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Mosaicking childhoodnature relations: situated encounters with country in times of climate change*

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ABSTRACT

This paper, by an intergenerational and international author collective, uses postqualitative 'mosaicking' to assemble and reassemble 'material moments' of childhoodnature encounters. Mosaicking is an experimentation that combines materials, digital devices, nonhuman nature, and humans to co-create something new; it enables us to ponder nature relations from multiple perspectives and in post-anthropocentric ways. Enacting this speculative inquiry, that works to blur the boundaries of diverse childhoodnature experiences, enables an exploration of the complex realities of climate change for children. This opens new post-anthropocentric orientations for Climate Change Education. We consider how the Aboriginal philosophy of Country and the posthuman concepts of childhoodnature, relational becoming, and nature relations can be interwoven and put to work towards this endeavour, thus challenging dominating minority world, humanist perspectives. Emerging from this we propose educational responses to climate change which are co-created, relational, place-oriented, embodied, transformative, and sensitive to children's Climate Change becomings.

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‡These are child authors who are under 16 and made their contribution to the preparation of this article.

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Figure 1. Mosaicking childhoodnature relations.

1. The story so far

The authors represent an intergenerational collective of children, researchers, and practitioners. The adults in this author collective founded the Nature Relations Research Group,[1] which set out to contemplate and advance a nature relations approach to Climate Change Education (CCE). We see nature relations as a holistic, interdisciplinary, and relational approach to understanding the realities of climate change for children (Barratt Hacking et al. 2022). Our research-practice-experience is multi-disciplinary, bringing together diverse ecological-social-cultural backgrounds. Albeit largely European and minority world,[2] our experience of climate change and childhood is informed by our multiple lived places: Indonesia, The Maldives, Wales, Scotland, England, Portugal, South Africa, Cyprus, Switzerland, and United States (Figure 1).

The opportunity afforded by this special issue, with its focus on the Aboriginal concept of Country, is not without challenge. We recognise that our interpretations of Country through a largely European lens are inadequate. We are concerned as an author collective of largely, but not solely, minority world/UK/European peoples, that our research-practice does not appropriate Indigenous knowledges, developed over millennia (Ellis et al. 2021). Recognising that there are many unique Indigenous groups globally, we refer to Indigenous knowledges as those which have commonality, for example, a holistic view of community and environment (Drolet 2021) or a nonlinear conception of time (Bergman 2006; Rifkin 2017). Further, we indicate where the knowledge or experience we refer to seems to be specific to a group, for example, Dayak, Betawi, or Aboriginal. We acknowledge that colonial and settler societies had a destructive impact on the lives and territories of Indigenous peoples around the world, and our connections with this exploitative colonial past-present. We wish to avoid reproducing colonial oppression through misinterpreting, corrupting, or commodifying Indigenous knowledges for our own academic purposes (Andreotti, Ahenakew, and Cooper 2011). Following Ahenakew (2016, 337), we endeavour to minimise these pitfalls through the 'ethical task … to make what is invisible noticeably absent'. In this, we recognise our responsibility to make such absences visible by giving voice to experiences which continue to be obscured, silenced, or ignored through colonialism, for example, voices of Indigenous peoples, people living in the Global South, impoverished

Figure 2. A hexagonal tessellated mosaic of interrelated theoretical concepts.

communities, nonhumans and children. We set out to acknowledge and show the absences through the process of mosaicking (Section 3) in which we materially engage with rendering certain 'things' (animals, plants, objects, experiences) visible. This process confronts us with decisions about 'who matters and what counts' (Barad 2007). In this, we open up colonisation and set out to reflect critically on our positionality, including our own colonial histories and our points of view. Further, we elucidate the intentions we bring to the discussion of Country and the advancement of a nature relations approach to CCE.

2. Conceptual openings

What follows unfolds the concepts that we utilise in our mosaicking (Figure 1), and how they interrelate. This unfolding reflects, in part, the initial exploratory discussions about this special issue paper by the Nature Relations Research Group. We accept that these are contested concepts. We do not work with them in isolation; in combination they have stronger explanatory potential for making sense of diverse nature relations. Acknowledging that the concepts are interrelated and inseparable we have tessellated them as hexagon-shaped tiles. Figure 2 provides a visual representation of this overlapping and messy blurring of ideas, but this is only one way of tessellating the concepts. The edges of the tiles are permeable, and the placement of each tile is not fixed; they can be moved around to reveal different conceptual interactions. Thus, the way we work with concepts through this mosaicking process is experimental, always unfinished and dynamic.

2.1. Climate change – a scientific and social concern

Climate change is the context, and raison-d'etre, of this paper. Climate change and how education can respond to it through CCE, is what provoked our work on nature relations. We recognise climate change as a process that we can understand scientifically through our appreciation of how humans are accelerating the rate of global warming through greenhouse gas emissions. Yet, we also seek to foreground the understanding of climate crisis as a social phenomenon. A divide between the human–nonhuman world is now widely acknowledged as a critical driver of climate

change (Latour 2014). The separation of nature-culture has led to the cultivation of an exploitative and extractive relationship between humans and the natural world. Confronting the disconnect between nature and culture is thus a fundamental imperative for addressing climate change.

2.2. Becomings: nature, nature relations and childhoodnature

Our view of the importance of children's lived experiences of nature is central to our argument that understanding nature relations is a fundamental part of CCE (Dunkley 2016). As such, within this paper, we bring a critical lens to the widely contested concept of nature (Castree 2014; Ducarme and Couvet 2020), and seek to highlight the diverse ways of interacting with and understanding 'nature' in childhood.

Yet, our focus upon CCE means that we also seek to go beyond an appreciation of the critique of concepts of nature, towards a consideration of nature relations as a response to climate change. Nature relations is a relational ontology where 'individual human and nonhuman bodies materialize and come into being through relationships; and so does meaning' (Murris 2020, 18; see also Braidotti 2006). Therefore, nature relations focuses on the embedded nonhuman-human relations within childhood experiences, across time and space.

In focusing on an understanding of the relations between children, climate change, and nature we are informed by Tanner's (1980) and Chawla's (2007, 2015) pioneering Significant Life Experiences (SLE) research. This explores what experiences in childhood produce 'an active and informed citizenry' committed to sustaining all life on our planet (Tanner 1980, 20). Ongoing SLE research has demonstrated a triad of experiences: primarily time in nature, but also activist intergenerational role models who communicate nature's value, and opportunities for action-taking to sustain or regenerate nature (D'Amore and Chawla 2020).

The new conceptual work on childhoodnature (Cutter-Mackenzie-Knowles, Malone, and Barratt Hacking 2020) holds further promise. Childhoodnature is a posthuman integrating theory which decenters the human, and acknowledges that children are nature, entangled with their nonhuman-human and material worlds. Childhoodnature foregrounds children's everyday situated experiences within nature; we think of this as *being and becoming,* recognising that humans are always becoming and changing in relation to their worlds. Childhoodnature is therefore a state of being and becoming within nature, through nature relations, through participation in the world. Barratt Hacking and Taylor (2020) coined the term relational becoming to encapsulate the unfolding of nature relations as an emergent process of becoming relational within nature.

Whilst this paper is about childhood and climate change, we wish to avoid harmful adult–child binaries. We disrupt the notion of child-as-adult-in-becoming, instead, children are agentic, capable of producing knowledge in relation with human and nonhuman others (Murris 2020). We acknowledge that children and adults are part of nature, that childhoods and adulthoods are entangled and relational, always changing and becoming and that the experience of childhood is within every adulthood. As such, our childhoodnature mosaicking contemplates child–adult entanglements through cutting together-apart (Barad 2014) child–adult–nature experiences.

