and engage with teachers as researchers and collaborators.

Qualitative studies

Using qualitative methods to investigate young children's CTN specifically is challenging, and there appears to be a significant blurring of lines between what constitutes CTN, the development of environmental identity, and the ways in which young children investigate and come to know any environment (natural or not) through engaging the affordances of that environment. The richness of the line of interdisciplinary research (e.g. children's geographies, environmental psychology, planning), which explores how children relate with their environments should not be excluded because of its variety, but emerges as a minor line in tension with the molar line of clearly delimited, quantifiable CTN, which defines Nature as something bounded and separate from human experience. I explore this further in relation to ecological psychology and posthuman figurings of childhoodnature. Most qualitative studies which do try to investigate connection specifically incorporate ethnographic observations and descriptions of interactions, either in specific nature kindergartens (Eliot et al., 2014) or through parenting/caregiving roles (Humphreys & Blenkinsopp, 2018).

There has been limited qualitative research on CTN specifically beyond evaluations of specific environmental education projects which are not usually led by teachers, so differ from the context I am interested in here. With their longitudinal research on a specific species stewardship project, Barthel, Belton, Raymond and Giusti (2018) get close to the context of school-based outdoor learning, but with older children working in what could still be characterised as project-based environmental education. They found that children involved with a voluntary project caring for newts in a local park developed affective, sympathetic relations with the newts and other surrounding non-human nature which lasted at least two years. They argued that these emerged through unpredictable, embodied experiences combined with behaviour settings which created space for responsibility, pride and commitment to the values of the project. Andy Ruck (2020) has explored the Scottish school context through his PhD research evaluating a pollinator stewardship project in school grounds, but resisted and disrupted the implicit expectation that CTN should be a central figure in research of this type. Instead, he mapped the co-production of curricula through the convergence of multiple organisational, human and more-than-

human elements, finding that "collective thinking" with the more-than-human and relations that emerged through this were important to the outcomes of the project.

(Dis)connection: framing issues.

Some authors argue that CTN and related discourses, especially in relation with childhood, inherently support and reify the nature-culture binary that can be seen to compound some humans' cognitive and emotional distance from the rest of nature in ways which allows its continued exploitation (McPhie & Clarke, 2014; Rautio, 2013; Malone, 2016). By implying that nature is something separate which we humans can 'connect' to implies that we are not ourselves just one part of 'nature'. Thinking back to the minor lines related to how cognitive frames affect how we perceive the world and our values, it seems clear that speaking of *re*connecting to nature, or *increasing* and *enhancing* children's connection to nature activate deficit frames in terms of people's current relationships with the rest of nature. I touch on this below in relation to fall-recovery narratives in children's experiences of nature (section 3.8.4). This is complicated though, and perhaps where the quantitative measures of nature contact and nature connectedness can be useful, even if combined with theoretical positions which they might seem at odds with (which is the power of assemblage approaches such as I am trying to use here). I will look at alternative ways of thinking with human-nature and childhoodnature in due course, but it is increasingly clear that the relations that we have with nature, and how they are constituted cognitively, affectively and experientially have the potential to be a significant leverage point for sustainability transformation (Abson et al., 2016). As a pathway to attending to how environments affect these relations, CTN and HNC offer one way of integrating change into areas such as planning and children's environments (Giuisti, et al., 2018).

Why I am not using CTN as a construct or a measure

My research objectives are exploratory and place an emphasis on investigating processes and pathways rather than outcomes. From the mapping that I have done here, it is clear that the molar lines of articulation are primarily figured through evaluative and correlational studies, and I am interested in identifying lines of flight which can support transformation and practice in (or rather out of) the classroom. I agree with McPhie & Clarke (2014), and Timothy Morton (2007), who they cite, that thinking about a 'loss' of connection to nature obscures the consciousness-raising realisation that we *are nature.* When combined with my self-awareness around my skillset and capacity for understanding the statistical analysis necessary to meaningfully apply quantitative measures of CTN, I chose to invest my energy in the application of post-qualitative and feminist materialist methodologies.

3.8.3 Health and Wellbeing

Introduction

One site where nature is often researched as having *value as importance* through *value as measure* is human health and wellbeing. Research with and about children specifically is limited but emergent, which means that the evidence linking human contact with nature and human health is predominantly researched in adult populations. These connections are complex and nuanced, which until recently, has made it hard to understand the specific pathways that create positive correlations with physiological, psychological and health behaviour outcomes. Part of this is due to the myriad ways that the relationship between nature and health outcomes can be explored: are we talking about nature contact (Chawla, 2015), green infrastructure (Lovell et al., 2020), green exercise (O'Brien et al., 2016), blue-spaces, air quality or something else? Thus, while clear linkages are established on a study-by-study basis, there is uncertainty about the evidence base at a more general level (Lovell et al., 2020). Like other locations on our map, this is a whole field of research in and of itself, which I cannot hope to consider in much detail here, but I feel it is important to at least outline some key points and I hope to honour these researchers' work. Any misinterpretation or misapplication is my own.

Health itself is a contested concept and has historically been defined in the context of biomedical or biopsychosocial models, typically considered across three key domains: physical or physiological; mental, psychological or emotional; and social, through connection with others (Lovell, 2018). Wellbeing is another term used in research and policy, which is similarly multi-dimensional (Bragg et al., 2015). However, health is now increasingly understood as an emergent, adaptive process developed over the life course through interactions between complex living systems and events in individuals' environments (Halfon & Forrest, 2017). This approach makes the potential developmental value of time spent in outdoor and natural environments during early childhood more obvious as a protective measure for health development across the life course (Chawla, 2015; Ulset et al. 2017).

More ecological approaches to understanding child development, health equity and social justice have emerged as a new molar line globally since the final report of the WHO's Commission on the Social Determinants of Health (WHO, 2008) and in the UK since the publication of *Fair society, healthy lives*, the report of the Marmot Review (Strategic Review of Health Inequalities in England post-2010 (SRHIE, 2010). These acknowledge that physical and social environments at multiple levels have effects on healthy early child development and public health. The six policy objectives to come out of SRHIE demonstrate how intermeshed health, development and environment are, which has implications for childhoods, and hints at the role that natural places can play in public health. In Scotland, health is a primarily devolved matter, and "as a nation, our overall health is unacceptably poor in comparison to other Western European countries, and many people living in our most deprived communities still experience poorer health than those living in our wealthier areas" (Scottish

Government, 2018a, p. 2). Alongside reducing the harm of drugs, the public health priorities for Scotland's citizens are to "live in vibrant, healthy and safe places and communities", "flourish in our early years", "have good mental wellbeing", "have a sustainable, inclusive economy with equality of outcomes for all" and "eat well, have a healthy weight and are physically active". These are all relevant and inter-related with the core concerns of this project, but also the value that nature has for health and wellbeing across the life course.

The adult line - molar but messy

While I do want to concentrate on children, it is helpful to very briefly cover the evidence base in nature-health research with adults. In this literature, nature is often homogenised into concepts like *greenspace ("*any vegetated land or water within an urban area" (Greenspace Scotland, n.d., para. 4)), or *green infrastructure* (the networks of urban and rural multi-functional green and blue space which contributes benefits to local communities (HM Government, 2021)). This parsing, while necessary, means that the types of inquiry are often limited what they can say about specific arrangements or qualities of human-nature relations.

Most research does relate to 'greenspace', but increasingly, the effects of 'healthy blue-spaces' (Foley & Kistemann, 2015) are also of interest to researchers, policy-makers and planners. I think that while this looks similar to the greenspace line on a superficial level, it has potential to form a line of flight, which troubles dominant conceptions of Nature, bios, vibrancy and the visibility of living systems. What is 'the sea', or the ocean? Is it alive? Does it have agency, or is it just a medium for life pulled here and there by the moon? How much of the restorative effect of water is to do with the sounds, the smells, the movement? Rivers, coasts and seas create such culturally diverse places (e.g. Wheaton et al., 2019) that the requirement for place-based, multi-perspective understandings of them, whether in relation to health or other fields, makes the need for research which honours complexity clear.

Literature reviews indicate that at a general level, green infrastructure, such as that which might be used for local outdoor learning, is linked with multiple physical (Twohig-Bennett & Jones, 2018), mental (Gascon et al., 2015) and social health outcomes (Lovell et al., 2020) for adults. It seems from research in the UK and Western Europe that everyone benefits from green infrastructure, but that communities experiencing the effects of socio-economic inequality may have the most to gain from greenspaces (Twohig-Bennett & Jones, 2018, McEachan et al., 2015; Mitchell and Popham, 2008; Jennings et al., 2012), particularly as there has been historic inequality of access (Allen & Balfour, 2014). There is limited and inconsistent evidence to inform understandings of what constitutes high-quality greenspace, or the characteristics of green infrastructure which might yield the most benefits for health. There are some reviews of studies researching the influence of biodiversity on health and wellbeing

(Lovell, et al. 2014; Bragg et al., 2015), but the focus on landscape scale analysis (e.g. vegetation cover) and diversity of research designs makes it hard to draw any conclusions about this. Due to the heterogeneity of research on this topic, some work has tried to concentrate on identifying pathways between nature and health. Ming Kuo (2015) identified 21 potential pathways across environmental, physiological and psychological realms and concluded that "with so many contributing pathways operating in concert, the cumulative effect could be quite large even if many of the individual pathways contribute only a small effect" (p. 6). The 'active ingredients' of nature which may contribute to health identified in this review included phytonicides (antimicrobial VOCs), negative air ions, microorganisms which contribute to immune function, the sights and sounds of nature, and, in urban areas particularly, the effect that greenspaces can have on air pollution and heat. Lovell et al. (2020) identified pathways/mediators under the headings of environmental states, health, wellbeing and behaviours, social and cultural, sense of place and knowledge, capacity and capabilities.

In a review of research on the relationship between greenspace and mental wellbeing of adults Houlden et al. (2018) identified six main ways that greenspace is conceptualised in the literature: *amount* of greenspace; *type* of greenspace; *views* of greenspace; *accessibility* of greenspace; and *connection* to nature. All of these domains have relevance to children's relation with nature through greenspaces in and out of school, and by implication, to their health and wellbeing. However, much of this research concentrates on adults, and as is clear from the different ways that greenspace is figured, there is limited evidence on the health benefits which come from direct experiential contact with or time in nature, or the specific affordances of outdoor environments such as those children might encounter at school. This is partly due to pragmatic considerations and the dominance of certain forms of knowledge in health research, but is also indicative of the wider privileging of visual perception in studies of human-nature relations, which I identify in the section on biophilia as a site of potential bias which may serve to exclude multi-modal and embodied cognition.

Physical activity is an apparently obvious pathway linking greenspaces and health, but is also challenging to investigate within the parameters of positivist health and psychology paradigms. In Scotland in 2020, 51% of men and 42% of women engaged in enough moderate to vigorous physical activity (MVPA) to meet the physical activity guidelines set by the UK's Chief Medical Officers (Scottish Public Health Observatory, 2022). Some of the research on this link characterises green exercise as having distinct characteristics and benefits beyond just the movement of bodies in outdoor spaces, but even at this level, "[e]vidence that greater neighbourhood greenspace, by itself, is associated with more physical activity, including walking and cycling is equivocal" (White et al., 2018). The form of activity may also have under-investigated influences, especially in terms of nature connection and physical activity: for example, the most widely cited reasons to 'visit the outdoors' in Scotland are consistently to exercise a dog (42%) or for health and exercise (Stewart

& Eccleston, 2020).

A significant proportion of the foundational literature on green exercise and nature-health assemblages depends primarily on visual relation to nature: for example, research in hospitals showed that patients with views of nature during recovery from illness or surgery had better outcomes than those without (Diette et al., 2003; Maller, 2006), and residents with views of natural settings from home reported higher sense of wellbeing than those without (Kaplan, 2001). Just looking at pictures of nature can have physiological effects, such as positive impacts on cardiovascular functioning (Laumann et al, 2003; Pretty et al, 2005; Duncan et al, 2014). While the methodology of these studies, using experimental approaches in controlled environments, can provide support for certain hypothetical links between nature and health, the small sample sizes and the diversity of variables intrinsically limits how it can be applied in different contexts. However, the positive health outcomes of green exercise specifically have been broadly identified as: improvement of psychological wellbeing; physical health benefits (through reduced blood pressure and burning of calories); and enhanced social connectivity (Pretty et al., 2011).

Due to the potential of greenspace as a population level health intervention, particularly in urban areas, amount, type and accessibility of greenspace have been more widely investigated recently. While the evidence base for making decisions on this is incomplete and variable, Lovell et al (2020) suggest five main related findings. Firstly, it is likely that the greener the living environment, the better the health and wellbeing of its human residents. Importantly, better quality greenspaces are associated to better health and wellbeing, but *perception* of quality is complex. A mix of private and shared gardens, public greenspaces and green routes is most likely to be beneficial, because different environments afford different benefits. Having greenspace close to home, education and work is important, but objective proximity is not always the most important factor in how accessible greenspaces feel, and people choose how they come into relation with nature dependent on a range of factors. Overall, "the value of different types, amounts and locations of green infrastructure for health and wellbeing outcomes is likely to be highly contextual" and thus does not necessarily transfer from easily one to community to another (Lovell et al., 2022, p. viii), enhancing arguments for integrating greenspace into community-based place-making (Our Place, 2022). Martin et al. (2020) found that *incidental* contact with nature actually associated with worse health; active choice to visit greenspaces, as well as quality may be more important (White et al., 2019). As I explore further below, there is also limited evidence for how this affects children's experiences of place, but some implications for health linked to child-greenspace intra-actions.

Nature and children's health and wellbeing

Clearly some of the pathways to health and wellbeing which have been hypothesised in adult populations may have relevancy to children and school

contexts. One framework for enhancing wellbeing, which can be used with all age groups, and underpins several green/blue health initiatives in Scotland is *Five ways to wellbeing*, developed by the New Economics Foundation. As a result of their review of evidence in 2008, Jay Aked, Nic Marks, Corrina Cordon and Sam Thompson suggested that creating ways for people to *connect*, *be active*, *take notice*, *keep learning* and *give* to others can enhance individual wellbeing and have cumulative positive effects. Bragg et al. (2015) in their review for The Wildlife Trusts argue that these pathways are synergistic with spending time in natural spaces and places, especially if connections, awareness, learning and relations are opened up to the more-than-human. For example, they illustrate how natural spaces can foster social interaction, physical activity and connection to nature; mindfulness, creative practices or field studies in nature support noticing, learning through nature supports lifelong learning and volunteering and conservation involve giving to other people and nature. As I have outlined, these can all be integrated into outdoor learning in ECE contexts and are also features of well-rounded LfS, suggesting that there is potential for school-based outdoor learning to contribute to children's health and wellbeing.

The Scottish approach to supporting child development is called Getting It Right For Every Child (GIRFEC), and has a set of wellbeing indicators at its heart (Scottish Government, 2022b). These factors (often referred to as *SHANARRI*) are supposed to ensure that every child and young person, whether at home, in school or the community feels Safe, Healthy, Achieving, Nurtured, Active, Respected, Responsible and Included (Scottish Government, 2022b). It can be argued that greenspaces, bluespaces and nature more broadly can contribute to all eight wellbeing indicators, particularly through well designed outdoor learning, but the molar articulations in the research literature beyond education centre mainly on the strands of being healthy and active, with a less clear, but equally influential connection to achievement through recent discursive focus on attainment. In a well-cited review, Louise Chawla (2015), identifies physical health, cognitive functioning and psychological wellbeing as well as affiliation (with humans and other species) and imaginative play as key health and wellbeing benefits that nature can bring to children. However, she also makes the very valid observation that most of the dominant research in the field, and quantitative research in particular, draws findings from high-income North American and Western European populations, when the most rapidly urbanising populations exist outwith these areas.

Healthy and Active

As I explore in section the next section, the figuration of a healthy child flourishing in nature is powerful, but one which can also come loaded with romanticism, ableism and racism before the practical matters of inclusion/exclusion are even considered. Nature and greenspaces are positioned in the research as key enablers of physical activity, which is seen to contribute significantly to positive health and wellbeing outcomes (Cooper, 2020; Sando & Sandseter, 2020). According to the WHO, physical

activity in childhood and adolescence improves physical fitness, cardiometabolic health, bone health, cognitive functioning, mental health and reduces adiposity (2020). While there is limited evidence to support the presumption that higher levels of physical activity in childhood track through into adulthood (Telama, 2009), based on understanding of health development at critical points in the life course, the WHO recommends that children from age 5 should engage in an average of at least 60 minutes a day of moderate-to-vigorous intensity physical activity (MVPA), with vigorous activities at least three times a week (2020, p.25). It seems clear that in a school-centric culture like Scotland, a not insignificant amount of this physical activity is expected to happen at school (and arguably, through play), one way or another.

Natural environments and places have been identified as potentially significant enablers in increasing physical activity (Pretty et al. 2005; Bowler et al. 2010) and children's physical activity in particular (Gray et al., 2015; Sando & Sandseter, 2020), principally through the variety of affordances that they offer for movement, play and bodily engagement (Fjørtoft, 2001; Norodahl & Johannesson, 2015; Larrea et al, 2019). This applies in terms of the availability of neighbourhood greenspaces (Almanza et al., 2012) and school grounds (Dyment & Bell, 2007). There is some evidence to show positive correlations between time spent outside and physical activity, which has been explored through analysing data from accelerometers with self-reports of time spent outside (Cleland et al., 2008), including a small study evaluating learning in natural environments at a primary school (Aronson, Tighe & Waite, 2014) which showed that 10 children in a year 2 class (aged 6-7) spent more time in MVPA during outdoor learning than indoors, and were noticeably more active when sessions took place in local woodlands compared to the school grounds. Some studies have shown that while children spent a relatively small amount of their overall outdoors time in greenspaces, that time constitutes a significant proportion of their MVPA (Wheeler, Cooper & Page, 2010; Lachowycz et al., 2012; Ward et al., 2016). There is a growing body of evidence which suggests that children are more physically active outdoors in ECEC contexts (Sando & Sandseter, 2020), but it is challenging for researchers to explain why and how this emerges in nuanced ways. A systematic review of the health, wellbeing and development impacts of nature-based ELC commissioned by the Sottish Government concluded that while the quality of evidence in this area was mostly limited, spaces with specific natural features e.g. rocks, grass, hills) were positively associated with increased physical activity (including MVPA) and movement during ELC. When compared with 'traditional' ELC, there was some evidence to suggest that nature-based ELC was positively associated with balance, self-regulation, nature relatedness and play interactions (Johnstone, et al., 2020)

It seems that open spaces and pathways which guide movement may afford more increased gross motor physical activity like running (Berg, 2015; Cosco, Moore & Islam, 2010; Cosco, Moore & Smith, 2014), although this is likely also to do with the forms of play which take place in open spaces (e.g ball play or teacher-directed activities), showing how multiple agents affect activity. However, it is less clear

whether all children are more physically active outdoors (Sando & Sandsetter, 2020), what role social and other environmental factors play (Bjørgen, 2016), and how biodiversity or types of 'natural' environments affect physical activity (Bragg et al., 2015), and how this interacts with other ways of being-in/becoming-with nature. Much of the literature on physical activity in natural spaces uses Gibson's affordance theory (explored in section 3.8.4) to suggest that natural environments offer a greater number of affordances for young children to engage in physical activity on their own terms, which Ingunn Fjørtoft (2001) argues results in greater physical motor development for children aged 5-7. In a similar vein, drawing on research by Wood et al (2014), Barton et al (2014) and Reed et al. (2013) Carly Wood, Rachel Bragg and Jules Pretty conclude that natural environments are particularly inclusive spaces for physical activity because they may reduce gender differences in physical activity, engage less fit children and make physical activity "seem easier and more enjoyable to children who are less physically active" (Wood, Bragg & Pretty, 2016, p. 47). One of the primary implications of this node of research for this thesis and outdoor learning more generally, is that outdoor spaces, and more natural spaces in particular seem to play a role in the emergence of specific ways of moving, being and playing in space, which involve more physical activity than other spaces.

Attention restoration and self-regulation

A significant amount of research with a relatively long heritage in environmental psychology focusses on the effects of natural places and views on attention restoration, which may contribute to wellbeing directly and indirectly, under the broad term Attention Restoration Theory (ART). Recently this has been developed more specifically in relation to children's attention restoration and the associated health, wellbeing and learning benefits that may come from that. Increased capacity for self-regulation as a result of attention restoration is presented as a potentially important pathway to wellbeing because of its links to reduced likelihood of obesity and academic performance (Jenkin et al., 2017).

I am cautious of including much of this research here. I trust the methodologies and the researchers' integrity, but I find it fundamentally hard to understand how individual children's experiences in experimental settings can be aggregated to make claims about specific cognitive processes. While self-regulation and stress response are cognitive processes, I do find it hard to understand them as removed from the worlds - the worlds of the children's lived embodied experiences, and the 'political', normative worlds which they live in.

The ability to focus on a task (which requires effort) is framed as *voluntary* (James, 1892) or *directed attention* (Kaplan and Kaplan, 1989), which is finite and can become fatigued over time. Contemporary lives, particularly in urbanised, technology-heavy socio-cultural situations involve stimuli and tasks which have a high directed

attention load. Kaplan & Berman (2010) contrast this with *involuntary* or *indirect attention*, which requires less effort to maintain and is directed towards things which are inherently fascinating or stimulating. A central premise of ART is that time spent in states of indirect attention can restore or 'top-up' levels of directed attention and therefore enhance executive functioning and self-regulation (Kaplan & Berman, 2010). It is proposed that this happens through four features: a sense of 'being away' from settings which fatigue attention; 'soft' or "intrinsically fascinating stimuli which can be appreciated in a contemplative way without mental effort" (Stevenson et al, 2019, p. 2); a feeling of 'extent' to explore, and compatibility with goals, or intent (Kaplan, 1995). Recent meta-analyses have shown that working memory and cognitive flexibility "may be improved after exposure to nature, through restoration of cognitive processes related to directed attention" (Stevenson et al., 2018), but it appears harder to understand how these effects emerge.

There is limited research specifically on how nature affects children's cognitive processes linked with directed attention, but speculation that this is different from how it affects adults (Stevenson et al., 2019). A number of studies have used virtual nature (e.g. videos of natural or urban scenes) as a proxy for direct experiences of nature, and make comparisons between experiences of natural environments and urban environments (Stevenson, et al., 2019). As researchers investigate the nuance between, for example, nature contact, nature connection and exposure to nature, the implications of this type of research may become more important: for example, using videos of natural and urban environments, Jenkin et al. (2017) found that the findings on self-regulation from one of their studies were likely to be "due to significant detrimental effects of the visual urban environment, rather than the restorativeness of nature" (p. 11). One longitudinal study of primary schoolchildren in Barcelona, showed that exposure to greenness in neighbourhood and at school had a beneficial impact on cognitive development (Davdand et al., 2015)

Psychological explanations of the value of nature to humans are subject to two main critiques: that of specificity (it is hard to isolate the elements of greenspaces that might contribute to these benefits) and the absence of evidence to suggest whether short term psychological benefits (which have been measured) contribute to the long-term health and wellbeing benefits which have been measured (Rook, 2013). Graham Rook argues that in addition to 'psychological' and 'physical activity' pathways to health and wellbeing, there is growing evidence that another significant health value of natural environments is as a context for the development of effective immunoregulation. This argument is captured in the Old Friends hypothesis (Rook, Martinelli & Brunet, 2003), which proposes that humans have historically co-evolved with a range of microbiota which play an important role in the development of immune system, and the biodiversity hypothesis, that reduced biodiversity (even at microscopic level) is linked with immune dysfunction and disease (von Hertzen, Hanski & Haahtela, 2011). This is in line with recent understandings of humans as a holobiont, a functional ecological unit consisting of a host with billions of symbiotic

microbial lifeforms and calls for 'micro-biome inspired green infrastructure' (Robinson et al., 2018).

Play as integral to health and wellbeing

Play is a consistent line which seems to transect many areas of this map, and is a fundamental right of children (UN, 1990). In relation with children's health and wellbeing, it can be seen as more than just an enabler of physical activity and the health benefits which flow from the fact that children seem to move more outside; as Marguerite Hunter-Blair states, "play and child development are often seen as synonymous, particularly in the early years" (2020, p.34). I cover play more comprehensively in section 5.5, but here I want to show that there is research and policy support for the value that outdoor places have in supporting children's wellbeing and development through play. In dominant ways of figuring child-play-environment relations, places are venues or contexts for play, environments which offer a range of affordances through which children can engage in the world. Outdoor environments are valued for offering a greater diversity of affordances and ways in which children can engage with them, but research has shown that ways of being in environments come to exist through both physical and social affordances (Bjørgen, 2016; Coelho, Fernandes & Santos, 2017). Just as we cannot expect outdoor places to contribute to educational processes without social context, play in natural places does not happen in a vacuum.

I explore how affordances are activated by social contexts in Section 3.8.4, but the ecological psychology of Edward Reed gives this section of the map additional form, an under-acknowledged molar line. One of Reed's core arguments is that "caregivers in all cultures promote the acquisition of competence in everyday skills" which is done "by organising the places of the environment and the daily routines of children in ways that promote a gradual process of comprehension and accomplishment" (1997, p. 140). This applies across all childhood contexts (e.g. around the home, where children develop understanding of how things, patterns of behaviour and people come together to make places), and must thus have implications for child-nature interactions and place-making. One way that this is done is through interaction frames which communicate how young children can act in certain environments, determining which affordances are available to them. Reed uses the terms *fields of free action* for when children have (relatively) autonomous agency to investigate the affordances of an environment. *Fields of promoted action* can only exist in the presence of an interaction frame, "social structures or patternings" (1997, p. 129) which activate affordances in the environment and show children how to respond. The field of promoted action consists of the affordances which are highlighted or scaffolded by other people, and excludes those which are "forbidden to the child by other people" (Reed, 1997, p.130). Attending to ecological approaches in psychology reminds us that we live in a unique time and way which humans have not necessarily evolved for, but which our developmental processes still try to work with. Putting aside the notion of

care for nature and focussing for now on the value of nature for child-health, it is clear that adults have a role to play in creating settings for both free and promoted action which activates the affordances for health and wellbeing of natural environments I have just identified. Play is an effective way to do this including gross motor development, physical activity, attention restoration and the nurturing of healthy microbiomes, but could certainly be leveraged to do more and supported by shifts in how children's worlds are structured.

In Scotland, play in natural places is promoted through place-making policy, such as Good Places Better Health, which advocates for outdoor play and recommends that neighbourhoods should "support and encourage children's access to the natural world in their everyday lives" (Scottish Government, 2011, p. 17). The insights from ecological psychology in terms of behaviour settings and interaction frames make it clear that this is not possible solely through physical infrastructure, but also needs consistent social context and attention to enable children to engage with these environments to their fullest capacity, across home and formal education and care contexts. Policy commitments and foundations for this already exist, as I have pointed to in, for example RtA and the NPF. Another articulation of intention, even if not yet fully realised is *Scotland's National Outdoor Play and Learning Position Statement* (Inspiring Scotland, 2020), in which adult capacity to positively influence how and where children play outdoors is foregrounded.

Implications for early childhood education

As I have shown, schools and ELC settings are important places in children's lives, where they spend significant amounts of their time, and which have an obligation to support children's wellbeing and their rights to health and play. As with wider nature-health interstices, the existing evidence is somewhat limited by the diversity of environmental factors, but some studies support the argument that well-designed 'greener' (including more natural elements) school playgrounds can have positive effects on attentional restoration, social wellbeing and physical activity (Mårtensson et al., 2014; Raney et al., 2019), especially for girls and younger children (Van Dijk-Wesselius et al., 2018). Sando & Sansetter (2020) published a noteworthy mixed methods study which investigated wellbeing and physical activity in outdoor spaces at early years settings, providing more detail on Sando's (2019) findings that wellbeing and play and physical activity and play are related, and the physical environment has a marked effect on physical activity. My reading of their work is that while places have significant influence on physical activity and wellbeing, they consist of so many social, cultural and material factors that it is hard to draw conclusions about how these effects manifest. Besides showing the constraints of the type of in-depth observation necessary to draw any conclusions about children's wellbeing in context, their honesty shows that ECE settings need to attend to how other children and adults, places and objects all come together to support physically active play, not just encourage children to go outside or increase biodiversity in playgrounds. Scottish ECE play policy, such as *Out to Play* (Scottish Government, 2020b) is one example of this being articulated, but, again, is specifically developed for pre-school ELC settings, where the day is

structured, resourced and staffed differently from most primary one and two classrooms. There is limited research and policy-practice literature on how outdoor play can be supported specifically in schools and on its effects across health and wellbeing.

3.8.4 Disorienting Nature's child, biophilia and the extinction of experience.

Introduction

Dominant contemporary European and colonial understandings of nature and childhood tend to keep the two concepts separate, but maintain symbolic and discursive links between them. Besides instrumental importance such as in relation to health or development of care for the environment, these discursive links create the perception that nature has *intrinsic* value and importance to childhoods, both through direct and indirect experiences, and the idea that children may have unique ways of relating to the natural world. The primacy of learning through experience is central to outdoor learning, but in ECE, this has tended to be tied to Romantic figurations of nature and childhood and more recently by interest in how preferences for certain forms of environment emerge through genetic, evolutionary processes as well as social ones.

As humans change Earth and how we live on it faster than ever before, there is justifiable concern for how children's experiences of nature are changing, especially in urban areas, which has been referred to as an 'extinction of experience'. ECE responses to this which are still informed by Romantic or utilitarian views of ecosystems can establish ways of relating to the living world which are respectful and developed through direct experiences of nature, but some folk argue that the simplification of this into practice and pedagogy holds limited space for children to develop understandings of humans *as* nature, or the type of ecological thinking which is required by the realities of Anthropocene. Going beyond this is likely to require adults to play active roles nurturing children's perception of natural environments

Historic links between childhood and nature and what that means for this study

Across societies, childhood has always been seen as more than a period of biological immaturity, playing a central role in cultural maintenance and the preservation of specific social orders, but has taken various forms, meanings and roles through history and in different contexts. We know more about the lives of privileged children (across all cultures) in history than others (Marten, 2018), and many accounts of childhood, such as those represented through religion or developmental psychology have marginalised some elements of childhood and universalised others.

This is particularly true through the late medieval and modern periods (Fass, 2013). Children and nature "have been explicitly associated… since the origins of Western thought" (Myers, 2012, p. 113), but because of the timing in relation to huge social and cultural changes and processes of colonisation, certain European takes on childhood and nature have exerted, and continue to exert significant influence on contemporary societies. The progression of these ideas that is important to map here goes from the Enlightenment and Romanticism on to developmental and evolutionary psychology.

Affrica Taylor (2014) argues that the figuration of Nature's Child in Romantic thought, and particularly in Jean Jacques Rousseau's *Emile* has had lasting and significant effects on the value that nature is perceived to have in child development and education, in spite of broader shifts in how we understand human nature relations. Alongside Taylor's writing, which I acknowledge here as important in my emergent understanding of this field, there are many thousands of more informed and considered words on Rousseau's work and that of other philosophies of nature that stem from the enlightenment (Conroy, 1998). The main thing that I want to put on the map here is the foundational Romantic position that Nature (and here it *is* singular, homogenised and capitalised, what Bruno Latour would call "mononature" [2004]) was inherently good, while society was steadily exerting a corrupting force on the world, feeding the growing dichotomy between nature/culture which emerged in 18th Century thought.

Rousseau's take on this extended to a belief that children came into the world pure and unsullied, 'Natural', but were corrupted by (adult) society; thus he argued that an education grounded in the freedom of Nature was an important part of developing the ideal citizen and the ideal state (Doyle & Smith, 2013). This is most fully expressed in his fictional philosophical work *Emile: Or Treatise on Education*, which, despite Rousseau's (self-confessed) lack of experience in parenting or success as an educator, has shaped child-raising and education in the Global North (Koops, 2012) and continues to be implicitly influential, particularly in the fields of experiential and informal education and ECE (Doyle & Smith, 2013). According to Koops (2012), Rousseau's key claims were that there were distinct age-related stages of development and that pedagogy and educational approach should respond to the individual child in this context; that "children must only be offered knowledge when they display a need for it" (p.50); and that direct experience, led by the child should be the primary source of new knowledge. Darling, writing back in 1994, identified three key elements of Emile's education which maintained prevalence in the UK: the importance of play; developmentally appropriate experiences; and indirect, non-didactic teaching methods. I would argue that these elements are still implicitly and explicitly articulated in early years settings and policy (Realising the Ambition, 2020), and the thread of Rousseau's influence can be mapped through Pestalozzi, Froebel, Dewey and Piaget into current practice.

As a reminder of just how far out Rousseau's views on child development were,

he argued that formal education and human socialisation beyond an individual nurse and then tutor should be avoided entirely until the age of 12, in order for the child to "learn by his sensory and physical experiences of the external natural world to be practical, moral and self-sufficient" (Taylor, 2014, p.8). He admits himself that in the literary project of Emile, "the author, who ranges at will among theoretical systems, utters many fine precepts impossible to practise, and even when he says what is practicable it remains undone for want of details and examples as to its application" (Rousseau, 1763). Despite this, Koops (2012) argues that Rousseau's influence on Enlightenment philosophers, including Kant and Goethe means that *Emile* has undoubtedly shaped contemporary education. While it should have been considered as "a revolutionary Enlightenment text, not a pedagogical handbook" (Koops, 2012, p. 50), the influence that it had on the German Swiss and Dutch pioneers of what would become primary education should not be underestimated.

Taylor (2015), considering Rousseau's work in this context, identifies two enduring 'figures' that can be attributed to him, which have shaped multiple discourses. These are 'Nature's Child' and 'Nature as Teacher'. Nature's Child is innocent, vulnerable and Other(ed) in relation to adult 'civilised' society; not just utopian, but presented in "radical alterity" to Rousseau's dystopian view of French society in the 18th Century. His lack of desire to educate young children into the human society he saw around him makes space for Nature to take on the primary role of teacher, and for the educator to take on the role of advocate for Nature (Fuchs, 2003). While its starting point was essentially a thought experiment, this positioning was integrated into pedagogical approaches in a variety of ways in Europe, alongside and counter to the rise of scientific naturalism. Perhaps most influentially in terms of early childhood, Friedrich Froebel developed Rousseau and Pestalozzi's ideas of a natural education with his understandings of natural sciences, particularly in the design of garden spaces, which were "a systematic attempt to formalize…" the correspondences between nature and child development, "by applying nature's perfect laws of plant growth and crystal formation to support the young child's optimal growth and development" (Taylor, 2014, p. 40). The figure of Nature as Teacher had influence beyond just the outside space of the kindergarten though, particularly through Froebel's design of his 'gifts', tools which provided methodologies to realise the key principles of unity and growth through (largely geometric) processes which he saw as fundamentally natural (Brosterman, 2003). However, it is important to note that both the outdoor spaces of Froebelian kindergartens and the gifts were specifically designed and carefully planned to facilitate learning in and from (and in later figurations, *with)* nature (Tovey, 2013) in the shared company of thoughtful adults.

As I have highlighted previously, Froebel's legacy should not be underestimated, particularly in Scottish ECE (Bruce et al., 2019), but I would argue that this does not always manifest as a direct or veritable development or implementation of his ideas, especially when we consider the first year or two of mainstream schooling as distinct from ELC, and the role and availability of "knowledgeable adults" in Froebelian

pedagogy (Froebel & Lilley, 2010). This is why I think it necessary to interrogate the discursive figurations of Nature as having value through conflation with a universalised 'childhood' (separate from rational [fully human] adulthood and socio-cultural structures) and as an active (and neutral or benevolent) agent in children's development and education. When they influence ECE, or even children's early experiences of nature more broadly, these figurings risk creating a misplaced certainty that if children are outside - preferably playing - then valuable, important things will just happen 'naturally', what Sue Elliot and Tracy Young identify as a "nature by default paradigm" (2015).

