UTS UNIVERSITY OF TECHNOLOGY SYDNEY

Tending to scalar ambiguity

by Ella Farley

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under the supervision of Penelope Allan and Saskia Schut

University of Technology Sydney
Faculty of DAB. School of Architecture

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I, Ella Farley, declare that this thesis, is submitted in fulfilment of the requirements for the award of *Master of Architecture (Research)* in the *DAB School of Architecture* at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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ABSTRACT

As landscape architecture increasingly engages with digital technology in all aspects of design, there is a risk of overlooking the speed, distance, simplifications and finality of technological solutionism[1]. Such tendencies of solutionism do not lend themselves to alternative and varied understandings of more-than-human landscapes, and this is particularly concerning in the initial stages of site analysis, which provide an important foundation for design.

To explore slower, direct and open-ended landscape architectural methods of site analysis and documentation, this research *tends to* the present ecology within a small-scale, suburban landscape. A conceptual framework of *fungi* provides a point of contrast to one's experience of site, embracing complex, entangled and multi-scalar ways of knowing and rhizomorphic connectivity. The method of *gardening* holds space for a close, iterative and collaborative relationship with site, while *storytelling* is embraced as a sensemaking tool that can hold multiple scales, relationships, and ways of knowing together.

Considered for how they prompt a continual return to site, these methods allow time and space for intricate ecologies and different understandings of site to emerge, inviting landscape architects to tend to the ambiguity, nuance and scalar complexity of landscapes.

Key words

fungi
mycelium
gardening
storytelling
scalar ambiguity
connectivity

1 Solutionism is a term popularised by writer Evgeny Morozov.
Morozov, Evgeny. To Save Everything, Click Here: Technology, Solutionism and the Urge to Fix Problems That Don't Exist. London, England: Allen Lane an imprint of Penguin Books, 2013.

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PROLOGUE

This thesis was undertaken in 2020. The year began with extensive and devastating fires in Australia which burned nearly 13 million hectares of land and killed over 1 billion animals[2]. As the east coast of Australia burned, smoke spread around the globe causing severe air quality issues in New Zealand and hazy skies across South America. [3] On a global scale, however, 2020 will likely be remembered for the covid-19 pandemic that threw the world into upheaval, with health authorities asking communities to refrain from travelling to keep those near and far from harm.

In this sense, both crises highlighted how the impacts of an event manifest in a multitude of ways across landscapes and scales, from the microscopic to the global[4] and everything in between. Marked by a sense of vulnerability and uncertainty, these events asked us to reflect on how our daily movements, choices and practices feed into the health of an intricately connected ecology that is currently speeding, due to human activity, towards environmental destruction.

As a result of the home becoming the main place of work and study, my initial research revolved around a backyard in a share house I moved into the week before the initial lockdown period in April 2020. I saw this site as a testing ground for how to draw, how to garden, how to notice and attend with a particular focus on the curious nature of fungi. However, as most gardens do, it became a space of joy, laughter, tears, reprieve, calm, curiosity and wonder. This small-scale urban site has now become the basis for my research project - a place to observe and enquire. I hope that by practicing curious concern for the landscapes, plants, animals and microorganisms a short step from my back door, I will invite care into my movements across the "planetary garden"[5], including the development of a landscape practice of tending.

2 "The Size of Australia's Bushfire Crisis Captured in Five Big Numbers." ABC Science, Updated 5 March March, 2020, https://www.abc.net.au/news/science/2020-03-05/bushfire-crisis-five-big-numbers/12007716.
3 "Australia Fires: Smoke to Make 'Full Circuit' around Globe, Nasa Says." BBC News, 2020, 2020, https://www.bbc.com/news/world-australia-51101049.
4 The impacts of microscopic virus can be attributed as a key factor in many landscape changes. From clearer skies and waterways and short-term falls in carbon emissions to an increase in illegal firewood collection (India) or deforestation (Brazil) and an increase in plastic pollution. Diseases like covid-19 are also more likely due to rising temperatures and deforestation.
"Could Covid Lockdown Have Helped Save the Planet?" The Guardian, 2020, accessed March 29, 2021, https://www.theguardian.com/world/2020/dec/29/could-covid-lockdown-have-helped-save-the-planet.
5 Clément, Gilles, Sandra Morris, and Gilles A. Tiberghien. *The Planetary Garden : And Other Writings*. Penn Studies in Landscape Architecture. Philadelphia: University of Pennsylvania Press, 2015.

Contents

1. INTRODUCTION

> *"We humans, too, can be saying yes. There is a fantastically large set of contexts within which to say yes, but to stay with the flying foxes, it is clear that to celebrate the lives of flying foxes is to say yes to Eucalypts and thus to say yes to dry sclerophyll woodlands and to rainforests. It is to say yes to photosynthesis and to say yes to oxygen. Why would one not? We breathe in, we breathe out. In this world of connectivity, we live to celebrate another day and to experience life's shimmer as it comes forth in our lives with all manner of tears, happiness, grief, commitment, love, exuberance, and celebration. Of course, we humans are a part of it."*[6]
>
> Deborah Bird Rose

Tending; gardening and storytelling with fungi

Landscape architecture always sits within more-than-human world-making. Our predominant medium – plants - are living and entangled within nuanced ecologies. This interconnectedness is foregrounded when you consider that 80-90% of these plants have mycorrhizal partners[7]. In these relationships, fungal hyphae of mycelium networks are in contact with the plant roots and work in symbiosis to exchange nutrients, increase resilience and communicate between species. Forming a vast rhizomorphic network of microscopic threads under the surface, mycorrhizal fungi are omnipresent yet largely unseen. Despite being vital to plant life, soil structure and the global ecology, fungi tend to be overlooked in most landscape design projects, in the same way that many non-human (and human) voices are.

Fungi are under-represented in ecology and landscape architecture and remain largely unmapped in Australia for several reasons. The mushroom – which many understand to be fungi – is actually the fruiting body, existing for short and sporadic periods of time. Certain species produce these spore-bodies anywhere from every year to every decade, while some never do[8]. In Australia, even the species that do produce fruiting bodies often do so below the surface (truffles) due to climatic conditions[9]. Often existing in symbiosis with bacteria, algae, cyanobacteria, plants and animals[10], their existence is intertwined with other organisms. In this regard fungi may be evident through woody galls, the presence of certain plants and animals or the decomposition of organic material. With identification and classification founded on observable morphology, fungi's tendency to change form, exist in multi-species relationships at a microscopic scale, under or within, means they are hard to document and can evade categorisation. The gaps in this understanding of fungi filters into their underrepresentation in global and Australian biodiversity protection, which Fungimap, a citizen scientist database, attributes to the way "conservation programs tend to focus on species recovery and rarely recognise the interrelationships of plants, animals and fungi" [11].

Similar sentiments around the impact of reductive approaches are echoed in the discourse around solutionist tendencies within landscape architecture. The concept of solutionism was introduced by writer Evgeny Morozov in 2013, as "an intellectual pathology" that identifies problems based on whether they are "'solvable' with a nice and clean technological solution."[12]. In critique of such problem-solving in the digital age, Morozov notes that when we look to technology to resolve imperfection and secure efficiency, other avenues of process are

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6 Rose, Deborah Bird. "Shimmer: When All You Love Is Being Trashed." 51-. University of Minnesota Press, 2017, pg. 60.
7 "Mycorrhizas." Fungi, Australian National Botanic Gardens and Australian National Herbarium, Updated 2013, 2012, 2020, https://www.anbg.gov.au/fungi/mycorrhiza.html.
8 Antonelli, Alexandre, C. Fry, Rhian Smith, M. Simmonds, P. Kersey, Hugh Pritchard, M. Abbo, et al. State of the World's Plants and Fungi 2020. Royal Botanic Gardens, Kew. 2020. doi:10.34885/172.
9 Pouliot, Alison. *The Allure of Fungi*. Edited by Anne Findlay. Clayton South, VIC, Australia: CSIRO Publishing, 2018.
10 Tsing, Anna Lowenhaupt. The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins. Princeton: Princeton University Press, 2015.
11 "How Well Are They Conserved?" fungimap, 2020, https://fungimap.org.au/about-fungi/how-well-are-they-conserved/.
12 Morozov, Evgeny, "The Perils of Perfection." The New York Times, 2013, 2020, https://www.nytimes.com/2013/03/03/opinion/sunday/the-perils-of-perfection.html.

Figure opposite: mushroom fruiting after rain at local oval 21/02/21

shut off.[13] Driven by the notions of optimisation, a reliance on digital technologies can increase the distance, speed and simplification with which dilemmas are approached. In *The problem with solutions*[14], landscape architect Rob Holmes describes how within the design of landscapes and infrastructure "solutionism short-circuits" the framing of a problem and can oversimplify or overlook intricate relationships between landscapes and ecological, social, political and culture dynamics. Landscape architect, Katherine Jenkins also notes that a deference to digital technology coincides with "a retreat from the physical landscape during the design phase" and how this "detached approach is further problematic because of its tendency to fix a landscape in the particular moment when it was first documented."[15] If this detachment is present during the initial stages of site analysis, the foundations for design are built upon static, distanced and prescriptive understandings of the visibly available aspects of site. Furthermore, anthropology professor, Shannon Mattern, observes that while convenience and proximity mean technological techniques can result in cheaper, faster and less demanding site analysis, these methods lend themselves to data that is easily represented and visually appealing[16]. Characteristics that fungi seem to elude.

I acknowledge the significant contributions of digital tools and my own use of mapping, CAD and graphic software; however, I am concerned with what is lost in the increasingly automated methods of site analysis and modelling. With those overlooked, such as fungi, tending to sit outside or between definitive labels and clear linear narratives, the solutionism fostered in the increasing use of digital technology, within and beyond landscape architecture, only further excludes voices (human and non-human) already underrepresented. Current mainstream practices of site analysis, such as GIS mapping and CAD documentation, are literally and figuratively distanced from the landscape. This site analysis and documentation often works at very set static scales in which a single objective or thematic takes centre stage and can struggle to hold onto the nuanced details of site-specific networks. Frequently based on government datasets or aerial photography, a hierarchy of information sets out what perspectives are considered important and there is a danger of prioritizing and repeating a human centric, linear narrative based on what has previously been mapped. Despite our existence in the scale of geological time being very minimal, the human continues to dominate discussion, authorship and design outcomes. At the same time, the speed, distance, simplification and finality of predominantly digital methods of site analysis can make it even more difficult to look beyond the already prevailing narratives of site and say yes to the knottiness of more-than-human landscapes. As omnipresent yet invisible, subterranean, microscopic unmakers, fungi invite different ways of observing.

13 Tucker, Ian. "Evgeny Morozov: 'We Are Abandoning All the Checks and Balances'." The Observer: Technology. (10 March 2013 2013). https://www.theguardian.com/technology/2013/mar/09/evgeny-morozov-technology-solutionism-interview.
14 Holmes, Rob. July 2020. "The Problem with Solutions." Places Journal.
15 Jenkins, Katherine. 2018. "Field exercises." Journal of Landscape Architecture 13 (1): 6-21, pg. 6. https://doi.org/10.1080/18626033.2018.1476024. https://doi.org/10.1080/18626033.2018.1476024.
16 Mattern, Shannon. November 2013. Methodolatry and the Art of Measure. https://doi.org/https://doi.org/10.22269/131105.

"To inhabit a space of attending to things is to incite attention to co-existing forms of composition, habituation, performance, and event and to the "weak" ontologies of lived collective fictions." [17]

Kathleen Stewart

Tending is one way of observing differently. *Attend* is defined as to be present, to deal with, to escort and wait on while *to tend* is to care for or look after; give one's attention. This research aims to add to the dialogue within the discourse around alternative methods by exploring fungi as a conceptual framework and gardening and storytelling as methods of site analysis that can embrace the complexity, dynamism, nuance and even ambiguity of landscapes by prompting slower, direct and curious attention to site. And how, in opposition to solutionism, these methods might sit within a broader framework of tending to landscape.

Fungi are centered as a way to shift my own perspective and provide a continual source of comparison and contrast in understanding the site. As a result, fungi as a metaphor becomes the central conceptual framework. This methodology is used to permeate habitual patterns of thinking within mainstream landscape practice and foreground three main concerns. The first is the recognition of alternate ways of knowing beyond Western scientific frameworks, to consider other temporal, spatial and relational experiences of landscape. The second is the notion of *scalar ambiguity*, a term introduced by ecologist, photographer, and writer Alison Pouliot[18] to express how mycelium (a fungus colony) has "no characteristic scale above that of an individual hypha" and"can potentially exist indefinitely"[19]. In addition, the scales through which humans interact with fungi shift with intent – mycologists primarily at the microscopic scale, foragers at the scale of the forest and conservationists at the scale of the habitat.[20] By prompting humans to think between scales, fungi start to permeate the constrained scales of landscape architecture. The third focus is connectivity, such as the rhizomorphic networks of mycelium, that resist hierarchical narratives and singular paths of enquiry. The form of these networks lean away from a top-down approach of site analysis and documentation. These concepts are unpacked further in the sub-chapter *2.1 Fungi as metaphor.*

In this research, *gardening* is explored as an alternative to the traditional processes of site analysis. Gardening becomes the means to a direct and enduring practice with the site at the scale of my own body. In contrast to a distanced mapping of schematics, gardening is built upon a close noticing, forming a dialogue with the dynamic ecology of the garden. This gardening practice draws on the work of gardener[21], botanist and writer, Gilles Clement, who works '*with*' ecology "whenever possible, '*against*' as little as possible"[22].

The method of *storytelling* is used to gather the details, dynamics and relationships that emerge from approaching the site through both fungi and gardening. Drawing from *The Mushroom at the End of the World* by Anna Tsing and *The Carrier Bag Theory of Fiction* by Ursula Le Guin, this research is concerned with the stories that spring up when progress[23] or hero narratives[24] are put aside, to create space for diverse, entangled, open-ended understandings of site.

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17 Stewart, Kathleen. "Weak Theory in an Unfinished World." *Journal of folklore research* 45, no. 1 (2008): pg. 73. https://doi.org/10.2979/JFR.2008.45.1.71.
18 Pouliot, *The Allure of Fungi*, 2018.
19 Ruth, E. Falconer, L. Bown James, A. White Nia, and W. Crawford John. "Biomass Recycling and the Origin of Phenotype in Fungal Mycelia." *Proceedings of the Royal Society. B, Biological sciences* 272, no. 1573 (2005): 1727-34, Introduction. https://doi.org/10.1098/rspb.2005.3150.
20 Pouliot, Alison. "Thinking, Un-Thinking, Re-Thinking Fungi." Wildlife Australia 56, no. 1 (2019): 2-6.
21 Clement prefers the title of gardener to landscape architect. "Groundbreaker: Gilles Clement." Garden Design, 2020, https://www.gardendesign.com/designers/gilles-clement.html.
22 Clément, Gilles, Sandra Morris, and Gilles A. Tiberghien. *The Planetary Garden : And Other Writings.* Penn Studies in Landscape Architecture. Philadelphia: University of Pennsylvania Press, 2015, pg. 45.
23 Tsing, Anna Lowenhaupt. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins.* Princeton: Princeton University Press, 2015.
24 Le Guin, Ursula K. "The Carrier Bag Theory of Fiction." In *Dancing at the Edge of the World*: Grove Press, 1986.

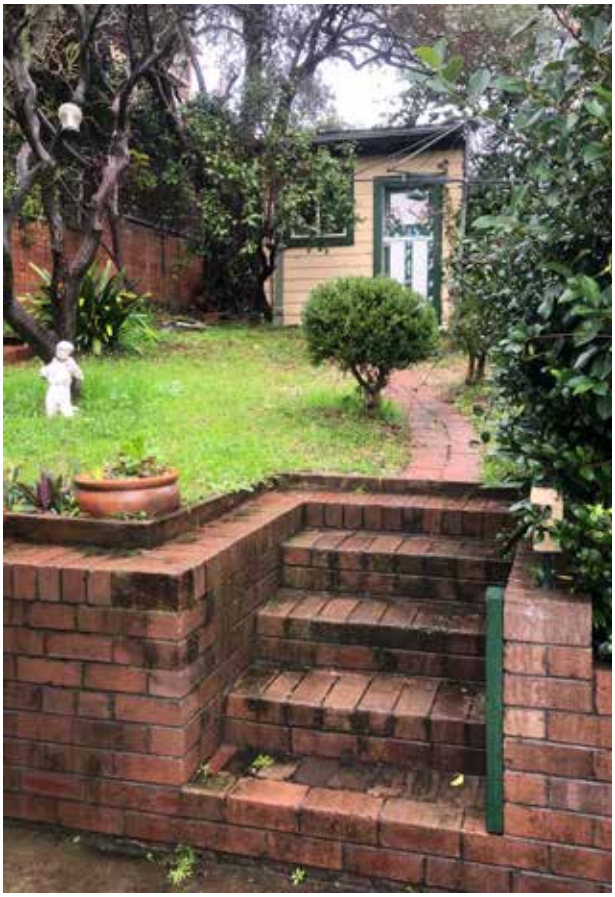
Informed by Le Guin's container format,storytelling is embraced as a sensemaking tool[25] and a bridge between multiple ways of knowing, able to span between different temporal and spatial scales. Drawn and written storytelling is used to both recount what is happening in the garden and draw out broader entanglements and enquiries, documenting many different but connected stories that are rhizomorphic in structure.

While gardening and storytelling are well established in the discipline of landscape architecture, both seem to be sidelined by digital practices that speed towards finite outcomes. Chapter *2. Literature and precedent review* discusses the context of these practices when embraced within a slower, small-scale landscape practice. Chapter 3 states the research questions, aims and objectives. Chapter *4. Methodology and method* also includes a precedent and literature review, however this is in regard to the specific methods explored to garden, draw, write and hold stories. Chapter *5. My work*, documents how these methods played out over the course of this year. The subsequent discussion unpacks how these methods of tending create space in a practice for the ambiguity, nuance and scalar complexity of landscapes.

The site for this research is the suburban garden of a rental property where I live in the eastern suburbs, Sydney. This is the land of the Bidjigal and Gadigal peoples of the Eora nation. Once swamps and heath vegetation[26] this area is now highly developed. The most likely future for this 1-storey house and garden is demolition and the construction of high-rise apartments like those surrounding. A familiar story around Australia, suburban lot sizes are decreasing, yet house footprints continue to increase at the expense of yards and gardens[27]. While not a substitute for quality public green space[28], suburban gardens do contribute to the connectivity of larger ecological networks. Often highly disturbed and manipulated, the ways in which they flourish provide hope for the adaptability of novel ecosystems in continually degraded environments. In addition, suburban gardens do not "function programmatically in the same way architecture does"[29]. Ambiguous in function, gardens hold the marks of many previous and current inhabitants - human and other - and are ultimately passed on. Despite being tied up in the politics of land ownership, these spaces are fundamentally shared over time. Their small scale and cycles of inhabitance provide interesting design questions about how to work with the continual state of flux and uncertain futures of landscapes, while tending to the present.

25 Millerand, Florence, David Ribes, Karen S. Baker, and Geoffrey C. Bowker. "Making an Issue out of a Standard: Storytelling Practices in a Scientific Community." *Science, Technology, & Human Values* 38, no. 1 (2013): 7-43. https://doi.org/10.1177/0162243912437221.
26 "Randwick." Dictionary of Sydney, 2015, 2020, http://dictionaryofsydney.org/entry/randwick.
27 Hall, Tony. "Where Have All the Gardens Gone? An Investigation into the Disappearance of Back Yards in the Newer Australian Suburb." Urban Research Program, Griffith University, 2007.
28 Mahmoudi Farahani, Leila, Cecily Maller, and Kath Phelan. "Private Gardens as Urban Greenspaces: Can They Compensate for Poor Greenspace Access in Lower Socioeconomic Neighbourhoods?". Landscape Online 59, no. 0 (05/18 2018): 1-18. https://doi.org/10.3097/LO.201859. https://www.landscape-online.org/index.php/lo/article/view/LO.201859.
29 "The Dirt: Roderick Wylie." The Planthunter, 2019, 2020, https://theplanthunter.com.au/gardens/dirt-roderick-wyllie/.

Figure above: 1:2000 aerial of site N ↑



Figures above: The garden in May 2020

2. LITERATURE & PRECEDENT REVIEW

2.1 Fungi as metaphor

My interest in fungi arose out of my final studio for the B.L.A. UTS 2019. The brief explored vitality in a hyper dense urban environment of the future. My approach began to explore the role of fungi in ecosystem health and how to design for, instead of against, decay. The ground plane of the city was broken apart and native fungi transplanted into the streetscape. Leaf litter was allowed to accumulate on the urban forest floor and fungi became a gateway species for insects, birds and more diverse plant communities. Through this project I found that the nature of fungi to exist in symbiosis, both mutualist and other, meant a range of other non-humans emerged and the site analysis ever-so-slightly resisted the singular human dominant narrative. Instead, the site analysis highlighted how multiple authors were working in collaboration. In trying to understand how fungi inhabited and co-created the landscape I began to think about the site through different terms and dynamics - particularly in regard to relationships and scales of time and space. Building upon this, fungi became a lens to approach this research project and are used as a model for alternative ways of knowing, scalar ambiguity[30] and connectivity.

Ways of knowing

> *"The world she lives in is not mine. Life is faster for her; time runs slower. Her eyes can follow the wingbeats of a bee as easily as ours follow the wingbeats of a bird. What is she seeing? I wonder, and my brain does backflips trying to imagine it, because I can't."*[31]
>
> *Helen Macdonald.*

Birds have four receptor-sensitivities where humans have three. As a result, they see ultraviolet. In addition to this, and while it varies between species, the typical avian visual speed is 120 frames per second while the typical human visual speed is 40.[32]. Not only do birds experience space and time differently to others but this understanding of the world extends beyond what is visible to humans (figure 1 & 2). In a similar way to goshawk of Macdonald's attention, fungi provide a contrasting understanding of landscapes. While fungi take on many roles in this research, the first is to offer an alternative to my own way of approaching and experiencing a suburban garden.

Figure 1: 40 frames per second

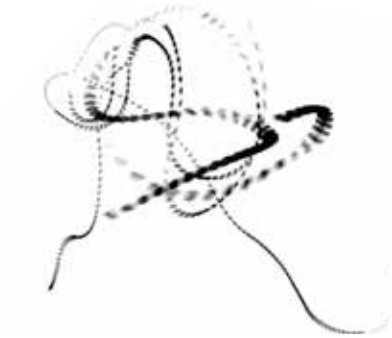


Figure 2: 120 frames per second

30 Pouliot, *The Allure of Fungi*, 2018.
31 Macdonald, Helen. *H Is for Hawk*. London: Jonathan Cape, 2014, pg. 98.
32 Boström, Jannika, Marina Dimitrova, Cindy Canton, Olle Håstad, Anna Qvarnström, and Anders Ödeen. "Ultra-Rapid Vision in Birds."11(3): e0151099. (2016). https://doi.org/https://doi.org/10.1371/journal.pone.0151099.

Figure opposite: mushrooms fruiting from log stacks in the garden (30/05/21). The mycelium was propgated from oyster mushrooms.
Figure 1 & 2: Sourced from Boström JE, Dimitrova M, Canton C, Håstad O, Qvarnström A, et al. (2016) Ultra-Rapid Vision in Birds. PLOS ONE 11(3): e0151099. https://doi.org/10.1371/journal.pone.0151099

Integral to the evolution of all terrestrial flora and fauna "fungi operate on slow timescales in invisible realms."[33] Fungi register deep time and slow time beyond human experience, their existence stretching back 1 billion years at the very least[34]. Additionally, the spores of all fungi, except for sterile species can enter a dormant phase until climatic conditions are more favourable. During this dormancy metabolism is reduced by approximately 50%[35]. In contrast to the goshawk, life is slow, and time runs fast.

Mycelium, theoretically capable of indefinite growth can also inhabit multiple places at once. More prone to disturbance the further they expand; fragmented parts of the original mycelium can continue growing independently despite no longer being physically connected. As the parts are still genetically identical, they are considered one individual and have the potential to fuse again at a later stage.[36] The same result is achieved through budding or fission[37] where cells from the fungus divide and split, forming new, genetically identical fungi that can then break off and grow on their own. This allows the fungus to reproduce more quickly than sexual reproduction alone.

Consider, for example, the experience of *Cyttaria septentrionalis* (C.S). C.S is a fungus that you might encounter if you took a walk in the Barrington Tops National Park. C.S. is an orange and white-coloured fungi native to Australia which usually appears in early spring, as a weak parasite in the canopy of the Antarctic beech trees (*Nothofagus moorei*).[38] The hyphae of C.S. are fine microscopic threads and the mushroom smaller than a golf ball, while the host Antarctic beech can reach heights of over 30m and diameters of 4m[39]. As C.S. disperses through fission and inhabits multiple places in separate forms simultaneously, can a fragmented C.S. be both old and young, growing and dying? What does this mean for how C.S. inhabits the forest landscape and the trees? How do we (as humans) comprehend and acknowledge the age and experience of this individual fungi moving along multiple trajectories at once? And in approaching these questions does a purely western understanding of time and place suffice in a discipline that designs with non-humans?

Linguist, Lynn Mario Menezes de Souza, explains how the western concept of time is linear and causal, independent from social, political, moral and daily practices[40], based on the research of Joanna Overing[41]. What has happened in the past precedes the present. This view of time as linear, progressive and cumulative - so that what comes later may be qualitatively better - has also led to continuous and unsustainable development . Mainstream landscape architecture functions primarily within this framework, with a process of data collection, concept design, construction and sign-off. This finite linear narrative does not encourage long-term participation or accountability on behalf of the designer. This understanding of time within landscape architecture can also be seen in the static nature of the planting plan. Landscape architect, Julian Raxworthy states "the predictive model of growth used in the planting plan, which aims for a fixed-future mature condition, denies the very thing that makes such an idea unique: growth."[42] These plans specify the location of a plant at a very particular point in its growth based on generic dimensions and linear stability. In reality, a plant's growth will ebb and flow with the season, the climate, the soil, the surrounding ecology and human intervention (pruning, fertilizing, hedging etc), never reaching a fixed state. Working with an expanded understanding of time could invite practice to work with the many iterations and transformations of a site, as it moves towards and then beyond the predictions of the plan.

33 Pouliot, *The Allure of Fungi*, 2018, pg.5-6.
34 Redfern, Jerry. "Earliest Fungus-Like Fossils Discovered in 2.4 Billion-Year-Old South African Bedrock." seeker, 2017, 2019, https://www.seeker.com/earth/earliest-fungus-like-fossils-discovered-in-24-billion-year-old-south-african-bedrock.
35 Moore, David. "4.2 Spore Germination and Dormancy." 21st Century Guidebook to Fungi, SECOND EDITION, 2019, accessed 18 May, 2020.
36 "The Mycelium." Fungi, Australian National Botanic Gardens and Australian National Herbarium, 2012, accessed 01 September 2020, https://www.anbg.gov.au/fungi/mycelium.html.
37 "Characteristics of Fungi." Boundless Biology, lumen, 2020, https://courses.lumenlearning.com/boundless-biology/chapter/characteristics-of-fungi/.
38 "Cyttaria Septentrionalis." *The IUCN Red List of Threatened Species*, IUCN Red List, 2019, 2020, https://www.iucnredlist.org/species/154440031/185718313.
39 "Nothofagus Moorei." National Trusts of Australia, 2019, 2020, https://trusttrees.org.au/tree/QLD/Springbrook/Repeater_Station_Road.
40 Menezes de Souza, Lynn Mario T. "The Ecology of Writing among the Kashinawá: Indigenous Multimodality in Brazil." In Reclaiming the Local in Language Policy and Practice, edited by A. Suresh Canagarajah, 73-96: Taylor & Francis Group, 2004.
41 Overing, Joanna. O Mito Como Historia: Um Problema De Tempo, Realidade E Outras Questoes [Myth as History: A Problem of Time, Reality, and Other Issues]. Mana, 7(1), 107-140. (1995).
42 Raxworthy, Julian. "Overgrown : Practices between Landscape Architecture and Gardening." (2018), pg. 128.

