

Walking, Sensing, Knowing: An Ethnography on Foot Around Forest Biosecurity Interventions in Te-Ika-ā-Māui

Maria Blanca Ayala

maria.ayala@pg.canterbury.ac.nz

Te Whare Wānanga o Waitaha|University of Canterbury
Aotearoa|New Zealand

ABSTRACT. Walking has gained prominence in social sciences as a source of inspiration for scholarly narratives and methodological experimentation with embodied ways of knowing. Walking across biosecurity research facilities and declining forests has been an essential part of the fieldwork that informed my doctoral research and this article. My steps followed those of the experts in forest pathology or traditional Māori healing, involved in the research and management of microorganism-induced plant diseases in Te-Ika-a-Māui (Aotearoa|New Zealand). Whether we looked at the progress of phosphite treatments, the attempts to reproduce the infection within controlled settings, the fatal evolution of the disease in the wild, or the discharge of tree patients treated with an experimental rongoā, my companions directed my attention toward different aspects of a shared reality. This article discusses some of the ways in which biosecurity in Aotearoa is being shaped by the cohabitation of science and mātauranga Māori. Walking around, I argue that social scientists must adjust their pace and attune their methods to better account for increasing and overlapping socio-environmental emergencies.

Keywords: biodiversity loss; indigenous knowledge systems; science stories; ethnography; qualitative methods; walking

How to cite: Ayala, M. B. (2023). Walking, Sensing, Knowing: An Ethnography on Foot Around Forest Biosecurity Interventions in Te-Ika-ā-Māui. *Knowledge Cultures*, 11(1), 260–281. <https://doi.org/10.22381/kc111202313>

Received 1 November 2022 • Received in revised form 1 February 2023

Accepted 11 February 2023 • Available online 1 April 2023

Warming Up

Walking as a research methodology has been a lush source of experimentation within the social sciences over the last two decades. From the social construction of place to the synchrony of breathing and paces among walking fellows, wayfaring

practices, mapping efforts and the adoption of mobile geolocation and video-recording technologies, almost all possible combinations have been studied and documented for different purposes to the extent that some scholars have felt compelled to answer an unspoken question: ‘Is it research or just walking?’ (Kowalewski & Bartłomiejski, 2020). The literature available explores walking practices as both an object and a method of study. While the first kind of study is concerned with environmental perception, place-making processes, urban design, or the connections between self and place (Balsas, 2017; Hall, 2009; Pink, 2008; Rose, 2020), the second one investigates the reliability and suitability of the walking methodologies (Evans & Jones, 2011; Kusenbach, 2003; Macpherson, 2016), sometimes experimenting with technological gadgets to artificially capture the sensorial elements of the human experience (e.g., video-recording walking sessions) (Pink, 2007) or explore the connections between perception, movement and place (e.g., complementing walking interviews with GIS data) (Martini, 2020). Interdisciplinarity emerges as a form of ludic experimentation between environmental education projects, artistic interventions, scientific facts and scholarly practices (Jung, 2013; Mullally et al., 2022; Myers, 2010) that are often described as ‘decolonising’ efforts (Myers, 2017; Yoon-Ramírez, 2021). Profusely deployed within and around urban areas, walking researchers move around gridded streets, urban parks, or metropolitan greenbelts. Overwhelmingly focused on human perception and experience, dominant discourses and practices – including conservation and research practices – often attend to the land as a commodity to be experienced or consumed. Somehow, we seem unable to move ‘beyond nature and culture’ (Descolà, 2005/2013). Nature remains ‘something we visit for a period of time’ (Springgay & Truman, 2018, p. 17), and our ability to produce maps that connect time, space and the mobility in between appears to be increasingly reduced to technological promises of kinaesthetic solutions (Shields, 2018).

Moving and mapping, however, are ancient evolutionary inventions from a time when memory and perception only worked at a cellular level and with little assistance from external devices, much like the zoospores that find their way into a kauri following olfactory signals exuded by its roots. When ‘walking’ researchers wander accompanied by indigenous peoples, mapping can become a politically charged activity that visualises the divergent dynamics of the ancestral ways of being on the land and the immediate goals of conservation biology (Harris & Hazen, 2015). Participatory mapping projects in Indigenous lands may serve to destabilise ‘cartographic colonialities’ (Sletto et al., 2021), and, even when social justice remains an aspiration, practitioners are starting to perceive the temporary adoption of Indigenous perspectives as a challenge to the dominant knowledge system.

While knowledge production is the axis around which my doctoral research orbits, the sole theories and methods that interest me are those that allow me to pursue the long-overdue undertaking of thinking’ nature in the active voice,’ as conceived by the late Australian eco-philosopher Val Plumwood (2009) in her

exhorting guideline for reinserting the human back into the web of life. Yet, even when our earliest experiences of the Anthropocene, borrowing the words of American environmental humanities scholar Stacy Alaimo, ‘muddles the commonsensical assumption that the world exists as a background for the human subject’ (2016, p. 1), the divide between the rhythms of nature and the imperious character of human enterprises – whatever they are – persists across all our institutions and enterprises. As long as the possibility of life is subjected to the strength of the economy, the progress of science or the techno-industrial development, the most generous statement we can make about our current situation is that we are ‘dwelling in the dissolve,’ a metaphor that Alaimo (2016) uses in reference to both the dissolving shells of the sea creatures under the acidic oceans of the Anthropocene and our personal experiences of a time ‘where fundamental boundaries have begun to come undone’ (p. 2) as we dive further into a dangerous and uncharted epoch.

Moving or walking around different field sites was not just a suitable methodological option during my fieldwork. It was a necessary condition to encounter the human and nonhuman others that would inform my study. It was my chance to witness the Māori and scientific approaches to forest health, and the many ways in which ‘what was once called ‘nature,’ acts, interacts and even intra-acts with, through and around human bodies and practices’ (Alaimo, 2016, p. 1). In the embodied act of walking, the nature of those multispecies interactions or the absence of them became noticeable. This article is about how moving across the land shaped the knowledge practices of the experts that I met in the field, but also about how walking with them was crucial for me to understand the system within which their research practices are taking place and how mounting human-made pressures are conditioning experimental design and biosecurity management approaches. In this way, walking among human and nonhuman others also shaped my own knowledge practices.

The kind of ‘walking’ research that interests me can be found in the wandering work of the American anthropologist Andrew Matthew (2017) on the abandoned capitalist venture of the chestnut forests of Tuscany (Italy); or the strolling study of American evolutionary biologist Anne Pringle (2017) among lichen populations thriving on the crumbling infrastructure of a European settlement in Petersham (Massachusetts); or the itinerant attempt to record the sounds and GPS coordinates for a living map carried out by Sino-French anthropologist Sophie Chao (2022) and her Marind companions across wetlands and forests threatened by palm oil expansion in Merauke (Papua). These works talk about past and present multispecies encounters still readable in the landscape, and, yet, the three examples resist categorisation. Products of a dissolving world, these works are testimonials of another ‘dissolve,’ that of the imaginary, disciplinary boundaries between the human and the rest of life. What Matthew, Pringle and Chao’s studies have in common is neither the methodological approach nor the research tools (in fact, none of them specifically referred to ‘walking’ as a method). Rather, the

commonalities emerge as their works speak of more-than-human interconnections and alliances, of reciprocity or the failure to see the other and reciprocate.