Truscott (2018) identified a knowledge gap related to this in terms of nature play in an Australian context, highlighting that most research "has been evaluative, highlighting the benefits rather than critically examining pedagogy in the context of nature-based play" (p. 1523). Her study found that children's experiences of nature play at daycare centres "could not be uncoupled from the pedagogy of their educators" (p. 1533) pointing to a need to further explore and understand the processes at work during outdoor experiences in early childhood. There is an emergent literature base to inform research and practice on this in Scottish and international contexts (MacQuarrie, Nugent & Warden, 2015; Ärlemalm-Hagsér & Sandberg, 2017), some of which I will cover in more detail in following sections (Hodgins, 2019), but the significant majority of it relates to pre-school or ELC contexts in particular. Sarah MacQuarrie (2018) investigated how outdoor learning and teaching was integrated into everyday practice in primary schools, but without a specific focus on nature relations, and by using teachers accounts of their experiences, rather than direct observations. The ways in which we understand childhood development have changed since Rousseau, just as the ways that we understand nature have, but clearly some figurings of child-nature relations which do not align with these changes have persisted. This is why further research which investigates the processes of these relations while disrupting the implicit assumptions about nature's connections to childhood in contemporary society is required.

I have real trouble thinking with Rousseau and Romanticism, for two reasons. The first is the cultural heft that these ideas have held for so long, shaping how many people around the world think of and relate to nature. The second issue I can now pin down is that in the present, I relate to Rousseau's zealot-like frustration and dissatisfaction with dominant society, but don't know what to do with it. If I'm honest, I would love to advocate for radical rejection of what we have in terms of education and the way that a lot of us structure our lives, but I'm scared to because we're made to feel that the stakes are so high, and that the best path to change is through moderation and leverage within that system. Despite knowing, cognitively, that Rousseau didn't really need to live out his ideas, I still feel that I should be trying harder!

Why how we think about development and childhood is important.

I have already highlighted how socio-cultural models of development and learning can contrast with transmissive, 'assembly-line' models of learning (Rogoff, Mejía-Arauz & Correa-Chávez, 2015), and I will touch on posthuman models of development and how they affect how we figure childhood in a moment. First though, I want to point to a characteristic of that Romantic line connecting Nature and Childhood which has (relatively) recently been disrupted: that notion of alterity between children and adults (and in this context, their relationships with nature). While Rousseau's child was 'free' and agential in some ways, they were also kept separate from, manipulated by, and thus disempowered in adult society (until the ideal state in which they were to be citizens emerged). The othering of childhood was characteristic of other European philosophies of the Enlightenment and their descendants, albeit for opposing reasons, and emphasised childhood as a process of development *into* or *towards* adulthood and full citizenship: children were positioned less as active agents and variously as empty vessels, passive material to be shaped into desired adult form, or on a universally linear development pathway based on Eurocentric and patriarchal ideals of childhood.

Various paradigmatic shifts in the late 20th Century challenged the long lasting legacy of Enlightenment thinking and shifted the ways that childhood was considered by psychologists and sociologists. These included the emergence of interactionist and structural sociology, feminist analyses of children as an oppressed minority and the acknowledgement of the temporal and cultural specificities of childhoods (Prout, 2011). This 'new sociology of childhood' (Matthews, 2007) was intended to be interdisciplinary and provide tools within modernist sociology for the apparently contradictory projects of considering children as active subjects and childhoods as distinct social structure, but arrived somewhat late, "at the very time that sociological assumptions about modernity were being eroded" (Prout, 2011, p.6). Despite this, the new sociology of childhood pushed researchers to consider childhoods and children in context, especially in light of the UNCRC (1989) and increasing recognition of transnationality, mobility and socio-cultural specificity. This enhanced the value of understanding children's everyday lives and attention to their participation as active agents in the socio-cultural processes of development (Rogoff, 2003).

Biophilia hypothesis as 'natural'

Another line on this pathway to implicitly valuing more 'natural' ways of humans being in the world takes in evolutionary psychology and the biophilia hypothesis. These are often used implicitly or explicitly by environmental educators to rationalise the belief in a special relationship between childhood and nature and to connect childhood experiences in nature with the health and wellbeing and connection to nature values which I explore in the next sections. These articulations *make sense*, but some scholars have recently argued that findings are easily stretched beyond

environmental preferences and that they may not be the most useful stories for understanding contemporary human-nature relations in the Anthropocene or nurturing earthly flourishing.

The biophilia line can be seen as a precursor to much of the literature covered on this map, and looks to sketch out an evolutionary affiliation of humans to other living beings. Erich Fromm coined the term to refer to the love of all life, but it is the articulation by E.O. Wilson (1984) which was developed by psychologists Stephen Kellert (Kellert & Wilson, 1993; Kellert, 2012) and Peter Kahn (1997) which gained traction and has been applied to various fields including conservation (Simaika & Samways, 2010), health (Grinde & Patil, 2009), architecture and design (Beatley, 2016; Söderlund, 2019). Biophilia in these terms is defined as an "inherent inclination to affiliate with the natural world instrumental to people's physical and mental health, productivity, and well-being" (Kellert, 2012, p. 7). The initial hypothesis developed from the premise that for most of our phylogenetic history, humans have evolved in specific environmental conditions which pre-disposed us to affiliate with certain elements of nature in ways which were evolutionarily beneficial and were retained through adaptation and genetic selection. This argument suggests that humans will prefer environments which meet our basic needs such as food, water and shelter, a position which has largely been supported by research (Clayton & Myers, 2013). There is less clarity from experimental studies as to whether people prefer specific types of environment which meet these needs, but key features seem to be availability of resources, and enough openness to observe predators and navigate easily, but with a degree of complexity to allow for exploration and shelter.

This has largely been studied through the use of photographs and other images, focussing on the perception of an environment's affordances primarily through visual sensing. This creates a conceptual link to the ecological psychology of James and Eleanor Gibson, but potentially excludes the influence of other embodied senses and limits researchers' capacity to consider how processes on different timescales (i.e. cultural-historical, ontogenetic and microgenetic) affect the person-environment relationship (Heft, 2012, p. 15). This is particularly relevant in light of how understandings of cognitive processes have changed over the nearly forty years since the genesis of this line (e.g. Chemero, 2009; Carter et al., 2018) and what one considers the basic units of perception and psychological analysis (Heft, 2012); to what extent can we make claims about the individual/environment relation when research tools depend purely on representation (an image) of an environment?

When the biophilia hypothesis is taken seriously and coupled with the acknowledgement that many people are not living in environments which meet these ancestral needs, it makes sense that it has been positioned as having particular relevance to conservation, because, if "we are presumed to be genetically predisposed to emotionally affiliate with living kinds and processes, it is in our own interest to preserve them" (Joye & De Block, 2012, p. 190). However, biophilia has been subject

to criticism from multiple angles, which I believe limits its usefulness when considering child-nature relations. There are fundamental criticisms that the field of related research is often contradictory and depends too much on sociobiological footings (i.e. the ways in which genetic characteristics and evolutionary drives contribute to social behaviour) which do not stand up to interrogation (Fischer, 1994). As I have already stated, most of the research supporting the hypothesis has been done under quasi-experimental conditions where respondents rated preference for photographs of specific biomes (Kaplan & Kaplan, 1989) , and while there seems to be cross-cultural generalisability to findings (Kahn & Kellert, 2002), a significant number of the studies have non-representative samples drawn from college students (often psychology students) in the USA, which creates a risk of sampling bias.

Joye & De Block (2012) highlight the philosophical risks of approaching the topic purely from a sociobiological perspective, and argue that biophilia "needs to be investigated in ways that take experience, learning and culture seriously" (p.28), particularly in light of the emphasis that folk like Kellert (1996; 2012) place on affective and symbolic components of biophilia. Joye & De Block, following Kahn (1997), propose that structural-development theory is an appropriate psychological framework for exploring moral reasoning towards nature which also makes space for aversion and dominion, as it provides a hierarchical and progressive structure for biophilic development and evaluation. However, for reasons that I hope will become clear through the remainder of this mapping exercise, I wanted to adopt a framework which drew from transactional and socio-material metatheories in order to consider processes of perceiving which included embodied cognition and non-human actors.

Through the course of my reading about human perception, human-nature relations and the Anthropocene, I became more certain that, while important, the biophilia line was not a productive pathway for me to follow, primarily because of the narrow specificity that an evolutionary psychology approach to human-nature relations implies. I did not feel that I could apply it with conviction to the complexity of children and teacher's direct experiences of outdoor environments. I also knew from the outset that pinning down what constituted 'natural' or 'living' in relation to how young children perceived and related to those environments would not be simple, and wanted an approach which allowed me to incorporate synthetic 'things' without adult assumptions about how children would relate to them.

This encouraged me to look for ways to think about child-nature relations, learning and development as emergent processes or assemblages which come into being across different units of time and space - whether task, place or life course. One overlap between these points is the concept of 'experience', which has different meanings on this map. Experience is closely linked to perception (Reed, 1996). In some of the literature on childhood connection to nature, certain forms of 'experience' in nature (as event or activity) are understood to be particularly important for elements of development, and are presented as limited in comparison to previous generations.

However, in ways of thinking informed by Dewey and Vygotsky, experience is not an event, but a "*category* of thinking, a *minimal unit of analysis* that includes people… their material and social environment, their transactional relations… and affect" (Roth & Jornet, 2014, p.2, italics in original). In the next section I map out some different ways that experience can be applied children's relations with nature.

Experience

We are following a slightly confusing topographical feature here: There are clearly articulated molar lines connecting discourses of childhood and nature but they seem to contradict or conflict with contemporary understandings of child development, accounts of many children's lived experience and their pathways through education and into citizenship. In trying to make sense of this early in my explorations of extant knowledge on the 'value' of nature, I, like others, tried to approach it by following children's 'experiences' of, with or in nature. When looking for the term 'experience' on our map, we can see it in many places: ; the 'extinction of experience' in childhood; the perceived importance of 'significant life experiences' of committed conservationists (Chawla, 1998; Wells & Leckies, 2006); 'experiential learning' as a defining characteristic of outdoor learning and play in Scotland (Beames et al., 2012); and the importance of a well articulated theory of experience in relation to children's perceptions of environments and how this influences development. By adding more detail to these features, I will show how they led me to figure experience as emergent through intra-action between actors, a position which need not devalue other articulations of the concept, but allows for critical engagement with the dynamic socio-material environments in which it occurs.

Extinction of experience - but what type of experience?

While it seems backwards to start with the loss of something which has not necessarily been pinned down, I am going to begin with 'extinction of experience', because it is a prominent molar line. In relation to childhood-nature relations, it is figured as the loss of a *specific form of experience* which has value in relation to the multiple outcomes which I consider in these sections. It is connected to urbanisation, (re)presentations of nature (as secondary or vicarious experience) and how our ways of 'knowing' nature across generations are perhaps struggling to keep up with the pace of environmental change, which has implications for sustainability thinking.

The term comes from lepidopterist Robert Pyle's memoir *The Thunder Tree* (1993), which details how his connection to urban 'wildland' along a canal in childhood was formative in his interest in ecology and conservation. The urban context for Pyle's experiences is important to remember, as Rousseau's legacy means that the idealised figure of child-in-nature is often imagined in rural or pristine nature, or at least in environments which do not belong to adult 'real-life'. Urbanisation and the concern that children were not having regular *direct* experience of nature have been central to

the extinction of experience discourse since its inception (Nabhan & St Aintoine, 1993; Wilson 1984; 1993). Miller (2003), whose attempt to synthesise diverse literature on the topic has been influential in the deficit framing of the issue, argues that urbanisation reduces biodiversity which, coupled with the limitations on children's mobility and agency, limits the opportunity for and diversity of child-nature relations. The reality of these shifts seem hard to deny: in Scotland, for example, the most recent figures available suggest that 71% of the population live in large urban and other urban areas (National Records of Scotland, 2021). Miller argues that exposure to low levels of biodiversity in urban environments may also contribute to 'shifting baseline syndromes' (SBS), "a gradual change in the accepted norms for the condition of the natural environment due to a lack of experience, memory and/or knowledge of its past condition" (Soga & Gaston, 2018, p. 222).

It is important to approach this with a degree of scepticism, as most of the empirical evidence of SBS comes from fisheries science. Risks associated with it include an "increased tolerance for progressive environmental degradation, changes in people's expectations as to what is a desirable (worth protecting) state of the natural environment, and the establishment and use of inappropriate baselines for nature conservation, restoration and management" (Soga & Gaston, 2018, p. 222). However, as I detailed in the planetary context section, surveys suggest that there has been a 24% decline in average species abundance in Scotland over the last ten years (State of Nature, 2019), which demonstrates potential differences in perceived 'normalcy' of biodiversity across age groups. The example of this which sticks with me, even in my rural living context, is the steep decline in numbers of Lapwing (Breeding Birds Survey, 2021) since I was my son's age. I used to see them regularly, hearing the 'pee-wit' call throughout the summer, but we hardly see them at all now, and I stop and get excited when we do. *I* notice the decline, but to him, they are, and always have been a rarity; will he notice if he never sees them when he is 35? In 2003, Miller argued that landscape ecologists, conservation biologists and planners should work together to create biodiverse (and biophilic) urban habitats, but in their 2016 review of global evidence, Masashi Soga and Kevin Gaston make it clear that in addition to loss of *opportunity* to directly experience biodiverse nature, there is also a loss of positive *orientation* towards nature.

Opportunity

In the context of childhood, there is limited quality evidence of how much or little contact Scottish children have with nature in unstructured contexts, and what factors affect 'opportunity', but some studies suggest that changes in children's geographies and how their free-time is structured may be important. An influential report commissioned by Natural England (England Marketing, 2009) is often quoted as showing that "that less than 10% of children today play in natural places such as woodlands, countryside and heaths, when compared with 40% of children 30–40 years ago" (RSPB, 2010), but these findings were based on self-reported responses to an

online survey of 1150 adults and 502 children. Dependence on retrospective or archival accounts (Clements, 2004; Karsten, 2005), or parent responses regarding their children's activity (Skar et al., 2016) is common in studies of children's time outdoors, capturing (but also at risk of bias from) the nostalgic comparison of childhood across generations (Waller et al., 2010) which gives form to many of the concerns about contemporary childhoods.

Factors which have been identified as barriers to children in terms of opportunity (particularly during 'free-time') are access to nature; risk and safety; adult's supervision and time use; and pressure in leisure time (Skar et al., 2015, p. 249). In a study of Norwegian parents' perceptions of these barriers, Skar et al. found that the primary barrier was that children (aged 6-12) had less free time available outwith organised sports, leisure activities and homework. Quantitative research conducted in Japan has shown that in urban environments, the frequency of children's visits to local natural places and nature connectedness was positively affected by family members' positive attitudes towards nature and nature connectedness (Soga et al., 2018), supporting the theorised synergies between social context, opportunity and connection.

One of the most visible molar articulations of this line is the 'nature-deficit disorder' (NDD) discourse articulated by Richard Louv (2005) which increasingly informs (implicitly or explicitly, with or without inverted commas) how child-nature relations are figured in the public consciousness. Louv makes clear that NDD is intended as a metaphor, not a medical diagnosis, and his beliefs clearly resonate with how many people feel about the ways children get to experience nature, the broader world around them and the social and psychological factors that affect this. While Louv's work gets regularly cited as background support in peer-reviewed research, Elizabeth Dickinson (2013) identified three ways that Louv and some environmental educators in the USA characterise human-nature relations which have potentially negative implications for children's relationships with nature: fall-recovery narratives; the dominance of science framings; and the importance of naming. Fall-recovery narratives are discursive representations of the issues surrounding some of the 'opportunity' factors, which Dickinson presents as twofold. In addition to dominant Western (re)presentations in terms of 'quality' of wild nature, with a need to return to an idealised original state (Cronon, 1996), there is a *generational* fall-recovery narrative which she captures as "When I was young…" For Dickinson, this trope shows how adults can idealise their own childhood experiences, perpetuating cultural assumptions about nature experiences that are not inherently damaging, but may be inadvertently exclusionary or set up negative human-nature relations. Novotný et al (2020) call both "when-I-was-young syndrome" and SBS "potential traps" (p.4) which may cause researchers to bypass generative lines of inquiry, arguing that while children's experiences of nature are constituted differently, they are not necessarily 'less' than those of children 120 years ago. In fact, when replicating a survey of nature experiences from 1900 with 12-14 year-olds in 2015, they found a

rise in experiences with nature, albeit sometimes mediated through vicarious experiences (i.e. television) and structured differently (with direct experiences not through engagement with agricultural or 'use', but through recreation). These findings, while open to methodological critique, serve to disrupt the proposed simplicity of the extinction of experience discourse, especially when both opportunity and orientation are quantified.

David Orr's statement in 1990 that "[m]ore of the same kind of education will only compound our problems" (2011, p. 238) is widely quoted in sustainability and environmental education as a reminder to consider the epistemological foundations which have facilitated the exploitation of planetary resources beyond sustainable levels. To apply this bluntly to the 'extinction of experience' while taking a holistic view of education and development as emergent in socio-ecological contexts, it becomes hard to argue that the childhood experiences of white, relatively privileged baby boomers should be adopted uncritically as the starting point for nurturing healthy child-nature relations for the future (Common Worlds Research Collective, 2020). It also becomes evident that opportunity alone is insufficient to shape these experiences into anything potentially transformative. The molar response to this can be identified in the research concerned with people's connection to nature within the dominant paradigm which I outlined above: humans are distinct from the rest of the natural world, but are able to feel more or less connected to it which seems to correlate with some influences, and other outcomes, behaviours and attitudes. In response, we should design interventions which increase human's feelings of connection to nature, although Soga and Gaston (2016) are clear that increasing opportunity alone is insufficient. In contrast, a minor line in the research literature, and particularly in childhood-nature practice, argues that only a fundamental refiguring of human-nature relations which positions humans as part of and implicated in an interdependent world will have any impact - this is different from a *re*connection to previous ways of knowing nature, implying the need for new forms of relation, opportunity and orientation.

Orientation

Orientation is the term which Soga and Gaston (2016) use for the body of research which seeks to investigate how people's emotional affinity or connection with nature affects the form, meanings and implications of their interactions with nature. They argue that if orientation shifts away from nature, there are likely to be further impacts on orientation and opportunity, for example through reduced rate of visiting natural environments; the impacts of reduced orientation on other people, particularly children; and on broader collective evaluations of nature and how they manifest in political systems. I have covered most of the literature on CTN and children's CTN that I want to in section 3.8.2.

Soga and Gaston's molecular presentation is useful in that it shows how children's

potentially reduced experiences of nature are mediated by social and physical environments across both spheres of opportunity and orientation. Orientation is clearly connected to community and the socio-cultural contexts that relate with opportunity. There are two specific fields in environmental psychology I want to consider which explore this in ways which relate to children's experiences of nature: research into significant life experiences (SLEs) and the primacy of direct experience of environments in ecological psychology. I will briefly introduce both before considering more fully how they may relate to earthly flourishing in the next section.

Significant Life Experiences

Significant Life Experiences (SLE) are "important phenomenological events considered critical in determining or influencing concerns, beliefs, and actions in later life" (Barratt-Hacking et al., 2018, p. 3). In human-nature relations research, these have largely been investigated in relation to memories and life choices or actions later in life which are seen to represent adult commitment to or closeness with nature (such as career choice or environmental activism), or correlational studies which use tools purporting to measure environmental sensitivity or pro-environmental behaviours. As approaches to researching SLE have developed and been challenged, the literature has been comprehensively reviewed at various points by Chawla (1998), Sward & Marcinkowski (2001), Wells & Lekies (2012), Chawla & Derr (2012) and D'Amore & Chawla (2018). The more recent syntheses of the associated literature support the key points that time and a "continuity of experiences" (Payne, 1999) in natural places are important, and earlier assumptions that socio-cultural context and important adults are central to the influence of SLEs over time in terms of identity development (Williams & Chawla, 2016). While there is limited clear evidence of what this looks like as it emerges in early childhood, insights from later in life point to the need to understand and support children's experience in social-ecological contexts, a theoretical standpoint which has become fairly established in developmental psychology (Rogoff, 2003), environmental psychology (Chawla & Derr, 2012) and children's geographies. Research in this field suggests that to foster connection and care for natural places, adults do not need to take on a direct instructional role, but instead express interest, fascination (Chawla, 2007) and create social support for non-consumptive or damaging activities (Bixler et al., 2002).

Just to make it very clear, the molar line of articulation from environmental psychology here is that experiences in nature during childhood and adolescence affect how we perceive ourselves in relation to the rest of nature; how we perceive ourselves in relation to nature affects our values, and in turn, our environmental identity and attitudes; these constructs then guide some of our actions in the world. The value assigned to this in childhood and sustainability discourses is based on the hope that if more children have more of the types of experiences which have been identified as generative, then it is more likely that there will be consensus and commitment to the transformational changes which are necessary to protect biodiversity and shift

consumption patterns (WWF, 2020). Chawla's review suggests that the most important features of childhood experiences with nature which encourage connection are:

> "multisensory immersion in nature play and exploration; caretakers who provide a sense of security and promote interest, attention, empathy and respect for living things and the land; a sense of competence outdoors; a sense of oneness; opportunities to enjoy nature with family and friends; and refuge from stress"
>
> (2020, p. 629)

Towards a patchwork theory of experience, perception and development

Putting these features on the map has two implications for this study. First is the question of how to approach and understand how young children's experience with natural environment emerges. Second, are the implications for LfS, and how, or whether these types of experiences are characteristic of children's outdoor learning at school. There are obviously myriad ways of approaching or understanding human experience and perception, which I do not have the space nor skills to fully explore here, so I can only offer a quick sketch of some of the ideas I apply to this project.

If *significant* experiences are important, what constitutes experience? For centuries, Western philosophy privileged understandings of experience which held the world somewhat at a distance, assuming a causal process where sensations from the external enviroment led to subjective interpretation in the mind. This applies to both modernist and postmodernist philosophies, with differing results (Reed, 1996). This molar line had significant impacts on the field of psychology, where dominant models of neural function and cognitions were long figured as mechanistic, with the nervous system receiving stimuli from the external environment and producing responses. In contrast, a range of approaches to psychology which can be characterised as 'ecological' emerged based upon a common premise that psychological processes emerged through relation with the individual's environment rather than from the internal processing of external stimuli. Heft (2012) argues that there are significant differences across the range of research which gets characterised as ecological psychology. This spans bio-ecological models of development (Bronfenbrenner (1996), eco-behavioural social psychology (e.g. Barker, 1968) and studies of visual perception (Gibson, 1996) or perceptual leaning and development (Gibson & Pick, 2000). However, this all belongs to what Heft calls the transactional metatheory, which positions individuals as participants in a dynamic system, where the boundaries between person and environment are fluid dependent on the action the person is engaged in. This metatheory "focusses on *processes* and it adopts a *relational* view (ontology) of system properties" (Heft, 212, p.17), which obviously makes it an appropriate choice for exploring how human-environment relations constitute experience, and a potential fit

with both feminist materialist theory and sociocultural models of development.

The perception of affordances as insight into experience

James and Eleanor Gibson's laboratory-based research on ecological models of visual perception used observations of infants and caregivers to develop an understanding of how humans perceive their environments through action, without the need for empiricist or rational assumptions about knowledge and representation. Gibsonian ecological psychology's smallest unit of inquiry is an "animal in its environment, considered as an interactive system" (Gibson & Pick, 2000, p. 14) which is constituted of reciprocal relations aimed at niche construction at a species level and an individual level. In Vygotskian terms, the different time frames across which these relations and processes emerge are phylogenetic (species history), cultural-historical (socio-cultural history), ontogenetic (the life history of the individual) and micro-genetic (the duration of a task at hand) (Heft, 2012, p.16). Most of James Gibson's research was specifically related to visual perception of environments, but the three distinguishing concepts of *affordance*, *information* and *information pickup* can and have been applied to different contexts.

In particular, Gibson's ideas have found significant application in early childhood research and practice (e.g. Bjørgen, 2016; Kyttä, 2002; Norðdahl & Jóhannesson, 2016, Sando & Sandseter, 2020), where the intuitive concept of affordances has been effectively applied to understand children's process of perceiving what actions are available to them in a given environment, especially in relation to physical activity and outdoor environments. Gibson's early descriptions defined affordances as properties of the environment in relation to an animal (Gibson, 1979), but more recent iterations of the concept argue that affordances are neither properties of the environment nor the animal, but relations or 'fit' between the perceiver (and their capabilities) and the environment (Chemero, 2003; Gibson & Pick, 2000) which create action possibilities. As understanding of human cognition has developed with new technology to span embodied, embedded, enactive and extended processes (Newen, et al., 2018; Shapiro, 2019), considering affordances purely in terms of physical, motor action and visual perception is considered to limit the richness of the concept (Rietveld & Kiverstein, 2014). At the outset of my research, I spent a long time coming to terms with just how complex the superficially simple phenomena of a child existing and *being* in any space, let alone an outdoor natural space, is. Since then, I have been fascinated and totally overwhelmed by contemporary cognitive science and the implications of what we increasingly know about how humans make sense of their environment *with* our bodies, tools and socio-cultural contexts and *through* our being in the world. But again, I know my limitations, and I am no cognitive scientist.

Because of how the concept of affordance has been applied in early childhood research and practice in terms of environments, it made sense for me to work with it, but in some areas I identified limitations in terms of how the socio-cultural

components of environments were neglected alongside the specificities of place, time and other species. There have been efforts to develop approaches which consider how affordances emerge through language and how this might affect caring and values (Hodges, 2014; 2015). There is also research on affordances as part of situated cognition which have clear sociocultural and semiotic elements (e.g. Lave & Wenger, 1991; Barab & Roth, 2006), but there is limited empirical work on children's outdoor learning relations which critically considers affordance networks in context. Because I did not want to limit my research to the ways in which children interacted with or experienced a physical environment, but rather consider how socio-material and discursive actors all come together in outdoor learning, I chose not to prioritise the concept of affordances in my methodology. However, it is important to map here as it is used in related literature, will emerge in the diffractive analysis later in the thesis and relates to processes of perceiving and experiencing.

Experiencing together

> "Perception is active, not passive; it is an effortful search for meanings and values"
>
> Reed, 2001, p. 118

Gibsonian affordance theory and the model of perception underpins it are central to a broader ecological psychology of experience which *is* relevant to this thesis, its focus on experiential forms of education and the extinction of experience discourse. Edward Reed was a passionate advocate for the importance of direct experience in human lives and development (1996; 1997), and his development of Gibson's ecological psychology makes space for the social influence of other people and semiotic meaning in perception which has been taken up by several ECE scholars (Chawla & Derr, 2012). I want to highlight some of Reed's key ideas here, for the ways they may entangle with the work of Gert Biesta, Tim Ingold, Barbara Rogoff and the direct experience line, and make sense in relation with posthumanist and Common Worlds approaches.

Joint attention

A core characteristic of ecological psychologies and enactive cognitive science which I see as compatible with critical posthumanist theory is that cognition emerges through the relationship between agents and their environments, rather than "entirely within the head of the agent in question" (McGann et al., 2020, p.2). This has significant implications for some concepts in dominant models of psychology, as the process of perceiving outlined above suggests. Joint attention is one such concept which is relevant to this study, as it interlinks with the SLE line and socio-cultural

models of child development. While there is no coherent cross-disciplinary definition of joint attention (Seeman, 2012), it is considered an important process in development from infancy, when babies follow their care-givers' gaze to develop reference and communication. At different stages in development and in different activity contexts, it can become more complex. In ecological approaches, joint or shared attention can shape experience by altering "the field of affordances by directing the agent to engage with specific affordances, marking them out as relevant, and making them more salient" (Ramstead et al., 2016, p. 1090). As such, Ramstead et al argue that patterns and "regimes of shared attention… mediate the acquisition of cultural affordances" (p. 1091). This figuring of attentionality is relevant to this study, as it provides one way of understanding how significant adults can affect the perception of value and meaning in a given environment. As Reed (2001, p. 199) states, '[o]bservers do not *make* meanings when perceiving their world, they *detect* meanings that emerge from their encounters with the world and with others." In relation to natural environments, for example, this is related to how we begin to identify and name things or beings, how environments emerge through shared activity and experience.

Fields of action

Related to joint attention are Reed's concepts of the *field of promoted action* (FPA) and the *field of free action* (FFA) (reworked from Valsiner (1987)) and Marietta Kyttä's (2004) additional *field of constrained action* (FCA). The FPA refers to "the aspects of an environment to which an individual attends because of consistent encouragement from others" (Reed, 1993, p.55); the FFA "encompasses those affordances and activities that the individual is both capable of accomplishing on his or her own, and is allowed by social circumstances to do so" (Reed, 1993, p. 70; the FCA consists of potential affordances which individuals are restricted or discouraged from actualising. In the context of young children's experiences of/with/in nature these can be exemplified in relation to how the actions of adults (oral other agents) affect the range of affordances available to them. Free action involves children investigating an environment relatively independently with little adult guidance, but with their existing and continually developing capacities, socio-cultural knowledge and interests guiding their actions. Promoted action might involve adults or other individuals drawing attention to specific feature of the environment, or may be broader. For example, adults who actively encourage outdoor play or choose to take children to spend time in natural places regularly are demonstrating the value that they place on such experiences, as well as developing skills or altering capacities which open up a different range of affordances. I regularly think about this in relation to clothing, which I will come back to in the diffraction sections. When my son was younger I regularly dressed him in waterproof clothing and boots, and actively explained that it was so he could get muddy or wet, but stay warm and comfortable. We always had a change of clothes, and it was no problem if he needed to change. This allowed him to engage with a different range of affordances in a given environment compared to if I had regularly dressed him in brand new clothes, which I regularly told him not to get muddy or 'ruin', or if he consistently had negative experiences of getting and staying wet. Neither is better or worse, but both promote

different action potential in the same environment, based on the actions valued by the (in this case adult) other in the situation.

Taken together, joint attention and the field of promoted action can be understood as contributing to socio-cultural, and apprenticeship models of learning, such as the practice and guided participation theories Barbara Rogoff and her colleagues … most recently presented as *Learning by observing and pitching in (*LOPI). LOPI is a model of child development which aspires to examine specific cultural ecologies and children's everyday contributions to their families and communities, rather than universalising assumptions about children generally and consolidating dominant, minority understandings of child development. LOPI is characterised as contrasting with 'Assembly Line Instruction'. Because events are understood as emerging because of people's participation in them, this approach "dispenses with the assumption of a boundary between people and the events in which they engage, a boundary that divides the individual and the context/culture into separate entities" (Rogoff et al, 2018, p. 7). I find this focus on event, process and culture as complimentary to the foundations of ecological approaches informed by Gibsonian affordance theory - culture, as expressed through participation in shared community activity supports engagement with specific affordances and the deactivation of others.

All of these approaches obviously build on the formative ideas of John Dewey, and Lev Vygotsky. For both, experience was "a category for understanding learning and development, that is, the minimum analytic unity that retains all the features of the whole" (Roth & Jornet, 2014, p. 2). In the context of the map that informs this study, the influence of Dewey's ideas on experiential education is one of the molecular lines which connect the areas of ecological models of perception, outdoor learning and schooling. In Dewey's terms, experience can be understood as both an unfolding process and experiences as discrete events, both of which are necessary for education (Dewey, 2005) but "the belief that all genuine education comes about through experience does not mean that all experiences are equally or genuinely educative" (Dewey, 1938/1997, p.25), with experience being mis-educative when it restricts the range or continuity of future experiences. For me, this is where the lines of educational purpose, direct experience in material, social and cultural environments, schooling and common activity might interconnect.

From this perspective, schools can and should be a context for educative experience. Reed states,

> "[s[chooling can be a valuable provider of nurturing experience, if it is organised correctly. This requires not only that individuals balance first- and secondhand experiences but that communities do so. Dewey's stress on the importance of community derived from his analysis of what nurtures educative experience. A community of experiencers and agents represents a

group of people who have joined together to do something."

Reed, 1996, p.128

Section Summary

Experience can be understood in a range of different ways, and research on the impacts that early childhood experiences have on later life choices suggest that opportunities for unstructured play and refuge in natural places, as well as with important adults who model value and respect for living beings and places are important. However, early childhood experience can be understood in different ways and some of the ideas which seem best suited to making sense of SLEs in nature come from the fields of ecological psychology and socio-cultural child development, both of which represent lines of flight in relation to dominant models of schooling in Scotland and beyond. While affordance theory and LOPI may provide useful means of understanding human-environment relations, they remain anthropocentric and lacking in clear axiological dimensions in ways which do not make for an easy fit with the specific focus of this study on the non-human environment, care and sustainability or earthly flourishing. In the following section, I very briefly map out the emergence of posthumanist and Common World figuring of child-nature relations.

3.9 Socio-ecological learning, common worlding and childhoodnature

There is an emergent minor line which connects the Anthropocene with understandings of early childhood and sustainability education while trying to resist romanticism and anthropocentrism or rely on development-based sustainability solutions. This line consists of a braiding of approaches which share common onto-epistemological and posthumanist roots: socio-ecological learning (Cutter-Mackenzie-Knowles et al., 2019); common worlds pedagogies (Taylor & Pacini-Ketchabaw, 2019; Common Worlds Research Collective, 2021) and the assemblage concept of childhoodnature, which is the focus of a significant research handbook (Cutter-Mackenzie-Knowles et al., 2018). I have covered a lot of the theoretical background common to this line in section 2, so here will limit myself to the implications for education contexts and care for the world. These approaches are becoming increasingly important and disruptive ways to make sense of the relations between children, teachers and material-discursive environments at school. The challenge comes with applying the pedagogies in practice.

De-territorialised socio-ecological learning

In their edited volume and in their own individual writing, Amy Cutter-Mackenzie-Knowles, Alexandra Lasczik, Judith Wilks, Marianne Logan, Angela Turner and Wendy Boyd (2020) have extended the idea of learning as a socio-ecological process (i.e. emerging in relation to multiple interconnected systems which are both social and material) to include a flattened ontology which involves a broader range of non-human agents in the learning process. Their three touchstones for doing this are the Anthropocene, posthumanism, common worlds and creative milieux, citing similar arguments as I have in precious sections of the cartography. This approach somewhat parallels the work of researchers like Blenkinsopp et al (2018), Jickling et al. (2018) and Jickling & Sterling (2017) to situate learning in 'big time' and real life places.

Common worlds research and pedagogies

This approach, developed initially by Affrica Taylor (2013), Veronica Pacini-Ketchabaw and Mindy Blaise has developed into a research collective and is beginning to inform pedagogies, particularly in early childhood (de Castro, 2020). Taking its ontological inspiration from Bruno Latour's concept of "common worlds" (2004, 2011, 2014) and Donna Haraway's (2003; 2004; 2008) "worlding", experience is figured as a process which (multispecies) agents bring the world into being through their relationality. The work of Hillevi Lenz Taguchi was influential in situating this in educational and pedagogical contexts, as she contends that

> learning does not simply take place inside the child but is the phenomena that are produced in the intra-activity taking place in-between the child, its body, its discursive inscriptions, the discursive conditions in the space of learning, the materials available, the time-space relations in a specific room of situated organisms, where people are only one such material organism among others.
>
> Lenz Taguchi, 2010, p.36

From these beginnings, the work of the Common Worlds Research Collective is now structured around three organising concepts: worlding, commoning pedagogies and inheriting (2023).

Childhoodnature

> Childhoodnature rejects the anthropocentric view of childhood and nature. It argues that children are nature and, as such, are interconnected with and part of the natural world. As children are nature, we can therefore assume that the social and cultural worlds of children are a subset of the natural world. Bringing together the natural and, within that, the sociocultural worlds of children enables us to understand more about the significant influences on

children's learning and development as natural beings.