In addition to expanded understandings of time, how would landscape architecture benefit from acknowledging diversity in pace? Robin Wall Kimmerer is scientist, professor and member of the Citizen Potawatomi Nation who highlights the need to lose the idea of the human pace as the only pace and acknowledge the conversations taking place around us across a multitude of scales[43]. In *Gathering Moss* Kimmerer writes:

> *"The rocks are beyond slow, beyond strong, and yet, yielding to a soft, green breath as powerful as a glacier, the mosses wearing away their surfaces grain by grain, bringing them slowly back to sand. There is an ancient conversation going on between mosses and rocks, poetry to be sure. About light and shadow and the drift of continents."*[44]

The conversations of the suburban garden in this research includes those between birds who speed through time, plants that grow in pulses and seasons, and fungi, like C.S., that delve in and out of slow time in response to the landscape conditions. In recognising that landscape architecture deals with the meeting of many understandings, experiences and paces what does it look like when these velocities pass, collide or interweave? And as these paces and scales open up a landscape practice, what methods can we, landscape architects, use to prevent the continued privileging of one perspective (human) over others in landscape design?

Galls - *Cyttaria darwinii* (Darwin's Fungus), F. J. Rodriguez, Bahía Wulaia, Tierra del Fuego, Chile November 29, 2015

Nothofagus moorei Borders National Park NSW Dec 30, 2010 by unknown

43 Tippett, Krista., and Robin Wall. Kimmerer. *The Intelligence in All Kinds of Life* Podcast audio. On Being 2019.
44 Kimmerer, Robin Wall. *Gathering Moss: A Natural and Cultural History of Mosses*. US: Oregon State University, 2003.

Top figure: Moss gathers in the garden where water pools in the indents of brick paths and walls.

Figure: Drawing set from B.L.A. UTS 2019 final studio submission. Although this proposal centred fungi, the drawings produced were still very much grounded in human-centric perspectives and struggled to convey the complexitity of mycelium.

Malurus cyaneus
Superb Fairy-wren found in urban gardens with dense, low shrubbery.

Psophodes olivaceus
Eastern Whipbird forages for insects on the leaf-littered forest floor.

Pycnoporus coccineus
Native saprophytic fungi are introduced to the site to start the soil creation process

Cortinarius archeri
Native mycorhizal fungi are transplanted to build up the underground network

Peziza whitei
A truffle-like fungi endemic to Australia.

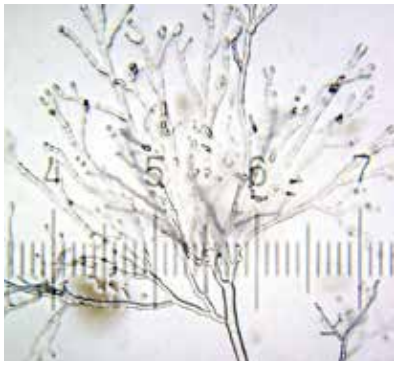
Scalar ambiguity of the planetary gardener

> *"Landscapes and the ecological processes they support are inherently complex systems, in that they have large numbers of heterogeneous components that interact in multiple ways, and exhibit scale dependence, non-linear dynamics, and emergent properties."*[45]
> *Therefore "no single scale is adequate for analyzing, understanding and/or facilitating effective, efficient and equitable sustainable landscapes."*[46]

In their article *Curious methods*[47], landscape architects Karen Lutsky and Sean Burkholder regard "all landscapes as dynamic territories influenced by natural and anthropogenic systems across multiple time and spatial scales."[48] As no singular scale suffices, they advocate for modes of working with the ability to continually change focus and speculate on that which is beyond our capacity to grasp. Fungi does just that, drawing attention to dynamics at the microscopic, the body, the local, the urban, the planetary.

Scalar ambiguity is a term used by Pouliot to describe the way in which fungus spores are omnipresent in air, water and human bodies while fungal mycelia pervade soils. The spore bodies can be held in our hands but "mycelium is almost always unseen without magnification."[49] A mycelium may be minute, forming a colony that is too small to see, or may grow to span thousands of acres. For example the largest known organism in the world (of the species *Armillaria solidipes* - previously known as *Armillaria ostoyae*) is a parasitic fungi that covers more than 8.8 km^2 in Oregon's Malheur National Forest, USA and is more than 2,400 years old[50]. Often overlooked and unmonitored, fungi are capable of vast devastation of forests and crops but also manipulate nutrient uptake of plants and underpin soil structure.

Mycorrhizal fungi form mutually beneficial relationships with plants, particularly trees. In 2016, research showed how a NASA-led team of scientists had found a way to detect this hidden network, by comparing satellite images of four U.S. forest research plots between 2008-2011.[51] Joshua Fisher who led the team explained that "individual tree species have unique spectral fingerprints, but we thought the underlying fungi could be controlling them as groups."[52] Key milestones throughout the growing season such as when "trees' leafed out in spring and when they



Microscopic view of a mycelium. Numbered ticks are 230 µm apart.
Image credit: Bob Blaylock, *Early growth of mold*, photographed 16 September 2010

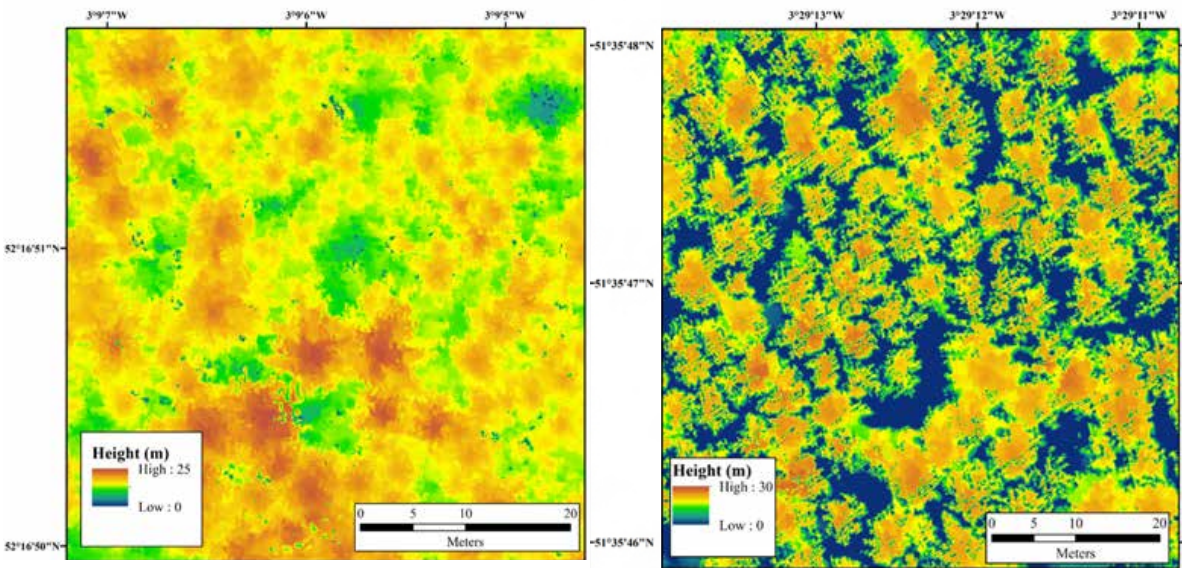
Armillaria solidipes fruiting bodies in Belgium
Image credit: Arterra Picture Library / Alamy

Dying conifer forest damaged by *Armillaria* in Siberia
Image credit: Igor Pavlov

45 Newman, Erica A., Maureen C. Kennedy, Donald A. Falk, and Donald McKenzie. "Scaling and Complexity in Landscape Ecology." [In English]. Review. *Frontiers in Ecology and Evolution 7*, no. 293 (2019-August-13 2019) pg. 1. https://doi.org/10.3389/fevo.2019.00293. https://www.frontiersin.org/article/10.3389/fevo.2019.00293.
46 Minang, Peter, Lalisa Duguma, Dieudonne Alemagi, and Meine Van Noordwijk. "Scale Considerations in Landscape Approaches." 121-33, 2015, pg. 121.
47 Lutsky, Karen., Sean Burkholder. "Curious Methods," *Places Journal*, May 2017. Accessed 2021. https://doi.org/10.22269/170523
48 Lutsky, Karen. "Curious Methods," *Places Journal*, 2017.
49 Pouliot, *The Allure of Fungi*, 2018, pg. 8.
50 "The Largest Living Thing on Earth Is a Humongous Fungi." BBC Earth, 2014, accessed 18 May 2020, http://www.bbc.com/earth/story/20141114-the-biggest-organism-in-the-world.
51 Rasmussen, Carol, "Nasa Satellite Images Uncover Underground Forest Fungi." NASA, 2016, accessed 18 May, 2020, https://www.nasa.gov/feature/jpl/nasa-satellite-images-uncover-underground-forest-fungi.
52 Rasmussen,"Nasa Satellite Images Uncover Underground Forest Fungi." NASA, 2016

reached peak greenness" differed in regions dominated by the two types of mycorrhizal fungi - ectomycorrhizal fungi (EM) and endomycorrhizal fungi (AM)[53]. From identifying the timing sequences related to each type of fungus, researchers developed a statistical model to predict the areas of fungus domination in any particular Landsat image from canopy changes alone (see lidar images below). AM and EM fungi are expected to respond differently to a changing climate so mappings of their distribution on a planetary scale are being used to predict areas in which forests may thrive or falter.[54] In this NASA study, the below-ground workings of minute hyphae bundled together in a mycelium network "manifest themselves in the changes in the forest canopies"[55] which is then documented through satellite imagery. The subterranean entanglements of fungi are mapped from space.

Working across scales is also expressed in Gilles Clements' concept of the "planetary garden". Instead of the garden being limited to the lots of individual ownership it becomes limited by the earth's biosphere. This new scale of the garden means the world is "entrusted to our care" with a feeling of collective responsibility that our actions have repercussions on the other side of the planet. Therefore, each one of us, in our daily activities, through our understanding of the world and transformation of it, however little, are in our own way, a "planetary gardener"[56]. This concept also encourages tending to smaller spaces. Tied into the workings of larger landscapes, the seemingly insignificant suburban backyard is acknowledged as part of a potentially extensive ecological network across the city.



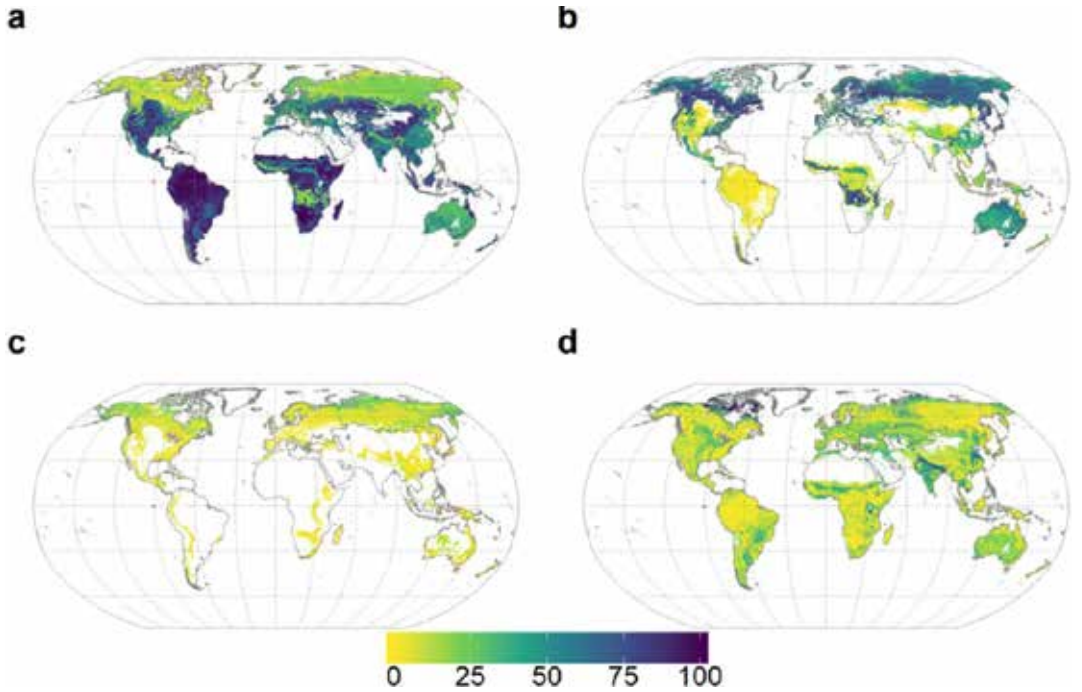
Lidar-scanned larches- not infected (left); infected (right). Image credit: Leicester University / Bluesky International Limited, 2017

53 The two main types are Ectomycorrhizal fungi (EM) which surround the roots without penetrating and Endomycorrhizal fungi (also known as arbuscular mycorrhizal fungi or AM) which grow within, rather than on, the plant root cells (penetrate the host root). "Mycorrhizas." Fungi, Australian National Botanic Gardens and Australian National Herbarium, Updated 2013, 2012, 2020, https://www.anbg.gov.au/fungi/mycorrhiza.html.

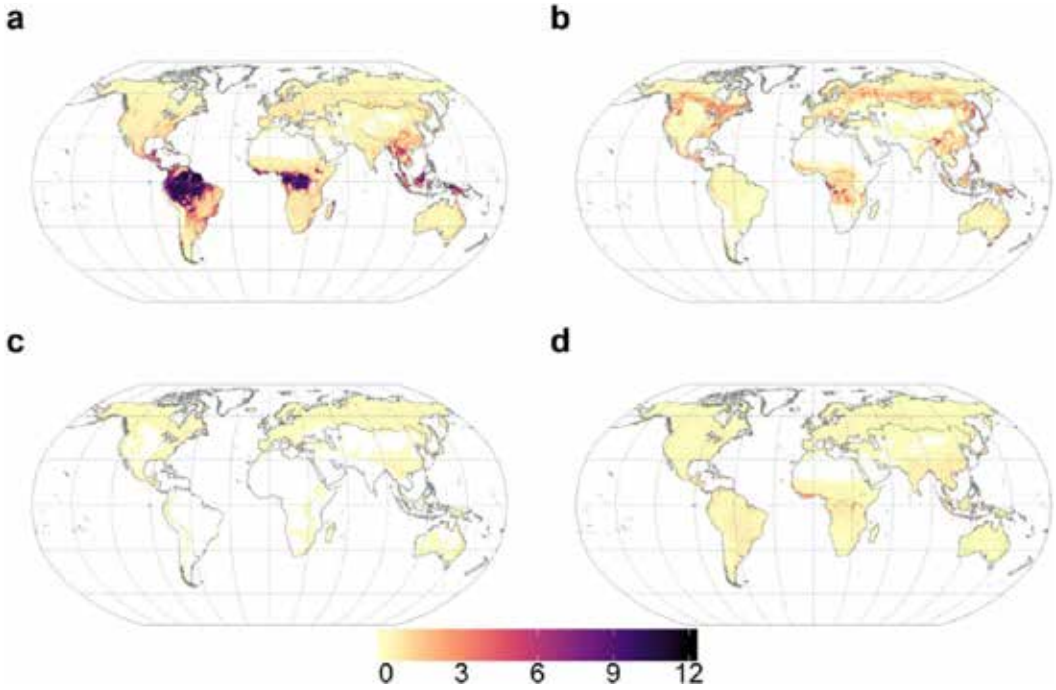
54 Rasmussen,"Nasa Satellite Images Uncover Underground Forest Fungi." NASA, 2016

55 Fisher, J. B., S. Sweeney, E. R. Brzostek, T. P. Evans, D. J. Johnson, J. A. Myers, N. A. Bourg, et al. "Tree-Mycorrhizal Associations Detected Remotely from Canopy Spectral Properties." [In eng]. Glob Chang Biol 22, no. 7 (Jul 2016): 2596-607. https://doi.org/10.1111/gcb.13264.

56 Clément, *The Planetary Garden*, 2015, pg. 9.



Percentage of aboveground plant biomass of: (a) arbuscular mycorrhizal plants, (b) ectomycorrhizal plants, (c) ericoid mycorrhizal plants, and (d) non-mycorrhizal plants. The map resolution is 10 arcmin.



Bottom sequence: Amount of carbon (Mt per grid cell of 15 arcmin) stored in plant biomass in vegetation of different mycorrhizal types: (a) arbuscular mycorrhizal plants, (b) ectomycorrhizal plants, (c) ericoid mycorrhizal plants, (d) non-mycorrhizal plants.

Image source - Soudzilovskaia, N.A., van Bodegom, P.M., Terrer, C. et al. Global mycorrhizal plant distribution linked to terrestrial carbon stocks. Nat Commun 10, 5077 (2019). https://doi.org/10.1038/s41467-019-13019-2

The details of connectivity

Back to C.S. The evolution of the genus *Cyttaria* parallels that of the host genus *Nothofagus*. Their interspecies relationship is intricate and enduring as these trees and fungi have shared their evolutionary development (cophylogeny). Unlike other *Cyttaria* species that have multiple host-parasite relationships, C.S. has a one-to-one relationship with their host[57], *Nothofagus moorei* (the Antarctic beech). C.S. hyphae from germinating spores invade the tissues of tender Antarctic beech new growth. The hyphae become intracellular[58] and release chemical signals that cause the tree to form a gnarled woody gall to sustain them, from which they sprout fruiting bodies annually. Following the distribution of their host, C.S. is restricted to mountain tops, from Queensland's southern border at Springbrook and Lamington to the Barrington Tops plateau in Northern New South Wales.[59] C.S. and the Antarctic beech experience the same land, climatic conditions and ecosystem dynamics, despite existing at vastly different scales. Deeply intertwined, the main threats to this species of fungi are those that also most impact the Antarctic beech. These threats include the warming climate and the increasing risk of fire such as the recent 2019/2020 fire disaster. Thought to have had a much wider distribution in the past, the Antarctic beech has retreated up the mountains where the conditions are cooler, and so too has C.S. Thought to have had a much wider distribution in the past, the Antarctic beech has retreated up the mountains where the conditions are cooler, and so too has C.S. C.S.'s assessment on the IUCN Global Fungal Red List notes that no other protections beyond that which safeguards their host is necessary[60]. The future of C.S. is entangled with that of the Antarctic beech and the mountains of the east coast of Australia. As a focus primarily on isolated parts or beings does not reflect the interconnected nature of ecology, this research is concerned with relationships and connection.

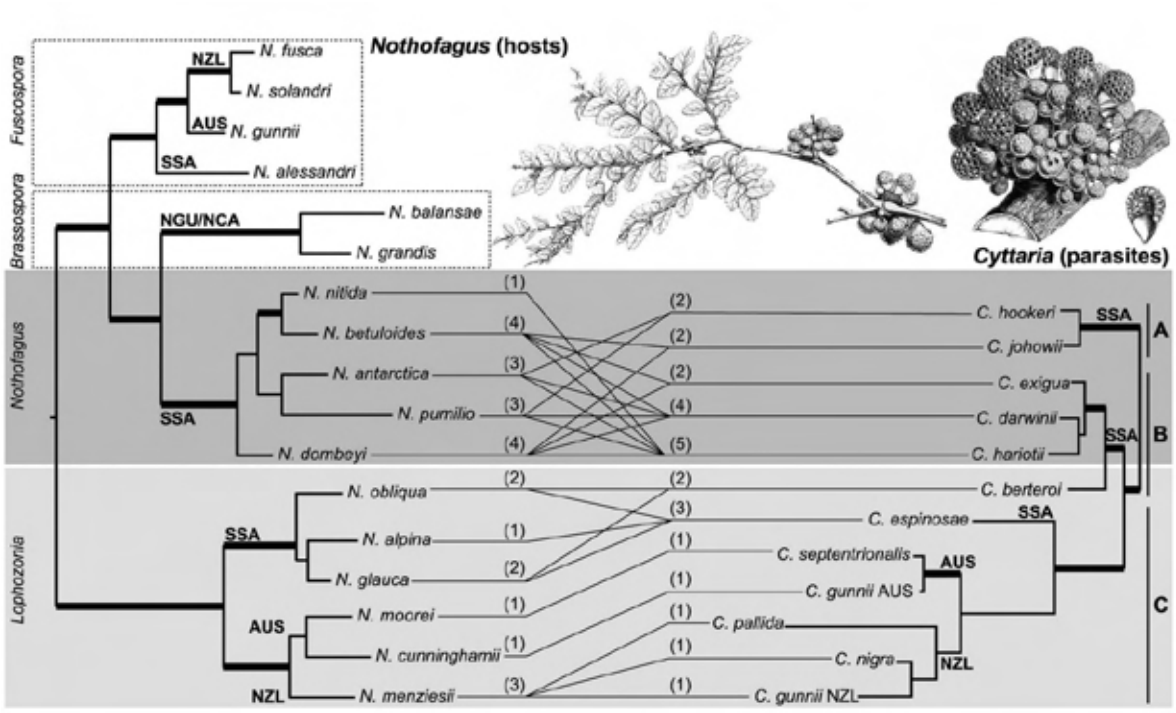


Image sourced from Peterson, K. R., D. H. Pfister, and C. D. Bell. "Cophylogeny and Biogeography of the Fungal Parasite Cyttaria and Its Host Nothofagus, Southern Beech." [In eng]. Mycologia 102, no. 6 (Nov-Dec 2010): 1417-25. https://doi.org/10.3852/10-048. Originally from Peterson KR, Pfister DH. 2010. Phylogeny of Cyttaria inferred from nuclear and mitochondrial sequence and morphological data. Mycologia 102:1398–1416.

57 Peterson, K. R., D. H. Pfister, and C. D. Bell. "Cophylogeny and Biogeography of the Fungal Parasite Cyttaria and Its Host Nothofagus, Southern Beech." [In eng]. Mycologia 102, no. 6 (Nov-Dec 2010): 1417-25. https://doi.org/10.3852/10-048.
58 Rawlings, G.B. "Australasian Cyttariaceae ". Transactions and proceedings of the Royal Society of New Zealand Volume 84 (1956-57, 1956): 19-27. https://paperspast.natlib.govt.nz/periodicals/transactions-and-proceedings-of-the-royal-society-of-new-zealand/1956/00/00/-84.
59 Leonard, P.L. 2019. *Cyttaria septentrionalis* (errata version published in 2020). The IUCN Red List of Threatened Species 2019: e.T154440031A185718313. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T154440031A185718313.en.
60 Leonard, P.L. *Cyttaria septentrionalis,* 2019.

In *Learning the Grammar of Animacy,*[61] Kimmerer sets out how the structure of Potawatomi (an Anishinaabe dialect), reflects the relationship between land and people founded on respect. In English, non-human beings are commonly referred to as "it". In contrast, Potawatomi assigns different verb forms, plurals and endings, based on whether that being spoken of is alive. This animacy extends to that not made by humans, including rocks, mountains, fire, water and places. Kimmerer notes that lack of animacy enables exploitation of landscapes.

> *"Saying "It" makes a living land into "natural resources." If maple is an "it," we can take up the chainsaw. If maple is "she," we have to think twice."*[62]

This formatting provides subtle but profound shifts to work around the hierarchies within English language structures. Such as those employed by the biologist, whose "language shifted to accommodate her relationships", using "someone, not something" in reference to moose and deerfly's alike.[63] How then does this grammar of animacy shift landscape architecture? If plants, waterways and soil were acknowledged within mainstream practice as living, would site analysis be a mapping of relationships instead of thematics? The transcribing of a dialogue across the animate world of a site?

By approaching a landscape through relationships, Australian ethnographer, Deborah Bird Rose addressed the limitations of thinking purely within ecological science. In her book Wild Dog Dreaming, Rose instead offered multiple ways of considering connectivity. These are:

> *"(1) …… exchange pathways (for energy, information, living things); the greater the number and complexity of pathways, the greater the biodiversity;*
> *(2) more widely, exchange pathways may include stories, songs, forms of address;*
> *(3) at the foundation—the bonds that sustain the life system of Earth."*[64]

Literally forming networks of exchange paths ways between plants - within and across species – mycorrhizal fungi embody connectivity. Considering this and the many other ways in which they form relationships within the landscape, fungi can provide a model for thinking about connectivity across a range of scales.

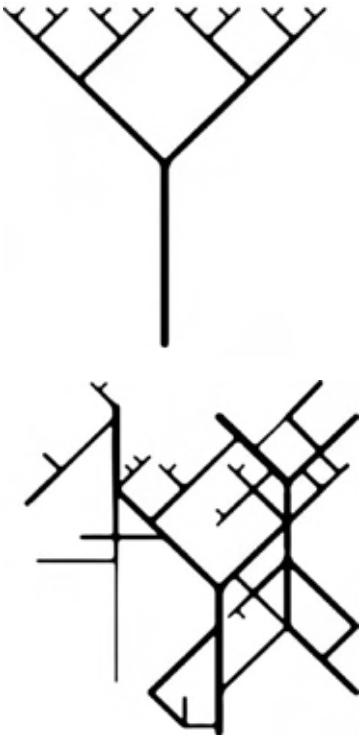


Figure above: Diagram of arborescent structure in elevation (above) and rhizomatic growth in top view (below) by Meitar Keshet. Sourced from Keshet, Meitar, "Think Like Fungus," Beyond Architecture, September, 2019, August 13.

61 Kimmerer, Robin Wall. "Learning the Grammar of Animacy." *Anthropology of consciousness 28*, no. 2 (2017): 128. https://doi.org/10.1111/anoc.12081.
62 Kimmerer, "Learning the Grammar of Animacy." 2017, pg. 9.
63 Kimmerer, "Learning the Grammar of Animacy." 2017, pg. 8.
64 Rose, Deborah Bird. "Wild Dog Dreaming : Love and Extinction." 2011, pg. 21.

One mode of fungal connectivity is the rhizomorph (rhizome-like). When growing in or on a surface, mycelium can appear as loose cottony threads[65]. When interwoven as bundles, an aggregation of hyphal threads form rhizomorphs. Resembling plant roots and branching out in multiple directions, rhizomorph networks are used as an exploratory tool or "migratory structure".[66] By transporting water, nutrients and oxygen from more habitable areas, these fungi can have security while seeking out new or additional sustenance. This multi-directional connectivity increases resilience, even in a mode of growth or enquiry.

In their book *A Thousand Plateaus*[67], philosophers Gilles Deleuze and Felix Guattari, set out a series of models for the conception of knowledge. The first is "tree-like" despite not actually reflecting nature. This structure sets up a hierarchy of dichotomies with vertical and linear connections. The next structure is that of the root, and while this brings in multiplicity, the system feeds into the unity of a singular entity, that which is above the ground. The tree or root "plots to a point, fixes an order."[68] Instead, Deleuze and Guattari propose the rhizome.

> *"A rhizome has no beginning or end; it is always in the middle, between things, interbeing"*[69]

Continuously establishing a multitude of connections, the rhizome is resilient. While it may break, this disruption will prompt new lines or reinvigorate old ones, and if one part fails, the rest of the network is not at risk of collapse. In regard to storytelling, rhizomes resist the linear hero narrative, with multiple entryways and "no grand final resolution."[70] Rhizomes continually grow, yet they do so in many directions simultaneously, and are able to fragment, divide and even reconnect, yet still thrive. The way in which the stories of the site have emerged (see chapter 5 and Appendix 1), connect and are open to further addition, begins to reflect the workings of a rhizome.