Makere Stewart-Harawira (2012, p. 27) considers that the most critical task in the transformational journey required if humanity is to survive the ‘perilous times’ ahead is no other but the pursuit of a deep understanding of the meaning and the practice of interconnectivity between us and the web of life.¹ Making of Stewart-Harawira’s appeal our north, let us now walk on Te-Ika-a-Māui, with the help of four vignettes taken from my field journals. ‘Walking’ has been used elsewhere as a metaphor for moving on the interfaces of settler-colonial and Māori knowledge systems (Greenwood, 2014) or in between Māori and Pākehā identities (Webber, 2008), implicating a need for working through dual realities. While putting on our trekking boots, I feel compelled to say something about the pace of my movement at the interface of scientific biosecurity and mātauranga Māori. Most of the time, I cautiously slowed down, taking care to comply with all sanitary requirements and te tikanga (the sum of traditional Māori protocols that I was not fully aware of). At times, I tried to go unnoticed, while filling my senses with the sounds, smells, colours and textures of the forest, in a conscious effort to bring other beings into my awareness. On other occasions, I wondered with fear if my steps were only mine or if, despite all the brushing, washing and disinfecting, I was taking a lethal pathogen for a ride. I was very aware of my presence, particularly of the danger it could pose for the trees. I strived to minimise my impact on the land and people. Walking with other humans, I looked for multispecies interactions, trying to perceive how contact, proximity and collaboration might be changing mindsets and practices. What follows is an account of what I learnt on a few of these walks.

Walking at the Interface

Monday, November 4, 2019

I met Dr Michael Bartlett for a guided visit to the headquarters of a Crown Research Institute in Rotorua. Dr Bartlett is a postdoctoral researcher, specialising in evolutionary biology, who kindly agreed to show me his workplace and arrange a few interviews for me, after my main contact within the institution had to cancel our appointment because of other work commitments.

The main entrance of the building was guarded by He Pou Marama, a carved masterpiece that visually narrated the story of the epic ascension of Tāne Mahuta to Rangiatea (the Twelve Heaven) to meet Io Matua te Kore (the parentless Supreme Being) and obtain from him the keys to living a good life, that then Tāne brought back to Earth in three famous baskets of knowledge: Tuauri, the basket of rituals and incantations; Tuatea, the basket of peace and compassion; and Aronui, the basket of skills and practical knowledge.² Te Pou Marama at the entrance of a scientific institution is an aspiration and a need, and, as happens with many other aspirations and needs, its existence and meaning can pass unnoticed to most visitors and employees.

Before being able to access the building, I was invited to watch the workplace safety video in the hall. Mainly produced to comply with current occupational regulations, the audio-visual piece succinctly mentioned another of the feats of Tāne Mahuta: The separation of Earth and Sky, the creation of the world that we inherited. Only to immediately add: ‘we know that trees create more than just a liveable world; they create a prosperous one.’ After all, this institution proudly puts research, science and technology to the service of the industry (forestry, wood and wood-derived products, and other novel biomaterials.) In this setting, plant pathogens are unwanted microorganisms with dire economic implications. The prospect of financial return often conditions funding decisions, and, as a result, as one of the senior forest pathologists would inform me later, exotic commercially grown species and the pests and diseases targeting them are better known to science. My visit, however, was focused on learning about the progress of the research on *A. psidii*, a self-introduced pathogen that endangers some seventeen native plant species (including trees, shrubs and vines) with great ecological and cultural value, and economic significance, particularly for the multi-million-dollar mānuka honey industry.

Dr Bartlett suggested that we begin our tour by the pathogen research lab. Before entering, I needed to follow the biosecurity procedures in place: clean the soles of my shoes, wash my hands thoroughly and wear a white coat. Dr Bartlett successively introduced me to the technicians present in a large, shared room where tables fully packed with instruments, substances, samples and notebooks were used to delimitate individual working spaces. Some of them asked questions about my research interests. Others offered me details about the work they were carrying on at the time. One longer interaction occurred with a technician showing seeming signs of burnout. He explained that he daily received samples from all around the country containing suspicious indications of microorganism activity that he needs to identify, catalogue and feed to a huge database shared with the Ministry of Primary Industries. Sometimes, he complained, he identifies pathogens that have never before been found in New Zealand, but then nothing happens because there is no one looking at the database, or maybe, he said, there is someone looking, but no research is conducted, and no policy is implemented. Despite the nature of his work, he seemed alienated, paradoxically disconnected from the world outside the laboratory’s walls. Dr Bartlett and I proceeded with our walk after he finished his exposition, unable to provide him with some comfort. We arrived at the last room, empty of people but full of intriguing machines designed to amplify, centrifugate, sterilise, isolate and measure all kinds of properties and compositions. He seemed surprised by my interest in such ‘ordinary’ artifacts. Eventually, we arrived at the exit door. I returned the white coat.

From there, Dr Bartlett guided me with renewed enthusiasm through the gardens and to a curated patch where mānuka, ramarama, kānuka and other native *Myrtaceae* species had been planted. At the time of my visit, Dr Bartlett was looking at the life cycle and the reproductive strategies of *A. psidii*, the fungus

responsible for the myrtle rust pandemic. This gardening effort was an attempt to monitor natural exposure to the pathogen rather than artificial inoculation under laboratory conditions. Unlike the kauri seedlings growing in a sterilised medium at the nearby nursery with restricted access, the *Myrtaceae* seedlings were not going to be intentionally infected with a lethal pathogen. Dr Bartlett explained to me that the fungi spores were virtually everywhere around us. It was only a matter of time before the plants developed symptoms of disease.

Dr Bartlett spoke passionately about the things he had discovered (e.g., the South American fungus is reproducing sexually on Aotearoa's (New Zealand's) land once considered too cold for *A. psidii* to establish itself) and the things he did not know yet (e.g., how the genetic exchange could be triggering evolutionary responses as virulence and resilience in the microorganism). The unanswered questions offered him clues for further investigation. I asked Dr Bartlett about the implications of the Vision Mātauranga policy for his work. He stated that globally the collaboration between scientific institutions and Indigenous knowledge holders is becoming common, and it is likely to increase as the effects of climate change hit harder and threaten species survival. Engaging with mana whenua, but also with the wider society and the forestry industry, is crucial, he said, if scientific research is going to have an impact. After all, some studies are funded by the forestry sector, he added. He mentioned that scientists at his workplace received professional training on how to speak to the media. He insisted that the training is focused on the skill to convey complex information to a non-specialised audience.

