15

Supply Chain Commons

Organic Waste, Climate Change, and Regenerative Farming in Peri-urban Sydney

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15.1 INTRODUCTION

Australia, like everywhere else, is amid a polycrisis. In the past five years, the effects of climate change have intensified: extreme drought from 2017 to 2019 (Wittwer and Waschik 2021), unprecedented bushfires in 2019–2020 (Deb et al. 2020), and widespread flooding in 2020–2022 (Climate Council 2022). During this same period, the "waste crisis" reached a tipping point precipitated by China's summary withdrawal as the world's recycler (Gregson and Crang 2019). In an important sense, both are different expressions of the same phenomenon: the Anthropocene (Crutzen 2002). Whether the Anthropocene is a new geologic era or, more hopefully, a punctuation point (Haraway 2016), one of its defining features is an accumulation of anthropogenic matter in the lithosphere, hydrosphere, atmosphere, and biosphere. In 1970, the weight of human-designed material was 3 per cent of earth's living biomass. By 2020, human-designed material outweighed living biomass (Elhacham et al. 2020).

What defines this polycrisis is interconnection. All along supply chains, the production, circulation, and consumption of designed objects generates waste that deepens our shared predicament. For example, the initial industrial production of single use plastics adds greenhouse gases to the atmosphere, while their "end-of-life" micro plastic waste floating in the ocean continues to add to the store of atmospheric carbon and, when consumed, delivers a toxic payload first to marine life and then to all life (Royer et al. 2018; International Union for Conservation of Nature 2021).

It is widely recognised that business as usual cannot go on. Policy paradigms like the circular economy promise comprehensive transformational change, while frameworks like the Sustainable Development Goals (SDGs) provide a way of tracking progress. Both paradigms (at times) emphasise the need for cooperation and intergenerational action. We argue that for these policy paradigms to *actually* achieve the transformative change they promise, people must learn continuously to build and maintain commons. As Ostrom's pioneering work has demonstrated, human communities around the world have been effectively stewarding commons-resources for centuries. The present moment requires us to translate this

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commoning capacity across scales and in response to multiple challenges (Gibson-Graham et al. 2016). In the decades that follow, human communities will continue to engage in activities of all sorts – from e-commerce to construction – but in parallel to this ongoing business, practices of shared stewardship of oceans, earth, atmosphere, and life itself will be absolutely necessary for survival.

We also argue that a commoning response to the polycrisis requires not only new material practices but also new ways of knowing, including new ways of knowing ourselves as commoner-subjects (Singh 2017). We need to learn to "think" and act like commoners for the long term and by extension to engage ourselves with others in an ongoing process of education and learning (Bollier 2014; Schneider 2018). Indeed, one could conclude that there will be no material commons without a corresponding knowledge commons to bring it into coherence and sustain it, as well as commoner-subjects who will do the work of caring for it.

In this chapter, we explore one such attempt to build a material and knowledge commons in tandem. We describe an engaged research project to create a circular economy for organic waste in Sydney. At the centre of this story is a material object – spent coffee grounds (SCG) and other coffee-related waste – enrolled into regenerative farming. A regenerative farmer had been collecting dehydrated food waste containing a significant portion of SCG from the university where she worked, which had installed an industrial food waste dehydrator to process campus organic waste. She was then windrow composting it on a farm where she grew heirloom garlic. Along with researchers, she convened a collaborative design workshop among inner city cafes as well as a range of other actors who could contribute to moving this material from city to country by creating links among material resources and infrastructure (SCG, trucks, roads, food dehydrators) through creating new exchange relationships and simultaneously producing and sharing new knowledge.

We describe an emergent relationship among a *material commons* (organic waste), a *knowledge commons* (the data encoded in the waste and the story this data can tell), and a *community of commoners* forging links to move waste from city to farm, that together constitutes what we call a supply chain commons. That is, we describe a *community of practice* or what we refer to as an "alliance" that is currently comprised of individual entrepreneurs, private enterprises, and public organisations that coordinate both market and gift exchanges in a decentralised manner in order to move materials and information along a supply chain. Like all moments of genesis, the shape of this innovation remains unknown to us: it is presently unclear if this alliance will assume a more durable form, perhaps by integrating into a business organisation, as recent efforts to formulate an entity (Ground to Ground) suggest. But it is precisely for this reason that we describe this incipient commons. Its potential to generate value (and values) depends first and foremost on establishing the kinds of social practices and coordination that we map here: most especially the commoning of knowledge about the value and the management of waste.

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In the following sections we first distinguish the supply chain commons from more business-as-usual approaches to the circular economy. Second, we illustrate how the particular supply chain we describe functions as a commons. To that end, we recount the pivotal role a design workshop played in enabling people to explore the diverse economic relationships that could allow for a commoning of knowledge and, through it, the commoning of a supply chain. Bearing in mind that workshop participants are only at the start of a commoning process, we pay particular attention to how the disciplinary field of design and a university-supported workshop space enabled social learning, data gathering, and data sharing. We conclude by reflecting on how commoning can redraw more capacious and open-ended notions of circularity that function to create a more liveable world.