2.3. Turning to country and colonisation

We have come to understand how we can learn from, and be challenged by, the Aboriginal philosophy of Country. Aboriginal peoples view Country 'as a site of multiple presences and encounters' (Rose 2000, 289); hence Country is much more than a context for life, a stretch of land or a place to be. Instead, Country emerges over time, linking past-present-future, coming into being through nonhuman and human relations. In Country, connections between human, nonhuman life and the material world are deep and life giving; Aboriginal scholar, Vanessa Cavanagh (2020, n.p.n.) describes her special tree, the 'Grandmother tree' as 'part of human and non-human kinship networks that connect us with Country'.

As the Aboriginal term Country is not typically used outside of Australia, for all but one of the authors Country was a less familiar concept. Ancestors of our authors in Jakarta had similarly intimate relations with the land. For example, in what is now Jakarta, a plethora of Indigenous peoples, such as the Betawi, and other ethnic groups, held deep and life-giving relations with their land, living and farming within the swamps for generations. But these relations were devastated by Dutch colonisers and their engineering, drying out the land to develop the city. The term 'Adat', originally introduced by Islamic merchants trading in what is now Indonesia in the 1200s, has been adopted by Indonesia's diverse ethnic groups to recognise the customary rights of Indigenous peoples in Indonesia (van Engelenhoven 2021). It is now used to fight for the reinstatement of Indigenous lands and acknowledges the 'vast array' of land-based ontologies and understandings of land relations that are at risk (Tilley 2020, 1436).

We further explored how Country holds very different notions to those of us with European heritage where the term 'country' is used to refer to a state or nation, countryside, a rural environment, a place that is used or owned. Our European Indigenous ancestors, like the Celts, Picts, Angles and Saxons, had a closer, spiritual relationship with the land and kinship with nature (Duncan 2015). For the Celts 'all geological features, as well as all flora and fauna, are imbued with life-force and personality … intertwined with humans' (Irwin 2022, 2). Time was perceived as circular rather than linear with sacred festivals representing the seasonal cycles (MacLeod 2012). This Celtic ontology is reminiscent of Country and its intimate nonhuman-human connections. But over time, in Europe, these nature relations have diminished and been repressed for example, by the Catholic witch hunts from the fifteenth Century (Irwin 2022). Nevertheless, faint echoes of nature kinship are expressed in modern folklore. People maintaining Celtic culture today see nature spirits and faeries as real and active (Massey 2021) and rituals like Wassailing, a pagan ceremony imploring the apple orchard spirits for a good harvest, are re-emerging in Britain.

These European roots also revealed painful connections with Country, past and present. It may have been our colonising ancestors who settled in Country violating land, people, ecologies, and ways of life (Rose 2002). Arendt's (1961) theorising of decolonisation shows how coloniality continues in the present, embracing Aboriginal philosophies of nonlinear time. The colonial concept of countryside as a distant wilderness to be exploited, continues to deny Aboriginal peoples, and Indigenous communities more widely, access, rights, agency, and knowledge of the land (Fletcher et al. 2021). This perpetuates colonial practices where European notions of country and countryside have been politicised through land ownership and boundary making.

History shows that the Aboriginal philosophy and practices of Country engender a way of life that is constructive, sustained without environmental degradation. This is common to Indigenous peoples around the world whose 'connection to the land … (is) radically different from the Western capitalistic view of land as a resource' (Marom and Rattray 2022, 117). The nature relations concept follows Country by foregrounding the indivisibility of human–nonhuman life and the entanglement of time, space, and matter and whereby meaning is created through relations within nature. Unlike Country, nature relations is but a recent concept, borne out of our concern with the climate crisis and the need for a different sort of education to address it. For us, learning from Country, and from other Indigenous land-based ontologies, is vital in advancing a sustainable, regenerative way of life as counter-act to the destructive, exploitative ways so deleterious for all who live on the planet. This paper acknowledges climate realities are already present, not distant in a dystopian future, and for Indigenous peoples across the world these realities are but one series of colonial violences (Whyte 2018).

3. Mosaicking childhoodnature

We see childhoodnature as a state of being and becoming entangled within nonhuman and human relations in space and time; it is these entanglements that we explore through mosaicking. Mosaicking childhoodnature represents a novel experimentation designed to disrupt the anthropocentric gaze. Instead, mosaicking seeks to co-create knowledge across nonhuman-human relations. This is a post-qualitative endeavour in which 'representation is not the goal … [rather] experimentation

and the creation of the new, which is very difficult' (St. Pierre 2021, 6; see also St. Pierre 2019). The postqualitative turn has emerged as a reaction against methodologies aligned with humanist ontology and its 'knowing over being' (Lather and St. Pierre 2013, 630). Postqualitative inquiry opens speculative thinking about the nature of life, experience, and research. It is inquiry which is 'risky, creative, surprising … cannot be measured, predicted, controlled … or called forth by preexisting, approved methodological processes' (St. Pierre 2018, 604). As such postqualitative inquiry is a troubled process (Somerville and Powell 2019), with the ever-present danger of falling back on the familiarity of qualitative analysis in searching for themes, sameness, and representativeness. We acknowledge the risk of recentering the human and minimising different lived experiences (Section 3). Instead, we attempt to speculate by amplifying differences and absences (Ahenakew 2016).

In this experimentation, we cut together-apart (Barad 2014) our images of childhoodnature relations and put to work the concepts discussed earlier, as provocation for CCE. Each photograph and its commentary capture a 'material moment' (Taylor 2018) revealing the authors' childhood-nature encounters in times of climate change. These material moments derive from our lived experiences in childhood, adulthood, education, biology, geography, ecology, ocean literacy, critical (eco)pedagogy, and environmental education. They reveal everyday realities that offer insights into the kind of nature relations and educational experiences so needed in times of climate change.

Taylor (2018, 157) defines material moments 'as instances, occurrences and interactions which inhere in, and are enacted through, the materiality of bodily relations; they are moments which are materially dense and specific; and they are time-bound and spatially-located'. Material moments tune in to the micro-level detail of our situated nonhuman-human encounters. This experimentation moves us beyond the anthropocentric gaze, considers 'data hotspots' that 'glow' and 'glimmer' to spark connections that resonate and remain (MacLure 2010), and enables us to explore difference across these multi-author-discipline-generational-nationality-ecological experiences from different degrees of privilege. Children and adults co-create the mosaic together, asserting that we are all relational becomings. Using the sharing of images and commentaries to communicate with each other, we enacted Murris (2016) figuration of the posthuman child, acknowledging that children are part of the world they inhabit and are capable of 'actively *constructing* knowledge through material discursive relationships' (163). This resists representing children as the future climate change saviours, and instead gives voice to their current lived experiences, hopes, and fears around climate change (Lee 2013).

