



ARTICLE

# Planty Childhoods: Theorising with a Vegetal Ontology in Environmental Education Research

Sneha Parmar<sup>1</sup> , Karen Malone<sup>1</sup>  and Tracy Charlotte Young<sup>2</sup> 

<sup>1</sup>Swinburne University of Technology, Hawthorn, Victoria, Australia and <sup>2</sup>Department of Education and Social Sciences, Faculty of Education, Southern Cross University, Tweed Heads, NSW, Australia

**Corresponding author:** Sneha Parmar; Email: [sparmar@swin.edu.au](mailto:sparmar@swin.edu.au)

(Received 20 December 2023; revised 09 May 2024; accepted 10 May 2024)

## Abstract

This paper explores the potential for extending relational ontologies to include a specific focus on human-plant relations. We theorise the emergence of a vegetal ontology, as a novel way of working and remaking theories around human-plant relations that can be applied to the field of environmental education. A vegetal ontological approach, as applied in the environmental education research project that informs this article, abandons hierarchical comparisons of plants, which are often historically positioned as “lesser species,” mere “objects” and “resources” even. We start our paper with a modest review of key theoretical approaches informing past and recent environmental education studies on child-plant relations. We then return to the discussion started within the introduction to the paper on how we have theorised a vegetal ontology as a mode of a relational ontology focussing particularly on human-plant relations and drawing on posthumanist, new materialist and Indigenous approaches. To conclude the paper, we then put this newly named vegetal ontology to work. We apply it to a recent study on childhood-plant encounters where researchers engaged with young children and their families in a botanical garden setting and a group of environmental education elders reflected on the significance of plant relations in their childhoods.

**Keywords:** Indigenous approaches; new materialism; plant-childhoods; posthumanism; vegetal

## Introduction: Plant thinking in everyday life

Accounting for 80% of the Earth’s biomass (Bar-On *et al.*, 2018), a recent climate crisis report (United Nations, 2019) reveals over a million plant species are on the verge of extinction. Happening in plain sight on every continent, accelerating plant and animal biodiversity loss is being named as the sixth mass extinction (Cowie, Bouchet & Fontaine 2022). Communities of ancient trees sustain ecosystems for a life on Earth with the potential to offer remedies to slow down this anthropogenetic climate change, by balancing ecological systems, sequestering atmospheric carbon dioxide, fixing nitrogen, producing oxygen and creating micro-climates and irreplaceable habitats. Ancient trees have the potential to tell stories of dramatic ice ages, the rising and lowering of oceans, the settler colonisation and ancient landscapes. Commonly characterised as passive, immobile and silent and important only as human sustenance, only a privileged few care to listen to the wisdom of ancient trees (Cowie *et al.*, 2022). Yet they could speak to us of adaptation enabling them to flourish across aeons and epochs stretched over deep time. But as Marder (2013) so aptly expresses “the exuberance of vegetal life has gone largely unrecognized in Western philosophy” (p. 7). Marder (2013) likens this practical lack of attention to the marginalisation of plants in philosophical discourses as plants becoming the backdrop to human

landscapes. With such significant neglect of vegetal life within the history of Western philosophy, it's time for a new ontological position that “accommodates plants” constitutive subjectivity. A new ontological position would account for an “emergence of a vegetal existentiality, referring to the time, freedom and wisdom of plants” (Marder, 2013, p. 90) that is drastically different from that of human beings, and describes their world from the hermeneutical perspective of vegetal ontology (i.e. from the standpoint of the plant itself). This shift away from a scientific paradigm for vegetal life according to Marder (2013) is needed to release plants from the shackles of botanists, geneticists, ecologists and microbiologists who have refrained from entangling plant lives into bigger “common worlds.”

According to plant anthropologist Natasha Myers (2018), this lack of connection or acknowledgement of plants is potentially because they are not easy to know. “They move slowly, they are very quiet, and they tend to lack the charisma of the megafauna at the zoos that incite so much attention for conservation” (p. 121). As Sanders *et al.* (2020) identify, plant life processes are viewed as significantly different from sentient humans and animals, and therefore it is easier to categorise them as lesser species. Yet as Smolander and Pyyry (2023) argue, “if listened to, the more-than-human within and around us can challenge the idea of an autonomous human subject and create breaks in what is considered as knowledge” (p. 1237). Whether it is plants or nonhuman animals, the attention given to this unpacking of dualisms and divides between human and nonhuman by the new humanities (using posthuman and new materialism) and/or Indigenous thinking, is critical. Otherwise, we could continue to support a world where “plant hiddenness,” is taken for granted and their value and ultimately their destruction and loss will continue to go on without fanfare or acknowledgement.

Exploring the emergence and naming of a vegetal ontology as a philosophical space in the field of environmental education research is central to the focus of this paper. By seeking to undermine the traditional boundaries between the human and other earthly plant entities, the focus of the vegetal ontology we present is to consider possibilities for a co-creational, emergent theoretical framing, adopted through a lively convergence (Braidotti, 2013) between posthumanist, new materialist and Indigenous philosophical approaches. We acknowledge that this work is already going on, so we start the paper by highlighting key articles in significant environmental education journals where studies have focussed on human-plant relations in environmental education. In particular, we have mapped some of the earlier studies where the focus was adopting concepts such as “plant blindness” to theorise studies with humans and then move on to more contemporary studies where theorising using posthumanism, new materialism and Indigenous approaches is central. The next step is to then map the theoretical framing of the vegetal ontology by drawing on three possibilities where a relational ontology already exists and therefore provides a basis for a vegetal ontology to emerge.

The first possibility identifies the role of posthumanism in nurturing relational ontological thinking towards plant worlds by revitalising a posthuman perspective where post-anthropocentrism can help us to identify vegetal neglect/absence and foster ways for inserting the intricacies and complications of human-plant relations by disrupting hierarchical anthropocentrism and supporting distributed agency. The second possibility is an unearthing of this plant agency through new materialist thinking; that is, exploring intra-actions between multispecies components as trans-species intra-actions and supporting transdisciplinary alliances that involve relational processes not bound to mere human intentionality. The third possibility explores the role of ancestral plant knowledge enabled by Indigenous and Vedic philosophies (Hall, 2011; Kimmerer, 2012, 2013; Reed, 2021; Rose, 2013; Shiva, 1989) as a re-emergence of ancestral ties, kinship relations and cosmological connectedness. By drawing attention to the efficacy and dynamism of plants, there is potential to recognise the critical role they can contribute to including reciprocity, kinship, mutualism and central consideration for multispecies liveability on Earth.

Once we have mapped our theoretical thinking of a vegetal ontological convergence, we turn to our research project to consider how we can enact an emerging theory to accommodate the stories

we have become open to, with humans and plants. To illustrate the doing of the theory as a diffraction of childhood-plant relations, we provide a short vignette from our study where researchers engaged with young children and their families in a botanical garden setting and a group of environmental education elders reflect on plants in their childhoods. To enact this new theoretical thinking, we consider vegetal theoretical approaches where knowing/being/thinking/doing/feeling with multispecies communities can take our imaginations beyond the known humanist world and unveil plant invisibility.