15.2 FROM CIRCULAR ECONOMIES TO WASTE AS COMMONS

We position our collective efforts to devise a supply chain commons for organic waste as both part of circular economy theory and practice and as an effort to redefine and reimagine it. In Australia, the circular economy gained currency in the late 2010s after nation-wide kerbside recycling was imperilled by China's abrupt withdrawal from international markets in recyclable materials. With China and other international recyclers out of the picture, Australia needed to assemble "in-house" approaches to circularity, while new policy frameworks like the SDGs launched in 2015 created global governance expectations for change over a fairly short time scale. For example, in 2017 the City of Sydney set a target of 70 per cent diversion of waste from landfill by 2030, which has significant implications for the organic waste comprising 50 per cent of the city's waste by volume (City of Sydney 2017; Food and Agribusiness Growth Centre 2021).[1]

As a response to this polycrisis, the "circular economy" holds varied meanings. In the late 1960s and 1970s, it grew out of theories of industrial ecology and discussions around the limits to growth. Indeed, it emerged as part of a critique of capitalist development just as globalisation was starting to take off (Gregson and Crang 2015). Over the past twenty years, the powerful advocacy organisation Ellen MacArthur Foundation has done much to make the circular economy central to European Union policy but also to make it politically palatable by recasting it as a new pathway to economic growth (Ellen MacArthur Foundation 2012, 2013, 2017). By the 2010s, the circular economy had become a promissory note, a path nations must follow to be both "rich and green" (Monbiot quoted in Hobson 2016, 5). Tellingly, in 2017, Kirchher et al. analysed 114 definitions of circular economy in a sample of academic and policy literature, concluding that circularity as a pathway to prosperity overshadowed sustainability concerns, while social justice concerns were nearly absent

[1] These goals anticipated an even higher target of 80 per cent set by the federal government a year later in the National Waste Policy Action Plan 2019 (Australian Government 2019).

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(Kirchher et al. 2017, 229). Valenzuela and Bohm (2017) have therefore criticised circularity as a palliative fantasy: the persistent idea that growth without ecological consequence is possible. Corvellec and Paulsson (2023) similarly see circularity as repositioning waste as assets into a new regime for capital accumulation.

The "circular economy" has thus been shaped by two contradictory value frames: an originating idea that might be read as prefiguring postcapitalist theories and practices such as degrowth, and a more recent dominant policy understanding aligned with capitalist growth and business as usual (Savini 2023). In Australia, this dominant, and we think impoverished, understanding of circularity means that as long as it remains cheaper to landfill waste materials than divert them to other uses, Australians will remain on the well-trodden path, even as the failure to recoup the value of organic waste degrades terrestrial and atmospheric commons as this waste rots (Papodopolus et al. 2022). Indeed, it would now seem that the horizon for Australia, following Europe, is to invest in "waste-to-energy" incinerator projects so that the next iteration of a "circular" solution merely involves redirecting the rubbish and "recycling" trucks from the landfill to the incinerator.

Today, however, we also see different opportunities to revitalise a more open and transformative version of circularity away from market-based definitions of prosperity. In part, this opportunity is practical: there is growing recognition that the revalorisation of waste is more expensive than anticipated and the rewards are fewer, at least when the metric is economic growth. Indeed, the vast proportion of wasted anthropogenic material that lies in a hole in the ground is a long way from ready for marketisation. In part, this opportunity also reflects new efforts by scholars and policymakers ascribing new socioecological understandings to waste governed by values such as innovation, care, social justice, and inclusion (Kirchher et al. 2021; Savini 2023). For example, Savini (2023) argues that it is possible to reframe circularity around collective rather than individual action, emphasising bioregional transformation over technical reconfiguration, where the animating value is not "profit" but rather the intrinsic value of assuming the socioecological "burden" of waste – a paradigm shift he calls "circular degrowth". In particular, Savini's emphasis on collective action in a defined bioregional context is meant to spur us to identify who is shouldering the burden of waste *and*, as a consequence, who needs help.

To that end, we see this moment as an invitation to recast waste as a commons (though we are hardly the first to make this connection; see for example, Lane 2011; Zapata Campos and Zapata 2023). The commoning of waste material involves an inventive reuse of a material that has been discarded, that is to say, momentarily released from being the property of a particular individual and thus available for new forms of reuse by a collective.[2] Building on the vast literature spawned by Ostrom's (1990) work on resources held as collective property, we also suggest that the

[2] Drawing on our research we hasten to add that at other times the appropriate response to a waste material is to "detach" from it – that is to say, to learn how to live without it (Hawkins and Madden 2023). Australia has followed many other parts of the world in banning certain forms of single use

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commoning of waste is an opportunity to reconsider both the community and the rules-in-use that surround it (Sacks and Galabo 2021). Ostrom's analysis famously testifies to how communities can effectively manage common resources like fields, forests, fisheries, and water supplies, preventing the so-called "tragedy of the commons" that can occur when resources are left open and unmanaged by either state regulation or private property rights.

