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Learning with compost: digging down into food waste, urban soils and community

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ABSTRACT

This paper explores human, soil, compost and food waste interactions in a community composting initiative in Australia. Drawing on an ethnographic study in 2 Australian cities – Sydney and Canberra, this paper identifies the emergence of a “composting ethic” among participants that is animated by three forms of learning and doing: (1) noticing and attending, (2) embodying and (3) experimentation. Fieldwork analysis is contextualised in relation to literature from the environmental humanities, discard studies and learnings from First Nations Australians and their ontologies. By bringing these empirics, key literature and ontologies together, this paper aims to deepen understanding of the opportunities and challenges of community composting to reduce negative environmental impacts and support anti-colonial practices of discard. It does this by identifying the characteristics of a composting ethic and the contexts and skills capable of nurturing its emergence. Attention is also paid to what may limit realisation of such an ethic. Overall, this paper aims to generate further applied academic understanding about the unique role – and possibilities – of efforts to revitalise and grow city soils and advance anti-colonial food waste management through community composting.

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Introduction

Soil underpins human and planetary health and wellbeing. It contains more than 25% of the planet’s biodiversity, supplies 95% of the world’s food and supports critical ecosystem processes such as water filtration, nutrient and energy cycling and carbon sequestration (FAO et al. 2020). Despite its crucial importance, the UN recognises that 33% of the world’s soil is degraded (FAO and ITPS 2015). Much of Australia’s ancient soils are low in fertility with 70% of Australia classified as arid or semi-arid (Tarin et al. 2020). Since the colonial invasion, degradation, salinity and contamination have intensified, contributing to the contemporary soil crisis (Koch et al. 2013). This crisis threatens our entangled ecological and human health and wellbeing (Koch et al. 2013). To date, agricultural soils have been the dominant focus of research and calls for action, yet urban soils also need urgent attention.

Inner city urban sites in Australia can have high levels of soil contamination linked to the use of lead-based paints and chemical infiltration from prior industrial land-use (Rouillon et al. 2017).

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Alongside contamination, urban soil health is also under pressure from sealing, where hard surfacing (roads and pavements) and housing construction impede soil's natural cycles (Meulemans 2020; Robertson 2020). Urban sprawl over recent decades has also led to the loss of some of the most fertile soils on the outskirts of major cities (Lawton and Morrison 2022). Simultaneously, there is growing demand on city soils for urban agriculture initiatives and home food production (see Smith 2023), which can require costly remediation work.

Responding to these pressures necessitates deep engagement and commitment to working with urban soils to improve and optimise more-than-human soil-related health and wellbeing in urban spaces. The concept of the more-than-human rejects the notion of a nature/culture divide and, instead, represents the inherent entanglements among humans and nonhumans through which lives and worlds are co-produced. This paper builds on recent work that identifies more-than-human soil-human relations as a potentially generative focus for the development of ethical relations that could lead to practical improvements in soil health (Krzywoszynska and Marchesi 2020; Puig de la Bellacasa 2017; Salazar et al. 2020). Through an ethnographic study involving 13 volunteers from 11 households in 2 Australian cities – the national capital, Canberra, and the Nation's largest city, Sydney – engaging with ShareWaste, an online community composting platform, the paper identifies composters enacting what we refer to as a "composting ethic". By focusing on "embodied practices and micropolitics of the self" evident in the fieldwork, we take our analytical cue from work on the ethics of waste produced by cultural theorist Gay Hawkins (Hawkins 2006, 15). In so doing, we find that while composting may not be inherently ethical or transformative, a composting ethic can enable "ethical sensibilities" (Hawkins 2006, 120) to emerge through 3 key learnings and doings – noticing and attending; embodying; and experimentation – capable of nourishing more generative waste relations. In this paper, learnings and doings refer to particular embodied practices and actions undertaken by composters.

The aim of this paper is to identify the characteristics of a composting ethic and the contexts and skills needed for it to emerge and be sustained. Attention is also paid to what may prevent or limit the enactment of this ethic. By contextualising fieldwork analysis in relation to theoretical ideas drawn from the environmental humanities, discard studies and learnings from First Nations Australians and their ontologies, the work aims to generate further applied academic understanding about the unique role – and possibilities – of efforts to revitalise and grow city soils through community composting.

Laying the groundwork

Introducing food waste

Significant academic attention has been paid to food waste in recent years yet there remains a paucity of research into the role of compost and composting in urban areas (Morrow and Davies 2022) beyond technical analyses (i.e. Pai et al. 2019; Bruni et al. 2020) and explorations of household engagement with municipal organic waste collection services (Ames and Cook 2020; Schouten et al. 2014; Sewak et al. 2021). This is despite the fact that reducing the volume of organic waste sent to landfill has been a significant focus in Australia and globally over the last decade, due to greenhouse gas emissions produced by rotting food waste contributing to climate change (Keegan and Breadsell 2021). While legal, technical and government solutions such as large-scale municipal organic waste collection services (commonly referred to in Australia as Food and Garden Organic collections – FOGO) managed by local governing bodies are regularly identified as the solution, their promise is yet to be fully realised.