Mosaicking, the process of cutting out sections of our images and words and assembling them to create one picture (Figure 1), builds on previous work, where several of the authors shared images to communicate nature relations in childhoodnature (Barratt Hacking et al. 2022). To extend our work, we used 'digital collaging' (Cranham et al. 2022) to assemble our mosaic and to think-with our collected images and words. Here, we explore our own understandings and experiences of childhoodnature in the omnipresence of climate change through assembling photographs as data and working-with photographs in non-representational ways. Mosaicking is a knowledge-creation process that allows us as entangled human/nonhumans to co-create images and writings that do not belong to one of us, or represent one perspective, but are ours and yours. The process of cutting sections of writing and parts of images, act as 'agential cuts' (Barad 2007, 175) and 'different agential cuts produce different phenomena'. Our intra-actions with these words and images 'iteratively reconfigure what is possible', and, whilst they constrain or exclude certain ideas and possibilities, they open us up to others. Placing these cut sections alongside/below/above/in-between one another is a form of 'cutting togetherapart' (Barad 2007). In this sense, in line with Barad's agential realism and inspired by Murris (2022) 'This is not a photograph of Zuko', our work uses photographs to agentise phenomena. Working with Hultman and Lenz Taguchi's (2010) provocation to move beyond anthropocentric readings of photographs, we have taken pieces of the photographs into the mosaic that play with time, space, and matters of scale.

The lived experiences encapsulated in the material moments span a range of micro and macro encounters with the nonhuman-human world. As such the material moments are situated

naturecultures reveberating past-present-future. Through this process, we cut apart and stitched together the mosaic in different ways. But there are many other possible cuts that could have materialised. The mosaicking is presented in three parts. Firstly, childhoodnature destinies; secondly, becoming childhoodnature; and finally, hope for childhoodnature. Each part mosaics a subset of material moments; a mini-tessellation of concepts precedes each mosaic to signify the combination of concepts we put to work in each one (Figures 3 and 4).

Figure 3. Mosaic 1: childhoodnature destinies.

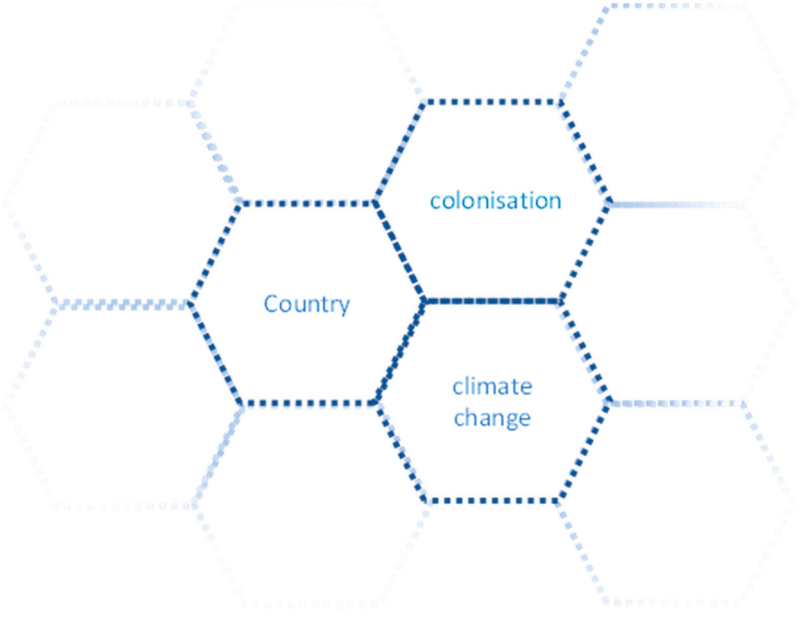
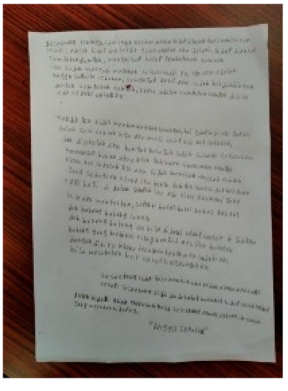


Figure 4. Core concepts illuminating Mosaic 1: childhoodnature destinies.

3.1. Mosaic 1 Childhoodnature destinies

Someone, of course, does not want to be born below the poverty line but this is life and destiny that I should live on between the garbage pile, inhaling smoke from fires – this all becomes my daily routine. Yes, I am Angga Saputra, 15 years old, since I was small I already live around the garbage piles, because inside the pile contains fortunes for me, My destiny doesn't make me despondent, there are a lot of things that I can be grateful for. One of them is being able to stay at school, and in school, I learn there are a lot of teachings and one of them is the school making me think I am an environmental hero. Why? Because my school says I already sort out garbage that people find useless. But for me, in that garbage, it has an economical value that I can benefit from like used bottles, paper, and other things. And those objects can be recycled and turned into something useful. I am also proud of myself because actually without me realizing it, I can do something good for the environment.



"*Someone cannot choose to be born in this world*
But someone can and deserves to change his life for the better
God cannot change someone's fate unless that person changes his/her own life."

Material Moment 1. Between the garbage pile, Angga, Jakarta, Indonesia

These two photographs capture encounters during a research visit to Jakarta, Indonesia (2015) The photographs juxtapose life in the kampung with their school, Sekolah Aman (pseudonym). This visit transformed my educational and childhoodnature perspectives. Here I witnessed violence against childhoodnature, tempered by efforts at reconciliation.

Unregistered children who live in the kampungs of Jakarta would not normally have access to school, typically picking the rubbish tips daily or seeking help on the streets. In the kampung human and nonhuman health are degraded, wildlife largely absent, homes adjacent to smouldering, toxic landfill sites. Climate change exacerbates the multiple vulnerabilities facing these children. Jakarta is one of the most susceptible coastal cities in Southeast Asia, with kampung districts most endangered by rainy season flooding (Firman et al. 2011). In the majority world children 'face the greatest risks' from climate change (Currie and Deschenes 2016, 3). This is, truly, childhoodnature at the margins.

Yet daily the children travel by minibus a few kilometers to this open-air charitable school, situated in the grounds of the company that sponsors the school. Built Indigenous-style of steel, bamboo, and thatch, its walls are alive

with orchids, creepers, ferns, insects, lizards, and birds. The school provides safety, nourishment, health, and education. Indigenous species and children thrive, weaving childhoodnature. The school offsets the worst effects of eco-social deprivation, lives and futures transformed.

For me, the deprivation I witnessed in this visit is linked to colonialism and the resulting oppression that places like this experience. As a white, female, privileged European academic, I felt uncomfortable by risking ongoing colonial exploitation through my research.

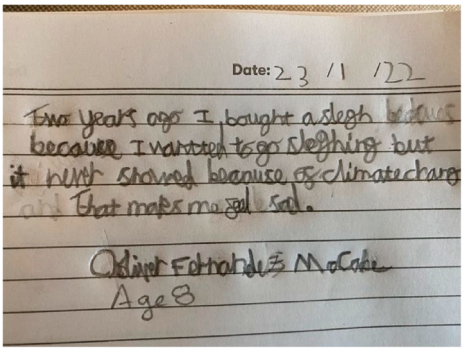
Material Moment 2. Childhoodnature at the margins, Elisabeth. Jakarta, Indonesia

This photograph is taken at Grass Roots Forest School[3] where young people are outside, in nature involved in activities inherently entangled, interwoven with and inseparable from nature. Perhaps the young people are climbing trees to identify which branches need lopping; gathering sticks, leaves, and mud, to construct rafts, or build fires; weeding, thinning, clipping, digging, working; sometimes quietly alone, sometimes collaboratively, yet all the while inextricably in nature.