But waste also brings something distinct to discussions of commons, commoners, and the process of commoning. When it comes to waste, more is needed than the rules and practices for shared governance of common materials. To think of waste as a commons in the first instance requires a break from existing habits of thoughts in how we put waste in its place, as Mary Douglas (1966) famously observed. Rather than a habituated response of managing, containing, sanitising, and disposing of waste, we must call into question what we think we know about waste and how to manage it as a quantum of material (Hird 2012; Hawkins 2005). To put this another way, we are arguing that the first step of reinventing the circular economy is a commoning of knowledge production – so that the commoning of reclaimed value of waste becomes a context for thinking with others about its potentiality.

To be sure, many scholars have articulated the concept and relevance of a "knowledge commons." For example, Madison et al. (2010) draws attention to how immaterial goods, such as open-source software systems, can be developed for common benefit. Likening to a material commons, they also draw attention to an analogous free-rider problem: rather than overuse of a material resource, people in a knowledge commons may lack incentives to produce intellectual resources, such as information, absent state subsidies/sanctions, or private property rights. Our efforts to identify a "knowledge commons" pose a related, but perhaps prior, inquiry. We submit that responding to today's polycrisis requires new ways of being and doing that spur people to revalue and redeem what was previously wasted (Marres et al. 2018). Hence, if for Madison et al. (2010), the knowledge commons is significant insofar as it successfully institutionalises the sharing of intellectual resources in ways that obviate the need for either private property endowments or state regulation to incentivise the "right" supply of information, for us, its significance lies in how it functions as a context in which commoner-subjectivities emerge (Singh 2017; Chitranshi and Healy 2022).

To consider how people may produce new forms of rules, information, and subjectivities in tandem, Healy, Mellick Lopes, and others began a three-year Australian Research Council (ARC) Discovery project titled "Investigating

plastic – and what is of course required here is a reconfiguration of commerce, adjustments to health and safety, particularly in relation to food, and shipping and logistics. In other words, making something disappear also involves us in the work of social reinvention, including changing the habits of practice that makes a particular world seem convenient. This too, in our view, is a type of commoning practice, and further benefits of "breaking up" with single use plastics have many common benefits.

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Innovative Waste Economies: Redrawing the Circular Economy." The project asks if social, economic, and ecologically innovative responses to waste could provoke new shared understandings of waste management in organics, single use plastics, and bulk textile waste (Hawkins and Healy 2023; Healy and Mellick Lopes 2023; Lane 2023). In the section that follows, we describe one effort to common knowledge using a collaborative design workshop as a method to understand the various agents and value frames that might shape a reverse logistics supply chain for organic waste in Sydney.[3] What emerged in the workshop was a process of both imagining and then negotiating disparate investments in a circular waste economy in ways that highlight the enabling role that the material properties of waste plays, alongside the crucial role that data gathering and information plays, in together making this economy happen.

15.3 DESIGNING A COMMONS

Creating and sustaining new cultures and economies entails a "massive social learning process" (Manzini et al. 2008). Strategic designer Ezio Manzini once compared the challenge to changing a jet engine mid-flight. Most often, however, learning how to do and be otherwise does not happen at scale or speed. Indeed, recent splashy failures in designing new so-called "circular" approaches to waste management (e.g. the collapse of the nation-wide soft plastics recycling scheme REDcycle in Australia) tells us that bigger and faster is usually not better.

To create space for slow collective learning and practice, in December 2022 researchers of the Investigating Innovative Waste Economies project partnered with strategic designer Dom Svejkar and regenerative farmer Michelle Zeibots to convene a range of actors and institutions in a collaborative design workshop. Participants gathered at the University of Technology Sydney (UTS) to explore the transformation of urban organic waste into an input for regenerative farming that would, in turn, find its way into high value-added crops like heirloom garlic sold back to consumers in Sydney – creating the possibility for a circular system. The workshop had three key aims:

[3] Here, the work of diverse scholars on the process of commoning with others, and in the context of engaged research, is instructive. St Martin and others (cf. St Martin 2001; Papaioannou et al. 2021) have used community mapping in their work with fishers to represent their livelihoods as both the use of and the care for fisheries through time for a community benefit. Technologies, and in particular participatory geographic information systems, have played a pivotal role in allowing fishing communities to see and understand themselves as commoners (rather than utility maximising individuals) and, in doing so, directly influence fisheries policies in places throughout the world. Petrescu et al. (2021) and Dombroski (2019, 2023) have applied similar thinking to urban commons, looking at how the commoning of urban farming, composting, and community learning spaces can have a transformative effect on how people understand themselves to belong to a place, recover from disasters, or act more effectively as citizens. Closer to our efforts, Morrow and Davies (2022) describe various experiments in community-based compositing in urban areas as a basis for shared social learning on how to effect transition.