### Locating vegetal theoretical stories

Nyberg and Sanders argued in their 2014 seminal article that we live in a “zoochuenistic” (animal focussed) landscape of life where plants are mostly “invisible” beyond their utilitarian function. According to Gagliano, Ryan and Vieira (2017), published scientific research often concentrates on the beneficial role of plants to human systemic existence. While animal rights are being fought for by various organisations, and much scholarly work is dedicated to the animal turn, plant rights and ethics according to many still just remain a vaguely absurd concept (Gagliano *et al.*, 2017). With plants supporting all life on Earth, it seems a focus on animals without considering their habitat, the very relationship they rely on for existence, seems an oversight (Wandersee & Schussler, 1999; Sanders *et al.*, 2018). Likened to the animals in many zoos around the world, who have shifted in status from “objects of curiosity, to ambassadors for their wild relatives, to representatives of an ecosystem” (Kawata 2000, cited in Sanders *et al.* 2018, p. 1077), we consider could plants, in a botanic garden, for example, be ambassadors for forests and wild places? Could they provide insights and possibilities to shift thinking about the position of plants as mere functionary? Bennett (2010) suggests anthropomorphism is one means “for likening plants to human features, gestures, and shapes, and appears to welcome them into a closer kinship, and at first it may be a desirable step towards recognizing ourselves in plants” (p. 99). With a strategy often used in scaffolding connections with animal species, she is also alert to the limits of anthropomorphising species other than humans as it can render the differences and unique qualities of the plant species invisible and underestimated. She also warns it may lead to a miscomprehension of the intricacies of plant life. Anthropomorphism as a strategy of becoming kin is therefore tricky, messy and contentious. The science bastion of anthropomorphism urges caution to speak about plants as having humanlike attributes; however, this recognition of similarities and differences also offers possibilities for reciprocity and relatability that the science world has too often sanctioned. Therefore, when used in a contextual and situational way, Parkinson (2019) acknowledges it can prompt children to relate to plants as kin (as it does often in animal studies).

### Mapping traditional plant theoretical thinking

Wandersee and Schussler (1999) coined the concept of “plant blindness” to describe the phenomenon in Western thinking where plants are misunderstood and not bestowed the same anthropogenic position as humans and animals and as active agents within ecosystems. They argued it was more than a zoocentrism or zoochauvinism (animal centredness) but rather the notion of blindness (as a metaphorical adjective likening it to snow blindness or colour blindness) describing an inability to see, recognise and appreciate the importance of plants. Though the air we breathe, the food we eat, the clothing we wear and the very basis of our life come from vegetal beings, yet plants are seldom acknowledged, rendering them essentially unnoticed, neglected and invisible even. According to Wandersee and Schussler (2001), the plant blindness phenomenon has nine plant blindness symptoms which include such things as thinking that plants are merely the backdrop for animal life; overlooking the importance of plants to one’s daily affairs; failing to distinguish between the differing time scales of plant and animal activity; lacking hands-on

experiences in growing, observing and identifying plants in one's own geographic region; and failing to see, take notice of or focus attention on the plants in one's daily life (see Amprazis & Papadopoulou, 2020). The phenomenon of devaluing plant relations and rendering plants mostly "invisible" in everyday life has been the focus of multiple studies (Allen, 2003; Fančovičová & Prokop, 2011; Frisch *et al.*, 2010; Wandersee & Schussler, 1999, 2001). While plant blindness has in the past been a useful concept for addressing the human-plant disconnect as a figurative metaphor (Sanders, 2019; Sanders *et al.*, 2020), it lacks the depth of a theoretical or ontological framing for human-plant relations.

### Bringing attention to contemporary vegetal theoretical stories

Attention to plant life is currently flourishing across the social sciences and humanities (Lawrence, 2021); however, there is a clear gap in the literatures and research for education-related debates on human-plant relations. There is even less discussion about applying new theoretical approaches beyond traditional humanist philosophies. Sanders *et al.* (2018) offer examples, in their special issue on Botanic Gardens as sites for environmental education research, that focus on the cultural context, theoretical framing and relationship between education, educators and learners through experiences in Botanic Gardens. They include humanistic approaches to designing and analysing pro-environmental behaviours (also see Haywood, 2018). For example, one paper in the special issue is a study conducted by Zelenika *et al.* (2018) examining adult participant's botanic garden visit experiences using pre- and post-visit surveys focussed on "the impact of a sustainability education program delivered in a botanical garden on people's environmental knowledge, attitudes, intentions and willingness to act" (1583). While this and other studies from around this time build on previous research on "the benefits of nature in a botanic garden environment" (2018, 1592), they provide less insights into the complexity of humans-plants relations as deep rich entanglements where plants are vibrant agentic entities, influencing the outcomes of the study rather than just "objects" available for the study.

The gap it forms enables a need for more expansive theorising on human-plant relations beyond humanist research approaches, theorising sought to disrupt culture/nature dichotomies in environmental education research (Green & Duhn, 2015, Smolander & Pyry, 2023). To move "beyond plant blindness," Sanders *et al.* (2017) identified that teaching that engages with children's aesthetic and affective experiences through personal encounters, observations and guided explorations may inform plant-based learning opportunities. The coming together of olfactory, auditory and visual senses may create affordances that might move children beyond the "physical otherness" of plants (Sanders, Snæbjörnsdóttir & Wilson, 2020, p. 42). They however press that further research is required into the elements of education that may facilitate learners to build prolonged relationships with plant life, beyond the learning contexts (Nyberg & Sanders, 2014). More recent research exploring botanical literacies of early childhood teachers suggests that "place-based and inquiry-based methods infused with firsthand Indigenous knowledge to practice botany with young children" (Beasley *et al.*, 2023, p. 176) not only contribute to the increase in plant knowledge of the teachers but also promoted them to integrate plant interactions with their students. Similarly, Acharibasam and McVittie (2023) adopted traditional ecological thinking alongside early childhood environmental education in their study to foster environmental values and relational human-nature connections. Most of these contemporary studies still had strong humanist theoretical framing and relativist ontological framing but show a significant shift in more sustained and cosmological approaches to human-plant relations.

By employing a relational ontology and posthumanist thinking to more-than-human geography education, Smolander and Pyry proposed "a shift from strictly instrumental notions of learning toward attached and engaged ways of attuning to difference, rupture and joint-movement" (2023, p. 1248). Tammi (2020) also acknowledged the need to explore "approaches

often referred to as posthumanism and new materialism” which have called into question “the dominant anthropocentric, dichotomic, and hierarchical thinking” (p. 1325). Green and Duhn (2015) could be seen as one of the first to adopt a new materialist theoretical approach in their child-plant study of children’s learning in a food garden in primary school. They write “we have attempted to begin to examine the intra-actions that occur as part of children’s learning in a school garden. By applying a new materialism framework to examine the garden practices from a set of three images, we identified the dynamic intra-activities that are in play in the reciprocal engagement between children and the non-human world” (2015, p. 69). Vladimirova (2021), adopting the concept of co-mergence also drawing from the new materialist tradition, provided insights for the first time into the “idea of care in-between through an everyday engagement of preschool children and forests” (p. 64). “By thinking about care with nonanthropocentric theories” she writes, I am trying to “disengage, not from anthropocentrism as such, but from the very evident forms of human chauvinism and speciesism” (Vladimirova, 2021, p. 65). She advocates for a “future new materialist and posthumanist research . . . to continue exploring a dynamic multiplicity of more-than-human carers” in environmental and outdoor education. Osgood and Axelsson (2023) in their recent study exploring arboreal methodologies in early childhood base their inquiry on “ontologies that refuse western, positivist ways of knowing” (p. 96), drawing also on new materialist approaches alongside feminist and Indigenous ontologies to trace their arboreal methodologies in forest research with children.