In Australia, the Federal Government originally committed to the implementation of a national roll out of kerbside organic waste collection by 2023, subsequently delaying this to 2030 (Manfield 2022). The new goal remains aspirational with key barriers to large-scale implementation remaining. The City of Sydney Chief Executive has claimed that in the Nation's most populous city – where just over 1% of households have access to FOGO in 2023 (City of Sydney) – it would be "more

difficult than anywhere else” to implement collections across the entire urban area. This is due to the cost of householder education; the need for bespoke infrastructure for apartment blocks; and the misfit between the expected organic waste volume and the availability of processing facilities (Lo Surdo 2022). In Canberra, less than 4% of households have access to FOGO in 2023 (City Services ACT). While a pilot FOGO scheme was implemented in the nation’s capital in 2021, the broader roll out has experienced ongoing delays reportedly due to the lack of adequate processing infrastructure.

Ongoing challenges in the implementation of large-scale solutions to diverting food waste from landfill suggest the need for multi-scalar approaches, including community composting. Our research indicates that such initiatives have the potential to not only reduce the volume of food waste in mainstream waste systems but also support the emergence of a generative waste ethic grounded in embodied practices and actions. As we explore in the following sections, this ethic could support a decentering of dominant human perspectives, motivate human efforts to learn to live well together with unknown and unknowable nonhumans, and strengthen anti-colonial approaches to waste.

Ethical potential of human-compost encounters

Our focus on the ethical potential of more-than-human composting encounters builds on a small body of foundational work, namely Abrahamsson and Bertoni’s (2014) study on vermicomposting in Europe; Turner’s work (2019a,b) with backyard and community garden composters (including bokashi and worm farm users) in Australia’s capital city; Morrow and Davies’ diverse economies research into community composting in New York (2022) and Waitt and Rankine’s “sensory composting ethnography” (2022, 98) with households in the regional Australia city of Wollongong. The existing work on human-compost encounters indicates this is a fertile focus for growing ethical interventions. Waitt and Rankine explore how “senses and sensibilities” (2022, 99) related to composting can impede or enable composters to “accumulate bodily capacities to affect and be affected, by composting” (2022, 104). Morrow and Davies (2022, 542) find that the “time and space” created by community composting can “shift subjectivities, as well as everyday waste practices”. Similarly, Turner describes how the “often tense multispecies landscapes” emerging through embodied, emplaced compost relations can support recognition of inextricable more-than-human entanglements that highlight the limits of human control in these sites (2019b, 18–19).

Finally, Abrahamsson and Bertoni’s concept of “compost politics” (drawing on Stengers’ notion of “cosmopolitics”) suggests that recognising the stubbornness of difference – or alterity – between humans and vermicompost could be a productive basis for learning how to live well together with unknown and unknowable others. Referring to compost politics as a practice of forging “togetherness in a way that is neither detached nor engaged” (126), they suggest it is highly challenging to relate (either via connection/engagement or via desire to detach or be apart from) to radically different species and materialities. Instead, they identify togetherness as emerging through ongoing practices of what we refer to as ethical learning and doing – and what they refer to as “a mutual domestication of multiple and different activities” (Abrahamsson and Bertoni 2014, 134). Through these practices, human and nonhuman differences are constantly being recomposed to generate new conditions and ways of being where all entities are responsive to, and necessarily co-produced through, the actions of others. Recognising that togetherness exposes the limits of human comprehension – “you may not know, but rather become attuned to your worms” (Abrahamsson and Bertoni 2014, 134) could be a critical foundation for challenging dominant human-centred perspectives.

Such efforts to re-focus on more-than-human entanglements and question human-centred perspectives as the norm are widespread across the academy. Notably, attention has been given to animal–human encounters (e.g. Buller 2015; Candea 2010; Haraway 2008); plant–human interactions (Head, Atchison, and Phillips 2015; Marder 2013) and human–microbiome encounters through “microbiopolitics” (Paxson 2008) and “probiotic environmentalities” (Lorimer 2020). Importantly,

for this paper, science and technology studies scholar, Puig de la Bellacasa's (2010, 2017) work with soil and permaculture identifies complex modes of "mutual care" among humans and nonhumans, which involve recognising that "humans are not the only ones caring for the Earth and its beings" (Puig de la Bellacasa 2010, 164). This broad literature calls out the impossibility of human/nature separation, drawing attention to the myriad of more-than-human lives and liveliness that co-produce shared worlds.

Of course, the vast power divide between, say, humans and worms or humans and bacteria, can make these unequal encounters. In ethnographic work in community gardens exploring human care-giving practices, geography scholar Hannah Pitt (2018) argues that instrumental modes of care that immediately benefit human gardeners are consistently privileged above the needs of non-humans. This prompts her to question the ethical potential of these intimate moments of encounter – or togetherness, suggesting human dominance is not easily disrupted. Pitt's cautionary tale is important. Togetherness does not necessarily induce positive or equitable encounters for all. However, exploration of how such moments of encounter *could* offer opportunities for a new ethic to emerge requires further investigation.