Research probes the use of forest school settings, in particular, for teenagers in deprived urban areas who are excluded from mainstream schooling, and typically spend less time in nature (Natural England 2019). Possibilities opened up in these spaces are all the more necessary for such young people, whose environment, whether inner-city, or formal classroom setting, may feel stultifying, hostile, or oppressive (Wenham 2021). In England, exclusion from school amongst teenagers varies by ethnicity, with the highest rates among Gypsy/Roma students, followed by those of mixed White and Black Caribbean ethnicity. Students from deprived backgrounds and those with special educational needs (SEN) are also disproportionately subject to exclusion. The most common reason for exclusion is persistent disruptive behaviour (Department for Education 2021). Yet prior to exclusion, many teenagers experience being ostracised, sidelined, and marginalised in school, subject to discrimination, and held back in the classroom (Wenham 2021). This experience of repeated stigmatisation – perhaps labelled as an outsider, misfit, trouble-maker, or simply a weak, inadequate learner – impacts ongoing identity formation, particularly in terms of learner-identity (Goffman 2009; Youdell 2006).

For excluded teenagers, a chance to step utterly away into forest school, provides breathing space, a calm, safe space to pause and to see the world – and their place in it – anew (Freire 2018).

Material Moment 3. A safe space to become, in nature, Lucy, London



Material Moment 4. It never snowed, Oliver, Bristol

Stitching together these four material moments (Figures 3 and 4) reveals insights for how climate change and colonisation impacts on childhoodnature destinies. The material moments occurred in the British cities of London and Bristol and the Indonesian city of Jakarta. These cities are on different sides of the world geographically and historically: minority-coloniser vs majority-colonised. Bristol and London hold strong binds to colonisation. Bristol's wealth grew from its involvement in colonial transatlantic trading including of slaves (Tallon 2007) and London was seen as capital of the British colonies (Zahedieh 2010). In contrast Jakarta, built by the Dutch colonisers, is now capital of Indonesia. Indonesia experienced successive waves of settlers over millennia from Melanesia (Southern Pacific), China, India and the Middle East (Brown 2003). Indonesia thrived until the 1500s ADE with diverse ethnic and Indigenous peoples living in various sovereign states 'before their slow decline into colonial subjugation began' (11). From the 1600s ADE, the Dutch planned Jakarta as a segregated city; affluent European enclaves were separated from the Kampungs, home to a multitude of Indigenous and ethnic communities. The colonisers took the Indigenous term, Kampung, or village, appropriating it to describe a non-European housing area stigmatised as 'undisciplined and insanitary communities (Putri 2019, 805). Colonisation also destroyed large tranches of primary rainforest in this and the wider region, displacing Indigenous communities and introducing monoculture plantations such as coffee and rubber for trade (Feintrenie and Levang 2009). Such acts of nature-culture violence continues for example, in Borneo rainforests are being destroyed and Indigenous communities such as the Dayak are displaced to develop the new capital city of Indonesia. Yet the Dayak people have managed and sustained the rainforest and rich biodiversity of Borneo for Centuries reflecting deep connectedness with the forest as 'a site of memory' (Tsing 2005, 257).

Colonialism is now recognised as an historical and enduring source of climate change, 'Climate Colonialism', continuing to exacerbate vulnerabilities to the climate crisis (Bhambra and Newell 2022; IPCC 2023). Climate Colonialism appears to orchestrate childhoodnature destinies in Mosaic 1. In his poignant material moment Oliver and his dog wait pensively for the snow that never comes and for Oliver 'this makes me feel sad'. Oliver believes it is too late for him to play in the snow because of climate change; he is deprived of the thrill of skidding downhill on his sledge with his dog. On the other side of the world, but stitched together in the Mosaic, Angga's childhood has been spent playing and working in the garbage piles around the Kampung, facing life-threatening toxicity and flooding. The latter is arguably attributable to climate colonialism whereby the Dutch constructed water engineering systems, including a network of canals, which dried out the swamp lands and brought disruption to hydrology leading to water pollution, water borne diseases and flooding (Steinberg 2007; Yapp 2018). There is injustice in the heightened degradation children face in the majority world as a result of minority world exploitation and ongoing colonisation. Here the Mosaic illuminates the interrelated impact of colonisation and climate change on childhoodnature destinies, and how colonial destruction and impoverishment of land and people continues into the present (Arendt 1961).

Mosaicking brings to life nonlinear conceptions of time present in Country. Posthumanist, Barad (2007), argues that space, time, and matter cannot be treated as separate entities, through 'spacetimemattering' they are entangled so that the 'infinitely thin slice of time called the present moment … is a crystallization of the past diffracted through the present' (Kuby and Taylor 2021, n.p.n.). Here for Angga and Oliver their past-present-future childhoodnature, is intimately interwoven with ongoing exploitative colonial processes across space and time. This has created environmental degradation including climate change whereby cumulative CO_2 emissions predominantly originate from the minority world (Our World in Data 2019). The impact of climate change is felt most severely in the majority world; the lack of snow in Bristol is disappointing for Oliver, but flooding in the Kampungs of Jakarta is life threatening for Angga. The cut between Elisabeth's and Angga's material moments tells another story. Angga sees his role in the rubbish piles as an 'environmental hero'. Here Angga's life between

the rubbish piles and school becomes blended and combined rather than opposed. His school, Sekolah Amman, forges peace and reconciliation for colonial past-present wrongs (Rose 2002) and gives Angga a new identity and destiny. Angga is acutely aware of his situation and shows agency rather than helplessness in recognising his contribution to ameliorating poverty and environmental destruction. But, the creation of children's identities as 'environmental heroes' raises questions about the loss of childhoodnature in places of deprivation where the impact on children is the greatest.

Lucy's material moment in Grass Roots Forest School demonstrates that London's affluence is not equal by amplifying the experiences of excluded and disadvantaged children. Elisabeth's material moment shows extreme stories of exclusion for children living in the Kampung. However, the fresh experience of relational becoming within nature allows the troubling of children's sense of self, opening possibilities for things to be otherwise; the children construct relational identities as learner and as childhoodnature. In seeing themselves, the world and their relations as subject to change and transformation, the children position themselves differently, re-constituting themselves as childhoodnature. In these two schools, nonhumans-humans are becoming relational as kin. The experiences of children at Sekolah Aman and Grass Roots Forest School push back against deprivation, effect eco-social justice and prompt new becomings. By removing spacetime between these places, placing a child in London, UK alongside a child in Jakarta, we illuminate the entanglement of environmental and climate crises with the past-present-futures of colonialism. As such we have mosaicked 'through the range of scales of injustice, not by pointing out similarities between one place or event and another, but by understanding how those places or events are made through one another (Barad 2007, 246).

In seeking transformative education, especially in times of climate change, redressing the wrongs faced by children at the margins in the majority world is vital and urgent in order to disrupt ongoing colonial forces, but it is also imperative to unsettle other inequalities. Those left behind, cast-aside, neglected, and rejected within majority *and* minority world communities must be re-engaged, included, and heard. In enabling relational becoming for these marginalised young people, forest schools, and other schools with significant opportunities for nature relations, offer a small, powerful possibility in this direction. Further, by embracing diversity of voices in Childhoodnature, this mosaic acts in part as a resistance to the underrepresentation and absences of research-practice around climate change and education in the majority world and with marginalised communities (Blicharska et al. 2017; Klingelhöfer et al. 2020; Rousell and Cutter-Mackenzie-Knowles 2020). The experience of mosaicking with these material moments illuminates the situatedness of childhoodnature encounters in time–space within Bristol, London, and Jakarta in times of climate change (Figures 3 and 4).

3.2. Becoming childhoodnature

It's easy to forget that humans are animals too. This is because humans have dominated the planet so much. If you're hurting an animal that's like hurting a human because we're the same level in life. There are some animals that are more clever than us and some that aren't as smart as us. Some animals help us and that's why they're so special to me. You may have noticed that some animals eat the same food as us that shows that we are alike some way or another. Birds are like this. Animals are interesting and special!