The fact that his organisation found it important to invest time and resources in producing consistent communications was interesting to me. My exposure to official communication from his institution is limited to publicly available reports, occasional news articles and frequent social media posts. In these communications, the advancement of scientific research seems inevitably linked to the needs of industry. Some facts seem particularly problematic to me: for example, the blurred distinction between native forests and pine plantations that occurs when the latter are systematically described as 'planted forests,' or the fact that the reports on forestry and greenhouse gas emissions are supported by the industry (Scion, 2020). I left wondering how such a consistent communication line helps to halt habitat destruction and prevent biodiversity loss.

Itinerant Discussion (I)

This vignette and the ones that follow are necessarily multi-layered. The move breaks the focus on narrative discourse that a one-on-one interview conducted in an office room might have had. The building, the health and safety briefing, the biosecurity protocols to follow, the technicians we met and their studies on microorganism-induced plant diseases, the samples and the instruments involved were all put into perspective as we moved. Different spatial and temporal relationships became visible. Past funding availability and research decisions limited current knowledge. The promise of future funds and research impact

conditions current partnerships and engagement practices. The paradoxical dimension of the movements inside and outside the laboratory's walls was evidenced in the experience of the technician who daily received samples from all over the country and yet, despite the nature of his role, seemed alienated, disconnected from the external reality, because his efforts to identify and classify potential threats invariably hit a dead end within the database. This paradoxical aspect also manifested in the attempt to obtain laboratory-like measurements in the *Myrtaceae* garden to track the rust infection as it might occur in the wild, and especially in the abrupt transition between the sterile environment of the laboratory and the all-pervasive presence of the fungal spores outside. Walking predisposed me to encounter multiple and overlapping dimensions of the practice of scientific biosecurity.

Thursday, July 9, 2020

After our online interview, doctoral candidate Sarah Killick offered to take me to her field site, a private property in Wainui (North-West Auckland), where she was monitoring the flow of sap within three different groups of kauri trees: The first stand was composed of trees infected with *P. agathidicida*, the lethal microorganism responsible for the kauri dieback. The second stand consisted of diseased trees injected with different doses of an experimental phosphite treatment as a part of a citizen-science program called Kauri Rescue. The third and last stand comprised healthy kauri trees, used as a control group. Precautions were taken to avoid the unintentional contamination of both research data and healthy trees. Sarah explained to me her experimental design weeks in advance, during the first national lockdown in response to the COVID-19 pandemic, while she was compelled to stop all her fieldwork activities, and I was driven to use technology (such as videoconferencing) to keep mine going. During those long days of gaining first-hand experience with biosecurity protocols, I conducted online interviews with some of Kauri Rescue's volunteers, virtually introduced to me by the program leader Dr Mels Barton. Sarah's field site turned out to be the sprawling backyard of Mr Stanley, one of the volunteers I had interviewed. Mr Stanley had already provided me with a detailed description of the land under his care and the type of activities required for his participation in the program. Now, accompanying Sarah, I was going to have the rare opportunity to walk inside an infested patch of kauri trees.

Sarah picked me up at Britomart, and we followed her accustomed route and stops while chatting about the specific tasks that we needed to complete within the next hours. Her doctoral research sought answers to crucial questions that surprisingly remained unanswered to date: What did happen inside a kauri after infection, how did the disease kill the tree, and what were the phosphite injections actually doing to halt the dieback? Sarah's hypothesis was that the kauri trees were dying of thirst because the pathogenic expansion compromises the conduits that carry water inside the tree. To prove this, she inserted temperature sensors into the

bark and recorded changes every 15 minutes, a process that she compared with ‘taking the vitals’ of her kauri patients. The temperature difference recorded by two independent sensors located on a vertical axis, 10 centimetres apart, allowed her to measure the pace of the fluid circulation inside the tree because the sap warms up as it travels up from the roots to the branches. During each ward round – to keep playing with Sarah’s metaphor – she had to download the data from each tree and replace the heavy batteries that powered her research stations. Our cleansing ritual started just after parking. Sarah offered me a spare pair of gumboots that she carried for the Kauri Rescue volunteers. These boots have only been used within this patch of forest. Then, she filled up a plastic bottle with a broad-spectrum disinfectant and attached it to her waist. Then she tied the fully charged batteries in a custom-made carrier that she uses as a backpack and gave me another bag with her laptop and the rest of the equipment (screwdrivers, cables, ropes, climbing carabiners, a waterproof cloak, etc.). We started walking toward the forest. We stopped at a bench placed over a wooden platform. Under the bench, we found a bucket full of water and two thick brushes used for removing all dirt from our gumboots before generously spraying the soles of our boots with the disinfectant solution. The slippery wooden deck gave access to a rope bridge that can only be crossed by one person at a time. While waiting for Sarah to cross over, I looked up at the canopy, only to detect the exfoliated crowns of many dead kauri. The forest soil was considerably wet after a few showers. With the help of other ropes tied to the tree trunks, we descended a steep slope, crossed a creek and ascended again on the other side. I recognised Mr Stanley’s favourite kauri: the biggest on his property and the first of the more than 600 trees that he treated with phosphite injections. Sarah showed me the white marks painted by the Kauri Rescue volunteers circling the lesions, measuring the height of the bleeding. We found other signs left behind by the citizen-science volunteers: the measuring tape around the girth used to calculate the right dose of chemicals to be administered and the tags with the tree name nailed to the bark.

Sarah also made me pay attention to more than human interventions. The action of *P. agathidicida* was visible in the deep cracks that marked dead trees from top to bottom, anticipating the detachment of the bark. As we moved from one research station to another, we paid attention to other plant species. I learned that the so-called ‘kauri grass’ (*Astelia trinervia*, kōkaha) cuts like a knife and can grow taller than me. Sarah pointed me to an astonishing algae-like ‘kidney fern’ (*Hymenophyllum nephrophyllum*, raurenga, kopakopa) growing among the mosses. We met mānuka, rīmu and horoeka seedlings. We also encountered seedlings of a broadleaf species that I could not identify. Sarah told me that their presence there was a sign that this patch of forest has been extensively disturbed in the past because this species is not present in mature kauri forests. She estimated that very few of the kauri growing around were older than 40 or 50 years. While Sarah downloaded the data and changed the batteries of her second station, I followed the cables that connected the many sensors inserted in the trees with the rest of the

measuring equipment, kept inside a big plastic box for weather protection. Suddenly, the forest took on the appearance of an intensive care unit, where the heart rates and blood pressure of neighbouring patients were constantly monitored.

Figure 1

Biosecurity research interventions on a diseased kauri tree



Note. Photograph showing the measuring tape attached by the Kauri Rescue volunteers and the temperature sensors inserted by Sarah in the bark. Copyright 2020 by the author.