Reflection

In my own limited exploration, I have found fungi to 'sit between' clear definitions, capable of shifting between parasitic and mutualist, embedded within or working around. They are a source of fear and fairy tale, omnipresent and expansive yet microscopic and invisible, healing and destructive, old beyond human time and yet still largely unknown. This inexactness can be a helpful tool in a discipline that works within predominantly Western scientific understandings of ecology. The uncertainty fungi embody can create a cognitive dissonance prompting shifts outside mainstream orientations and modes of working. Instead of one dominant understanding, method or scale, an ambiguous existence calls for a dialogue between multiple approaches across many scales. The nature of fungi to exist in symbiosis, both mutualist and other, brings relationships and networks to the forefront of any site analysis. By centring fungi, this research explores methods that tend to the connections within a landscape, stretching between the microscopic to the urban.

65 "Structure of the Thallus." Fungus, Britannica, 2020, https://www.britannica.com/science/fungus/Annotated-classification.
66 "The Mycelium." Fungi, Australian National Botanic Gardens and Australian National Herbarium, 2012, accessed 01 September 2020, https://www.anbg.gov.au/fungi/mycelium.html.
67 Deleuze, Gilles, and Félix Guattari. *A Thousand Plateaus : Capitalism and Schizophrenia.* Minneapolis: University of Minnesota Press, 1987.
68 Deleuze, *A Thousand Plateaus*, 1987, pg.7.
69 Deleuze, *A Thousand Plateaus*, 1987, pg.24.
70 Keshet, Meitar, "Think Like Fungus," Beyond Architecture, September, 2019, August 13, https://beyondarchitecture.co/think-like-fungus/

2.2 Tending as method

> *"The idea of fixing a landscape by making it permanently stable may be wholly incompatible with a healthy planet."*[71]
>
> Rob Holmes

In approaching site analysis through tending, this research explores methods whose qualities make them less susceptible to the finality, distance and speed of solutionism. In his article, *The problem with solutions*[72], landscape architect Rob Holmes lists the methods already available to landscape architects in beginning this transition. The first of which is direct fieldwork. Rather than outcomes based on information gathered from afar, a direct relationship with a site provides an opening for the designers' assumptions about the landscape to be undermined or contradicted[73]. As set out in the introduction, tending to a site brings attention to "lived collective fictions"[74] and provides time for the multifaceted qualities of landscape to emerge (problematic aspects included). With the intent to embrace different ways of knowing, scale and connectivity by centring fungi, the specific methods of tending chosen are gardening and storytelling. These methods are explored because of their potential to slow, shift scale, develop rhizomorphic-ally and not be confined to a singular understanding of site.

71 Holmes, Rob, "The Problem with Solutions," *Places Journal*, July 2020. Accessed 17 Apr 2021. https://doi.org/10.22269/200714
72 Holmes, "The Problem with Solutions," *Places Journal*, 2020.
73 Holmes, "The Problem with Solutions," *Places Journal*, 2020.
74 Stewart, Kathleen "Weak Theory in an Unfinished World." Journal of folklore research 45, no. 1 (2008): 71-82. https://doi.org/10.2979/JFR.2008.45.1.71.

Figure opposite: roots of a damaged tree removed from the garden (31/07/20).

Pottering towards a land ethic; gardening as method

Fungi make and unmake landscapes. As a key decomposer, fungi push against the notion of maintenance or finality, constantly degrading organic material. Their actions are more in line with that of a gardener. Transporting nutrients and water, supporting plant life and stabilizing the soil, fungi respond to the conditions of the landscape as they shift, day to day, season to season, year to year.

The distinction between gardening and maintenance was raised in a lecture at UTS by writer, gardener and landscape designer, Georgina Reid and in later correspondence unpacked as:

> *"Gardening necessitates and rewards close observation, whereas maintenance is more about a 'list of jobs', in order to control and keep a space relatively static. It is not really seeing but conforming to a particular idea of how it should be."*[75]

In this regard, gardening is capable of a more nuanced practice of tending because it is not bound to sustaining a status quo. While both maintenance and gardening are a manipulation of a landscape, gardening informed by the notion of the "planetary gardener"[76] leans toward a dialogue with the particularities of a site. Rather than fixated on control, (ecologically considerate) gardening is open to the adjustments necessitated in working with the dynamics of coexistence. In response, this research explores gardening as a collaborative practice of tending and an alternative means of site analysis, adept to engage with diversity of scale and changing landscapes.

By maintaining the narrative of a finite outcome, solutionism prevents an enduring connection to landscapes. In mapping the "solutions" employed to stabilies the Red River, Texas, landscape architect Holmes sets out the need to "engage with troubled landscapes without presuming to fix them".[77] The recent history of this river includes side channels, cutting of banks, dredging, levees, jetties and rerouting all in an attempt to fix a problem with interventions that as a consequence ultimately produce more problems. The risk of "reducing landscape complexities to solvable problems"[78] is heightened when approached from a distance at a limited set of scales and perspectives (1:200, 1:100, plan, section). However, Holmes reminds the reader that problems are subjective. Conditions unfavorable for one species or community may be favourable to another, meaning no singular stagnant outcome will suffice. Unfortunately, as professional practice is structured around a series of phases from concept design to construction concluding with handover, the landscape architect has limited opportunity in standard practice to cultivate a "continual, direct involvement" with the site. In response, Holmes proposes modelling a landscape practice around "adaptive management" like that of the restoration ecologist, or gardener. The structure of these disciplines acknowledges that a landscape is never "finished" and accommodate for ongoing adjustments.

Moreover, Julian Raxworthy sets out that while the landscape architect works with drawings of an "imagined future state", and have to entrust this vision to others, the gardener acts directly with growth.[79]

> *"Gardeners frustrate landscape architects because they change a project, inevitably modifying it from the landscape architect's original concept. Presented with the necessity to encourage the plants to grow, gardeners make immediate decisions on the basis of found conditions that have emerged since the drawing was done."*[80]

This practice welcomes responsive and continuing iteration. There is no finite all-encompassing solution but rather a series of feedback loops that hold space for changing landscapes. This is happening simultaneously to

75 Reid, Georgina, *Gardening Vs. Maintenance,* personal communication citation 2021.
76 Clément, *The Planetary Garden*, 2015.
77 Holmes, "The Problem with Solutions." 2020.
78 Holmes, "The Problem with Solutions." 2020.
79 Raxworthy, "Overgrown ", 2018.
80 Raxworthy, "Overgrown ", 2018, pg. 21.

Figure opposite: Tree left discarded after decorative use at Christmas 24/01/21

a direct tactile practice with the living medium of plant beings. As a result, the barriers to collaborative practice with more-than-humans are not as impermeable.

Unfortunately, tactile time with plants (and by association fungi) is not a common occurrence when landscape design is confined to digital mediums employed in the office. This distance between site, living medium and designer heightens the risk of the plant world being overlooked or oversimplified, with practitioners at risk of "plant blindness"[81]. This detachment is reflected in the offhand use of static, generic planting palettes that limit biodiversity and compound Western perceptions of nature, which landscape architect, Joan Nassauer, explains are grounded in picturesque conventions, and as a result mistake tidiness for ecological health[82]. In addition, Nassauer notes the societal belief that the way a landscape looks, reflects on its citizens. In subscribing to neatness as a signifier of human intent, people "*perceive landscapes that exhibit biodiversity as messy, weedy, and unkempt"*[83]. *"Mistaken for a lack of care,"*[84] biodiverse landscapes are overshadowed but cultural conditioning. In order to work around these constructs, Nassauer sets up orderly frames for messy ecosystems. This concept uses "vernacular language to present unfamiliar ecosystems", so that gradually, they too become recognisable and perpetuated. This model provides a way of integrating ecologically rich conditions into culturally recognizable signifiers of care. For example, the mowing of a lawn "can frame patches of greater diversity", clearly signifying human intention. In this way, well-known, "reliable" plants, can provide a framework of familiarity, within which a greater diversity of (particularly indigenous) "risky" plants can be included. Nassauer's research highlights the power of tending, to shift cultural perceptions of landscapes. By providing "cues to care", a gardening practice forms the foundation for a continuing relationship with the site. This basis opens the practice up to then experiment with increased biodiversity while simultaneously working within and shifting cultural concepts of ecology.

One landscape architect who has successfully foregrounded a gardening practice is Gilles Clement. Clement sets up a gardening practice of "working with" with many of his key theories and writings emerging out of his gardening practice within his property in La Valle, Creuse, south of Paris. Here, his practice is a dialogue between both closely tending and allowing for spontaneous growth. In the late '80s and '90s, Clément mainly worked on public projects including Parc André-Citroën which showcases one of his key theories – the garden in movement. This garden is managed by the park staff who decide where the paths will be mown from year to year, to respect self-sown plants. By embracing methods of iteration this public work is not bound to a finite outcome. In regard to Parc André-Citroën Piet Oudolf, Henk Gerritsen and Michael King commented that:

> *"Gilles Clément's triumph at Parc André-Citroën demonstrates the range of possibilities the art of gardening offers for both self-expression and communication. He has shown how ideas may be presented both on the grand scale and in the tiniest detail, making his approach as relevant to the private gardener as it should be to the broader world of the landscape architect."*[85]

This project is evidence that gardening need not be restricted to domestic space. The act of creating space for self-sown plants acknowledges their agency and the dynamism of the site. It is also a celebration of more-than-human collaboration fostered through considered tending.

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81 Defined by James Wandersee and Elizabeth Schussler as plant blindness: "Plant blindness: the inability to see or notice the plants in one's own environment, leading to the inability to recognise the importance of plants in the biosphere and human affairs. Plant blindness is also an inability to appreciate the aesthetics and unique biological features of plants and the misguided, anthropogenic ranking of plants as inferior to animals, leading to the erroneous conclusion that they are unworthy of human consideration."
Allen, William. "Plant Blindness." BioScience 53, no. 10 (2003): 926-26. https://doi.org/10.1641/0006-3568(2003)053[0926:pb]2.0.co;2. http://www.jstor.org.ezproxy.lib.uts.edu.au/stable/10.1641/0006-3568(2003)053[0926:pb]2.0.co.
82 Nassauer, Joan Iverson. "Messy Ecosystems, Orderly Frames." *Landscape Journal* 14 (01/30 2007). https://doi.org/10.3368/lj.14.2.161.
83 Nassauer, "Messy Ecosystems," 2007, pg. 163.
84 Nassauer, "Messy Ecosystems," 2007, pg. 163
85 Jones, Louisa "Groundbreaker: Gilles Clement." Garden Design, 2020, https://www.gardendesign.com/designers/gilles-clement.html.

Scattered throughout past and present landscape practices are other examples of firms and practitioners who actively pursue continual engagement with site. Holmes discusses the work of Michel Corajourd and Beatrix Farrand[86], highlighting that an involvement with landscapes over time used to be more common, with landscape architects acting as ongoing consultants. In conversation with David Godshall of Terremoto, LA, USA[87], we discussed the factors at play in an iterative practice with long term site engagement. Godshall noted that the team at Terremoto had raised the desire to maintain connection with these landscapes they had "fundamentally changed and curated with an ongoing vision in mind". One avenue included the provision of yearly site visits into the project contract, providing a day or two for working in the garden. Interestingly enabled by small budgets, which ask the designer to think outside common installation and planting methods or timelines (planting by seed, recycling building material, building up topsoil on site), this ongoing iterative practice invites conversation with the client around the perception of a landscape practice. Discussing the realities of a landscape firm working in this way was extremely encouraging, particularly considering the long-term impacts of designing with the intent to "do right by a site". Godshall noted that if Terremoto shaped 500 or so gardens over the next 10 years, pushing "gardens toward a native ecological expression"[88] in their pocket of Los Angeles, these sites add up to the scale of a large park but actually form a patchwork of ecological islands for local fauna to pass between.

May 1992 in the Garden in movement - a part of Parc André-Citroën. "Première fauche de printemps par les jardiniers du parc." Translation "First spring mowing by the park's gardeners".
Image credit: *Parc André Citroën Jardin en Mouvement 2011,* sourced from http://www.gillesclement.com

A potential antidote to solutionism within landscape architecture, this research positions gardening as both a method for site analysis and an ongoing act of tending. A practice that can provide landscape architecture with a direct, responsive and enduring connection to site, built on close collaboration with plants and more-than-human inhabitants. Rather than a focus on the individual firm "scaling up", gardening within a landscape practice provides an avenue for collective disciplinary action. In this way, the design and care of small scales sites does in fact contribute to larger connectivity, incentive for client and landscape architect alike to embrace gardening as a practice to closely notice and tend.

Clement's garden in La Valle, Creuse, south of Paris.
Image credit: *Jardin personnel de Gilles Clément dans la Creuse*, sourced from https://www.genevieveerrembault.be/gilles-clement-jardiner-cest-resister/

86 Holmes, "The Problem with Solutions." 2020.
87 Godshall, David. "A Gardening Practice with Landscape Architecture." By Ella Farley. 2020.
88 Godshall, 2020.

Holding rhizomorphic narratives; storytelling as method

> *"Progress is a forward march, drawing other kinds of time into its rhythms. Without that driving beat, we might notice other temporal patterns."*[89]
>
> Anna Tsing

Mainstream landscape architecture functions within this framework of progress that rewards stability in the pursuit of continual growth. In contrast, the methodology and methods discussed in this research feed into a slower, malleable practice that foregrounds connection and accounts for the dynamic nature of landscapes. Tsing's forward march acts in a similar way to Ursula Le Guin's "hero" narrative,[90] in that both overshadow stories operating at paces or scales outside the prevailing. The unsustainable hero narrative disregards the majority for exceptional individuals and thrives on action and power. In contrast, Le Guin's "container" holds many diverse stories together, allowing the connections between them to emerge. This type of storytelling is used as one method of tending, to both document the landscape and gardening practice, and draw out deeper understandings and connections. Storytelling is embraced as a sensemaking tool, a bridge between scales and ways of knowing.

An example of this model currently occurring within landscape ecology is the citizen science platform Fungimap[91]. Fungimap is a digital collection of accounts from the field. Members spot mushrooms then try to identify and locate them, with database records ranging in degrees of formality. As a result, this collection of stories begins to cross between scientific and cultural understandings of fungi. Constantly updated, the larger narrative of fungi in Australia both expands and develops in detail, while the platform holds these stories together, providing the opportunity for previously undocumented connections to emerge.

Notions of gathering stories to build diverse and layered understandings of entanglements is also explored by Miranda Trimmier in her piece *Cisco Trash Map* for Places Journal.

> *"One way to counter myth, I thought, was to let stories be as sprawling as they are in real life."*[92]

In this piece Trimmier's friend Eileen learns about her home - Cisco, Utah, US - from "scraps left behind" and by comparing notes with current, former and part-time neighbours. Gleaning becomes a method for collecting stories about the landscape. Trimmier defines gleaning as "to gather information", drawing from the 2015 film *The Gleaners and I* in which filmmaker, Agnes Varda, enquires into the intent of those who trash pick. In the process of placing separate pieces side by side,

89 Tsing, *The Mushroom at the End of the World*, 2015, pg. 33.
90 Le Guin, "The Carrier Bag Theory of Fiction.",1986.
91 "Fungimap Australia." iNaturalist, 2020. https://www.inaturalist.org/projects/fungimap-australia.
92 Trimmier, Miranda. "Cisco Trash Map," *Places Journal*, February 2019. Accessed 07 May 2021. https://doi.org/10.22269/190219

Figure opposite: unintended pumpkin vine which sprouted from a bed of soil built up with compost from household organics (06/03/21).

the connections come to be narrated and although each piece has its own deeper histories, the act of collection creates scope. In this research, gardening achieves a similar outcome by drawing attention to and working directly with the nuanced details of the site. Storytelling then holding these moments together.

Central to both these examples is an open-endedness. Rather than shutting down inquiry, they remain porous to emerging threads and connections. The conflict/resolution model, in fiction and landscape architecture, has a finite trajectory and hierarchy of characters. In contrast, the carrier bag model allows many stories to be shuffled, rearranged and entangled. When the narrative is thought of as a "container" the whole is not reduced to a single genre. It is not *"characterised either as conflict or as harmony, since its purpose is neither resolution nor stasis but continuing process"*[93].

Anna Tsing's *The Mushroom at the End of the World* is yet another example of carrier bag storytelling. Tsing structures stories of humans and landscapes entangled with the matsutake like the flushes of mushrooms that pop up after rain. Based upon fieldwork and research conducted around the globe, Tsing notes the collaboration inherent in storytelling and how the book is compiled as an "open-ended assemblage".[94] Acknowledging the matsutake stories yet to be written, Tsing sets out diverse narrative threads whose entanglements surface over the course of the book and expand beyond its limits, not confined to this particular telling. This open-endedness accounts for the dynamism of landscapes. Within the framework of a design practice, an ongoing assemblage shifts the focus from outcome to continuing process, making room for a slower, intentional practice. Without reaching for a finite resolution the role of the designer can extend past a traditional timeline allowing for further exploration, collaboration, testing, failing and adjusting. Storytelling is one means of site analysis and documentation that accommodates for this rhizomorphic working.

> *"I like walking because it is slow, and I suspect that the mind, like the feet, works at about three miles an hour. If this is slow, the modern life is moving faster than the speed of thought, or thoughtlessness."*[95]
>
> Rebecca Solnit

Gleaning, foraging, gardening and the subsequent gathering of stories requires detailed noticing, which tends to prioritise time in site over speed. Aline Wiame discusses Didier Debaise's theory that storytelling which resists the hero is 'ambulatory'.[96] "Ambulatory" relations, as set out by philosopher William James, are how we actually experience the world – the speed of walking step by step. However, James notes this experience can be made to appear saltatory when presented abstractly, by jumping from one point to another and skipping the distance between.[97] The novel as a container is a chance to resist "the too disconnected, too badly constructed abstractions"[98] and instead compile an experience of landscapes at the speed of thoughtfulness. Drawing from the work of Tsing, Le Guin and Debaise, carrier bag storytelling as a method for the discipline supports diverse and detailed, yet grounded understandings of site. In doing so, such storytelling can form a strong foundation for considered design.

93 Le Guin, "The Carrier Bag", pg. 153
94 Tsing, *The Mushroom at the End of the World,* 2015, pg.10.
95 Solnit, Rebecca. *Wanderlust : A History of Walking*. New York: Viking, 2000.
96 Wiame, "Gilles Deleuze and Donna Haraway" (2018) and Debaise, 'Narrations spéculatives', 2017.
97 James, William. *The Meaning of Truth*. Project Gutenberg, 2004. http://www.gutenberg.org/files/5117/5117-h/5117-h.htm.
98 Wiame, "Gilles Deleuze and Donna Haraway" (2018) pg. 527.

3. RESEARCH QUESTIONS

The previous literature review sets out the inherent role of fungi in landscapes, the presence of gardening within landscape history and contemporary practice, and the centrality of storytelling in navigating the relationships of people, fungi, and place. Given my concern around techniques that distance, accelerate and simplify process and outcomes, and given the characteristics of fungi, gardening and storytelling, these are the questions that will direct the work in this thesis:

How might centring fungi shift understandings of site and invite different methods of landscape analysis and documentation?

How might a practice of tending within landscape architecture accommodate for more-than-human understandings, scales and connections?

How might a practice of tending through gardening and storytelling resist the distance, speed and finality of solutionism?

How might gardening, and storytelling reveal what may otherwise go unnoticed in mainstream site analysis?

Aim:

In response to the speed, distance and finality of solutionism present in technological approaches to landscape site analysis, the aim of this research is to explore methods useful for landscape architecture that can uncover and hold the complexities not revealed in mainstream techniques.

Objectives:

- To use fungi as a way of understanding a landscape and site dynamics, both literally and metaphorically
- To explore the notion of tending in the context of site analysis, specifically gardening
- To consider what is uncovered or left out in approaching the site through these methods and what implications this has for the following design stages
- To consider why understandings of site shaped by these methods are important for the discipline, alongside more contemporary digital processes of site analysis

Figure opposite: mushroom fruiting through lawn at Redfern oval after period of frequent rain 24/03/21

4. METHODOLOGY AND METHOD

Through the conceptual framework of fungi, this qualitative practice-based research explores methods of gardening and storytelling as means to incorporate tending into landscape architectural site analysis and design. The following chapter is particularly concerned with how, in drawing from other disciplines, these methods can avoid solutionism through a continual, direct, and open-ended relationship with a small-scale urban site.

Fungi as metaphor

The first act of this research was to centre another. With fungi as a consistent point of reference and comparison, fungi as metaphor became the central research methodology. Metaphors in research can be an effective sensemaking tool, "provid(ing) structure to the data".[99] They also reframe the "design "problem""[100] in a different light, drawing out latent understandings from fieldwork. This is a helpful method for shifting perspective in a discipline constrained by habit. In this instance, fungi as metaphor foregrounds scale (particularly the microscopic) and connectivity due to the way in which they inhabit landscapes and work in symbiosis. For example, fungi as metaphor helped me see decomposition as a consistent presence in the landscape. This in turn led to viewing both boundaries and connection as dynamic, being made and unmade, rather than static and final. A mapping of lot boundaries took on new qualities of vitality and porosity. As a metaphor for connectivity, the rhizomorphs of fungi provide a model for how the different but connected site stories are held together in the "carrier bag" collation. This weaving of fungi throughout all aspects of the research is elaborated on in the previous sub-chapter *2.1 Fungi as metaphor.*

99 Carpenter, Jacque. "Metaphors in Qualitative Research: Shedding Light or Casting Shadows?" [In eng]. Res Nurs Health 31, no. 3 (Jun 2008): 274-82, pg. 274. https://doi.org/10.1002/nur.20253.
100 Groat, Linda N., and David Wang. Architectural Research Methods, Second Edition. 2nd ed. ed. New York, NY: Wiley, 2013, pg. 40.

Figure opposite: *Trachelospermum jasminoides* wrapped around a ficus (06/03/21).

Gardening as method

Landscape architecture has "its roots in gardening",[101] a tactile and dynamic practice. Reactive and reliant on seasonal, environmental and ecological conditions, gardening is inherently site specific and filled with trial and error. These characteristics, while not necessarily a smooth fit for a finite mainstream model of procurement, design, documentation and delivery, create space for feedback and frequent adjustment at the scale of the site. Gardening is also undertaken *in-situ*, reducing the distance between the landscape architect, site and more-than-human inhabitants.

This particular gardening practice took place intermittently throughout the year and covers tasks such as planting, pruning, watering, composting, raking, transplanting, propagating, mowing and unfortunately the removal of deceased plants. All of which has made the ecology and materiality of this site more tangible. Although my primary influence for this gardening practice is Clement's framework of "working with, not against"[102], at times my actions did subscribe to Nassauer's observation of maintaining "neat, orderly" landscapes. In consideration of fungi, I tried to garden in a way that avoided compaction, supported mycorrhizal plants, and left leaf litter in certain areas for protection and decay.

As I live at the residence I end up in the garden, one way or another, most days. However, there is a distinction between being in the garden and gardening, the former an intentional engagement and tending. Whenever I am *actively* gardening, I have a camera, notepad and pen with me. The camera, in particular, prompts a closer noticing. As I gardened, I would stop intermittently and photograph anything that caught my attention, such as olives in the lawn or the intricate roots of a plant unearthed. The lens allowed me to literally zoom in, pinpointing details as they sat in the broader landscape. Photography was also useful for the way in which photos can document small changes difficult to signify in a drawing at the scale of the site. These changes include the form of trees shifting from season to season and how spaces in the garden feel much smaller after spring due to all the new growth. Inversely, photos could document how open and exposed the garden felt after pruning or mowing. This tool also gave pause to the gardening practice, providing moments of consideration and reflection.

In considering fungi as a fellow gardener in the site, I began to categorise my actions and observations under verbs we shared. These then became the key threads running through the five stories held in the field guide. An explanation of the verbs is set out in *5.1 Stories tended in the garden*, while excerpts of the stories are in a following subchapter *5.2 Stories held in the field guide* and will be displayed in their entirety in the exhibition.

101 Foreword by Fiona Harrison. Raxworthy, Julian. "Overgrown : Practices between Landscape Architecture and Gardening." (2018).
102 Clément, *The Planetary Garden*, 2015.

Figure opposite: Volunteer plants scattered throughout the lawn (25/03/21).

Here, the camera was used to more closely notice the materiality of the ground plane. The range of colours and textures documented underfoot were much more diverse than any drawings had previously conveyed.

Storytelling as method

Storytelling is embraced as a way of recounting, sorting and drawing out. Undertaken through both drawing and writing, this mode of site analysis connects fungi, the gardening practice and the site, whilst also contributing yet another mode of enquiry. Informed by Ursula Le Guin's "carrier bag theory of fiction"[103], the stories are held together in the f*ield guide*. This field guide as "container" holds multiple understandings of the site simultaneously, allowing the connections and contrasts between them to emerge.

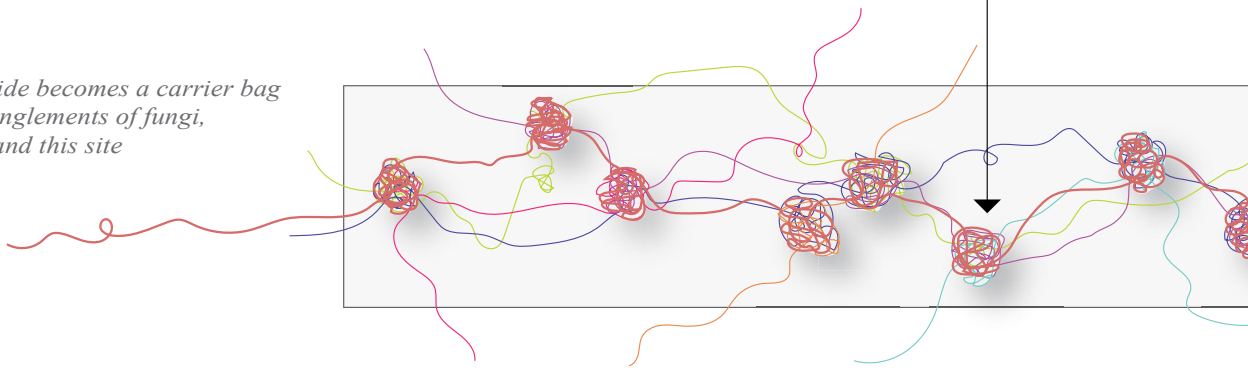
The origins of the field guide are tied to data collection. In this project, the field guide collates the many details and relationships that emerge over the course of the year, in a series of stories. Traditionally, a field guide is set out as an open system, the reader flipping between moments to more closely notice a landscape or ecology. These stories are also set out as an open system. Each story is a separate double-sided concertina. As they unfold, the front side reveals a particular dynamic as it manifests within and beyond the site, from the microscopic to the urban. The individual stories can be read as independent parts, in any order. The underside of each concertina holds part of a larger site mapping in plan view. When laid out adjacent, the stories create a detailed plan, situating the five verbs, and build a more in-depth understanding of the site. This transition between distinct stories and a larger narrative reflects the way in which these stories emerged from gardening – individual moments that sat within a longer practice of tending.

The field guide as container also does not enforce a singular reading or layout, allowing the reader to make their own connections beyond those that are more explicit (the site, fungi and gardening). This format attempts to reflect an open-ended rhizomatic form, supporting "sprawling" diverse stories, further enquiry and an ongoing relationship with the site. In comparison to the hero narrative, both the container and rhizome as models for storytelling are less susceptible to one way of knowing, or habitation of landscapes, being prioritized above another. Instead, the many stories build a network of experience and resist the finite nature of solutionism.