Material Moment 5. Humans are animals too, Ana, Bristol, England

This photograph captures two lives entangled in an intimate moment of dynamic stillness. Their vastly different spatial scales infuse the encounter with curiosity and wonder; the delight in the child's face reflected in the other-worldly iridescence of the beetle's exoskeleton. The careful touch of the child's fingers supporting the overturned hand mirrors the gentle touch of the beetle's feet in contact with skin as it explores this unique spacetimematter (Barad 2007). In this encounter, there is no pre-established action or reaction, no focus on an outcome, yet the intra-action creates space for ways of knowing to emerge which are outside of dominant minority world concepts of education. Within this moment an appreciation of the aliveness of the beetle arises, and perhaps for the first time this child is aware of the spirit which infuses all beings, placing them within an interconnected ecosystem of becoming, in which child, beetle, and place are entangled, inseparable and whole.

As we attempt to heal the damage to climate, soil, and human and nonhuman lives, we must look outside of dominant minority world narratives of nature as something separate, a resource. Exemplified in this image, embodied moments of connection and awareness merge the human and nonhuman in ecosystems of relational becoming, healing the disconnect with our ancestral past which is inseparable from the present.

Material Moment 6. Biological becoming, Bryony, South West England

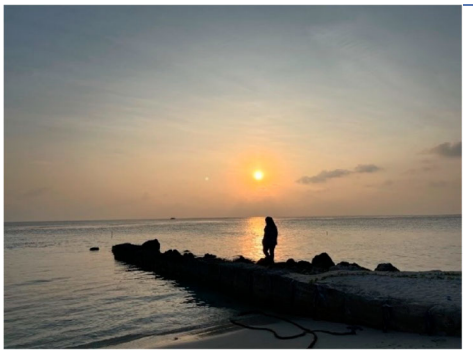
In this image, children have climbed a tree to look out over the woodland. Climbing, hugging, looking out, or jumping from, are all ways in which children play with/in trees. This photograph was taken whilst exploring young children's play in an outdoor nursery in England, and my initial analysis focused on what tree climbing afforded the human, helping to develop gross motor skills or enhancing wellbeing. This perspective was based on an extractive, minority world ontology that sees humans as separate from and superior to plants. The children named the trees during a child-led tour 'Meet the Trees!' (Barratt Hacking and Hogarth 2021). Working with posthuman, relational philosophies offer a way to re-think with trees in educational research that aligns more closely with the children's non-anthropocentric onto-epistemologies that seemed to acknowledge these childhoodnature encounters as intra-active. One child commented 'this tree is 'the climbing tree', it has branches for us to climb on and for me to sit' (Barratt Hacking and Hogarth 2021). The children gently stroked tree saplings saying 'look after these, they are babies' enacting kin-making (Haraway 2016). Lawrence explored human/ plant relationships and asks 'what does it mean to hear a plant?' (2021, *p.*1). Through a slow, relational approach where the children regularly spent time with/in the trees the children seemed able to respond to the plants they were becoming entangled with.

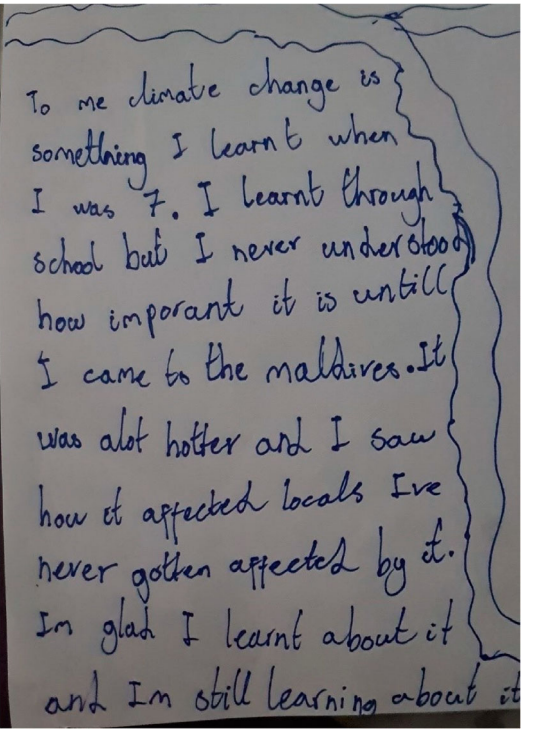
Material Moment 7. Playing with/in our multi-species kin, Hannah, South East England

This photograph shows a boy encountering a creature, found under a log, through an insect magnifier. It was taken whilst researching how young people living near the Brecon Beacons National Park explored, played, learnt, and engaged with nature during a Summer Club (Dunkley and Smith 2019). The research revealed that children explore and understand micro-ecological worlds around them in very different ways from adults. Micro-worlds are so significant when you are small, and insects and their micro-ecosystems are encountered with greater curiosity and joyfulness.

Early experiences of micro-ecological worlds, though brief, can be significant both at the moment of encounter and in the stories children might create. In an ever-growing ecological consciousness, in different times and places, children, like adults, draw upon ecological memories, recalling and re-storying in an ongoing process of relating to the natural world (Dunkley and Smith 2019). Early experiences, however small they may appear to the adult gaze, afford children opportunities to make kin with other species (Haraway 2016).

Material moment 8. Lost in a microworld, Ria, South Wales





Material moment 9. Still leaning, Amaan, Maldives

Figure 5. Mosiac 2: Becoming childhoodnature.

Figure 6. Core concepts illuminating Mosaic 2 becoming childhoodnature.

Together, these five material moments represent a transitional phase in our mosaicking journey in which relational becoming, as a catalyst for transformation, creates new understandings of childhoodnature. Through this relational approach, and early experiences of making kin with nonhuman nature (Haraway 2016), a sense of hope, togetherness, and response-ability (Barad 2007; Haraway 2008) emerges. Response-ability is the ability to respond in ongoing, appropriate, and

diverse ways, '*with* not *for*' (Barratt Hacking and Taylor 2020, 145). This empowers children to navigate climate change by being grounded in, supported by, relational and responsive with the living world. These SLE (D'Amore and Chawla 2020) have been shown to foster lifelong commitment to protecting and regenerating nature.

In stitching together these five moments (Figures 5 and 6), we move through scales of space and time, from micro-encounters in Ria's and Bryony's material moments to Amaan looking out over the vast ocean. Once again, the choices made through stitching and cutting togetherapart, create and amplify in particular ways, as particular material moments are brought-together or juxtaposed. In Hannah's image, branches of a large tree support a small child who is observing a micro-being on its bark. Differences in perspectives arise, as Ria explains, reminding us that '*micro-worlds are so significant when you are small, and … are encountered with greater curiosity and joyfulness*'. In Bryony's image the difference in scale between the child and the beetle creates an expansiveness of time and space that, in that moment, is infused with '*curiosity and wonder*'. However, as we cut from Mosaic 1, we are again reminded of the injustice of how climate change is experienced across space and time. As Amaan looks out over the vast ocean, he reflects on how his perspective of climate change has transformed since moving to the Maldives. His past-present-future childhoodnature, like Angga and Oliver in Mosaic 1, is experienced across different scales of time, from the minority world, where climate change may be perceived as abstractly slow, to the majority world where the impacts are often severely and urgently felt.