Barrat Hacking et al., 2018, p. 1

As a concept, the core intention of this assemblage approach is to demonstrate the potential richness of thinking of childhoodnatures as emergent and co-constituting rather than as separate subjects interacting. This allows for the flattened onto-epistemological framework, which again means that researchers and practitioners must attend to the material and ecological environments in which childhooodnatures emerge. The comprehensive research handbook published in 2018 covers a broad range of topics, with some chapters focussing on practice, but as with all of these approaches, it is hard not to see this as top-down post-hoc analysis of happenings, rather than ideas which are guiding pedagogy yet.

Commonalities and opportunities

While there are nuanced differences between these approaches, there are core commonalities. These include the posthumanist orientation, a flattened ontology which requires any analysis to include material, human and non-human actors and a radical acceptance of the Anthropocene as outlined in section 3.4. Most importantly for this study, these emerging approaches to research and practice emphasise relationality at all levels as a crucial way of understanding the world. This makes them particularly well-suited to investigating whether caring relations are cultivated through school-based outdoor learning, as the ethical entanglements are of response-ability between human and non-human actors.

3.10 Chapter Summary

Through this cartography, I have tried to make a map of the knowledges I have moved through over the last few years and show some of the routes that I followed. It has been an iterative process, retracing some paths and putting off exploring others. Getting lost sometimes too. In some places, it informs the fieldwork which I will go on to tell you about, and in others it has been informed by my experiences during fieldwork and the time that I have had to think with them in relation to that broader landscape. Because I started with exploratory research objectives rather than questions designed after identifying a 'gap' in the research literature, my mapping was guided by those objectives which continue to run throughout the thesis.

From this position of looking back over the map, I can identify seven key features. They are relevant to fulfilling my research objectives in themselves, but I want to further explore how they relate to the realities of practice in schools through my empirical fieldwork. These seven features will play a part in the diffractive readings

of my fieldwork data:

- **Critical, anti-colonial figurations of the Anthropocene are valuable across disciplines.** This is because humans *are* nature and the lives of *some* humans are undeniably changing Earth's systems. Thinking with the Anthropocene also requires that we do not shy away from planetary emergencies and that we embrace ecological ways of thinking and being which do not revert to romantic figurations of nature. Acceptance of our societal, cultural and ecological relationships with the rest of nature makes it clear that radical transformations of human social systems are the most viable pathways to a flourishing planet.

- **Education can be considered a common good and an emergent, relational process which could serve as a significant part of responses to planetary crises, but dominant forms of education are not yet grounded in purposes which support this.** Re-figuring education as part of the radical transformation of broader social systems and in a way which accounts for our understanding of development as a socio-ecological process holds potential: there are commitments on paper to do this, but relatively limited progress has been made following similar pathways in recent years.

- **In Scotland, time with nature is valued in children's development** for its role in nurturing health and wellbeing and play, and there is a robust and developing evidence base from around the world to support this value, albeit with cultural blind-spots and biases. Time with nature (particularly during early childhood) is further valued because of perceived influences on how people relate with the world in later life and how this might affect how they act in the world. However, it is challenging to gain empirical insight into how these processes work, because of the complexity and diversity of what being in or with nature during childhood constitutes, and the historic romanticisation of child-nature relations. Because of this, one pathway on the map for further investigation of these processes involves working with contemporary understandings of child development as embedded in socio-cultural, material and ecological contexts, but this does not align easily with pragmatic policy and practice discourses. This is because it inherently draws attention to the ways in which wider social structures (such as growth-centric models of economy and consumption) are implicated in the education and development of future citizens, particularly as young children spend significant amounts of time in formal ELC settings and schools. There are national and international discussions on this, but change is slow in the face of rapid environmental breakdown.

- **To have significant influence on future ways of being in the world, and particularly on the formation of caring, reciprocal relations with Earth, it is likely that the time children spend developing with nature needs to be**

supported by coherent ways of knowing and valuing the natural world which are integrated through socio-cultural contexts in order to support the development of values and identities which underpin those ways of being.

- **In Scotland, there are policy and practice frameworks in place which aim to bring child-nature time into early childhood and throughout schooling, but how they are enacted in reality is very mixed.** LfS, as a values-oriented and interdisciplinary approach provides one aspirational pathway and includes outdoor learning as a central strand. However, learning outdoors does not necessarily relate to learning for sustainability; child-outdoor time is not necessarily the same as child-nature time; and neither implicitly leads to transformational shifts in ways of being in the world, especially if vertical transitions through school systems contradict experiences in early childhood. Teachers are tasked with doing all of this and more, whilst working within the constraints of an already stretched system.

- **Children come to know the world in multiple ways, but direct experience through commoning activities with human and non-human partners is an important form of education** which can resist the instrumentalisation, outcome focus and 'learnification' (Biesta, 2013) which has been identified as problematic in dominant forms of curriculum-making. Education-as-commoning-activity /commoning-activity-as-education makes space for education to be an emergent process rather than a fixed event or a transmissive act and requires critical consideration and inclusion of environments in pedagogy.

- **Environments and their constituent parts (material, ecological, social and cultural) are active agents in the process of education, but are easily overlooked or marginalised in the practice of pedagogy and the structures of schooling.** Finding pragmatic ways to use anti-colonial theories of non-human agency and posthumanist figurations of childhoodnature is one potentially productive way to think about this relationality and how it affects education.

4. Research Assemblage Two

4.1 Introduction

My cartographic mapping identified early childhood outdoor experiences at school as a potentially important site for developing relations with the non-human world. Scotland's CfE and policy landscape creates space for these experiences, and as schools and teachers are expected to plan and facilitate outdoor learning and learning for sustainability, they are well positioned to affect positive changes. However, I have highlighted that this is a contested and complex field, with different forces pushing and pulling it in multiple directions. This results in a lack of clarity around what type of relations educators should strive for when working to nurture regenerative, caring relationality though outdoor learning and how best to go about this.

In line with the theoretical assemblage that I worked with, rather than start with a set of bounded, answerable research questions, I began with the following research objectives:

- Investigate how children and teachers come to know the outdoor environments in which they are learning.
- Identify potential pathways and barriers to learning for sustainability that emerge during school-based outdoor learning

In this chapter, I outline the research apparatus that I used to pursue these objectives and develop new understandings of how children, teachers and outdoor environments came together during school-based outdoor learning at two Scottish schools.

Research assemblage, agential cuts and diffraction apparatus

> Assemblage isn't a thing - it is the process of making and unmaking the thing. It is the process of arranging, organising, fitting together
>
> Youngblood Jackson & Mazzei, 2011, p.1

In the previous chapters, I have introduced a *theoretical* research assemblage and mapped out some of the multiple assemblages involved in school-based outdoor learning and human-nature relations. As I hinted at in Chapter 2, thinking with posthumanist theories and feminist materialist approaches also influences and informs methodological decisions, and affords researchers greater choice in regards to the tools they use to engage the world around them in research-making. Rather than methodology and methods following paradigmatic conventions almost by default, researchers can 'plug in' different tools to constitute the research 'machine'

(Youngblood Jackson & Mazzei, 2011). In some ways this makes the research process simpler, and in others more complex: as Taylor states, when knowledge is considered as emerging through onto-ethico-epsitem-ological relations, "what emerges as 'research' cannot be 'about' something or somebody, nor can it be an individualised cognitive act of knowledge production. Rather, posthumanist research is an enactment of knowing-in-being that emerges in the event of doing research itself" (Taylor, 2016, p. 18). The assertion that 'objective', neutral understanding of social phenomena or the representation of others voices is not (always) possible is central to a range of post-qualitative critiques of dominant social sciences methodology (Lather & St. Pierre, 2013). When the field of inquiry is extended to include young children and non-human agents, as in this project, this becomes all the more relevant, and researchers have responded in a range of ways, including multispecies ethnography (e.g. Hohti & Tammi, 2019; Lloro-Bidart, 2018; Pacini-Ketchabaw, Taylor & Blaise, 2016), worlding approaches (e.g. Nxumalo & Pacini-Ketchabaw, 2017; Taylor & Giugni, 2012; Taylor, 2013), place-narrative (e.g. Somerville, 2010, 2013) and visual and multimodal research methods (e.g. Hackett & Rautio, 2019; Leder Mackley, Pink & Moroşanu, 2015) to incorporate multiple ways of being into their understandings beyond voice and words.

Within this context, the researcher must be able to acknowledge that it is fundamentally hard to describe how we think (Smartt Gullion, 2018) and to openly chart the influences that this deficit has on how we do research. In new materialist ontologies, the role of inquiry is no longer situated in either realist or constructionist terms (Fox & Alldred, 2015), but as a means to approach events and research processes as "material, relational and interacting networks comprising human and non-human components" (Fox & Alldred, 2015, p.1). One of the weaknesses of dominant Euro-centric posthumanist ontologies lies in the linkage between the theory and the practice of applying them through inquiry. This is partly due the broad and overlapping range of similar terms used to chart the ways that various actors relate, and goes back to what Rosiek, Snyder and Pratt (2020) identified as an overbearing focus on thinking about how to *define* relations rather than concentrating on the action of nurturing those relations in generative ways. To be honest, this is how I often feel - like I am having to jump through theoretical hoops to justify what I *know/feel* is the right, or at least a good, way to go about it. Alison Jones and Te Kawehau Hoskins express similar exasperation with the challenge of looking for "*method* in the new debates" (2016, p. 83, italics in original), and link this to the challenge of *experiencing* the process of inquiry as a human scholar while trying to think with (not about) matter.

However, "[t]heory should inform how we think about a thing in a structured manner" (Smartt Gullion, 2018, p. 101) and this does have some implications for the methods that I used in my fieldwork, so I will try to provide a very brief articulation of what this means for my inquiry. As I outlined in chapter 2, in Deleuzo-Guattarian approaches, all bodies, things and ideas are *relational*, and have "agential capacity to *affect"* (Fox & Alldred, 2015, p. 2), with agency being extended to feelings, desires and

less 'material' parts of the assemblage because they too have capacity to affect. The process of social inquiry becomes about following the flows and economies of affect through assemblages and examining how they (de)territorialise and aggregate. Not all beings or things have equal power, but that does not mean that we should not consider them on the same plane in order to chart that power (Bennett, 2010, p.108).

Karen Barad uses a different lexis in her presentation of an *agential realist* approach, drawing on her understanding of physics, science and technology studies, and particularly on the work of Niels Bohr. I do not have any real understanding of quantum physics or science and technology studies. I trust her knowledge, and have seen others apply it productively and with peer-review to social science contexts similar to the ones I am interested in, but I need to be humble about how and to what extent I can know here. I find her arguments hard to follow in places, but she provides useful tools that have been taken up by scholars in a broad range of fields, including education (Ceder, 2018; Rath, 2015; Lenz Taguchi & Erikson, 2021). For Barad, *phenomena* are the "primary ontological unit" (2013, p. 139), consisting of relations between intra-acting agencies, "relations without pre-existing relata" (p.140). *Intra-action* is her term for these emergent relations, as the more common form, 'interaction' points to the existence of discrete (human) components rather than the performative process of becoming. There is no distinction between the material and the discursive in intra-action. Phenomena are brought into being by specific *apparatuses* which allow the multiple and emergent intra-actions to be identified. These apparatuses "enact what matters and what is excluded from mattering" (2013, p. 148) through *agential cuts*, which determine component parts of the phenomena. I will quote Barad's explanation of how she defines apparatus fully here, because I cannot paraphrase her meaning effectively:

> (1) apparatuses are specific material-discursive practices (they are not merely laboratory setups that embody human concerns and take measurements); (2) apparatuses produce differences that matter - they are boundary-making practices that are formative of matter and meaning, productive of, and part of, the phenomena produced; (3) apparatuses are material configurations/dynamic reconfiguring of the world; (4) apparatuses are themselves phenomena (constituted and dynamically reconstituted as part of the ongoing intra-activity of the world); (5) apparatuses have no intrinsic boundaries but are open-ended practices; and (6) apparatuses are not located in the world but are material configurations or reconfiguring of the world that re(con)figure spatiality and temporality as well as (the traditional notion of) dynamics (I.e. they do not exist as static structures, nor do they merely unfold or evolve in space and time).
>
> Barad, 2013, p.146

In the context of my study, the **phenomenon** which I am interested in could be

called 'human-nature relations in school-based outdoor learning'. **Intra-actions** are the emergent relations between the various **agents** (material and discursive) that could constitute this phenomenon - relations between, for example, teacher, multiple children, pupil support assistant, learning intention, weather, tree, vegetable bed, picture book, school bell. I can use a **research apparatus** to create boundaries that allow me to identify those intra-actions, but how I do this affects what components of the phenomenon are identifiable, and what form they take. In this case, the apparatus consists of me, and the tools of a multimodal, diffractive ethnography, which I outline below. Articulating this is never snappy, but Hillevi Lenz-Taguchi and Anna Palmer state that in their practice, it is

> "in the events of encounter with the different agents of this apparatus – including the affective responses and memories of our own – that we can make intelligible how this phenomenon will come to matter as an effect of the material-discursive intra-activities taking place in this apparatus."
>
> 2013, p. 673

By enacting **agential cuts** with this apparatus, I can figure multiple readings of 'human-nature relations in school-based outdoor learning', thus enabling not only deeper understanding of what happened during fieldwork, but also more speculative understandings which make space for the type of holistic knowledge which is required to inform policy and practice.

Both these articulations of how to follow (non-human) agency have implications for methodology, and can be used synergistically, but I draw more on Barad's work, and in particular her development of Donna Haraway's (1992) argument that diffraction is a more appropriate tool for posthumanist methodologies than reflexivity. In the following sections I provide further detail on the diffraction apparatus that I used.

4.2 Research Apparatus

4.2.1 Introduction

My **research apparatus** is best characterised as *diffractive ethnography*.

Ethnography, in its traditional sense literally means 'writing about people' (Madden, 2017), so my desire to work with young children, but beyond human/non-human, subject/object and nature/culture binaries required a form of ethnography which either extended personhood beyond the human, as in some multi-species ethnography, or allowed for the incorporation of material-discursive actants of

various forms. I achieved this by combining tools from sensory, multimodal and sociomaterial approaches to ethnography with a diffractive analysis. In the following sections, I try to outline this pragmatically.

4.2.2 Educational ethnography

Until relatively recently, ethnography has been firmly situated in humanist interpretivist and constructivist paradigms of social research (Cohenet al., 2011). Ethnographic research in this tradition typically involves inductive meaning-making through long-term engagement with specific cultural contexts through participant-observation, interviews and other sources which allow for 'thick description' (Geertz, 1973) with the aim of developing holistic understandings of a socio-cultural group or setting. This often involves both qualitative and quantitative data (Walford, 2018). Ethnographic research has gone through major changes since the 1970s in the face of critiques of the unequal, exploitative power dynamics that can emerge through researcher 'immersion' in unfamiliar socio-cultural contexts (Drysdale & Wong, 2019), leading to methodological innovation which sought to position the researcher as collaborative co-constructor of knowledge. Its home field is (cultural) anthropology, and a full account of the history is not useful here: even within educational ethnography there are multiple genealogies in multi-local contexts across the world (Anderson-Levitt, 2013). As a research approach, these forms of ethnography are a good fit with my apparatus: in educational contexts they have "always been focused on transforming future teaching and schooling practices" (Rosiek, 2018, p. 404).

There are various forms of educational ethnography, but in the inaugural edition of *Ethnography and Education*, the editors laid out what they consider defining characteristics:

- The focus on the study of cultural maintenance;
- The use of multiple methods and thus the generation of rich and diverse forms of data;
- The direct involvement and long-term engagement of the researcher(s)
- The recognition that the researcher is the main research instrument
- The high status given to accounts of participants' perspectives and understandings;
- The engagement in a spiral of data collection, hypothesis building and theory-testing - leading to further data collection;
- The focus on a particular case in depth, but providing the basis for theoretical generalisation.

Troman et al., 2006, p.1

In a similar vein, David Mills and Missy Morton (2013, p.3-4) outline three overarching principles of educational ethnography. For them, ethnography is first a "way of being, seeing, thinking and writing" - it is fundamentally process-driven and iterative (and perhaps textual). Secondly, it involves an element of discomfort in the research, of de-familiarisation through open-ness to new understandings of often conventional and familiar contexts. Finally, they argue that ethnography demands empathy, which they characterise as "the ability to understand and be attentive to the feelings of another on their terms" (p.4). These three strands have particular implications for ethnographic studies with children, where most ontological positions entail that children are members of a distinct culture which they are the experts in navigating, while the adult researcher often adopts the role of 'unusual' adult (Christensen, 2004), interested in children's perspectives of the social world, but without attempting to 'be' a child. The primary and obvious challenges of applying ethnographic methods in a project which purports to adopt an onto-epistemological standpoint is the problem of decentring the human, both in terms of the research subject(s) and the researcher (Lenz Taguchi & Erikson, 2021), and the implicit requirement to consider education and environments in a truly interdisciplinary manner at genetic, ontogenetic, behavioural and socio-cultural levels.

4.2.3 Embodiment, multi-modality and perception

Mills and Morton also emphasise the embodied nature of ethnographic practices. However, within interpretivist or constructivist ontologies, even when attempts to resolve the mind/body dualism are made, knowing human subjects are positioned as discrete, and the ability to enquire into embodiment is limited to the researcher's own experiences or the articulations of others. Humanist ethnographers across disciplines have sought to incorporate sensory and embodied experiences beyond the textual by using multimodal and sensory methods. In this context, as well as trying to account for participants' sensory experiences through observation and representation through communication "the body of the ethnographer can be thought of as the research instrument" (Smartt Gullion, 109, p. 96). This, along with the fact that experience is increasingly constituted through interaction with multiple media, leads to questions about how to record, (re)present, analyse and share ethnographic understanding. Responses have been varied, including visual ethnography, which involves incorporating images and image-making into observation, analysis and communication (Pink, 2021; Manay, Fink & Lomax, 2019), arts-based practices (Delgado, 2015), digital and multimodal ethnography (Renold & Mellor, 2013). In this context, Kress (2010) defines a *mode* as a "socially shaped and culturally given semiotic resource for making meaning. Image, writing, layout, music, gesture, speech, moving image, soundtrack and 3D objects are examples of modes used in representation and communication" (p. 79). This social-semiotic approach to multimodality is valuable for exploring meaning-making, but how does it make sense of alternative relations, of just being, of communication with the nonhuman: gardening alone for example?

For Bollig Honig, Neumann & Seele (2015), a multimodal ethnography should explore "how the narrative, the visual, material, the body, space, place and time interrelate and connect in the accomplishment of social orders and realities as a dynamical, non-linear, and emergent process" (p. 25). This is particularly important with regard to young children's multi-modal meaning-making in/with the world around them. In this context, for example, children's running has been variously figured as a semiotic mode (Hackett, 2014), a collective way of being together, a form of becoming-with environment (Hackett & Somerville, 2017) and correspondence communication between child-bodies and material surfaces (Hackett & Rautio, 2019).

Perception, and the ability to co-respond with the way that participants perceive their environments is central to ethnographic processes, but particularly those concerned with the senses (Pink, 2015). In addition to phenomenological accounts of perception, the ecological psychology of James and Eleanor Gibson, and in particular, Tim Ingold's application of it, has been influential in ethnographies across geography and anthropology, which is one of the things which first brought me to ethnography as an appropriate research approach for this project. Ecological psychology and critical ethnography have been used synergistically in the past, (Georgiou & Carspecken, 2002). However, as I outlined more fully in section 3.9, the need to (at least try to) account for the cultural affordances of an environment, the affordance networks with which (human) actors can engage with said environment, and how the socio-material circumstances of those actors affect their perception or engagement led me to look for research approaches which would allow for that: the *and…and…and…* which allows the multimodal semiotic to be read with/through the ecological/physical.

4.2.4 Sensory ethnographies

Sarah Pink, one of the most prominent advocates for sensory ethnography, proposes that space/place, knowing, memory and imagination are the complementary elements which can allow researchers to come to know how others perceive environments (2015). She situates Doreen Massey's relational, heterogeneous and emergent characterisation of place - "integrations of space and time" (Massey, 2005, p.130) - as a touchstone for sensory ethnography because it requires ethnographers to work with the ways in which the "lived immediacy of the 'local' as constituted through the making of ethnographic places is inevitably interwoven or entangled with the 'global'" (Pink, 2015, p. 38). Pink also draws on various formations of situated knowledge (e.g. Wenger, 1988) and how this knowledge can be shared, learned or transmitted which, all taken together, constitute what she calls "ethnographic place" (2015, p.49). These strands have clear parallels in the objectives of my project, showing that an ethnographic approach in line with Pink's principles is an appropriate methodological starting point: through my cartography, I have

shown that perception through relations is linked to identity and care; care for the world as figured through learning for sustainability works through local/global entanglements; and knowledges can emerge in situated contexts in relation with others.

Sensory ethnographies tend to draw on phenomenological understandings of experience, and multimodal work is primarily interested in human meaning-making which positions both approaches as inherently anthropocentric. The next step in putting together a research apparatus that aligns with my theoretical assemblage is to find ways to incorporate non-human actors into ethnography. This is done in several different ways in fields that are relevant to this study. Where the focus of the research is the relations and entanglements between species (and not just human-animal or human-plant) researchers are developing and adopting multispecies studies and ethnographies (van Dooren, Kirksey & Münster, 2016), influenced by the more-than-human and animal turn (Lorimer, 2015). From this perspective, as Anna Tsing states, "[h]uman nature is an interspecies relationship" (2012b, p.144), so efforts should always be made to understand human *becoming-with* other beings in ecological contexts.

4.2.5 The more-than-human

Teresa Lloro-Bidart (2018), argues that the rise of feminist new materialist and common world approaches to understanding (and facilitating) early childhood and environmental education has stimulated a parallel shift in how research is conducted. In her genealogical reading of how posthumanist theory influences early childhood studies, Somerville (2018) identifies several ways in which researchers account for this and try to move beyond the nature/culture divide: new materialist approaches which focus on 'thing-power' and materiality; child-animal relations; and indigenous-non-indigenous intersections. Ethnographic approaches are present across the first two strands which she analyses in more detail. Materialist researchers follow the intra-actions between particular objects and children through observation, interview or visual artefacts (e.g. Duhn, 2015; Green & Duhn, 2015; Hultmann & Taguchi, 2010; Rautio, 2013; 2014; Rautio & Winston, 2014), while she characterises common worlds research as using Haraway's concern with queer kin and 'thrown**together**ness' to extend the attention of the researcher onto multispecies becoming-with, becoming-worldly or worlding (Haraway, 2003; 2004; 2008).

For common worlds researchers, both routes provide a way to resist the (understandably) dominant child-centredness of early childhood education. For this project, this was beneficial, as it allowed me to concentrate on the multi-species, multi-agential *process* of 'outdoor learning' in a space where attention is usually only paid to human *experiences* or *outcomes.* However, I chose to draw on elements of both materialist approaches and multispecies ethnography, because, as I laid out in section

2.1, to concentrate purely on 'living' nature, or biodiversity would, in this case, negate a range of non-living natural agents from my accounts. The degree of radical openness required to go beyond living beings (especially more 'noticeable' species) towards attending to materials can disrupt assumptions and hierarchies about what *matters* in outdoor learning. Even, for example, multispecies thinking at the level of microbes (well beyond the scope of this thesis) - and the potential benefits that encountering them might have for children outdoors - is less visible than encounters with garden plants, climbing trees or class pets, but could still have significant impacts on health and wellbeing (Franco, Shanahan, Fuller, 2017). Similarly, plastic, paper, tape, or similar materials are not 'directly' 'nature', but are extracted / synthesised from natural materials, can mediate human-nature relations and have implications in terms of environmental impacts, so should be incorporated beyond a purely semiotic or physical level (Kraftl, 2019).

4.3 Ethnographic tools: how to put the apparatus to work

Again, it's easier to articulate the theory than explain (or implement) the practice. How do you go about actually enacting ethnography that goes beyond the human? There's no right or wrong way, but only through efforts, experiments, piecing together will something emerge

> An "ethnographic attitude" can be adopted within any kind of inquiry, including textual analysis. Not limited to a specific discipline, an ethnographic attitude is a mode of practical and theoretical attention, a way of remaining mindful and accountable. But it is about risk, purposes and hopes - one's own and others' - embedded in knowledge projects.
>
> Haraway, 1997, pp.190-191

There are multiple tools available to the contemporary ethnographer, and in the spirit of the bricoleur, "who makes use of the tools available to complete a task" (Kincheloe, 2001, p.680), I employed traditional field notes as well as making video and audio recordings during my visits to schools. As I will explain when introducing the concept of diffractive readings, I was also able to bring interviews, documents and places into the process. Before providing more detail about the specific implications, I will explain why I chose some of these tools in particular.

4.3.1 Observation

In Scotland it is not unusual for there to be multiple adults coming and going

during the school day. I have previously worked in a primary school as a pupil support assistant (PSA), and would regularly transfer between classes throughout the day, or work in small groups with children in or out of their main classroom. I was quite confident that my presence would be accepted by both children and teachers (in line with the process detailed in section 4.6), but was aware of not always having an overt 'purpose'. When not actively making video recordings or taking field notes, I tried to slip into a role of 'unusual' or 'least-adult' as advocated by Pia Christensen (2004) and Nancy Mandell (2003), joining in on the children's terms as much as possible in order to lessen the unequal power dynamic between adult-researcher and child-participant. I tried to do a similar thing with the adults at school as well. While all the adults knew why I was there and that I had a background in working outdoors with young people, I actively tried to position myself more as a researcher interested in their professional practice than someone who had opinions about how outdoor learning could/should be enacted. As I explore in more detail in Section 4.6., this was not out of any assumption of maintaining 'objectivity' but as part of a process aimed at articulating the specifics of what was happening - not 'best practice', not exception, not intervention, but the day-to-day emergences which ethnographic research is so well positioned to investigate. A significant proportion of outdoor learning research relates to programmes delivered by specialists: here I was deferring to the reality of schooling.

In line with this, I did not just visit classes when they were outside - I was interested in how, when, why and where they were going outside, so it was important to build up relationships with children and teachers indoors too. This also allowed me to be present during transitions and breaks and in liminal spaces. This meant that sometimes I helped out with reading groups, played maths games or just sat with the children on the floor during direct teaching. Outside, I inevitably got pulled into play or 'tours', but did my best to take traditional field notes (Delamont, 2020) in my orange notebook (see section 4.6), which was often hijacked by children who wanted to write their names or draw in it.

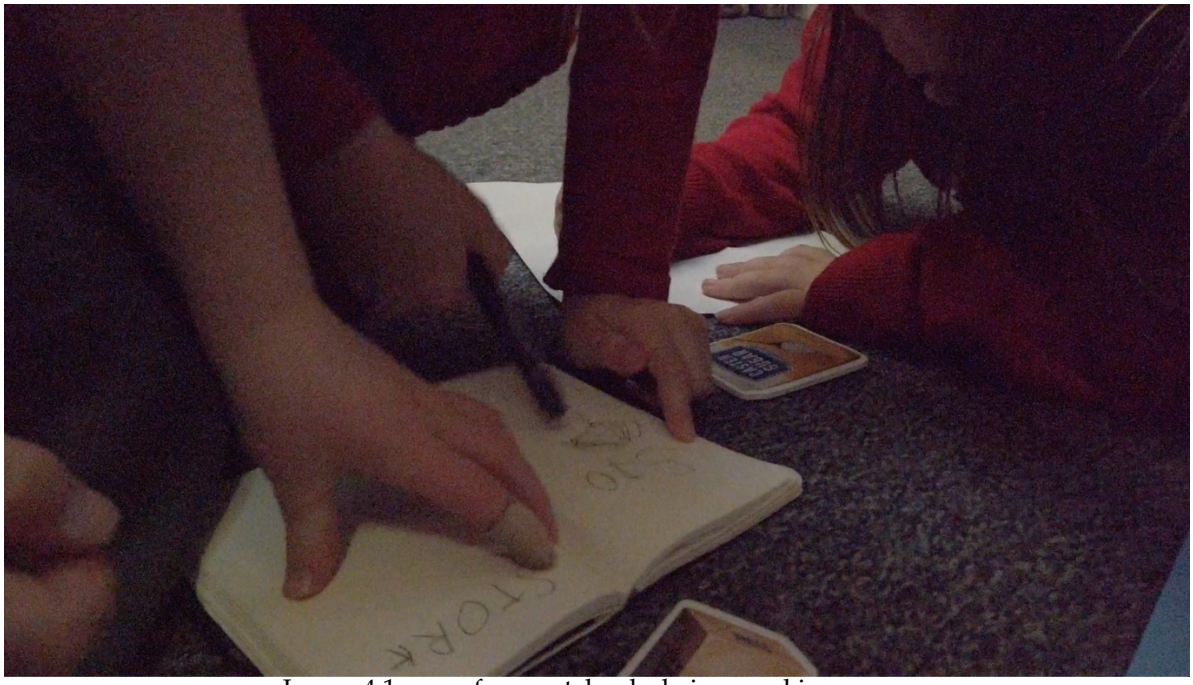

Image 4.1: one of my notebooks being used in a game

These field notes were then typed up and interspersed with (cross)references to videos, screenshots, still photographs and analytic memos to constitute the 'out of the field records' (Delamont, 2020) which in turn inform the diffractive readings in chapter 5. In anthropocentric ethnography, field notes are an important mediation space between the researcher's own identity, process and experiences and those of the research participants (Jackson, 1990). In my attempt at a post-anthropocentric figuring of ethnography, I had to adapt the process of observing and writing field notes to incorporate the nonhuman. I did this in various ways, including the obvious steps of identifying and naming species of plants and insects which I could learn more about, thinking of indoor and outdoor environments in ecological terms and maintaining an open inquisitiveness towards materials that I encountered. Take, for example, the small rubber teddy bears which are used as manipulatives in early childhood maths - they are ubiquitous in classrooms, have material impacts and semiotic meaning in and of themselves, but can also deviate to become soldiers through intra-action with child. What happens when you follow water in the field notes? Others have practiced post-anthropocentric observations in early childhood settings through approaches including 'modest witnessing' (Blaise, Hamm and Iorio, 2017) and common worlds approaches (Taylor & Pacini-Ketchabaw, 2018).

4.3.2 Visual methods

One way that I sought to incorporate the socio-material into my ethnographic practice was through making photographs, video and audio recordings. Visual methods are at the heart of many contemporary approaches to ethnography and other post-disciplinary research (Pink, 2021), and video in particular is well suited to a situated, ecological analysis of everyday contexts (Heath, Luff & Paul, 2010). In education research, visual methods have historically focused on still images and there

is a lack of specific theoretical context for their application (Moss & Pini, 2016), perhaps partially due to the rapid changes in technology, but there is a growing number of examples where audio-visual methods are used to explore young children's lived experiences of learning and play (e.g. Cutter-Mackenzie et al., 2013), especially in relation to environmental identity, learning for sustainability and outdoor play (e.g. Cutter-Mackenzie, Edwards and Pinton, 2015; Green, 2017; Caiman & Lundegard, 2014; Kahn, Weiss & Harrington, 2018; Canning, 2017). Video is particularly useful with young children as it offers opportunities for insight and reflection without the need to depend on written, or even verbal communication (Clark, 2017), and may be effective in studying embodied practices (Simpson, 2011; Degerbøl & Svendler Nielsen, 2015). The same technology that is making video research easier has also led to the ubiquity of moving images and cameras in children's day-to-day experience, which offers opportunities for engaging children in the research process and perhaps limits the influence of the camera on behaviour which may have been greater in the past. Video records also offer unique opportunities to (re)read and (re)present sociomaterial intra-actions in a range of ways, enabling the type of diffractive analysis I outline in the next section. Both in analysis and presentation, the researcher can slow down or speed up time, follow specific actors, trace lines of relationality through socio-material happenings (Ingold, 2011).

4.3.3 Audio

Along with the lower quality audio from the video camera, I used a digital audio recorder to capture the soundscapes and also conversations during outdoor learning sessions, allowing for accurate transcriptions of some observations. Listening back to the recordings is evocative, and the more-than-human is often more noticeable than in the video. A skein of geese fly over; a fork scrapes against the edge of the vegetable bed; the potatoes 'thunk' into the bucket with a satisfying weight. The audio recorder was a source of interest to the children and was sometimes taken away by them to record sounds, which is an approach which I would like to revisit and extend.

4.3.4 Ethnographic interview

Dialogue is a core part of any ethnographic process (Madden, 2019), and I had conversations with research participants which took a variety of forms. These included basic exploratory prompts during observations; casual conversations with adults in staff rooms which were not recorded, but were written up in field notes; and some more formal interviews where we sat down to discuss specific topics in response to my observations or things that were happening in class. As a whole, these can be characterised as "ethnographic interviews" (Spradley, 1979), with a focus on questioning which draws out descriptive, structural and comparative responses (Madden, 2017)

4.4 Diffractive Ethnography

When considered as a whole, this research apparatus can be best characterised as diffractive ethnography, following Jessica Smartt Gullion's (2018) attempts to describe ethnographic methodology that works with the ontological turn. Central to this approach is the concept of diffraction - taken from physics, but applied to sociomaterial contexts. At its simplest, this "has to do with the way waves combine when they overlap and the apparent bending and spreading of waves as occurs when waves encounter an obstruction" (Barad, 2007, p.74). The most regularly cited example of diffraction is that of ocean waves meeting a barrier with a gap in it and arcing out on the other side of it, but diffraction occurs in all wave forms. Interference, or diffraction patterns emerge when multiple waves overlap, for example, if you were to drop two stones into a pond: where the ripples meet, and interfere with each other, new patterns emerge. This is the type of physics - the dropping of stones in water, or the curling of wave round a point break - that I can just about understand. But diffraction also works at the level of quantum physics, where experiments have shown that under certain circumstances electrons (matter) can sometimes demonstrate wave-like characteristics, and conversely, light (waves) can sometimes behave like particles (matter). The experiment apparatus determines how the world is observed. Barad argues that this disrupts both the ontological and epistemological assumptions associated with Newtonian physics which have in turn dominated Western social sciences:

> a belief in representationalism (the independently determinate existence of words and things), the metaphysics of individualism (that the world is composed of individual entities with individually determinate boundaries and properties), and the intrinsic separability of knower and known (that measurements reveal the preexisting values of the properties of independently existing objects as separate from the measuring agencies)
>
> Barad, 2007, p. 107

Barad and other feminist theorists working with the ontological turn take this disruption as impetus to find strategies which acknowledge that ontology and epistemology are entangled and can be made to work in different ways.

The use of diffraction and the associated concepts of superposition and interference patterns as metaphors in post-qualitative research is one such strategy. This is because, as a starting point, "diffraction doesn't differentiate between subject and object" (Smartt Gullion, 2018, p.122); it is performative rather than representational (Barad, 2007) and suggests forms of critical difference-making *through* research. In the midst of a broadly reflexive turn in the humanities, Donna Haraway proposed diffraction as an alternative optical metaphor to reflexivity, stating that "diffraction is the production of difference patterns in the world, not just of the

same reflected-displaced-elsewhere" (1997, p. 268). For her, it "is about heterogeneous history, not about originals" and can act as a metaphor for a critical consciousness "committed to making a difference and not to repeating the Sacred image of the Same" (1997, p. 273). This implies that the researcher cannot 'take a step back' and reflect upon their observations as separate. Instead, it allows for, or even "requires caring about the worlds or possible worlds that your own work, your own kind of work, helps create and/or sustain" (Schneider, 2002, p.470).