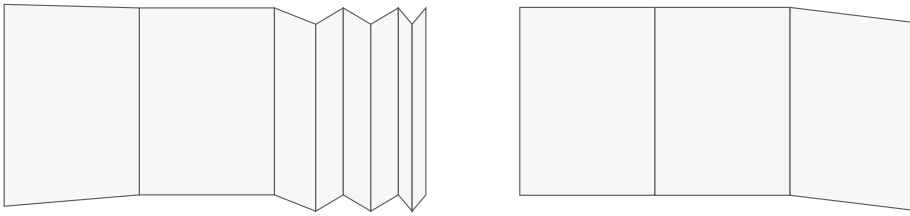
103 Le Guin, "The Carrier Bag Theory of Fiction.", 1986

Figure opposite: a crowded but vibrant corner (06/03/21).

the field guide becomes a carrier bag for the entanglements of fungi, gardening and this site

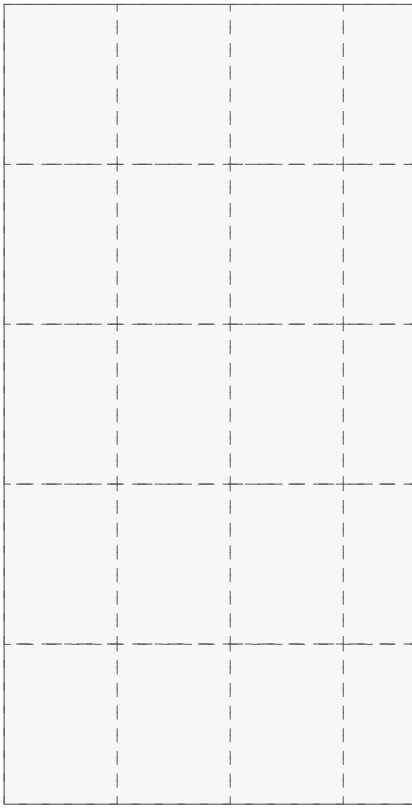


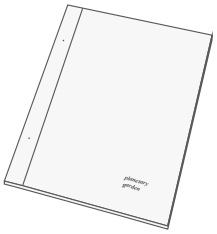
short stories unfold



Compiled these concertinas create a plan of the site - together the stories and plan document seen and unseen existences of this garden.

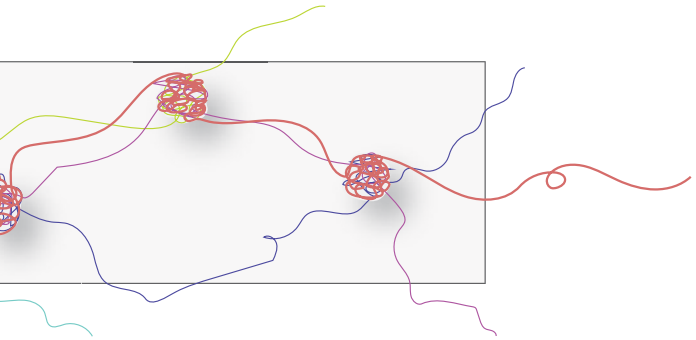
The double sided depiction of the site was envisioned as the two sides of an embroidery piece. A different perspective (above or below) shifts the understanding of the same landscape.

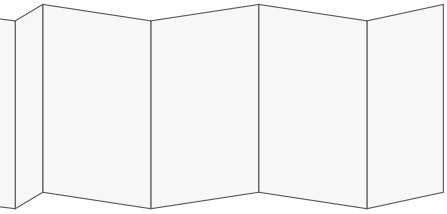


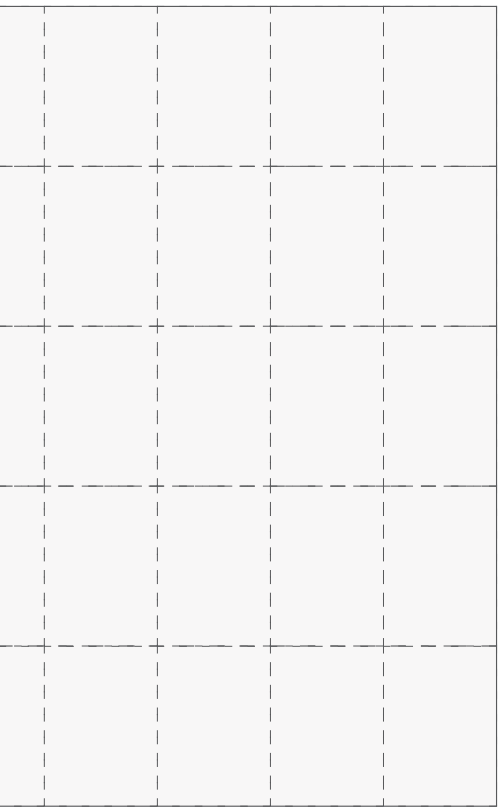


folded map of garden

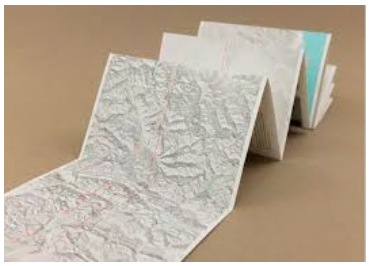
short manual and extended footnotes







Precedent:
Mels Van Zutphen - The Speed Of Light follows the journey of a tiny neurtino particle from Switzerland to Italy.



Precedent: these maps are cut into segments and laid out on linen cloth as a more durable backing and then held in a slip casing.

Drawing as method

In mycology field guides, species of fungi are most often depicted in drawing by their fruiting body (mushroom), rather than the mycelium. The illustrations use a similar approach to botanical art, whereby the fungi are isolated from the surrounding context, dissected and detail is given to mechanics and form. Mycelium (the actual form of mycorrhizal fungi) are predominantly diagrammatic and quite abstracted or magnified. As mycelium primarily exists below the surface, photographs in the field also, more often than not, capture mushrooms. Although landscape architecture is well versed in using a primarily digital dialogue to document unseen dynamics, I have struggled to communicate the presence of fungi, gardening or an interconnected ecology using the conventions of plans, sections and elevations. As a result, the following precedents (with exception to the first) are situated outside the discipline. The work of these artists has been included in this research because their compositions, mediums, mark-making and intent, deal with scale, interconnectedness and landscapes in a way that is porous to narratives beyond the visual. In a similar way to the carrier bag theory of fiction[104], I find the ambiguity present in their works, achieved through different means such as medium, composition, and layering, holds space for multiple connections and narratives to emerge.

Figure 4: *Collapse (Effondrement)*

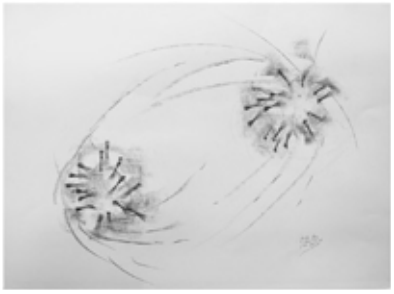


Figure 4: *Interchange*

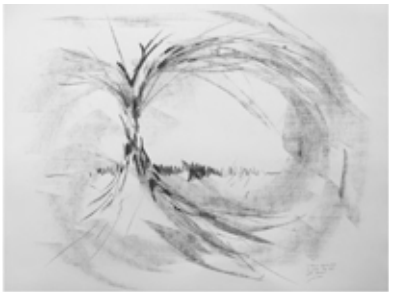


Figure 5: *Symbiosis*

Image credits: Drawings by Gilles Clement from his book *The Planetary Gardener* (2015)

In building a landscape practice around a dynamic and direct tending, a key dilemma has been the static, diagrammatic nature of standard landscape drawings. For example, this concept plan (figure 8, pg.53) of Paddington Reservoir by JMD sets out a very vague representation of planting. Beyond giving an approximation of canopy cover, this plan and section reduces plants to immobile symbols placed, rather than grounded, in the site. As is the case with any isolated piece of documentation, it is difficult to grasp not only the form of the plants, but their presence in the landscape, as they change season to season, year to year, and this does not reflect the dense and intimate experience of planting in reality. In contrast, the loose sketch and watercolour (figure 9) conveys a planting presence of vibrancy and vitality and is not constrained to the finality of the photorealistic bird's eye view. No drawing or survey is as accurate or detailed as the site itself"[105] and planting plans, at best, depict future possibilities rather than certainties. In place of meticulous accuracy, this research is concerned with how to represent the dynamism, community and vitality of a site in landscape documentation.

In addition, an iterative practice such as gardening can quickly make such drawings a representation of past, or no longer probable, realities. The dialogue back and forth between gardening and drawing, therefore, is a conversation between past, present and future and could benefit from slight ambiguity in temporal scale. Instead of specifying a singular moment in time and focusing on spatial conditions, the drawing of tending to a landscape could instead depict dynamics or intention, as they both change. Gilles Clément's gardening practice influenced not only his design theories but also his drawings which form the first set of precedents. Figures 3-5 are a series of drawings contained in *The Planetary Gardener and Other Writings*. Without any spatial signifiers or set scale, these

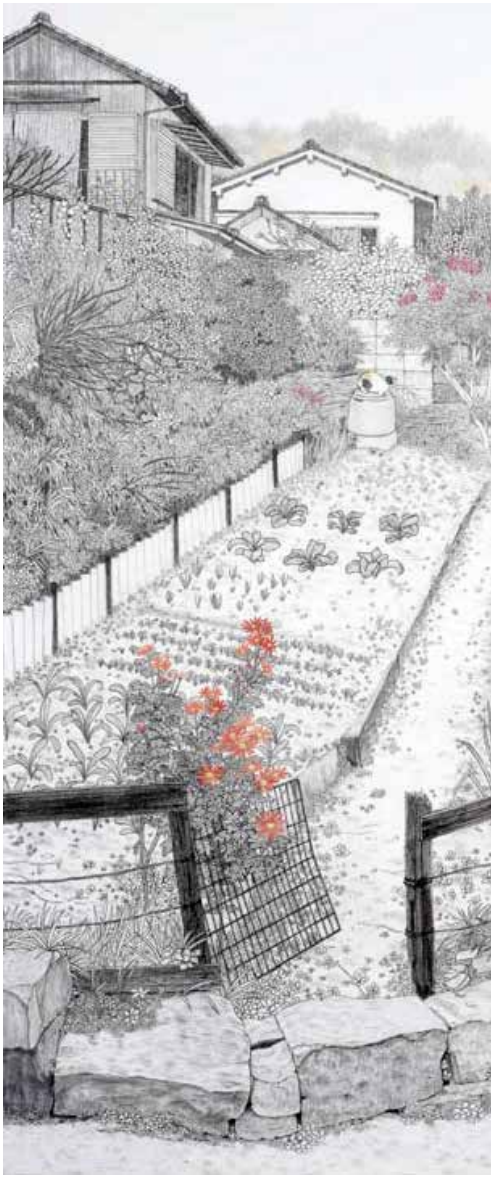
104 Le Guin, "The Carrier Bag Theory of Fiction.", 1986
105 Comte, Olivier. "Gilles Clement, the Garden in Movement." 52 minutes. France, 2013.

Figure opposite: Detail of *Senecio cineraria* (07/02/21)

drawings convey the movement and connection of dynamics within an unspecified landscape. The lighter charcoal tones speak to a fleeting presence or moment in transit, while darker moments claim more permanence. In this regard, Clement is able to hold multiple paces in one drawing and spatialize a landscape dynamic without confining it to a static singular perspective (i.e. plan or section).

The work of artist John Wolseley also engages with scalar ambiguity and interconnectedness, often exploring thresholds where one system meets another, and scales overlap. In 2001, Wolseley followed the journey taken by a 19th century naturalist 150 years earlier. Alfred Russel Wallace travelled throughout the Malay Archipelago from 1854 to 1862[106] and his studies are credited as the origins of biogeography. Collecting large quantities of flora and fauna along the way, Wallace was struck by the stark difference in birds when travelling from Bali to Lombok. Drawing a line between the biogeographical realms of Asia and Wallacea, Wallace laid out the margin where distinct Asian and Australian flora and fauna meet as a result of recent tectonic movement. Wolseley notes how Wallace would "look at things on the ground – beetles, even worms, and then extrapolated these huge theories about how the dynamics of the world worked."[107] Wallace and Wolseley share a focus on theorizing in the field and recognizing connections across scales, despite their difference in tools and methods. One piece from Wolseley's subsequent body of work is *Tracing the Wallace Line; wing leaf and land* (1999)[108] (see top image adjacent). In this work, minute details evident in the decaying leaf or the wing of an insect are acknowledged as a part of a highly functioning ecosystem connected to the ever-evolving dynamics of continental drift on a global scale. The boundary which helps spatialise these dynamics is depicted as a fragmented red line separating landmass shaped like leaves, and the deep-sea trenches are a mix of turquoise and indigo.[109] Wolseley's bright watercolours reflect the playful approach which allows him to move lightly around the scalar conventions of cartography and instead foreground the interconnectedness of ecology across multiple scales of time and place.

Sharing a similar attention to detail, Japanese artist Yukiko Suto's focus on the mundane and domestic lends itself well to the landscape of a suburban garden. In contrast to the ambiguity of Wolseley's abstract assemblages, Suto's works are easily discernible recordings of very specific landscapes. Focusing on residential and semi-rural landscapes of Japan, Suto first photographs and then creates highly detailed predominantly black and white line drawings with pencil.[110] Suto's works gave me confidence in my choice to focus on one small suburban yard for the course of a year. By drawing spaces that may be considered "mundane" in high detail, Suto draws the viewer in to notice the vitality and diversity in what may normally be overlooked.



106 "Drawing the Line at Bali." ABC Science, 2013, accessed 15 March.
107 Allam, Lorena. *Tracing Wallace*. Podcast audio. Hindsight 39:02Sunday 19 January 2014 1:05PM. https://www.abc.net.au/radionational/programs/archived/hindsight/weallace/5154316.
108 "Tracing the Wallace Line." John Wolseley, Roslyn Oxley9 Gallery, 2001, 2020, https://www.roslynoxley9.com.au/exhibition/tracing-the-wallace-line/x0yev.
109 Allam, *Tracing Wallace*, 2014.
110 "Traces of Nature in Japanese Suburbs: Works by Yukiko Suto." SOCKS, 2014, 2020, http://socks-studio.com/2014/05/26/traces-of-nature-in-japanese-suburbs-works-by-yukiko-suto/.

"Neighborhood landscapes sometimes show me beauty beyond my expectation. I draw fields, gardens and kitchen gardens in which I see their owner's joy, sometimes I just draw wild grasses growing in the city, weeds that I see in parking lots; they can be breathtakingly beautiful. I also draw houses in which their owners seem to have lived happily for a long time."[111]

Her documentary-like attitude to particular landscapes in their current state is reinforced in the titles of her exhibitions including *Late Autumn Weeds (2019), Field expedition (2010), Flowers and a small mountain (2012),* and *House (2017)*. Drawing simultaneously built and natural spaces in this way celebrates their significance both as small individual entities and as connected parts within larger networks of ecology. Accents of colour break through and also speak to the joy found in Suto's process of attending and making.

While the intense detail of Wolseley's and Suto's documentation speaks to a direct encounter with a landscape, ambiguity can open space for connections to emerge beyond that which is depicted. In exploring techniques that support a sense of ambiguity I kept coming back to the renowned master of Japanese ink and wash painting, Toyo Sesshu, who is particularly known for his landscapes (see next spread). Evident in his work is "the inclination in Japanese aesthetics of esteeming the hidden or merely suggested as higher than the obvious or boldly exposed".[112] This practice contrasts the high clarity and singular interpretation normally called for in mainstream landscape documentation. The use of ink wash also has an inherent inexactness. Instead of an accurate representation of form or scale, landscapes depicted in Suiboku-ga or Sumi-e works (Japanese monochrome ink painting) are gestured at and exist in a state of movement and flux. In regard to composition, there are vast areas of white space in Sesshu's works as yugen is also achieved by "the space that is left untouched, the invisible and absent"[113]. This allusive space invites the viewer to "actively complete it"[114] and the work becomes a container for multiple stories and authors beyond that visibly represented.

111 Suto, Yukiko,"Statement." 2019, 2020, https://www.yukikosuto.com/statement.
112 Tsubaki, Andrew T. "Zeami and the Transition of the Concept of Yūgen: A Note on Japanese Aesthetics." *The Journal of Aesthetics and Art Criticism* 30, no. 1 (1971): 55-67. https://doi.org/10.2307/429574. http://www.jstor.org/stable/429574.
113 Parkes, Graham and Adam Loughnane, "Japanese Aesthetics." *The Stanford Encyclodedia of Philosophy*, Metaphysics Research Lab, Stanford University, 2018, 2020, https://plato.stanford.edu/entries/japanese-aesthetics/#YuugMystGrac.
114 Parkes, "Japanese Aesthetics." 2018.

Figure above: John Wolseley, *Tracing the Wallace Line; wing leaf and land,* 1999. Watercolour on paper, 136 x 205 cm. https://www.roslynoxley9.com.au/artwork/john-wolseley-tracing-the-wallace-line-wing-leaf-and-land-1999/32:915

Figure below: Yukiko Suto, *Late Autumn Weeds,* 2019. Pencil and watercolour on paper mounted on panel. Exhibition at Take Ninagawa, Tokyo, Japan. https://openartdoors.wordpress.com/2019/01/31/yukiko-suto-late-autumn-weeds-exhibition-take-ninagawa-tokyo/

Finally, holding detail, ambiguity, movement and multiple scales to build rhizomatic stories also relies on composition. Matthew Rangel is a Californian artist whose methods resonate with how I have found myself piecing together the narratives of this garden. I am particularly drawn to the way Rangel layers his different modes of representation together. For example, Rangel's collection *Layers of Place*[115] has been a central precedent for layout. Using predominantly lithography, screen printing and etching, Rangel builds up works based on first research and then hiking expeditions, field drawing and photography in a specific landscape. Further ecological, ethnographic and historical enquiries follow the field work, and from this continued process of research, field outings and inquiry - which may take years – a mode of representation evolves. Rangel explains how "in an effort to build meaning within my connection to land, my work embodies physical aspects of landscape through personal narrative."[116] In most works, handwritten notes offer insights into the field work and reinforce a practice of attending and curiosity through the narrative of the artist's time in the landscape. This narrative is also "framed by the graphically encoded language of maps"[117] which in many works highlight the contrast between human imposed boundaries on unyielding landscapes. It is clear at what points this division of land yields to the topography and at what moments landform is disregarded. This dynamic is mirrored in the way Rangel's works often partly permeate drawn bounds. The final pieces collate "historical, geological, and interpersonal information,"[118] with each layer of a work encoded with different scales of in-situ observation and external research. As seen in the work titled *Sierra Nevada Codex: Muro Blanco*[119] these layers are held together with ambiguous textures from prints related to the site. The complete compositions showcase the many layers of stories connected to these places in both physical and intangible ways.

Drawing from these precedents (Clement, Suto, Sesshu, Rangel and others), I have considered the ways in which medium, composition and perspective can both document the details of this suburban landscape and hold space for the ambiguity of unseen actors and dynamics - with a particular focus on the workings of fungi through spores and mycelium. Certain methods of documenting the site, such as print making, note taking and line drawing, also call for attention to detail, fostering time spent in place: a slowness in production to allow for these many varied narratives to surface, like the sudden and brief fruiting of a mushroom that hints at the presence of mycelium below.

Figure 6: *Haboku-Sansui* by Sesshu Toyo (1495) is a splashed-ink hanging scroll.

Figure 7: *Down the Riverbed - Past Wukchumni Hill* by Matthew of Settling exhibition. Lithograph layered with multimedia. https:/ images/down-the-riverbed-past-wukchumni-hill

115 Exhibited at Arts Visalia - a nonprofit community art center located in downtown Visalia, California
116 "Matthew Rangel." Arts Visalia Visual Arts Centre, 2020, http://www.artsvisalia.org/matthew-rangel/.
117 "Bio." Rangel Studio, Rangel Studio, 2020, https://www.rangelstudio.com/pages/bio.
118 "Unknown Landscapes: Matthew Rangel." 2020, https://www.artistrunwebsite.com/inspiration/621/Unknown+Landscapes%3A+Matthew+Rangel.
119 "Matthew Rangel." Arts Visalia Visual Arts Centre, 2020.

landscape painting on a

Rangel from the Detail
/www.rangelstudio.com/

Figure 8: Concept plan for Paddington Reservoir by JMD, sourced from https://jmddesign.com.au/projects/paddington-reservoir/

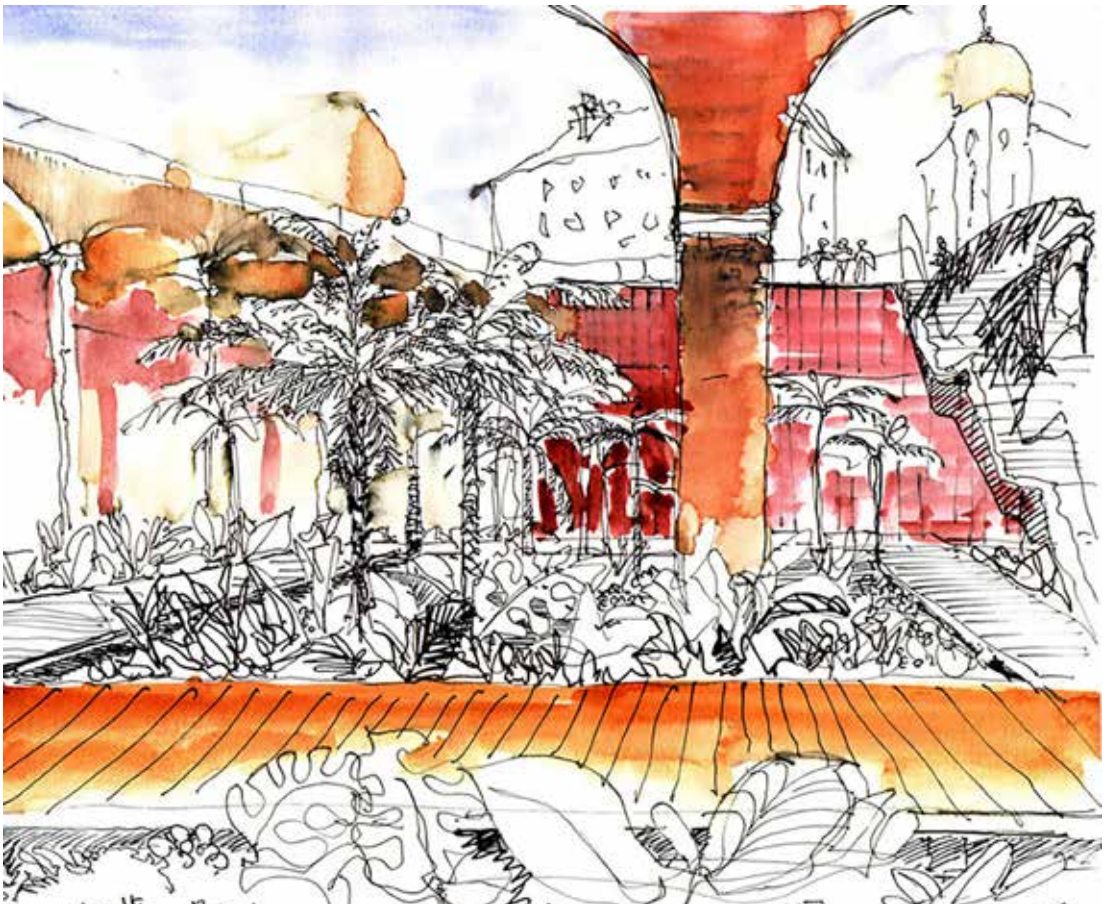
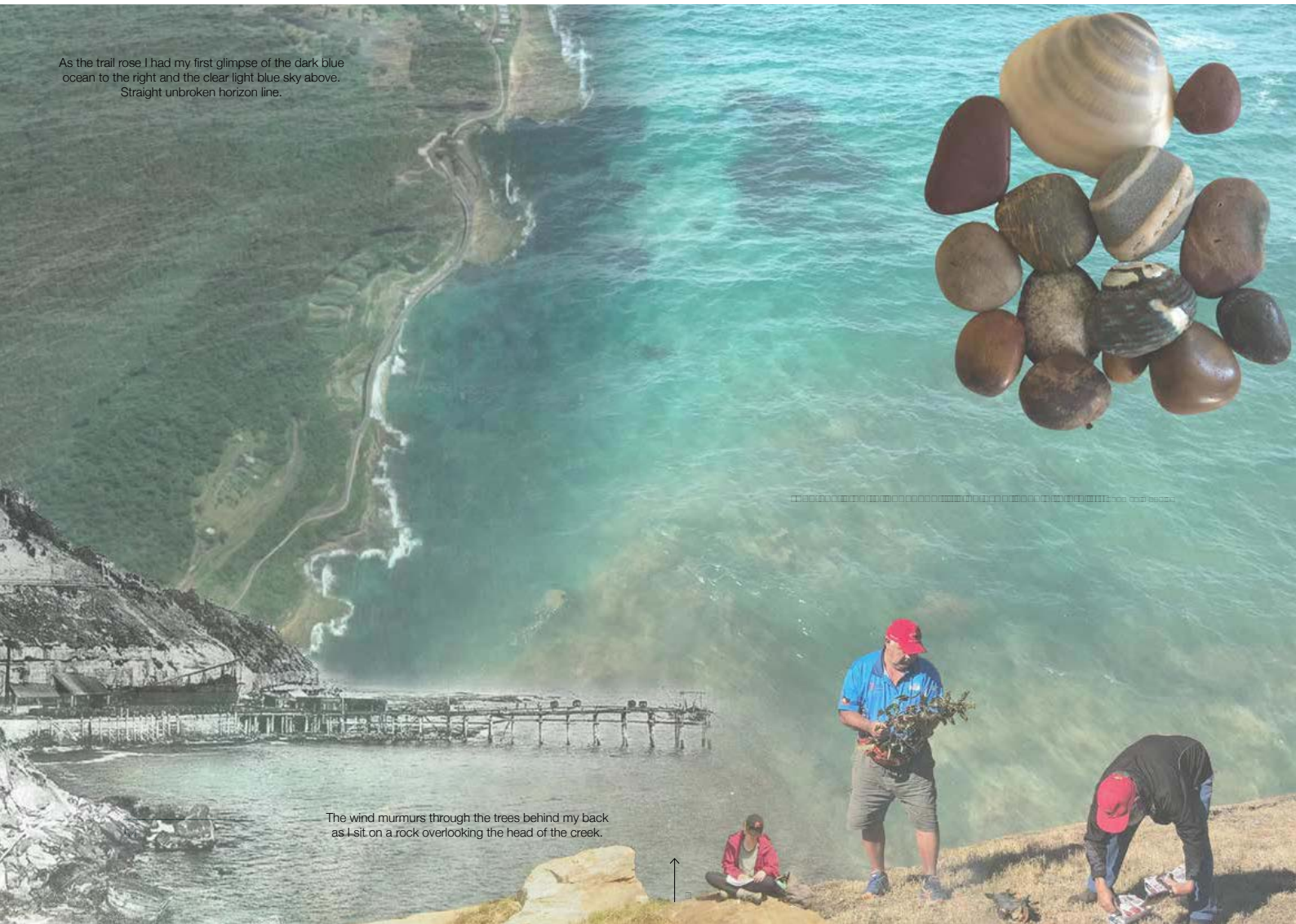


Figure 9: Walter Read sketch of Paddington Reservoir, sourced from https://jmddesign.com.au/projects/paddington-reservoir/

He speaks of the men he works with and they become figures larger than

seek out. A thick black band in the cliff face running parallel to the rising



Writing as method

A sensemaking tool, words are used to label, associate, categorize and relate. Within ecology, words can both open and close enquiry. In a podcast with Krista Tippett, Kimmerer addresses the limits of naming, especially within the context of botany[120]. The Latin binomial can become an end to enquiry. Signalling to morphology, it does not provide insight into the complexity of this being, who exists within larger ecological and cultural contexts. Kimmerer describes this practice of labelling plants as the teaching of names and ignoring of songs reinforcing narratives that reduce plants to mechanisms that provide "ecosystem services".[121] In contrast, Clement states that "without a name, nothing exists" and goes to great lengths to identify and count the species of *third landscapes*,[122] where direct human intervention has ceased and diversity flourishes. His naming is the means to acknowledgement and attention. This research is concerned with written storytelling that acknowledges non-human co-inhabitors without isolating or confining. Although Latin binomial nomenclature is used to first identify non-human agents in the garden, it does not denote the end of their presence in the landscape. In the stories, the names are an initial point of reference to then curiously document the relationships, movement and shimmers[123] of co-inhabitors across scales.