I noticed that the bleeding of sap was more copious among the kauri that have not received phosphite injections. Coming from an agonising, water-stressed tree, the bleeding of sap felt like a desperate cry for help. To distract myself from the trees' suffering, I took photos of the needles inserted into the bark after Sarah removed the windshield sunshades to check one of the sensors providing erratic data. Sarah used this waterproof and reflective material to protect her experiment from rainstorms and excessive heat and to obtain accurate measures. We disinfected our footwear again before walking up the hill toward the last station, the one composed of healthy kauri trees. I asked Sarah if her relationship with individual trees had changed after months of dedicated attention. She told me about an unusually reddish-bark kauri that she named Carrot. She considered it a rebel character after it persistently broke her sensors. 'We tend to anthropomorphise everything, right?'

said Sarah, laughing. Carrot appeared in front of us, and the raindrops lightened up its reddish bark with freckles. I helped her to improvise a shed with the waterproof cloak and the rope.

Not all of Sarah's work happened on the ground level. She climbed one of the biggest kauri trees to see the impact of the disease over the canopy. Despite the professional equipment, climbing the branches of a dead kauri is a scary enterprise, she said. Even robust limbs can break at any moment. From the top, she realised that she was not deep into the forest but rather on a small green island, the last bastion of the kauri resistance, encircled by highways, farmlands and urban developments. While listening to Sarah's overstory incursion, my eyes wandered around the ground level until I met countless kauri seedlings. I asked Sarah about their fate. A seedling only survives a few weeks after infection, but without doing some testing, she was unable to say if they have developed any kind of resilience or if, simply, they have not encountered the pathogen yet. On our way back, she spotted a tiny kauri greenhood (*Pterostylis agathicola*), a native orchid that exclusively grows among mosses on kauri soils. The extent of what is at risk is often out of sight. Driving back to the city, Sarah said that she was considering extending her data collection phase through the summer. She feared that the research period allowed by her doctoral program would not be enough to track the evolution of the disease. She wished that any government or research agency would fund a longer study or that another doctoral candidate – able to cover the petrol costs and carry the heavy load through the field site – would be willing to continue what she started.

Itinerant Discussion (II)

This vignette draws parallels between palliative care and forest pathology research. Despite the learned disposition to avoid 'anthropomorphisation,' the medical imaginary around health and disease, quarantine/isolation and disinfection (e.g., limited access and footwear sanitation protocols), treatment options (e.g., chemical injections) and monitoring of disease progression (e.g., pulse measurement) widely inform forest biosecurity. As is often the case with human patients, life stories and environmental factors that resist the immediate causality targeted by medical interventions are often disregarded. In this sense, the evidence of past and present environmental disturbance is recognised, but its complexity is not incorporated into the research design. For instance, the fact that there are no kauri trees older than 50 years in that patch of forest or the presence of a broadleaf tree species that is not naturally present in old-growth kauri forests is acknowledged as a sign of a major historical perturbation and very recent regeneration. Sarah's panoramic view after climbing a dead kauri tree revealed to her that what appeared to be a forest from the ground level was one last stronghold of kauri, threatened by agricultural expansion and urbanisation. Yet, the influence of past and present human disturbances on the forests' structure and the soil's biochemistry remains understudied.³ The signs of recovery are not readable on the landscape. Resilience

is not a property of the species or the ecosystems, but a variable to be tested and calculated. Research timeframes are determined by very human factors (e.g., the duration of a doctoral program or the availability of research funding) that have little to do with the natural cycles being studied. Walking sensitised me to the vertiginous chasm between the narrow focus of scientific experimentation and the immeasurable happenings of the forest.

Saturday, January 2, 2021

Lynne Butterworth introduced herself as an experienced physiotherapist and a novice rongoā (Māori medicine) student when I met her at her family's home in a remote rural area that has already been noticed by the media. Over two consecutive summers, she applied the first experimental treatment, crafted by mātua Tohe Ashby (Ngāti Te Tarawa, Ngāti Hine, Ngāti Kawa, Ngāti Rāhiri, Ngāpuhi) and other sage Māori elders, to the dying trees enrooted on the land under her care, and the results were very promising. Lynne insisted that there was nothing special about her. Her relationship with te ao Māori, she said, does not come from the past but from the future as two of her (now adult) children married Māori partners, and six of her eight grandchildren are Māori. Lynne told me about her approach to human health and how, despite the positivistic training provided by her medical discipline, she always considered the social and environmental conditions affecting the well-being of her patients. Her interest in herbal remedies drove her to become one of mātua Tohe's students. She remembered how in a wānanga, the elder talked about the dieback and described the symptoms of the disease decimating kauri trees. The description provided by mātua Tohe reminded her of something disturbing she had noticed in her front yard. Some of the biggest kauri on her property were suffering excessive sap bleeding and showed symptoms of overall misery that she compared to the loss of shine in the eyes of the sicker of her human patients. At the request of mātua Tohe, she returned to the next wānanga bringing photos of her dying kauri. Mātua Tohe confirmed the diagnosis and proposed a plan of action that she could enact. By then, the tōhunga had spent a long time thinking about the most effective way to help kauri, te tupuna. He recalled old stories. He met traditional experts from other tribes around kauri land. He listened to scientists conducting studies and experimental treatments. He particularly followed the work of the microbiologists from Victoria University of Wellington in the frame of a study designed to assess the effect of extracts of a powerful selection of Māori medicinal plants on *P. agathidicida*, the kauri killer. All the knowledge he was able to gather was put to work in the much-needed rongoā. The fact that one of his students had dying trees in her land was seen as the awaited opportunity to make a first trial of his mātauranga Māori-based treatment for kauri dieback. For half an hour, Lynne shared with me her experience of applying that treatment: the necessarily intuitive approach, the physical demands of the preparation and the application of the remedy, the determination and commitment to repeat regular treatments over months, the crucial role of karakia (ritual chants) all along the

process. Her partner Andrew reinforced her narration, gesturing, adding details and showing me huge pieces of dried sap that Lynne removed from the bark.