Beyond metaphor, diffraction as methodology can be seen as a difference-making practice (Barad, 2007). This requires "reading insights from different areas of study through one another, where resonances and differences between varying theories are articulated and affect what is produced (what comes to matter)" (Truman, 2019, p. 6). I know this sounds vague, woolly, and risks falling into problematic tropes (Bendix Petersen, 2018), but the awkward language and challenging concepts seem to offer ways to align fieldwork and analysis with the requirements to simultaneously stay with the messiness of outdoor learning and childhoods in the Anthropocene which I laid out earlier in the thesis.

Diffraction practices are perhaps most easily enacted in the analysis phase of research projects with discrete qualitative data, when researchers want to resist the coding conventions of dominant research paradigms (St. Pierre & Jackson, 2014), which Jackson & Mazzei (2012) argue restrict the likelihood of creating new knowledge. In ethnography however, analysis is not seen to be a distinct process, but happens alongside the generation of data *through* the process of writing (Smartt Gullion, 2016) or image-making. This approach has been successfully applied by other researchers working in early childhood (Fairchild, 2017), education (Lenz Taguchi & Palmer, 2013, Rosiek, 2018; Ivenson & Renold, 2016) and outdoor-environment-pedagogy intra-actions (Malone, Duhn & Tesar, 2019; Mereweather, 2019), using various ways of figuring the diffractive process, from murmurations (Mereweather, 2019), to earthworm disturbances (Fairchild, 2017). However it is named, Hillevi Lenz Taguchi and Anna Palmer, describe a diffractive analysis as an "enactment of flows of differences, where differences get made in the process of reading data into each other, and identifying what diffractive patterns emerge in these readings" (2013, p. 676).

After fieldwork, my approach involved making a series of "agential cuts" (Barad, 2007) which allow me to generate and bring together writing and images around specific entities. As I have said, the smallest units of analysis in an agential realist approach are phenomena, and an apparatus (in this case the ethnographic apparatus detailed above) can "enact agential cuts that determine boundaries and properties of "entities" within phenomena, where "phenomena" are the ontological inseparability of agentially intra-acting components" (Barad, 2007, p. 148). Through ethnographic writing and image-making, I aim to do this in ways that produce "momentary

stabilisations, doings rather than beings…[which] enact that which is inside and outside of phenomena in a single movement" (Sauzet, 2018, para. 15). I hope that this affords for simultaneous descriptions of what happened during my fieldwork, what did not happen, and what could happen, and it is within this space that the research can becomes a difference-making practice. Useful. Response-able.

4.5 Fieldwork

4.5.1 Identifying schools to work with

As I have tried to articulate elsewhere, I am trying to foster good relations with you, the reader, by being as honest as I can, situating my knowledge and mapping out the lines of articulation which influence how this research comes into being. This next section explains how I ended up working in the schools that I did and records why I think that they were a good fit with the aims and objectives of the project. I'll try to provide you with enough information about this process for you to make an informed reading of the next stages of the thesis.

When I committed to conducting ethnographic fieldwork, I acknowledged that I was going to be limited to working with schools which I could visit regularly, over an extended period of time. Through exploratory conversations with teachers it was clear that many classes had specific times in the week where they were more likely to be outdoors, often due to internal school or class-level routines, such as PE slots, whole-school assemblies or teacher availability, so in order to observe a significant amount of school-based outdoor learning the best approach would be to visit regularly at weekly or bi-weekly intervals. The reality of this manifests in the extant literature, where there are a significant number of ethnographic studies in different countries of children's time outside in ELC settings, especially 'nature-based' settings, but relatively few in school contexts. If ELC settings utilise outdoor spaces, children are more likely to be outdoors every day, so intense periods of fieldwork can generate sufficient data over shorter periods of time; school-based projects are perhaps more easily approached using research methods which require less in-person researcher time.

While making decisions on field-site selection, I found myself weighing up the environmental, familial and wellbeing impacts of travelling to distant schools over a significant amount of time, pushing me right up against my desire to approach this research in a way that aligned with my values. Could I justify driving for an hour each way to observe a couple of hours of outdoor learning, once a week, or would I be better off finding a school where I could visit more regularly, using my bike when I could? At the time of my fieldwork, my wife was working full-time, and I was caring for our son and dropping him off at his ELC settings. Being present through these processes was important to me and thus my ethical obligations to my family and my way of parenting were also imbricated in my decision-making. This ruled out being away regularly for consecutive days or weeks.

While clarifying the specifics of my research in the first year of my studies, I spoke and had email dialogue with lots of people who I knew through my involvement in outdoor learning or who were connected through Learning for Sustainability Scotland

and NatureScot projects. My supervisors were supportive and influential in negotiating this access. It was heartening to hear stories of exemplary teachers, schools and communities working outdoors regularly, many of whom I had seen showcased in other contexts, but I was very aware of the fact that in 2019 there were 25,027 primary teachers working across 2004 schools in Scotland (Scottish Government, 2019a), and that the teachers that I was being told about were probably the exception rather than the rule. As laid out in section 3.6.4, teachers are obliged to incorporate outdoor experiences into their practice, but, while provision is increasing, it is "unevenly spread and further substantial increases are realistically achievable" (Mannion, Mattu & Wilson, 2015, p.ii). So should I present an ethnographic study of best practice, or investigate what the majority of children are likely to experience through their schooling?

Some researchers argue that generalisability can be achieved in ethnography through transferability or theoretical generalisation based on "empirical evidence of the wider population (Walford, 2008, p. 18). I concluded that theoretical generalisation was not possible based on the diversity of potential actors in my research, in outdoor environments, teachers, children, pedagogical aims and on and on… While the purpose of ethnographic research is not necessarily to concentrate on a case which is representative of the whole, I wanted this research to tell the stories of what was happening in those schools with nascent or emergent cultures of outdoor learning and learning for sustainability, rather than describing processes present in already successful practice. Instead of generalisability, the diffractive readings allow me, readers and users of the research insight into the specifics, at the sites of different intra-actions.

I set about looking for two schools (one in a more rural setting, one in a more urban setting) within one hour's drive of my home who were actively developing or incorporating outdoor learning into children's experiences. The aim was to identify 'information-rich' contexts through a purposive sample. At this stage I had not fully committed to early level classes, so reached out to headteachers and outdoor learning practitioners that I knew, as well as quality improvement officers within local authorities. As is the way with these things, I got no response from several schools which I had initially identified as being a good fit with the research. Knowing the workload of teachers, particularly in areas of multiple deprivation, this is understandable. While it is beyond the scope of this thesis to explore this further, this process suggested that while there are a lot of actors involved in outdoor learning and LfS in Scotland this can translate into mixed provision at local authority, school and teacher level. My impression at this stage was that there was confidence in the importance and value of outdoor learning, but little certainty on how this was enacted pedagogically beyond specific projects, outdoor learning support teams, secondments, influential training providers or individual teachers' practice. Scaling up consistent provision remains a challenge for Scottish outdoor learning.

Walford (2008) recommends trying out field sites "for fit" (p.18), which I did by visiting several schools, speaking to heads and class teachers and volunteering for a couple of outdoor sessions, but he also states that researchers should be honest and systematic about the reasoning behind their choices. With several schools, I got to the final stages of negotiating access only to be required to start again. These processes suggested to me that outdoor learning can be carried or driven by individuals within a team. In one instance the key teacher left for another job; another was due to start maternity leave; in the other, the teacher worked part-time and was concerned about how much time she could be outside while trying to fit other school-wide initiatives into her three days a week, and I sensed a pressure to participate from the senior management team. In two of these cases, there were no other members of staff whom the heads could identify as a good fit with the research, suggesting that sometimes, the individual teachers, not the environments or school cultures were influential in enabling existing outdoor learning.

In the end, I identified two schools willing to accommodate me, which I will briefly describe in the following section, using the titles Village School and Town School. I agree with Walford (2018) that true anonymity is impossible in contemporary ethnographic research, particularly where visual methods are used. It would probably take someone with the will and access to a web search engine about ten minutes to identify a shortlist of schools that I might have visited, so I was clear from the outset that full anonymity was not possible for the schools and that images would be shared in the public domain. Instead, I will do what I can to only use details that are relevant to the points I am making and use broad brush descriptions to depict the schools and their contexts. I acknowledge that this goes against many of my own arguments for attention to the minutiae of place as specific assemblage, so I will try my best to strike a balance.

4.5.2 Village School

Overview

Village School has just over a hundred pupils, spread across a mix of composite and straight classes. I spent time with the Primary 1/2 class, which consisted of 22 pupils, taught by one full-time teacher, who had been working at the school for nearly 20 years. The main building is over a hundred years old, with an even older separate building housing the hall and nursery, and some 'temporary' classrooms which have been in use for decades. A new building and refurbishment is due. The school has a mixed catchment from the village and the outlying rural communities. Although there are challenges with using it to assess relative disadvantage in rural areas (Scottish Government, 2020h), according to the Scottish Index of Multiple Deprivation (SIMD), the village sits in decile 5 of the index, while the rural areas surrounding it are in decile 8. This means that at a community level, the impacts of deprivation are relatively low,

but individuals and families may still experience significant disadvantages. Access to services beyond the village requires private transport or costly public transport. Within walking distance, there is access to a wide range of habitats including farmland, ancient woodland and river, but access is not always equitable or safe due to the level of road traffic and limited active travel infrastructure, particularly for children or wheelchair users.

Culture of outdoor learning in a context of school improvement

When I first met with the headteacher at Village School, she made it clear that she was trying to encourage and prioritise outdoor learning across the school. The school had recently been inspected, and outdoor learning had been identified as "at the early stages of development" with the school "in an ideal setting to ensure that this becomes an integral part of everyday learning." In order to foster this development, teachers had been asked to plan specific time outdoors into their week. My first impression was that this had the potential to form good habits of outdoor learning, or perhaps conversely lead to tokenistic, tick-box activities. While I was with them, P1/2 tended to go out twice a week, most often between break and lunchtime. Initially this time was spent in the garden, and then split between the garden and the woods. The teacher, who I will call Mrs. D, is a keen gardener at home and had attended training through the Royal Horticultural Society's campaign for school gardening. She enjoyed spending time outdoors in her free time, and came across as enthusiastic about the opportunities for outdoor learning, especially in terms of child-led play. The school inspection report highlighted that at the time, the majority of learning activities across the school were teacher-led, and that there were more opportunities for children to lead their own learning. In my initial observations, this was the case, but outdoor learning was perceived by staff as one pedagogical approach which might afford children more agency and differentiation in their learning.

School building/classroom

The main school building has a long corridor that is wide enough for two adults to pass easily, but feels cramped because of the displays on both sides, shared resources in storage units and occasional lines of children waiting to go somewhere. The primary 1/2 classroom has a high ceiling and big windows along the southwest facing wall in the style typical of its age. The light streams in through these, but the sills are well above eye-level for the children who use the space, giving glimpses of the trees beyond the wall when the blinds are rolled up. Mrs D has been in this classroom for several years and the space is busy, with resources in plastic trays, drawings (from the current year and last) stuck around the walls, alongside posters for school-level initiatives and vocabulary. There are four desks and enough seats for everyone to sit down at the same time, as well as a few seemingly quite fixed play and activity zones, such as water tray, a craft table, a reading area and a home corner.

No free flow/direct access to outdoor space. Mrs. D said that this would have been valuable, particularly in first couple of terms where children would have chosen to be out. Material environment dictates pedagogy

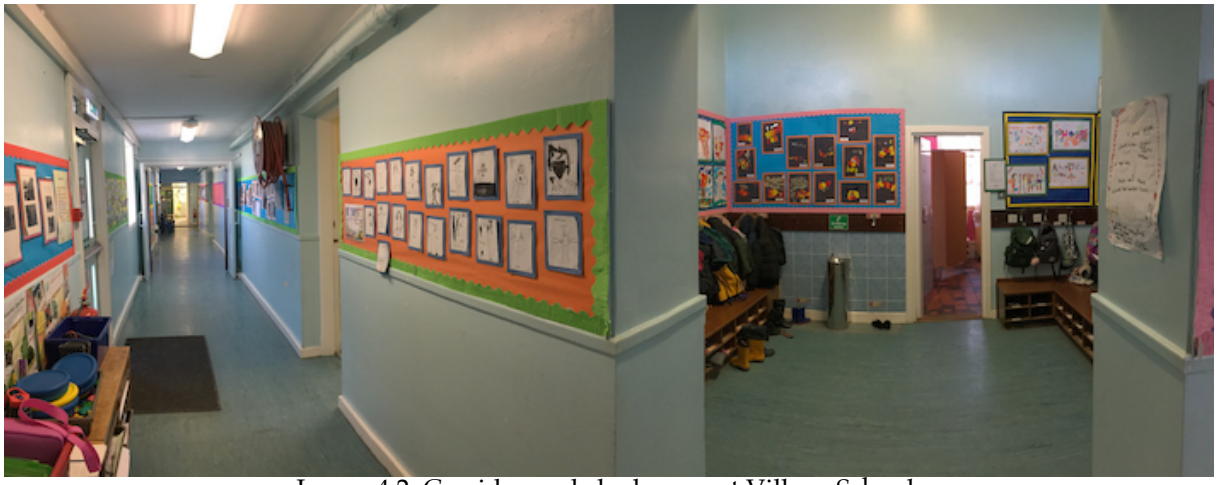

Image 4.2: Corridor and cloakroom at Village School

School Grounds

The school grounds are varied, but not particularly biodiverse. The playgrounds are tarmac, surrounded by stone walls and bordered by the carpark. On one side, there is a bike shed and a covered storage area. There are some planters with flowers and the painted tyres which seem to be ubiquitous to playgrounds across Scotland, and a playing field across the car park. At break times, PSAs bring out plastic boxes of resources and games, but the main area which P1/2 are allowed to play freely in during their breaks is low in environmental affordances. At morning and afternoon breaks the children access this space through a fire door on the the northeast side of the building; after lunch they find their way round from the separate canteen building (which feels somewhat like a postwar scout hut). Despite the low context environment of the school grounds, the surroundings are relatively verdant and biodiverse, with the grounds bordered by greenspace on three sides: gardens to the South, amenity park and playing fields to the West and mixed woodland to the North.

School Garden

Separate from the playground, the school has a garden. This bit of land, now about 40m x 20m, half of the original size, actually belongs to the local landowner, but has been informally leased to the school since the school was a junior secondary. It is bounded by a tall wooden fence on three sides and the high playing field fence on the other. On the fences are flower shaped chalk-boards and laminated bird ID posters made by last year's P2/3 classes. Access to the garden is controlled by adults, and there is a combination lock on the gate. Children (from nursery up to P7) come here in the company of adults for specific purposes, usually during class time, but also as part of a volunteer gardening group.

Image 4.3: Village School garden gate

There are mature trees: big old apples, ashes, coppiced hazel, a willow structure that has overgrown and been pruned back a bit wrong, and a beautifully planted beech hedge which forms a sheltered circle at the south end. When I first visit in late summer, the wind is warm and rich, and the leathery green beech leaves shiver with life. There is space for growing food plants: eight slightly raised beds made from wood and painted in various shades of pink, blue and purple and a small but vibrant poly tunnel tucked in beside the fence. Brambles droop over the fence, and rhubarb and herbs grow in a concrete bed. Compost bins imply the recycling of organic matter. In spite of the grass monoculture next to it, the large trees and overgrown corners make the garden feel relatively biodiverse, at least as far as managed school greenspaces go.

Image 4.4: a boat in the garden at Village School

Image 4.5: resources in the garden at Village School

Image 4.6: Tyres and brash

Image 4.7: a wide view of the garden at Village School

One day when I'm there without children, I make a list of surfaces as I walk around, listening to the sounds and feeling them under my feet: Gravel, grass, big stones, paving slabs, weed proof membrane pulling back from under bark chips, tree roots, soil. With fewer humans, Robin is the most vocal resident, calling out at me.

There are lots of objects which suggest that the purpose of the garden is not limited to growing food and other plants. There are objects to be used, structures to move around in/on/inhabit and loose parts. There is one storage unit with fairly distinct

resources for play and learning: foam bricks and dominoes, 'play' tools, wooden blocks, dressing up costumes and one pedal-powered plastic digger just big enough for most 5-year-olds to drive. There are child-sized wheelbarrows, watering cans and a shed full of tools and buckets. Spread throughout the space are a range of spaces and structures: two house forms, cast in plastic to mimic wany edge timber; a trapezoid gazebo with seats; benches of various forms; a pedallo boat, stranded between two trees; a 'mud kitchen' with a sink and cooker ; a hexagonal sandpit, covered with a tarp which collects water; a wooden xylophone . Where surfaces have been painted, the predominant colours are pastels: blue, purple, pink, light yellow. Mostly over by the storage unit, but also where they have been left, there are objects intended to be used in loose-parts play: cable reels, pallets, plastic guttering, pots, planks.

My overwhelming feelings when I first saw the garden were of time and potential. This has been a garden with and for children for a long time, and quite recently people obviously committed a lot of time and energy to making it fit for *a purpose*. What was less clear initially is what those purposes are: is it a place for play? Is it a place for growing food? Is it a place where children have agency? Across all of these forms, there was a lot of potential, and I was interested to see how, or whether, the place and the way the materials and species which constitute it could enact those potentials when enlivened by outdoor learning.

Local greenspace

On one side, the school borders a large amenity greenspace, which includes playing fields and a playpark. Families are encouraged to park in the public carpark and walk the 300m around the edge of the park at drop off and collection times. To the north, there is an open woodland area on small a raised drumlin, mostly consisting of mature oaks, sycamore, ash, rowan and willow. This is just over the wall, and there is a (locked) gate directly from the playground, but when I am with them, the class goes out onto the pavement in front of the school and through the public gate. A path runs along the edge of the school wall and through the bowl of the drumlin, joining the two sides of the park and making for a popular dog-walk. The understory to either side of the path is pretty open, but while I was there in autumn it was covered with nettles in the darker areas and rosebay willowherb gone to seed where there had been more sun. The steep south ridge is full of rabbit warrens and tangles of fallen trees, with no obvious paths. The north ridge, with views out over arable fields, has a couple of paths leading up to it, which follow along the top to a more open grassy field border and, at the west end, some stately oaks on a steep slope, complete with rope swings.

Image 4.8: A view of oak trees with a rope swing and open fields from woodland near Village School

It is clear that folk do spend time here, but I also know that it is a contested space. There is often broken glass, litter and other evidence of (young) people hanging out, and also the tensions that come with any greenspace which is used my multiple people for different purposes. The small patch of land and the walkway which runs through it seem to exist in a grey area in terms of care and management, and periodically, volunteers from various groups will get together to 'clean it up', including strimming the paths and nettles and picking up litter.

The fact that this site, relatively rich both in terms of biodiversity and environmental affordances, is literally adjacent to the school marks it out as fairly unique. When combined with the established garden space, the set-up at Village School represents nature-rich settings within the first two 'zones' of outdoor learning identified by Beames, Higgins & Nicol (2011): the school grounds and local neighbourhood. The proximity of semi-natural woodland to the school potentially removes or mitigates some of the perceived challenges often associated with local outdoor learning in terms of travelling to a separate site, and could include opportunities for nurturing relationships with multiple human and non-human beings within local communities.

Summary

In summary, village school is a small primary school with an established garden, playing fields and an area of ancient semi-natural woodland adjacent to the school grounds offering rich opportunities for close-to-school outdoor learning. At the beginning of my fieldwork, outdoor learning had been identified as an area for development and the P1/2 class were intending to go outside twice a week in discrete sessions, but there was little medium-long term planning about what form this would

take.

4.5.3 Town School

Overview

Town School is a medium-sized primary school, built relatively recently to serve a community in an area of intensive housing development, with 70-80% of pupils classed as living in an urban area, and 20-30% in a rural (Scottish Government, 2019a). The school has over 300 pupils, with a mix of straight and composite classes. I spent time with 3 classes: two straight P1 classes (of 24 and 25 children) taught by Mrs B and Mrs C and a P1/2 composite (of 25), taught by Ms A. I originally planned to work with the P2 class as well, but teacher workload and timetabling meant that I concentrated on the other 3 classes, totalling a potential of 74 children. All three teachers were experienced and had been working at the school for a few years. Ms A and Mrs C (a principal teacher) had taught P1 before, but this was Mrs B's first year working with the youngest children in the school. Ms A had previously taught in a rural school where there was woodland just over a low fence and smaller class sizes, quite a contrast to where she found herself now. She told me that she noticed a big difference in those children's skills for looking after themselves when outdoors: knowing whether a rotten log would hold their weight, swimming in the river in the summer months, cycling around the village unsupervised. She herself had attended a small village school, and was open about how this probably influenced the fact that she particularly valued the possibilities that the rural setting and the smaller class sizes offered for learning and teaching outdoors. This is in line with observations about student teachers' emerging ecological identities (Gray & Collucci-Gray, 2018) and the SLE research describes how conservationists cite childhood experiences as formative in their adult relations with the natural world (see section 3.8).

Town school's catchment is in deciles 7-10 for most of the indices of the SIMD, which means that at a community level residents experience the lowest levels of deprivation in the surrounding area and nationally. However, the community ranks in the most deprived 10% in the country in the geographic access domain, which is intended to show the cost, inconvenience and time used to access basic services, such as shops, healthcare and so on, demonstrating the primacy of private car use in the area. There is, however, relatively good active travel provision around the school, and children do walk, cycle, wheel and scoot to school. The development model means that, while there are pockets of greenspace around the community, these are classified as amenity greenspace, which often offer limited scope for outdoor recreation or learning.

Culture of outdoor learning in a context of play-based pedagogy

I wanted to work with Town School partly because I knew that teachers had previously been active in developing outdoor learning across the school, including visits to local woodland. However, the main draw at the time was that the Early and

First level classes were attempting to enact the curriculum through play-based pedagogies (see 3.5.7) which included regular, and often free-flow access to an outdoor courtyard space within the school grounds. The teachers were already engaged in reflective practice around this move towards child-led learning, responsive planning and play and we all felt that having someone else involved in thinking with the outdoor spaces could be mutually beneficial. I explore how the pedagogical approaches, children and outdoor spaces intra-act in more depth in chapter 5, but the contrast to the discrete blocks of outdoor learning at Village School offered opportunities to explore diverse experiences, and I was interested to see how having the option of spending time outside (but not necessarily in biodiverse places) more regularly affected what happened in those spaces.

School building/classroom

The school is about ten years old, and is structured around two wings of classrooms, each of which have one glass side with doors out onto a wooden deck in communal playground areas within a large boundary fence. Each classroom has a teaching wall along one side, with interactive whiteboard, whiteboards, storage and a sink; the wall opposite the windows has sliding wooden doors which cover additional storage and are used for displays. In one class, these surfaces were used for children to showcase work that they were proud of, with each child having space in which they could display anything they wanted to, changing it as desired. The floor is half carpet and half vinyl, and the rest of the space is flexible, arranged differently in each class. The furniture is all coherent, the building feels accessible and well designed and the overall feeling is one of space. In the primary 1 and 2 classes, there are the usual units of trays, but also reading corners, soft toys, home and shop spaces, some tables with chairs stacked off to the side, writing materials and boxes of resources which come out at different times. The teachers' desks and chairs are in the corner next to the teaching wall.

Because of its location, it's hard for me to include many zoomed out images of Town School without making it significantly easier to identify where it is, so I've chosen to keep these minimal here and hope that my descriptions, coupled with some of the more focussed images in the next chapter provide you with enough detail where needed without compromising my relations.

School grounds

The P1 and P2 classes are organised so that they all face onto a sloping shared courtyard space about 40m x 20m. The third side is a long glazed corridor which includes the library and connects the admin block to the hall, while the west side is open with a view over the town. All the doors are operated by key fobs, so at break time, these doors are monitored by older children to allow access to toilets and cloakrooms. As one child tells me, "You knock on the door and they let you in." In the courtyard there are 4 wooden raised beds, each about 10m long and terraced in three

stages down the fall of the slope. Another row of beds is used as a sand pit and is covered with red fitted tarpaulins, which gather water overnight or when it rains. Each class in the school has their own garden bed which are used for growing vegetables and flowers, but by the time I arrive in late October, most things have died back and there is a lot of bare soil. Between the beds are grassy slopes, which are damp and slippy in the autumn, and there are patches nearer the building which obviously used to be grass, but have been compacted and scraped back to dead dirt over the years.

Around this space are bird feeders, several small storage sheds, and halfway through the term a large play house was donated and installed. There are materials for loose parts play, including pallets, bricks, cable reels and, of course, a lot of tyres. The decks outside the classrooms have benches, and there are other places to sit on a flat tarmac area in beside the building. There are a few bigger trees, maybe 15 years old, planted around the grass - some birches and a pine tree - all of which look like they have had pretty tough lives so far. I imagine they have been swung on, kicked, bashed, not out of malice, but vigour. Where the edge of the playground drops down a steep bank there is a compacted line of soil along the kerb, then a dense mix of native trees and bushes which all seem to be doing well: oak, birch, whin, willow, rowan. This bank is muddy and slippy, but has a significant draw for lots of the children. There are pathways through the bushes along beside the fence and it is easy to hide from your friends or any adults who are reluctant to slide down the hill. When I am there, this part of the playground is *cold*. The school is high up, so that it sometimes feels like you are in the clouds and the courtyard faces north, with the sun not reaching it until later in the day.

On the other sides of the classroom wings are tarmac playgrounds and a wooden trim trail, but the P1/2 children are only allowed round there at break times. About a minute's walk away, and behind a high fence there is a Multi-Use Games Area (MUGA), a synthetic playing field used for a range of sports and activities. Ms A's class regularly uses this as a manageable, bounded space for the whole class to move and burn off some energy before starting classroom tasks, and it is open for use at break and lunchtimes.

Local greenspace

Within the community, greenspace consists mainly of strips of various sizes between phases of housing development or parkland. Up until recently green field sites waiting for development were the domain of dog walkers and presumably kids, with desire paths developing over time, but many of these have been built out. An old mill burn with its tangle of alder still runs down the hill through the houses, but a lot the land alongside the roads has more recently planted trees and long grass mixes which go uncut. These probably act as wildlife corridors and sheltered habitat, and are not particularly accessible to humans: they are parallel, transitional spaces, viewed out of car windows or while walking on the smooth tarmac paths to get somewhere.

In some ways, I like this, because it feels like these places have little lives of their own where human presences are just a little off to the side or regular, but fleeting, but their location next to the busy road and lack of boundaries and paths do not necessarily make for an easy outdoor learning venue. The closest playpark is 700m from the school, and the larger public park is over 1km, which at P1 walking pace is probably close to half an hour.

There are commercial conifer woodlands with access points about 1km from the school, which, again is a not inconsiderable distance to contemplate with 25 6 year-olds, but these have recently been felled, making them less appealing as an off-site outdoor learning venue. The most accessible venue is a strip of woodland about 500m to the south east of the school. It is only about 10 minutes walk from the school, is used by classes in the upper school or small groups of students with additional support needs and PSAs and has been used by P1/2 classes in the past. In the autumn term of fieldwork, the three P1/2 teachers expressed interest in taking their classes there, but class dynamics (e.g. balancing inclusion and risk with specific children in each class) and timetabling meant that this did not take place while I was there, or before the first COVID-19 lockdown. I had planned to arrange community walks with parents and children after school in the spring term, so that children could show me any local places that they knew or played in. I did discuss it with one of the chattier children, who told me that he goes to the park near the school quite a lot, but when asked about visiting the woods, responded that there are "no woods" around here, "the bushes are the only woods we have", meaning the bushes on the hill in the playground where we were speaking. Some of that could be contextual, but it was clear to me that he did not have an initial frame of reference for positioning 'woods' in the school/home place.

Summary

Town School is a medium-sized primary school in a suburban, recently developed community on the edge of a large town. It has well designed indoor and outdoor environments with space for growing and playing outdoors at the centre of the school grounds, and children in primary 1 and 2 regularly have the choice to take their learning outside when they want to. There are some possible venues for outdoor learning in the local neighbourhood, but these are perceived as being tricky to access and when I was there, the teachers in primary 1 and 2 classes were concentrating their energy on developing a play-based approach to early and first level, including providing opportunities for free flow access to a shared courtyard space.

4.6 Ethical considerations

4.6.1 Introduction

Over the last 25 years, what constitutes ethical conduct in research with children

has shifted. Rather than the assumption that acting in universally prescribed ways is sufficient to protect children from harm, ethics is now more often "thought of as practical wisdom shaped through an ongoing process of critical reflection" (Gallagher, 2009, p.11). How does adopting diffraction, rather than reflection as the driving force in the research assemblage affect how I approached questions of ethics in my research?

As I have made clear from the start, 'ethics' is not an additional, separate process or set of procedures to follow. In feminist materialist approaches, what the world is (ontology), how we come to know that world (epistemology) and how we relate to others in the world based on those knowledges (relational ethics) are so closely entangled as to be inseparable, and often coalesce in processes of caring (Puig de la Bellacasa, 2017). In this section I will explore some of the specific implications, relations and actions that came out of enacting this research assemblage. While doing relational ethics is a process, there were a few obvious elements of the research assemblage which required particular thought from the outset: the involvement of young children; the visual nature of the ethnographic practices; and ethical relations with non-humans. What I lay out here is what I set out to do with the best intentions, but it did not all work out as planned. The final section of this chapter is an attempt to make peace with that, learn from my experiences and acknowledge the limitations of my study.

4.6.2 Relational ethics

A relational approach to ethics is rooted in the premise that ethical action takes place in and through dynamic relationships rather than based upon fixed, objective moral reasoning. It "demands attentiveness and responsiveness to our commitments to one another, to the earth, and to all living things" and encompasses our "interdependency as well as our freedom, our emotions as well as our reason, and our unique situation as well as our human commonalities" (Austin, 2008, p. 749). Not all relational ethics are explicitly posthumanist. Where humanist relational ethics, such as those founded on the work of Emanuel Levinas (1991a, 1991b) and Jacques Derrida (Smith, 2005) emphasise *responsibility* and unpredictability in encounters with the (human) Other, in feminist materialist, or agential realist forms, this is refigured as *response-ability* (Haraway, 2008; Barad, 2012), the capacity to come together in onto-ethico-epistemological events and be in worldly relations with human and non-human agents (Blaise, Hamm & Iorio, 2017).

As I have already highlighted, relationality, and the accountability implicit in relations built on respect and reciprocity, is a fundamental characteristic of much older ethics and ontologies (Wilson, 2008; Yunkaporta, 2020), as is the challenge to the notion of objectivity inherent in Haraway's challenging of the 'god-trick' (1988). For Shawn Wilson (2008), a truly relational approach to research cannot fit within the paradigm of dominant academic knowledge structures. In acknowledging that he cannot possibly know all the relationships that influence other people, or speak on

their behalf in a way which honours those relations he makes it clear that the role of the researcher, as writer, speaker and storyteller "is to share information or to make connections with ideas" (p. 134) with humility, and that is what I aspire to do here too. Wilson also highlights the responsibilities of the reader or listener in the research relationship: to listen respectfully without judgement, to internalise the information and be patient as the ideas are incorporated into your own network of relationships, and to form your own conclusions.

4.6.3 Ethical relations with young children and teachers

Research ethics are characterised by Priscilla Alderson and Virginia Morrow (2011, p.3) as "concerned with respecting research participants throughout each project, partly by using agreed standards". According to Marilys Guillemin and Lynn Gillam (2004, p.262), this involves both *procedural ethics*, which entails following prescribed institutional and professional guidelines, review boards and legal considerations and *ethics in practice*, the navigation of ethically important moments encountered throughout the research process.

Gallagher (2009) identifies the key ethical issues in research with children as coalescing around the themes of informed consent, privacy, legal and institutional guidelines and power relations. I used both procedural and practical strategies in order to act ethically. For the procedural components of my project I followed the British Educational Research Association's ethical guidelines (BERA, 2018), as well as the charter and guidance produced by the Ethical Research Involving Children Project (Graham, Powell, Taylor, Anderson & Fitzgerald, 2013) to structure my relations with research participants. The ERIC approach is well suited to this project, because it calls for researchers to be "attuned to the relational dimensions of research ethics" (p. 11) and is underpinned by the core ethical principles of respect, benefit and justice and based upon children's rights as expressed by the United Nations Convention on the Rights of the Child (UNCRC). I had my project approved by the MHSES Ethics committee, and obtained a Protecting Vulnerable Groups (PVG) Scheme update through the university.

Informed consent/dissent

My mapping of the research literature suggested that informed consent in particular has been identified as a challenge in ethnographic studies with young children (Kustacher, 2014; Gallagher, Haywood, Jones & Milne, 2010; Blaisdell, 2016) and research that produces visual data (Wiles, Prosser, Bagnoli, Clark, Holland & Renold, 2008; Robson, 2011). According to the ERIC guidelines, informed consent is central to the value of respect and should be "an explicit agreement which requires participants be informed about, and have an understanding of, the research" (Graham, Powell, Taylor, Anderson & Fitzgerald, 2013, p. 55). It must also be voluntary and renegotiable, including the balancing right to dissent or withdraw at

any time in the research process (Gallagher, 2009). Procedural approaches to ethics assume that much of this work can be done through information sheets, correspondence with gatekeepers, consent forms and the provision of contact details for follow up, but ethnography and working with young children troubles this across all four characteristics of informed consent.

Information, understanding and explicit agreement

Many consent processes are designed for methodologies where data collection takes place in discrete chunks during obvious episodes, such as interviews or survey completion, but ethnography requires consent to be less of an event and more of a constantly negotiated process. Ethnographic approaches are often used for exploratory research, and when combined with an ontological position which assumes that knowledge is situated and emergent, the idea that all research participants, or even the researcher, can fully understand the purpose and outcomes of the research and how data will be used - especially at the beginning of the fieldwork - is troubled (Delamont & Atkinson, 2018). Therefore, my research design required me to consider what information was important to share with various different participants throughout the process, and different ways to do that with respect.

Adults

Having gained permission from the headteachers of both schools and arranged the participation of class teachers, I shared information sheets with adult members of staff who were going to be closely involved with the research and asked for them to return written consent forms approved by the MHSES Ethics committee. My approach necessitated an attunement to whole-school systems/environments as well as individuals, so while it was not feasible or necessary to gain this specific level of consent from all staff or visitors, it was important that everyone knew who I was and what I was doing in order for me to negotiate further consent as necessary. To allow this, I was introduced to other adults in the schools at staff meetings or in the staff rooms at break time, and I made sure to provide a brief oral overview of the research and its implications when meeting visitors or other staff.

Children

I developed different processes to aim for informed and ongoing consent from children. In this research project, children are figured as active agents with rights to make decisions about issues which affect them. A rights-based approach implies that even young children should be the final arbiters on their participation, but there is a persistent tension in childhood studies research where parental, or gatekeeper consent (on behalf of children) comes first (Gallagher Haywood, Jones & Milne, 2010; Heath, Charles, Crow & Wiles, 2007). It would have been challenging for me to exclude children from interacting with the research at some level due to the class-based context of my observation, but because of the visual nature of my research methods, I felt it was important that I actively seek the permission of adult caregivers in terms of the level of participation that they and their children were comfortable with. To do this, I

used an opt-in process, where caregivers were supplied with information sheets (Appendix A) and consent forms (Appendix B) and encouraged to discuss the study with their child. I also arranged information evenings where I gave a short presentation about the study and answered questions, as a standalone event at Village School (with very low attendance) and as part of broader curriculum information evenings at Town School, which were much better attended.