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- To understand the diverse perspectives, experiences, and aspirations of participant actors.
- To create a shared vision for an organics circular supply chain.
- To explore how participants could work together going forward, and what resources might be required to do so.

Organisers structured the design space – big, open, and airy with moveable tables and chairs, props, reams of "butcher's paper," stacks of coloured pens, and traces of previous gatherings – to invite thinking and provoke imagination. For design experts, workshops provide an important space for participants to "sit with ambiguity," exploring how the affordances of material objects are open-ended and imagining different uses and destinations for them (Asquith and Soble 2023).[4] Organisers here encouraged participants – all with different vantage points and resources along the supply chain – to cultivate a sense of ambiguity and possibility as a precondition for new ways of knowing waste and new possibilities for our relationship with it (Stark 2011).[5] Coffee roasters brought networks of cafes, a social enterprise organisation brought skills in waste transport, local government representatives brought knowledge about disused council spaces that could be used to store waste, the university brought its food waste dehydration technology and formal commitment to "circular" goals as well as an appetite for engaged social learning, and Michelle brought other farmers with much larger acreages who were interested in regenerative farming. This group – which represented the whole reverse logistics supply chain from the coffee shop where SCG are "produced" to the farm (Table 15.1) – was brimming with relevant knowledge and experiences, promising a level of maturity in the conversation and investment in what it generated.

TABLE 15.1 *Reverse logistics workshop participants*

Farmers	One vermiculturist
	One small-scale farmer
	One broad acreage farmer
Social enterprise	One trucking, hauling, and logistics representative
Private enterprise	Three coffee roasters
	One cafe manager
Not for profit (large scale)	One representative from UTS operations and management
Local government	One City of Sydney representative
	One Inner West Council representative
Researchers	Four academics

[4] Remarks made by Lindsay Asquith and Leanne Soble, during a Concept Note talk, "Re-Imagining Disability Care: Supporting Human Connectedness Through Design," May 16, 2023, University of Technology Sydney.

[5] Stark's analysis points to the productive role of dissonance in clarifying different senses of value; this sense of the possible is in turn facilitated by design workshops that are at the centre of our research approach.

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Participants also brought a will to engage as incipient *commoner-subjects*. The workshop opened with a "circular" form of participation where each person was asked to share an object that evoked the circular economy to them. In one instance, an inventory manager at a local coffee roaster introduced chaff, a by-product of the coffee roasting process, expressing dismay that this clean, dry material was going straight to landfill. Immediately, others in the room offered practical ideas for how the chaff could be recirculated. But more than offering ideas, participants offered their own pressing sense that organic waste was a socioecological burden to be borne by a particular set of somebodies – namely, them – connected by a common purpose: reducing urban landfills, contributing to living soils, and sequestering carbon through regenerative cropping practices. More broadly, and in keeping with the spirit of the Discovery project, the workshop provided a space for participants to think with one another, and with the "waste" in the room, to see what it could "tell" us about assuming collective responsibility for our common future (Healy and Mellick Lopes 2023).

The design task then became how to orchestrate diverse knowledge and common commitments to socio-environmental values around the practical challenge of inventing a supply chain commons. Organisers spread a four-metre-long map on the floor. The map illustrated a tentative circular supply chain journey through a series of loops representing the interactions and exchanges from the university and coffee shops to the farm, and then back to urban markets. Rather than a tight circle of neat flows that obscure the messy realities of reverse logistics, this enormous, open-ended temporal structure acted as a scaffold (Sanders 2006) that participants used to build out through knowledge-sharing and conversation (Figure 15.1).

To be sure, the basic contours of the reverse logistic supply chain design were already visible to many of the participants. Michelle had been at work since 2017 drawing on relationships with operations staff at UTS to take food waste across Sydney up to her Blue Mountain farm, and people came to the workshop cognizant of what regulatory agencies and measurements might be important, potential obstacles along the way, and the larger context in which this supply chain might take shape. But rather than starting with a ready-made solution, the workshop opened space for Agamben's (1993) "coming community," by continually foregrounding the question – what are we designing here? – in the presence of others who share a common concern (Wernli and Chan 2023). As relationships began to coalesce into what we came to call an "alliance" of people committed to a commons, it became clear that participants needed to understand others' valuations to coordinate common action and create common value.

In what follows, we describe how participants had different vantage points for *knowing* the value of waste, including through different ways of taking its measure. Depending on where one sits in the supply chain, waste becomes a gift to be received, desirable for its use value, a source of revenue/an employment opportunity, or a cost to manage and mitigate – different valuations that, in turn, enable commons

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FIGURE 15.1 Mapping the reverse logistics supply chain.

coordination.[6] We also describe how the workshop surfaced a common interest in waste *as information* (Offenhuber 2017) that participants proposed to communicate – and futher create the value of the supply chain.