The sound of a car approaching marked the end of our interview. Lynne had a surprise for me. I wasn't the only one waiting to meet her kauri patients that day. Mātua Tohe and his 'crew,' as she referred to them, were about to join us. Lynne and Andrew welcomed their honourable visitors. The elders brought her a whale vertebra (one of the remedy's ingredients that she can only access through them). Mātua Tohe recognised my face and reminded me that we had a scheduled meeting in three days. Then he asked me to explain my role to his fellow companions. What happened next has kept me pondering for months. I could not remember the exact words that came out of my mouth. Nervous as I was, I probably used the phrasing of my academic assignments and introduced myself as a student documenting 'New Zealand's effort to save the forest.' One of the elders to whom I will refer as mātua Mumu,⁴ a well-known tohunga with a long trajectory as a fierce defender of Māori interests with considerable media appearances, started quietly talking and walking toward me. As he approached, his voice became clearer and louder until the adjectives 'the liars, the robbers, the murderers' knocked my ears. I was only able to add, 'I hear you, mātua, and I cannot agree more.' He went away from the group to calm himself down. Mātua Tohe made a gesture to let me know that it was all good. My Spanish accent probably acted in my favour. In a short time, mātua Mumu came back inside the house, and we started anew. This time, he asked me where I was from, and, after hearing that I was born in Venezuela, he merrily mentioned that he once travelled to Chile to meet the Mapuche people. Over lunch, the conversation was relaxed, but mātua Tohe returned time and again to what brought us together on that day. He wanted to receive a complete account – a medical record – before we walked into the bush to visit the kauri patients. Lynne explained again some of the details that she had already shared with me. The elder was mainly interested in the frequency of the sessions and the duration of the whole treatment. Lynne explained one of the innovations she introduced during the second year. Intuitively making analogies with the human skin, she removed the thick crust of dried sap before applying the rongoā directly over the tender new tissue. According to her, this simple modification in the procedure acted as a booster for an astonishing recovery.

The time to visit the kauri patients finally arrived. The biosecurity protocol to follow was to wait until an elder chosen by consensus, another of the 'crew' members, pronounced a karakia asking permission to enter the forest. It was a hot and dry day. The neighbouring property was recently clearcut and planted with pine. They even chopped a few of Lynne's trees to make room for the fence. We stopped at each one of the seven kauri treated by Lynne. The elders took note of all the recovery signs they could find: The sap bleeding that had stopped long ago; the canopy that looked lush and green despite the drought; the regrowth that popped up along the trunk; the damaged bark that was shedding, making visible the healthy new tissue beneath. They also looked for signs of recovery in neighbouring plants

and birdsongs. Successive karakia were pronounced after completing the ‘medical examination’ of each patient and making official their ‘discharge.’ The elders lowered their eyes and pressed the palms of their hands against the trunk with reverence, in a humble and open exchange. They took a good number of photos for their records and for use in a report that they were preparing for the Ministry of Primary Industries.

Figure 2

Mātua Tohe poses his hand on one of the kauri trees treated by Lynne while pronouncing a karakia



Note. Photograph showing how flakes of bark are beginning to detach from the trunk. Copyright 2021 by the author.

We made several pauses to recover our breath when moving across a tangled forest floor with a pronounced slope. The elders used this time for informal chatting. They laugh at how scientists have only recently discovered that trees have a heart that pumps water from bottom to top at regular intervals. ‘We have always known that trees have a heart, a skin, a mind. We breathe each other.’⁵ This rongoā, mātua Tohe said to me, is addressed to the skin of kauri (the analogy with another skin, that of the whale, immortalised by Māori ancestral stories, inspired the selection of the active ingredients in the mixture applied to the trees),⁶ but also to the heart of

kauri, because it is applied at the lesion in the bottom of the trunk and pumped up to the whole tree. Lynne showed us where she poured wairākau, the mānuka and kānuka brew that she spilled into the little holes she made in the ground around each tree. I thought there was something almost poetic about the flow of ancient Māori knowledge to a biochemistry laboratory (which certified the efficacy of kānuka extracts against *P. agathidicida*)⁷ and then back to the whenua.

The elders were visibly pleased after the clinical round. Mātua Mumu proposed that no one ever uttered ‘kauri dieback’ again in a patch of forest where he only saw ‘kauri ora,’ with ora meaning to be alive and well. On our way back, he addressed Lynne. He confessed that he believed she was going to fail, not only because she was not Māori but because the mission she had been entrusted with required ‘a lot of wairua,’ or strength of spirit. He only agreed to entrust the first trial to her due to mātua Tohe’s intercession. He also said that he was glad he was wrong. At my request, the three of them posed together for one last photo, which accidentally captured the wire fence that separates the kauri forest that they are trying to save with so much effort and devotion and the recently planted commercial timber exploitation.

Itinerant Discussion (III)

This vignette presents various kinds of collaborations and describes mutual bonds of responsibility and care among different northern tribes across the kaurilands, between different animal and plant species (e.g., the kanuka and the kauri, the whale and the kauri, the human and the kauri), but also across the generational lines (e.g., the stories of the ancestors guiding their mokopuna in finding solutions to the dieback). It also refers to some unexpected collaborations, such as the mātauranga that travelled to a biochemistry lab in Wellington to assess the effects of what Māori ancestors identified as healing and nurturing plants on the pathogenic agent; and then returned to the land – this time without scientific supervision – in the form of the wairākau that Lynne poured into the holes she fingered in the ground around the ailing trees. This vignette shows how the wounds opened during colonial rule are still present in the sensitive tissue of the people and the land. It also demonstrates what it takes to overcome the pain and the fear and move forward for the well-being of all creatures, like when a Pāhekā physiotherapist chose to go beyond her disciplinary training, or a tohunga decided to entrust her with the task of conducting the first trial of an important experimental rongoā. Walking made me aware of the gap between the slow-paced rhythms of life necessary to nurture relationships and heal bodies and souls, and the frenetic cadence of the economic machinery that devours minds and landscapes or, to put it another way, fills them with prospects of profit and fast-growing exotic conifers.

Sunday, May 16, 2021

I joined a small team of artists, activists, academics and practitioners for a one-day event organised under the umbrella of Mobilising for Action, a Biological Heritage

National Science Challenge's research investment aimed at exploring the human dimensions of forest health management. The agenda for the day consisted of two parts: morning activities included a guided tour to the Auckland campus of a Crown Research Institute, specialised in science-based food production – and accordingly, equipped with a range of departments dedicated, among other things, to plant genomics, breeding technologies, plant pathology and biosecurity. This visit was devised to provide attendants with an overview of the national history of phytopathology research and management, with a special focus on *A. psidii* and its impacts on Indigenous *Myrtaceae* species. The afternoon session included a field trip to the epicentre of *P. agathicidida* infestation in the kauri forest of Huia, west Auckland, in the Waitākere Ranges. Our hosts were the senior plant pathologist Dr Nick Waipara (Rongowhakaata and Ngāti Ruapani ki Turanga) and the artist and researcher Dr Mark Harvey (Ngāti Toa, Clan Keith). Dr Waipara briefed us with a visitors' health and safety induction before granting us access to a building that, he said, probably contains the most dangerous microorganisms to be found in Aotearoa – securely contained within quarantine labs which we were not going to enter in any case. For extra protection and to help us to achieve the purpose that brought us together on that day, Dr Harvey led a karakia next.