Amaan's image in the Maldives demonstrates the importance of nature relations to contextualising what was learnt about climate change in school. '*I learnt through school but I never understood how important it is until I came to the Maldives. It was a lot hotter and I saw how it affected the locals*'. For Amaan, meaning emerged from the relationship with place – physically feeling the heat, and becoming with the local people. This meaning creates a positive sense of value for learning, and nurtures response-ability for further learning: '*I am glad I learnt about it and I'm still learning about it*'. This is reminiscent of the Aboriginal concept of Country, which comes into being not through the physical attributes of place, but through human-nonhuman relationships. Reflecting these understandings, Amaan's image demonstrates the importance of nature relations to CCE, focusing on meaning arising through relations rather than through knowledge acquired in school alone.

The complex, entangled lives Bryony describes when she discusses the beetle, the child, the soil, reminds us that we are not separate from our worlds. In the context of CCE, the minority world conceptualisation of nature and humans as separate ontological spheres may perpetuate a sense of disconnect and powerlessness, and contribute to eco-anxiety (Randall and Brown 2016). From an Indigenous perspective, however, the components of 'nature' (biotic, abiotic, human, and nonhuman) are regarded as coinhabiting the same living space in an equal way, as a single sphere (Zent et al. 2022). Relational values such as reciprocity, mutual care, and respect, are central concepts which are viewed as key to survival (Kimmerer 2013). Through the process of relational becoming, our nature relations approach to CCE follows Indigenous value systems. In Hannah's image of two children climbing in a tree, looking out over woodland, the tree is entangled with the soil, with the other trees in the woodland, and with the children at an outdoor nursery. Hannah notes how the children enact kin-making (Haraway 2016), gently stroking the trees and saplings, saying '*look after these, they are babies*'. In Ana's photograph, she reminds us that '*humans are animals too*' and that '*if you're hurting an animal that's like hurting a human because we're the same level in life*'. For these children, relational becoming with nonhuman nature is an instinctive way of learning; Hannah and Ria highlight that it is the adults who may learn from the children in this sense, showing the entanglement of childhoods and adulthoods in nature relations. Like the life-giving educational experiences in Mosaic 1, these relational moments speak to Country, where 'kinship' 'extends beyond the biological links of kin or family in a European sense … all Aboriginal people will be related to each other … (and) it is possible for a person to be "related" to an animal or plant … as a brother or sister' (Kohen 2003, 230).

Furthermore, these childhoodnature encounters, from the macro-scale for Amaan, to trees for Hannah, birds for Ana, beetles for Bryony, and Ria's image of a micro-scale encounter, spark moments of curiosity, wonder, or joy. These moments create lasting impressions and a growing ecological consciousness or sense of stewardship (Dunkley and Smith 2019). Ria writes '*in different times and places, children, like adults, draw upon ecological memories … in an ongoing process of relating to the natural world*'. Such encounters can be conceptualised as a form of ecopedagogy, informed through a critical pedagogy (Freire 2018) of ecological consciousness-raising. For example, Ana describes her experience of relational becoming with the birds on her home-made feeder: '*some animals eat the same food as us that shows that we are alike some way or another*'; this nurtures values of reciprocity, care and respect for her environment '*some animals help us and that's why they're so special to me'* also reflected in Hannah's observation of the children gently stroking the saplings. Observing and becoming relational with the nonhuman inhabitants of our shared environments arguably enables active hope (Macy 2012). Such hopefulness has a powerful effect on the health and wellbeing of the individuals involved, and their potential eco-anxiety (Randall and Brown 2016; Richardson and Sheffield 2017). Observing and becoming relational with the natural world can be a way of 'living on' (Berlant 2011). Engendering ecological consciousness through nature relations approaches in CCE may therefore shape the cultural shift necessary for addressing the climate and ecological crises.

As we reflected on the value of ecological consciousness, of becoming childhoodnature, for CCE, we noted how, in our largely European context, exploitative nature relations have divided us from the soil beneath our feet, now concealed with concrete, a metaphor for Anthropocentric processes. Indigenous epistemologies have been pushed underground by minority world scientistic knowledge. But under concrete, soil remains. Soil is deeply entwined within Country, 'each plant belongs to that very soil, and under that particular sky. Each plant is connected to the next, also growing in its own perfect way … families to each other … .woven together with every element of nature participating' (Cavanagh 2020, n.p.n.). Biodiverse landscapes have long been shaped by Indigenous peoples. For us therefore, the separation of childhood and nature in CCE is problematic. What we can learn from the soil, from Indigenous wisdom, from the stitching together of photographs representing relational becoming across scales of space and time, from insects to birds, and trees to oceans, is that life is holistic, components are co-constitutive, and actions emerge from relations across visible and invisible worlds; nature relations (Figures 5 and 6).

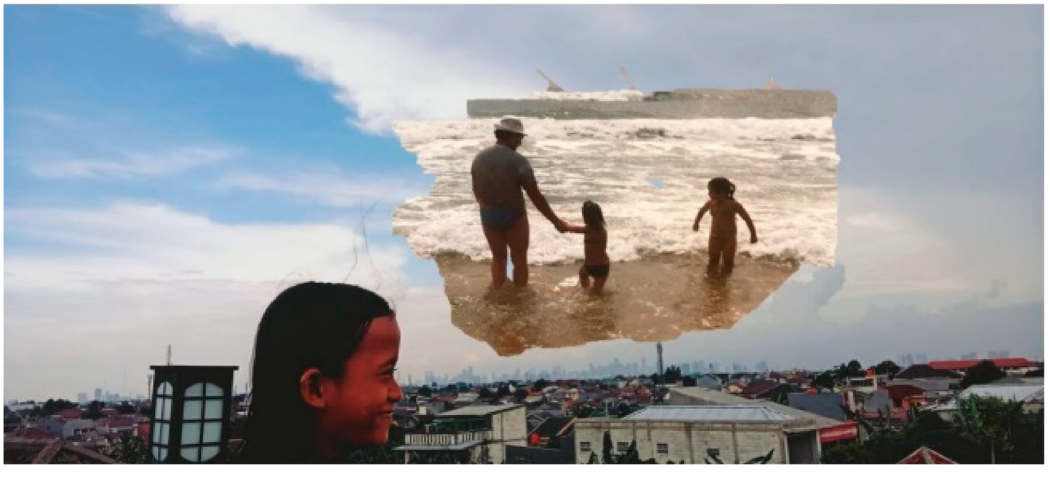


Figure 7. Mosaic 3: hope for childhoodnature.