Central to this research, both *The Allure of Fungi* by Alison Pouliot and *The Mushroom at the End of the World* by Anna Tsing record stories of fungi in a way that invites curiosity. Although Pouliot is an ecologist and photographer and Tsing an anthropologist, both are also writers and I wonder if delving into the realms of predominantly unseen fungi lends itself more to words than visuals. In compiling these texts, Pouliot and Tsing gather many stories, from different places and perspectives. While a set of drawings across a range of scales gives an understanding of both scope and detail, they often require large jumps between. Through written storytelling, Pouliot and Tsing both carefully weave multiple smaller anecdotes of fungi and foragers into an understanding of large-scale dynamics, such as environmental management or systems of capitalism. In both instances the use of first person gently absorbs the reader into the narrative, and the transition between scales is made incrementally, or at the speed of walking.

In 2018 I undertook the B.LA undergraduate studio (W)hole histories, run by Saskia Schutt and Therese Keogh. We spent a week just south of Sydney at Coalcliff, NSW, on Dharawal country. Coalcliff is a small coastal town, situated on a narrow strip of land between the Pacific Ocean and the steep Illawarra escarpment. Mining of the Illawarra coal seam began here in the 1870s and continued until 1991.[124] In approaching this landscape of extraction, and a community whose identity is shaped by the mining industry, we students were asked "how do we encounter the thing/s we cannot see, that are absent, below the ground, or inaccessible?"[125] The central methods used to meet this landscape were walking, drawing and writing. The first writing exercise asked us to pay attention to three sites of significance, chosen by us, on a long walk up and across the escarpment. At these points we noted down our initial response, what we saw, heard and smelt and how these observations shaped our understanding of the site. The second task involved creating a fictional narrative built upon the conversations and interactions we had with community members. The third was focused on our auditory experience along Stony Creek. Using onomatopoeia, we recorded the layers of the site as we passed through it. While the situated writing solidified my presence in the landscape, the fictional weaving opened up my understanding to the broader cultural context. The creek recording shifted my awareness and increased my reception to qualities that were not purely visible, highlighting the vitality of this small-scale ecology. Having never previously used writing practices on a site visit, beyond brief note taking, I found the exercises asked me to be immersed in the landscape, rather than purely observe. They made me question how a predominantly visual language of both site

120 Tippett, *The Intelligence in All Kinds of Life,* 2019.
121 Myers, *Dr. Natasha Myers on growing the planthroposcene*, 2020.
122 Comte, "Gilles Clement, the Garden in Movement.", 2013.
123 Rose, "Shimmer: When All You Love Is Being Trashed." 2017.
124 "Coalcliff." Wollongong City Libraries, Wollongong City, 2021, https://wollongong.nsw.gov.au/library/explore-our-past/your-suburb/suburbs/coalcliff.
125 Schut, Saskia. *(W)hole Histories* - Introduction Presentation. 2018. University of Technology Sydney.

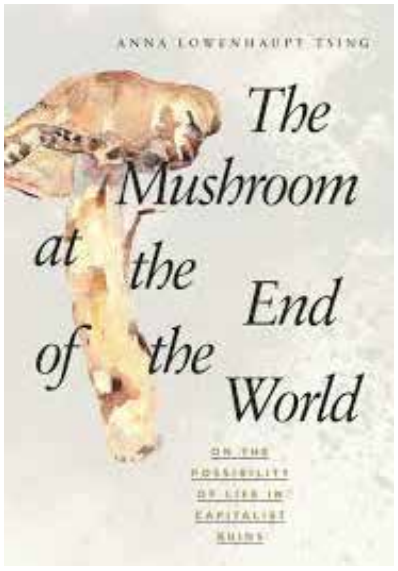
Figure opposite above: Excerpt from fictional narrative writing excerise - *(W)hole histories* studio, 2018

Figure opposite below: Collage from situated writing excerise - *(W)hole histories* studio, 2018

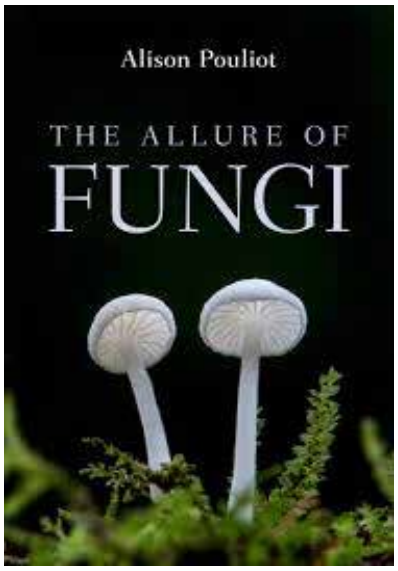
analysis and design may limit our understanding of the landscapes we are working with. Having always struggled to convey the impression of a landscape or the intent of a design through visuals alone, this research embraces writing interwoven with drawing as an approach to meeting and designing for landscapes.

Drawing from these precedents and exercises, the writing of stories in this research always began with notes taken during the gardening practice. These notes included changes in plant form, weather conditions, passing fauna, sounds, smells, textures, and atmosphere. By asking me to describe, writing was a means to capture an experience of gardening and site beyond the visual. To set out the difference between the crumbling texture of rich topsoil and powdery dry of depleted fill. To recount the earthy smell before rain, or the sound of dry leaves crackling underfoot. The slow sway of branches or the hurried movements of garden critters rustling through leaf litter. Directly after gardening, I used writing to reflect on the intent and impact of my presence in the site. These notes and reflections were supplemented by off-site research into the details and dynamics I had observed. By focusing on fungi, I learnt new terms, described dynamics with different adjectives and thought about the landscape through completely different verbs. The combination of these writings helped me pause and consider how my actions and this site sat within the broader landscape. While drawing layered scales, writing wove them together in a less stilted manner, unconstrained by visual conventions. In this regard, I found writing allowed me to shift between scales more easily.

The in-situ notes, off-site research and reflections are the foundation of the five stories held in the field guide. The writing of these stories is not a writing up of something finished but rather another way to allow for multi-scalar entanglements to emerge.



The Mushroom at the End of the World by Anna Tsing, 2015



The Allure of Fungi by Alison Pouliot, 2018

In summary

With fungi as the central conceptual framework, this research has been a continual shift between gardening, drawing and writing. The insights and understanding that emerge from these practices are then collated and expanded through storytelling. By approaching the same landscape time and time again, continually shifting between modes, time and space is created for details to emerge that may otherwise go unnoticed in site analysis and documentation taking place at speed and distance.

5. THE WORK

5.1 Stories tended to in the garden

My gardening practice began tentatively and then proceeded to ebb and flow throughout the year. At first it felt intrusive or presumptuous to alter the garden in any way because I did not know this landscape or its' inhabitants. This feeling was heightened by the strong presence of a previous human gardener. A former owner of this lot, this particular man had tended to this garden for many years. He was responsible for the majority of present planting including the large olive tree that branches out over the surrounding lots, the assortment of cacti, the citrus and the pomegranate bush. When we moved in, all his tools were still resting in his shed alongside bottles and bottles of preserved olives and a stubborn, old mower. However, not long after we moved in one of those large olive branches cracked and fell, covering nearly half the yard, and I was reminded that landscapes change, regardless of whether I decide to be an active participant or not. I chose to move lightly and curiously. Rather than implement any discernible design, my intent was to support the existing ecology and learn from the plants, insects, animals and fungi by tending to the site. As I did so the garden began to feel more familiar.

Below are the paths of enquiry that a gardening practice, with the framework of fungi, took me down over the past year. Emerging from details in the garden and then developed through writing and drawing, these threads are framed by verbs that begin to draw out relationships between gardening, fungi, and landscape dynamics (rummaging, turning, framing, dispersing, decomposing).

Accompanying each verb is a loose catalogue of related photographs and working drawings. Regardless of style (or accuracy), each new drawing expanded or tested my understanding of the site, shifting my attention and prompting me to consider how these dynamics are spatialised across a range of scales. The following chapter expresses these same threads of enquiry developed into the stories held in the field guide (see 5.2). The open-ended questions that arose from this process revolve around how I choose to garden, how I intend on working with landscapes and the methods and means of landscape architecture in a broader sense. These questions are likely to be common themes in my evolving practice.

Figure opposite: dragon fruit cactus quietly flowering in back corner of the garden (16/02/21).

These photos are insights into the growth of this mycelium. The left hand side show the expansion over the course of 6 days. The right hand close ups document change over 2 days.

21.04.20

25.04.20

24.04.20

27.04.20

26.04.20

Rummaging (through rubble)

During the early days of this research project, I experimented with growing mycelium. With travel limited due to covid restrictions and local markets closed, the only source available were oyster mushrooms from the local grocer. The process began with soaking cardboard in water until the layers peeled apart. One of these pieces of cardboard was used to line the base of a container. This was then covered with tiny slivers cut from the stem of the mushrooms. This was topped with another piece of cardboard and the process of layering mushroom cuttings and card continued. After closing the lid, the container was left in a cool dark corner of the house. Only 3 days later I could see patches of mycelium breaking through the top layer of card and filling in the gaps between layers. I was hugely excited and also astonished at the vitality of this being, able to thrive off so little, especially considering the distance and time between where the original fungi had been grown (the label only specified that this took place in Australia).

Around the same time, I was looking into favourable conditions for fungi and had chosen a specific part of the garden to tend to, with the intent to eventually transplant in native fungi (this never eventuated). Thinking about the landscape through this lens prompted mappings of conditions outside the common thematics I would consider, particularly at a scale more removed from the site. Figure 10, for example, considers hardscape in comparison to soft surfaces and the cumulative effect of this at a suburban scale. Figure 11 then loosely sketches this out at the scale of the site.

As a result of these drawings, I chose to focus on the south west corner where, under the shade of a large Tuckeroo tree, leaves had been left to accumulate for years, creating a thick layer of protection. Screened by a green wall of assorted cactus and spiky bougainvillea, this area of the garden had been left undisturbed by human activity for quite some time. I believed this to mean the soil would be uncompacted and rich from the decaying organic material on top.

The top layer of leaf litter was about 10cm deep. As I swept this to one side, I uncovered not only caterpillars, spiders, slaters and worms but also muesli bar wrappers, bottle tops and even a sock. Thinking this would be the extent of the littering, I dug a small hole to investigate the soil below. The shovel failed to sink deep, instead hitting hard objects everywhere I turned. Bricks, broken bits of tiles, long metal rods, a bathroom sink. Vaguely disgusted by this suburban landfill, I laid out a blue tarp and created an inventory of all that I uncovered and removed. I then reinstated what soil was left and brushed the leaves back over to protect what I could in the meantime. When I packed up for the day and went inside, soil had gathered under my fingernails and in the creases of my toes, having seeped through my shoes and socks.

In researching the history of Sydney's waste, which had, until recently, been dealt with by burning or burying (and often recounted with an odd sense of nostalgia), I came across an article by writer Miranda Trimmier, discussed earlier, titled *Cisco Trash Map*[126]. Trimmier references anthropologist Gastón Gordillo's distinction between ruin and rubble, stating:

> *"Ruins are the idealized structures of a vaguely defined past, meant for looking but not touching; rubble is the aftermath of specific events that people live in, reuse, and form material relationships to. If treating a place as ruined makes it hard to ask what happened there, paying attention to rubble opens the question up.*
> *And paying attention to rubble, Gordillo says, is a bodily act."*[127]

126 Trimmier, "Cisco Trash Map," 2019.
127 Trimmier, "Cisco Trash Map," 2019.

With these concepts in mind, my thoughts wandered back to the mycelium weaving its way around and through the layers of card. And how this container was a microcosm of subterranean life, a small insight into the agency of rummaging taking place below the surface. With decomposers like fungi continually making rubble of organic material, a closer noticing is required to engage with the living stories of landscapes that pass by lightly, leaving little to no trace at all. This was made apparent through print making with an assortment of leaves from this corner of the garden, their edges starting to blur as they dissolve into the landscape (figure 12).

Gardening is also a bodily act, and provides one way to rummage through rubble. It is a tactile engagement with the material histories of a landscape, and in doing so, brushes against the stories implicitly entangled. Treating these material histories as “rubble” invites curious and critical engagement, in contrast to erasure or idealization.Through this direct and continual relationship, gardening has the potential to gently and incrementally inquire into the recent histories of a site, reaching beyond the superficial, and, if appropriate, repurpose the remnants left behind. While I am yet to find a new function for the bricks, tiles and rods unearthed, my rummaging did raise some interesting questions around past suburban landscape practices and what has taken place previously in this garden. All of which was previously buried.

How might rummaging uncover and acknowledge underlying or overlooked histories in a landscape?

How might the notion of rubble encourage working with both the existing materiality and stories of a landscape?

Series opposite: Catalogue of rubble 07.05.20

Figure 10: Compaction @ 1:20,000 N ↑

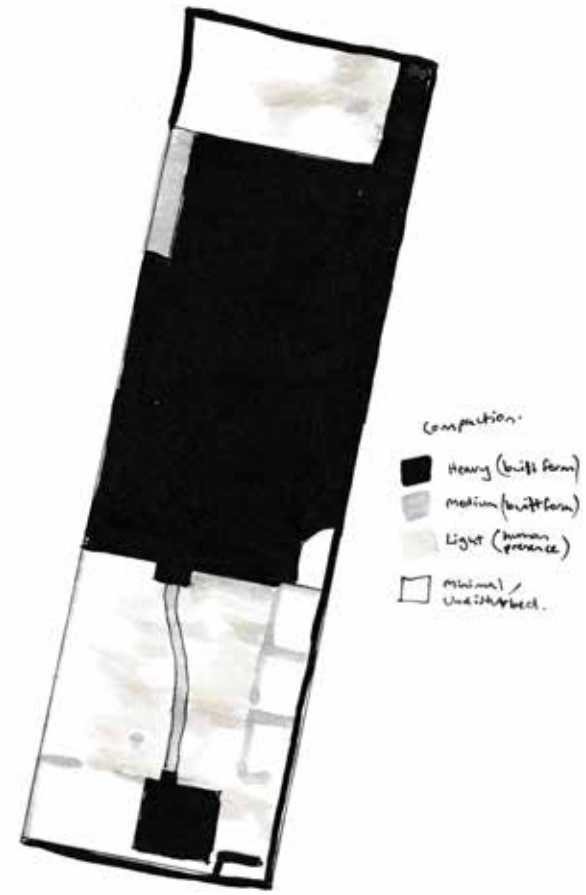


Figure 11: Compaction @ 1:300 N ↑

Figure 12: Series of Sumi Chinese black ink prints of fallen leaves around the garden @ 1:1.

The act of printing made details and textures visible to me that I would have otherwise overlooked and visualised what I would struggle to document in hand drawn sketches. The partial silohouttes hint at what isn't captured, remnants of past or unseen presences.














Turning (to pulses)

As the mycelium grew day by day, patches of density became more visible, mapping out courses of growth. The directions fungi extend are in response to a range of environmental factors. These can include the presence of water (hydrotropism), the chemical composition of rocks or minerals (chemotropism), grooves, ridges or pores (thigmotropism), light (phototropism), and gravity (gravitropism). Tropism is the turning of an organism in response to external stimulus. I wonder then what I turned towards in the garden? What moments had shifted my trajectory and all the resultant decisions and actions? And what moments had I missed or chosen to disregard, not turning to, but away?

The falling of the olive tree branch stands out as one clear turning point. My housemates and I were having lunch in the backyard when we heard a soft creaking that built into more distinct sharp cracks. When the large branch landed with a big thud, the foliage covered nearly half the yard. Seeing the branch stretched out across the ground illuminated just how much space this tree had grown to occupy up above. This tree has been held in this landscape for at least three decades, their trunk gnarled, their leaves reaching out to collect the sun and their roots supported by mycelium networks unseen below the surface.

In response to this moment, I cut down the torn branch and sawed it into segments. As I did so, I took charcoal rubbings of different parts of the olive tree (figure 13 and 14), literally embedding the trunk's surface into the paper. The rubbings accentuate the markings and texture of the bark and how this changes over time as the tree ages while also reducing the distance between the site and the drawing. Figure 15, approximately to scale, reflects the delicate rings exposed when I cut the branch into pieces. The rings of these transects hold memories of this landscape - their darkness, symmetry, thickness, and scars creating a detailed account of the area's climatic history. I used these segments to make mushroom stacks – freshly cut wood layered with the card inoculated with the mycelium from the oyster mushrooms. Concerned about the health of the olive tree I found myself much more aware of all the mature trees in the yard. I pruned back the citrus and watched the new growth rush forth before being consumed by possums and took note of the birds who seemed to visit the same trees over and over, hunting for the caterpillars and worms hiding below the tuckeroo. Turning toward the olive tree directed my attention toward so many other details in the garden.

Journalist Brian Reed explains how in antique clock making there are no manuals. Instead clockmakers rely on witness markers to guide their adjustments and fixes.

"*A witness mark could be a small dent, a hole that once held a screw. These are actual impressions and outlines and discolorations left inside the clock of pieces that might've once been there.*"[128]

128 Reed, Brian. *S-Town*. Podcast audio. Chapter 1 51:222017.

Figures opposite:
1st series: profiles of a sunflower 31/12/20, 13/01/20, 07/02/21, 06/03/21
2nd series: citrus 31/07/20, 26/11/20, 18/12/20, 08/02/21
3rd series: a fallen branch of the olive tree was cut down and used as substrate for the mycelium.


DANGER,
GAS LIVE LIVE

Aware of how it used to be, the gap in the canopy is noticeable. The cut marks where the trunk and limb met is a small reminder of a past presence, one of the witness marks throughout the garden. A reminder to turn towards pulses[129] before they fade away.

In her essay *Shimmer: when all you love is being trashed*, Deborah Bird Rose discusses how "shimmer, the ancestral power of life, arises in relationship and encounter"[130]. While this connectivity means one death leads, to another resulting in extinction cascades, it also means in tending to one life, a whole network of life and "great patterns" are entangled. Each plant is interconnected with other plants, fungi, insects, birds, or mammals. In choosing to somehow change or curate landscapes, landscape architecture engages directly with such patterns and networks of relationships, known or unknown[131]. Instead of acting on predetermined plans, a slowing of process to take notice of pulses and witness marks may highlight new directions to turn, setting in motion whole other paths of inquiry otherwise overlooked.

How am I intervening or getting out of the way in the relationships of this garden ecology, which carry on regardless of my presence?

How to document a practice of responding to, or passing by pulses and witness marks?

How might projects and modes of landscape architecture diverge and redirect over time in response to dynamic ecologies?

129 Rose, "Shimmer: When All You Love Is Being Trashed." 2017.
130 Rose, "Shimmer: When All You Love Is Being Trashed." 2017.
131 Rose, "Shimmer: When All You Love Is Being Trashed." 2017, pg. G61.

Series on opposite page: the contents of the garden shed provide an insight into the workings of a deceased gardener who previously owned this house and land. This man harvested the olives from the olive tree and stored them in great quantities, some of which remain in the garden shed (08/05/20).

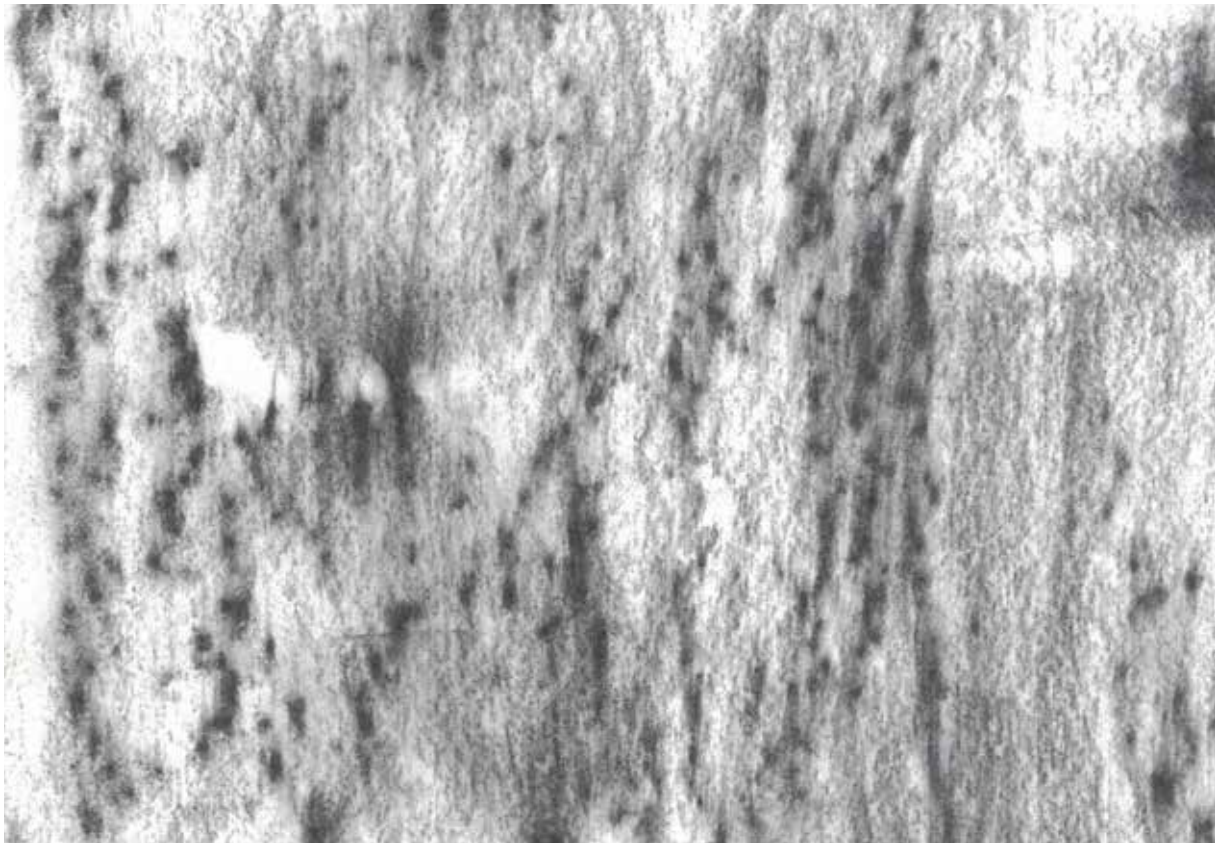


Figure 13: Charcoal rubbing of olive tree branch @ 1:1 22.04.20

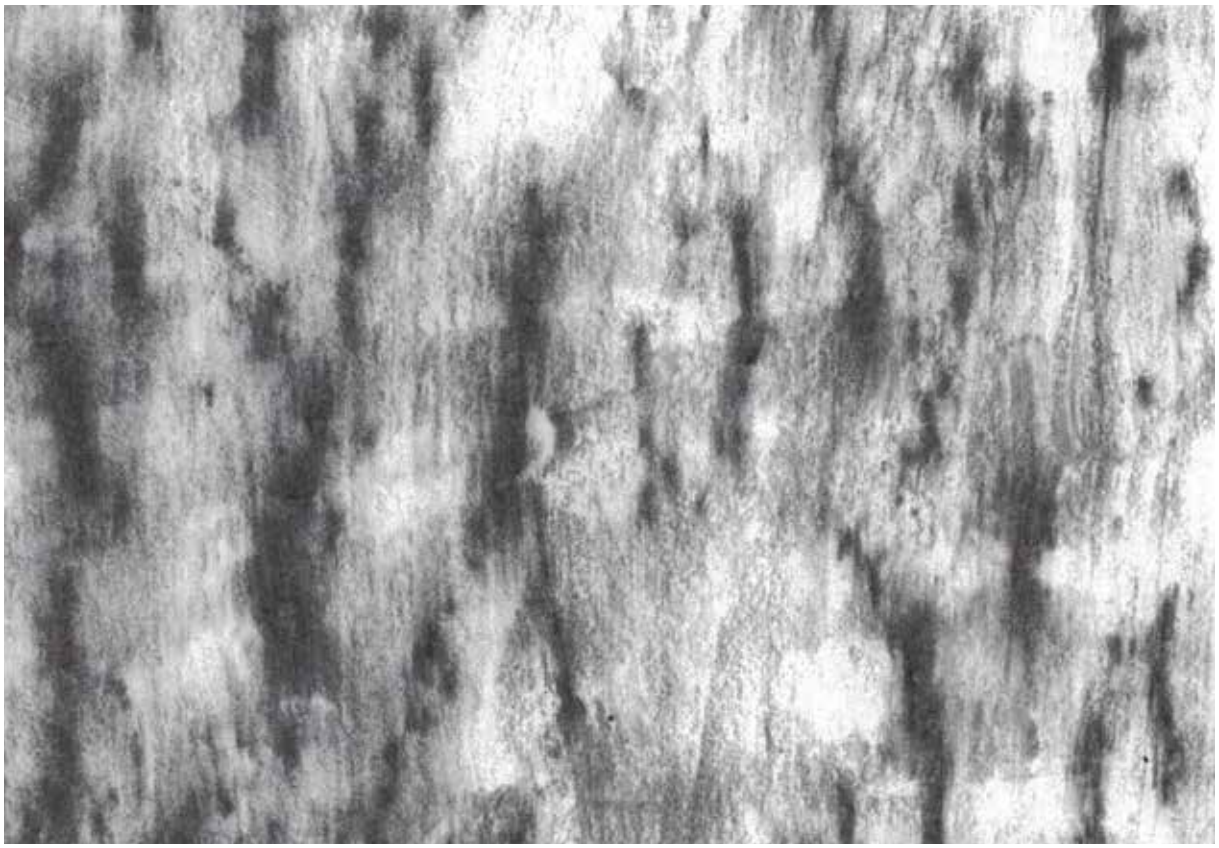


Figure 14: Charcoal rubbing of olive tree trunk @ 1:1 22.04.20

Figure 15: Ink drawing of transect from fallen olive tree branch @ 1:1

Again the process of charcoal rubbings and ink prints encouraged a close and tactile noticing, highlighting the nuances of this olive tree.









Sequence above: garden inhabitants and visitors

Sorting through the layers of soil

Moss mapping waterways

Dispersing (spores)

The mushroom stacks were left in a dark cool corner of the garden so the logs wouldn't dry out. Less than a month later they bore three mushrooms, so small I nearly missed them. Considering I had never tried this before I really hadn't expected them to fruit and again, I was taken aback by the stubbornness of this fungi to live, grow and spread.

The primary purpose of a mushroom is to produce and spread spores so that new fungi can develop. Microscopic and able to be preserved for astonishing amounts of time, spores hold the DNA blueprint of a fungi. Omnipresent, there are 1 to 10 fungal spores in every breath of air.[132] The mushroom raises the spores above the ground before releasing them to be carried away along the wind, washed along in water, or by insects, birds and any other creatures that brush past.

Drawing on the work of Gilles Clement, figure 16 and 17 on the following spread try to express these paths of movement, rather than record specific moments in the landscape. Figure 16 plays with spore dispersal by wind, the ink sprayed across part of the garden to be captured by the paper. In Figure 17, ink pools in the crevices and indentations of the paper, like water flowing across the site, following the guidance of the slope. For these drawings ink was chosen because of the inherent inexactness, leaving space for the medium to respond to the atmosphere or paper contours.

One creature of dispersal is the ant. A stone path leads from the concrete patio up through the lawn to the old shed and a trail of ants are often seen traversing back and forth across it, making their way from one burrow entrance to another. These two entrances are the only evidence of the potential labyrinth below my feet. One afternoon over the course of half an hour there was a frenzy of activity. I watched as the chemical trails left by worker ants guided others to a small plant stalk in the grass, where two winged ants were perched, one female about to fly away to start a new colony elsewhere.