Conducting research in line with the UNCRC "requires that, in appropriate circumstances, children are given information (Articles 13, 17) and adult guidance (Article 5) while their views are in formation, in order to be assisted in determining and expressing what will then be both a formed and informed view (Article 12)" (Lundy & McEvoy, 2012, p.140), so while consent from parents was deemed essential, it was just as important to develop ways to share information and afford children ways to express their consent. I developed a leaflet, specific to each school, explaining the research and the children's role in it should they choose to participate (Appendix C) to structure parents', teachers' and my conversations with them. Most children were not able to engage with the text independently, so I used pictures on the printed leaflet to identify myself and show some of the methods I would use. I suggested five levels of participation that children could consent to with thumbs up or down tick boxes:

- I want to join in with Chris's research
- I am happy to be in photos
- I am happy to be in videos
- I am happy to have my voice recorded
- I am happy for Chris to use photos of my schoolwork

I used this prepared text to introduce myself in person to the whole class with the images on the electronic whiteboard during my first visits. My intention was to go through the leaflet and the consent options with children in small groups, which I did with nearly all children in Village School, but my experiences of trying this guided the decision not to do this with the (nearly 70) children I might spend time with at Town School. As I recount below, the process did not feel particularly meaningful, and would have taken a lot of time, which was better spent getting to know the children at Town School through joining in with their play and learning.

During soft start, the first part of the day when children come in and choose where they play, I knelt down at a table in the centre of the room with my consent forms, some pens and my video and sound equipment. Understandably, not many wanted to come and join me when there were more exciting things to play with but one child was very interested in my recording equipment and, after completing her form,

started rounding up others to come and speak to me. All but two consented to the five points on the back of the form, but I found myself rephrasing them as questions, not statements so they made more sense. Even so, I was left with the feeling that the kids were unclear (at best) on what I was going to be doing. We were inside, not outside, and they had only been in school for a month - what context do they have for postgraduate research at a university? They were happy to 'join in' (the term that I used on the form), but this felt like more of a general sentiment than an informed choice.

At that table, on that first day, two boys were quite clear that they didn't want to join in. I accepted that, and told them that they could whenever they wanted later in the term. Just a week later, and throughout the term, these two emerged as some of the most vocal in wanting to show me things or film their play, which I understood as consent to participate in spite of their initial response. They were (more) informed about what the process of participation meant and what I was interested in, but I couldn't really say that they had any idea of how the videos would be used, or what form my writing would take. The BERA Ethical Guidelines state that in situations where participants are "unable to be fully informed about the implications of their participation… researchers and participants should negotiate consent within relationships of mutual trust, the credibility of which depends on the integrity and trustworthiness of the researcher" (2018, p. 9). It was in this spirit, and in light of my developing understanding of the fluidity of consent/dissent that I focussed on my relationships and intra-actions with the children as the basis for negotiating and understanding consent and dissent.

Informed consent is connected to epistemological assumptions about the nature of information and how knowledge or consent is communicated or constructed between researcher and participant (Klykkel, 2021). Dominant forms of informed consent are based on a 'transmission' or linear model of communication where information is constructed by individuals and transmitted to a discrete other to be processed or received, and then acted upon (Cargill, 2019). Recent literature, particularly in the field of ethnography (Delamont & Atkinson, 2018), is highly critical of the implications that this model has on ethical practices in social research, especially as it clashes so obviously with the epistemological stances taken up by most contemporary researchers which frame knowledge as something which is co-constituted through processes of social interaction or experienced through relationships. When extended to feminist materialist and agential realist understandings of how knowledge comes into being, there are obvious points of dissonance with conventional strategies for

ensuring informed consent.

Thus, while the anticipatory procedures outlined above were necessary for ethical approval of the project, informed consent in this context must be understood as an ongoing process, not an event. Children might be willing to talk to me or for me to take photos of them at the start of the morning, but not later on in the day and I had to make space for this; our understanding of what constituted the research would emerge through our worldly relations.

I was aware of some of the challenges of negotiating informed consent in extended and ethnographic research with children in formal education and strategies used to mitigate them, particularly through the accounts of Gallagher (2004), Kustatscher (2014) and Blaisdell (2016). Working with slightly older children, Gallagher used stickers for children to signal whether they wanted to participate (be written about in field notes) at the start of the day. He lays out how this apparent solution was quickly troubled, becoming implicated in differences between researcher/child understanding, children's playful manipulations of the materiality of the stickers and various power struggles. He concludes that while the stickers stimulated interesting research situations, "they did not serve the intended purpose of negotiating consent… they did not enable the children to make an informed decision about whether to participate in [the] research or not" (Gallagher, 2004, p. 86). In a similar setting, Kustatscher (2014) tried to make the opt-in/out process less binary and more situated in time by using magnets, which children could shift from one zone to another throughout the day. In her research, the magnets also emerged as unexpectedly active agents in the classroom and researcher-child dynamics, often making visible the importance and power of relationships in the consent process. Because she was working with younger children and babies, Blaisdell (2016) opted to take a relational approach to negotiating consent from the start, including attuning to young children's expression of *dissent*, which can also be understood as situated, temporal and flexible.

The outdoor environments that I was working in meant that stickers or magnets would have been less meaningful or practical than in a classroom context. I considered using armbands or stickers, but decided to concentrate my energy on attending to how, when and with whom I was implicated in ethical relationships, especially as I spent more time with certain children than others. Klykken (2021), also using a feminist materialist orientation and video methods to research classroom practices, describes informed consent as a continuous process, in which not just researcher and participants are active agents. Behaviour patterns, cameras, notebooks, and in her case, even children's computers or phones shift how consent affects the ways in which researchers can and should use data. I tried to acknowledge and use this temporality to make it clear to children what was happening. I used the transition from indoors to outdoors as a time to check in and remind them what I was going to be doing. I used bright orange notebooks for my fieldnotes to make it very obvious when I was writing about what was happening, and before filming or photographing specific children, I

asked questions like "Can I film what you're doing just now so that I can remember it and write about it?" Some of the children enjoyed teasing me about how forgetful I must be if I had to write everything down or take pictures all the time.

Dissent was not always vocalised or expressed in response to this type of questioning. As Dockett, Einarsdóttir & Perry (2012) describe, children express dissent in various ways including verbal or physical responses, disengagement or disinterest and it was necessary to attend to the behavioural responses to my presence and act accordingly, either clarifying children's assent or backing off.

Visual methods

The text-based mode and linguistic focus of dominant qualitative research allows researchers to respect participants' right to privacy and confidentiality relatively easily by anonymising data. When using visual methods, such as photography and video, ensuring that research participants are not identifiable becomes harder if the researcher wants to include (re)presentations of the visual data in the analysis and dissemination of the project. Some researchers choose to pixellate children's faces or identifying features when referring to specific data, or use line drawings of images (Heath et al., 2017) to selectively remove details, while others argue that blurring techniques are problematic in terms of (literally and figuratively) erasing children's identity and agency in how they are represented (Coxet al., 2014).

Texts on ethics in visual research suggest that the principle of non-maleficence requires researchers to weigh up risks associated with how findings are disseminated, and potential consequences for participants (Graham et al., 2013). I did this before, during and after my fieldwork, and made relational decisions based on an honest appraisal of what levels of anonymity I could offer, the subject of my research and the types of risk associated with participants or research sites being inadvertently identified.

Geoffrey Walford (2018, p. 519) argues that in our digitally connected age, ethnographers must acknowledge that "there is practically no chance of maintaining anonymity of research sites" and should instead work towards positions of openness with participating schools and readers. I agree with him that it is increasingly hard for ethnographers to use thick description or documentary analysis without providing a determined reader with enough data points to triangulate a basic internet search. For example, if one was to quote a section of a school handbook, a blog post , or even a school improvement plan, it would be relatively easy to search and find publicly available PDF documents on the school's own website or social media accounts. Alongside more bounded digital tools for learner and family engagement, the public visibility of schooling is increasing, particularly through schools' use of social media to communicate with families and other external stakeholders (Cox, 2014) and for teachers to develop professional learning networks (Greenhow et al.,, 2020; Greenhow et al., 2021). During the process of identifying partner schools and mapping how

outdoor learning was being presented, I was surprised at how many photographs of children's in-school learning were publicly available on unsecured school websites and blogs. Although I trust that the schools all had consent for the children to be pictured in such contexts and there were few identifying features such as names, it highlighted how ubiquitous digital images have become in (re)presenting and documenting learning for various purposes, particularly in environments or contexts which align with policy discourses like outdoor learning. I also had the feeling that few school leaders or teachers were spending as much time or energy as I was stressing out about how and where I could use specific images in line with what I had agreed with a child. The rapid adoption of virtual learning environments during COVID-19 lockdowns has changed these practices somewhat, but digital images and videos still play a role in representing the eco-certified child (Ideland, 2018).

In light of these thought processes, I decided to be open with caregivers, children and teachers about the fact that I could not reasonably guarantee anonymity, and would be using images in public presentations and articles; being clear about this was part of the process of informing consent. For most children, the risks associated with this were negligible, but it did guide some caregivers' choices, particularly for looked-after children or where there were other potential safeguarding issues: in these cases, caregivers were happy for the children to participate in the research, but not be depicted in publicly available documents, which I respected, minimising the potential for negative impacts on those who might be at risk.

Visually documenting the non-human actors involved in the research also had the potential for identifying schools and therefore children. Tree species, garden designs, maps and views all provide details which might impact on privacy, but are also intrinsically important to the ethnographic place (Pink 2021), so in places I have been selective with which images I have used directly, using transcription or drawing where necessary to limit identifying features, just as I have with humans.

Visual methods, particularly when digitally presented, also come with the risk of appropriation and use outwith the intended initial audience and purpose (Cox, Drew, Guillemin, Howell, Warr & Waycott, 2014). I wanted my research to be close to practice and accessible, so there is no easy solution to this. One way that I have tried to maintain control of images (of my own and on behalf of participants) is through making explicit that copyright of images and video remains with me when material is shared in public.

4.7 Challenges and limitations

4.7.1 Introduction

In the previous sections, I have outlined the research apparatus, how I went about my fieldwork and tried to foster caring, ethical relations with those involved in my research. I tried my best at the time, but I learned a lot through the process, and I want to be honest with you about some of the challenges I experienced. This also allows me to engage in another diffractive process which will affect changes in the rest of this project and anything I go on to do next. Many of the challenges coalesced around ethical issues and these were linked to pragmatic limitations of the research and the realities of what I was able to achieve with modest resources and time. COVID-19 also significantly impacted on my fieldwork and write-up, which I acknowledge here.

4.7.2 Consent and ethical relations

I spent a lot of time on the anticipatory, procedural ethics before gaining access to schools, where now I can see that time spent working it out with children and teachers, and trusting to the processes would have been more beneficial. I think that this was starting to emerge at the end of the first block of fieldwork, and would have strengthened had the second block not been interrupted by COVID-19.

Predictably, consent was the main location of dissonance for me, as several of my assumptions were challenged, creating uncertainty. Firstly, in terms of family consent on behalf of children, it was only after considering why some caregivers had not responded, that I realised that the whole process rested on the assumption of caregiver literacy. More up to date figures are not yet available, but prior to a strategic programme of initiatives, the Scottish Survey of Adult Literacies in 2009 showed that 26.7% of Scottish adults may face occasional challenges due to literacy difficulties, and within this, 3.6% (one person in 28) "faces serious challenges in their literacies practices" (Scottish Government, 2010b, p. 8). Lower literacies capabilities are also linked to poverty. Family engagement beyond sending letters home in schoolbags is challenging for research projects of all scales, but particularly for individual researchers who are not already involved with the community.

Choosing opt-in rather than opt-out consent almost certainly meant lower rates of caregiver consent. Of the 22 children in the P1/2 class at Village School, 18 caregivers consented fully to their children taking part in the project. Following up consent forms was even harder at Town School, with three classes to move between. Caregivers of 14 of the 73 children in the two P1 and one P1/2 classes did not return forms. Opt-in consent, particularly when dependent on caregiver literacies thus has the potential to create a source of bias or exclusion in research of this sort. Several of the children whose families did not consent to their participation were the most interesting to observe, and arguably got the most from being outdoors, for various reasons. To me, this suggests that children from families who perhaps do not have the capacity to

easily return paperwork to school may have more to gain from school-based outdoor learning. I would have liked to explore this further with these particular children, but was not able to due to the consent process that I put in place; even if they wanted to take part, I did not have family consent.

4.7.3 Ongoing consent and child-memory

I have actually met some of the children from my research project in different contexts recently, mostly while attending sports events with my son, and this has created a significant diffraction pattern in terms of how I think about the possibility of informed, ongoing consent with young children after the fieldwork phase. Admittedly, it was about 18 months, including all of the COVID-19 pandemic and significant associated shifts in their lives, but of the three children that I met, none of them recognised me initially, or remembered me spending time with their class. I reminded them of the context in which we had met, but the only one who seemed to genuinely make the connection is a child whose family has a dog from the same litter as mine - it was through this non-human link and triangulation relationship that she was able to remember me being in school with them. This raises a lot of questions about how meaningful consent is in the long term, particularly with children at certain stages of development: they may legitimately understand the context and purpose of the research and how their participation will be represented at the time of fieldwork, but it certainly seems unlikely that their remembering affords consent at the time of publication or dissemination, even in studies like this, where I spent at least 30 hours with their class over two terms. This creates a power and knowledge dynamic that I am not fully comfortable with - I am analysing micro-interactions and spending a lot of time and energy thinking about events that they maybe do not even remember. I was probably a pretty minor part of their P1/2 experience, but my time with them is the foundation for my PhD, four years of work. Am I ascribing too much importance to intra-actions which were not as significant as I am making them out to be, and thus using events in ways which are unfair to the children involved?

The dominant paradigm would suggest that my position as researcher affords me the 'distance' to undertake objective analysis of these moments, but in contrast, my ontological position implicates me in the world right alongside the kids and the critters. I see the synergies between action research, auto-ethnography, research-with/by children and worlding approaches more clearly having tried to implement parts of them with limited success.

4.7.4 Coronavirus (COVID-19)

I began my fieldwork at Village School in September 2019, and at Town School in November 2019. I planned to spend more time at Town School up until March 2020 while beginning writing with the first round of data, then split my time between the

two schools for the busiest term of the year before summer, giving me almost a full year of observations. However, by 23rd March 2020, all schools in Scotland and the rest of the UK were closed and the first lockdown was put in place (Scottish Parliament Information Centre, 2022), with children and teachers doing their best to continue their mandatory education remotely. Schools did not reopen until 11th August 2020, but with no non-essential visitors, and closed again in January 2021 until after the Easter holidays. This meant that there was no practical or ethical way for me to continue with my fieldwork, and I agreed with my supervisors to work with what data I had already gathered. I managed to contact some teachers I worked with, but they were all so busy juggling multiple projects and their own family life that it felt right just to give them the space they needed, which created an additional barrier to being able to reengage with schools. Having the direct experience of living with a teacher who was working in a management role at the time schools reopened and following guidance form the University, it was clear that the best available option for me was to honour the space that schools and children needed.

5. Agential cuts

5.1 Introduction

The following sections might be considered agential cuts which create diffractive readings of how the component agents of the phenomenon 'human-nature relations in school-based outdoor learning' came together at the two schools where I spent time. Using the ethnographic apparatus outlined in the previous section, I will try to figure some of the intra-actions between agents (human and non-human), beginning with processes which knot them together. This will create patterns which may produce valuable insights into how children and teachers come to know the outdoor environments in which they are learning, as well as into potential pathways and barriers to LfS that emerge during school-based outdoor learning.

5.1.1 The process of making agential cuts

I outlined the basic premise for why and how agential cuts emerge in relation with my research apparatus in Section 4.3, but it is worth adding some detail about this part of my ethnographic inquiry. In qualitative, representational ethnography, where analysis is considered as integral to the act of ethnographic *writing*, a process of coding or analysis is often implicit; the researcher, and their experience of the phenomena is the conduit through which fixed, clarified understandings can emerge and be communicated. Post-qualitative and socio-material researchers who are critical of coding argue that it can create (an artificial) distance between the researcher and the data (or world). This in turn increases the likelihood of narratives being shaped to fit themes, and therefore acting in a territorialising manner or ossifying concepts rather than creating space for new or multiple understandings to emerge (Jackson & Mazzei, 2012; Mazzei, 2014).

In contrast to coding or thematic analysis, an agential cut "resolves the indeterminacy of relational entanglements and produces a boundary…" while remaining "provisional" (Fenwick et al., 2015, p. 156). What I present below are just some (of many) potential ways of making sense of human-nature relations in school-based outdoor learning. Agential cuts do not try to separate or disentangle phenomena but should make space to "discuss difference with less positivism and essentialism" (Stark, 2016, para 2). Lisa Mazzei (2014) argues that this type of diffractive reading can create "a spreading of thoughts and knowledge" (p. 744), rather than the narrowing down to single truths of data saturation, and it was this process of reading data sources and actors "*through*, *with* and *in relation to* each other" (Mazzei, 2014, p. 744) which I aimed for in the ways I worked with the data. While there are increasingly rich outputs of this type of research, I found limited pragmatic sources suggesting specific practices for diffractive analysis. However, several sources did guide how I related with my own data. In her rigorous enactments of new materialist ethnography

Cornelia Schadler (2019) suggests a process of *referencing* across multiple forms of data, and then using these references to *rebuild worlds* in different ways, from a range of starting points, often following different (human and non-human) actors. Jane Mereweather's (2019) work on listening and documentation practices with young children provided practical insight on ways to (re)present young children's ways of being in socio-material worlds and I used Hillevi Lenz Taguchi and Anna Palmer's (2013) practices of boundary-making to attend to how materiality and affect might relate.

To make the most of the multi-modality of the data I compiled, I made digital out-of-field records (Delamont, 2020) for each day I spent in schools. These brought together primary data such as digital photographs, screenshots and links to video clips, transcripts, audio clips and field notes. These were then enhanced by rhizomatic connections to websites, videos, texts, supporting literature and tangentially connected sources. I could interrogate these records with a basic search function, which I used to compile an overview document with a summary of each day's observations and significant moments and map connections across the different environments and processes. From there, I essentially spent significant amounts of time being with the data in different ways, particularly in relation to the video and audio data: I was able to replay, rewind, transcribe and slow down moments which would have gone unnoticed had I not been filming or recording. Editing, and 're-reading' videos multiple times and for multiple purposes allowed me to follow different actors in the same intra-action, which fed iteratively back into the out-of-field notes and kept pushing me to look beyond the human. The timing of my writing up and the interruption of fieldwork due to COVID-19 meant that while I was working with the fieldwork data, I was also developing the previous cartography chapter, so connections and lines of flight emerged between the two in further generative cycles.

The ethnographic writing and imaging which follows is the result of these processes, the "rebuilding worlds" (Schadler, 2019) which comes from the boundary-making practice that occurs when researcher, data collection methods, software and phenomenon come together. They are situational and contingent, but in this context, where I have been honest with you about the process, not necessarily any less *true* than the themes which might appear to emerge out of a more formal process of coding. This understanding of how the research apparatus is implicated in the agential cuts also makes space for me to integrate speculative figurations. These can follow ideas out of the empirical 'did happen' space and into the 'could happen' space, and often emerge from moments where I noticed that something *did not* happen. Following this through within the boundaries of the agential cuts is one way to begin the work of crafting healthier futures.

> In the interest of meeting academic conventions, I will make it clear where this takes place by using this font and formatting.

5.1.2 Overview of the agential cuts

Figurations of nature

To begin with, I look at some of the ways that various figurations of nature emerge through the intra-action of indoor and outdoor learning environments, and through direct, (re)presentational and vicarious experiences.

Collecting

I observed several different processes of *collecting* in different assemblages, which may have implications for the dynamics of human-nature relations as children and teachers come to know the environments they learn in. I figure some of these, and then offer some speculative forms of collecting which might offer different ways of worlding.

Commoning

From this, I concentrate on some examples of commoning between children and teachers and how social, material and discursive environments are implicated in this. Commoning here can be understood as communication, but also as a potentially disruptive and democratic pedagogical practice. These elements of child-teacher commoning, collecting, play, and pedagogical choices are all in relation with a spectrum of intention/attention which has implications for education.

Play (and) pedagogy

Play is a prominent force in Scottish early childhood education in general, and in outdoor learning in particular. I observed different figurations of play and play-pedagogy assemblages between Village School and Town School. These emerged through intra-actions between pedagogical intentions and the physical and social affordances of specific environments: by thinking with specific instances of children's play, we can explore how these manifest in flows of affect which influence children's learning.

Synthetic materiality outside, or outdoor learning and fly-tipping

My fieldwork clearly shows that school-based outdoor learning in early childhood takes place in environments which represent a range of 'natures' or degrees of 'naturalness'. Thus it is important to consider synthetic materiality in outdoor learning assemblages, as well as the ecological: what do the materials and objects that children intra-act with do?

Realising the Ambition (and LfS)

RtA is a vision of ECE which extends with the child from ELC settings into the first years of school, creating space for educators to use experiences and outcomes from the Early and First levels of CfE in creative ways. Being outside is an important discursive component of RtA, but the structures of schooling, and the changes in

staffing between ELC settings and P1 in particular, pose challenges for enacting smooth vertical transitions, particularly in relation to the children and teachers' ability to take their learning outdoors in meaningful ways.

5.2 Figurations of nature

5.2.1 Introduction

If 'nature' is important, how and where does it come into being at school?

My cartography has shown that nature is valued in childhoods, and particularly in the early years of schooling. It is valued for the ways it supports health and wellbeing, enables physical and imaginative play, and for the impact it can have on how people relate to the world in later life. There are different ways of understanding what 'nature' is - it can be considered a social construct or representational signifier (Bonnett, 2004); a nested series of dynamic ecological systems (Morton, 2018) or a place, person or thing to be experienced, connected one in relationship with (Antal & Drews, 2015). Early childhood scholars concerned with how children might develop more caring relations with Earth increasingly advocate for understandings which do not reinforce the historically dominant dualism which separates humans from nature, because children *are* nature (Charles et al., 2018). The concept of childhoodnature shifts focus away from the (universal) child in (homogenous) Nature towards how "the materiality of child bodies and the bodies of other nonhuman entities as relational assemblages allows this new ethical imagining for children and their encounters with place and nature" (Cutter-Mackenzie-Knowles et al., 2018, p. 13).

This, and other ways of thinking about how children and the rest of nature come together, such as Common Worlds approaches (Taylor & Pacini-Ketchabaw, 2019), are useful for post-hoc analysis and progressive practice settings, but dominant ways of thinking about the world still guide and frame much of children's experience at school and beyond. Therefore, it is important to consider and question how children and (the rest of) nature come into relation in school contexts. In this section, I describe some instances of this in obvious assemblages like woodland and gardens, and less direct, but still important classroom assemblages. This process identifies some of the challenges and opportunities associated with fostering generative human-nature relations and provides some of the initial connections into other sections in this part of the thesis.

What is a figuration in this context?

To make sense of those situated relations which bring multiple natures into being, I will use Donna Haraway's concept of figuration and the process of figuring. Early in her writing, Haraway described figurations as "performative images that can be inhabited" and used as "maps of whole worlds" (1997, p. 179), which necessarily involve displacement and the understanding that worlds are simultaneously both literal and figurative. Rosi Braidotti proposed a definition of figuration as "a politically informed account of an alternate subjectivity" (1994, p. 179). The scope for

acknowledging the multiple, perhaps conflicting accounts of multiple actors (not all of whom are human) which can be (re)configured to mean something different is one aspect that motivates researchers to use the concept in critical ethnographic studies where they want to go beyond human subjectivity (Mellander & Wizsmeg, 2016). Haraway's more recent writing uses the term SF to capture the act of making 'string-figures' as a way of storytelling alongside "science fiction, speculative fabulation… speculative feminism, science fact and so far" (2016, p.2).

Again, I find too much energy being taken up with thinking about the complexity/reason for doing this and the big concepts that go with it. I don't know whether I can do this, but I want to try.

So, in this agential cut, the intention is to chart some of the different ways in which nature is figured through indoor and outdoor learning processes at the two schools documented in my fieldwork data. From there, I can read those figurings in relation to other core processes such as embodied experience, play and pedagogy which affect how children come to know nature.

5.2.2 In the woods

The woods in relation to the classroom

I'm at Village School, and we're planning on going to the woods for the first time, rather than the school garden. Right from the start, there are so many stories and experiences that it overwhelms me, and they fill the space left by Mrs D's open-ended approach to how the experience fits in the day and the broader curriculum. Everyone is sitting on the carpet after soft start. Mrs D sits on an office chair in the corner by her desk, quite high above the children. This is where the outside comes in for the first time today, initially through mention of the weather, and then in the form of some early autumn leaves which A has collected on the way to school and wants to show everyone. After some discussion about autumn and the colour of the leaves, Mrs D introduces the idea of going to the woods, saying, "If we go to the woods, do you think we would find anything like this?"

Two boys lead a chant of "No, no, no!", while others call "Yes, yes, yes!" Once these chants are hushed, the swell of stories rises again instantly: L doesn't want to go to the woods; someone shouts, "We might get lost"; someone else says they aren't allowed to take their bike into the woods. Everyone has *something* to say about the woods, whether to the person next to them, or aimed in the general direction of the teacher. Mrs. D distracts them back to the classroom by calling out "Touch your

heads… Touch your knees…"

-

When the woods are brought into presence in this short intra-action first through the presence of leaves and then the concept of 'the woods' represented through words, they are figured as somewhere separate from school, and there are mixed feelings about going there. This could be read as a general antipathy, or even biophobia (Ulrich 1993) towards the environment, but for now, let us just leave it as a whole lot of different perspectives, all coming out at once, with nothing in particular to frame them. For the children, *going to the woods* has no form in school yet, so they try to fill the gaps. This brief presencing of *the woods* is unresolved, but it is figured as a place where you might 'find' things, and of polyphonic emotions and experiences - some positive and some negative.

Later on in the day, the children are back on the carpet, having kept their outdoor shoes and jackets on after morning break. While the twenty children filter in, there are many worlds brought into being through conversation - some are talking about owls with Mrs D, while others seem to be discussing a computer game.

Mrs D begins with, "Boys and girls [sic], can I have everyone looking this way - we're going to have a wee chat before going to the woods, so legs crossed… Shh Shh Shh Shh… Boys and girls [sic], when we go to the woods we need to be aware of a few things. We need to be aware that there might be…"

"A fox!"

"Hold on… some nettles…"

"Ow."

"Why don't we want to touch the nettles?"

- - - Because they sting; they're jaggy! They sting; they're jaggy…- - -

"They *sting* you…"

"See in Granny's garden, see in Granny's garden? There's like nettles and C got jagged by one and there was like a black scratch and a white scratch…"

"And sometimes, people walk their dogs through the woods… So what might there be?" (Mrs D makes a commiserating face)

"Pooh, dog pooh…

"Sadly, some people don't pick it up and put it in a bin…"

"Dog pooh!"

"So be aware of that, because we don't want to stand in that…….If you see glass, don't touch it."

"It might be sharp"

"It might be sharp and cut you, so just stay away from glass. What would be the *good* things about the woods d'you think?"

"Finding stuff!"

"Finding stuff - what do you think we might find?"

Leaves! (Mrs D echoes)

Conkers! (Mrs D echoes)

Sticks! (Mrs D echoes)

Nuts! (Mrs D echoes)

Fairies (Mrs D echoes questioningly)

Acorns! (Mrs D echoes)

A child comes in crying because she thought she might have missed going to the woods, which catches the teacher's eye and disrupts the flow of the conversation. Mrs D gets the children to choose partners and line up one at a time, ready to go out to the woods for the first time.

In this short prelude to the first direct experience of the woods, the complexity of a children-teacher-nature assemblage emerges and a few important features can be identified in relation to how 'nature' is figured here. First, it is clear that even in the classroom there are multiple voices and ideas in the assemblage, which are elicited by the idea/process of *going to the woods* and formed with a range of experiences from outwith school; the environment which children are relating to extends into their broader socio-cultural and experiential ecosystem. This is the beginning of a new activity in a distinct socio-cultural and ecological environment, but nothing is neutral; they are all bringing their own experiences to the table. Second, the linguistic forms used by both children and adult attribute agency to non-human agents, both organic and synthetic: *the nettles* sting you, *the glass* might cut you. Third, driven by a desire to keep the children in her care safe, and limited practice identifying hazards and associated risks with children, it could be argued that Mrs D unwittingly frames the woods primarily as somewhere with things that can hurt you. She uses neutral terms like "be aware", but starting with the 'bad' or unpleasant things about the woods before realising this and asking what the 'good things' are emphasises this frame. Finally, in this assemblage, the woods is figured as *a place to find things*, to go looking for things. At this stage, this is open-ended - it may imply discovery, wonder,

exploration, investigation or collection, but this is the only human activity implied in this conversation.

The lack of a clearly articulated reason, or purpose for going to the woods on this day is notable. As I will show in the other agential cuts, collecting, play and specific learning activities are regular motivations for going outdoors across both schools in different ways, but how nature is (re)presented in these activities, and how this interacts with learning intentions has implications in educational terms, especially in relation to sustainability. On the first two trips to the woods at Village School, there was very little in the way of intention or purpose to the time spent in the woods, which made space for child-led investigation, but also meant that the environment and the pre-experience figurings of 'woods' activity had much more agency in child-teacher-nature relations than pedagogy. Both figurings of the woods as *a place to find stuff* and *a place where things might hurt you* manifest in these first two trips.

A place to find stuff

The process of *finding* emerges on the first day in the woods, primarily through adults' and children's speech and actions of looking. Most of the non-human actors involved have little agency in being found, but we can assume that the rabbits and other diurnal animals avoid finding, while the nocturnal residents of the woodland are not visible, even if they are here somewhere.

As an example of speech and action stimulating finding, just a minute after entering the woods, Mrs D and the pupil support assistant (PSA) stop by the side of the path. When I catch up, Mrs D is holding a black and white plastic carrier bag and some children are collecting fallen leaves and sometimes lichen, mostly from below sycamore and ash trees. One girl is jumping up to pull leaves off the branches, and the children who are engaged seem most excited about showing specific leaves to the teacher - leaves are held out at child arm's length, adult chest height and waved, before being deposited in the bag. They want recognition, a finger pointed, an acknowledgement of pattern or size. The bag fills up; the leaves become objects.

Image 5.1: Child-leaf-teacher-carrier-bag collecting assemblage

Adult languaging (including through bodies and gazes) figure nature through finding in the woods:

Mrs D looks up and points, before looking down at the ground: "This tree here's an oak tree, I think, so you might find acorns beneath it… have a look, look carefully… Can you find any?" Some children's gazes follow hers, bringing the oak tree into relation with them through the specificity of her words and direction.

Image 5.2: Teacher arm-child-oak tree-gaze finding assemblage

Conversely, A, the PSA instructs a child to "Go and see what you can find", an open-ended invitation.

I catch myself asking, "what did you find?", just as I cut the video recording.

This language is mirrored back to the adults by children, but becomes about sharing and showing. F calls me over to see a snail, saying , "I found a massive slug, a daddy slug..." Later, C has found another slug, picks it up and wants to take it back to school. This is something I've observed him do in the garden too.

Image 5.3 slug-child finding assemblage with grit and slime

When we're walking back towards school (in a line, in partners, holding hands), C spots a ladybird on the ground. He and his partner E crouch down to look at it and E picks it up. C immediately wants it:

C: Can it be mine, cos I found it

E: No

C: E, please can we share it. Can I hold it.

Can we share it

E: No - I picked it up

C: I found it, I found it!

Image 5.4: Maintaining possession of ladybird with the intent of presenting to the teacher.

They speed up to catch up with the rest of the class, C constantly asserting his right to hold it and take possession of it due to the act of *finding*. As soon as they're in earshot, they start calling out Mrs. D's name, trying to get her attention. She's in the middle of getting some children to blow dandelion seeds, but the linear nature of the path and how the children are arranged means that there are multiple different conversations going on, including C & E's attempts to show her the ladybird. They're both desperate to show Mrs D, and E is adamant that she will be the one still with the ladybird in her hand.

Image 5.5 Children try to include teacher attention into relation with them and ladybird

When she becomes aware of what they've got, Mrs D makes an affectionate sound of acknowledgment, which attracts other children's attention to the ladybird and four or five at a time lean in to get a look as E lets the insect crawl on her hand, with C still trying to get it onto his finger.

Image 5.6 Looking at found ladybird

O holds out a leaf for it, and someone in the background is repeatedly shouting

"Count how many spots it has! Count how many spots it has, then you know how old it is!" The ladybird tries to fly off - Mrs D tells them to be careful not to harm it and makes the point of trying to draw attention to how its wing cases opened up as it flies away, but only a couple of children will have been able to see. It lands on the ground and C finally manages to pick it up, secreting it in his hand and rejoining the line. Mrs D notices and asks, "Can we leave it in the woods, in its home. You wouldn't like somebody to come and take you away."

Here, she makes an implicit distinction between ladybirds and leaves (collecting/finding leaves and acorns is different from collecting/finding ladybirds) but also consolidates a process of relating with an environment which is beginning to establish - looking > finding > sharing > looking together. This is a potentially important process full of scope for commoning activities, which I investigate further in the intention/attention cut. It can also be read as an example of the *aesthetic* value of nature, the development of which Kellert (2002, p. 130) describes as "instrumental in a child's emerging capacity for perceiving and recognising order and organisation, for developing ideas of harmony, balance and symmetry and for evoking and stimulating curiosity, imagination and discovery."

But focussing on how nature is figured at school, this is a simple but effective example of how even direct experience in a woodland is not unmediated. Even here in the woods, the nature is not just there, passive, waiting for the human children to come and connect with it - those specific, situated natures emerge in relation with the lifeworld of each child, which is affected by multiple environmental and structural agents, only some of which educators can affect. This is why Lasczik et al. argue that educators should

> understand the lifeworlds of the learner as a nexus or interpenetrating series of socioecological milieux which account for not only the external environment and atmosphere of learning, but also the internal states and biophysical responses which come to condition the lived experience of relationality within the home, classroom or educational setting.
>
> 2019, p. 21

In this example, the key agents which contribute to how the figuring of *nature as a place to find stuff* interacts with the children's lifeworlds are the process of looking/finding (established in the classroom as a purpose for going to the woods); the staff:child ratio (which affects pedagogical choices and leads to the class being strung out in a line, partnered up and jostling to be close to any adult input) and the children's desires to communicate their experiences with the teacher, which cannot all be fully satisfied. The challenge for Mrs D. in these examples is to attend to all of those 23 complex lifeworlds in a way which is educative.

A place where things might hurt you

The initial conversations around risk actually carry on throughout the next month or two, spanning the classroom space and then the direct experiences of moving through the woodland. The second time the class goes out to the woods they follow a path where several children get stung by nettles and become angry at the plants, using sticks to beat them down, punishing them for stinging their friends. This is another example of where the nettles in particular are perceived as beings with agency, but without any broader ecological function. Free to explore, the children spread out along the ridge and into an unfenced field, converging at some rope swings which I'm pretty sure Mrs. D didn't know about. After reflecting, this prompts her to try and engage the children in identifying potential hazards as part of a risk assessment, but this happens in the classroom a couple of days after, removed from the environment and segregated from any planning about the purpose of future visits to the woods. They do a good job of identifying potential problems, and the teacher seems happy with the outcome, but there is hardly any consideration of severity, probability or potential benefits. After thinking about the woods, we go to the garden for the rest of the morning session. I see some of these hazards affect children's intra-actions with the environment over the coming weeks: as well as noticing insects, leaves, mosses and sticks, the children nearly always notice glass, even if it's not broken and tell an adult. The one time that we see a dog and a human, everyone freezes, absolutely silent until the bemused man and his elderly dog have passed through our spread out group.