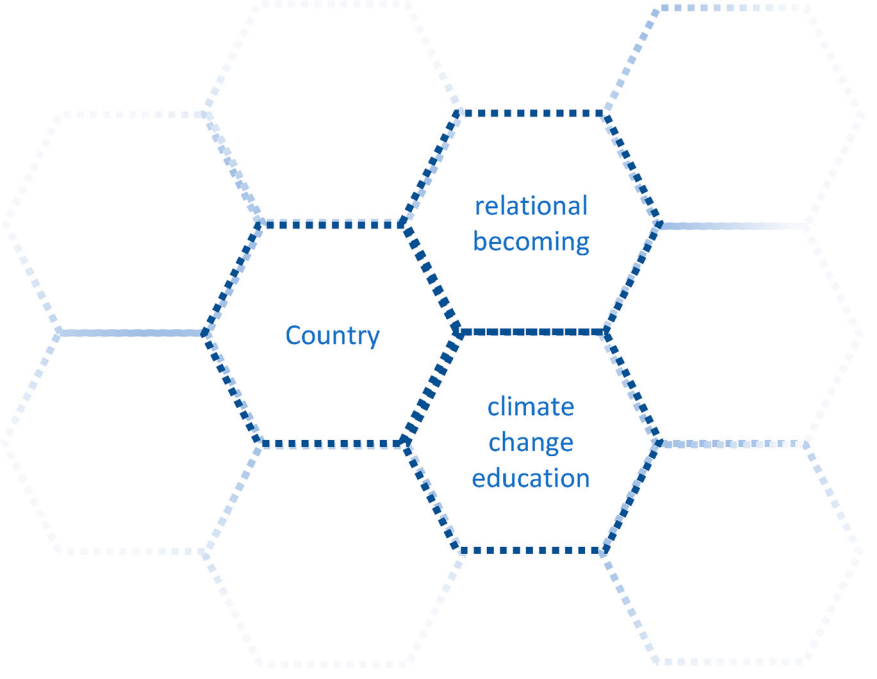
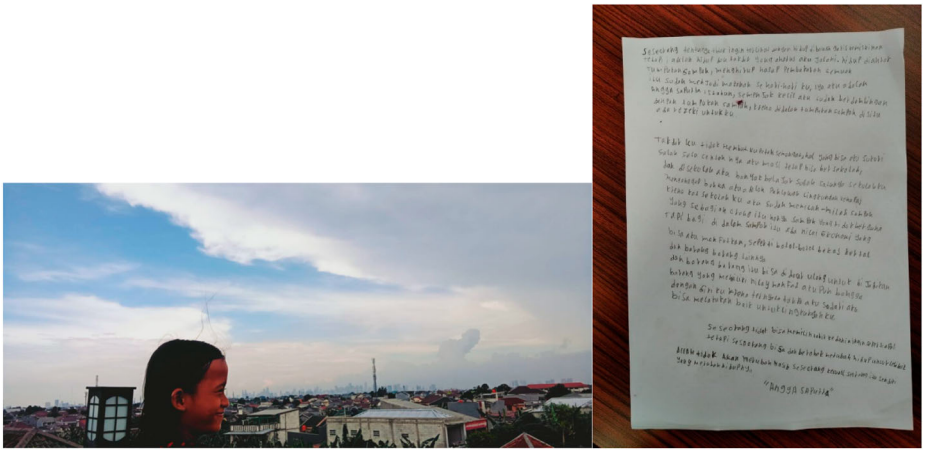


Figure 8. Core concepts illuminating Mosaic 3: hope for childhoodnature.

3.3. Mosaic 3: hope for childhoodnature

This photograph encapsulates the memory of my first encounter with the ocean, in 1980s' Apartheid South Africa, the land of the First Nations Indigenous San and Khoekhoe peoples. As a white child on a colonised land, the magnitude of this encounter was beyond the realms of my understanding. Hand-held safely by the caring father, a story of becoming-with the ocean was entangled with the lives and stories of both the guardians and the plunderers of the earth, segregated by colour and territory. However, the ocean has no borders. It is not mine, not yours, it is everybody's, yet colonial practices mean that it is increasingly divided and distributed. Nonetheless, the rhizomes of my childhoodnature ocean encounter reverberate across spacetime to provide hope, in resistance against further unknown destruction of our home to meet humanity's needs. Through de/re-territorialization (Deleuze and Guattari 1987) with the ocean, where thought and material flow are traced onto the earth, there is potential for reconciling the harm of the past, bearing the wounds of the present, to hope for the future. This is because de/re-territorializing with the ocean is beyond citizenship, stewardship and place, with important implications for education.

Material moment 10: Becoming-with ocean, Eliane, Durban, South Africa



Nowadays as far as I can see, around my house is filled with blocks of buildings and I am around them. They stand very sturdy and strong and the wind that blows around my house is no longer there. I cannot enjoy the fresh air and gusts of wind that I usually feel every morning. At the corner of my house, I can see skyscraper buildings that were what my mom said used to be the playground and finding fish.

I imagine how beautiful my mom's childhood was because she can find fish in the swamp and shower in the river. How can I experience my mom's childhood, showering in the river when the rivers near my house already changed colour to brown and even black sometimes. Even the air feels hot at the moment – in my house I need to use 2 fans to feel cooler. Now I am 11 years old, I am thinking about my childhood and right now I am extremely struggling to get fresh air, and how it will be when I'm an adult later with my son and grandsons. Hopefully, they don't need to breathe with oxygen tanks. I hope my worry won't happen and nature still allows there to be air in between buildings for human life in this world.

"*With full hope to God and nature,*
Hopefully God will give us a blessing to stand again beside the nature He has created
Hopefully we can become friends again with the natureAnd hopefully we can treat the wounds we have created all this time"

Material moment 11: Finding fish in the playground, Artha Anjani, Jakarta, Indonesia

Mosaicking so far has taken us on a journey of resistance against destinies orchestrated by climate change, and colonial legacies, towards reconciliation through relational becoming. The material moments encapsulated in this final cut take us further (Figures 7 and 8). There is hope in Anjani's voice '*Hopefully we can become friends again with the nature*', reminiscent of the Aboriginal philosophy of Country that resists nature-culture binaries, and instead views humans as inseparable from nature. Anjani's voice similarly echoes animism, and the deification of nature, practiced throughout Indonesia before the arrival of Buddhism, Hinduism and Islam. Anjani's prayer of hope to God, from her Muslim faith, similar to Angga's reference to God (Material moment 1), illuminates successive waves of settlement in Indonesia bringing the religions which challenged animism. Initially brought by the Middle Eastern settler traders in the twelfth Century, Islam largely replaced earlier religions and has flourished in Indonesia. The Dutch Christian colonisers were keen to impose their authority on their Muslim 'subjects', but they had to negotiate Islamic anti-colonial resistance and insurgency (Motadel 2012) and carefully manage religious institutions. Despite Christian colonisation 86.7% of the population of Indonesia is now Muslim (World Population Review 2023). Anjani shows tremendous generosity, assuming responsibility for '*the wounds we have created*', despite, the omnipresent and unequally experienced realities of colonialism, climate change and climate colonialism (Mosaic 1).

Eliane's material moment calls for a deep transformation in the way we relate to the ocean to move beyond past-present eco-social injustices. The cut between Anjani and Eliane highlights the need to learn from Indigenous and religious value systems and address, through the process

of relational becoming, the separation between humans and nature that has largely driven climate change. This further supports our argument advocating for a nature relations approach to CCE. Water plays a significant role in cutting together-apart Eliane and Anjani's material moments. On one hand, we witness Anjani's present reality of living with rivers that '*already changed colour to brown and even black sometimes*', likely a result of colonial engineering with waterways in Jakarta and contemporary pollution. Anjani is nostalgic of waterways, formerly a source of food, hygiene and enjoyment for her mother and their ancestors. For Eliane, memories of her first encounter with the ocean as a three-year-old child elicits how the past-present-future ocean has been harmed. There is only one ocean, in constant flow and recycling the beginning and end of journeys through sprawling networks of natural and humanmade waterways. This journeying carries past-present-future stories telling of anthropocentric organic and inorganic chemical pollution, resource extraction, and depletion. Despite her minority world citizenship, Eliane encounters waters that turn brown, as no longer fit for purpose sewage systems inherited from the colonial era frequently become overwhelmed and discharge raw sewage into local waterways (Armitage 2022). The ocean and its journeying, once meant to nurture human and nonhuman life – again and again, is now affected by anthropogenic intrusion, with grave consequences for planetary health. Anjani longs for clean, thriving waters with implications beyond nostalgia. Blue carbon sequestered and stored in marine and coastal ecosystems is increasingly acknowledged as holding significant potential to help mitigate the effects of climate change, yet still are often absent from science and policy discourse (Herr et al. 2017). The omnipresence of water in these material moments is a powerful reminder of our constitution as 'bodies of water' (Neimanis 2017, 1) and the need to cultivate a continued becoming-with water, which offers possibilities for better ways of living with the oceans so urgently required (Neimanis 2017).