During the day, Dr Waipara made a case against what he defined as 'colonial science,' a highly stratified discipline that set an instrumental value on specific methods, species and collectives, while undervaluing and diminishing the contribution of other ways of knowing based on art, social sciences, or mātauranga Māori. According to Dr Waipara, the absolute dominance of the biophysical sciences, and their hyper-specialised and hierarchical interpretation of the living world, encourages an enormously fragmented and competitive biosecurity system that does not always deliver the outcomes required for the protection of Indigenous biodiversity. Dr Waipara's claims were based on his long experience as a phytopathologist working to inform policymaking. In an informal conversation undertaken on our way to Huia, he reflected on what he described as the 'benchmark of disaster' – that is, the management of kauri dieback in the decade that followed the detection of the soil-borne disease in the Waitākere Ranges. He said that, in hindsight, he felt naive after believing that the scientific evidence was enough to make people listen and appreciate the scale of the problem. Soon, he realised that neither the visitors to the park nor the policymakers charged with the protection of the last remnants of kauri forests fully understood what is at stake when a species is lost. Since then, Dr Waipara has volunteered many hours to divulgation and awareness initiatives. His recent collaboration with Dr Harvey is an attempt to use visual arts and Māori philosophies to connect Aucklanders back with their homeland. The myrtle rust incursion offered Dr Waipara and his team the possibility of starting anew, this time including humans as a crucial factor of the biosecurity equation.

Listening to Dr Waipara while walking across the research facility was a mesmerising exercise. As he talked, invisible threads seemed to be connecting

people, trees, moments and places. He made intelligible for us some of the many stories contained in that piece of land and into the walls of the research facility. In this way, we got to know about the wealthy family that has no descendants and donated the land where the scientific institution operates; the story of epidemiology and phytopathology in New Zealand; the story of Dr Waipara's mentor, the late Dr Ross E. Beever; the stories of the *Myrtaceae* species growing in the gardens and the iwi and hapū related to some of these plants. We also heard about successive government and research agencies and biosecurity interventions.

Dr Waipara led us to the gardens to meet some of the *Myrtaceae* family members rooted nearby and the lethal fungus (*A. psidii*) feeding on them. The first stop was a splendid (and critically endangered) *M. bartlettii*, a white-flowered rātā (rātā moehau). He explained to us that there are only fifteen known individuals of this species left in the wild. With such a small gene pool, the fungal pandemic is a huge menace. Only after facing this unprecedented threat, Dr Waipara said, plant pathologists realised how little they knew about seed generation for conservation purposes. Native plant species have highly irregular seeding cycles that sometimes occur years apart and are susceptible to significant regional differences. From his perspective, conversations with mana whenua are vital not only to fill in knowledge gaps but also to identify seed donors of endangered species and potential recipients willing to take on the role of kaitiaki. Walking further, we found recently planted seedlings of mānuka, rohutu and ramarama. The last two are among the native Myrtaceae most affected by the fungus. Dr Waipara reminded us about the insects and birds that exclusively feed on one plant and the birds that prey on those insects. 'Extinction is a chain reaction,' he said. The rust is acting differently in each host, simultaneously attacking new growth, flowers, fruits and seeds, damaging not only individual plants but preventing intergenerational regeneration. Minimal weather stations, tiny sensors monitoring changes in humidity, temperature and rainfall, were installed close to the seedlings. Dry, cold weather may kill fungus spores. It remains to be seen if such conditions also suit the needs of the threatened plants and if humans had envisaged different uses for pathogen-free lands.

Itinerant Discussion (IV)

You might have noticed, in the first and last vignettes, an allusion to the fact that New Zealand research institutes are 'Crown'-owned companies that carry out scientific research to enhance productivity and profitability.⁸ When a scientific institution is primarily designed to attend to an industry's needs – in the examples provided, forestry and wood materials and other biomaterials, or horticulture and food and beverage industries – the resources dedicated to the protection of native species with no commercial value are consequently limited. In this vignette, Dr Waipara's reference to 'colonial science' anticipates an agenda different from that of the objective construction of knowledge. He describes a research activity that sets instrumental values for specific groups, species and methods, aligned with an

overarching ideology that has little to do with the protection of Indigenous biological diversity. As a result, the biosecurity efforts designed to care for the industry are massive, well-funded and well-articulated. In contrast, biosecurity efforts to protect the wider web of life rely heavily on volunteer work. Dr Waipara does an impressive job by rendering visible the threads that connect plant species and local communities to scientific interventions, historical contexts and alternative biosecurity strategies. Similar research and outreach efforts are required to make visible the threads that tie our research institutions and government agencies to agendas opposed to the protection of life and life-sustaining systems. Walking, I learned that scientific research – any kind of research, indeed – can be carried out in a different way.

Wandering Thoughts

In this article, I have tried to put into words some diverse thoughts about fit-for-purpose methodological experimentation. During my multi-sited fieldwork, walking was not only a necessary condition to establish relationships with human and nonhuman others. It was my opportunity to witness scientific biosecurity and mātauranga Māori-based approaches to forest health, including research implementation, disease treatment and the evaluation of results.

Walking offered me the unusual opportunity to observe how encountering others and being exposed to others can open spaces for unexpected alliances if we dare to overcome the invisible restrictions imposed by colonial wounds, disciplinary silos, power structures and dominant ideologies. Walking with other humans across research nurseries and forest patches allowed me to observe how their engagement in experimental studies and practices of care (which often require months of close contact and intimacy) transformed both the human perception of individual trees and plant species and the health conditions of those trees and seedlings, sometimes in beneficial ways. Wandering among nonhuman others also provided me with a picture of the limitations of a fragmented national approach to biodiversity loss. Outside the tiny pockets of healing where volunteers invest much of themselves in disease management and pest control initiatives designed to preserve the remnants of native forests, the wider set of practices grouped under the label 'land use conversion' remain unchecked.

British anthropologists Tim Ingold and Jo Lee Vergunst (2006, p. 67) state that 'we cannot simply walk into other people's worlds and expect thereby to participate with them.' Walking, they say, only becomes a participatory experience when researchers achieve some kind of attunement with their fellow walkers by 'heading the same way, sharing the same vistas and perhaps retreating from the same threats behind' (Ingold & Vergunst, 2006, p. 67). As our inability to change the trajectory of our destructive commitment to economic growth threatens to unleash multiple and simultaneous social and ecological emergencies, researchers are called to attune their methods and adjust their paces to better account for the

intricate tangle that binds humanity to the fate of the living world. Our only chance to avoid the greatest threat that has ever chased us depends on it.

Acknowledgements

A word of gratitude to all the people who allowed me to walk by their side while I was enrolled in a doctoral programme. I would like to specially acknowledge Michael Bartlett, Lynne Butterworth, mātua Tohe, mātua Mumu and Nick Waipara for reviewing my accounts of our encounters and – when needed – harnessing my errant prose for accuracy. I would also like to acknowledge Susanna Finlay-Smiths, Will Allen, Andrea Grant, Hugo Reinert and Alison Loveridge for their comments on previous versions of this work. Finally, I would like to thank Marie McEntee and Mark Harvey, editors of this special issue, for making room for novel investigators. The research that informs this article was authorised by the Human Research Ethics Committee (HEC2019/121) and the Ngāi Tahu Consultation and Engagement Group at the University of Canterbury.