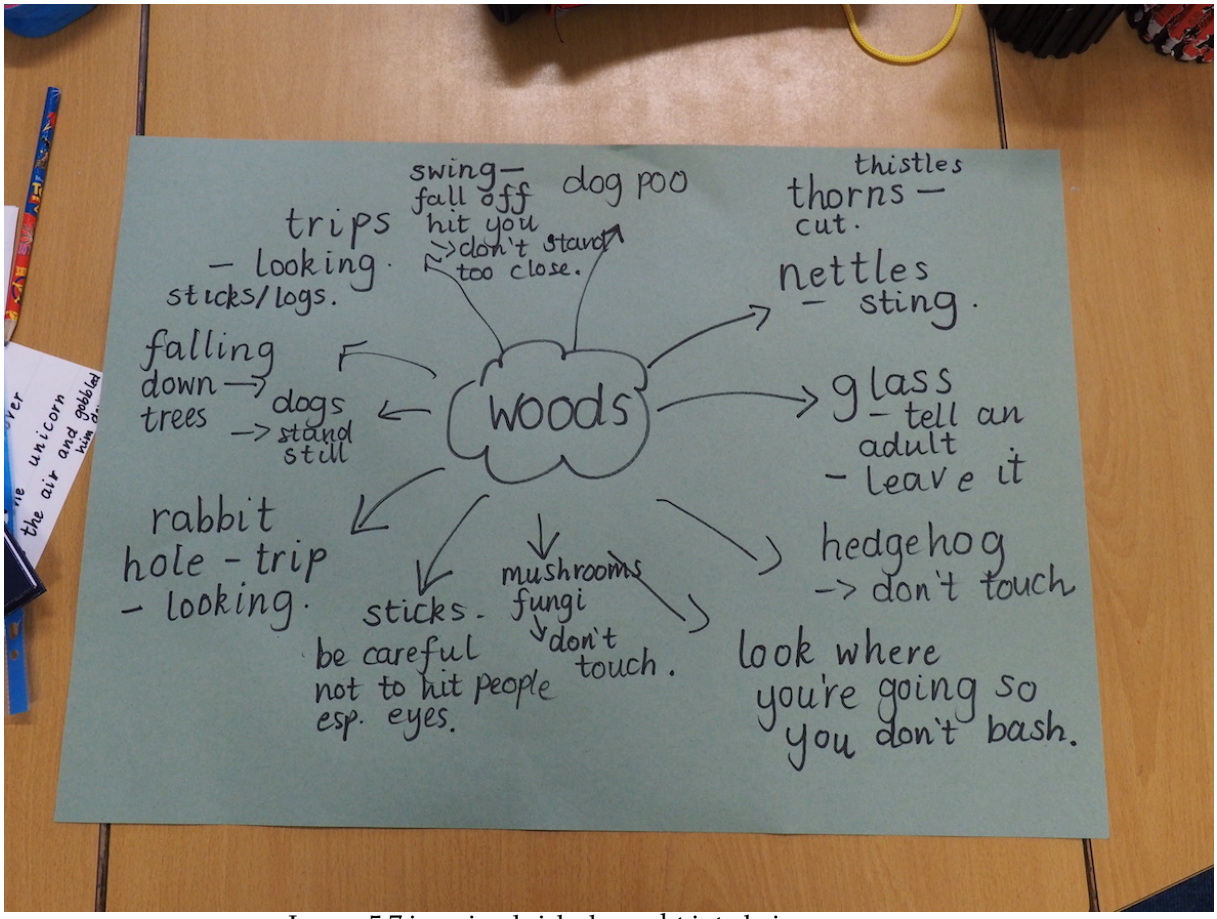

Image 5.7 imagined risks brought into being on paper

In this example, direct experience, reflection and forward planning are disconnected and segregated, dependent on the children imagining/remembering environments and the generic activity of 'going to the woods'. This comes out in the perceived risk of getting spiked by a hedgehog (which is not based on any prior experience, and worked through by Mrs D, but came from thinking about things which might spike you) and some of their ideas of how to manage risk which do not get written down, such as using 'grippers' to help climb trees safely. On the previous visit to woods, when the children had found the swing and dispersed widely in their exploration much of the adults' capacity appeared to be taken up with ensuring everyone was safe and having fun, and strategies for organising or controlling children's movement which worked indoors had been ineffective.

For example, when it comes time to go back to school, she tries to get them to line up in partners as she does in the corridor or classroom, but some children are too far away to hear her and the ones who begin to line up are pulled away by the hill or sit on the log they're standing next to. When they're all there it's hard to engage everyone from the front of the line. Over the the next week or two she and I talk about strategies for bringing everyone back together, establishing boundaries and communicating in circles (which always seems so much easier outside), which should

increase the adults' capacity to concentrate on interactions with the children.

Having a reference point to talk to children about risks created another agent in child-nature-intra-actions in terms of "what we do/don't do" in certain situations. This appeared helpful for freeing up teacher capacity to concentrate more on pedagogy, but demonstrated the importance of framing and action possibilities: hazards were identified and foregrounded without any conversation about potential benefits .

> Speculation:
>
> What would be the best frame or value to guide this sort of outdoor learning in order to keep everyone safe and encourage meaningful engagement with the learning environment?
>
> Respect? Respect for the world, for each other and our selves.

5.2.3 In/out of classrooms

The short vignette describing the prelude to Village School's first visit to the woods showed that (imagined) outdoor environments can be brought into classrooms through discussion or narration, but natures are also figured indoors in other ways.

As objects for sharing and as inert materials for making, counting or shaping

Further to the example of the leaves which A brought in, there were other instances when children at Village School brought in natural 'objects' to show the class, but rarely were these stimuli connected to other experiences in a way that might support deeper learning. One week in September, J brought in a bag of acorns, which she showed to the class in the morning, and then wanted to share out. This stimulated a conversation where most children were able to articulate that they were the seeds from a tree and that some mammals might eat them through winter, but got the words oak, acorns and pine cone mixed up. However, this did not lead to any responsive planning from Mrs D (see section 3.5.7 and 5.8). The following week, C and E did the same, bringing in a carrier bag quarter full of plump green acorns, but this time they planted a few in pots, thinking to grow them on as seedlings.

A month after A first brought in autumn leaves, the class read a story called Leaf Man, beautifully illustrated with images made of collaged leaves. They go out to the woods to collect leaves again, which are brought back into the classroom to make pictures. There is no classification, naming or identification, but the leaves become material to stick down, textures, shapes and colours.

Image 5.8 Drying sycamore, wych elm, oak, willow leaves-table-PVA-blank paper image making

Image 5.9 Butterfly imaging with willow leaves

I also observed this in the garden.

We are going to the garden to do some sort of scavenger hunt. L is tasked with taking a box of sticks out from the classroom, to the garden, which I don't understand until I see that there are other things coming out, which correspond to a laminated sheet. The activity involves the children finding specific numbers of different natural things and using them to 'make a picture', so it is primarily a numeracy activity focusing on number, numerals and digits up to 10. Some of the things are present in the garden, and others, such as pine cones, conkers and acorns are not, so they are brought out in plastic tubs, which are laid out for children to 'find'. Most children do make nice patterns with their collections, but one or two are confused because they know there are no coniferous or oak trees in the garden.

Image 5.10 Taking sticks from inside to outside for teacher-initiated activity

Image 5.11 natural materials held in fossil-fuel derived containers taken from classroom to be used in teacher-initiated activity

I include these observations here just briefly to make the point that nature *is* present in the classroom at Village School, but not always in connected or coherent ways, and not often with the learning 'about' or 'for' of environmental education (see section 3.6.4). Without planning which specifically considers how and why children relate to the non-human natures brought into the classroom and the purpose of their relations with them, they become passive materials with no context rather than part of larger connected ecology.

Weather

In both schools, I observed that the weather played a part in morning routines, again mostly through language and communication between teacher and children, but it could also play an active role in the indoor/outdoor dynamic, and thus the range of other agents available for children to relate with. Tonya Rooney, (2018) argues that in the context of global climate breakdown, "it is time for early childhood environmental education to directly attend to the pedagogical significance of child/weather relations" (p. 2). The start of the day for most classes usually involved a process of situating in time and place, with discussion of the day, the date and the weather. At Town School, one teacher calls it 'weather blether' [blether is a Scots word meaning chat] and instructs a child to "go and get your weather blether specs on and have a look" out the window. Sometimes the responses were simple and verbal, such as "windy and snowy", but other examples demonstrate the multimodality of children's communication (Edwards, et al., 2011; Hackett & Somerville, 2017; Hackett

& Rautio, 2019), how important direct experience is in how they make sense of the world and again provides insight into how children attribute agency in natural systems.

For example, on a windy day at Village School, someone says "I saw the trees going…" and waves their arms side to side: the best way to communicate is to demonstrate by *being a tree*, and in this worlding, it is not clear that it is the wind blowing the trees - agency seems to belong more to the trees. On a frosty day, children share things they've encountered which form their understanding of this type of weather and the processes associated with it: "my puddle was completely iced", "the water in the puddles got frozen", and "when you try to hit it, it was just solid".

Image 5.12: Freeflow access to the deck affords the emergence of a melting frost-water-paintbrush-child assemblage

At Town School, the weather also dictated how the outdoor environments were accessed from the classroom and, therefore the intra-actions that could take place. On warmer, less windy days, most of the P1/2 classes would have the door to the deck and playground open when children were engaged in self-directed play, so there was freeflow access to the courtyard space. On cold, wet and windy days this was much harder to maintain and the doors tended to be unlocked, but closed. This did not necessarily deter the children who wanted to be outside, but it did make it harder for teachers to maintain any relationality with what was happening outdoors. The weather also entered the classroom through intra-actions with child-clothing and child-shoe assemblages, in terms of what had to be 'put on' to go out, the legacy of wet and cold weather on different pieces of clothing, such as gloves, shoes and socks, and the time and energy it took both children and teachers to organise getting dry inside.

Image 5.13 A child has stuffed blue paper roll into shiny patent leather shoes and placed them on a radiator in an effort to dry them out after playing in the rain while wearing a dress and tights.

School design in the classrooms also affected the availability of certain natures. The oaks and sycamores of the woodland were no more than 50m from the P1/2 classroom, but the Victorian design meant that even views of the trees were limited. The windowsills were well above child eye level and when it was sunny, the blinds often had to be lowered. To go outside, children had to go into the cloakroom, then tended to be asked to line up in the corridor on the inside of the classroom, sometimes waiting for several minutes for the whole class to be ready. Weather, and the non-human community outside were only marginally present when indoors.

Image 5.14 The trees can barely make themselves known in the classroom when perceived from child height

In contrast, at town school, the windows and doors were full height, but with limited complex natural views within close range. The freeflow access to the outdoor spaces was also affected by the interiority of the school design: outdoor clothing and footwear was kept in the cloakrooms, which were on the 'inside' of the classroom, meaning children walking through the dry classroom in wet shoes. It sounds minor, but the weather also significantly influenced teacher presence in child-nature relations outdoors at Town School, as when teachers were dressed for working indoors, it was more of an undertaking to be present with smaller numbers of children outside. When the grass was wet and muddy, one teacher also expressed that it did not feel safe for her to walk across the playground from her classroom in case she slipped, so she would try to engage or call children in her class in from the deck area.

(Re)presented through texts

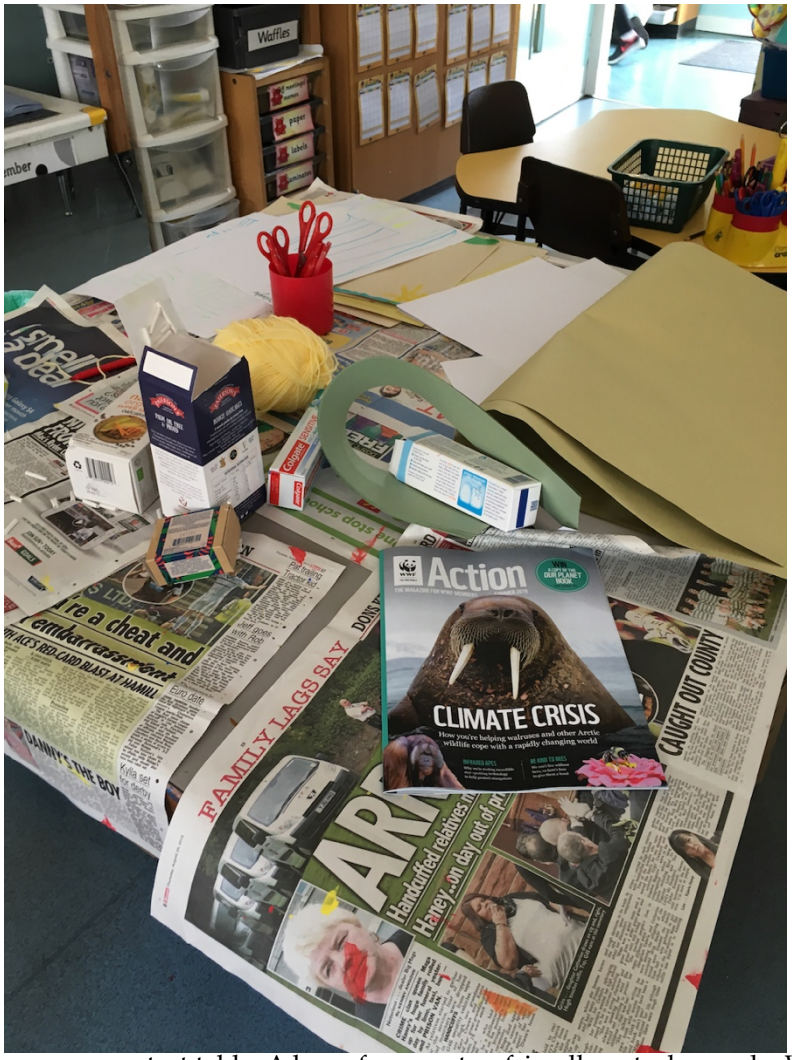

Image 5.15 Newspapers protect table. A box of orangutan-friendly oatcakes and a WWF magazine about the climate crisis are available for teacher-framed open craft activity

Dominant understandings of nature experience tend to distinguish three types: "direct, indirect, and symbolic or vicarious" (Kahn & Kellert, 2002, p.117). *I am trying to resist subdividing my observations like this to make it clear that all of these influence emergent teacher-child-nature assemblages, but in some places, it is all I can do just to chart some of the sources of vicarious experience that many children came into relation with in class. It seems obvious to state that children encounter representations of nature at school through books, magazines, videos, computer games and other media, but there is a risk that, as with other topics where discursive representation or invisibility creates significant (political) affect, that there is limited critical evaluation of what these texts might do.*

A full ecocritical discourse analysis of the texts children engaged with or talked about is beyond the scope of this study, but I had intended to perform a structured cataloguing of texts in each class in the third term of data collection, which was cut short by the closure of schools (see section 4.7). There is a significant but fragmented lineage of interdisciplinary research analysing representations of nature in children's texts (Marriot, 2002), particularly concentrating on children's relations with animals

(Melson, 2001; 2013) bears (Hayes, Prince & Convery, 2020, science textbooks (e.g. Gugssa, Aasetre & Debele, 2021; Lemoni et al, 2013; Sharma & Buxton, 2015) or in specific cultural contexts (e.g. Goga et al., 2018). Most of these studies are motivated by a concern that significant amounts of children's knowledge of nature comes through media or literary representations, potentially at the cost of direct experience, but other scholars have provided close readings of specific texts or themes (Kidd & Dobrin, 2004; Curry, 2013). Since the publication of Robert Macfarlane and Jackie Morris's book *The Lost Words* (2017), a 'book of spells' for nature, there has been some increased attention to how nature appears or does not appear in children's texts. A crowd-funded campaign raised over £25,000 to purchase a copy of the book for every school in Scotland (Beaton, 2018) and conservation organisations have developed resources to encourage its use (John Muir Trust, 2018).

Without the close critical reading of specific texts, my main impression when engaging with child-nature-media assemblages as an adult was the risk of confusion. Within texts, there was confusion or mixed-uppedness of species and place, there was anthropomorphism, and globalised decontextualisation which might have created confusion between the texts and local places, ecosystems and biomes. These different, perhaps problematic characteristics of the assemblage are only relevant dependent on (educational) purpose and intent, but must have some affective influence on children's emerging ways of knowing the world.

Picture books play a role in the socialisation of children and can support children's science learning (Cleveland, 2015). Further, they are acknowledged as valuable in making sense of experience and developing critical literacy when supported by pedagogy (Roche, 2014). However, there is limited holistic research on how fictional representation of natural systems and beings affect young children's understandings of ecology and environment. While drawing on now dated texts, in his study of animal representation in over 500 children's picture books, Marriot (2002) identified the domestification and transformation of animals to have human qualities as widespread in his sample, and concluded that besides information texts, less than 10 "could be unreservedly recommended as making use of the picture book form in ways that contribute to the environmental education of young readers" (p. 182).

One morning at Village School, Mrs D is reading a picture book to the whole class. She's a very engaging storyteller, and nearly all the children are very attentive, sitting looking up at her, hanging on her every word. The book is about a bear who is hibernating, and his 'neighbours' who pop in to stay warm and have a bit of a party without him. A mouse lights a fire, then is joined by a hare, who has a cup of tea and eats popcorn. They are joined by a badger, a gopher, a mole, a wren and a raven, before the bear wakes up. Instead of being angry, the bear feels left out, and the other animals make sure to make more tea and popcorn to include him. The book

ends with bear somewhat resentfully wide awake as the sun rises, cradling the other animals as they sleep.

First, obviously the book in this example is North American, with animals endemic to that biogeographical realm. In the bioregion Scotland is part of, there are also mice, moles and badgers, albeit different species, but no bears or gophers. The implicit assumption is that young children *know* that there are no longer bears in Scotland, just as they *know* that mice do not light fires, drink tea or make popcorn, so they can infer that this story does not represent a potential reality in the here and now. But approaching the text as having some sort of agency, it must at least make space for the imagined coming together of bears and the mice, rabbits, moles and badgers which the children know inhabit the woods next to the school. It could be argued that the naming of individual animals with species names (e.g. "Mouse came in and made tea") universalises individuals animals (and subspecies) within a genus but it also attributes them personhood in a way that may make it easier for children to identify with them. Following Schwartz's (2002) logic that the closer we perceive ourselves in relation to other relationship partners (including nature), the more likely we are to care about them, this could support care for nature.

The Potawatomi botanist and writer Robin Wall Kimmerer has long argued for forms of English language which attribute personhood to non-human beings, which she thinks children do intuitively. As she puts it,

> Our toddlers speak of plants and animals as if they were people, extending to them self and intention and compassion - until we teach them not to. We quickly retrain them and make them forget. When we tell them that the tree is not a who, but an it, we make that maple an object; we put a barrier between us, absolving ourselves of moral responsibility and opening the door to exploitation. Saying it makes a living land into "natural resources." If a maple is an it, we can take up the chain saw. If a maple is a her, we think twice.
>
> 2013, p. 57

Drawing on an Anishinaabe word, Kimmerer further proposes 'ki' and 'kin' as specific pronouns for non-human beings to avoid the use of the objectifying 'it', an idea which has been taken up in very limited spheres. Regardless of how it is approached, the process of naming and recognising must influence the cognitive frames which are activated, how environments are perceived, and the ways of being which are made possible. However they are represented though, vicarious figurings of nature can be abstracted from direct experience of non-human beings and the reality of what transformative change might look like. It is unlikely that the possibility of relating more closely with the drawing of the generic mouse or hare is enough to

contribute to that here, which is fine, as long as the teacher acknowledges this and critically engages with why the book is part of the educational assemblage.

Clearly picture books, computer games and other texts with representations of non-human nature serve diverse pedagogical purposes. The book in the example above features lovely rhyming rhythms, alliteration and assonance, which contribute to phonological awareness (Melby-Lervåg et al., 2012) and a range of expressive vocabulary (Education Scotland, 2022b). But if teachers are encouraged to have text rich classrooms and use stories repeatedly to develop this as part of policy initiatives such as the Scottish Attainment Challenge (Education Scotland 2022b), then the stories they use have agency in child-nature relations.

At Town school, the courtyard area has raised beds, where some classes have grown vegetables. By now, everything has been harvested. One morning a small group of children are in the reading corner and the teacher comes over to read *The Enormous Turnip* with them while the rest of the class engage in self-directed play. If you don't know it, this is an old Russian folk tale in which an old man sows turnip seeds in spring. One grows so large that he can't pull it up, and he needs to enlist the help of various human family members and pets to harvest it. Eventually, the teamwork pays off and they all share the turnip. The teacher asks the children what's happening on the front cover. Someone says that the vegetable looks like a beetroot; the teacher expands, saying "That's what we grew in our bed!" Another child chips in, stating "Radishes are red." The book begins with sowing the seeds in spring, and someone says, "It's like Little Red Hen!" The reading is interrupted by the arrival of another class.

Here, in contrast to the wild, but anthropomorphised animals in *Bear Snores On*, it is possible to identify how nature is figured in this assemblage through the intra-action of direct experiences, a small group, parallel ways of knowing plants as food and profit-making literacy initiatives. The small group-with-teacher-working-with-a-small-book is enabled by the play which engages the rest of the class, and makes a more dialogical form of reading possible than with the whole class. The colour and form of the root vegetable in the illustration is identified by children as looking like two other plants with similar form and growth patterns, which they have been in direct relation with. Both the school garden horticulture and the domestic subsistence horticulture represented in the book are plants-as-food assemblages which have little in common with the dominant food systems which provide sustenance to the children and their families in 'real life' (see section 5.3.5 on school-garden figurations of

nature). The reference to 'Little Red Hen" is because the early level classes at Town School were using Talk for Writing (Corbett & Strong, 2017), an approach to literacy which is promoted through commercial training and resources for teachers. Talk for Writing at early level involves using specific model texts which are the basis for imitation, innovation and the independent innovation. The educational purpose of this approach is to develop skills for reading and writing, and aligns with the prominence placed on attainment in literacy in Scottish education policy in recent years, and what I observed involved lots of repetition and story-mapping of the same text, including actions for vocabulary. The primary ones at Town School were using the fable of Little Red Hen, another anthropomorphic story featuring an industrious hen who sows, grows and grinds grain to make bread in spite of lazy animal housemates who refuse to help her. When the bread is baked, she eats it all herself. The linking of the two stories suggests that the child noticed they both started with the sowing of seeds in spring, and hints at the potential for eco-cultural coherence across texts, regardless of the intended learning outcome. However, in these observations, beyond the ability to identify plant foods and parts of growth cycles, the grounding of both stories in essentially pre-industrial cultural contexts limits the capacity for any leaning to move into spheres which might support future earthly flourishing.

I'm very aware of the fact that these are thoughts which bothered me as a parent, a researcher and a practitioner before I began thinking about the topic in relation to my fieldwork, and also that I can often come across as an ecological or ideological bore, so a lot of that confusion might just come from me and the way I experience the world. But I take so much inspiration from Debbie Reese's critical and close readings of children's literature relating to and by Indigenous people (American Indians in Children's Literature, 2023), and I wonder what would happen if we paid as much attention to the books we have in our schools/ELC settings in relation to LfS. Nothing is going to change if we're depending on pre-industrial hens and mice to make sense of the world beyond simple moral lessons.

I cannot put it better than Chessa Adsit Morris (2017, p.47) does, citing one of her touchstone thinkers:

> "Most environmental educators interested in ecological thought agree that we need new metaphors - new stories - to create new ethics for new worlds; we need, as Fawcett (2009, p.230) so poignantly states, to 'remember, or learn anew, how to story differently.'

5.2.4 In the playground

Nature in the playground emerged most obviously at Town School, as the courtyard space which children had access to during free play, or exploratory learning time was the same area where they spent most other time at break and lunchtimes. This contrasted with Village School, where the play spaces available at breaks were largely tarmac or monoculture grass football pitch; the garden and woods were accessible only with adults.

The limited time I was able to be at Town School, many of the living beings present in the playground were dormant for the winter, so the child-nature relations I observed were often with less obviously animate things like stones, ice, snow and soil. This meant that the natural elements of the outside space were different to the classroom in ways which were largely to do with what was physically possible and permissible. This was made clear in a few instances in Ms A's class when before and during periods of child-centred play they agreed on what forms of action were appropriate in different environments. Once, while setting out the plan for the morning, she asks, "If you want to run around, where's the best place to do that?", to which the children respond "Outside!" She then asks if anyone wants to go outside, and responds by opening the door.

Another, cold day:

Ms. A: "We can't run inside; there was lots of running and jumping this morning. So if we're really excited and we want to run and jump, where's the best place to go?"

There is a chorus of "Outside!"

Ms A:"Yes, where you've got lots of space to play."

H: "But it's icy outside."

Ms A: "If it's icy outside, what will that mean H?"

H: "No running, no jumping"

B: "No running, otherwise you might slide on the ice"

Ms A: "Oh."

…

Ms A: "If we're not running outside, some people might go, 'Och, I'm a bit bored. I want to run.' Do you think we have to set that rule where we're saying *no running*?"

Some children say no, but there is consensus that that is a good rule.

Ms. A: "Okay, we can set that rule. If *I* wanted to run outside, *I* might choose to run on the grass. Because the ground is hard and it might be less slippy."

D: "One day I slipped on grass."

Ms A: "Well if *you* feel that you might fall, then *you* be safe, okay."

Another day. It's during one of their 'get busy' times, where most children are choosing what to play with from a range of teacher-defined tasks set out on a couple of tables or the rest of the resources in the classroom while Ms A works with a small group on spelling. B and B are playing with cars, zooming them along a cabinet and across the room. It's quite disruptive, and Ms A suggests that if they want to play with them like that then they should go outside, and maybe use the pipes that are out there. They do this, but the play moves in and out of the half open door over the next five or ten minutes.

I think these examples show that Ms. A is trying to guide the class to a collective understanding of the courtyard as a space which affords specific ways of moving and playing, which are distinct from those indoors. Some of this seems to be because it is a safer space for children to move in certain ways, but it also limits disruption of the other play and interactions which are taking place indoors. Bashing, throwing, splashing, kicking, hitting, jumping, balancing and climbing are all actions which are more appropriate outside than inside. I wrote in my field notes, "you *could* throw a full watering can around in the classroom, but the implications of this are different."

"Quiet jobs inside; loud jobs outside"

This might seem an obvious or subconscious thing for a teacher to do, but however it is approached it exerts some sort of force in the assemblage. For example, a net result of this is that the children who choose to be more physical or noisy in their play appear to spend more time outside during child-centred play than others. In a child-centred play pedagogy approach, such as that advocated in RtA and aspired to at Town School, this has implications for how adults support development, as the cycle depends on observation, interpretation and documentation to enable responsive planning (Education Scotland, 2020, p.48). When there is limited capacity for adults to be present across two spaces (in this example because Ms. A is engaged with small group work indoors), the potential of nurturing learning and development through outdoor experiences is restricted, but more importantly in this agential cut, there is no adult relation working in the emergence of potential natures out there. What is notable and potentially useful about the way that Ms A establishes 'what is appropriate where' is that it is not didactic or based on limiting action or avoiding hazards; instead her intent seems to be to develop shared understandings of behaviour which supports the functioning of the class.

Image 5.16 child-ice-stone-frozen soil-bare hand smashing

Image 5.17 a young, but tired silver birch tree waiting for spring

Behaviour settings

As I laid out in sections 3.8.4 and 3.9, the understanding of experience that I am trying put to work here is intended to explore action possibilities in environments as emerging through relations rather than guided by social and physical properties. However, what the above examples hint at, is that in Ms A's class at least, there are specific ways of acting, moving or being which are positioned as more appropriate for specific outside and inside spaces. Other researchers have used the concept of

behaviour settings developed by Barker (1968) and Schoggen (1989) to make sense of how individual-environment interactions are shaped by social and physical contexts, in what Heft (2012, p.34) describes as mutually constituted "naturally occurring, dynamic extra-individual structures" which govern how individuals act in given settings. In settings where power is manifest in the everyday geographies of schooling (Gallagher, 2004), it could be argued that the ways that Ms A and other teachers at Town School try to empower the children to choose where and how they play shows a commitment to child-centred pedagogy and has potential for shaping their ways of being outside. However, the playground at Town School is simultaneously a space for play-in-relation-to-class-time (Mrs C calls it 'exploratory learning'; I heard Ms A call it 'getting busy') and play-as-break-time, with different ways of being in each setting.

This does not seem to cause much dissonance for children, but does mean that the activities of the children who choose to go out during class time are similar to what they do at break, unless there is an adult present to observe and respond to their play. One aspect of the school culture which appeared to have potential for nurturing consistent ways of being across the day and spaces was their use of a specific relational practice approach to behaviour based on the work of Paul Dix (2007). The core values of being Ready, Respectful and Safe were raised by teachers several times in relation to ways of being and playing in the playground, and this was something that I wanted to investigate further in the cancelled spring term fieldwork, as it seemed to offer a potential framework for relating to human and non-human beings that the children encountered.

5.2.5 In the school garden

School gardens have already come up in a couple of places in this thesis: Froebel's clear conception of the Kindergarten as a place where children could regularly spend time and cultivate their own bit of land, alongside significant, knowledgeable adults (Read, 2012); my own childhood experience of establishing a food garden in primary school; the garden at Village School, which has been a feature of the school for decades in one form or another; and the raised beds at Town School. There is a wealth of literature exploring the connection between schools and gardens which I do not have space to consider fully here, covering the historical purposes and the educational potentialities of such gardens as far back as the writings of Comenius in the seventeenth century (Desmond et al., 2003). This literature places particular emphasis on the scope for interdisciplinary learning and the health and well-being synergies between being outdoors and healthful food, and creativities (Collucci-Gray & Robertson, 2022) all of which relate to earthly flourishing and LfS. Some recent studies have used relational materialist and embodied methods to investigate how human-nature relations emerge through the practices and places of school gardens (Green & Dunn, 2015; Gray et al., 2019), finding that engagement was enacted in different, often

more embodied ways and that novel garden pedagogies could emerge, shifting the dynamic between teacher, children and non-human agents in the garden.

This is another overwhelming section for me to think about. Gardens are such vital and multi-faceted places, regardless of where they are and why people are in them, and considering anything beyond what emerged in my fieldwork is probably not possible within the bounds of this study. There's the aesthetics, the control, the care, the time, the difference between making/crafting a garden and enjoying it as a visitor. The variety of purposes. The way that the primary inhabitants of those gardens are plant and animal beings. I've mentioned the concept of response-ability (Haraway, 2008) before, but I remember when it made sense to me of the first time. I had ordered some veg seedlings from Mairi who grows small numbers of seedlings for transplant not far from us - some for me and some for Seori's school - to see how they went and because I was behind in my garden. They were grown in modules and arrived in the morning, each plant wrapped carefully in newspaper. I knew that if I didn't do something for them that afternoon, they would likely die from the shock of their journey. I felt ethically motivated to act to care for those small plants, not just because I wanted them to grow so I could eat them, but because I was implicated in their presence on my bench - I had requested them, and had to honour my commitment, as well as the energy that Mairi had put into raising them from seed. And I knew what I was able to do, how I was able to respond to their needs: I pricked most of them out and transplanted them into my beds and took the remainder to school the following day. Being implicated in relations (or maybe even obligated), but having response-ability. I am struck by how few of the choices or ways of being that we have which add up to 'living more sustainably' are tangible and feature agency like this.

Many accounts of exemplary projects show how pedagogically meaningful school gardens can be (e.g. Williams & Brown, 2012; Gray et al., 2018), but this is contingent on more than just the physical environment or actions. Because of the timing of my fieldwork, and the subsequent closure of schools due to COVID-19, I was unable to observe a full growing cycle at either school, but even this provides insights into some of the challenges and opportunities of garden spaces in Scotland.

Village School garden: a simultaneous space with emergent possibilities

I have already described the garden at village school, and how my initial impression was that it had potential to 'be' many things, and I saw this play out through my observations. As I will explore further in the following sections, the

environment was used as a space for activities with specific learning intentions; it afforded forms of play and physical activity which would have been disruptive indoors; it became multiple child-formed playscapes and patterns, which often persisted over time; and it became a place to encounter non-human others in various forms. What form the child-nature assemblages took was significantly affected by the teacher's agency, and there were regular examples of contrasting happenings overlapping at the same time. Right now, I am going to concentrate on the specific figurations of nature that emerged in the garden - I will come back to play and synthetic materiality in sections below.

Nature-as-food

First, children were brought into relation with nature-as-food through the cultivation of and encounters with small numbers of food plants. In Scotland, the growing season is short but intense, and the most important and labour-intensive time for growing food falls over the summer holidays, when schools are closed. I think the way that the school year does not align with the seasons has an under-acknowledged effect on children's outdoor experiences at school, particularly of growing food, but as my supervisors reminded me, the school holidays do historically align with the Scottish agricultural year (e.g. lambing, berries, and potatoes) only in a way to prioritise children being available in the community, not at school. As Mannion et al (2015) imply, the busiest time of year for outdoor learning seems to be the term before the summer holidays: teachers have known the children in their classes for most of the year and the weather is at its most favourable. Mrs. D mentioned to me that this is particularly relevant to her in terms of the P1 children's development, highlighting how much the children's independence develops over the first year at school. Most classes change teachers at the beginning of the school year in August, with the exception of composite classes or when teachers move stage within the school. Without the commitment and collaboration of several teachers, this makes it hard to support children to engage with the process of food growing from propagation through to harvesting. At Village School a small number of staff and parents spent time in the garden, but Mrs. D was the main teacher involved in growing food, including taking a cross-year gardening group. This meantthat she felt she had agency to harvest the last of the summer vegetables and plant over-wintering crops in the early autumn.

It's one of the first days that I'm going out to the garden with P1/2. As they line up inside Mrs. D recaps what she wants them to do, asking, "E, what are we going to do when we go out to the garden?"

E replies, "Find some vegables first?"

Mrs D, leading her towards a more open understanding of the edible things they might find in the garden, tries "You're going to be looking for some…"

E reiterates, “VEG.AB.LES,” clear that that’s the type of food that you find in gardens.

Mrs D, says “Just vegetables? What else might be in the garden?” Assuming that the mention of vegetables is enough to remind the rest of the class that they’re going looking for a range of things to eat.

T chips in with mushrooms, and Mrs. D gives “fruit” as another category, which lots of children respond to with shouts of “Apples!” Mrs. D passively confirms this while making it clear that they will have to *look* and find out.

Another child says, “I think there might be grapes.” Mrs. D mirrors this back to him: “Do you think there might be grapes?” not shutting down his logic, but questioning it. He responds to this with “Yeah, you did get tomatoes,” which is drowned out by a chorus of children going “Noooo…. Nah!”

In the garden, they come back together after a few minutes of looking for edible things. Some children have spotted apples, and children and teacher together use their hands and arms to point, directing their gazes to where they found them, up high for the apples still on the tree. Corn, cherry tomatoes and a small courgette have all been found in the polytunnel. Mrs. D draws attention to the potato plants which no-one has noticed, asking, “What’s growing underneath here?” The new potatoes are revealed by a P7 helper with a fork, but some children who lost interest have found something else, which Mrs. D notices and draws the rest of the group’s attention to. She asks the children, “Do we know what they’re called?”, to which someone answers “Blackberries”. They’re right, which she acknowledges, but she asks what else we sometimes call them, while holding the little bunch of berries upon for everyone to see. “Brambles!” calls J from the back of the group amidst other suggestions. “That’s right, we call them brambles!” Mrs. D picks several for children to taste.

Image 5.18 child attention is brought to brambles by teacher body and the promise of taste

Some children go back to harvest the potatoes, using small metal hand tools to work through the claggy soil. The small potatoes are thrown into a blue plastic bucket, creating an audible 'thunk' when on target and slowly accruing as different children come and go from this task.

Image 5.19 small potato flies towards blue bucket

It's not been made explicit, but children are either engaging with the teacher-suggested task, or playing on their own terms. Because of the fence and gate, Mrs.