In environmental education research, much of the rethinking of human-animal relations was brought about by applying ecofeminist, Indigenous, new materialist and posthuman theoretical lenses which were already getting traction in other fields of study (philosophy, arts, humanities, environmental humanities and anthropology). The means of rethinking and applying a vegetal ontology, we believe and argue in this paper, could be supported by applying this similar strategy in studies of human-plant relations in education. We can do this by jumping onboard the plant turn already existing across a range of disciplines in academia (e.g. Foster, 2023; Marder, 2013; Myers, 2018, Myers, 2019), adopting principles existing in ancient Indigenous knowledge and acknowledging and expanding new ontological thinking already happening within education (see Tammi, 2020; Vladimirova, 2021; Osgood & Axelsson, 2023; Smolander & Pyry, 2023).

### **Mapping an emerging vegetal ontology**

In this section of the paper, we map an emerging vegetal ontology as a mode of a relational ontology focussing particularly on human-plant relations and drawing on posthumanist, new materialist and Indigenous approaches. Within this convergence of theories, a vegetal ontology views plants as life-inhabiting, dynamic entanglements supported by vitalist forces and shared agentic ancestral relations.

### **Converging posthumanism possibilities**

In contemporary Western thinking across the “new humanities,” posthumanism supports a critique of dominate human-scientific-techno-centred ontologies and seeks an “unlearning” of these anthropocentric ways of being and knowing the world by encouraging an onto-epistemological recasting of difference and a queering of binaries such as human/nature and self/other. Posthumanism provides a theory of the subject demanding a disruption of the human story of anthropocentrism (Braidotti, 2013). Posthumanism has the potential to generate diverse materialities and vitalities of thinking, so rather than seeing it as “the theory” to inform our vegetal ontology, we see it more as a theory for working with and on other theories (Braidotti, 2016). According to Bradiotti and Bignall (2019), the posthuman convergence opens up space for new fields of scholarship that identify and connect a series of philosophical commonalities “taking place across and within the hybrid and marginal disciplinary terrains of ‘the new Humanities’”

(p. 26). By shifting the paradigmatic shackles that constrained potential alliances, say, between the sciences, the humanities, creative arts and technology, we have seen new philosophical approaches emerge in the recent times — not only approaches such as agential realism, vital materialism, assemblage theory, thing theory and affect theory but also a renewed vivacity for classical radical epistemologies reawakening from the late seventies such as gender, feminist, queer, race, postcolonial theories and cultural and media studies. The posthuman condition supports relationality and the inseparability of ethics, ontology and epistemology. This is critical in a holistic co-emergent view of human-plant relations. Lemm (2022) reminds us, “Plant studies brings to posthumanism a new understanding of what it means to live embedded in an environment co-existing with and co-depending on other forms of life” (p. 850) and “advances new ways of knowing and living that de-centre the human toward a more ethical relationship to plants and other forms of non-human life” (p. 842).

In an emerging vegetal ontology, this would mean the central task is to dismantle human exceptionalism critically and creatively by partaking in new theoretical thinking to support complex of human-plant relations focussing on, amongst other ethical concerns, a decentring of the human (Malone, 2016). Much like the “animal turn” in education (Young & Bone, 2020; Young, 2024), a “vegetal or plant turn” must include a rethinking of ethics and epistemology, as well as ontology. Comparisons between the “animal turn” and the “plant turn” have been made by Lemm (2022), “plants are the new animals and the renewed attention to plant life has further deepened the crises of humanism, de-centring the human and emancipating other than-human forms of life” (p. 845). While a humanist perspective frequently assumes the human is autonomous, conscious, intentional and exceptional in acts of change, a posthumanist perspective assumes agency is distributed through dynamic forces in which the human participates as a co-creator of knowledge rather than the intentional controller. A vegetal ontology as we outline extends beyond a posthumanist theoretical framing by incorporating a vitalist vegetal ethics to embrace ancient tree wisdom. It is for this reason a spiritual and cosmological interest in Indigenous knowledge systems is central to an emerging vegetal ontology.

For example, Foster (2023) extends the work of Kohn’s plant vitalism (2013) “to consider how nonhuman forms of nature ‘think’ can reshape our understanding of such foundational concepts such as the self, difference, life, mind, person, and agency” (p. 229). Exploitation and extraction by Western systems of patriarchal capitalism have been supported by “plant science” and colonialisng practices that categorised plants as “objects” always available to humans. The forced labour of the more-than-human compels us to consider that this relationship has always been one-sided, yet it is the reciprocal relationship that is key to a shift towards a relational ontology (Mittman, 2019). “In order to examine the anthropocentric assumptions of patent law, interrogate the residues of colonial pasts that obscure notions of plants as sentient beings, and imagine new ways of understanding and acting toward plant worlds” (p. 229). Foster (2023) therefore draws on a “vegetal feminist” approach to understanding human and plant relations, and we have also noted the importance of feminist thinking. We however do take interest in the newfound plant science advancements that prescribe agency to plants (Gagliano *et al.*, 2012; Gagliano *et al.*, 2017; Hall, 2011; Mancuso & Viola, 2015; Mancuso, 2018; Marder, 2013); thus bringing to posthumanism “a new understanding of what it means to live embedded in an environment co-existing with and co-depending on other forms of life” (Lemm, 2022, p. 850) but deny to go with the positivist reductivism or the scientism. Bonnett (2023, p. 830) defines this scientism as “the phenomenon of presuming that classical experimental science has a privileged access to the nature of reality; that somehow its methods, findings and constructions reveal what is ‘really’ real.” Natasha Myers’ (2019) more-than-human anthropology with plants argues that “decentring the human from the meaning-making process calls into question many foundational conceptions of research as a process that uncovers or constructs knowledge” (p. 237). Therefore, we believe there is an imperative when making this vegetal ontological shift to look “beyond the reductive, utilitarian and anthropocentric view of plants” (Gagliano *et al.*, 2017, p. 11) as reflected in much of Western

science literature. Foster (2023) and Myers (2018) argue that principles of mechanistic science colonise plants as products that can be controlled with patents that define them as “property, resource, and commodity” rather than living beings with their own ways of sensing and interacting beyond human worlds” (Myers, 2018, p. 57).

### **New materialism as entangled mutualism**

According to Braidotti and Bignall (2019), Deleuze’s geo-zoe-ethological philosophy leans on theories of vital materialism (which he drew from revisiting Spinoza), stresses we should abandon hierarchical comparisons in deciding the value or operative potential of a plant or a child or a fly, since all life forms inhabit, or comprise, mutually affective “inter-kingdoms.” It is to be affected and entangled in a relational dynamism, through a revitalised recognition of becoming-with. Relational dynamism, therefore, emerges as an important facet of a vegetal ontology as all living beings are bound together in mutually beneficial relations, namely, sympoiesis. According to Haraway, critiquing the current worldly crisis and supporting mutualism argues “bounded individualism becomes unthinkable” (2016, p. 31) and planetary liveability is reliant on it. Sheldrake (2020a) refers to this as an “entangled life” in a neglected world, where knowing plant connections, interactions and communication could change the way humans position themselves in the hierarchy of life on Earth.