The analysis in this paper attends to the possibilities of embodied practices in community composting (ethical learnings and doings) to nurture the contexts and skills needed to decentre dominant human perspectives to better care for urban soils. To further develop our analytical framework, we now turn briefly to the field of discard studies and its central concern with learning how to "discard well" (Liboiron and Lepawsky 2022) before discussing how our work seeks to learn from and with First Nations Australians and their ontologies to support an anti-colonial approach.

Discard studies, ethics and anti-colonial frameworks

Work in the burgeoning interdisciplinary field of discard studies demonstrates how practices of discard make certain forms of more-than-human encounters possible across diverse scales, from everyday individual waste interactions to municipal waste management. In particular, discard studies aim to expose and interrogate why some things – people, nonhumans, ways of life – come to be valued while others are not. While discard studies is a young field, socio-cultural interest in waste has a long history, and this paper takes its initial line of flight from the work of Gay Hawkins. In her text, *The Ethics of Waste* (2006), Hawkins identifies the under-recognised ethical potential in encouraging the development of ways of relating to and with waste that can emerge outside dominant moral approaches that tend to be motivated by feelings of "[g]uilt, resentment, and anxiety" (2006, 38). Instead, Hawkins, makes a case for the generative possibilities of forging "other ways of being with waste" (2006, 38), turning her attention to "which bodily affects and habits of self-cultivation shape ethical sensibilities and our relations with things and the world" (2006, 120).

Critical to contextualising these "ethical sensibilities" and "relations" or encounters is the investigation and analysis of dominant approaches to waste and discard. Understanding, exposing and questioning how waste values, associated practices and techniques are formed and perpetuated is core business in discard studies (Liboiron and Lepawsky 2022). In varied sites and through each waste encounter, this involves asking the question "How do you discard well given specific contexts, materialities, and power relations?" (Liboiron and Lepawsky 2022, 30). The process of discarding well begins with understanding and then questioning existing waste values and practices. The work of Métis scholar, Max Liboiron, has been foundational in highlighting and resisting overarching colonial frameworks that value certain lands and waters as places where waste can be disposed of or stored often at the expense of the health of the surrounding environment and those living in this location, which often includes First Nations people and populations with low socio-economic status (Liboiron 2021 & 2018). Liboiron advances an anti-colonial research agenda that aims to resist the "settler and colonial entitlement to Land and Indigenous cultures, concepts, knowledges, and life" (Liboiron 2021, 27) that dominate discard and waste practices. The research informing this paper recognises the importance of this resistance and aims to enact an anti-colonial approach.

In the Australian context where we live and work, this requires learning with and from First Nations' Australians and active efforts to not "reproduce settler and colonial entitlement". However, we also acknowledge that, in different ways, all authors of this paper are beneficiaries of these very entitlements as non-Indigenous women. As an initial step towards building an anti-colonial approach, we begin the following section by privileging First Nations Australian-led collaborative research to disrupt the dominance of non-Indigenous understandings of Land and human–nature relations.

Learning with and from Country

In Australia, home to the longest continuous culture in the world, First Nations Australians' understandings of interconnections, responsibilities and obligations to nonhumans manifest in the concept of "Country" and comprise vibrant and sentient understandings of place and space, enlivened through interconnectivity with inhabitant species and materiality. Bawaka Country¹ et al. observe "Country and everything it encompasses is an active participant in the world, shaping and creating it" (2015, 270). Relationality among all entities is foundational to First Nations Australian ways of knowing, being and doing (Martin and Mirraoopa 2003; Somerville and Turner 2020), and this informs approaches to caring for Country and understanding Country as caring for all humans and nonhumans. This notion of relations does not revolve around human desires for connection/engagement or detachment. Relations are active, carrying responsibilities and obligations to learn and act because, as Karulkiyalu Country et al. (2020) write, "humans, like all other species, are an integral part of connected, obligated, ecological communities" (34). While it is important to acknowledge that there is no one universal First Nations Australian ontology, understandings of Country have enabled First Nations Australians to develop the knowledge, skills and capacities to maintain culture and Country over 65,000 years through periods of great violence, dislocation and change.

When women dig for *ganguri* (yams) in Bawaka Country in northeast Arnhem Land, they are interconnected with the sand they dig in, both physically through having to lie on their bellies in a hole to reach the yams, as well as spiritually (Bawaka Country et al. 2016). Their being and doing are interconnected with the yams, sand, rocks, weather systems and all the diversity of other species that inhabit the land, such as the bird *gukguk*, a type of pigeon whose call signifies digging time (Bawaka Country et al. 2016). For Bawaka et al. "knowing and valuing place/space comes from living within it, learning (through hearing, feeling, doing) the language of its soils and winds and birds, and in becoming together" (2016, 464).