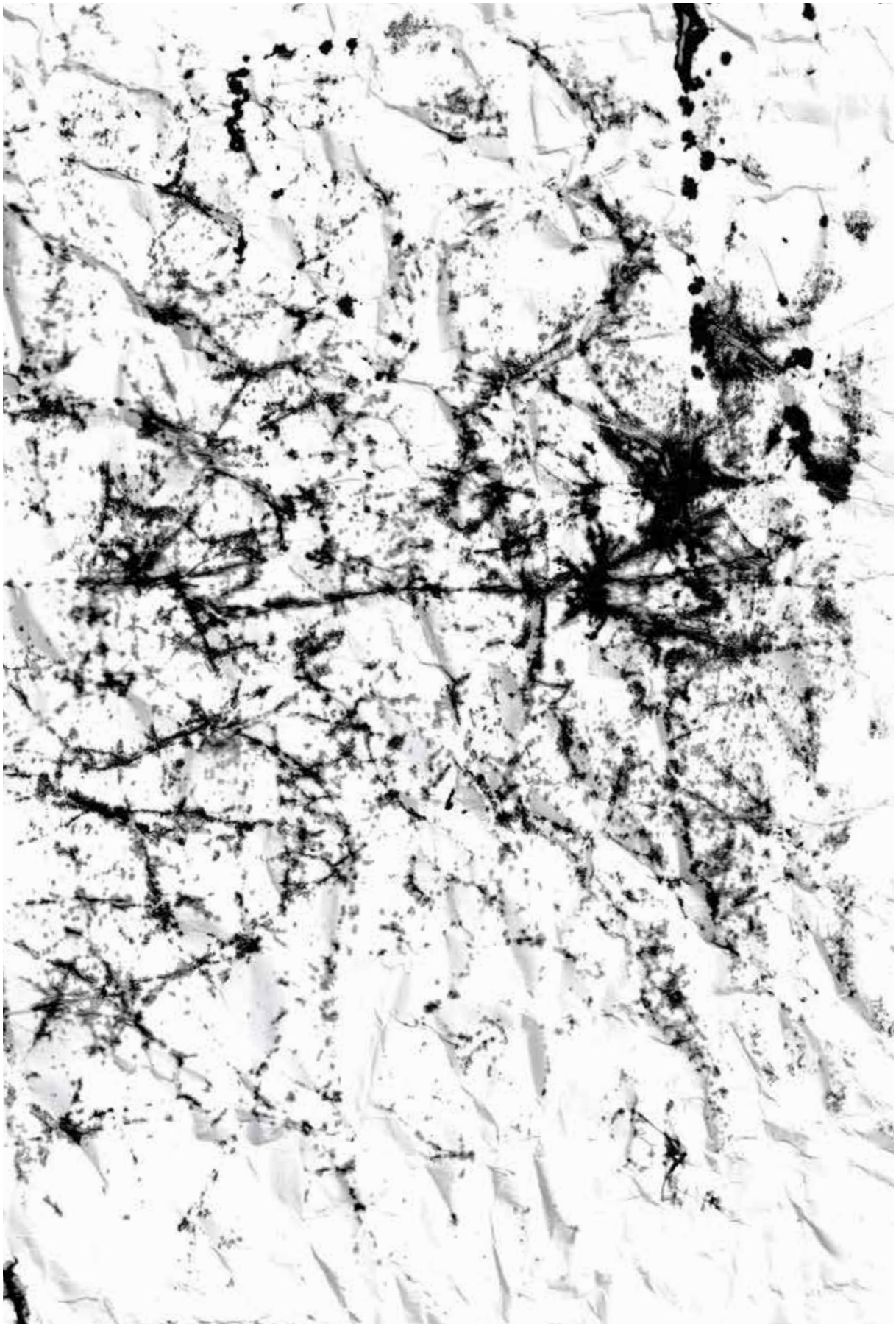
As these ants move through the garden foraging for nectar, they pollinate plants and spread spores. Alongside the rummaging of earthworms, the ants' unmapped burrows below create space for fungi to grow into and inhabit, the travels of one life making way for another. Gilles Clement discusses how "everything is conducive to travel, from marine currents to shoe soles."[133] Birds come and go each day and bats pass overhead as they leave Centennial Park each night. Even the sweeping of footpaths made me wonder about who and what was being brushed around the yard. Considering the spores sailing on unseen currents, chemical insect trails and subterranean burrows highlighted the constant movement and many paths traveled in this garden.

What visual modes can hold this constant movement? How to translate these paths of co-inhabitors into static documentation? Especially if they remain unseen.

What would it look like to design for these paths of dispersal and moments of transfer across the garden, the suburb, and the city?

132 Fröhlich-Nowoisky, Janine, Daniel A. Pickersgill, Viviane R. Després, and Ulrich Pöschl. "High Diversity of Fungi in Air Particulate Matter." Proceedings of the National Academy of Sciences 106, no. 31 (2009): 12814. https://doi.org/10.1073/pnas.0811003106. http://www.pnas.org/content/106/31/12814.abstract.
133 Clément, Gilles. "In Praise of Vagabonds." *Qui parle* 19, no. 2 (2011): 275-97, pg. 275. https://doi.org/10.5250/quiparle.19.2.0275.

Figures 16: Sumi Chinese black ink sprayed in garden onto hanging paper - testing spore dispersal by wind



Figures 17: Ink pooling in the depressions of paper like water across the site

22/10/20

31/12/20

28/03/21

31/12/20

31/12/20

13/01/21

31/07/21

13/01/21

13/01/21

31/07/21

Pollinators playground

Volunteer plants throughout the veggie patch 27/09/21

Volunteer plants throughout the lawn 25/03/21















Framing (vitality)

As set out earlier, most (if not all) plants in this garden form mycorrhizal relationships with fungi in the soil. These fungal partners help water and nourish these plants who in turn provide fungi with carbohydrates. These plant roots and mycelium also provide structure for the soil, a scaffold for the landscape. Relationships like these, that support or amplify, can take shape in a multitude of ways in the garden, spanning decades (the olive tree and AM fungi) or mere weeks (volunteer plants).

In early spring we, as a household, spent some time working in the garden. Deciding to start a veggie patch, we cleared a space off to the side that receives lots of sun. We placed wooden stakes along the fence in anticipation of tomato vines, but our compost mix was not quite ready to integrate, so we left the patch for about a month with little further thought. In that time an unruly reclamation took place with an assortment of volunteer plants staking out the veggie patch. I was intrigued by the diversity and immediacy with which this patch had been filled. In documenting the volunteer plants in the veggie patch I also took notice of other opportunistic presences in the yard. While a standard planting plan gives an idea of spatial arrangements and approximate quantity of trees and shrubs in the site, they fail to express the agency of these plants and how they came to occupy this place. Figure 18 (very loosely) assumes the intent of each planting, whether instigated by human intervention or the desire of the plant. Looking into how these plants came to be, I learnt that the type of plant can hint at the soil conditions below. A plant whose root system extends vertically (such as dandelions) work to decompress and aerate, indicating compacted soil. When these root systems eventually decompose, they create channels for water, nutrients, and weaker root systems[134]. Inversely, a plant whose roots extend horizontally stabilize and prevent erosion, indicating loose soil. These volunteer plants also speak to the pH and nutrient balance of the soil[135].

Unfortunately, these plants were removed, in favour of other herbs and veggies. When I removed them, I was struck by the intricacy of their root systems, growing ever finer, as well as the extent they reach. Figure 19 documents one such presence. So easily removed, these plants seem destined to live and die in gardens with intensity and speed. But in that short time they fill an absence. They hold space, opting to grow where other plants cannot and support the soil while they can. It is this stubborn and hasty reclamation of space that has made me fall in love with volunteer plants or 'vagabonds'[136]. Where these plants do not overrun other species, they support the ecology, adding diversity and occupying an ecological niche[137]. To do so with an uncertain future seems appropriate in a garden likely to be removed and developed in the near future.

Recently sold to a potential developer, the 1-storey house and garden looks to be replaced with an apartment block, the olive trees canopy substituted with brick and concrete. Knowing this is the most likely outcome over the next couple of years sets up an intriguing premise for gardening. What does it mean to tend to an ecology like to be forced out? While the birds and insects may find new trees to nest in and gardens to pollinate, what will happen to the plants and fungi that are grounded in the soil? How can the existing inhabitants be supported and amplified in the face of eviction? Some of the frameworks of support already in place provide guidance. The relationship between fungi and the trees spanning decades are a form of long-term infrastructure and work in conjunction with the volunteer plants supporting the soil, who are, for the most part, a short-term intervention. Together they set up a frame for vitality, acting with immediacy and resilience.

How can I, as a gardener, support this ecology as it exists right now?
What can I do to support the future of this ecology, even after I am no longer directly involved in its care?
How can landscape architecture act quickly to support existing vitality and also embed long-term frameworks for continuing ecological health?

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134 "Using Weeds to Read the Soil: Some Basic Concepts to Get Started." Permaculture News, Permaculture Research Institute, 2017, 2020, https://www.permaculturenews.org/2017/04/14/using-weeds-read-soil-basic-concepts-get-started/.
135 "Gardening Australia." In *Read Your Weeds*, ABC, Fri 9 Oct 2020. https://www.abc.net.au/gardening/factsheets/read-your-weeds/12745698.
136 Clément, "In Praise of Vagabonds." 2011.
137 Comte, "Gilles Clement, the Garden in Movement." 2013.
Series opposite: Inventory of volunteer plants that have appeared over the last 12 months

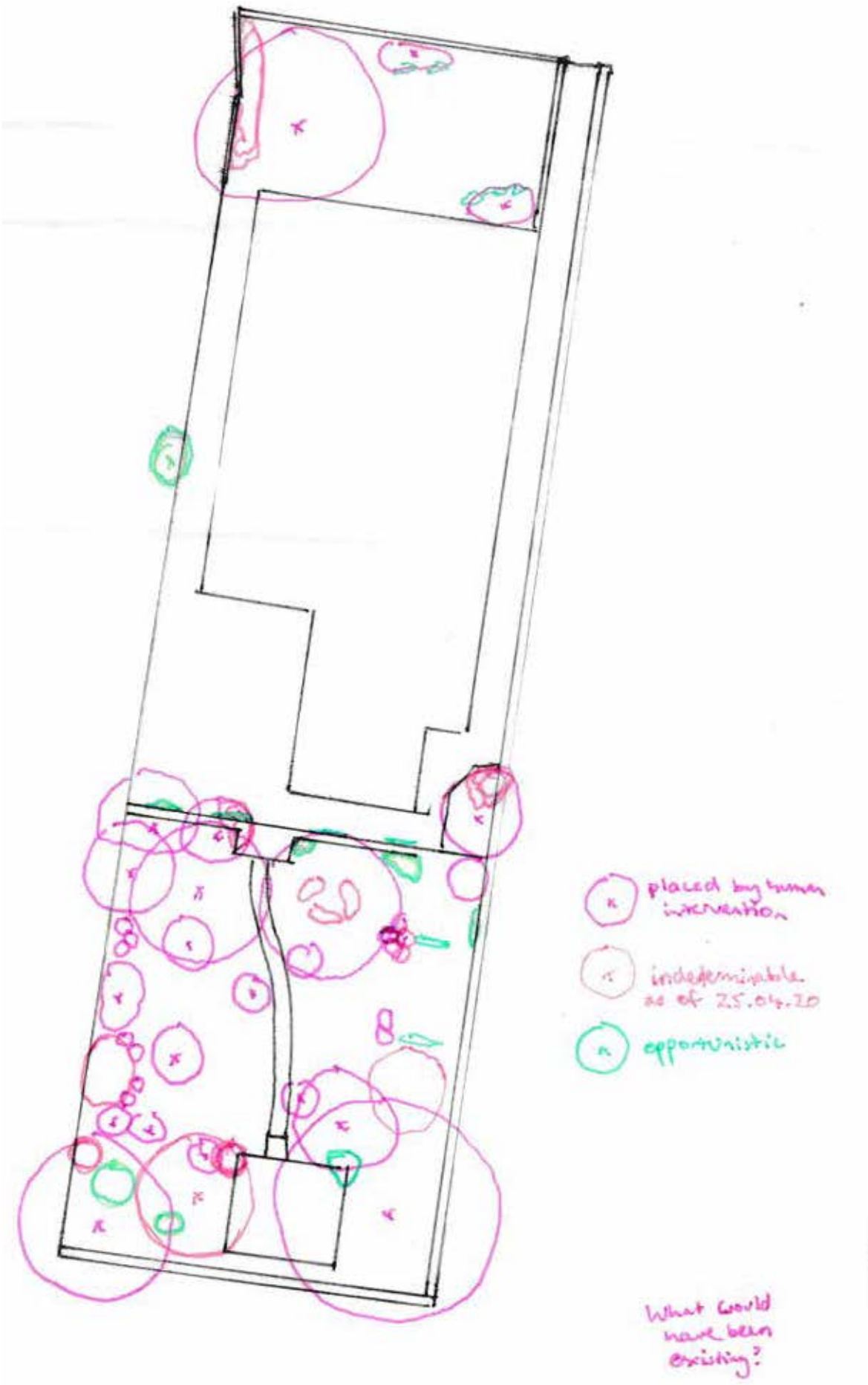
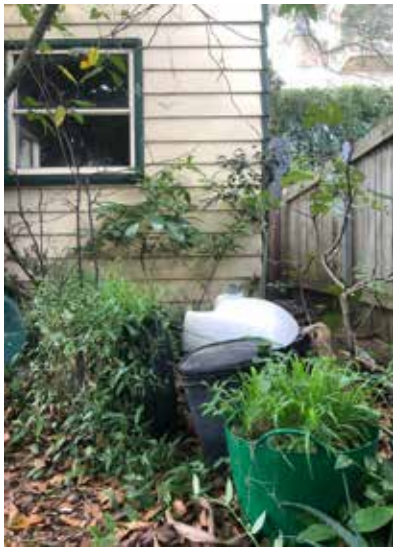


Figure 18: Intent of occupation @ 1:150 N ↑. This drawing began to locate areas more prone to volunteer plants. Are these points along common paths of dispersal? Are they areas more commonly overlooked by human inhabitors?

Figure 19: Sumi Chinese black ink print of volunteer plant removed from the lawn @ 1:1

Examples where my actions did subscribe to Nassauer's observation of maintaining "neat, orderly" landscapes and resulted in the reduction of plant coverage (both existing and recent volunteers).



Decomposing (boundaries)

Most fungi are decomposers, breaking down organic material and returning minerals and nutrients back into the soil that would otherwise not be recycled. Essential for the balance and health of ecosystems, fungi unmake. Approaching the garden with respect for decay shifted my perspective. Decay was everywhere. It seems to be the only constant, and vitality diversity seemed to be found where this decay was most abundant. The southwest corner, for example, despite being a suburban landfill, had the highest concentration of leaf litter and is the most obvious home for a diverse range of insects (caterpillars, snails, slaters, worms, spiders). The leaves on the ground document the stages of decay, their edges start as sharp and bright becoming dry, frail and jagged before softening into the soil.

In this same corner are the three compost bins. With five adults living in the house, we produce a substantial amount of food waste such as banana skins, apple cores and veggie off cuts. All of this is emptied into these three compost bins along with dry organic material collected from our garden. Left to decompose, the microbial break down creates heat, warming each bin. Eventually this compost is fed back into the soil and used to sustain further life.

This speed of this decay contrasts with the very gradual decline of the brick wall running along the east boundary line. However, as the brick wall deteriorates connections emerge across a variety of scales. For example, the minerals of the bricks are slowly degraded by fungal hyphae which seek out these grooves and grow towards the weak points. They work their way in by slowing tunneling, mining through mineral material to break down surfaces, and in doing so create space for soil and seeds to rest. Again the act of print making asked questions of this boundary at 1:1. Figures 20-24 are taken along the brick wall and the adjoining concrete path, and highlight a texture and porosity to these hard surfaces. Instead of a stable defined medium they are worn and irregular.

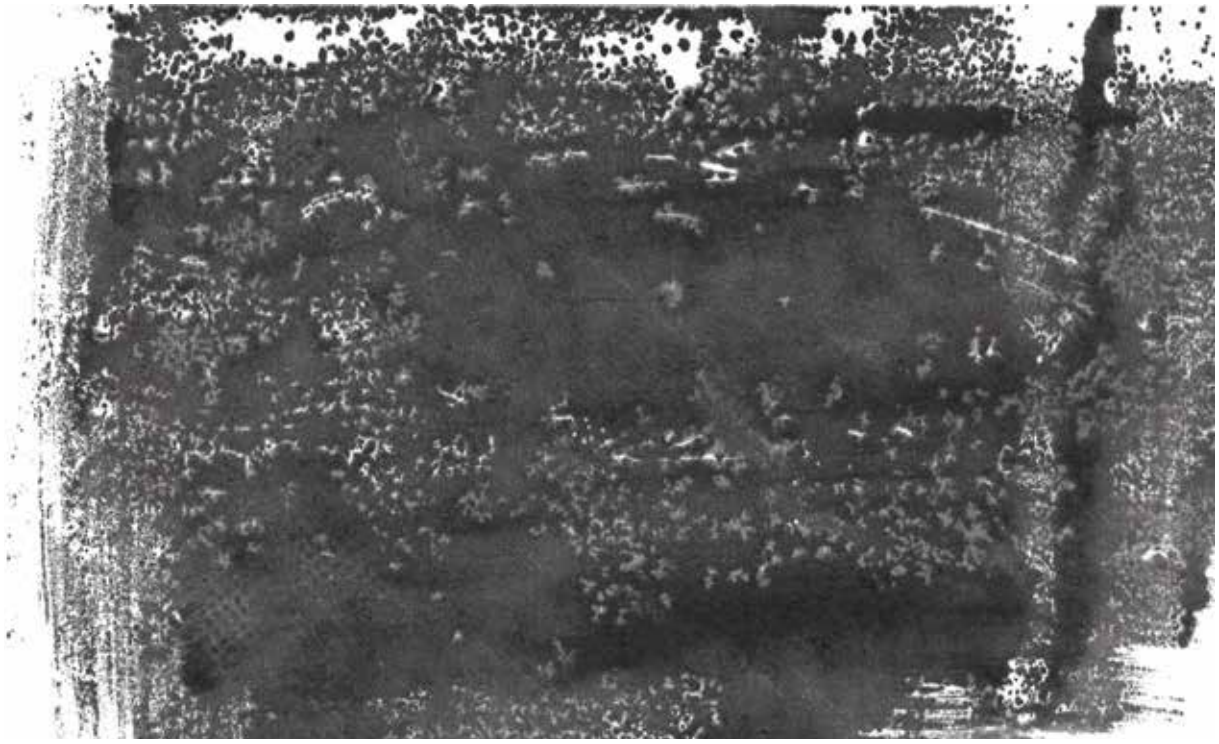
These nooks and crannies become occupied by an assortment of plants, living within the boundary. In other areas of the wall, bricks are pushed out of place by tree roots and star jasmine weaves its way between neighbouring lots. Passing fauna dismiss the wall completely, coming and going from each garden. Figure 25 is a loose account of moments where the site's boundary is questioned by plants. When considered next to a mapping of lot boundaries at the suburban scale (figure 26), this sketch highlights the agency of gardens and the possibility for connected local ecologies and inversely, how the maintenance of human imposed boundaries disturb networks of ecology.

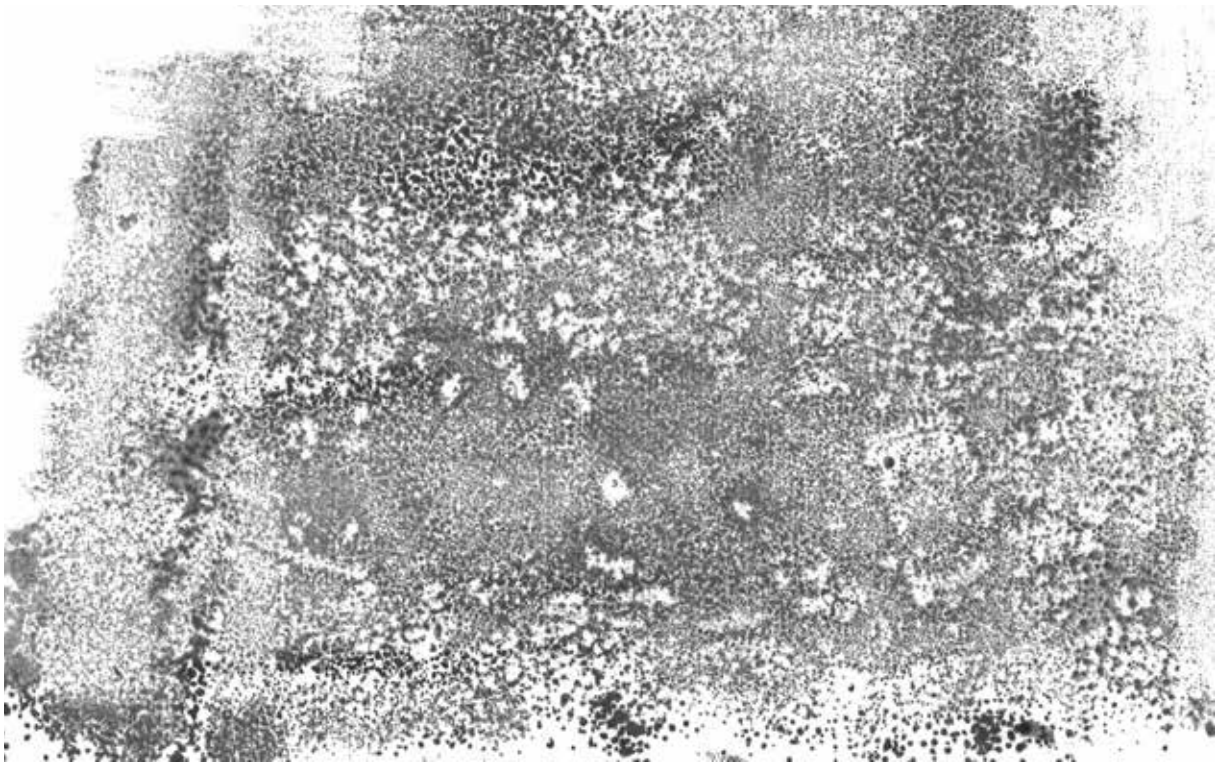
When presented as a thin straight line within thousands on a cadastral map this boundary has a certain dominance. Its presence sets out a clear hierarchy within the landscape about who lays claim to the white space it bounds. However, a shift in scale makes this meeting much more vibrant. This boundary has a thickness, a movement, and a porosity. It is where ways of knowing meet and mingle so that what initially seemed to be a hard edge is actually in a continual state of flux, being made and unmade, inhabited and bypassed. A shift in scale and slight decay enables connection and lets vitality seep through.

At what scales is a moving landscape and ecology uninhibited by human imposed boundaries?

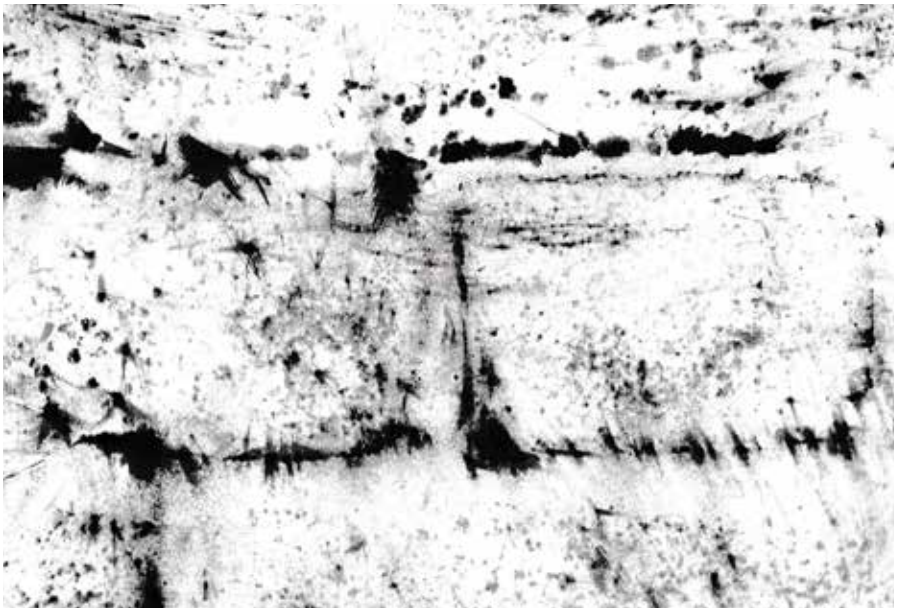
How to comingle within and around the boundaries between ways of knowing?

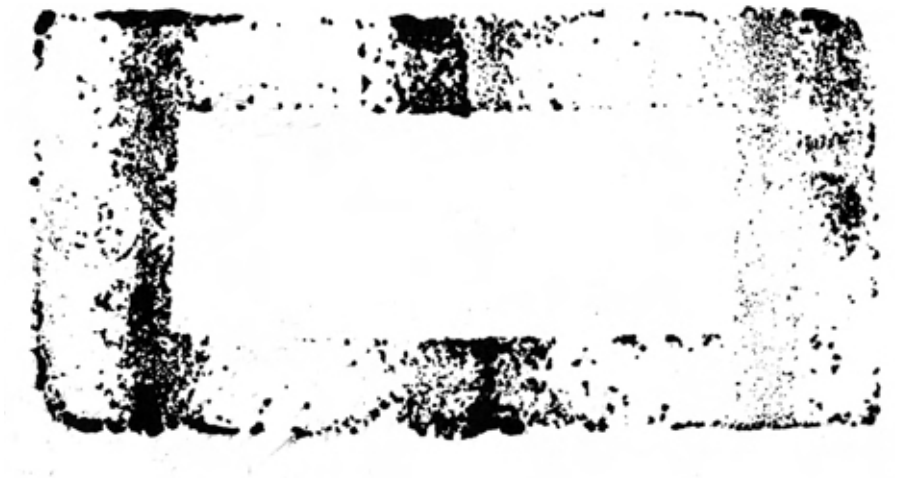
Series opposite: Volunteer plants in the boundary





Figures 20 & 21: First and second impressions of ink prints from concrete path @ 1:1





Figures 22, 23 & 24: Exploring porosity through black ink prints of brick wall @ 1:2

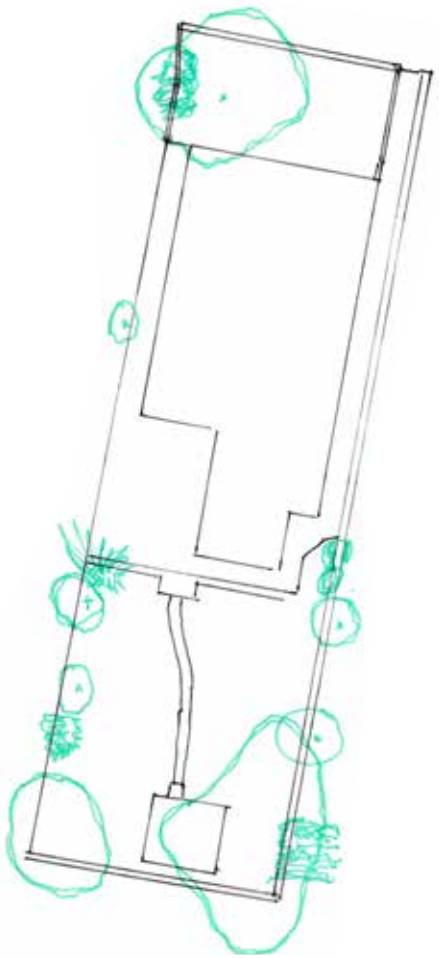


Figure 25: Plants questioning boundaries @ 1:300 N ↑

Figure 26: Barriers to connection @ 1:20,000 N ↑

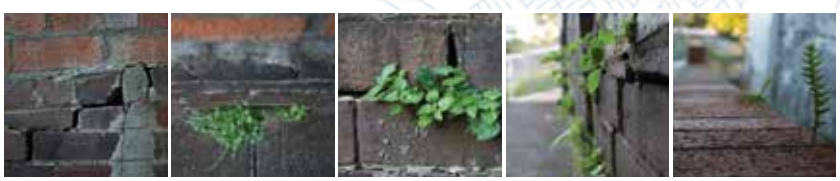


Figure 27 is an excerpt from an early iteration of the story *Decomposing boundaries*. This story explores the manifestation of barriers and connections across multiple scales and how fungi, plants and landscape dynamics continually make and unmake these thresholds. Moments of disruption by plants are set out in photos. This iteration felt too crowded and faint, lacking the vitality and thickness of the boundary line.