15.3.1 *Farmers*

Farmers talked about the unique qualities of SCG-rich composting piles – the way they repel vermin when they are first set in windrows, how at a certain point in their decomposition they attract earthworms that recondition the soil as they digest this material. Farmers desire this "pure" waste stream, they explained, for its use value – for how it can be windrow composted and added to soil without fear of introducing weed seed to their fields. Unlike commercially prepared soil amendments that are sterilised through heating before being sold, composted material is readily available

[6] What we describe recalls Anna Kornbluth's (2010) characterization of Marx's *Capital* as a Victorian novel in which the story of capital is re-narrated from different vantage points – the commodity itself, the perspective of the capitalist appropriator, the merchant, the landlord, and the banker. For Kornbluth, following Karatani (2005) – the "truth" of surplus capital is found in the movement among these vantage points attesting to both the power and the uncertainty of how surplus value is actualized through circulation. In contrast, what we are describing is how the value of SCG undergoes transmutation – from waste to asset to a source of livelihood, a gift gladly received, and finally to something that regenerates the vitality of soil through its reconnection with the more than human world. What emerges as it changes hands is a commonwealth that accrues to a broad community.

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to microbial life. But to remain fertile, soil conditioned with compostable material needs continuous amendment – continuously adding organic matter improves soil quality, particularly its tilth, which allows it to retain moisture.

For farmers, then, the relevant unit of measure for what they value in SCG is volume. One farmer with a larger acreage stated, "I need about six and a half thousand trucks to put a five-millimetre cover of composted soil over it. So that puts into perspective [as] a small farm in the ... central west how much capacity there is, but [also] how much volume needs to go over the hills."[7] Coffee roasters and cafes, we should in turn stress, produce volume: one of the larger roasters at the workshop estimated they generated 20 tonnes of SGC per week across a network of more than 600 stores – an amount sufficient to satisfy the need for composted soil for a 20-hectare regenerative farm.

15.3.2 *Social Enterprise Haulers*

The social enterprise representative explained that she valued this waste stream for how it could advance the enterprise's social and commercial mission: providing training and employment opportunities for ex-prisoners in commercial hauling and logistics. The enterprise could (and does) use regular service contracts to haul SCG and chaff away from roasters and cafes. But current Environment Protection Authority EPA regulations create an opportunity. Farmers can receive pure compostable materials like SCG and chaff as a "gift," and if the enterprise gifts waste to farmers, they are not paying a tipping fee to dispose of it. But the EPA limits a gift to 200 tonnes/200 cubic metres per year.[8] For waste haulers, then, one relevant unit of measure is weight. Weight in freighting is a practical concern connected to hauling capacity; what roads, bridges, and other infrastructure will allow for transport as well as the costs associated with this movement? But weight here also determines the possibility of a mutually advantageous gifting relationship.

The social enterprise representative had a second interest in this waste stream. While workshop participants initially focused on the "biophysical" dimensions of the supply chain, they very quickly identified both the necessities and possibilities

[7] The reference here is not to a dump truck but a "ute" (utility vehicle, or in the US parlance a pick-up truck), where the truck bed capacity is about one to three cubic metres or roughly half to three-fifth of a metric tonne of compostable material.

[8] Current New South Wales EPA guidelines encourage on-farm composting but balance this commitment against concerns about odour, vermin, disease, the presence of weed seed, or groundwater contamination. Schedule 12 of the Protection of the Environmental Operations Act 1997 states that farms may receive up to 5,000 tonnes per annum of non-putrescible organic waste (e.g. wood chips, saw dust, leaf mould) but only 200 tonnes per annum of putrescible waste (which SCG and chaff is currently classified as), without needing to apply for special licencing that would reclassify the farm as a commercial waste facility. It is the putrescible waste that triggers many of these aforementioned concerns that understandably require regulatory oversight. The live question in the workshop, however, was whether SCG and chaff should rightly be considered putrescible waste or if they should, instead, be exempt from this limit.

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surrounding the collection and disposition of data alongside coffee grounds. The social enterprise representative put the point bluntly: "We do not collect waste without collecting data" (Social Enterprise representative, in post-workshop follow-up conversation, 2023). This valuation of data, in turn, reflects new measures created by private global governance regimes such as the Environmental, Social, and Governance (ESG) system. Indeed, just as farmers had used the word "pure" to describe the qualities of SCG as a waste stream free from contaminants, the social enterprise representative adopted the adjective "pure" to describe the information this waste contains and why this data is valuable – it directly satisfies metrics for landfill diversion and social procurement set forth by relevant ESG criteria. In her words: "because it's a pure stream we can get [an ESG] rating on it" (Social Enterprise representative, in workshop 2022). The rating, in turn, communicates to relevant audiences the amount of organic waste the enterprise has successfully diverted from landfill. This information was similarly valued by the local government official present at the workshop, who was eager to signal the council's contribution to responsible waste treatment. He proposed to incorporate the council into the supply chain by contributing disused council land and facilities in an inner-city adjacent suburb as a site where SCG and chaff could be stored before being hauled to the hinterland.