However, such visceral, intimate connections are not readily available to all First Nations Australians who may have been stolen and displaced from the Country and whose Country may also have suffered intense violence. Sensorially attuned storying has been suggested as one-way connection with Country can be maintained, revitalised and shared among First Nations Australian and non-Indigenous people (Somerville and Turner 2020). Being attentive to Country and actively attempting to enact anti-colonial approaches requires recognition of the ongoing impacts of colonial, capitalist violence and of the need for repair and healing; it requires effort to unlearn and resist the privileging of dominant, colonial ways. This is a process akin to "learning to use a new muscle" that "takes slow, constant practice of listening, interacting, of applying the principles of reciprocity" (Hughes and Barlo 2021, 357).

By digging down and exercising new muscles with community composters, this study explores the ethical learnings and doings that could help provide the training ground for an anti-colonial composting ethic.

Methods

This paper is grounded in ethnography and draws on fieldwork which was approved by the Human Research Ethics Committee at the University of Canberra (project ID 404). All participants were

provided with a participant information form detailing the study aims and processes and all signed a declaration of informed consent. The paper draws on an ethnographic study of ShareWaste, an online community composting platform initiated in Sydney in late 2016. ShareWaste allows food waste donors to connect directly with households with compost heaps (known as compost hosts) to divert food waste from landfill (sharewaste.com).

The study was conducted between 2018 and 2020 with 13 volunteers from 11 households. The data examined in this paper was gathered through 2 stages: Stage 1 involved show and tell home and garden semi-structured interviews informed by the garden-based ethnographic work of Franklin Ginn (2014) and Hannah Pitt (2015). These ran for 1–1.5 hours supplemented with researcher observations, photographs and fieldnotes. Stage 2 involved volunteers keeping a diary for 1–4 weeks. Participants came from two Australian cities: Canberra, the national capital and home to around 450 000 people; and, Sydney, where over 5 million people reside.

Canberra, located on the unceded land of the Ngunnawal and Ngambri people, is an inland city a 2-hour drive from the nearest coastline. Summers are marked by sustained periods of dry heat and, in winter, temperatures commonly dip below freezing. The soil is rich with clay. Sydney covers a vast stretch of land. The study was carried out in its central and eastern suburbs on the unceded lands of the Gadigal people of the Eora Nation where summers are warm and humid and winters mild and hospitable. The soil types vary significantly, but sandy loam was common in our research sites. All volunteers participated in Stage 1 with four continuing on to stage 2.

In stage 1, after initial greetings, signing of the ethics form, and discussion about the project, the interviewer asked participants to discuss their involvement in ShareWaste before inviting householders to show her how they attended to food waste and compost in their homes. This resulted in the majority of the interview time being mobile, involving the researcher being shown aspects of participants' food waste processes. The researcher made observations in areas such as front verandas (drop-off points), kitchens (the home of compost buckets, fridges and freezers) and gardens/backyards (home to worm farms, compost heaps and soil). The observation sites were determined by what participants decided to show the researcher. This stage also included a 1-hour long semi-structured interview with one of the ShareWaste initiators at a Sydney café. All interview data was fully transcribed and returned to participants to review before pseudonyms were allocated and analysis was carried out.

Participants from stage 1 were invited to join stage 2 which involved keeping a diary of how food and food waste entered and flowed through their homes and gardens via an online text and visual (photos and video) diary for an average of 4 weeks each. The diary guidelines were intentionally loose, with the aim of enabling participants to document practices that they considered to be important and relevant. The diary information sheet stated we are "most interested in what you want to share/record" not issues "directed by researchers". No participants in stage 2 selected the video option, but all used photos.

Two of the households were donors and the remaining participants were hosts. Consequently, our analysis focuses on the experience of hosts. Eight of the compost hosts resided in homes with front and back gardens. Seven of these households used compost bins on their own property to manage the waste while one used council land at the front of their property. The study also included one apartment-dwelling household that had a small courtyard garden and that was the only householder in the study with access to a municipal FOGO service. Six of the hosts reported that they had already been engaged in community composting prior to joining ShareWaste, and this reflected the fact that all hosts identified as being highly engaged in their local communities through various volunteer activities. Ages ranged from 20s to 60s.

Both stages of the study were interested in capturing multisensory aspects of food waste and compost work through including observations and audio-visual options as part of the documentation process rather than solely relying on text and talk. The researcher conducting the fieldwork paid particular attention to multisensorial observations (sound, smell and touch) in their fieldwork journal to home in on embodied encounters. Thematic analysis (Minichiello, Aroni, and Hays

2008) using an inductive approach (Boyatzis 1998) to initial open coding was used on all gathered data. This approach understands the process of analysis as one that actively produces themes (Braun and Clarke 2019). Drawing on the theoretical framework set out in the previous sections, our analysis was drawn to encounters among bodies, materialities and place. This process led to the identification of 3 key foci of ethical learnings and doings: (1) noticing and attending, (2) embodying and (3) experimentation. The interaction of these learnings and doings can produce what we refer to as a composting ethic. Given the complexity of these relations and encounters, the remainder of the paper uses exemplars from households involved in the fieldwork to flesh out this analysis.