D doesn't need to think about them going anywhere, even if they're not engaged in the task she had intended them to be. A couple of children have picked three sweetcorn cobs, which Mrs. D shows to a small group, who all want to touch the soft corn silk. Both the corn and the potatoes would probably keep growing if left unharvested for another couple of weeks, but clearing the beds means that gardening activities can be spread out over several short sessions across the coming weeks. Later in the day, the cobs have been cooked by the kitchen staff, and the children try a spoonful of corn and cherry tomatoes each. The corn kernels have been removed from the cob and the samples get hurriedly passed round in plastic Ikea bowls with teaspoons, but everyone who wants to gets to taste.

Image 5.20 child-corn silk relations through fingeryeyes

In this short synthesis of observations from one day, I can identify four important features of how the nature-as-food figuration emerges: naming; the identification of several different forms of plants-as-food; the role of embodied communication and experience in perception; and the disconnect between well-intentioned child-food-garden assemblages and the reality of the dominant food system in the UK.

The process of naming the 'types' of food that are present in the garden is an example of joint attention (Reed, 1996), of the adults identifying and noticing important features of the environment *with* the children. Here apples, sweetcorn, courgettes and tomatoes and brambles are all named, but the specificity which the

adults deem necessary for the young children is limited; there is no need to distinguish between the types or the varieties of sweetcorn or potatoes which have grown, but it is valuable to know the locally preferred word for blackberries. What is important, although not explicitly articulated, are the different structures of plant which can provide nutrition to humans. By the end of the session, children can say that food can come from trees, from underground parts of plants, from tall plants which need to be inside and from berries, but this is not explicitly assessed by the teacher.

The ways which they have come to know this in the garden are intrinsically articulated through body-environment relation: first through the direction to *look* while moving around the garden, then in the ways the Mrs. D directed their gaze and attention, just as I observed in the woods. When stationary, she did this by turning, pointing and looking while asking questions, which led to most children subconsciously copying her. When she moved to point out the brambles, the children who were engaged intuitively moved with her, and reached up for berries. On this day, I also noticed just how much the children 'looked' with their hands. It makes me think of Eva Hayward's (2010) term, "fingeryeyes", which she coined to describe the multispecies sensing between marine biologists and cup corals. The children want to reach out and stroke or touch everything, even if they have gloves on, brushing the corn silk, imagining holding a bramble between their fingers as they reach out. By digging around for the potatoes, they feel how they are held by the soil. Then by throwing them into the bucket, they make visible the mass which was hidden below ground, while developing their aim. The harvesting process is another example of collecting as a way to relate with non-human natures.

Image 5.21 independent child-glove-tool assemblages come into being next to raised bed

Because the class at Village School are all going to the garden at least once a week, there are further opportunities for the figuration nature-as-food to emerge, but not all children engage with them. Generally, after a discrete planned activity, usually focussed on literacy or numeracy, the children can choose how and where they play within the garden, which is when Mrs. D and the PSA will begin a gardening activity, with children joining in with if they want to. Over the weeks in the late autumn term, this includes turning over beds which have had a green manure growing in them and planting onion sets and garlic, as well as planting some of the acorns which were brought in. Not all children choose to take part in the gardening activities, which makes it manageable for the adults to support learning about which way the sets go, spacing and so on. At Town School, each class is allocated a raised bed, where they can choose what to grow. In the past some have grown vegetables, others flowers, but when I'm there, most beds are either hard packed soil from children playing on them, or full of plants gone to seed.

Image 5.22 bigger tools and progressive tasks come into relation with white socks and dress shoes

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I find food gardening at this scale interesting to think about in terms of learning for sustainability at school. It is clear that the food grown won't make any direct impact on the food that the children are eating, and unless scaled up drastically at home, growing your own vegetables has limited impact on the environmental impact of food consumption. There will be enough onions for one per child the following year, and they each got a couple of mouthfuls of sweetcorn, so one criticism is that it's largely performative and based on 'nice' experiences removed from the 'real' dominant food system which influences much more of their lived experience. This is particularly true at early level, where the curriculum experiences and outcomes are open and have limited consideration of environmental impacts of food choice and prioritise human health and wellbeing. I don't know the answer though, especially here in Scotland, where it's challenging to grow varied food all year round. I just tried to write a speculative figuring of what it could look like and even when I try to suspend reality and not think about the status quo, it's hard to imagine what sort of localised food solution might work with children. And that's where the school garden at Village School sits right now: planting an onion, tasting fresh sweetcorn or tomato is much better than nothing. When I shared this (less than hopeful) perspective with my supervisors, Beth had a good take on it, which I would like to acknowledge here, as she

has a clear vision of LfS as a whole-school approach. Because of my focus on the specifics of my observations, I was forgetting to think about these early experiences in the bigger picture of children's experiences at school. Outdoor learning opportunities as part of LfS are supposed to be progressive and curriculum-led (Scottish Government, 2016), so while these initial experiences of nature-as-food may be limited when considered in isolation, they could underpin later experiences or provide a concrete experience to act as a counterpoint to more abstract learning about food. Beth's other point was that this type of gardening can *act as a performative statement of values, which are what should underpin a whole-school approach to LfS*

5.2.6 Through encounters with other animals

Non-human nature as resident and consistent but not fully known or connected

Because the children at Village School visited the garden weekly, they were in relation with birds, animals and plants as the year turned, whether they were conscious of it or not. Robin and blackbird were always singing, the beech leaves were changing colour, the apples were ripening. A lot of what I have talked about so far involves relations with other species, but encounters with animals such as insects often had a distinct character. There was insufficient opportunity to collect enough data to draw firm conclusions about these relations and other researchers have written in much more depth about multispecies encounters between young children and invertebrates such as ants and earthworms (e.g. Taylor & Pacini-Ketchabaw, 2015; Ejlertsen, 2019) and there is increasing nuance and criticality in understandings of care and child-animal relations beyond the universalising biophilia hypothesis which underpinned many earlier studies (Taami et al., 2020). While limited, my observations supported the position that child-animal relations are situational and contingent. I think that wherever opportunities exist, some children will find other beings and engage with them; others will not. These encounters might be pleasant, fun, caring or even hurtful to one or more actors, but leaving this up to children limits the scope for such encounters to be truly educational and creates the risk of miseducative experiences.

Image 5.23 A millipede is hard to pick up in gloves

The garden spaces at both schools, as well as the woodland at Village School, were places where children encountered animals such as insects and invertebrates. As most of my visits took place in the autumn and winter, these opportunities were limited, but some children seemed more likely to find and spend time with these beings. As I mention in the collecting cut, these encounters tended not to come about during teacher-directed activities, but at times when children were choosing how to be in the spaces. At Village School, C would regularly find slugs (which he usually wrongly identified as snails) and carry them around; one frosty day three girls found a very cold looking worm and made a 'house' for it; a ladybird was tentatively deposited off the path to hibernate. These children tended to relate with the animals in anthropomorphic terms, sometimes using gendered pronouns. But there was not much they could do *with* them.

Image 5.24 "He doesn't like the rain"

C always said that he wanted to take the slugs back to school. I could not work out whether it was driven by a sense of ownership, a desire for the slug to see somewhere different, or just to have a companion, but these relations were limited to *being with* the animals - there were no real opportunities for learning about or caring for, beyond a generic naming and finding somewhere nice to put them. While the sensory experience and engagement is important (Beery & Lekies, 2018) and concern for the other may support increased inclusion of self in nature (Schultz, 2002), this is where child-invertebrate relations ended in the encounters that I observed. Practice guidelines such as *Realising the Ambition* (Education Scotland, 2020) suggest that such experiences would be a good point for sensitive interaction, documentation and intentional and responsive planning, but this was not possible for either Mrs D (because of the diversity of experiences all happening at once during free play and the demands of 22 children) or the teachers at Town School (because they were often not able to be physically present for extended periods of time with the small groups in the playground). The absence of a more knowledgeable person in the child-nature assemblage here limits the capacity for these encounters to be educative and integrated into the children's other experiences; in an ELC setting where there is one adult to every six children, this may be more achievable, but over the summer holidays, that changes for these young children.

I'm aware that my presence in these encounters also affected the child-nature-teacher relationality, and that's important to acknowledge here, as I did in Chapter 4. Because I was engaging with the children, even just to document their action, it was hard for me not to be 'another adult' in the dynamic. This potentially affected the ways that teachers acted in these encounters, especially as I was perceived as having knowledge and experience in working with children outdoors. At some points I tried hard not to interfere and just watch,

but in other intra-actions I tried to understand what was happening by asking open-ended questions.

Image 5.25 Where now for the caterpillar-child relation?

N and L are playing with water and digging in the mud. They have found a caterpillar. L wants N to find another one. It's crawling around on her hand, and she clearly likes the way it feels. She's holding it in her cupped left hand.

> Speculation:
> It could go lots of different ways. It could be about looking closely as the worm or the slug moves where it wants to, using language and gesture to communicate about how it moves, the differences and similarities between that being and another. It could involve thinking about the place of that being in the ecosystem, in the seasons of the year, in food webs, in energy flows. The children don't know these things, don't have these ways of understanding and the slug can only do so much, so if this is deemed educationally important, then there needs to another more knowledgeable person in the relation, and needs to extend into other experiences. That is maybe easier in an ELC setting where there is one adult to every six children, but doesn't seem particularly achievable with 24 children all doing their own thing. The skill of the educator lies in being

present and able to respond to the human and the non-human.

5.2.7 Reading Figurations of nature through research objectives

Reading this through Research Objective 1

Investigate how children and teachers come to know the outdoor environments in which they are learning.

Considering how and where nature was figured in the early years at these two schools shows that children's direct experiences in outdoor environments are tied up in complex lifeworlds consisting of socio-cultural interactions, representations and direct experiences in other contexts. How teachers frame or figure nature before and during direct experience may affect how child-nature relations and future behaviour patterns emerge, but I observed limited evidence of this being used to support forms of relating centred around care or ecological understandings of the world. At a simple level, this was evident at Village School in the figuring of the woods and garden as a place to 'find' or 'collect' things without a specific educational purpose, which persisted across several visits, as well as the use of natural objects as inert, context-less materials. At Town School, the primary figuring of outdoor space was as a venue for free-flow play, which meant that teachers had less agency in child-nature relations and often could not be as present outdoors to engage in the cycle of observation, interpretation and documentation which enables responsive planning. I explore this, and the consistency of some play patterns at Village School further in Section 5.5.

My observations also support perspectives which emphasise the importance of embodied action and perception in developing child-nature relations; framing and communication about nature is not limited to spoken language. Child-nature assemblages emerged through physical, tactile engagement between children and non-human others, but the bodily action of adults was also important in guiding children's attention to 'important' features of the environment. Finally, some natures emerged through sharing and showing, with some children demonstrating a keen desire to share experiences, objects or other beings with peers and adults. I will explore this further in the commoning, attention and play cuts.

Reading this through Research Objective 2

Identify potential pathways and barriers to LfS that emerge during school-based outdoor learning.

These figurations point towards the balancing of intention and attention which I explore more fully below. I have provided examples of how child-nature relations emerge through a range of assemblages, many of which do not critically engage with the reality of the Anthropocene. This is not to say that *everything* that happens at

school, indoors and outdoors must be focussed on changing the way that humans relate to the world, but it demonstrates just how little critical consideration there is in terms of how young children come to know the world around them. Trying to achieve this through child-centred play pedagogy at schools (indoors *or* outdoors) under current circumstances looks to be very challenging due to the absence of a coherent way of articulating humans' place in a flourishing Earth. However, even in everyday routines, such as discussing the weather, there are opportunities for developing different relations with Earth.

5.3 Collecting

5.3.1 introduction

This agential cut provides further detail on some of the processes of collecting that I observed. Children collected different things for different reasons. This connects with the figuration of *nature as a place to find things*. I have already detailed a couple of instances of collecting at Village School where the teacher provided the stimulus: collecting leaves to make pictures in the classroom in response to a picture book and a number scavenger hunt.

A further example takes place in the same bit of the woodland, gathering leaves as a stimulus for using adjectives to describe the texture or appearance of the leaves. After going round the circle eliciting a word each, Mrs D sets them off with a strip of cardboard with double sided tape to find 'beautiful leaves' and make a 'bracelet'. The implication is that the choice of leaves should be based on aesthetics, and there's no explicit mention of biodiversity, why some trees drop their leaves or the species of plants present, and I get annoyed at myself for feeling that that should matter. The children move around, trying to stick wet leaves to their pieces of card, sometimes getting frustrated. They find evergreen ferns and ivy, yellowing willow and spotty sycamore. A lot of the leaves have already dropped, but others are plucked from living plants. Everyone comes back to the tarp to hold them up on display.

At Village School, Mrs D's practice showed fairly clear distinctions between activities which were linked with curriculum enactment and child-initiated play. One of the implications of this is that the teacher-initiated tasks could have significant power in the child-nature assemblage, which makes being clear about specific learning intentions important (Education Scotland, 2011). Mrs D tended not to

explicitly articulate learning intentions to the class separate from her outline of the task, but in the example above, the intention could probably be expressed as something like "We are learning to use a range of describing words" by describing the appearance and texture of the leaves. For a literacy activity, this seems appropriate, but I felt quite uncomfortable with how this affected (and limited) the forms of child-leaf relations which were possible, especially as the acquisitional collecting (bracelets) happened after the vocabulary had been explored. I felt driven by a desire to identify, classify and name the leaves and incorporate discussion of day length, leaf pigments, photosynthesis, weather, and decomposition, but I could not fully explain why this was more important to me than valuing the leaves for their beauty. Over time, it became clear that I was feeling the absence of a coherent and consistent framework to connect the children's direct experiences there in the woods, with those leaves, with the wider world, with their discussions of the weather in the classroom, and intuitively looked towards ecology to provide it.

Another example of collecting for beauty, this time in the garden on a cold, clear November morning after a hard frost. Mrs D opens with, "The challenge today is… I am going to give you all a tub. You have to look round the garden and find some natural objects. What do you think I mean by natural objects?"

The children respond: "Sticks! Ice! Stones! Leaves!"

"Would a plastic spoon from the [mud] kitchen be a natural object?"

"No No No!"

"No. cause it's been made by people. So anything that's natural in our world, that we haven't made.

"Leaves?

"So leaves are a natural object."

The children are to collect things to put in a tub with water and a loop of string in the hope that it will freeze overnight and make decorations they can hang in a tree. Mrs D uses rosehips, a rowan berry and some leaves as an example, and the children go off to find things.

5.3.2 Adult-initated collecting

Ecology, science or species knowledge is not the only epistemology that might provide this. As my cartography shows, environmental knowledge alone is not thought to be sufficient to change the way that people act in the world (Kollmuss & Agyeman, 2002; Siegel et al., 2018), especially in early childhood education (Wolff et al., 2020), and Nicol (2002) argues that it is imperative to combine experiential

knowing, presentational knowing, propositional knowing and practical knowing for holistic learning to emerge in outdoor environmental education. Here, only the first two ways of knowing are activated, and some form of propositional species or ecological knowledge could have provided the basis of conversations across different contexts. Adults' species knowledge and capacity to answer children's questions about nature has recently been investigated in Scandinavian early childhood settings (Skarstein & Skarstein, 2020), with previous research showing that young children are "often left to make their own experiences and discoveries" (Gustavsson & Pramling, 2014, p.60) or find their queries answered with a question being put back to them.

Gustavsson & Pramling (2014) connect this to the legacy of Piagetian developmental theory which prioritises children's intuitive exploration of the world on their own terms, but found that in teacher-child interactions with non-human nature, the ways that teachers spoke about other beings affected what type of learning was possible. They argue that interactions focussed on surface learning such as naming or describing, without consideration of comparison and connection to broader ecology restricted the potential for deeper learning, with implications for science and sustainability. I will explore this further in relation to play below. From an ecological psychology perspective, this can be understood as languaging affecting the affordances and action possibilities available to the actors in a given environment (Hodges, 2014), which can affect learning and values. How Mrs D introduces the activity shapes how the children perceive the environment and where their interest can go.

From a critical posthumanist viewpoint, language is one of the many actors in the emergent intra-action between child, teacher and others in the environment (Hackett & Somerville, 2017), as is the task of collecting. There are myriad possibilities for how common worlds between the different actors might emerge (Young & Cutter-Mackenzie Knowles, 2020), but the framing of the teacher has significant power in how this happens. In ECE contexts, there may be reluctance from the educator to restrict the openness and creativity with which young children approach objects, particularly in settings where loose parts play is valued (Casey & Roberston, 2019). However, as Beery & Jørgensen (2018) argue, based on interview data with adults about childhood collecting, being able to identify diversity through the embodied experiences of collecting allowed them to better make sense of their experiences in diverse ways. I will go on to explore how different play-types and adult involvement affect learning about biodiversity (Edwards, Moore & Cutter-Mackenzie, 2012) in more detail in the following two cuts.

It could be argued that the adult-initiated collecting tasks I observed at Village School also activated an extractive frame of *nature-as-resource* which emphasises extrinsic value rather than a relational frame (Stibbe, 2015) and biospheric values which may be more likely to foster closer identification with nature (Schultz, 2002). If the adult is not able to be physically present alongside the child while they go through

the process of collecting, the initial framing affects the intra-actions between children and other actors, and the adult has limited capacity to shift the form of those relations. Maybe this is why respect tends to be the first step in many Indigenous ways of relating to Land or Country (Yunkaporta, 2019).

I'm struggling again to write about this in a decolonial fashion. I want to cite Robin Wall Kimmerer's figuration of The Honourable Harvest (2013) which has been taken up by some as providing insightful ways of 'taking' from nature based on an ethic of respect and responsibility (Bioneers, 2019), and her meditation on how her relationship with wild strawberries represents a gift economy with different expectations than a private property economy. But, although she makes it clear in the book that she is synthesising common attributes from across different Indigenous contexts and that "the guidelines for The Honourable Harvest are not written down" (p. 183), it feels universalising to just lay out those principles as if applying them in the woods with children in Scotland is going to do them justice or do any decolonising work. There is a lot that I can't fully honour here. But there is also wisdom, which could *change ways of relating and attending to the world, so I will include them to make the point of contrast, but with the proviso that following these principles in only superficial ways is politically pretty meaningless; only when scaled up to all aspects of economies will changes which honour the ideas emerge.*

> "Know the ways of the ones who take care of you, so that you may take care of them.
> Introduce yourself. Be accountable as the one who comes asking for life.
> Ask permission before taking. Abide by the answer.
> Never take the first. Never take the last.
> Take only what you need.
> Take only that which is given.
> Never take more than half. Leave some for others.
> Harvest in a way that minimizes harm.
> Use it respectfully. Never waste what you have taken.
> Share.
> Give thanks for what you have been given.
> Give a gift, in reciprocity for what you have taken.
> Sustain the ones who sustain you and the earth will last forever."
> (Kimmerer, 2013, p. 183)

The examples from my fieldwork above represent the limitations of concentrating on specific learning outcomes in a way that isolates experiences from the broader process and purpose of education: Biesta argues that the language of learning in education makes it more difficult to ask questions about context, purpose and "the specific role and responsibility of the teacher in the educational relationship" (2013, p.

127). If, as the literature and policy moves I mapped earlier suggest, one of the primary purposes of education needs to be supporting radical transformations in how we relate to Earth and the values which support that, this will need to underpin the educational process in one way or another (UNESCO, 2022), and adults have a responsibility to think about what honourable harvesting might look like in their practice.

> Speculation: other forms of adult-child collecting
>
> Photography, texture rubbings, flower pressing, gathering for making ink or dyes, foraging for mushrooms, wild garlic or berries, 'ticking off' species, like in the Big Garden Birdwatch.
>
> Where do these collections go for thinking with? Are they for creative work or display? Are they for citizen science projects?
>
> The action or the purpose of the collecting is not necessarily where the learning (for sustainability) happens, but it can provide a vehicle or a stimulus for joint attention and integration of non-humans into the socio-material life of both children and adults and the enactment of what is valued and how.
>
> This is where the situatedness of knowledge-making practices or ways of being in the world becomes clear and where ethical dictats, such as Leave No Trace do not apply universally, requiring contextual response-ability. If conducted as part of an integrated, knowledgeable practice in place, collecting could be generative for both humans and non-human nature. Like how mushroom baskets have an open weave to allow the spores to disperse as you walk through the woods.

As I will show below, the way that adults spoke about the non-human beings which children found or collected tended to be different when related to insects rather than plant material or stones, with both children and teachers often using anthropomorphic language and gendered pronouns, something which Thulin & Pramling (2009) identified in one study as usually initiated by teachers. As Hodges states, "[w]e speak in order to help others and ourselves differentiate, to integrate, to expand, and to complicate our actions and understandings of the world and our place and activities in it" (2014, p.94).

5.3.3 Child-initated collecting

Across both schools, children also collected things in the environment without adult direction. Childhood collecting in nature is a consistent theme in the extinction

of experience literature (Lekies & Beery, 2013) and significant life experience literature (Chawla, 2007), but there is limited empirical data which is relevant to contemporary childhoods. Kristi Lekies and Thomas Beery have studied adult memories of collecting (2013), which showed it was widespread in their sample, with respondents collecting rocks, leaves, insects, fossils, mushrooms and berries amongst a wide range of things. For many there was something intrinsically satisfying about the process, but motivations for collecting items also included use in imaginative play, which aligns with the importance placed on natural objects as the ultimate open-ended resource for play (Casey & Robertson, 2019). I observed many forms of play which involved some sort of collecting where the natural materials shaped what was possible, even if it was just pulling branches together to make shelter, moving soil or sand from one place to another or gathering flowers or leaves to make potions.

In addition to collecting things *for* something Paulina Rautio has described child actions such as carrying stones as *autotelic practices*, "activities that we repeatedly

engage with for no external reward or motivation such as money or outside recognition" (Rautio, 2013, p. 394). She contends that children often demonstrate "aesthetic-affective openness" (Bennett, 2010) towards their surroundings, "an attentiveness to and sensuous enchantment by non-human forces, an openness to be surprised and to grant agency to non-human entities" (Rautio, 2013, p. 395). From this perspective, children's collecting practices could resist the dominant subject-object form of relations and provide a creative stimulus for educational interventions. Since he was young, my son has been very attentive to objects he finds on the street or in the park in the same ways that he is on the beach; his pockets often house nails, screws, bits of wire, cable, light fittings, or hair elastics that he has picked up through his day. As I will explore below, how teachers respond to this, perhaps through pedagogical play affects what forms of learning are possible (Cutter-Mackenzie et al., 2014)

L is wandering around. She has a stone - I ask her where she got it from, and she tells me she got it from the pitch and put it in her jacket sleeve.

Me: Do you like collecting things?

L: Yes. I collect stones and worms

Me: What do you do with them?

L: Put them in my bag [I don't know if she means stone, worms or both - she walks away before I can clarify].

Reading this through Research Objective 1

Investigate how children and teachers come to know the outdoor environments in which they are learning.

In my observations, 'collecting' natural materials emerged as a significant process, especially at Village School. Processes of collecting can be initiated by teachers as part of an educational activity, or children, who might collect things to use in their play or because of a connection to a thing or being which is meaningful to them, but not others.

Reading this through Research Objective 2

Identify potential pathways and barriers to LfS that emerge during school-based outdoor learning.

Where collecting is part of an educational activity, teachers have a responsibility to consider the purpose of the collecting and how the learning intentions and ways of knowing relate to the values which guide their practice. How teachers involve themselves in children's collecting may affect any

learning which emerges from the process, and this involves skill, time and capacity for attention, especially in whole-class early year contexts.

5.4 Child-teacher-nature commoning

5.4.1 Education as commoning activity

The terms 'common worlds', 'commoning' and 'common good' have come up in lots of different places so far. In this cut, I will try to read the phenomenon of human-nature relations in school-based outdoor learning through some of these and my observations in the hope of identifying synergies and potentialities.

First, there's the influence of John Dewey's understanding of communication as "a process of sharing experience till it becomes a common possession" (1916, p.12), and education as fundamentally about that type of communication (Biesta, 2013). In the human terms which this is normally considered, this implies that meaning is brought into being through actual participation in social practices, not just in abstractions of those. Biesta argues that this means, for example

> that the teaching of mathematics should be about bringing the practice of *mathematizing* into the school and allowing for students to take part in this practice, just as, for example, the teaching of history should be about engaging students with the practice of *historisizing*
>
> 2013, p. 32

From this perspective, communication comes from "doing things together" (Biesta, 2013, p. 42), but only participation which enables everyone involved to transform their experiences together, in the ongoing creation of a social world can be truly educative and democratic. Thus, communication is not about individuals having to find pre-existing 'things in common' before starting, but about "the capacity to respond and be responded to" (Ingold, 2018, p. 5) in the participatory practice. From this perspective, education is not about the transmission of pre-existing knowledge from one mind to another less knowledgeable mind. Commoning is a process of education, which entails the capacity to respond to one another, that response-ability which can lead to care. If we take Biesta's example above, for learning for sustainability to be educative, must it be about the practices of *being sustainable*, of *caring,* of *noticing*?

Dewey and Biesta (to a certain extent) speak of participation and the ongoing-ness of the world in human social terms but the concepts are extended by others to include other species and things Haraway, 2008; Ingold, 2018). There is Bruno Latour's

concept of "common worlds" (2004, 2011, 2014) which has been taken up by education scholars like Affrica Taylor, Veronica Pacini-Ketchabaw, Mindy Blaise and their colleagues in the Common Worlds Research Collective (2023) to explore how children and other beings and objects come together in ways which are "neither predetermined nor fixed, but in a continuous state of composition, of common-ing (Taylor & Pacinin-Ketchabaw, 2019, p.13).

As I mentioned before, aspects of these perspectives are expressed at United Nations policy level most fully in the UNESCO (2021) Futures of Education project, which positions education as a common good due to two features:

> "First, education is experienced in common putting people in contact with others and with the world. In educational institutions, teachers, educators, and learners come together in shared activity that is both individual and collective. Second, education is governed in common. As a social project, education involves many different actors in its governance and stewardship. Diverse voices and perspectives need to be integrated in policies and decision-making processes."
>
> p.13

'Commons' are often discussed as if they can be resources, natural or otherwise, which Peter Linebaugh argues is "misleading at best and dangerous at worst - the commons is an activity and if anything, it expresses relationships in society that are inseparable from relationships to nature" (2008, p. 279). Because of this, it is argued that commoning as a verb, or commoning activity is the best way to understand the commons as produced through social practices (Bollier & Helfrich, 2019). Heila Lotz-Sisitka (2017) argues that social (and ecological) action is why education as commoning activity holds potential for ethical and political ways of being and becoming in the world. She also identifies the risk of tokenistic engagement with superficial commons though, and what this might look like as an emancipatory or meaningful practice remains to be seen. In 1996, the Delors Report proposed that the four pillars of education for the 21st Century should be *learning to know, learning to do, learning to live together,* and *learning to be.* Noah Sobe (2021) of the UNESCO Ideas Lab has proposed reorienting these as four pillars of commoning activities in education:

1. Learning to study, inquire and co-construct together (knowledge pillar)
2. Learning to collectively mobilise (skills and competencies that enable collective action beyond the world of work)
3. Learning to live in a common world
4. Learning to attend and care (relationality)

Sobe's reworking is speculative, but it noticeably focusses on community, students as active and empowered citizens, and our common world as intentionally extending

to the more than human world. "Learning to attend and care" is fundamentally about acting response-ably in relationships with each other and the world around us. As such, these four pillars may prove particularly synergistic with outdoor learning and learning for sustainability.

> "In a new social contract for education, pedagogy should be rooted in cooperation and solidarity, building the capacities of students and teachers to work together in trust to transform the world. Reimagining the future together calls for pedagogies that foster cooperation and solidarity. How we learn must be determined by why and what we learn."
>
> UNESCO, 2021, p. 50

5.4.2 Potential commoning activities observed in fieldwork

Showing, speaking and listening as forms of attending

If we think of commoning as communication, communication between children, teachers and non-human things in the environment is a good place to start. As I began to show in the cuts about finding and collecting, a lot of this emerged from children's embodied perception of the environment and progressed to *showing* or *sharing* something which the child had perceived, either from a teacher stimulus or from the child's own noticing. Again, this sounds simple, everyday and inconsequential, but with this age group may be foundational to later experiences and is easily shifted at multiple points in the process.

Field notes from a windy day in December:

Several children are moving along the little ridgeline, silhouetted against the low winter sun. They begin to move down the steep slope to the south through a tangle of broken branches and soft leaf loam.

The group of children at the bottom of the hill have found rabbit holes and are calling up to the teacher. There's a lot of demand on the teacher - lots of children want to show her lots of things. C found a rabbit hole and after showing me, just started yelling Mrs D's name over and over again.

M (who is usually very quiet and wouldn't initiate interactions) has found a little leaf or plant, and straight off wants to show it to Mrs D, calling her name.
Mrs D responds: "What have you found?"
M gives it to her and turns away without answering.
Mrs D: 'Wow, a little heart-shaped leaf.'

She tried to wait for M to respond so that they could relate with the object on her terms, but M hadn't got beyond wanting to show it to her I don't think. Is this a pattern that she's observed in others?

Image 5.26 showing acorns, which come from an oak tree

In the example above, the children are engaging with the environment on their own terms, exploring a new area with most of the activity involving negotiating a steep hill with lots of branches, tangled storm debris and nettles. They are learning to move safely, identifying different features of the environment and feeling the cool wind on their skin, but it is hard to argue that there is education happening here in Biesta's terms. However, many of the children are compelled to involve others in their perception of and intra-action with the environment. On that day, I observed a lot of them moving about in groups of three or four, helping each other climb over tricky bits, avoid nettles or crowding around a slug on a leaf, and the recordings capture consistent calls for the teacher to come and see different things. It could be argued that when Mrs D brings her attention to where the child was directing it, together they are bringing common worlds into being through their seeking, listening and noticing. But these emerge and shift rapidly, as each agent moves on: here, the commoning activity is stimulated by nature, but does not fully involve the other beings beyond that initial recognising.

Someone says, “They're thistles. They're thistles." The teacher says, "They're thistles."

High quality teacher-child relationships in early childhood are important (Gregoriadis & Grammatikopoulos, 2014), and the children in this example seem to be striving to bring that relationship into their exploration. Bert Hodges argues that language is a “crucial means by which humans care for each other, including themselves, and their surroundings” and that “[u]nless humans care about themselves, others, and the world, there is little or no reason to speak or to listen” (2014, p.101). Are the children simply saying, “Look Mrs D, look at this! I’ve found something that feels important to me, is it important to you?” as a way to bring their worlds into being? She consistently acknowledges children’s invitations, and uses open-ended questions and wait-time (Walisk & Hindman, 2018) to make space for children’s understanding to emerge. From a constructivist perspective this would be a sufficient starting point to build on, focusing on human-human perception of and learning about the environment, establishing intersubjectivity (Carr et al., 2009). Jane Waters (2011; 2013) has paid very close attention to how children and teachers do this outdoors and the sustained shared thinking (Siraj-Blatchford, 2010) that can emerge from this. She found that there were more child-initiated interactions patterns on visits to a local park than in the classroom, which she argues partly emerged from the increased diversity of environmental features to create opportunities for prolonged interaction. Crucially though, the ratio of adults (not all teachers) to children in her study, was typically 1:2 or 1:3, much lower than is typical in classroom situations or in the outdoor learning I observed, but typical of some Forest School settings, where research has also shown increased scope for child-teacher interactions (Reker-Powers 2020).

Being in the woods and relating to the children and their experience of the place through language is valuable work in itself, and going back to the cartography, is obviously enabling children’s physical activity and time in nature with all the benefits that come with it. However, I contend that the type of communication pursued through showing, speaking and listening recounted here is unlikely to be educational in the terms laid out above, and has weak connections to Learning for Sustainability. Ingold argues that commoning “entails an attentive stretch whereby each participant casts their experience forward in ways that can answer to the experience of others, and they, likewise” (p.38), and here, the teacher has limited capacity to attend to child and non-human agents because multiple children are trying to involve her in their own worlding processes simultaneously.

5.4.3 Joint attention and noticing as speculative commoning activity with young children

I wrote earlier of the importance of joint attention, as it has been figured in the significant life experience literature and determines the field of affordances which are accessible to a child (Reed, 1993). What adults and children 'pay attention' to or 'attend' to shapes their relations with the environment around them. For Ingold there are two types of attention, one which aligns with the triad of volition, agency and intentionality; the other with habit, *agencement* and attentionality. Exploring these fully here is beyond the scope of this section, but there is a useful insight which I want to draw out. Ingold (2018) uses the example of taking a walk to demonstrate the difference between these two triads. When life is understood through the principle of intention (which is outcome focussed), this takes the form of *going for a walk (*with the associated outcomes of staying healthy, thinking or getting somewhere). The associated form of attention is "about matching up the contents of the mind and the objects in the world" (Ingold, 2018, p.25). Contrastingly, when life is understood through the principle of habit, this takes the form of *walking*, an unfolding process. Dewey's principle of habit is central in his theory of experience as the simultaneous coming together of doing and undergoing (1938/1997). Thus, the form of attention cultivated by habit is one of attentionality to the emergence of experience *with* the world and other agents, over time.

I find Ingold's working through of this pretty abstract and hard to ground in concrete imaginings of educational reality, but this does lead on to more practical ideas in relation to this study. He goes on to argue that it is education driven by attentionality rather than intentionality which can incorporate an ethical, relational dimension, stating that "we care for people and things by giving them our full attention and by responding to their needs" (p. 27). This capacity for co-respondence and response-ability is fundamental to the types of commoning articulated above, and I would argue that it should be this type of attentionality which adults strive for in how they attend to nature with children. The language of 'learning intentions' - Biesta's 'strong' education - is clearly connected to the triad of volition, agency and intentionality, rather than habit, *agencement* and attentionality.

I saw examples in my fieldwork where children appeared to fully in the moment of doing and undergoing, both during open-ended play and teacher-framed activity. However, there were limited examples where child-teacher and non-human nature came into attentionality with each other in ways that demonstrated educative purpose aligned with healthy human-nature relations. Gardening seems to offer one such activity, but I observed mostly anthropocentric forms of this, which differ from biodiversity-centred forms such as the pollinator project investigated in Andy Ruck's work (2021). Several times I did see teachers engage in joint attention with children around insects in ways which supported care, but usually in anthropomorphic terms (Thulin & Pramling, 2009) and for very short periods of time.

On a frosty day three children have found a very cold worm and have 'made a

home' for it out of leaves to try and 'warm him up' (which is an ironic gendering given that earthworms are simultaneous hermaphrodites). They are keen to show the teacher and me how they are caring for it, but this stewardship frame is as far as it goes. There is no time for noticing, observing or acknowledging difference with the teacher, because away from this quiet wee corner there are a multitude of play worlds emerging. I sit with the children and the worm for a little longer and we talk about what might eat it if it was left uncovered on the surface. This feels like I'm forcing myself into their worlding, but it also feels like I bring the worm with me a bit, validating their care.

At Town School, it was hard for teachers to be present across the outdoor spaces when the predominant activity was open-ended play, and it was not always clear what pupil support assistants' roles were in the playground. The assumption is that for sociocultural models of development (e.g. Rogoff, 2003) and apprenticeship models of learning (Lave & Wenger, 1991), this type of joint attention, when two or more people "notice the same thing with a mutual understanding that they are sharing this experience" (D'amore & Chawla, 2018, p.9) is sufficient for adults demonstrate what is valued in the environment and how, but when this occurs in a school context, particularly in the midst of play where the adult does not always have agency, it appears more complex. Gustavsson & Pramling (2018) have found that beyond just taking an active role in conversation, interlocutors need to share attention and co-ordinate perspectives on what they are attending to, which is essential for this form of attention to be educational.

Image 5.27: the activity is digging, but where is the joint attention directed, and how does it go beyond 'just' weeding?

Given the emphasis on play-based pedagogy in Realising the Ambition and other early level discourses, play seems like an obvious commoning activity to develop the kinds of interactions which can hold space for this type of attentionality, but as I will show in the following section, balancing intention and attention with play has documented challenges.