Figure 27: Excerpt from iteration of *Composting boundaries* story section with moments of disruption by plants set out in photos

Figure 28: Excerpt from previous iteration of *Decomposing boundaries*

Figure 28 is yet another iteration of *Decomposing boundaries*, informed by the compositions of Matthew Rangel (discussed in *Chapter 4. Method and methodology)*. With the concertina format, the first spread is actually the first and last internal page side by side, the story within yet to unfold. The intent was to layer different scales of decomposition together, from the microscopic to the suburban. However, again this drawing felt too crowded, and the leaps between scales too jarring.

Figure 29 on the following spread is an early attempt at mapping story moments. The plan view was used to set out 1x1m grids, to then draw or photograph in more detail. The numbers located where soil samples were taken and the red boxes set out the flow of organic material across the site, from kitchen or garden to the compost bin, to the veggie patch and back to the kitchen. In this interation, the plan view flattens the site, failing to convey the depth and vitality of this garden. However, the patches of colour on a black and white background did quickly accentuate specific details and moments within the broader landscape.

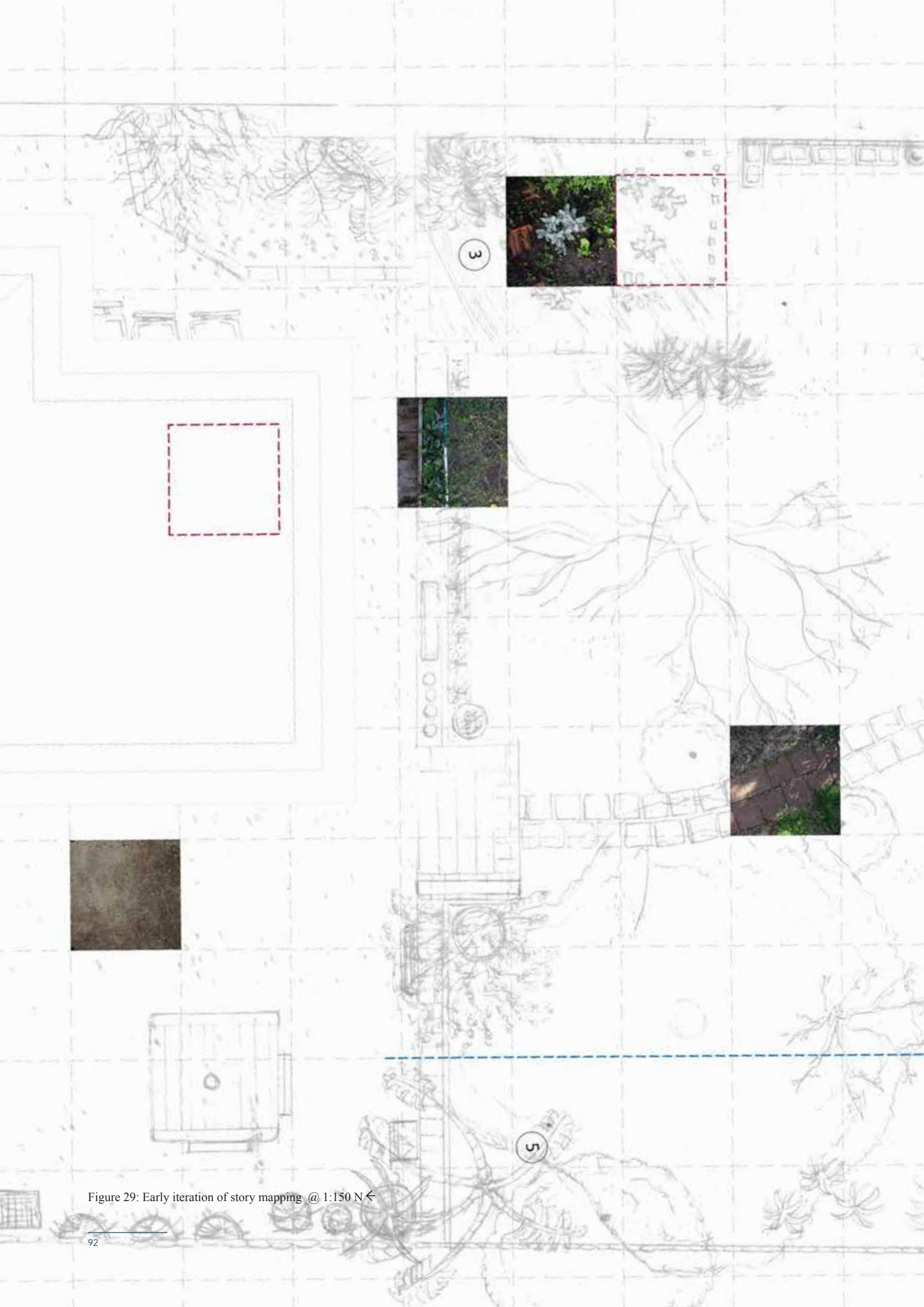


Figure 29: Early iteration of story mapping @ 1:150 N ←

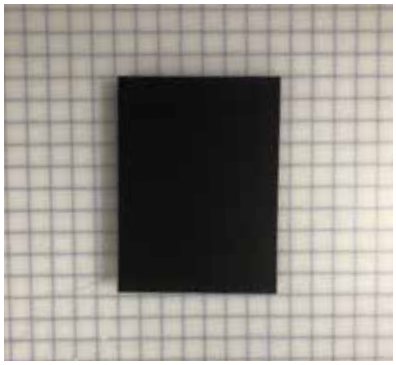

4
1
2

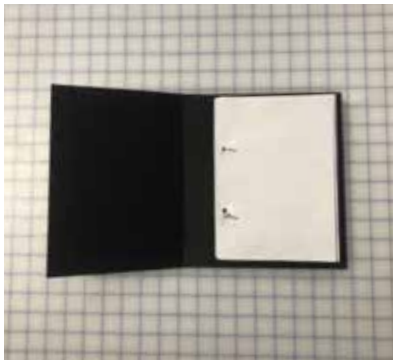
5.2 Stories held in the field guide

This chapter contains a brief overview and excerpts from the five stories held in the field guide. At this point, after a lot of testing in terms of drawing styles, I came to the conclusion that, rather than a collage of different techniques and different perspectives, a consistent graphic language and approach worked better to hold the distinct but connected stories together. I choose to use predominantly black line drawings, based on the precedents of Yukiko Suto, as the basis for site plans, story sections and elevations.

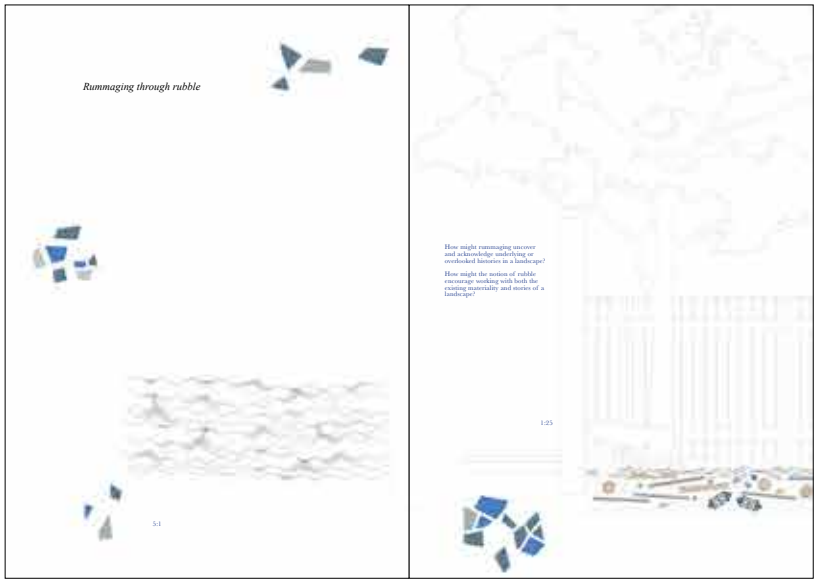
The visual format for each story is similar. They begin with a moment tied to fungi in the site. For example, in the story *Rummaging through rubble* this moment of entry is mycelium weaving between layers of cardboard, propagated from an oyster mushroom. In *Dispersing spores* this moment is fungi fruiting from the mushroom stacks. This drawing unfolds out with a graphic chosen to represent the verb in focus. This representation weaves through the story, eventually tying into an elevation of the site, locating where I first understood this dynamic to manifest in my gardening practice. The verb in focus is represented at three different scales in each story – that of fungi, an ambiguous representation and at the scale of my gardening practice. Drawing the same dynamic across a range of scales questioned my understanding of these dynamics, reframing them each time.

The underside of the stories is yet another line drawing, this time in plan view, so that when the stories are laid out together, they form an overview of the site. In this plan the verbs are spatialised and compiled. Five colours, pulled from the photos in each story, are used to highlight where those dynamics are most noticable in the site.

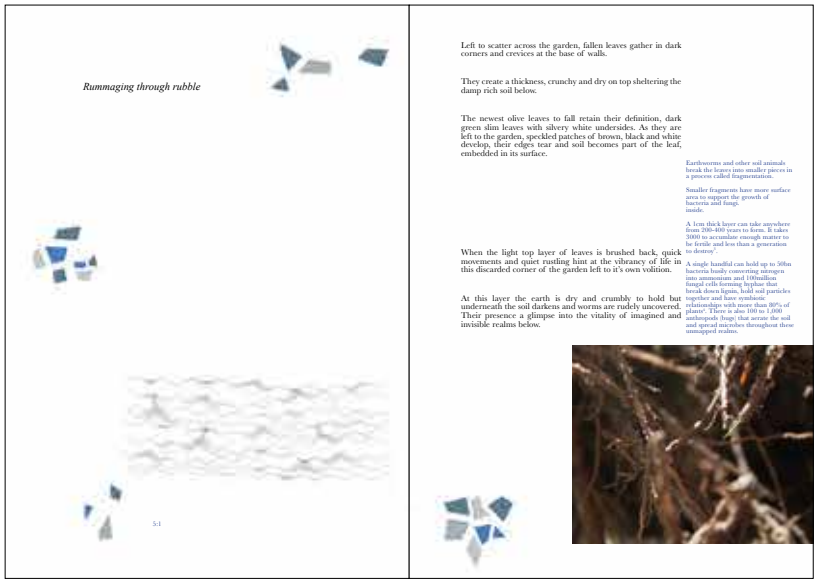




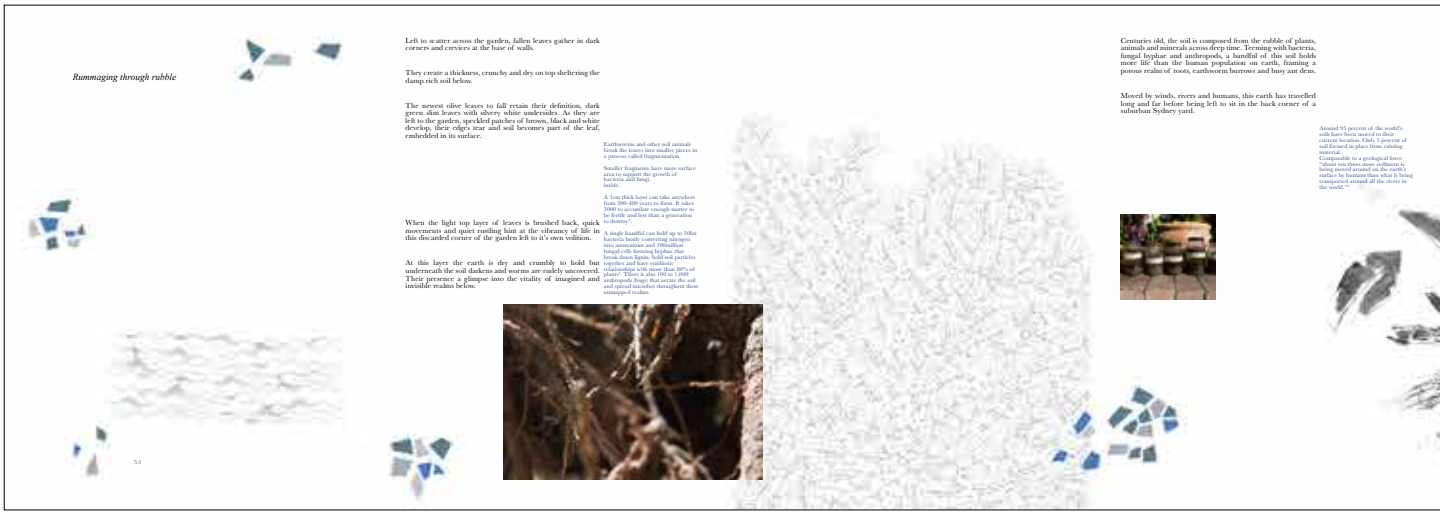
Figures adjacent: An iteration of the field guide unfolding
Figure opposite: the citrus tree in the garden that holds Spanish moss across their branches was decorated for Christmas (25/03/21).



Pages 1 & 8 of *Rummaging through rubble*

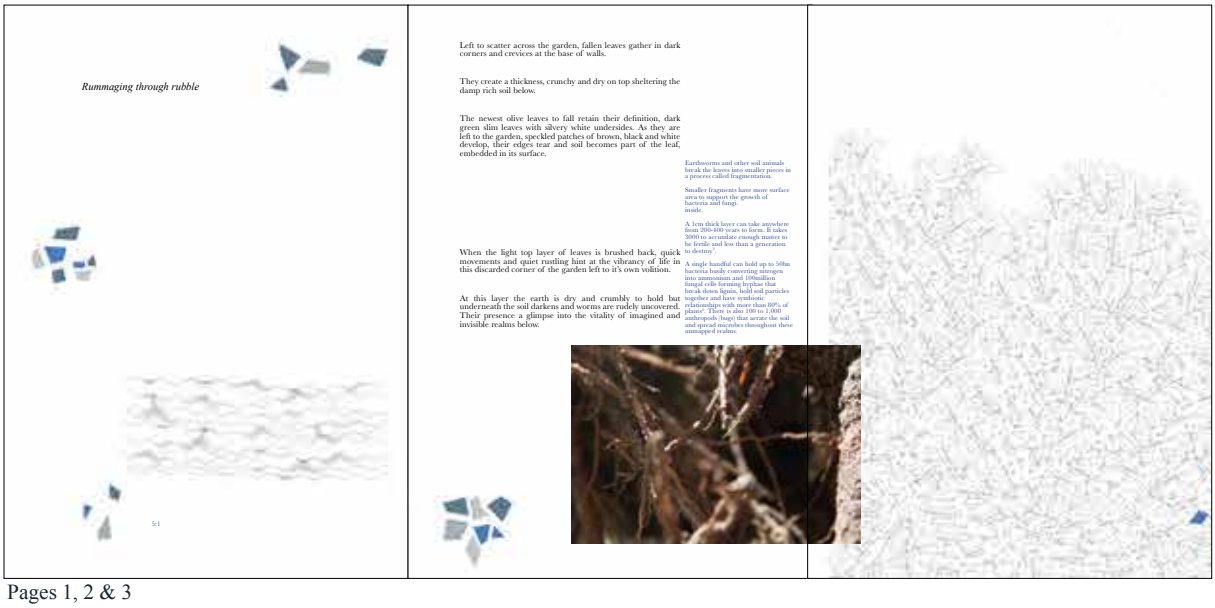


Pages 1 & 2



Pages 1- 8

As the concertina unfolds, the first spread places the first (1) and last (8) page side by side. These pages work as two seperate panels and one single drawing. The next spread is pages 1 & 2 side by side. The format of the folds means pages 1, 2 & 3 also form a single spread. To view the field guide in more detail see Appendix 1.



Pages 1, 2 & 3

Dispersing with spores

A stone path leads from the concrete patio up through the lawn to the old shed. A trail of ants are often seen traversing back and forth across it, making their way from one burrow entrance to another. These two entrances are the only evidence of a potential labyrinth underneath.

One afternoon over the course of half an hour there is frenzy of activity as the chemical trails left by worker ants guide others to a small plant stalk in the grass. Two winged ants are perched, one female about to fly away to start a new colony elsewhere.

As these ants move through the garden foraging for nectar, they pollinate plants and spread spores. Alongside the rummaging of earthworms, the ants unmapped burrows create space for fungi to grow into and inhabit, the travels of one life making way for another both above and below the surface.

Aphids suck the sap out of the stems of plants and flowers and produce honeydew - a nectar-rich resource for the ants. In return, ants will protect aphids whilst they are feeding from predators such as the common spotted ladybird.

Worker ants constantly build nests to accommodate their growing colony. They dig a labinythn of tunnels that aerate the soils and allow moisture to get to the roots of plants. These pores create space for mycelium to inhabit.

Chemical trails left by female worker ants guide others to and from the nest when seeking and collecting food. Ants help pollinate plants as they forage for nectar and spread the sweet-tasting seeds many wild plants have symbiotically evolved for this purpose.

Pages 1 & 2 of *Dispersing spores*

Decomposing boundaries

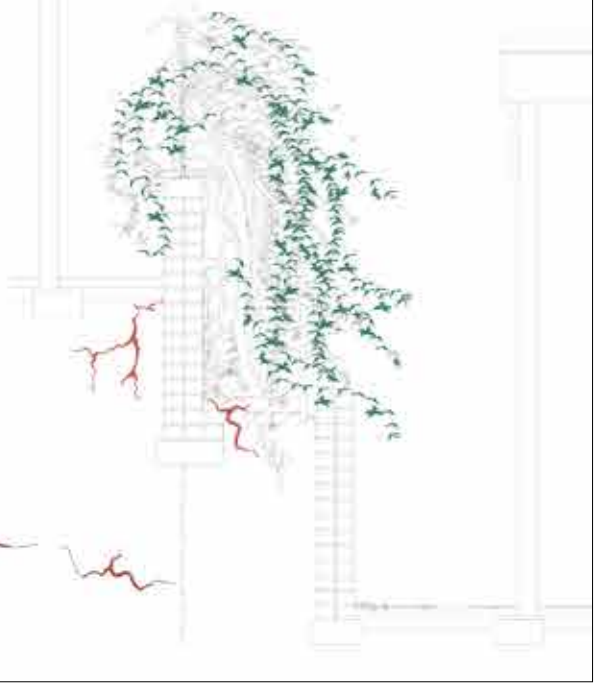
750:1

Based off a scanning electron micrograph from Landweert et al. 2001. Captures "branching hyphae that embrace and penetrate a mineral particle."[16] Fungi seem to enter the particle at upper left and center left.

At what scales is a moving landscape and ecology uninhibited by human imposed boundaries?

How to comingle within and around the boundaries between ways of knowing?

1:25

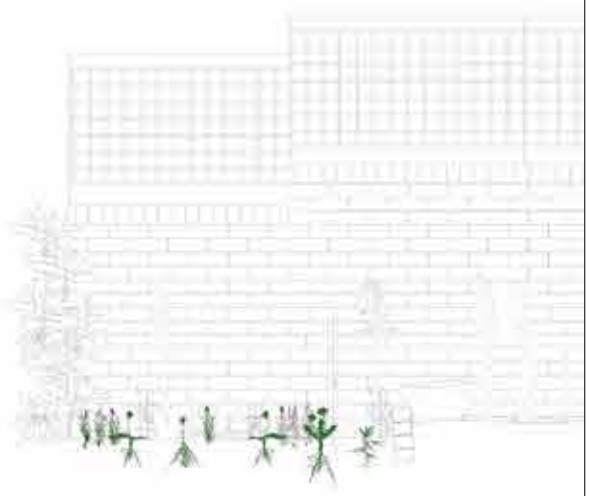


Pages 1 & 8 of *Decomposing boundaries*

"To heap onto the abuse of the environment an abuse of the beings who, nevertheless, manage to live there, surely is to condemn the territory to sterility."[11]

Gilles Clement, *In praise of vagabonds*

Recently sold to a potential developer, the 1-storey house and garden looks to be replaced with an apartment block, the olive trees canopy substituted with brick and concrete. Knowing this is the most likely outcome over the next couple of years sets up an intriguing premise for gardening. What does it mean to tend to an ecology likely to be forced out? While the birds and insects may find new trees to nest in and gardens to pollinate what will happen to the plants and fungi that are grounded in the soil? How can the existing inhabitants be supported and amplified in the face of eviction? Some of the frameworks of support already in place provide guidance. Long-term infrastructure in the form of the relationship between fungi, plants and trees spanning years, even decades, work in conjunction with the volunteer plants who are, for the most part, a short-term intervention. Together they set up a frame for vitality, acting with immediacy and resilience.



How can I, as a gardener, support this ecology as it exists right now?

What can I do to support the future of this ecology, even after I am no longer directly involved in its care?

1:25

How can landscape architecture act quickly to support existing vitality and also embed long-term frameworks for continuing ecological health?

Pages 7 & 8 of *Framing vitality*

Rummaging through rubble

Left to scatter across the garden, fallen leaves gather in dark corners and crevices at the base of walls.

They create a thickness, crunchy and dry on top sheltering the damp rich soil below.

The newest olive leaves to fall retain their definition, dark green slim leaves with silvery white undersides. As they are left to the garden, speckled patches of brown, black and white develop, their edges tear and soil becomes part of the leaf, embedded in its surface.

Earthworms and other soil animals break the leaves into smaller pieces in a process called fragmentation.

Smaller fragments have more surface area to support the growth of bacteria and fungi.
inside.

A 1cm thick layer can take anywhere from 200-400 years to form. It takes 3000 to accumlate enough matter to be fertile and less than a generation to destroy[3].

When the light top layer of leaves is brushed back, quick movements and quiet rustling hint at the vibrancy of life in this discarded corner of the garden left to it's own volition.

A single handful can hold up to 50bn bacteria busily converting nitrogen into ammonium and 100million fungal cells forming hyphae that break down lignin, hold soil particles together and have symbiotic relationships with more than 80% of plants[4]. There is also 100 to 1,000 anthropods (bugs) that aerate the soil and spread microbes throughout these unmapped realms.

At this layer the earth is dry and crumbly to hold but underneath the soil darkens and worms are rudely uncovered. Their presence a glimpse into the vitality of imagined and invisible realms below.

Centuries old, the soil is composed from the rubble of plants, animals and minerals across deep time. Teeming with bacteria, fungal hyphae and anthropods, a handful of this soil holds more life than the human population on earth, framing a porous realm of roots, earthworm burrows and busy ant dens.

Moved by winds, rivers and humans, this earth has travelled long and far before being left to sit in the back corner of a suburban Sydney yard.

Around 95 percent of the world's soils have been moved to their current location. Only 5 percent of soil formed in place from existing material.
Comparable to a geological force "about ten times more sediment is being moved around on the earth's surface by humans than what is being transported around all the rivers in the world."[2]

A shallow dig uncovers remnants of a very recent past, when it was common practice for households to either burn or bury their rubbish. Odd nostalgia surrounds this weekend ritual which has left a layer of artificial geology underneath the garden.

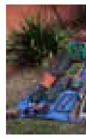
Long metal rods, old fence palings, shattered corrugated plastic, chipped bricks, a bathroom sink, roof tiles, broken furniture, pieces of disintegrated clothing, a pair of lanterns, glass bottles and tennis balls.

Widespread incineration was introduced to Sydney when Bubonic Plague broke out in 1901 with the construction of a 'destructor' at inner-city Moore Park. Incinerators were still in use until the 1990s.

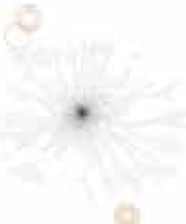
Laid out on a blue tarp spread ac
findings form an odd catalogue of
a road map to the recent human l

This unearthing of human r
subterranean life, the movemen
air and the shovel tearing throug
mycorrhizal networks.

Hidden from sight just below th
through soil alongside other critter
rebuilding. With decomposers like
rubble of organic material, a clo
engage with the living stories of lan
leaving little to no trace at all.



Turning to pulses



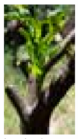
The house is on a hill, two lots from the very top. A huge olive tree sits in the far back corner, the canopy spreading out above the rooflines, locating this house in a dense suburban block. This tree shades the garden with dappled light and is a resting place for the passing birds.

One windy afternoon in autumn, the olive tree split. A huge limb reaching out over the garden began to creak before crashing down with a deep thud. Leaving a massive gap in the canopy above, the branch stretched out across the ground covering a third of the back yard.

This tree has been held in this landscape for at least three decades, their trunk gnarled, their leaves reaching out to collect the sun and their roots supported by mycelium networks unseen below the surface.

Olive trees are the oldest cultivated trees in existence and can live for thousands of years.[5]

Olive and citrus trees are particularly mycotrophic, forming symbiotic relationships with endomycorrhizal fungi (aka arbuscular mycorrhizal fungi or AM). AM fungi associate with over 90% of plant species, including vegetables, grasses and many ornamentals. In a mycorrhizal association, the fungal mycelia use their extensive network of hyphae and large surface area in contact with the soil to channel water and essential minerals like nitrogen and phosphorus from decaying matter in the soil into the plant. In exchange, the plant supplies the products of photosynthesis to fuel the metabolism of the fungus.



Soon after this branch was cut down and sawn into segments. Each cut revealed transects with fine lined rings - detailed memory of the trees life. The different line thicknesses and shapes of rings recording periods of growth, stress, disturbance and the surrounding landscape in movement.

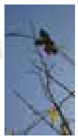
The shorter segments were used to create mushroom logs, cardboard innoculated with mycelium layered between the olive branch remnants.

Concern for the health of the olive tree expanded into an awareness of all the mature trees in the yard. This prompted the pruning back of the citrus, watching the new growth rush forth before being consumed by possums. It also led to a log book of birds who seemed to visit the same trees over and over, hunting for the caterpillars and worms hiding below the tuckeroo.

Shifts in this garden, like the falling of the olive branch, exist in the context of relationships. Turning toward the olive tree directed attention toward so many other interconnected details, the ripple effect setting new paths of tending in motion.

Journalist Brian Reed explains how in antique clock making there are no manuals. Instead clockmakers rely on witness markers to guide their adjustments and fixes.

"A witness mark could be a small dent, a hole that once held a screw. These are actual impressions and outlines and discolorations left inside the clock of pieces that might've once been there. They are clues to what was in the clockmaker's mind when he first created the thing."[6]

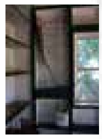


Aware of how it used to be, the gap in the canopy is noticeable. The cut marks where the trunk and limb met is a small reminder of a past presence, one of the witness marks throughout the garden.

Other witness marks hint at a previous inhabitor - one who planted this olive tree. This gardener was Italian man, who's presence is felt most through the predominantly exotic plants, the struggling citrus and the mysterious garden shed whose door is adorned with oyster shells.

This shed is a time capsule of a gardeners' methods. Well lived in, the organised garden shed is home to an inventory of tools hanging from nails alongside jars upon jars of preserved olives. It houses a rusty lawnmower, a big basin, a fridge, a landline, old cabinents, a blackboard with family members phone numbers and cut outs from magazines thumbtacked to the back of the shed door. One window looks out across the garden back to the house and the other to the shaded corner where the tuckeroo sits.