Learning and doing with a composting ethic

Noticing and attending

We begin our teasing out of constituent components of a composting ethic by noticing and attending. Here, we identify that these practices, and the accompanying affective force of more-than-human encounters, can provide a basis for recognising and attuning to the alterity of nonhumans that could “shift subjectivities” and “everyday waste practices” (Morrow and Davies 2022, 542).

ShareWaste field investigations carried out on Gadigal Country along the coastal fringes of Sydney found composters struggling to work with the ancient geology of the sandy-soiled region. Here, working with sand took a different form from the earlier example from Bawaka Country. The coastal composters were, instead, learning how to build up fertile soil through combining sand with compost in the hope of growing a range of plants that would survive, and hopefully flourish, in these conditions. ShareWaste hosts Esther and Walter sat with one of the researchers on their front porch alongside three ShareWaste drop-off buckets, conversing about their garden struggles: “We have terrible soil here ... Wait until you see out back, it’s just sand, it’s terrible soil”. Composted materials they added to the ground “just disappeared”, they claimed with some amazement and frustration.

This identified struggle with growing in sandy soil is a form of *noticing and attending*. Be it difficult and frustrating, this noticing offers an ethical opening through its recognition of the vitality of nonhumans with whom the composters are entangled, but whose actions remain outside of their control. Noticing, as Anna Tsing notes is foundational to learning that “[w]e become who we are through multispecies aggregations” (Tsing 2014, 229–230). Recognition of human entanglements with often unknown and unknowable nonhumans is also fostered through what has been called the “arts of attentiveness” (van Dooren, Kirksey, and Münster 2016) which cultivate human capacities for “paying attention to others and meaningfully responding” (van Dooren, Kirksey, and Münster 2016, 6). Instead, in this study, noticing and attending appeared to support human attunement to their unavoidable more-than-human togetherness. This then encouraged them to invest in learning how to live well with nonhumans. The noticing of nutrient-poor sandy soils fuelled Esther and Walter’s composting activities and motivated involvement in ShareWaste.

ShareWaste buckets, brimming with compostable matter delivered to their front veranda by donors, were a symbol of hope and possibility that supported their community’s capacity to “discard well” while also helping fulfil their goal of enriching the soil around their home. They recognised that the buckets contained food for worms, cockroaches, fungi and bacteria that could help grow soil and they actively entered into these “multispecies aggregations” (Tsing 2014, 229–230), observing and adjusting their actions to support nonhuman activities. The end goal was fertile soil to help feed humans, but feeding the soil with the broken-down waste of their neighbours was also part of Esther and Walter’s commitment to challenging mainstream waste practices that entombed methane-producing waste in landfill. Their noticing and attending were concerned with keeping things local and place specific as they worked with humans and nonhumans to grow and maintain healthy soils.

Efforts to grow soil health are reliant on noticing and attending to soil’s diverse multimaterial and multispecies make-up as well as responding to changes in ecological and environmental

contexts. One way this became evident in ShareWaste households was through navigating the seasonal nature of composting work. The compost heap, and management of household compost buckets, demanded noticing and different modes of response depending on climatic and weather patterns. This included the slower breakdown of material in winter (particularly in frost-prone Canberra), the need for vigilance related to rapid decomposition and associated smell and insect proliferation in summer, and challenges of obtaining sufficient carbon/brown/dry to support breakdown in ways that reduce methane emissions (and thus, unpleasant smells) in spring and summer. Working with compost was consistently found to be harder in winter in both cities, as Lucy noted:

Winter's hard for brown stuff to add. So, it does get a bit stinky in winter. Yeah, winter, it's the hardest because it just doesn't break down as fast. I just say it's still better off with me than in landfill. So just try and manage it.

Digging through the bins with Lucy was a masterclass in noticing and attending as she unflinchingly pointed to the various states of decay of different matter, removed plastic packaging as it was unearthed, and spoke of the many nonhuman participants, from worms to rats, that were bound up with composting. Lucy's statement that, "It's [food waste] still better off with me", as opposed to being sent to a landfill is imbued with a desire to "discard well". Her compost care was motivated by: recognition of the damage to the health of land and water that food waste in landfill can cause; a desire to promote a rethinking of the value of food waste among her neighbours; and, recognition of how many in her local community value having access to these compost bins. Lucy spoke of the difficulties faced by apartment dwellers trying to avoid adding organic waste to landfill, and the delight many express in finding ShareWaste. She recounted a recent interaction with a donor who asked to take some compost to add to pot-plants, speaking of how the donor later sent through a message expressing the immense joy felt when encountering the worm-filled compost. This interaction indicates the potential for community composting to also support donors to develop their capacities to notice and attend, potentially contributing to further sustaining and motivating their revaluing of food waste.