5.4.4 Outdoor learning will not support the four pillars of commoning activities when it is positioned as a discrete activity.

As I have already shown, the outdoor spaces at both schools were seen as distinct environments for distinct types of learning, teaching, playing and moving. At Village School, "Going to the garden" or "going to the woods" were activities in and of themselves, mostly centred around play, but sometimes featuring teacher-initiated tasks. At Town School, the outdoor space was another space to continue exploratory learning, which was usually child-initiated. Where I observed clear links to curricular experiences and outcomes, these were generally times where the non-human environment was figured as material; a place or objects to count, measure, make marks, move the body.

This exemplifies the shift I identified in section 3.6.4, where outdoor learning is presented as "an approach to learning which is embedded in the curriculum…" with purposes which "…include developing environmental understanding, encouraging physical activity, health and wellbeing and personal and social development" (Education Scotland, 2015 , p. 59). This contrasts with the conceptions of outdoor learning as one integrated part of pedagogies used to enact a holistic and interdisciplinary curriculum, and with Learning for Sustainability as "a holistic pedagogical approach that seeks to build the values skills and knowledge necessary to develop practices within schools, communities, and at governance levels within teacher education, that accord with the collective aim of taking action for a sustainable future" (Higgins & Christie, 2018, p, 554). Some of the activities which I have described already could provide contexts for the pillars of commoning activity and Learning for Sustainability, but not without increased attention to educational purpose. Following the argument above, achieving this in school contexts without being overly dependent on intentionality or the language of learning, and thus restricting the scope for richer educative experience depends on the process of *teaching* (Biesta, 2013, 2017). Enacting this type of education in an early childhood pedagogy-curriculum assemblage which is determinedly child-centred (Education Scotland, 2021) presents early level teachers with a challenge whether teaching indoors or out.

Reading this through Research Objective 1

Investigate how children and teachers come to know the outdoor environments in which they are learning.

Understanding education as commoning activity holds significant potential for making sense of child-teacher-nature assemblages, but I observed limited instances where teacher, child and non-human agents all came together in forms which fostered attentionality and which might nurture co-respondence, care and response-ability. The main commoning activities centred around showing, talking and listening and playing, but gardening also showed significant potential dependent on how it was framed.

Reading this through Research Objective 2

Identify potential pathways and barriers to LfS that emerge during school-based outdoor learning.

In my observations, scope for commoning activity and attentionality was limited by the capacity for one teacher to come into meaningful relation with multiple children, often across more than one space. The predominance of child-initiated open-ended play outdoors and a reluctance to interfere also appeared to affect how and where teachers were willing and able to interact

and enter child-non-human nature assemblages. When outdoor learning or play is perceived a thing or an activity in and of itself rather than a way to teach within a holistic, purposeful and interdisciplinary curriculum, the scope for Learning for Sustainability and commoning activity appears to be limited.

5.5 Play and pedagogy

Different forms of play constituted a significant proportion of children's time outdoors at the schools I visited. Play-based pedagogies outdoors could offer important contexts for the forms of attention which I highlighted in the previous cut about commoning activity, but entail significant challenges. Adult efforts to use (true) play in pursuit of learning or education epitomise the challenge of balancing attentionality and ensuring that educational processes maintain clear purpose without defaulting to over-intentional, 'strong' forms of education (Biesta, 2010, 2013). In this cut, I will characterise the different approaches I saw and read them through some of the literature connecting play and environmental education. When teachers and learning intentions exert less power in play assemblages, the environment has greater influence, which has implications for children's play outdoors and indoors, especially if educators hope that play may have a role in children's developing relations with non-human nature. This then relates to the materials (natural and synthetic) which are available in the environments which I consider in the next cut.

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Play is one of those concepts which notoriously (or joyously) has been theorised in multiple different ways (Bergen, 2014; Flannery Quinn, 2017), largely due to the fact that it can move in and out of activities depending on "the amount of control the player(s) have over the activity, and the ability of the player(s) to use and act on their imagination" (Flannery Quinn, 2017, p. 23). Play can do a lot, including two functions relevant to my analysis: play transmits culture through social interaction and communication (Wood, 2013), and supports the development of ethical identities (Edminston, 2008). Just the fact that I'm considering it here represents how problematic it can be when adults try to prescribe what forms of play are desirable - when players have less control and imagination then the activity becomes less playful and motivation to participate may change. There are also myriad different types of play and a continuum of pedagogical play experience moving from children's self-selected play to adult-framed activity (Wood, 2013), or spanning open-ended play, modelled play and purposefully-framed play (Cutter Mackenzie et al. 2014). I don't have the space to consider it as fully as I want to, but I want to highlight the differences between play, and play-based pedagogy and the opportunities and challenges both offer based on what I observed.

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Play was understood and supported differently at the two schools, but all teachers valued child-initiated play as a process for learning, particularly outdoors. This aligns with early level policy and curriculum guidance (Education Scotland, 2020; Palmer, 2020; Scotland's Outdoor Play and Learning Coalition, 2019). However, my observations highlighted some of the challenges of integrating play into early level pedagogy within the structures of schools and other discourses such as attainment which have been documented elsewhere (Burns, 2022).

At Village School, this manifested as periods of activity where children got to play or 'explore' as distinct from teacher-initiated learning tasks (such as those outlined in the first cuts, a maths scavenger hunt or mark-making). The child-initiated play which appeared most engaging happened in the garden, which the children recognised and valued as a space for free play. There was no child-choice involved in when to play outdoors; the whole class went either to the woods or the garden at the same time - child agency lay in how, where and with whom to play during times when it was appropriate. The teacher valued their free play outdoors for the range of social skills it seemed to foster, such as collaboration and communication, as well as the play groupings which seemed to emerge somewhat differently than indoors.

"Mrs D after we've done our numbers can we play?"

"Yes, but we've got two more minutes…"

"Yes! Two more minutes then we can play!"

Play patterns out in the garden have a different sense of time. It can be a week or two since we've been here, but many of the children will go right back to where and what they were playing and pick up where they left off. Children and materials collaborate and self-organise around emergent (but consistent) activities. Water and soil play emerges and develops in the same part of the garden over three and a half months. It begins with the invitation of various vessels (in the form of an old kettle, plastic pans, a ladle and a giant plastic teapot), a water tap and a piece of guttering. "This is a waterfall" I am told, as water is brought across and poured down the gutter to pool in the dry soil at the bottom. "Looks how much water me made!" That day, the play develops to incorporate a bridge and another piece of guttering, but then it's time to go. The children call Mrs D across urgently and she comes to see the pool which is characterised as a pond or a pie before they all have to go or lunch. The next day as soon as they can, they're straight back to it, working together, experimenting

with the slope to make the flow faster. There is turn-taking, emergent understandings of fluid dynamics, collaboration. “This is like a river.” Three weeks later, the slope gets steeper more children join the core group, using different vessels to pour down from above. Because the teacher is working in the vegetable beds, this is when spades enter the assemblage, and digging happens where the water has softened the compacted soil beneath the apple trees. The next week an older child adopts the role of foreman and they work together to build a sort of covered drain, all wearing plastic hard hats. On one of my last days in the garden, everything is really muddy, the hole is deep enough to hold water, and up to 11 children are jumping and smashing in it, some with wellies, some without.

Image 5.28: Initial experiments with flow of water

Image 5.29: Taking turns to pour

Image 5.30: Digging

I consider the longitudinal aspect of this play pattern quite unique to the outdoor environment at Village School. While in some ways the re-assembling and developing the play each week is similar to selecting blocks or other resources indoors which then have to go away, the children in this class had limited access to that type of resource and time inside. Outside, the place and the materials remained consistent even while the environment changed gradually, with weather and the change of the season, and the children did not have access to the space in between sessions - when they returned, it was easy to slip back into the play where they left off. This has educational potential for nurturing continuity of experience, as well as attending to what stays the same and what changes with time, but the play remains child-led with minimal interaction to develop and extend the activity. Also striking in open-ended play was the spatial overlap and diversity of multiple play assemblages - moving in the same place there might be two separate groups of entirely independent witches, builders orfamilies: diverse, active and rich but challenging to harness in pursuit of educational purpose, a point I pick up in the next section on the role of the material environment.

I saw these same longitudinal characteristics contribute to a persistent miseducative form of play which transferred out of the garden and into the woods to intra-act with the utilitarian framing of that place. Over a couple of visits to the woods, I observed a consistent group of children hitting an oak tree with hefty sticks, which

caused some damage to the bark of the tree. At one point this extended to scraping living moss off another oak tree, during one of the collecting activities. I have considered this in more detail elsewhere (Mackie, 2021), and tracked the play pattern back to the garden, where, while playing with the spades near the apple trees in the garden, a couple of children started hitting the trees, which made a satisfying noise and simulated the use of an axe. They caused some superficial damage to that tree. From an anthropocentric perspective, this could be characterised as an interaction pattern which Kahn, Weiss and Harrington call 'striking wood on wood'. In their analysis of video from a nature kindergarten, this pattern is positioned as perhaps being linked to human evolutionary history, the "ontogenetic origins from our phylogenetic past" (2018, p. 8) - it emerges from a natural instinct, a drive, the need for food or fuel. It appears very satisfying. However, in my feminist materialist reading of the relations which emerge between children-tree-sticks, what is evident is a lack of reciprocity or caring relations with this old tree, which is almost visible from their classroom. As in the garden, there is so much going on that it is hard for the teacher to notice, or attend to everything all at once and to interact without interfering (Fisher, 2016).

Image 5.31: "We're going to cut this tree down!"

Image 5.32: Damage (?) to oak trees

There is no judgement here, of children or teacher. Let's be clear, these children are outside on a cold, beautiful morning, moving, breathing fresh air, having fun, maybe even imagining future careers as arborists. What I am interested in is how over time, the lack of a socio-ecological framework in which the tree is a living, active agent, worthy of respect intra-acts with the privileged position of children's freedom to play how they want to. In the Deweyan sense which I'm trying to adapt to be about relations, experiences can be educative or mis-educative, and it is the principle of continuity of experience which leads to education: "every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after" (Dewey, 1997, p. 27).

> And what could be different while meeting some of the same needs? Hitting already dead wood? Utilitarian, active and biodiversity-sustaining activities which like coppicing, planting and harvesting willow somewhere or composting? How could the children's "attentive stretch" (Ingold, 2018, p.38) extend to the tree as more than a material surface? Would understanding the tree's form through a metaphorical, experiential but teacher-led activity, like in Joseph Cornell's 'build a tree' (1989) change the way they relate to it?

The discrete periods of mandated and diverse free-play as distinct from 'work' activity (Wood, 2013) contrasted with Town School, where P1 and P2 classes had periods of the day which were dedicated to child-initiated play, or exploratory learning. This was time where children could choose to engage with materials, activities or provocations chosen by the teacher or other play materials (e.g. blocks, toy vehicles, play dough, drawing materials) which were available in the classroom, or they could play outside in the courtyard. Often during these periods of self-selected

play, the teachers tried to do small group work, asking several children at a time to join them in adult-framed activity. This meant that children could choose when or if they wanted to go outside, but the implication was that the teacher's attention and capacity to engage with children's play was limited and often split across two playspaces. The teachers at Town School did try to co-ordinate so that one teacher was more present in the outdoor space at any one time, but in reality, during the time I was there, this was limited due to the needs of the majority of the class or specific pupils, coupled with limited numbers of pupil support assistants.

The teachers at Town School were open about the fact that they were early in their journey with what they described as play-based pedagogy and the challenges associated with it. They had a clear conception of the continuum of play experiences, and some of the materials in the classroom were selected to ensure that curriculum areas were accessed consistently through more structured games and playful activities while other resources responded to children's play. However, in the outdoor spaces, there were similar challenges to being present and in relation with children and environment in order to understand and support play in a way which might contribute to Learning for Sustainability. As noted in section 4.7, a lot of this was affected by the season I was able to conduct fieldwork, and all three teachers were clear that pedagogical play outdoors was easier in the summer terms, with more vibrant living beings in the playground and higher proportions of children wanting to be outside, shifting the focus of their teaching.

Image 5.33 "We're starting our own tree club"

S & D are digging in one of the raised beds and I notice that they're trying to 'plant' a broken branch from one of the gorse bushes in the soil so that it stands up like a small tree. S sprinkles wind-blown leaves from the birch above. "Look at us, we're helping the trees," says D. They tell me about something called 'tree club', which I establish was their own play-initiated 'club' which had the purpose of caring for the trees. But they used to do it with their friend who quit, so they haven't been doing it. Now, with this planting activity, they are starting their own club, with two bosses. They keep trying to stick it in the compacted soil and it keeps falling over. I don't want to guide their relations too much with questions, but they are able to tell me that trees need water and 'mud' (not living, vibrant soil, full of micro-organisms), but don't mention sunlight. This assemblage is a potential part of the cycle of "observations, interpretation and documentation of learning, responsive and intentional planning and facilitation" which is the basis of child-centred play-pedagogy (Education Scotland, 2021, p.48), where an adult could (or could not) have acted to extend or develop certain aspects of the play to explore the common world or childhoodnature relation which was emerging. But because there are other children who need attention right now, there's no one apart from me there, and I'm too caught up in knots about being a researcher to know what to do. Other days, the teacher is there, but the relations are more direct, more embodied, or don't incorporate living systems. Ms A facilitates the collection and smashing of ice, which leads to rich vocabulary modelling and lots of energy, but the worlding doesn't extend beyond this in the way that a conversation about trees and energy might have, or the scope for tree club continuing as a way to care for the living beings in the courtyard.

Cutter-Mackenzie et al. (2014) bring together a significant body of research on how play relates to environmental education in early childhood. They argue that different play-types can and should be valued for their different ways of contributing to potential education, and that skilled educators can combine different play-types to support different aspects of environmental learning. This aligns with the pedagogical cycle outlined in Realising the Ambition, and Julia Truscott's assertion that beyond environments or play types "it is educators' pedagogy that emerges as playing a central role in shaping these experiences" (2018, p. 1152).

Since the publication of Realising the Ambition, there has been a concerted effort to integrate playful pedagogy into primary one classrooms, and the teachers at Town School can be considered as outriders for this movement, but also representative of

some of the challenges with putting this practice guidance into practice in schools, which I will pull together in more detail in section 5.8. In relation to play though, as Cutter-Mackenzie et al put it, "[s]imply providing children with access to open-ended play in an outdoor setting is insufficient to support environmental learning" (2014, p. 80). Their argument is predominantly related to content knowledge in environmental education, drawing on Fleer's (2010) research and making the case that sustained shared thinking (or commoning in Ingold's terms) with adults is necessary to develop understanding of scientific concepts. Similarly, from my observations, I conclude that for play to contribute to early level Learning for Sustainability, significant adult attention needs to be given to the play-types, and the materials and framing which shape children's play experiences indoors and out. However, in contrast to learning 'about' the environment these play experiences should ideally incorporate values and socio-ecological relations. In contrast to Early Learning and Childcare settings, primary one classrooms are subject to the structural demands of schooling (from lunch breaks through to access to outdoor spaces or parent, management and colleague expectations of what 'school' teaching looks like) and the very real difference in adult:child ratios.

When teachers are not able to be part of a child-nature assemblage because of other demands on their time, the material environment plays a more significant role in shaping activity and experience and teachers have less agency in what is happening, particularly in relation to how nature is valued. This could be seen at Village School with regards to the play patterns which emerged without an ethical grounding of respect for non-human others and in relation to the play materials which were present in the garden. I will outline some of these tensions in the next cut.

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Reading this through Research Objective 1

Investigate how children and teachers come to know the outdoor environments in which they are learning.

Play was a very important means through which children related with outdoor environments and it was highly valued by teachers at both schools. At Village School, play was often seen as distinct from educational 'work', and tended to be open-ended and child-directed, with the whole class outdoors at once. At Town School play was seen as the primary pedagogical tool and children had more choice about when and how much time they spent outside. There, children experienced more of the play continuum indoors, but during my fieldwork outdoor play tended to be open-ended, with teacher availability limited by the needs of the class and the effects of the season on the richness of the outdoor environment. I identified a longitudinal consistency to play patterns which implied that children were building on and extending prior play experiences.

Reading this through Research Objective 2

Identify potential pathways and barriers to LfS that emerge during school-based outdoor learning.

When the dominant form of play was open-ended and child-directed there were limited opportunities for teachers to involve themselves in child-nature intra-actions or the vibrancy of play in pursuit of Learning for Sustainability. Modelled-play and purposefully-framed play have significant value, particularly in developing content knowledge, but using these outdoors requires the adult to be skilled and, crucially, able to be attentive and present, which is challenging when either working with a whole class outside or splitting attention across fee flow spaces. Consistent socio-cultural and ethical frameworks are important to ensure that play experiences are educative and not miseducative.

5.6 Synthetic materiality in outdoor learning assemblages (or outdoor learning and flytipping)

The focus of this thesis has been on how children, teachers and nature come together during outdoor learning, but as I argued early on, accepting the Anthropocene exposes how mutually entangled humans and the rest of nature are at this moment of 'contaminated diversity' (Tsing, 2012a) in Earth time. This was evident on a micro level in the outdoor environments at the two schools. All the places children and teachers spent time were human designed or managed to varying degrees, and represented differing degrees of discursive 'naturalness' and biodiversity, from the tarmac playground at Village School through to the mature woodland. Human life is also tangled up with synthesised forms of nature, often in the form of plastics manufactured from the remains of plants which photosynthesised millions of years ago. As well as featuring 'natural' actors such as trees, plants, stones, birds and insects, the outdoor spaces at the schools I visited included some human-made things which had agency in outdoor learning assemblages too.

Open-ended resources and loose-parts

Bricks, tyres, planks of wood, guttering, pallets, sand, bread crates, shopping baskets, cable drums.

Image 5.34: tyre-moving

Over the last decade there has been a resurgence of interest in 'loose parts' play in Scotland as a facilitator for physical activity, creativity and child-centred pedagogy (Casey & Robertson, 2019). There is a whole body of research literature and playwork practice (Daly et al., 2014) around this term usually charted back to a popular article by the landscape architect Simon Nicholson (1971) which emphasised the innate creativity of children that could be fostered by open-ended resources with a high number of variables. Nicholson drew on play experiences in postwar urban 'junk' playspaces and adventure playgrounds (Frost, 2009) where adults developed accessible resources for child-led play. The core argument behind much of this practice is that when combined with children's creativity, the affordances of a resource increase hugely, as it comes into relation with their play.

Loose parts can be of any size and are used indoors, but their role in the responsibilities of ECE settings to develop physical activity and gross motor skills (White, 2015) means that they are prominent in outdoor spaces. Natural 'things' are valued in this discourse for their variability, and as detailed already, I observed children using leaves in potion play, branches for den-building and so on. Anyone who has worked outside with children knows the cliche that a stick can be anything. However, in practice, many of the loose parts resources in the school play spaces I visited were synthetic or manufactured, and I have a feeling that this is fairly representative. To me this seems to be at least partly down to budget and time constraints and a desire for resources that are long-lasting. Tyres, pallets and bread or delivery crates abound in playgrounds because they are light enough for children to move, relatively safe and can be used myriad different ways.

This is where the open-ended free play identified in the previous section comes to the fore. Children throwing bricks into puddles to assess their depth. Chipping

away at that frozen soil with just the right shape of stone. Balancing around the tyres as fast and as creatively as possible, with right hand just touching that whip birch branch for balance. Using the cord that the teacher provided to tie your pallet building together, or the pan to move water to where you need it. Some of the objects have a more obvious purpose, affording digging, barrowing or balancing, but these can still be subverted.

Image 5.35: pallets-bench-cable-reel-pipes-string

Again, I am cautious of sounding too cynical, but the main point that I want to make here is that being outside, whether engaged in a whole spectrum of play or a teacher-intra-action, doesn't mean that children are necessarily in relation with (healthy forms of) nature. They may be in relation with Tsing's contaminated diversity and involved in worlding with real social, material and ecological realities, but educators and researchers have a responsibility to acknowledge that, and work from that position rather than one which puts unrealistic expectations on the environment alone, or continues to skew our baseline evaluation of what healthy ecosystems for humans can look like.

Taking this into account, it is possible to acknowledge the value of loose parts in developing physical activity and skills, creativity, awareness of physical processes and so on, but also critically evaluate what they do not do in outdoor learning assemblages, without additional teaching, attention or situation in socio-cultural frameworks. As Ms A said to me, of where she felt she was in her practice with loose parts at that point: "Pipes and tyres just aren't enough."

Image 5.36: Throwing brick and tyres into water

A growing supply of loose parts. Willow. Reeds. Cob. Larch planks. Birch logs. Baskets. Hazel rods. Jute string. Canvas. Conkers. Hazelnuts. Acorns and the elf hats or teacups that come with them. Stones. Shells. Heather. Dry stone walls. Soil. Compost.

It's much easier to ask for mud kitchen equipment, get some tractor tyres dropped off (thus saving the contractor money on recycling them) or buy one of the packs from the catalogue.

For our wedding, we had twelve 6-foot slabs of inch thick larch cut and sat them on twenty four birch logs each nearly a foot in diameter, which were harvested respectfully from a wood about 3 miles from where we were married. Those planks and rounds ended up in two different schools and moved house with us. I didn't think of it like this at the time, but we honoured the gift of the trees by ensuring the wood had value over time to all of the children who sat on them, or balanced on them, or made seesaws with them. I know that there are several of them still being used in the playground of the school up the road.

Synthetic and material resources which were less open-ended were also present in the Village School Garden and influenced child-nature play assemblages. Because the nursery used the garden regularly, some of these were organised and provided by those staff, but inevitably came out during the P1/2's play.

Wheelbarrows, yellow hard hats and hi-vis vests, a police officer's helmet, a pram, a plastic toy hedgetrimmer, plastic oversized, swollen teapots, vessels for water, pans in the mud kitchen, two plastic play-houses, water trough, crates, tables, benches, a plastic JCB digger.

When we read these in relation with the previous cut about open-ended play, where teachers privilege child agency to play as they will, I see a pattern where the flow of power in the child-play assemblage shifts towards the non-human objects. Take the plastic hedge-trimmer toy, for example. One day it just appeared in the garden, with a matching strimmer and a wheelbarrow. None of the adults knew where it had come from, but the consensus was that it must have been donated to the nursery by a parent or someone else from the community, and it had been added to the storage unit. Of course, with its electronic noise and blade, it was a desired object, and was used in chainsaw play by several children, with limited attention from any of the adults in the garden. In the school garden there is no socio-cultural context for chainsaws as tools in regenerative forestry or conservation, so there is no certainty that the intra-action that emerges between child, chainsaw and trees is anything but "I'm cutting this tree down." This is a fairly blunt example, but hopefully makes it clear that objects have agency in play assemblages, which may affect children's ongoing relations with the world, the continuity of experience. In attending to the interaction, experiences and spaces which the children are intra-acting with, adults can make critically informed choices about what type of relations are possible, which is significant if play and loose parts are expected to contribute to Learning for Sustainability.

Of course attributes like creativity, healthy bodies and effective communication and collaboration are essential for the just transition, the Great Turning, staying with the trouble, or whatever we choose to call it, but it seems like attending to children's play, continuing to take it seriously, as generations of educators have could be a significant leverage point in the same way that figurations or framings of nature can be. While it is beyond the scope of this study, play resources indoors have significant potential to shape worlding as well, and be leveraged for sustainability.

Reading this through Research Objective 1

Investigate how children and teachers come to know the outdoor environments in which they are learning.

Driven by good intentions and sound research showing the multiple benefits of

outdoor and loose parts play, there are significant synthetic agents and objects in school outdoor learning environments, which children relate with in embodied and creative ways. These are stimulating and fun to intra-act with and can create rich play assemblages, but without additional socio-cultural and ecological context do not necessarily have a direct positive influence on child-nature relations. As well as 'open-ended' materials, specific toys and costumes exerted power on play patterns.

Reading this through Research Objective 2

Identify potential pathways and barriers to LfS that emerge during school-based outdoor learning.

Not everything outside is 'natural'. When critically accepted as part of the reality of Anthropocene childhoods, this makes for an interesting starting point for thinking about creative futures and the processes associated with loose parts play such as being creative, re-using materials, communicating and collaborating and so on have a place in LfS. However, when not critically engaged with, this may result in a very low standard of 'nature by default' (Elliot & Young, 2015). At Town School, where a culture of play-based pedagogy was developing there was more awareness of how resources shaped play, and the teacher's role in this to develop educative experiences, but there was limited capacity for teachers to scaffold activity with socio-cultural contexts for change.

5.7 Realising the Ambition

5.7.1 Introduction

My cartography demonstrated that being outside is valued in Realising the Ambition (RtA), Scotland's national practice guidance for early years. Other important aspects of that guidance which relate to this study and the agential cuts I have already made are the cycle of child-centred pedagogy presented, vertical and horizontal transitions, and the central positioning of play. As I noted, this guidance was published just after I had started my fieldwork, so I read it through this cut not as an evaluation of teaching , but as a potentially productive interference pattern for going forward. As such I draw less on specific observations and try to pull together aspects of the other cuts.

5.7.2 Transitions

In RtA, horizontal transitions are "the multiple changes that happen throughout the day, such as from home into a setting an moving from periods of play to mealtimes", while vertical transitions involve "major change for children and their families, such as starting ELC or primary school" (Education Scotland, 2020, p. 90). At a practical level, as I have already

observed, there were differences in how children moved indoors and outdoors at both schools, but different horizontal transitions to get there. At Town School children came and went between classroom and courtyard largely on their own terms when that was available to them; At Village School, the whole class went out at once, often involving some standing waiting in corridors, but resulting in higher numbers of children relating with outdoor environments for discrete Periods of time. This had an equalising effect on time outside, as not all children would have *chosen* to go out (as at Town School). Having a set of values to guide behaviour (being Ready, Respectful and Safe) at Town School which were transferrable and consistent across all spaces in the school seemed an effective way to communicate expectations and set boundaries.

The more significant impacts of transition in terms of how child-adult-nature relations emerged came from the vertical transition from ELC setting to primary one. In relation to play extending in to primary one, RtA includes the statement that:

> The learning environment in the early stages of primary school should not look or feel starkly different from a motivating ELC environment. The level of provocation might be greater, the interaction might be more challenging, and the experiences on offer might be different, but the school environment should be conducive to learning through play.
>
> 2020, p.45

While this is an aspiration grounded in research and practice and supports many of the points underpinning this thesis, it is a significant expectation to place on primary one teachers given that the maximum adult:child ratio shifts from 1:8 at ELC settings to a maximum P1 class size of 25 , and with the average P1 class when I began fieldwork in 2019 having 21 children.

Given that some children start school when they are four and others when they are five and a half, this has always made me wonder what magic happens over the six-week summer holiday between finishing nursery and starting school. Because, if as a country, we value high quality early level provision, the implication here is that either the children change drastically (implying a linear developmental understanding of childhood which contrasts with a child-centred approach) or that our expectations of the adult's role and skills in children's formal ECEC experience shifts.

I have already outlined the impacts of this transition in my observation of teachers' limited capacity to engage in the sort of sustained shared thinking, noticing and attentionality in child-nature assemblages which may be conducive to education-as-

commoning-activity. There were different root causes for this at the two schools, but the low numbers of experienced, knowledgeable adults with a clear understanding of the educational purposes of the time outdoors who could engage with *all* children, not just those with additional support needs, affected the types of child-nature relation which could emerge. Angela Rekers-Power's findings in a study looking at regular supported forest school sessions with primary schools children support this. She observed that

> there were fewer children (only half of the class attended at a time), extra adult support, less pressure on outcomes, and more time for playful adult-child interaction. Thus, the teacher found she was better able to engage with and assess children from a competency rather than deficiency perspective, due to the 'spaciousness' of both FS pedagogy and place.
>
> 2022, para 6

5.7.3 Interactions, experiences and spaces

In RtA, the learning environment is figured as consisting of interactions, experiences and spaces. My fieldwork shows that outdoor learning can provide a diverse range of all three. However, my findings suggest that without a clearly articulated educational purpose and consistent socio-cultural and ecological framework aimed at shifting human-nature relations spanning that whole learning environment, outdoor learning's contribution to transformative change or Learning for Sustainability in early childhood will likely remain superficial or confined to other knowledge domains. This does not mean that taking learning and play outdoors does not have *significant* value in other spheres, as it clearly does, but I spent so long laying out the reality of the challenges that the future holds because I wanted to be clear about what we are asking of education and direct experiences of the world. Stephen Sterling articulates is better than I can, when he states that

> [t]he paradox of education is that it is seen as preparation for the future, but it grows out of the past. In stable conditions, this socialisation and replication function of education is sufficient: in volatile conditions where there is an increasingly shared sense (as well as numerous reports indicating) that the future will not be anything like a linear extension of the past, it sets boundaries and barriers to innovation, creativity, and experimentation
>
> Sterling, 2009, p. 19

RtA offers the pedagogical tools for doing this in early childhood, but the radical transformation of educational purpose necessary is missing from current educational policy and action in Scotland. Without that re-orientation of purpose towards worlding, commoning and lower impact ways to relate to the world to provide direction for child-centred pedagogies, the risk is that we restrict our young children's capacities to meet the world on different terms. The ideas are there at a

global level (Common Words Research Collective, 2021; UNESCO, 2022), but the educators in my study did not feel they had the mandate, the knowledge or the time to do it on their own.

Reading this through Research Objective 1

Investigate how children and teachers come to know the outdoor environments in which they are learning.

As a discourse and policy agent, RtA has potential to stimulate a significant drive towards the use of outdoor spaces in the first year(s) of primary school, the expansion of child-centred, play-based pedagogies and responsive planning. These will all potentially increase the amount of time children and teachers spend outside, which is positive for a range of outcomes, but comes with the associated risks and limitations that I have identified in the other agential cuts.

Reading this through Research Objective 2

Identify potential pathways and barriers to LfS that emerge during school-based outdoor learning.

If outdoor learning is to be part of meaningful Learning for Sustainability in early childhood, educators need to feel able and confident to connect local direct experiences of nature with global systems and ways of being. As a pedagogical framework, RtA is well suited to supporting the forms of commoning activity which may support attending to non-human nature and response-ability, especially in ELC settings. However, if our society expects teachers to employ this type of pedagogy with the purpose of transformative social change for sustainable ways of living, a coherent socio-cultural framework for understanding non-human nature and more adults who can share that are needed in and out of classrooms.

6. Conclusion

6.1 Overview

In this study, I used a feminist materialist research assemblage to investigate how children and teachers at two primary schools came to know the outdoor environments in which they were learning. Through doing this, I also wanted to identify potential pathways and barriers to learning for sustainability that emerge during school-based outdoor learning. The field of outdoor learning and care for Earth is expansive and influenced by multiple inter-related bodies of knowledge, and I charted molar, minor and molecular lines which affect the practice of outdoor learning in the context of global climate and biodiversity emergencies, which expose the reality of living through the Anthropocene.

Through this mapping, I identified early childhood as an important developmental phase in terms of how we humans understand ourselves in relation to the rest of the world. In Scotland there is a significant transition between early learning and childcare and primary school, but contemporary policy and practice guidance also offers significant opportunities for creative pedagogies and the use of outdoor environments in the first years of school. My cartography also showed that there is an urgent need and desire for transformative change in how we relate to nature and value its contributions to people at a global level, but limited change at national or practice level. Re-figuring education as a relational process and a common good has been identified as an important step in doing this, but limited progress has been made on this so far. At a Scottish level, the curriculum and the unique approach of Learning for Sustainability seem well suited to support this, but there appears to be a significant policy-practice gap in enacting changes. The first years of schooling are an effective place to focus attention because child-nature relations are valued there and there are policy-practice shifts happening which should support teachers to adopt pedagogical approaches which foster commoning activity where children and other non-humans can come into meaningful co-respondence.

I conducted ethnographic fieldwork with 4-6 year olds and their teachers at two schools to meet my research objectives, using a research apparatus which I hoped would allow me to meaningfully consider the non-human agents in learning processes alongside children and teachers. From these observations, I made six agential cuts, reading the data through the research objectives, other literature, policies and my own speculative figurations to create interference patterns. These showed that nature was brought into being in multiple different ways and places and that this affected how children related to their direct experiences of nature through outdoor learning. I identified collecting, cultivating food and other processes as having potential as commoning activities, but the empirical data highlighted how important the socio-cultural and ecological framing and modelling of human-nature relations by the teacher is. A lack of effective cultural and ecological metaphors or worldviews beyond

utilitarian or stewardship frames, coupled with the privileged position of open-ended play outdoors made it hard for teachers to shape respectful human-nature relations through sustained shared thinking and attentionality without considered critical engagement. In the school with a more developed play-based pedagogy and free-flow access to an outdoor space, this was compounded by seasonal weather and the challenge of teachers splitting their attention across two spaces, while also trying to complete targeted group work on literacy and numeracy. Play was shown to exert significant power both discursively and in children's experiences and play patterns were consistent and developed over time. This holds significant potential, but if educators want outdoor play to contribute actively to more sustainable relations with Earth or environmental education, it requires balancing critical engagement and planning without reverting to 'strong' intention-focussed forms of education. At both schools, while there were rich opportunities for physical and creative play, the predominance of synthetic and manufactured materials in the most accessible outdoor spaces, coupled with the high ratio of children:teacher limited the likelihood of meaningful, respectful human-nature relations emerging.

6.2 Implications for practice

I'm going to be aspirational here, and not think too much about the realities (of the political economies which exert power to restrict transformative change). Finding ways to do that which honour the pragmatism of the people who have supported me through this process can be the next step in the journey.

Scottish policy-makers and education leaders should take UNESCO's call for a new social contract for education seriously. It entails a revisioning of education as fundamentally relational and extending it to incorporate the more-than-human, with pedagogies which are "based on ethics of reciprocity and care and recognise interdependencies among individuals, groups and among species" (2021, p. 51). However, in order for educators to be part of this, coherent cultural frameworks and metaphors, as well as the knowledges to inform and develop these are required. Understanding social and Earth systems through ecological ways of thinking offers one way to do this, and institutions with responsibility for initial teacher education should support pre-service and in-service teachers to develop consistent(ly radical) ways of understanding the natural world as inter-dependent. From this root, educational purpose, shared ways of thinking and talking, pedagogies and materials which support commoning activity offer scope for experiencing and developing co-respondence and response-ability. This is where direct experience of and active care for non-human nature in shared places is important.

In shorter, more focussed and more pragmatic terms, early childhood educators should pay critical attention to how nature is figured and framed in resources, texts, dialogue, play and learning. For example, where nature is figured as separate from humans, or presented in a utilitarian or extractivist frame, adults should critically consider how to incorporate it in their practice. Further research is required to understand the implications of vicarious and metaphorical (re)presentation of natures before recommendations on how to foster change can be made responsibly. In outdoor learning processes, educators should be cautious about how both teacher-initiated and child-initiated play activities contribute to these figurings and framings of nature, particularly where nature may be framed as a resource free from reciprocal relationality. Play is immensely valuable in early childhood, but as an educational community, we should seek to develop strategies to nurture play activity which supports and represents respectful human-nature relations without removing children's agency in play. Critically considering environments, indoors and out, and what natural and synthetic materials and resources do in children's play can have a role in this. However, for early level teachers to do all of this and everything that is expected of them in RtA meaningfully, it appears that additional support in the form of staffing, resources and time is required.

In Scotland we have vision. We have innovative policy frameworks. We have committed and passionate educators, and human and non-human communities that are full of potential to flourish together. Transformative change is possible, but it is not happening yet, and it is not happening fast enough for the children I spent time with during this research. Which is why the interweaving of the material, the ecological, the non-human, the political with the socio-cultural is so important. Our species' unique abilities to remember, to story and to re-story for alternative futures, is where the hope lies.

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