Funding

This work is funded by the Ministry of Business, Innovation and Employment (Mobilising for Action theme of the Ngā Rākau Taketake programme of the Biological Heritage National Science Challenge in Aotearoa/New Zealand C09X1817).

Author contributions

The author confirms being the sole contributor of this work and approved it for publication. The author takes full responsibility for the accuracy and the integrity of the data analysis.

Conflict of interest statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Notes

1. In the cited piece, Māori (Waitaha ki Waipounamu) scholar Stewart-Harawira, professor in Indigenous, Environmental and Global Studies at the University of Alberta (Amiskwaciy-wāskahikan|Edmonton, Canada), made a case for ‘returning to the sacred’ by recovering the wisdom of relatedness still contained in the rich (yet, in most cases, fragmented) repositories of land-based knowledge systems, preserved and enacted by indigenous communities since time immemorial to date. She warned, however, about the appropriation, commodification, or partial adoption of bits of indigenous knowledge to be incorporated within systems and institutions erected for incompatible purposes.

Potawatomi citizen and American decorated botanist and plant ecologist, Robin Wall Kimmerer (2014, p. 17), explained the meaning of the ties between the people and the land with an account of the Anishinaabeg’s subjection to settler colonial/capitalist regimens:

Children, language, lands: almost everything was stripped away, stolen when you weren’t looking because you were trying to stay alive. In the face of such loss, one thing our people could not surrender was the meaning of land. In the settler mind, land was property, real estate, capital, or natural resources. But to our people, it was everything:

identity, the connection to our ancestors, the home of our nonhuman kinfolk, our pharmacy, our library, the source of all that sustained us. Our land was where our responsibility to the world was enacted, sacred ground. It belongs to itself; it was a gift, not a commodity, so it could never be bought or sold. These are the meanings people took with them when they were forced from their ancient homelands to new places. Whether it was their homeland, or the new land forced upon them, land held in common gave people strength; it gave them something to fight for. And so – in the eyes of the federal government – that belief was a threat.

2. Various versions of the Māori creation stories are held by different iwi. The account offered here was the one summarised in the plaque that accompanied Te Pou Marama (the Pillar of Enlightenment) at the entrance of the Crown Research Institution. In some tribal accounts, however, it was Tāwhaki and not Tāne Mahuta the one who ascended to the heavens in search of the baskets of knowledge. For an original present-day adaptation of this Māori ancestral story, see Morris (2019).

3. In recent dates, research instigated by Māori (Tūhoe, Whakatōhea, Whānau-ā-Apanui) biochemist Dr. Amanda Black is starting to look at the influence of land-use changes in the propagation and survival of *P. agathidicida*. See, for instance, Lewis et al. (2019).

4. In te reo Māori, ‘mumu’ refers to valiant warrior. this was not his real name and is used here for ethical purposes.

5. Te hongī, the traditional Māori greeting performed by two people touching their forehands and pressing their noses together, while exchanging ‘the breath of life’ during major ceremonies (like the pōwhiri) recreates the intimate communion between all breathing beings. Matua Tohe statement ‘we breathe each other’ is strikingly similar to what Italian evolutionary biologist Monica Gagliano learnt under the guidance of the master plant Socoba and a Shipibo elder in the Peruvian Amazon. Gagliano (2018) wrote as Socoba dictated:

At each inhalation, free oxygen breathed out by plants enters us in all its levity and allows us to convert what we eat into energy. At each exhalation, we let go of carbon dioxide and water, which plants ingeniously combine with a touch of sunlight to make their own food and, once again, more oxygen. Excitedly, she [*Himatanthus sucuuba*] continued by pointing out how we breathe each other in and out of existence, one made by the exhalation of the other. (p. 15)

6. You can listen to mātua Tohe’s account of the kōrero that inspired the creation of the much-needed medicine in the short documentary Te Wao Nui (2020), beautifully captured by screenwriter, director, and indigenous storyteller Ngāriki Ngatae (Ngāti Uri, Ngāti Ārera, Ngāti Rupe, Ngāti ‘Akatauirā), and available online at RNZ (2020).

7. The story of this collaboration has been captured in scientific jargon in an article entitled ‘Mātauranga-Guided Screening of New Zealand Native Plants Reveals Flavonoids from kānuka (*Kunzea robusta*) with Anti-*Phytophthora* Activity.’ See Lawrence et al. (2019). See, especially, the supplementary information on the mātauranga Māori used in the selection of plants for the study.

8. The institutional description of the purpose of each Crown Research Institute includes the terms ‘economic growth,’ ‘economic value,’ ‘productivity,’ ‘profitability’ and ‘sustainable management’ of a whole range of ‘resources and environments’ to fuel extractive industries, including geologically-based energy and minerals industries, pastoral and agri-technology sectors, horticulture and arable sectors, aquatic resources and environments, seafood, food and beverage industries, forestry, wood products and wood-derived materials and other biomaterial (see MBIE, 2021). For a discussion of neoliberal doctrines and scientific research in Aotearoa, see also ‘Neoliberal knowledge production in Aotearoa New Zealand: Confronting kauri dieback and myrtle rust’ by Ehler et al. in this special issue.