Noticing and attending to diverse soils and seasonal compost needs is one component of ethical doing and learning with compost that emerged in the fieldwork. These are grounding practices that can help gardeners, composters and donors situate themselves and their composting work alongside work being done by "others" such as birds, slugs, shredded paper, soil microbes, sunlight, water and worms. Noticing and attending works in tandem with other processes and cues to inform an emergent composting ethic, most of which are embodied and sensory.

Embodying

The human composters in our research identify that, over time, they learn to feel and sense cues from compost heaps and bins to support the process of waste decomposition. They engage in bodily learning that requires openness and sensitivity to what Latour calls learning: "to be affected, meaning "effectuated", moved, put into motion by other entities, humans or nonhumans" (Latour 2004, 205). The affective force of waste has been shown to elicit powerful human embodied responses such as disgust and revulsion, which, in turn, can be powerful forces for emergent beings. Humans can become a different kind of being, differently affected and engaged in multispecies, multimaterial ethical relations through waste relations (Hawkins and Muecke 2003, xiv; Hawkins 2006; Waitt and Rankin 2022).

ShareWaste composters in our study share insights that show they are in constant training, their bodies differently affected in ways that can support attunement to the vitality of the myriad of nonhumans present in the composting process and the limits of human control over these processes. Reinforcing identification of the importance of sensorial engagement in supporting composting practices (Turner 2019a,b; Waitt and Rankin 2022), our research finds that these community composters adapt their modes of learning and doing using sensorial cues from

waste and compost. Sensorial compost cues include feel (temperature and moisture content); how it looks (colour, texture, degree of decay and what organisms are present); and, most powerfully its smell. While hot compost that is warm to the touch, emits steam on a cold morning and quickly breaks down is considered to be the pinnacle of compost, this does not reflect the realities of most compost heaps. Instead, ShareWaste composters were found to be learning how to work with their variable compost contexts to reduce food waste and facilitate breakdown in the “least smelly way” (Olivia). To do this, they expressed ways in which their human senses were being trained to help guide the management of the compost heap through visceral encounters with smell, touch and visual observation. We suggest these human composting bodies are being trained by the multimaterial and multispecies compost inhabitants or, at the very least, composters, donors and compost are becoming entrained to each other. As Game (writing of human-horse relations) explains, “Any sort of training can be thought of as an entrainment”, noting that this involves:

learning to be carried along in the flow, learning to become in tune with or in the train of. For this to happen, one needs to get into these waves, to be receptive, letting go of will and self-consciousness. Training, in this account, works through a magically mimetic relation ... with the rhythms or images or performances of others. (2001, 3)

Practices of noticing and attending lay the groundwork for recognition of the “rhythms or images or performances of others” while embodying involves training over time. To explore this ethical learning and doing we return to Esther and Walter’s home and garden where they live with their dog, worm farm and large compost bin.

The daily rhythms of Esther and Walter had shifted over a number of months to accommodate the needs of the Aerobin composter now residing in their backyard. The couple joined ShareWaste after accidentally ordering the wrong (larger) size compost bin and recognising it needed more food waste than they could provide in order for it to function efficiently. Gradually they became entrained not only to the volume of scraps required but also to what organic waste should or should not be added and how this needed to be processed (e.g. cut or blended) to support quick decomposition. The flow of organic materials through their home came to revolve around the compost bin, beginning with the six food waste donors who, with varied regularity, leave buckets of scraps on their front veranda. These buckets are washed and returned, empty to the same location for collection when donors make their next deposit. The household dog sniffs out the ones that need to be brought inside first.

Once inside, each donor bucket is sorted through. As one of the researchers watched on during fieldwork, Esther smelt the contents before dipping her hands in to begin sorting. She chopped up anything she had learnt was too large for the compost bin to easily breakdown. Esther told how the sorting step sometimes yielded the discovery of foods that could be saved and eaten by the hosts (a whole mango was one recent example). She also spoke of the educational materials she had developed to help guide and entrain, the donors with Aerobin’s needs. These materials included notes that reminded participants that, for example, egg shells should be separated out on top (Esther dried and pulverised these before adding them to the compost); corn cobs should not be included (suggesting these can be added to green waste); avocado pits be sliced; and all other materials be chopped up into small chunks. If things weren’t to the bin’s taste, a note would be added to the returned buckets reminding donors of the bin’s needs. When donors dropped off the next bucket, there would be a noticeable shift in their practices.

While Esther and Walter were, in part, motivated to shift bodily habits and routines due to their desire to increase the productivity of their own garden, this form of training involved hard-work and a significant investment of their time. They were in a position to be able to buy-in soil and grow only in raised garden beds, but they were committed to the slow and unfolding process of nurturing soil and diverting organic waste from landfill. For the donors, their learning about decomposition by proxy and changes in their practices appear to primarily serve a desire to discard food waste in a manner that causes less environmental harm.