This shed speaks of pottering, noticing, reading, pruning, shaping and being. Time spent tending to these plants and the soil.



6:1

Dispersing with spores

Lysurus mokusin spores (found within 1km radius)

Leucocoprinus birnbaumii spores (found within 5km radius)

Aseroe rubra spores (found within 1km radius)

1000:1

A stone path leads from the concrete patio up through the lawn to the old shed. A trail of ants are often seen traversing back and forth across it, making their way from one burrow entrance to another. These two entrances are the only evidence of a potential labyrinth underneath.

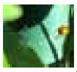
One afternoon over the course of half an hour there is frenzy of activity as the chemical trails left by worker ants guide others to a small plant stalk in the grass. Two winged ants are perched, one female about to fly away to start a new colony elsewhere.

As these ants move through the garden foraging for nectar, they pollinate plants and spread spores. Alongside the rummaging of earthworms, the ants unmapped burrows create space for fungi to grow into and inhabit, the travels of one life making way for another both above and below the surface.

Aphids suck the sap out of the stems of plants and flowers and produce honeydew - a nectar-rich resource for the ants. In return, ants will protect aphids whilst they are feeding from predators such as the common spotted ladybird.

Worker ants constantly build nests to accommodate their growing colony. They dig a labinythn of tunnels that aerate the soils and allow moisture to get to the roots of plants. These pores create space for mycelium to inhabit.

Chemical trails left by female worker ants guide others to and from the nest when seeking and collecting food. Ants help pollinate plants as they forage for nectar and spread the sweet-tasting seeds many wild plants have symbiotically evolved for this purpose.



Even on the most still day there is a movement to this garden. When the lid is taken off the compost bin tiny flies swarm upwards while silvertails scurry through the decaying food scraps.

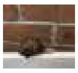
One May afternoon a red wattle bird chases a moth through the sky above the patio and catches it mid flight, both aerialists spreading pollen and spores on their journeys.

The currawongs move with much less haste, casually passing by to peck about the base of the tuckeroo tree in search of rolling caterpillers or slow, steady snails hidden in the veggie patch. One of these currawongs may be responsible for the fig growing out of the sheds drainpipe, or the spindly tree sprouting out of a crack in our neighbours pathway, both the result of a seed dropped in passing.

In any garden compost heap there will be millions of springtails which accidentally pick up fungal spores and take them to the roots of plants.

The foliage and flowers of tuckeroo trees are food for a number of Australian caterpillars. Caterpillar are mostly harmful to garden plants yet develop into moths or butterflies that pollinate the garden. Tuckeroo seeds are dispersed by several species of birds, attracted to its brightly coloured fruit.

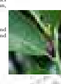
Fig seeds can germinate high on the branches of other trees. The sticky seeds are dispersed by a variety of fruit-eating birds and bats.



Slower again, yet with much more force, bats fly past at dusk on most warmer nights. They head south from Centennial Park on their route from one roost to another, their silhouettes set against the darkening purple sky.

But it is not just the animals and insects in movement. The spanish moss hanging from a citrus tree breaks apart and pieces float along on the wind to settle else where. The grasses spread filling in gaps, the shrubs expand and the trees canopies reach out. The leaves made flexible to turn towards the sun, collecting its rays.

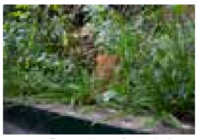
Even the soil is in movement, permeating shoes and socks and tracked through the house, or caught in the currents of wind and water to settle elsewhere.



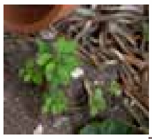
Framing vitality

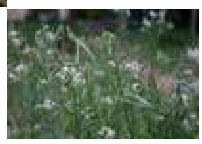
The veggie patch sits outside the kitchen window against the brick boundary wall. In early sprint this sunny area was carefully lined with newspaper and mulched in preparation for a fresh crop of herbs and leafy greens. Then it was forgotten for a month, maybe two.

By the time it had reregistered on the list of gardening priorities, the patch had been quietly overrun by a mix of volunteer plants. An unruly and diverse reclamation achieved with speed, vitality and intention.



These pop-up plants are a glimpse into the subterranean conditions, their root systems an indicator of the health of the landscape, what is lacking and what is abundant. They fill an absence, they hold space. Opting to grow where other plants cannot. A plant whose root system extends vertically, such as dandelions, works to decompress and aerate, indicating compacted soil. When these roots systems eventually decompose, they create channels for water, nutrients, and weaker root systems.[9] Inversely, a plant whose roots extend horizontally work to stabilize and prevent erosion, indicating loose soil.





Most, if not all, plants in this garden form mycorrhizal relationships with fungi in the soil. These fungal partners help water and nourish these plants who in turn provide fungi with carbohydrates. These plant roots and mycelium also provide structure for the soil, a scaffold for the landscape. These relationships of support take shape in a multitude of ways in the garden, spanning decades (the olive tree and AM fungi) or mere weeks (volunteer plants).

So easily removed, the volunteer plants of the veggie patch seem destined to live and die in gardens with intensity and speed. But in that short time they fill an absence. They hold space, opting to grow where other plants cannot and scaffold the soil while they can. Where these plants do not overrun other species, they support the ecology, adding diversity and occupying an ecological niche[10]. To do so despite an uncertain future seems appropriate in a garden likely to be removed and developed in the near future.

Decomposing boundaries

In the far back corner of the garden, under the olive tree, leaves build up against the old brick wall and a spider has made its home in the furthest weep hole.

The brick wall runs along the east and south boundary line, holding back the steep slope across the land. It is also falling apart. No sharp edges are left and the grey mortar is chipped. In some places bricks have been cut to match odd angles and mortar has been lathered on to fill large holes.

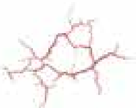
Down the side of the house the bottom half is a deep purple while the top is an reddish shade where one wall has been patched onto another. The subject of many repairs and worn away by the wind, rain and runoff the surface of the wall has a multitude of crevices and cracks.

Dependent on quality, climate and site a brick retaining wall can last 100 years or more[1]. Made up of silica (sand), alumina (clay) and a small amount of lime the bricks are held together with mortar (cement, sand, lime and water). Mortar is meant to be less dense to more easily allow the moisture in the brick to expand and contract in response to the temperature and weep holes also reduce pressure. However over time this cycle with water still causes the brick to loss its outer layers[15].

Hairline cracks commonly occur where separate materials meet and are often a result of shifts in the surrounding area such as trees planted or removed, construction and unstable soil.

750:1

Based off a scanning electron micrograph from Landweert et al. 2001. Captures "branching hyphae that embrace and penetrate a mineral particle."[16] Fungi seem to enter the particle at upper left and center left.

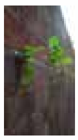


Like the ink on crumpled paper fungal hyphae seek out these grooves and grow towards the weak points. They work their way in by slowing tunneling, mining through mineral material to break down surfaces and in doing so create space for soil and seeds to rest.

Many fungi are oligotrophic, capable of growing in environments with very low nutrients by scavenging what they can from the air and rainwater. They are also able to inhabit these spaces due to symbiotic relationships with algae and other plant life[13].

Lichen – a symbiotic relationship between fungi and algae or cyanobacteria – are the first organisms to colonize and weather a mineral surface[4]. It is through such processes of mineral weathering that all essential elements except nitrogen and carbon are made available to the ecosystem.

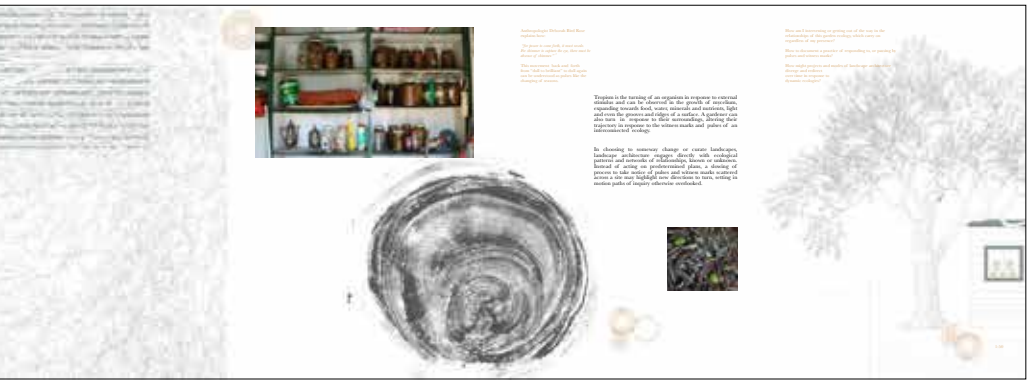
This weathering is achieved in different ways. Biomechanical weathering is where fungal hyphae tunnel into otherwise intact mineral material and is aided by certain tropisms. Thigmotropism is where fungal growth is directed towards grooves, ridges and pores while chemotropism depends on the chemical composition of the rock or minerals. Biochemical weathering is how fungi can solubilize minerals and metal compounds by releasing acid forming chemicals[14].



As plants make the most of these gaps an assortment of greens are scattered throughout the mosaic of hodge podge brickwork. Some are just clinging on while others grow with vibrancy and forcefulness, staking out a place of intended permanency. At certain points mosses haven taken hold, adding an extra furry depth.

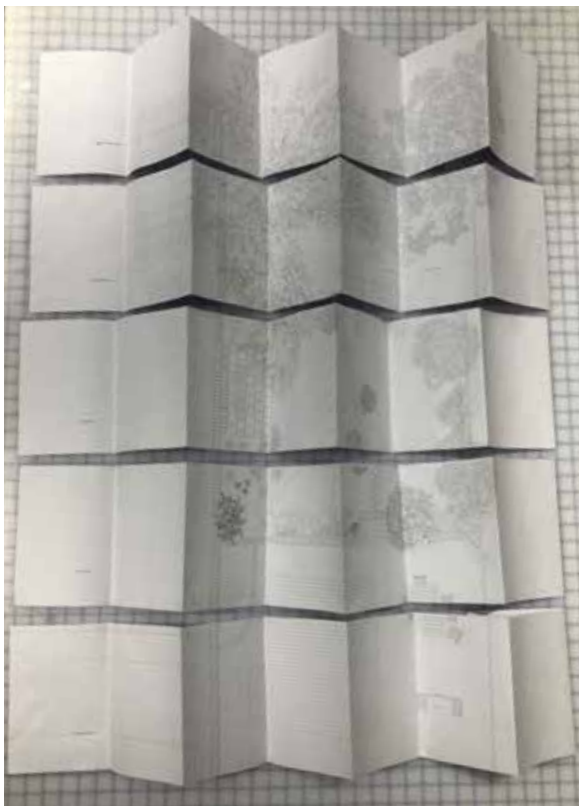
Under constant pressure from fungi, soil and spreading tree roots the boundary is once again dismissed with the necessities of everyday life. Washing is left to hang on the metal railing above the wall meant to seperate one lot of land from another. Small trees and vines are tied to its rungs for support and trach jas spills over. Garden tools are left along its edge and birds come and go as they please jumping from one gardens veggie patch to the next.

Afternoon chatter carries across the block as small snippets of conversation are shared in passing and at 5pm without fail a black and white cat walks casually along the boundary wall, the clearest path through the suburban maze.



These are the five concertinas held in the field guide.
Each page is A5 in size. Dimensions for each strip are 210mm height by 1195mm width.

These are the five concertinas flipped over, the undersides patched together to form a site plan. The five colours from the stories will be used to map out the verbs across the garden.



Rummaging through rubble

Turning to pulses

Dispersing with spores

Framing vitality

Decomposing boundaries

6. DISCUSSION

> *"Our first step is to bring back curiosity. Unencumbered by the simplifications of progress narratives, the knots and pulses of patchiness are there to explore. Matsutake are a place to begin: however much I learn, they take me by surprise."*[138]
>
> Anna Tsing

A carrier bag of methods

In an interview with *Mas Context*[139], writer George Manaugh of *Venue*[140] stated that "once you have the instruments to measure the landscape, you start paying attention to that thing that you maybe would have not otherwise thought about or noticed"[141]. Also noting that the tools used to encounter a landscape embed assumptions and that surveys are not objective, this interview reiterates that initial methods of site analysis are central to design. The tools we use to engage with a landscape curate what stories or data are collected, and will, to some extent, condition our understanding of site. While noting that all methods of site analysis are in some way subjective and do not form a complete understanding of site, an expanded toolset of methods can permeate habitual understandings of landscape and landscape architecture.

In attempting to approach site with time and space for curiosity to germinate, this research has explored fungi, gardening and storytelling as methods of site analysis. On one level there is what I learnt about fungi and this suburban site, most of which is held in the stories of the field guide (see Appendix 1). These stories weave together scale and connection and begin to ask questions of how we consider landscape dynamics in a broader sense. On another level, the framework of a research project made me aware of the tacit knowledge I carry in approaching a site as a landscape architect, and how this has been informed not only by my undergraduate studies, but also my broader worldview. In exploring ways of working, I was asked to acknowledge and question these underlying assumptions that I bring to processes of site analysis. And finally, there is what I have learnt about ways of working through site analysis and the merits or limitations of each method I employed.

A pace for curiosity and encounter

From the outset, centering fungi asked me to consider paces outside the human (my own). Timeframes of scope shifted from months or years to millennia, to consider how fungi may have inhabited this site long before human inhabitance. This undercurrent was a continual reminder of the deep time that a landscape sits within. Acknowledging one alternative scale of time also prompted a consideration of the many others running through site. The birds, the plants, the insects or even the journeys of water. Each experience added a new pace to the present moment. From here the method of gardening gave me a way to acknowledge and respond to this expanded consideration. In conversation with ecology, gardening moves through many different speeds, navigating the changing seasons, the local climate, weather, growth and decay. The hot dry season is a steady burn with sporadic bursts of activity here and there, the following wet weather invites a deceleration, paring back to a pottering through the cooler months. And as the warmth returns, meandering shifts into quick strides in busy preparation before heat once again sets in[142]. To accompany this, storytelling is also a tool that can shift speed

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138 Tsing, *The Mushroom at the End of the World*, 2015, pg. 23

139 Manaugh, Geoff, and Nicola Twilley. 2013. *A Year on the Road with Venue*. edited by Iker Gil: Mas Context.
This interview was also discussed in Shannon Mattern's article "Methodolatry and the Art of Measure" 2013.

140 *Venue* is a landscape research venture by writer Geoff Manaugh and journalist Nicola Twilley that conducts interviews and surveys across North America. The route of each trip is used as the methodology to the explore a theme, such as extraction and disposal or simulation and landscape analogs. (Manaugh, Geoff, and Nicola Twilley. 2012. "Venue." http://v-e-n-u-e.com/About.)

141 Manaugh, 2013. *A Year on the Road*.

142 "D'harawal Calendar." Indigenous Weather Knowledge, Commonwealth of Australia 2016, 2020 http://www.bom.gov.au/iwk/calendars/dharawal.shtml (Permission to use the D'harawal seasonal calendar is granted by the D'harawal Traditional Knowledgeholders' and Descendents' Circle.).

Figure opposite: moss spilling down a brick wall in the garden (25/03/21).

quite easily, capable of smooth transitions that weave different paces together. In this regard, fungi provided an awareness of alternative paces, while gardening and storytelling were malleable enough to embrace these different paces over a longer stretch of time, and in doing so allowed the site's characters, connections and narratives to emerge.

With fungal timescales "imprecise"[143], centring fungi also shifted my perception of timeframes and process. There is still so much to learn about, and from fungi, and so much that will remain unknown. Inherently mysterious, they prompt working from a place of uncertainty and this filters through to a looser grip on outcomes or a sense of finality. At the same time gardening is never complete. Dependent on dynamic systems and seasonal cycles, gardening works with long and short-term futures in mind, but with an underlying acceptance of change. Gardening is constant trial and error growing ever more site specific and the carrier bag rearranges the surfacing site narratives, which, in this case, led to five distinct but connected exploratory stories. As gardening and carrier-bag storytelling are both open-ended they blur the line between site analysis, documentation and design. At what point one stage ends and another begins is hard to pinpoint. In addition, the landscape is not reduced to one singular static problem but rather approached through many parallel and divergent strategies. This open-endedness lends itself to quick adaption in response to both short-term and long-term changes; a mode of working particularly relevant in the context of designing with dynamic landscape systems and ecologies under increasing pressure and disruption. As Tsing sets out, if stability and accumulation are central to and rewarded in the progress narratives that have put us on the path to destruction[144], there is a case for practices that resist linear progress, work outside conventional timelines and lean towards impermanence.

Thinking between scales

Just as fungi asked me to consider alternative paces, they also questioned my deference to certain scales of site. Most commonly working in plan my experience of landscapes is normally set at 1:50, 1:100 or 1:200. This is then expanded to the suburban scale and, less often, the scale of the region. Site visits complement this with a preliminary understanding at the scale of my own body. In contrast, fungi quickly foregrounded the microscopic alongside the site, and upon further research, planetary scales (see chapter 2.1). Landscape architecture is already multi-scalar, however in responding to the nuance of landscape dynamics and ecology, of which fungi is central, it seems highly beneficial to think beyond those common conventions more frequently.

Compared to a handful of fleeting site visits, gardening involved a more direct, curious, continuing relationship with the landscape at the scale of the body. In doing so this method encouraged intimacy and intent. Each plant came to be understood for how it occupies space in relation to how I do, whether they tower overhead, span more than an arm's reach, flower at eye level or require me to get down low and lean in. This scale also doesn't rely as dominantly on the visual and this adds a thickness to the understanding of site, placing porosity and texture alongside scents,

143 Pouliot, *The Allure.* 2018, pg. 8.
144 Tsing, *The Mushroom at the End of the World*, 2015, pg. 33.

humidity, dryness, softness, roughness and give. Again, capable of holding complexity as it surfaces, storytelling stretched between discernable scales and between past, present and future narratives.

Fungi, gardening and storytelling foregrounded a consideration of scale. Together they expanded the scope of this project to consider the details, knots and pulses that can be overlooked by the conventional scales of a landscape practice and how these relate to landscape dynamics within and beyond the extents of the site. This diversity in perspective highlighted how a solution or barrier at one scale may manifest as a risk or connection at another, providing more points of encounter and therefore opportunities to respond.

Details grounding the abstract

Themes explored in the field guide, such as decay, wind, hydrology, and networks are central to all landscapes and are taught within undergraduate study, if not before. These understandings become tacit knowledge, accepted as constant or present in every site. For the sake of efficiency, they are sometimes assumed or not examined closely, understood from a far and then fed into generic representations. In contrast, the methods I explored for site analysis grounded my tacit but limited knowledge, very specifically, within this landscape. Moments within abstract or complex systems were tangible in site specific details. Over the year I witnessed rain pooling in the dips of the garden before rushing down the slope and out the front gate, the bats overhead each evening and the vibrant growth of different volunteer plants. With time in site and tangential research, these observations built into an understanding of the sites contours and how they had been manipulated to accommodate for hardscaping, or shifted when the removal of plants and their roots caused erosion. How the pattern of moss on the bricks followed the flow of water, and that the location of breeding and feeding grounds across Sydney created a southwest flight path for the bats right above the garden. Or how ‘weed’ species can indicate the conditions of the soil below, mapping out nutrient deficiencies and pH balance above ground. Working with a site through gardening made its liveliness ‘real’, grounding large scale dynamics and vague understandings in the details of site. The format of carrier bag storytelling held space for each new layer of information to unfold without loosing intricacy. In moving from one detail to another, both gardening and storytelling slowly weave complexity in a way that is accessible and relative.

This research also emphasised that visuals as a predominant form of documentation can be exclusive because they tend to only hold space for data or understandings of site that can be visually represented. While mappings can show thematic or features of a landscape, they are normally heavily diluted to be legible and aesthetically pleasing. In this way select narratives are presented separately rather than intertwined. In contrast, fungi, gardening and storytelling pushed against generic or vague conclusions of a plan based, visual understanding. Fungi prompted a consideration of the subterranean, gardening provided a tactile, three-dimensional and dynamic understanding, drawing could spatilise narratives beyond my vocabulary, and writing could describe that which was unseen or sat outside my grasp of the chosen visual language. Storytelling then presented this understanding as the rhizomorphic assemblage that it is.

Tending to rhizomes

Practices that acknowledge interdependence and foreground connectivity are humbling in the least and at best have the potential to degrade notions of hierarchies in the understandings of landscape ecology. As discussed throughout, fungi tend to exist in symbiotic relationships, their presence in a design drawing in the consideration of many others. Through the gardening practice, what could have remained abstract, disconnected and removed on paper has been tended to in some way, highlighting the impact of my actions on the health of the ecology around me, raising questions of power and consent. For example, is it ok that I prune this tree, a tree grown for the fruit it bears to be consumed by humans? A tree that also feeds birds and insects, gives stability to the soil and inhales carbon dioxide. Is the subsequent growth a sign of approval? In addition, gardening, like foraging, is not a practice that guarantees success. Over this year possums have completely defoliated the two healthy citrus trees, stink bugs were spotted, cuttings have failed, branches have dropped from the olive tree and the mushrooms logs dried out after a first and very limited fruiting. At the same time the cactus produced striking flowers, bird life was seemingly constant, and the pomegranate bush fruited. The shortcomings are a reminder

of my lack of control or, in some cases, the detriment of my intervening in the garden ecology. On the other hand, the relationships that produce glimmers of vitality such as the mycorrhizal partnerships, the insects carrying spores or the birds dropping seeds, are a reminder of the precarity of co-dependency[145]. In this dynamic, does my presence have any more or less weight in the function of the ecology then the microbial life in the soil or the pollinators passing through? Recognizing these collaborations and celebrating a working with, not against,[146] provides a shift towards networks in which a singular voice or agenda is not prioritized above all others. Gardening also does not depend on the mediums of computers, pen and paper which are currently inaccessible to non-human landscape makers. In the confines of an office, these media allow the designer to create exactly what they desire. In the garden, this total authorship is removed, replaced by a dialogue with the site and co-inhabitors, remaining open to redactions and additions of others.[147]

Implications

In a broader sense the rhizome as a model for the discipline sets up a structure for collective action. Digital techniques are often praised for their scalability, but unfortunately, scalability tends to go hand in hand with distance between decision makers and conditions 'on the ground', alongside diminished diversity[148] by "repress(ing) change and encounter"[149]. In considering the implications of this project in broader practice, Tsing's notion of non-scalability becomes central to inclusive, considered site analysis and an overall framework of tending. Fungi, gardening and storytelling all depend on encounter and attention to detail, asking for time in place. In doing so they push against scalability, questioning the intent behind practices that seek to expand beyond a scale that can hold dynamic relationships. Rather than uniformity, a rhizome thrives on connectivity. In place of a broad sweeping approach to achieve 'green space', a rhizome can be built on many practices working first with site specific relationships, that then feed into networks of ecological health and accountability. Able to work around the constraints and simplifications of top-down approaches, the constellation of small-scale, diverse but connected practices is resilient and reactive to change.

Furthermore, operating within conditions of uncertainty will be an ongoing challenge moving forward due to human-induced climate change. In this context, methods of "*look(ing) around not ahead.*"[150] will be increasingly vital to ensure progress narratives or notions of "fixing" humanity and landscapes in the way of solutionism do not go unchecked. Rather than be bound by a replicable process or particular methods, there is grounds for practices that respond to each site and embrace the uncertainty that accompanies change. Without the end goal of a finite outcome or stability, tending seems to be the antithesis of solutionism. Methods of tending foreground close, continual attention and care, responding to the present dynamics within existing landscapes. They

145 Wiame, "Gilles Deleuze and Donna Haraway on Fabulating the Earth" 2018, pg. 527.
146 Clément, *The Planetary Garden*, 2015.
147 Comte, "Gilles Clement, the Garden in Movement." 2013.
148 Tsing, *The Mushroom at the End of the World*, 2015, pg. 49.
149 Tsing, *The Mushroom at the End of the World*, 2015, pg. 138.
150 Tsing, *The Mushroom at the End of the World*, 2015, pg. 22

acknowledge the current state of ecologies and can hold space for the uncertainty or discomfort that comes with being responsible for the future health of that land; a practice that seems increasingly vital for the accountability needed within commercial landscape architecture.

This research recognises the accessibility, convenience and advances of digital techniques for landscape architecture, particularly when dealing with large scale systems. However, when used as the predominant or only means of site analysis, they can set up a detachment between designer and site[151]. On the other hand, just as distance from a site in the initial stages of a project can set a precedent for the following stages of design, the direct and continual time in site provided by the methods of this project created a sense of intimacy that invites ongoing engagement. By exploring the potential of methods long held within the discipline, this research adds to disciplinary discourse around site analysis methods that can counteract the distance, speed and finality of solutionism underlying increasingly prevalent digital processes. By welcoming slow, intimate time in site and a consideration of more-than-human understandings, this research shows how fungi, gardening and storytelling might expand the disciplines' consideration of landscape and hold space for the complexity of more-than-human experiences.

151 Jenkins. 2018. "Field exercises." pg. 6.

7. CONCLUSION

> *"Agnostic about where we are going, we might look for what has been ignored because it never fit the timeline of progress"* [152]
>
> Anna Tsing

At the beginning of this research project I had proposed exploring landscapes across NSW with stories of fungi. To go out and meet fungi in landscapes where I knew they would be. Then the covid-19 pandemic hit, and the backyard became the only easily accessible space to study. This redirect was vital to how I came to understand fungi and landscape. Ecology surrounded me, I did not need to travel and seek out, but rather stop and listen. To closely notice; to tend.

On the other hand, this has limited the scope of this study to the very local. This research also only dealt with the initial design stage of site analysis and as a result, the implications of these methods in a consequent design are unclear. While testing these methods in mainstream practice will be a long-term exploration, my understanding of this suburban site is undoubtedly more vibrant because of the centring of fungi, the tactility of gardening, the open-endedness of storytelling and the underlying curiosity and care of tending.

Centring fungi shifted my perspective, providing a counter to my own experience of time, scale and connectivity. Fungi emphasised the ecological connectivity already present within the site, the constant presence of decay and a microscopic experience below the surface. Thinking through fungi also altered my broader perception, particularly regarding what is means to move between scales and work with rhizomatic thinking in landscape practice and design.

This point of counter was supported by both gardening and storytelling. This research has touched upon a wider use of gardening as a method to regain connection with site. A way to ground the designer in the landscape, alongside more-than-human inhabitants and experience the landscape as it exists currently, before making plans for its future. Gardening is already discussed in the discourse as a way to have an enduring connection with a landscape design post construction and instalment. However, I hope this research also raises interest in the merit of gardening before design, to get to know a landscape personally. This proximity and intimacy rejects detachment from the outset and invites care, setting up design to embrace the details of a site and the responsibility of making decisions with, and for, an uncertain ecology.

While storytelling is already well used in landscape architecture, this project emphasised it's capability in weaving many scales and understandings together in the early stages of site analysis. Due to the malleability and open-endedness of the carrier bag format, space is held for understandings to develop and then stretch and diverge to compensate for the complexity and diversity that will continue to unfold in meeting a landscape.

When progress and speed was not at the forefront of the design process, all methods used in this research were readily at hand. While already long entangled and well documented in landscape practices, the fact that gardening, drawing, writing and storytelling were so quickly at my disposal in a year of worldwide upheaval, hints that there is a case for their use in uncertain futures ahead. Because of their tendency to develop around details and relationships, these methods hold the intricacy of a site alongside their context in broader landscape dynamics, without simplifying or generalising, and can act as a counter to the simplifications of solutionist framing. These are methods that provide opportunities to slow the speed towards finite outputs or hero narratives and close the distance between practitioner and landscape. Methods that I will continue to make use of in working with plants, fungi, people and landscapes.

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152 Tsing, *The Mushroom at the End of the World*, 2015, pg. 35.
Figure opposite: raindrops on a garden sunflower (31/12/20).

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APPENDIX 1

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