References

- Alaimo, S. (2016). Introduction: Dwelling in the dissolve. In *Exposed: Environmental politics and pleasures in posthuman times* (pp. 1–14). University of Minnesota Press.
- Balsas, C. J. L. (2017). The right to walk in cities: A comparative review of Macau, Lisbon and Las Vegas. *International Journal of Law in the Built Environment*, 9(2), 123–142. <https://doi.org/10.1108/IJLBE-03-2017-0012>
- Chao, S. (2022). Living Maps. In S. Chao (Ed.), *In the shadow of the palms: More-than-human becomings in West Papua* (pp. 51–74). Duke University Press.
- Descolà, P. (2013). *Beyond nature and culture*. University of Chicago Press.
- Evans, J. & Jones, P. (2011). The walking interview: Methodology, mobility and place. *Applied Geography*, 31(2), 849–858. <https://doi.org/10.1016/j.apgeog.2010.09.005>
- Gagliano, M. (2018). *Thus spoke the plant: A remarkable journey of ground-breaking scientific discoveries and personal encounters with plants*. North Atlantic Books.
- Greenwood, M. (2014). Walking in the interfaces: A story of coming to know. In A. T. Black, H. Murphy, C. Buchanan, W. Nuku, & B. Ngaia (Eds.), *Enhancing mātauranga Māori and global indigenous knowledge* (pp. 135–149). New Zealand Qualifications Authority.
- Hall, T. (2009). Footwork: Moving and knowing in local space(s). *Qualitative Research: QR*, 9(5), 571–585. <https://doi.org/10.1177/1468794109343626>
- Harris, L. M., & Hazen, H. D. (2015). Power of maps: (Counter)mapping for conservation. *ACME: An International Journal for Critical Geographies*, 4(1), 99–130. <https://acme-journal.org/index.php/acme/article/view/730>
- Ingold, T., & Vergunst, L. J. (2006). Fieldwork on food: Perceiving, routing, socialising. In S. Coleman & P. Collins (Eds.), *Locating the field: Space, place and context in anthropology* (pp. 67–85). Berg.
- Jung, Y. (2014). Mindful walking: The serendipitous journey of community-based ethnography. *Qualitative Inquiry*, 20(5), 621–627. <https://doi.org/10.1177/1077800413505543>
- Kimmerer, R. W. (2014). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed.
- Kowalewski, M., & Bartłomiejski, R. (2020). Is it research or just walking? Framing walking research methods as ‘non-scientific.’ *Geoforum*, 114, 59–65. <https://doi.org/10.1016/j.geoforum.2020.06.002>
- Kusenbach, M. (2003). Street phenomenology: The go-along as ethnographic research tool. *Ethnography*, 4(3), 455–485. <https://doi.org/10.1177/14661381034300>

- Lawrence, S.A., Burgess, E. J., Pairama, C., Black, A., Patrick, W.M., Mitchell, I., Perry, N. B. & Gerth., M. L. (2019). Mātauranga-guided screening of New Zealand native plants reveals flavonoids from kānuka (*Kunzea robusta*) with anti-*Phytophthora* activity. *Journal of the Royal Society of New Zealand*, 49, 137–154. <https://doi.org/10.1080/03036758.2019.1648303>
- Lewis, K., Black, A., Condrón, L. M., Waipara, N., Scott, P., Williams, N., O’Callaghan, M., & Woodward, S. (2019). Land-use changes influence the sporulation and survival of *Phytophthora agathidicida*, a lethal pathogen of New Zealand kauri (*Agathis australis*). *Forest Pathology*, 49(2), 12502. <https://doi.org/10.1111/efp.12502>
- Macpherson, H. (2016). Walking methods in landscape research: Moving bodies, spaces of disclosure and rapport. *Landscape Research*, 41(4), 425–432. <https://doi.org/10.1080/01426397.2016.1156065>
- Martini, N. (2020). Using GPS and GIS to enrich the walk-along method. *Field Methods*, 32(2), 180–192. <https://doi.org/10.1177/1525822X20905257>
- Mathews, A. (2017). Ghostly forms and forest histories. In A. Tsing, H. Swanson, E. Gan, & N. Bubandt (Eds.), *Arts of living on a damaged planet: Ghosts and monsters of the anthropocene*. University of Minnesota Press.
- MBIE. (2021). *Crown Research Institutes*. Ministry of Business, Innovation and Employment | Hikina Whakatutuki. <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/research-organisations/cri/>
- Morris, P. (2019). Tāwhaki: Real life. In W. Ihimaera & W. Hereaka (Eds.), *Pūrākau: Māori myths retold by Māori writers* (pp. 129–137). Penguin Random House New Zealand.
- Mullally, G., O’Neill, M., de Bhailís, D., Tuohy, B., Breen, M., Duggan, A., & Ní Loinsigh, E. (2022). Walking, talking, (re-)imagining socio-ecological sustainability: Research on the move/moving research. *Irish Journal of Sociology: IJS*, 31(1). <https://doi.org/10.1177/07916035221118023>
- Myers, M. (2010). ‘Walk with me, talk with me’: The art of conversive way finding. *Visual Studies*, 25(1), 59–68. <https://dx.doi.org/10.1080/14725861003606894>
- Myers, N. (2017). Ungrid-able ecologies: Decolonising the ecological sensorium in a 10,000-year-old natural-cultural happening. *Catalyst: Feminism, Theory, Technoscience*, 3(2), 1–24. <https://doi.org/10.28968/cftt.v3i2.28848>
- Pink, S. (2008). An urban tour: The sensory sociality of ethnographic place-making. *Ethnography*, 9(2), 175–196. <https://doi.org/10.1177/1466138108089>
- Pink, S. (2007). Walking with video. *Visual Studies*, 22(3), 240–252. <https://doi.org/10.1080/14725860701657142>
- Plumwood, V. (2009). Nature in the active voice. *Australian Humanities Review*, 46, 113–129. <http://australianhumanitiesreview.org/2009/05/01/nature-in-the-active-voice/>
- Pringle, A. (2017). Establishing new worlds: The lichens of Petersham. In A. Tsing, H. Swanson, E. Gan, & N. Bubandt (Eds.), *Arts of living on a damaged planet: Ghosts and monsters of the anthropocene* (pp. 157–167). University of Minnesota Press.
- Radio New Zealand. (2020, 20 August). *Loading docs 2020/Te wao nui/RNZ* [Documentary film]. Youtube. <https://www.youtube.com/watch?v=BLzkhSePKw>
- Rose, M. (2020). Pedestrian practices: Walking from the mundane to the marvellous. In H. Holmes, & S.M. Hall (Eds.), *Mundane methods: Innovative ways to research the everyday*. Manchester University Press. <https://doi.org/10.7765/9781526152732.00021>

- Scion. (2020). *Planted forest and carbon*. https://www.scionresearch.com/__data/assets/pdf_file/0008/77786/Planted_forests_and_carbon_infosheet.pdf
- Shields, R. (2021). Bergson's GIS: Experience, time and memory in geographical information systems. *Media Theory*, 2(1), 316–332. <https://journalcontent.mediatheoryjournal.org/index.php/mt/article/view/49>
- Sletto, B., Barrera de la Torre, G., Lamina Luguana, A., & Pereira Júnior, D. (2021). Walking, knowing and the limits of the map: Performing participatory cartographies in indigenous landscapes. *Cultural Geographies*, 28(4), 611–627. <https://doi.org/10.1177/14744740211034479>
- Springgay, S., & Truman, S. E. (2018). *Walking methodologies in a more-than-human world: WalkingLab*. Routledge.
- Stewart-Harawira, M. (2012). Returning the sacred: Indigenous ontologies in perilous times. In Williams, L., R. Roberts, & A. McIntosh (Eds.), *Radical human ecology: Intercultural and indigenous approaches* (pp. 73–88). Ashgate.
- Webber, M. (2008). *Walking the space between: Identity and Māori/Pākehā*. NZCER Press.
- Yoon-Ramirez, I. (2021). Walking-sensing as a decolonial art and pedagogical practice. *International Journal of Education Through Art*, 17(1), 115–133. https://doi.org/10.1386/eta_00053_1