Attuning to compost regularly calls upon composters' and donors' sense of smell with "bad" smells being a barrier to compost engagement (Ames and Cook 2020; Waitt and Rankin 2022) and a particular challenge for bokashi users. Bokashi is a form of food waste management that ferments scraps using a bran mixture inoculated with microorganisms. While Bokashi has been widely promoted as an efficient way of managing food waste for apartment dwellers, once bokashi receptacles are full they must be emptied into the soil, potting mix or traditional compost heaps to recycle the nutrients. During this research, numerous hosts lamented the high uptake of bokashi, identifying a growing demand for ShareWaste hosts to take on donations. However, the smell of inadequately managed bokashi stopped many ShareWaste hosts from accepting it (declaring a bokashi ban on their online profile) and led to others having to alter their composting practices in order to take it on. One inner-West Sydney host recounted her first experience with the "distinctive smell" of a bokashi donation:

The first time she [the donor] dropped it off I thought, oh my God, and I stepped on the compost as quickly as possible. And then the second time ... she actually emailed me and said, do you mind if I do it, because some people don't like it, because it's got quite the smell ... I said, just let me know [when you are dropping it off] and I'm going to dig a hole and put it into it straight away. So that's what I did ... I dug a hole beside my fig tree, which has not done well, and buried it there. (Lidia)

This host bypassed her traditional compost processes to accommodate a bokashi donation to reduce the impacts of undesirable smells. This action was motivated by the recognition that the donated material had great value, possibly able to support an ailing tree. This valuing of food waste, and commitment to supporting others to "discard well", trumped the sensorial disgust and extra labour involved in taking it on. The host also conceived of this action as part of her compost experimentation, and this kind of practice forms the third ethical learning and doing with compost recognised in this research.

Experimentation

We identify experimentation as a form of ethical doing and learning amongst our research participants because experimental actions are underpinned by their desires to improve the capacity of themselves and others to "discard well" within their "specific contexts, materialities, and power relations" (Liboiron and Lepawsky 2022). In particular, the hosts actively sought to share the land they had access to along with their skills and time to grow local capacity to divert food waste from landfill and nourish soils and their multispecies inhabitants. Foundational to this was the hosts' interest in, not only reducing waste but finding out how best to care for – and be together with – their nonhuman garden and compost companions.

Experimentation was common among the ShareWaste composters involved in this research, echoing previous work carried out with household composters (Author 1 2019; Waitt and Rankin 2022). There was a willingness and desire to see what might happen if certain materials were added or excluded from compost heaps and worm farms and, importantly, what the nonhuman compost companions might do, As Olivia explained:

Sometimes I'll experiment, Will you eat this? Like clothing, they [microbes, worms and other decomposers] will eat clothing. So again, that's just kind of me dabbling ... [and worms are] actually good for eating very small bits of paper. (Olivia)

For participants, this experimentation was not informed by "how-to" guides or human-compost experts. In fact, expert guidance that encouraged the pursuit of "perfect compost" was consistently identified as a barrier to more widespread uptake of composting. Lidia believed that the emphasis on producing a very high "Gardening Australia² quality" product prevented people from simply giving it a go. Another Sydney resident, Sally, concurred, stating " ... I think if people felt composting was easier they would do it ... It's almost like people feel, oh well I need to have a degree in horticulture to do a good job with a compost bin". Olivia was of the same opinion, and emphasised the importance of simplifying and demystifying composting:

Many people believe that composting is challenging, and worms won't eat this. Yes, sure, if you're trying to create a spec product, sure okay. But if you're literally trying to get rid of your waste, you could bury it in a hole. I think a lot of times on gardening groups, it's been made unnecessarily complicated.

Despite identifying the problems associated with the promotion of perfect compost outcomes, all of these hosts were apologetic about the state of their compost as we dug through it during the fieldwork. Their experimental approach to composting was described in a self-effacing manner, often cited as evidence of their lack of due diligence and failure to follow the scientific guidelines. Hosts commonly described themselves as "lazy", "loose" or "not very good" composters because they were not paying fastidious attention to the ratios of green or brown/wet to dry/nitrogen to carbon in their bin, like Lidia: "I'm not a very good composter, because I know that my ratios aren't right ... I mean eventually it'll break down and it'll be fine. It's a very lazy person's compost, I just stick things in". Sally, another host described how she would "just wing it", describing herself as "... more of an artist than a scientist".

Rather than being evidence of poor composting, we see the experimentation of these ShareWaste hosts as an important site of ethical learning and doing that seeks to respond to the material and contextual complexities necessary to discard well. These experimental practices – that start with noticing and attending and rely on embodied encounters – offer openings for more generative waste relations through "bodily affects and habits of self-cultivation" (Hawkins 2006, 120). Learning to discard well is, necessarily, an ongoing process of learning to respond to and live with shifting materialities, changing personal contexts and diverse nonhuman compost companions. It requires regular adjustments to the type of care that can be, and is, offered to compost heaps. This does not require a rejection of technical advice, nor does it suggest "high spec" (Olivia) products are undesirable, but it does encourage recognition of the value of everyday compost experimentation and responsiveness to open up possibilities for reducing organic waste, recognising that human-made plans can be easily disrupted by nonhuman contexts and critters, and regenerating soil in urban areas.