The vegetal world is populated with a multitude of other organisms that coexist forming such complex ecological communions (Karban, 2015) like the lichens, corals or mycorrhizal nodules of plants (Simard, 2018). These communities lead to constructive symbiotic but also parasitic and mutualistic relations. Any ecosystem is never linear. Everything affects everything else (Sanders et al., 2020). The give and take, the interactions, amongst various components of the biological world, is essential for maintaining the balance of life. Humans are made in such a way that they depend on organic matter and must consume plants, like other herbivore animals, and this does not make us reprehensible. Mancuso and Viola (2015) describe how plants have evolved as food sources for animals as a part of their evolutionary strategy for one approach to seed dispersal. Plants, they suggest, have a modular morphology and lack any irreplaceable organs; thus, if grazed upon, plants are able to regrow back completely as they don’t have any indispensable parts in their body. However, to live in multispecies communities means that humans need to learn, like other species, to avoid an over-exploitation of plant resources.

Vegetal ontology as a theoretical frame drawing on new materialist perspectives offers possibilities for unearthing the significance of plant agency (Ambang et al., 2019). Multispecies research is bounded by what Barad (2003) calls intra-actions between multispecies components and transdisciplinary alliances that involve relational processes not bound to human intentionality (Charlston, 2023). Rose (2012) when describing the need for focussing on this becoming of trans-species intra-actions writes, “If we were to hold ourselves open to the experience of nonhuman groups, we would see multispecies gifts in this system of sequence, synchrony, connectivity, and mutual benefit” (2012, p. 136). Such vegetal approaches to plant-human relations create a porosity between nature and culture and language borders as “language is more than the audible communication carried out by humans; it encompasses the complexities of intersubjective and interspecies dialogue, involving nature (including plants) and humanity” (Gagliano et al., 2017, p. 19). To be listening without hearing, speaking without words is to recognise we are living a collective future with plants on this planet (Lemm, 2022). Taking a vegetal ontology seriously requires us to be both attentive to and becoming aware of the ways in which we are co-produced with the more-than-human. There are multiple urgent challenges requiring us to consider this mutuality and our relationship with plants in bio-geo-ecological communities where it is essential to ignite love and respect with multispecies intra-actions (Barad, 2007). Questioning human relations with plants helps to rethink perceptions of plants as acting agents in a collective life on Earth. In the foreword to the book *Brilliant Green*, Pollan highlights how “it takes a leap of

imagination over the high fence of our self-regard to recognise that plants are less passive and wily protagonists” (2015, p. 11) and the possibilities for leaping over that high fence and seeing and knowing plants anew could be awakened further through applying new materialism as the arts of noticing (Tsing, 2015). “Pines find mushrooms to help them use human-made spaces. Assemblages don’t just gather lifeways; they make them” (Tsing, 2015, p. 23).

### ***Acknowledging Indigenous ancestral relations***

There is no one-dimensional depiction of Indigenous and First Nation philosophies; nevertheless, some common aspects “are indicative of how core ontologies, epistemologies, methodologies and ethical understandings are shared across Indigenous ecological worldviews” (Bignall & Rigney, 2019, p. 164). Indigenous philosopher Michael Adams (2021) contends Indigenous understandings are diverse and many share understandings of human life as embodied in the natural world, shaped by ancestral generational connections with place and plants. Indigenous nature connections in Australia are aligned with “Country” where interconnectedness with plants, animals, oceans, land and air is intrinsic to the traditional knowledge of First Nations people (Burgess *et al.*, 2022; Cumpston *et al.*, 2022). Many Indigenous cultures offer kinship-based approaches for connecting with the plant world (Hall, 2011). The commonalities reveal a vitalist ethics; the being and knowing of relational ties, shared across creation and the cosmos is central to most. Such alternative ontological framings of more-than-human relations are present in the extensive writings of eco-philosophers, feminists and Indigenous thinkers such as Kimmerer (2012) and Shiva (1989), and we draw on these in our workings. With one of the researchers and one of the research participants both sharing being Vedic, we also turn to their ancient Indian traditions to help us consider how principles based on the view all plants are immortal and sacred can be incorporated into our vegetal ontology.

Traditional ecological knowledge (TEK), according to Kimmerer (2012) is rich in the prescription of both philosophy and practice of mutualistic and reciprocal relationships with nature. TEK, including diverse traditional land and resource management methods, and traditional medicinal plant knowledge have been a prominent and important aspect of ethnobotanical studies (Nolan & Turner, 2011, Sheldrake, 2020b). This history helps to locate colonial and settler extraction of Indigenous knowledge about plants, not revered historically as sacred and cosmological but as part of a political act of oppression and power. Vandana Shiva (1989) provides ontological insights around human-plant relations that espouse a Hindu-ecofeminist ontology of nature, which argues that there is no separation between humans and nature. Hinduism believes in trees being deities, and hence, tree worship has been a long-established tradition. Through her framing of an ecofeminist-Hindu ontology, Shiva critiques capitalist-patriarchal power structures and Western science and its capacity to create a reality of worldliness based on separation and human dominance (Swier, 2020). She, like Kimmerer, articulates on an ontology that respects the interconnectedness in nature and an ethical way of life. Shiva in her writing seeks to reveal, “. . . oppositional categories to critique reductionist ontologies of domination, and from which she can identify and foster alternative modes of being that eschew dualistic concepts and embrace forms of praxis and spirituality that sustain the processes of life” (Swier, 2020, p. 130). Shiva argues that everything she needs to know she learnt from the forest.

Vedic philosophies also offer a useful example of how an Indigenous perspective and TEK can help to provide insights into these ancient ancestral connections with plants. Vedic, as an ancient Indian philosophy, endorses plant sentience and kin relations helping us to listen and respond to the ancestral teachings on the agency of all life forms, including the ancient trees. A cosmological/theological view of nature as living and sacred can be found in the Vedic texts and India’s ancient system of knowledge, which date from between the seventh and sixth centuries BCE and are a few centuries older than the earliest European philosophical traditions (Chakravarthi, 2007). Ancient Indian texts like the Vedas, Puranas and Upanishads describe the importance of plants to the