15.3.3 *Private Enterprise Coffee Roasters and Cafés*

Coffee roasters and café owners similarly valued the waste stream for how it could enable them to improve both current waste management practices and their own ESG commitments. One of the roasters had previously experimented with requiring corporate customers to include (and pay for) sustainable waste management in their service contracts. The roaster stressed that making this arrangement visible – for example, SCG stored in bins outside cafes awaiting pickup – created value for them by signalling that they are "part of the circular economy" to an audience of urban customers (Coffee Roaster representative 1, in workshop 2022). "There is a storytelling value," he emphasised. Another roaster similarly ventured that they could create value "through PR, marketing at a bigger scale," that communicates the worthiness of a circular arrangement for organic waste that is cared for by producers and users across the chain (Coffee Roaster representative 2, in workshop 2022). A third roaster emphasised "pride" in their story and not simply publicity (Coffee Roaster representative 3, in workshop 2022). As the local government representative summarised, workshop participants were all eager to use this supply chain to "influence [others] to try and change their behaviour to do something for the better … [through] telling that story of saving the coffee grounds or food waste from landfill" (Local Council representative, in workshop 2022).

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15.3.4 *Not for Profit: UTS*

A representative from UTS Operations and Management Team valued this waste stream for how it reduced recurrent operational expenses associated with waste management – their primary measure was cost savings. The representatives explained the university had purchased a second large capacity food dehydrator to minimise the cost of waste management. Rather than have a dump truck pick up "putrescible food waste twice a day," UTS hoped instead "to store the dried food output of the machine on campus and have one truck a week" (UTS representative, in workshop 2022). From the UTS representatives' perspective, it was serendipitous that Michelle offered to move a portion of this waste for free, setting into motion the workshop's aspirations to expand this relationship to include other local coffee roasters and cafes and indeed the current waste services provider. UTS also values the waste stream for its research, education, innovation, and engagement activities.[9] It has a remit, even a responsibility, to enact propositional futures ahead of the business-as-usual status quo, given its status as a signatory to the University Commitment to the UN SDGs among other commitments and aspirations.[10] Like the social enterprise and local government representatives, UTS also values information about waste – data about where a consumer's coffee grounds go – and the supply chain commons tells a story that aligns with its values and commitments.

Of course, UTS and other universities are also comprised of researchers, including the authors of this chapter, who also value this waste stream in particular ways. Higher educational institutions are all in a position of having to demonstrate leadership in environmental and social governance in ways that predispose them to innovations around waste management. We as individual researchers value data about waste for its potential to contribute to theoretical and empirical insights measured by requirements for academic performance, including generation of research funding and outputs, as well as curriculum development. We also value information about this waste stream for its potential to generate methodological insights: how to "do" action research that facilitates and creates the conditions for commoning. While these values are not dependent on the success of the supply chain commons (a possible point of tension with other participants), researchers share with other participants a *political* value: successfully producing a "knowledge commons" would make explicit the capacity of the university to take a coordinating role and custodial responsibility for commons-making as part of the research enterprise.

[9] A number of learning and teaching opportunities have emerged since the installation of the food dehydration technology at UTS, including a Transdisciplinary Living Lab (TDLL) as a mechanism to link curriculum, operations, and research (Fam et al. 2021).

[10] Indeed, the initial purchase of a food waste dehydrator was instigated by a researcher at the Institute for Sustainable Futures at UTS, Dr Dena Fam, with a grant from the EPA. See https://www.uts.edu.au/case-studies/circular-economy-food-waste-recycling-uts.

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15.4 COMMON KNOWLEDGE TO COMMONS POSSIBILITY

The relationships that began or recommenced in the collaborative design workshop allowed for an initial identification of diverse and common interests, brokering connections and beginning to set the practices of coordination and rules (in the broadest sense) necessary to configure a circular supply chain that connects waste to those points where it might be meaningfully redeemed. People articulated different value frames for waste as they discussed their own economic activity – a freely received gift for farmers which enriches the soil and adds value to products for market, service contracts for waste haulers that can benefit from regulatory exemptions, a source of livelihood generation for haulers, reduced operational expenses and other synergistic benefits for educational organisations such as universities. The way participants valued organic waste was, in turn, indissociable from how they took its measure – as volume, weight, cost, or ESG criteria.