Digging into our work with ShareWaste composters we identify that compost experimentation – whereby expert guidance is tempered with the honing of in-situ, embodied noticing and responsiveness – can contribute to creating the conditions necessary for learning to reconfigure how humans live well with nonhuman others. Following Gibson-Graham and Roelvink, this is "[n]ot learning in the sense of increasing a store of knowledge but in the sense of becoming other, creating connections and encountering possibilities that render us newly constituted beings in a newly constituted world" (2010, 322). The possibilities of learning "to become other" with compost through ethical learnings and doings requires particular contexts and skills. These possibilities begin with very practical considerations. For hosts, this includes access to resources (such as compost heaps) coupled with time, commitment, and skill to engage in physical and emotional composting labour. For donors, it requires finding access to a local compost host and cultivating the habit of separating out waste in the home. However, taking these actions does not guarantee a composting ethic will emerge. The final section of the paper considers what might constrain the broader uptake of community composting and limit the potential of the ethical learnings and doings outlined above, before offering suggestions for how these could be addressed.

Challenges, opportunities and the on-going work of enacting a composting ethic

Our ShareWaste fieldwork identifies some very practical challenges that need to be addressed for human composters moving forward. The time, effort and agility needed to be a compost host can become overwhelming when: lives are busy; a larger than expected volume of waste is donated; there are a large number of donor enquiries; and in response to seasonal and weather patterns that make compost management challenging. At these times, ShareWaste hosts can find that being a community composter becomes a "burden" that facilitates other community members to

“shift the responsibility” (Bridget) for their waste to their neighbours because they want “their problem to be dealt with by someone else” (Sally). Wanting to divert food waste from landfill, having access to composting resources, and being community-minded, may not be enough for compost hosts to motivate and sustain the ethical learning and doings that underpin a composting ethic. This study found that the physical and emotional labour that can be involved in managing the waste of others to support local efforts to “discard well” can become a barrier to broadening the reach and impact of community composting.

To ease the burden, more support for local efforts to divert food waste from landfill is needed. Study participants identified this could include recruitment of more composting households and compost hosts coupled with investment in social or government-supported enterprises to collect and manage organic waste in local neighbourhoods. As Bridget stated, “I mean if there was one person on every street or whatever, that would make it so much better”. Compost hosts were also adamant that the promotion of composting as an “art” rather than a technical endeavour would encourage greater uptake. This could be further supported by more widespread access to low-cost infrastructure necessary to carry out the composting. Overall, our research finds that compost labour must be more evenly distributed in local contexts before more donors are encouraged to join community composting initiatives. Our findings suggest that growing the number of – and support for – compost hosts could facilitate an increase in the number of food waste donors and, in turn, expand opportunities for donors to build a composting ethic.

Donating food waste takes time and effort – to separate out waste in the home, identify host sites, and organise drop offs. Donors spoke of how by engaging with ShareWaste they had learned new behaviours and routines to manage food waste – from keeping a “scraps bag” in the freezer to avoid bad smells between donations to changing their shopping habits after becoming aware of the volume of food waste they generated. These learnings and doings are examples of the “micropolitics of the self” (Hawkins 2006, 15) that offer opportunities to build “other ways of being with waste” (2006, 38). To better support local-level practices of “discarding well” that resist forms of waste colonialism, a diverse landscape of approaches that support food waste diversion from municipal waste streams and the nourishing of local urban soils is needed.

Alongside practical challenges and opportunities, on-going work is needed to engender a composting ethic not only capable of reducing the environmental impacts of food waste but also providing opportunities to decentre humans and reconfigure relations with land and nonhumans that resist colonial, business as usual practices of discard. This involves creating contexts and growing skills for the cultivation of anti-colonial approaches that recognise, and learn from, the vitality of nonhumans and the inevitability of more-than-human entanglements. First Nations Australians are the critical teachers here.

Overall, the paper has identified the ethical potential of: noticing and attending to the vitality of nonhumans with whom human composters are entangled but whose actions remain outside of their control; on-going composting training, with human bodies differently affected in ways that can support attunement to the vitality of the myriad of nonhumans present in the composting process; and in-situ, embodied responsiveness, with humans responding in experimental ways to the material and contextual complexities of compost making. The ethical potential of compost learnings and doings in community initiatives is important because it moves these practices outside of the framework of individual responsibilities to explore how more-than-human communities can negotiate composting encounters and mutually dependant togetherness, to develop more ethical environment–human relations, reduce food waste and grow urban soils. There is much more work to be done, but we hope this has seeded the soil for future work in this area.

Notes

1. This section of the work cites research where Country is identified as first author. Ascribing authorship to Country recognises its vitality and role Country in shaping everything, including research.

2. *Gardening Australia* is a popular Australian gardening show (with an associated magazine) running for over 30 years aired by the Australian Broadcasting Corporation (ABC TV).

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