extent that their destruction is directly linked to the end of time (Shyamala & Shwetha, 2018). Forests were assigned a sacred position in the form of sacred groves or “Devrais” to ensure plant conservation. Almost all temples in India have a “sthalavriksha,” a tree regarded as sacred to that area or a “tulsi,” holy basil in its yard. These trees epitomise all plants in general, reminding the pilgrims of their worth and encouraging them to remember to respect plants (Shyamala & Shwetha, 2018). In India, the Vedas encompass this idea from amongst the four Vedas: the Rig Veda, the Yajurveda, the Samaveda and the Atharvaveda. Rig Veda and Atharvaveda trace the history of plants and their uses since the ancient civilisations, and this has influenced Hinduism. Vedic philosophies include six major (āstika) schools of mediaeval and ancient Indian philosophies (Chapple, 2012). The Rig Veda written during 4500 BC to 1600 BC is believed to be the oldest repository of human knowledge about the medicinal usages of plants in the Indian subcontinent. Within it, as per Vrikshayurveda, trees are our ancestors and are existing here on this Earth much before human beings. “Mother Earth may whatever I dig from you grow back again quickly, and may we not injure you by our labour” (Atharvaveda as cited in Patyal, 1968, p. 1). The Vedic philosophies, via the prominent Bhagavadgītā, endorse that all living beings mobile or immobile, plants, humans and other animals and organisms alike possess what it called “jiva” or personal self-existing sentient soul. The principle that all plants are immortal and sacred is central to Vedic beliefs (Patyal, 1968) and that twigs, trees, the soil and the water are all manifestations of the divine soul. Kimmerer (2013) echoes this sentiment of plant sacredness when she writes they have “been on the earth far longer than we have been and have had time to figure things out. They live both above and below ground, joining Skyworld to the earth. Plants know how to make food and medicine from light and water, and then they give it away” (p. 9).

In summary, our purpose in framing a vegetal ontology drawing on posthumanism, new materialism and Indigenous approaches in the first part of this article enables us to recast the position of plants in the human-plant relation by dismantling human exceptionalism, decentering the human and supporting mutualism when employing a vegetal ontology (Braidotti, 2013, p. 132). We have argued akin to the animal turn a newly emerging plant/vegetal turn has the potential to apply similar conceptual frames as the animal turn to bring theorising within the realm of an emerging posthumanist, new materialist and Indigenous vegetal ontology. The final part of the article shows how we employed vegetal ontology as a theoretical frame for environmental research with planty childhoods.

### **Planty childhoods inquiry**

The research inquiry focussed on “planty childhoods” that reminisce on past experiences as evolving and emerging in the here and now is the basis for this theoretical work. The key questions explore how childhood encounters with plants enhance children’s deepening plant relations (plantiness), what are some of the plant related interests and spontaneous choices made by children (present) in a rich plant environment and what are significant plant life experiences expressed by ecological Elders who participated in the study (past)? The study included two types of “planty” childhood encounters.

#### ***Encounter one: Experiencing planty childhoods***

In the first encounters, six child participants (aged 5–7 years) attended four ecologically rich workshops with their families and the researchers at the Royal Botanic Gardens in Melbourne. Paying attention and noticing multispecies communal spaces and engaging in sympoietic ethnobotanic practices like drawing, storying, walking, climbing, imaging, feeling, imagining, observing and noticing were incorporated into the research design. These planty encounters were designed using sympoietic ethnobotanic practices with an emerging vegetal ontology in mind. The theorising is helping us to uncover entanglements of the ecological kind and reminding us of our

shared corporeality, our co-creative potential to resist binary modes (us/them, human/plant). Encounters were documented by the researchers using journal notes and voice recorders and children using photographic images, drawings and iPads at the Botanic Gardens and their homes.

### **Encounter two: Tracing planty childhoods**

The second type of encounters studied involved storytelling with the six selected “ecological Elders” where significant childhood-plant experiences from their childhood were traced and enticed through conversations (D’Amore & Chawla, 2020). The Elders were scholars invited from the fields of ecophilosophy, environmental education, postcolonial, posthuman and Indigenous theories who have written substantially on multispecies plant relations and who have published theoretical research, bringing diverse ecological, theoretical and cultural perspectives to their thinking. The encounters provide a retelling and storying of planty childhoods as significant life experiences, guiding and influencing the Elders’ being.

The following narrative illustrates the doing of this analytical work with data from the children, an ancient tree and participant as ecological Elder, Sean.

### **Storying through barkskin**

*While exploring the Ancient Grandmother Tree – a very old red gum with gnarly roots in the Ian Potter Foundation Children’s Garden at the Royal Botanic Gardens, Melbourne, the children are eager to climb the ancient carbonised blackened bark, circling in the tunnels left by her roots, looking for footholds, hugging and stroking the coarse textured bark. We wonder what stories could be told by this ancient tree who lived over 10,000 years ago on the banks of the Murray River? We see revealing signs that as the river dried, she toppled into the water where she lay for thousands of years, protected from decay by the water, which turned her bark jet black. The children show us how the bumpy, rough texture of the bark indents the soft skin of their hands.*

*Children decide to trace the bark using paper and crayons. They make several tracings and then move on to surrounding trees, comparing the textures, feeling, touching, being affected by and paying attention. In the bamboo forest the children notice how different this bark is from all the others, “like a green thin skin.” We point out that although the bamboo looks like trees, it actually belongs to the grass family. They once again want to closely sense the kin, the bark covering. As we walk along the path further, they make acquaintance with the She Oaks and the Tea Trees. Bark textures become imprinted firstly on our hands and paper and then in our thinking. Someone finds a bark that is “all sorts of twisted” and is inquisitive about why barks are so varied and why trees have bark. Another child responds, “they probably protect the tree since they are so dense and strong”. The children point out that the Paperbark Tree bark is very fragile, thin like paper and they try to pull it off. “Hey you kids” says the tree, “that hurts. My bark is like the skin that covers your body” and the ancient tree tried to show how bark and skin protect us from the elements of life. We wonder, when is bark, bark and when is skin, skin? Barkskin protecting trees, grass, and people (Figure 1).*

*Sean tells us how important it is to take a step back as human teachers to listen to nature. Discovering barkskin was unintentional. We had many planned possibilities for the children’s garden visit. The intra-actions between the trees, grass and children evolved (Figure 2). Barks enchanted children through sensorial and affective modes. Through blurring borders of skin and bark concepts of kin, affect and adaptation become known. Plant encounters taught us about their morphology, their structural traits and role of barkskin as a protective multispecies shield. Entanglements increased plant visibility; the more-than-human world had drawn us in to listen with planty childhood potential.*



**Figure 1.** Tracing images of tree bark, Royal Botanic Gardens, Melbourne.



**Figure 2.** Experiencing barkskin relations at the Royal Botanic Gardens, Melbourne.

**Conclusion**

The call of the Anthropocene challenges us to consider new ways of thinking, knowing and engaging with the natural world (Malone, 2016, 2018). Trees are complex chemical workshops and major hubs for biodiversity with perceptions, behaviours, healing capacities, language, memory and wisdom. Without them, many species would not survive. The complex cycle of forest life is led by ancient trees that offer profound lessons about resilience and kinship (Simard, 2022). In this article, and in the research study it explored, we are considering: What are the means for nurturing post-anthropocentric (planty) childhoods, and can such practices influence a reconfiguring of environmental education research? We are guided by Kimmerer (2013) in this entanglement of science, theory and story. “Old stories and new ones that can be medicine for our broken relationship with earth, a pharmacopoeia of healing stories that allow us to imagine a different relationship, in which people and land are good medicine for each other” (p. 10).