Like in Mosaic 2 where relational becoming occurred across scales of space and time, from insects to birds, and trees to oceans, Anjani's and Eliane's material moments transverse spacetime and deeply resonate with Barad's (2007, 234) concept of spacetimemattering: 'the past is never left behind, never finished … past and future are enfolded … in matter's iterative becoming'. Eliane's photograph evokes a past memory with father and sister which reverberates with the present process of coming to terms with an inescapable colonial history, and with the future through hope. For Anjani understanding her lived childhood experience, struggling to breathe in a landscape dominated by skyscrapers where the wind no longer blows, comes to matter in relation to the memory of her mother's childhood, as well as by contemplating her future children and grandchildren's fortunes. Stitching Anjani's and Eliane's moments together sparks attention to how climate change is experienced across vast scales of space and time, honouring Indigenous understandings of time as circular. This has implications for relational becoming in the Anthropocene. Neoliberal systems champion individualised and competitive identities founded on binaries that do not enable mattering as becoming-with the world (Davies 2021). Drawing on Barad's agential realism, Davies explores how binary categorisation does 'more harm than good, making us unable to appreciate difference, oblivious to a life in its diffractive, emergent, *relational immanence*, in its intra-active becoming' (Davies 2021, 6, emphasis added). Nature relations, as a holistic and relational approach to understanding the realities of climate change foregrounded in this final mosaic cut, offers an antithesis to the harm afforded by the binaries that dominate the Anthropocene. Nature relations, where past-future-present experience is entangled with and rooted in place, resists nature-culture binaries.

Following in the footsteps of Country, this mosaic (Figure 7) foregrounds the indivisibility of nonhuman-human life within the entanglement of time, space and matter. It illuminates how relational becoming in childhoodnature can inform a much-needed kind of education to address the climate emergency.

Figure 9. A framework for a nature relations approach to CCE.

4. Looking ahead: childhoodnature, education, and research in times of climate change

Mosaicking with material moments and concepts is an iterative, nonlinear process that creates knowledge in unforeseen ways wherein our work became a sprawling becoming-with the world. A mosaic captures fixed spacetime moments but facilitates spacetimemattering where adjacent material moments blur, converge and reveal new becomings. When we place an old tree in England next to a rubbish pile in Indonesia or a child-now-adult entering the ocean next to a teenager seeking solace in a wood, it evokes specific affects; there is a 'vitality to the liveliness of intra-activity', a new sense of 'aliveness' (Barad 2007, 177). Micro-bio-eco-encounters are entangled with lived experiences of climate change, past-present-future. Cutting together-apart (Barad 2014), these material moments intra-relate with one another, illuminating possibilities for understanding hope, despair, differences, and inequities in childhoodnature. Through agential cuts, accountability and response-ability must be thought of in terms of what matters and what is excluded from mattering (Barad 2007, 220), and as Ahenakew (2016) warns, certain voices become noticeably absent.

These mosaic choices, with material moments brought-together or juxtaposed, 'reconfigured' through this specific 'cutting togetheerapart', is fundamentally creative, provoking amplifications, as opposed to seeking sameness or difference (St. Pierre 2021).

Mosaicking as a collaborative, generative process puts human-nonhuman, past-present-future, majority-minority world, adult–child into conversation. Enmeshing intergenerational experiences within our experiment enabled us to see and think differently and amplify childhoodnature encounters typically rendered invisible. Like Rousell, Cutter-Mackenzie, and Foster (2017, 29) we worked intergenerationally in mutual learning with 'a distinct opportunity for children and young people to actively re-shape the very nature of climate change education', without the burden of responsibility being attributed solely to the child. The outcomes of this collaboration suggest CCE should be intergenerational, not just for the young.

The relatively new practices of CCE tend to focus on scientistic knowledge and solutions alone (Rousell and Cutter-Mackenzie-Knowles 2020). There is also vital action-taking through school and community projects (Monroe et al. 2019) which, together with science and climate research, contribute crucial understandings and solutions around climate change. However, the resulting knowledges and actions are interim, partial, and often divorced from the richness and complexity of childhoodnature and climate change. Additionally, such approaches risk maintaining anthropocentric views of nature, which render nonhuman nature and the material world a resource for humans.

A nature relations approach remembers that knowledge, understanding and skills alone will not solve the climate crisis. This approach makes a distinct contribution to CCE by advancing holistic, situated, relational practices within past-present-future in order to co-create meaning. We offer a framework of interlocking dimensions of CCE with nature relations at its heart (Figure 9). These dimensions radiate outwards from self-as-nature within the lifegiving entangled and situated worlds we live in. The dimensions are not separate, or linear, however, self-as-nature within situated nature relations, is a foundational starting and returning point, vital for children's sense of belonging within nature. Further, all children need regular openings for relational becoming within healthy environments, fresh air, healthy food, rich ecologies, and positive communities, especially those at the margins, as Elisabeth's material moment shows.

The framework is not standardised; it must be situated in, and responsive to, place, to eco-social-cultural context, as in Country or Adat. This is because childhoodnature experience is diverse and unequal, from the toxicity of garbage piles and black-brown rivers to vibrant, biodiverse plants and forests, enlivening micro-encounters and revitalising oceans, as the mosaicking has shown. Intergenerational experiences and engagement with diverse worldviews and science can then expand the frame towards response-ability. More than ever, children and young people need an education which nurtures childhoodnature enabling children to navigate the omnipresence of climate change and respond creatively. Angga's recycling and repurposing in the garbage piles, and Hannah's witnessing of very young children nurturing the saplings indicate situated response-abilities arising from childhoodnature and educational experiences.

Together the elements of the framework offer complementary dimensions, with and beyond climate science, that can be combined in different ways to form a coherent yet fluid, place-sensitive framework for CCE. This approach follows in the footsteps of Country to trouble contemporary dialogues about climate change and CCE by seeking alternative ways of knowing and becoming. This calls for consideration of how Indigenous and scientific knowledge can be put to work cooperatively (Bardsley 2018). CCE, after all, must lead towards more regenerative living, which Aboriginal peoples have practiced for millennia.

We invite you, the reader, to engage in experimental mosaicking, to cut and stitch together climate concepts and diverse situated encounters from different degrees of privilege. We argue that such experimental work can render absences visible and consider fresh possibilities and response-abilities for climate change, education, and research.

Notes

1. 'Nature relations' is part of the Climate Change Education Research Network (CCERN), funded by the GW4-Alliance Generator Fund, UK: http://ed-climate.net/.
2. The term 'minority world' is used to denote 'Western' countries where a small percentage of the earth's population lives as opposed to 'majority world' or 'non-Western' countries in Africa, Asia, South and Central America, and the Caribbean. Majority world countries were formerly referred to as 'third world' or 'developing countries', and more recently as 'the Global South'. We prefer the use of the terms 'majority' and 'minority' as less pejorative terms acknowledging the minority or majority of humankind, lifestyles, and landmass. We acknowledge these terminologies are contested and do not reflect the complexities, diversities and richness of the peoples of the world we live in.

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