Moreover, as people discussed how they valued the material qualities of SCG, it became clear that they valued information about the waste stream as much as the waste stream itself: they thus repeatedly described the importance of creating a traceable and data-driven supply chain so that they could communicate (and further enhance) the value of circularity as economic activity. The sharing of information among participants thus functioned as a complementary currency of variable worth: from information about how SCG performs as a soil amendment to how this diversion of organic waste consummates ESG commitments. Participants discussed how getting this information to flow through the appropriate channels mattered as much as the flow of organic waste material from city to country. They envisioned recruiting an array of actors: other regenerative farmers who might make use of organic waste, waste haulers, cafe owners, other universities and receptive local councils, accommodating regulators, coffee roasters, and custodial staff. Each would play a role in managing the flow of organic waste in the system and each would be attuned to the data it expresses and its different measures. Or to put the point in Frischmann et al.'s (2014, 2) words, the workshop allowed for the beginning of an "institutionalised sharing of [intellectual] resources among members of a community," a "knowledge commons," as they define it.

This knowledge commons, in turn, depends upon and helps to solidify an incipient commoner-subjectivity who cares for waste and human and more-than-human life. Workshop participants hoped to use information about the supply chain to enrol more people into a capacious, caring, and felt understanding of circularity. They also wanted to build relationships of solidarity and care across the chain. For example, participants discussed ways to disburden Michelle and her family from carrying the entire system on their shoulders through redistributing the efforts required to move organic waste from the city to peri-urban farms. For those of us interested in putting the circular economy to work, the task here really does involve a practical reinvention of the social in ways that expand the capacity of those who, in

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Savini's (2023) terms, are carrying the socioecological burden. The commons offers an entry point that emphasises the possibility of redistributing who (or what) shoulders the burden in ways that make it more manageable.

The workshop (and the convivial lunch that followed it) cemented the sense that something more than the sum of its parts had been created. As Michelle remarked, the workshop enabled what she had achieved thus far "to be reimagined and renewed in a really positive way." "There is scale here *and* it's clean," she said, summarising learning from the day. "You've got to get it started with something that is very doable," she advised, "but if people get used to the idea that this is what's possible within a circular economy, then I think suddenly, it's much easier to then throw [in] other parts of the putrescible waste," potentially catalysing broader-spread changes in knowledge, practices, self-understandings, and social relationships.

To carry forward this sense of possibility, solidarity, and social innovation, the strategic designer Dom Svejkar collaborated with the researchers to synthesise workshop findings into an illustrated report that included the map now populated with the ideas and comments of the participants. Since the workshop concluded, there have been several meetings of the proto-alliance, and more voices have been brought to the table, including a logistics professional and a "parent" company sustainability manager to trial a larger-scale version of what Michelle had been doing over the last six years. This supply chain commons is thus taking shape – not as a linear chain as much as a co-evolutionary trajectory of knowledge production and exchange, and quite possibly through the creation of a new organisational form whose principle objective is coordinating flows of materials and information.

We must however stress that at present this supply chain is closer to Lauren Berlant's (2021) depiction of the commons as a series of patches and improvisations than to Ostrom's (1990) conception of the commons as something with intergenerational durability. And yet we would also submit that the flow of organic waste matter from Sydney's Central Business District (CBD), over the Blue Mountains, and onto regenerative farms – and the corresponding flows of information (data/knowledge) to and from all points of the supply chain – represents a concrete instance of what Çalışkan and Callon (2009, 2010) term *economisation*. Economies are made, not given, they argue; work is required to establish the relationships and practices that enable exchange and to maintain these relationships over time. Expanding on this proposition, the supply chain we identify here is an instance of more-than-market economisation: a set of exchange relationships that are both market and nonmarket, in particular the giving and receiving of gifts. More-than-capitalist agencies are involved in the process of valuation: family farms and social enterprises operating alongside for-profit companies and large organisations like the university. In turn, the communication of these agents' diverse and common valuations – to regulatory authorities, stakeholders, boards, and investors – is a condition of common possibility for people who want to assume the socioecological burden of waste.

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The future success of this endeavour depends on how actors continue to coordinate their diverse forms of measuring, tracking, exchanging, and most centrally valuing waste material (see, for example, Cohen 2020). Because success depends, in other words, on shared knowledge production, we also wish to highlight the crucial role that universities can play in enabling in vivo experimentations of the kind sparked by the workshop (see, for example, Çalışkan and Callon 2009, 2010; Fam et al. 2021). Against an array of all-too-familiar forces that pressure universities to produce proprietary research and commercialisable data for business and industry traditionally defined, universities as knowledge custodians can play a particular role in helping the commons to cohere (Erdem and Akin 2019). Our case suggests that universities can yet provide a kind of "safe-to-fail" space for experimentation in our current situation of climate and civic emergency (Fam et al. 2021).