To enact this, we have questioned theories that can impel future generations to come towards a life, growing a “becoming-with plants” (Haraway, 2016, p. 58) in multispecies, interactive

ecological communities. Incorporating ancient epistemologies passed down through generations of ancient trees, Indigenous people and posthuman sensibilities offers opportunities for plant education and research that opens kin relations that disrupt ‘the otherness’ of plant communities. Through our study, we used vegetal ontology to resurface the planty entanglements of past and present childhoods. As Charlston *et al.* (2023) asserts, “the future of our shared ecosystem cries out for a reversal of deep-seated disconnections from nature and a concurrent repositioning of humans to live in equitable relations with other species” (p. 78). We see a coming together of the posthuman, new materialism and Indigenous approaches has the potential for rethinking human-plant relations in the wake of the newfound efficacy, agency and sentience that plants have always had (Ryan, 2015) and has been diminished through the processes of colonisation, capitalist plant industries and the Cartesian logic of separation. We see the newly planted ontological approach has the potential to nourish sympoetically plants with other entities, to loosen hierarchical dominance in the wake of the “multispecies flourishing” envisioned by Haraway (2016, p. 97). Through this working-with theory and theoretical concepts, we intend on creating fertile soil for a new vegetal (relational) ontology to grow. An ontology rejecting anthropocentrism, decentring the human from the position of being above other life forms, one that nourishes new lively forms of symbiotic completeness of plants within complex lively futures. Plants in a vegetal ontology, are viewed as co-creators of life-inhabiting, dynamic entanglements supported by vitalist forces and shared agentic relations. We have explored the potential in this article for a rethinking of human-plant relations, a new vegetal ontology, as a working-with theory. We used a creative convergence by embracing posthuman and new materialist thinking with ancient wisdom drawn from a range of Indigenous approaches, including Vedic and other Ancient Indian philosophies. By framing a vegetal ontology with posthumanism, new materialism and Indigenous approaches, we have recast the position of plants in the human-plant relations by dismantling of human exceptionalism, decentring the human and supporting mutualism. We nurture and nourish this emerging theoretical landscape, with the intention of deepening our analytic process in order to expand ongoing possibilities for a rich and thriving vegetal ontology.

**Acknowledgements.** We offer our warm thanks to all the families who participated in the visits to the Royal Botanical Gardens, Melbourne that informed the study discussed in the article. We also thank Ms. Aviva Reed, Dr. David Duncan, Dr. Dawn Sanders and Mr. Peter Solness, Dr. Prasanna Srinivasan, Dr. Sean Blenkinsop, who contributed to the study as the Ecological Elders. We also express gratitude towards all the other than human collaborators and co-creators who have made our thinking in this article possible.

**Financial support.** The study informing this article was not funded.

**Ethical standards.** The study discussed in the article was approved by the Swinburne University of Technology Human Research Ethics Committee (Ref: 20225769-9126) and was conducted accordingly.

## References

- Acharibasam, J.B., & McVittie, J. (2023). Connecting children to nature through the integration of Indigenous Ecological Knowledge into Early Childhood Environmental Education. *Australian Journal of Environmental Education*, 39(3), 349–361. DOI: [10.1017/ae.2022.37](https://doi.org/10.1017/ae.2022.37).
- Adams, M. (2021). Indigenizing the Anthropocene? Specifying and situating multi-species encounters. *International Journal of Sociology and Social Place*, 3(4), 282–297.
- Allen, W. (2003). Plant blindness. *Bioscience*, 53(10), 926–926. DOI: [10.1641/0006-3568\(2003\)053](https://doi.org/10.1641/0006-3568(2003)053).
- Ambang, O., Alloggio, S., & Tandlich, R. (2019). Moral reciprocity, ethics of appropriation of Indigenous medicinal plant knowledge and associated biopiracy. *Acta Educationis Generalis*, 9(2), 24–65. DOI: [10.2478/atd-2019-0007](https://doi.org/10.2478/atd-2019-0007).
- Amprazis, A., & Papadopoulou, P. (2020). Plant blindness: A faddish research interest or a substantive impediment to achieve sustainable development goals? *Environmental Education Research*, 26(8), 1065–1087. DOI: [10.1080/13504622.2020.1768225](https://doi.org/10.1080/13504622.2020.1768225).
- Bar-On, Y.M., Phillips, R., & Milo, R. (2018). The biomass distribution on Earth. *Proceedings of The National Academy of Sciences of The United States of America*, 115(25), 6506–6511. DOI: [10.1073/pnas.1711842115](https://doi.org/10.1073/pnas.1711842115).

- Barad, K.** (2003). Posthumanist performativity: Toward an understanding of how matter comes to matter. *Signs: Journal of Women in Culture and Society*, 28(3), 801–831.
- Barad, K.M.** (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Beasley, K., Hesterman, S., & Lee-Hammond, L.** (2023). Reviving botany in the curriculum: The botanical journey of two Western Australian early childhood teachers. *Australian Journal of Environmental Education*, 39(2), 166–180. DOI: [10.1017/ae.2022.42](https://doi.org/10.1017/ae.2022.42).
- Bennett, J.** (2010). *Vibrant matter: A political ecology of things*. Duke University Press.
- Bonnett, M.** (2023). Environmental consciousness, nature, and the philosophy of education: Some key themes. *Environmental Education Research*, 29(6), 829–839. DOI: [10.1080/13504622.2021.1951174](https://doi.org/10.1080/13504622.2021.1951174).
- Braidotti, R.** (2016). Posthuman Critical Theory. In *Critical Posthumanism and Planetary Futures* (pp. 13–32). Springer (India) Private Limited. [https://doi.org/10.1007/978-81-322-3637-5\\_2](https://doi.org/10.1007/978-81-322-3637-5_2)
- Braidotti, R., & Bignall, S. (Eds.)** (2019). *Posthuman ecologies: Complexity and process after Deleuze*. Rowman & Littlefield International.
- Braidotti, R.A.** (2013). *The posthuman*. 1st edition, USA Polity Press.
- Burgess, C., Thorpe, K., Egan, S., & Harwood, V.** (2022). Towards a conceptual framework for country-centred teaching and learning. *Teachers and Teaching*, 28(8), 925–942.
- Chakravarthi, R.P.** (2007). *Indian philosophy and the consequences of knowledge themes in ethics, metaphysics and soteriology*. Routledge.
- Chapple, C.K.** (2012). Unifying Hinduism: Philosophy and Identity in Indian Intellectual History. By Andrew Nicholson. *Journal of the American Academy of Religion*, 80(2), 546–549. DOI: [10.1093/jaarel/lfs017](https://doi.org/10.1093/jaarel/lfs017).
- Charlston, L.** (2023). Sympoietic art practice with plants: A case for posthumanist co-expression. In C. Daigle & M.H. (Authors) (Eds.), *Posthumanism in practice* (pp. 79–94). Bloomsbury Academic. <http://dx.doi.org/10.5040/9781350293830.0012>
- Cowie, R.H., Bouchet, P., & Fontaine, B.** (2022). The Sixth Mass Extinction: Fact, fiction or speculation? *Biological Reviews*, 97(2), 640–663. DOI: [10.1111/brv.12816](https://doi.org/10.1111/brv.12816).
- Cumpston, Z., Fletcher, M., & Head, L.** (2022). *First knowledges plants: Past, present and future*. Thames & Hudson Australia Pty Ltd.
- D'Amore & Chawla** (2020). Significant life experiences that connect children with nature: A research review and applications to a family nature club. In *Research Handbook on Childhoodnature* (pp. 799–825). Springer International Publishing.
- Fančovičová, J., & Prokop, P.** (2011). Plants have a chance: Outdoor educational programmes alter students' knowledge and attitudes towards plants. *Environmental Education Research*, 17(4), 537–551. DOI: [10.1080/13504622.2010.545874](https://doi.org/10.1080/13504622.2010.545874).
- Foster, L.A.** (2023). Plants as inventors: Interrogating human exceptionalism within narratives of law and vegetal life. *Narrative Culture*, 10(2), 226–245. DOI: [10.1353/ncu.2023.a903846](https://doi.org/10.1353/ncu.2023.a903846).
- Frisch, J.K., Unwin, M.M., & Saunders, G.W.** (2010). Name that plant! overcoming plant blindness and developing a sense of place using science and environmental education. In A.M. Bodzin, B.S. Klein & S. Weaver (Eds.), *The inclusion of environmental education in science teacher education* (pp. 143–157). Springer Netherlands.
- Gagliano, M., Mancuso, S., & Robert, D.** (2012). Towards understanding plant bioacoustics. *Trends in Plant Science*, 17(6), 323–325. DOI: [10.1016/j.tplants.2012.03.002](https://doi.org/10.1016/j.tplants.2012.03.002).
- Gagliano, M., Ryan, J.C., & Vieira, P.** (2017). *The language of plants : Science*. Philosophy, Literature. University of Minnesota Press.
- Garrity-Bond, C.** (2018). Ecofeminist epistemology in Vandana Shiva's The Feminine Principle of Prakriti and Ivone Gebara's Trinitarian Cosmology. *Feminist Theology*, 26(2), 185–194.
- Green, M., & Duhn, I.** (2015). The force of gardening: Investigating children's learning in a food garden. *Australian Journal of Environmental Education*, 31(1), 60–73. DOI: [10.1017/ae.2014.45](https://doi.org/10.1017/ae.2014.45).
- Hall, M.** (2011). *Plants as persons: A philosophical botany*. Suny Press.
- Haraway, D.** (2016). *Staying with the trouble: Making Kin in the Chthulucene*. Duke University Press.
- Haywood, N.** (2018). Beauty in the foreground, science behind the scenes?: Families' views of science learning in a botanic garden. *Environmental Education Research*, 24(8), 1085–1101. DOI: [10.1080/13504622.2018.1469116](https://doi.org/10.1080/13504622.2018.1469116).
- Karban, R.** (2015). *Plant sensing and communication*. Chicago: University of Chicago Press.
- Kimmerer, R.W.** (2012). Searching for synergy: Integrating traditional and scientific ecological knowledge in environmental science education. *Journal of Environmental Studies and Sciences*, 2(4), 317–323. DOI: [10.1007/s13412-012-0091-y](https://doi.org/10.1007/s13412-012-0091-y).
- Kimmerer, R.W.** (2013). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.
- Kohn, E.** (2013). *How forests think: Toward an anthropology beyond the human*. University of California Press. DOI: [10.1525/california/9780520276109.001.0001](https://doi.org/10.1525/california/9780520276109.001.0001)
- Lawrence, A.M.** (2021). Listening to plants: Conversations between critical plant studies and vegetal geography. *Progress in Human Geography*, 0(0), 1–23. DOI: [10.1177/03091325211062167](https://doi.org/10.1177/03091325211062167).

- Lemm, V.** (2022). Posthumanism and plant studies. In S. Herbrechter, I. Callus, M. Rossini, M. Grech, M. de Bruin-Molé & C. John Müller (Eds.), *Palgrave handbook of critical posthumanism*. Palgrave Macmillan. DOI: [10.1007/978-3-031-04958-3\\_64](https://doi.org/10.1007/978-3-031-04958-3_64).
- Malone, K.** (2018). *Children in the Anthropocene*. Palgrave Macmillan.
- Malone, K.** (2016). Posthumanist approaches to theorizing children's human-nature relations. In T. Skelton, K. Nairn & P. Krafti (Eds.), *Space, place and environment*. Geographies of Children and Young People, vol. 3. Springer.
- Mancuso, S.** (2018). *The revolutionary genius of plants: A new understanding of plant intelligence*. Atria Books.
- Mancuso, S., & Viola, A.** (2015). *Brilliant green: The surprising history and science of plant intelligence*. Island Press.
- Marder, M.** (2013). *Plant-thinking: A philosophy of vegetal life*. Columbia University Press.
- Marder, M.** (2017). To hear plants speak. In M. Gagliano, J.C. Ryan & P. Viveira (Eds.), *The language of plants: Science, philosophy, literature* (pp. 103–125). University of Minnesota Press.
- Mittman, G.** (2019). Reflections on the Plantationocene: A conversation with Donna Haraway and Anna Tsing. *Edge Effects*. Retrieved 18 Jun 2019 from [Donna Haraway and Anna Tsing Reflect on the Plantationocene \(edgeeffects.net\)](https://www.edgeeffects.net)
- Myers, C.Y.** (2019). Afterword: Potentialities. In C.Y. Myers (Eds.), *Children and materialities: The force of the more-than-human in children's classroom lives* (pp. 227–245). Springer Singapore. DOI: [10.1007/978-981-13-8168-3\\_6](https://doi.org/10.1007/978-981-13-8168-3_6).
- Myers, N.** (2018). How to grow livable worlds: Ten not-so-easy Steps., the world to come: Art in the age of the Anthropocene. In K. Oliver-Smith (pp. 53–63). Samuel P. Harn Museum of Art.
- Nolan, J.M., & Turner, N.J.** (2011). Ethnobotany: The study of people-plant relationships. In E.N. Anderson, D. Pearsall, E. Hunn & N. Turner (Eds.), *Ethnobiology*. DOI: [10.1002/9781118015872.ch9](https://doi.org/10.1002/9781118015872.ch9).
- Nyberg, E., & Sanders, D.** (2014). Drawing attention to the 'green side of life'. *Journal of Biological Education*, 48(3), 142–153. DOI: [10.1080/00219266.2013.849282](https://doi.org/10.1080/00219266.2013.849282).
- Osgood, J., & Axelsson, S.** (2023). Arboreal methodologies: The promise of getting lost (with feminist new materialism and indigenous ontologies) for social studies. In B. Varga, T. Monreal & R. Christ (Eds.), *Toward a stranger and more posthuman social studies* (pp. 90–109). New York Teachers College Press.
- Parkinson, C.** (2019). *Animals, anthropomorphism and mediated encounters*. Taylor & Francis Group.
- Patyal, H.C.** (1968). Significance of "Varaṇa-" (Crataeva Roxburghii) in the Veda. *Oriens*, 21(22), 300–306. DOI: [10.2307/1579909](https://doi.org/10.2307/1579909).
- Reed, A.** (2021). Flowerlands: The written word as world maker. *TEXT*, 25(Special 62). DOI: [10.52086/001c.29648](https://doi.org/10.52086/001c.29648).
- Rose, D.B.** (2013). Val Plumwood's Philosophical Animism: Attentive interactions in the sentient world. *Environmental Humanities*, 3(1), 93–109. DOI: [10.1215/22011919-3611248](https://doi.org/10.1215/22011919-3611248).
- Ryan, J.** (2015). *Posthuman plants: Rethinking the vegetal through culture, art, and poetry*. Common Ground Publishing.
- Sanders, D.** (2019). Standing in the shadows of plants. *Plants, People, Planet*, 1(3), 130–138. Retrieved from <https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10059>
- Sanders, D., Nyberg, E., Snæbjörnsdóttir, B.D., B., EriksenBrkovic, I.** (2017). *Beyond plant blindness: Seeing the importance of plants for a sustainable world*. (Symposium presentation) SOTWP Symposium, Kew DOI: [10.13140/RG.2.2.24304.66](https://doi.org/10.13140/RG.2.2.24304.66).
- Sanders D., Snæbjörnsdóttir B., Wilson M., (Author), Eriksen B.,** (2020). *Beyond Plant Blindness: Seeing the importance of plants for a sustainable world*. Berlin, Germany: The Green Box Kunst Editionen.
- Sanders, D.L., Ryken, A.E., & Stewart, K.** (2018). Navigating nature, culture and education in contemporary botanic gardens. *Environmental Education Research*, 24(8), 1077–1084. DOI: [10.1080/13504622.2018.1477122](https://doi.org/10.1080/13504622.2018.1477122).
- Sheldrake, M.** (2020a). *Entangled life*. Bodley Head.
- Sheldrake, M.** (2020b). The 'enigma' of Richard Schultes, Amazonian hallucinogenic plants, and the limits of ethnobotany. *Social Studies of Science*, 50(3), 345–376. DOI: [10.1177/0306312720920362](https://doi.org/10.1177/0306312720920362).
- Shiva, V.** (1989). *Staying alive : Women, ecology, and development /*. Zed Books.
- Shyamala, B., & Shwetha, S.S.** (2018). Relevance of ancient Indian methods of environmental protection in the present-day scenario. *International Review of Business and Economics*, 1(3), 162–165. DOI: [10.56902/IRBE.2018.1.3.37](https://doi.org/10.56902/IRBE.2018.1.3.37).
- Simard, S.** (2022). *Finding the mother tree: Uncovering the wisdom and intelligence of the forest*. Penguin Books.
- Simard, S.W.** (2018). Mycorrhizal networks facilitate tree communication, learning, and memory. In F. Baluska, M. Gagliano & G. Witzany (Eds.), *Memory and learning in plants* (pp. 191–213). Springer International Publishing. DOI: [10.1007/978-3-319-75596-0\\_10](https://doi.org/10.1007/978-3-319-75596-0_10).
- Smolander, W., & Pyry, N.** (2023). Attuning to geostories: Learning encounters with urban plants. *Educational Philosophy and Theory*, 55(11), 1237–1252. DOI: [10.1080/00131857.2022.2133700](https://doi.org/10.1080/00131857.2022.2133700).
- Swier, G.M.** (2020). Nature, gender and technology: The ontological foundations of Shiva's ecofeminist philosophy. *Comparative and Continental Philosophy*, 12(2), 118–131. DOI: [10.1080/17570638.2020.1780685](https://doi.org/10.1080/17570638.2020.1780685).
- Tammi, T.** (2020). What if schools were lively more-than-human agencements all along? Troubling environmental education with moldschools. *Environmental Education Research*, 26(9-10), 1325–1340. DOI: [10.1080/13504622.2019.1584881](https://doi.org/10.1080/13504622.2019.1584881).
- Tsing, A.L.** (2015). *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton.
- United Nations.** (2019). *The climate crisis – a race we can win*. Retrieved from The Climate Crisis – A Race We Can Win. United Nations.
- Vladimirova, A.** (2021). Caring in-between: Events of engagement of preschool children and forests. *Journal of Childhood Studies*, 46(1), 51–71.