In the months since this initial workshop, the university researchers involved in this project (Stephen and Abby) have continued to organise follow-up meetings and conversations. Very quickly the group prioritised additional research to pilot the set of relationships and logistics required to move organic waste from central city locations to farms in the central west region at a larger commercial scale. Participants also decided to form an entity that could act as a partner-investigator able to collaborate with university researchers and speak on behalf of the individuals, organisations, and sectors that comprise the commons-supply chain—an entity the group named the Ground to Ground (GtG). From a commons perspective, the GtG now acts as a custodian charged to consider and attend to the broader community located along this supply chain. These custodial duties include developing a transparent set of norms and practices to govern the coordination of activities and relationships that move SCG and other waste from the CBD to the urban periphery. They also include developing principles to ensure that all parties have the relevant data that would allow them to communicate the value of this circular supply chain and to mediate conflicts as they inevitably arise. The GtG's immediate goal is to lay the groundwork for a pilot study that will test developing the supply chain at a commercial scale, beginning by moving ten tonnes per month of SCG and other waste from city to periphery.

The stakes are high for such experiments. The state government of New South Wales has set clear targets around overall waste diversion of all types by 2030. As noted, government planners continue to propose large-scale waste-to-energy facilities as the easiest "circular" response to meet these targets. Whereas the GtG alliance aims to recover the value of organic waste by returning it to the soil, these facilities would use organic waste in place of coal to generate electricity – a proposal that has prompted community concern about public health effects. For example, in 2022, the state government proposed to build a waste-to-energy plant in Lithgow, a municipality near Michelle's regenerative farm.[11]

[11] www.planning.nsw.gov.au/assess-and-regulate/state-significant-projects/energy-from-waste.

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Community outcry has for the moment scuttled these plans (Hogan 2022). But what this conflict makes clear is that responding to the complex and competing uses of organic waste will require robust data collection to help demonstrate the economic, social, and ecological value of composting waste at scale. This data could include landfill diversion rates for local councils, universities, cafes and roasters, potential jobs created for social enterprises, and enhanced soil quality, including estimates for carbon capture for farmers and state government. Data of this sort would help make the value of a *supply chain commons* visible, legible, and comparable in a moment when the meaning of the circular economy is by no means settled.

Writing in what would seem a different context of Odisha, India, Neera Singh (2018) describes how commoner subjects are not given but made through their ongoing interactions with what they share and how they care for it. They come to know themselves as commoners and, precisely for this reason, there are no physical commons without corresponding knowledge commons. The context might be different, but the task is much the same; we *learn* to become commoners by continually revisiting the rules of use, ministering to the commons and taking away new insights over time. Ground to Ground offers one way of making commons, flows of organic waste and knowledge more durable. But, again, possibilities to entrench successful partnerships will depend on how people, embedded within their larger and multiple ecosystems, can coordinate their diverse forms of valuations. We can all too easily attest to the challenges university researchers face when they endeavour to integrate or translate *community engagement* into the research enterprise. As such, part of what the developing GtG alliance must deliberate about is how to generate, share, and manage information in ways that can both respond to and influence the future of universities as custodians for "the preservation, defence and expansion of knowledge commons" (Erdem and Akin 2019, 158, quoting Caffentzis).

15.5 CONCLUSION

Like others contributing to this series, our intention in describing this incipient supply chain has been to extend the conceptual purview of the commons, which involves, in the first instance, making them visible (Gibson-Graham 2006). A community of commoners managing a shared biophysical asset like a field, fishery, or forest is today easier to discern. But the commons we have traced here is more diffuse and provisional: in our example, commoners are the people convened along a supply chain, sharing knowledge, data, and valuations to make the chain function for their common benefit as well as for a larger community benefit that accrues to both human and more-than-human life, including improved soil vitality, sequestered carbon, improved farm viability, and flood risk mitigation, improved livelihoods, and regenerative peri-urban futures.

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Even as it is diffuse and provisional, this commons, then, is crucial. It sits in the context of the state's commitment to achieving an 80 per cent diversion of solid waste from landfill by 2030. Given that half of all waste moving through the municipal waste stream is organic waste, readers can appreciate the power of connecting urban organic waste to a reinvigorated practice of farming in the region.

Above all we have stressed that thinking like a commoner involves people in a different way of *knowing* waste. All too often, the dominant approach to circularity founders on the difficulties of profitably economising waste. That waste materials are expensive to sort, process, or redeem, and that these practices depend on skills that are currently not widely valued, means that we are measuring these costs against the cheapness of simply abnegating our responsibility for those materials with which we share a common world. Against a dominant conception of circular economy that measures the costs of landfill against the costs of alternatives – where costs are again narrowly defined – this experiment in commoning links waste-generating organisations, those capable of hauling it away, and those who could enrol it into a regenerative farming practice. In so doing, it offers a new context for reinventing our relationship with waste, new possibilities for livelihood, and for meeting our collective responsibility. This process of commoning requires new ways of setting rules, as Ostrom insists, but also new ways of measuring and knowing waste alongside a different sense of how we connect to the world and one another.

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