- Wandersee, J.H., & Schussler, E.E.** (2001). Towards a theory of plant blindness. *Plant Science Bulletin*, 27(1), 2–9. Retrieved from 01-32 (botany.org)
- Wandersee, J.H., & Schussler, E.E.** (1999). Preventing plant blindness. *The American Biology Teacher*, 61(2), 82–86. DOI: [10.2307/4450624](https://doi.org/10.2307/4450624).
- Young, T., & Bone, J.** (2020). Troubling intersections of childhood/animals/education: Narratives of love, life and death. In A. Cutter-Mackenzie, K. Malone & E.B. Hacking (Eds.), *Research handbook on childhood nature: Assemblages of childhood and nature research*. Springer International Publishing.
- Young, T.C.** (2024). Imagining spaces of hum(an)imality by animalising childhoods and socialising animalhoods. In P. Born (Eds.), *Multispecies thinking in the classroom and beyond teaching for a sustainable future*. Lexington Books.
- Zelenika, I., Tara Moreau, T., Lane, O., & Zhao, J.** (2018). Sustainability education in a botanical garden promotes environmental knowledge, attitudes and willingness to act. *Environmental Education Research*, 24(11), 1581–1596. DOI: [10.1080/13504622.2018.1492705](https://doi.org/10.1080/13504622.2018.1492705).

## Author Biographies

**Sneha Parmar** is in the final year of her PhD at the Swinburne University of Technology, Melbourne. Her PhD topic is “Childhoods in the Planthropocene: An Ethnobotanic Study of Child-Plant Relations.” Sneha has a master’s in plant physiology from India, and her project was on draught stress physiology in ARI (Pune, India). She has taught plant sciences to undergraduates for 4 years and always being fascinated by transdisciplinary work spanning plant sciences, environmental studies, social sciences and relational multispecies studies expanding into the post humanities. She hails from the Western Ghats of India and has always been involved in the conservation efforts of endemic plant species. In 2022, she presented at PESA annual conference in Sydney, NSW, on the topic “Exploring the potential for applying posthuman ethnobotanic theoretical approaches in education.”

**Karen Malone** is a professor of geography, environmental science and childhood studies at Swinburne University. She is an international author, educator and postqualitative researcher who studies human-environment relations and the impacts of the ecological crisis including climate change, waste and biodiversity loss on children’s lives. In her teaching and research, she applies ecofeminist, posthuman, new materialist and Indigenous theoretical perspectives. In 2022, she was identified in the Stanford University list of top 2% most cited scientists in the world in the disciplines of *education*, *geography* and *social sciences*. Her most recent books include *Wilding Ecologies*, *Walking-with Glacier*, *Theorising Posthuman Childhood Studies*, *Children in the Anthropocene* and *Reimagining Sustainability in Precarious Times*.

**Tracy Charlotte Young** is a lecturer-researcher at Southern Cross University, Australia, sustained by a commitment to animal rights activism and ecological justice. Her transdisciplinary research embraces the complex interrelationships of ecologies, education, early childhood, human-animal studies and cultural geographies. Postqualitative methodologies invite creative practices in her work, including theorising with critical posthumanist, ecofeminist and new materialist philosophies. Her work considers modes of attention such as embodied knowledge and more-than-human relational ways of being and knowing.

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**Cite this article:** Parmar, S., Malone, K., & Young, T.C. (2024). Plantly Childhoods: Theorising with a Vegetal Ontology in Environmental Education Research. *Australian Journal of Environmental Education* 40, 243–257. <https://doi.org/10.1017/ae.2024.29>