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Research

Artistic practice, public awareness, and the ngahere: art–science–Indigenous Māori collaborations for raising awareness of threats to native forests

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ABSTRACT. We build a rationale for a nuanced approach to raising public awareness of ecological threats through interweaving art, science, and Mātauranga Māori (Indigenous Māori knowledge). The thinking we present emerges from the first phase of a transdisciplinary project, Toi Taiao Whakatairanga, which explores the ways the arts can raise public awareness of two pathogens that are ravaging native trees in Aotearoa New Zealand: *Phytopthora agathidicida* (kauri dieback) and *Austropuccinia psidii* (myrtle rust). One of our first steps in the project was to explore understandings of "public" and "awareness" and their relevance to Aotearoa's ecological, cultural, and political context. This collective task was about developing theory to guide the second phase of the project, in which we would commission nine Māori artists to create new works about kauri dieback and/or myrtle rust. One of the key outcomes of our collective inquiry was a realization of the limits of certain conceptions of public awareness in the settler–colonial contexts. For example, conceptions based on an unproblematized definition of "public" fail to respond adequately to the rights of Indigenous Māori tribes and subtribes to sovereignty over their lands and taonga species. We identify the need for alternatives to transactional conception of public awareness-raising. This includes alternatives that align with te ao Māori (Māori worldviews) and allow for a lack of consensus about the nature of an ecological threat or the required response. We propose that mātauranga Māori and arts practices can be combined with colonial science knowledge to promote different awarenesses in ways that are responsive to difference audiences, acknowledge different knowledge systems, hold space for contested/provisional knowledge, and support the mana motuhake of iwi/hāpū and the ngahere.

Key Words: *Aotearoa New Zealand; arts practice; colonial science; ecological threats; Indigenous knowledge; public awareness*

INTRODUCTION

Raising awareness of threats to forest health in Aotearoa New Zealand requires nuanced approaches that are attuned to the complex ecological, cultural, and political context. In Aotearoa ngahere (forests), native and endemic species struggle for survival with invasive and introduced predators, weeds, and pathogens (Foote et al. 2017). There are different understandings of the ngahere: what it is, its value, what threatens it, and its future. In te ao Māori (the Māori world), the ngahere is part of whakapapa (genealogy), many plant species are taonga (treasured), and there is an inherent obligation to protect and care for te taiao (the environment) as whānau (family) (Hill et al. 2022). Government ministries, Crown entities, and local authorities have responsibility for forest management/governance, but also have different priorities and approaches. Māori iwi (tribes) and hapū (subtribes) demand rights to self-govern their whenua (land) according to their priorities and tikanga (protocols and customs) (Bennett 2017). Various other interest groups use ngahere for industry, recreation, private development, and community-led initiatives (Foote et al. 2017). For some of these groups, Aotearoa's unique biodiversity profile means the intrinsic value of maintaining native species is unquestionable; others know or care little about native biota (Foote et al. 2017, Harvey 2021). Programs aimed at protecting native species and ecosystems can be challenged when they threaten activities or introduced species that have valued places in people's cultures and livelihoods (Foote et al. 2017, Hill and Waipara 2017). There can also be tensions between the cultivation of commercial species and protection of native species (Bradshaw et al. 2020). We, a transdisciplinary, bicultural research team (including Māori and Pākehā), share our first steps in taking on the challenge of raising public awareness of two plant pathogens that are threatening native species in this complex landscape.

At the core of this paper is the argument that common-sense, de-politicized understandings of public awareness need to be rethought in settler-colonial nations. In Aotearoa, the colonial conception of the public as the nation's citizens as a whole is limited because mana motuhake (self-determination, separate identity, sovereignty, autonomy) for separate iwi/hapū is paramount for Māori and part of Te Tiriti ō Waitangi (the Treaty of Waitangi). Pan-Māori identity came about only after contact with Pākehā (Paora et al. 2011). The Treaty of Waitangi is the English language version of an agreement between the Crown and Māori representatives that was signed in 1840. Te Tiriti ō Waitangi is the Māori language version. Te Tiriti guaranteed to hapū (subtribes) "te tino Rangatiratanga" authority over land and taonga (treasured things), and "exclusive and undisturbed possession of lands and estates, forests, fisheries, and other properties" (Orange 1987). Māori who signed Te Tiriti did not cede sovereignty to the Crown, but rather devolved responsibility for governing the increasingly lawless British immigrants to the Queen (Orange 1987, Walker 2004, Mutu 2019). However, the English version of the Treaty was used by the British Crown to claim sovereignty over New Zealand and authority over all Māori (Orange 1987, Walker 2004). Iwi and hapū mana motuhake over their ancestral lands was "stripped away" throughout the 19th and 20th centuries (Bennett 2017). Subsequent colonial laws made it possible to take Māori land for "public" purposes with little or

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no compensation (Marr 1997, Walker 2004). As a result, iwi/hapū often resist what Crown law assigns as being "public," particularly when it comes to land and waterways (Marr 1997).

We wrote this paper in the first phase of a 3-year transdisciplinary project, Toi Taiao Whakatairanga, a creative practice research project that explores how the arts can raise public awareness of *Phytopthora agathidicida* (kauri dieback disease) and *Austropuccinia psidii* (myrtle rust). Both pathogens present significant threats to the ngahere, and are putting native and endemic species at risk. Toi Taiao Whakatairanga is part of a large, national strategic research program—Mobilising for Action, Ngā Rākau Taketake: Saving our iconic trees from kauri dieback and myrtle rust (https://bioheritage.nz/about-us/nga-rakau-taketake). Mobilising for Action focuses on the human dimension of forest health management and the interface of western and Indigenous knowledge (https://www.mobilisingforaction.nz). One of our first steps was to unpack understandings of "public" and "awareness" and consider their relevance to Aotearoa's ecological, cultural, and political context. Our aim was to generate theories to inform the second phase of the project, the commissioning of nine Māori artists to create artworks to raise awareness of kauri dieback and/or myrtle rust. We present the outcomes of this critical, theory-building process. First, we examine the history and colonial science of the two diseases and established approaches to awareness-raising. We then consider contextually specific tensions around public awareness and the diseases. Finally, we examine the role of art in addressing ecological threats, internationally and locally. In conclusion, we consider how raising public awareness of ecological threats through the arts might support mana motuhake for hapū, iwi, and ngahere, while also working in conjunction with established and emergent colonial science research.

METHODS

In creative practice-led research, artistic practice is recognized as a form of research (Smith and Dean 2009, Slager 2021). For Toi Taiao Whakatairanga, the commissioning, curation, and production of artworks by nine Māori artists over the 3 years of the project will, in and of itself, generate and disseminate new knowledge. These works include documentaries, photography, an audio-visual installation, game design, a graphic novel, participatory poetry and print-making workshops, a site-based sound work, and a billboard campaign. These artworks have been (and will be) shared in multiple ways, through social media, webinars, film festivals, schools, and universities; at local community centers; in Māori tribal contexts; and in galleries. The project team is also using a range of qualitative and Indigenous Māori-informed methods alongside and within processes of curation and artistic production to generate multiple perspectives on the role that the arts can play in engaging the public with plant pathogens and forest health.

Creative practice-led research often has an emergent design with layers of intersecting, iterative cycles of activity (Smith and Dean 2009). Toi Taiao Whakatairanga involves ongoing cycles of curation (commissioning, artistic creation, and sharing/exhibiting), qualitative research (interviews and observation, analysis, and writing/reporting), and critical reflection (reading literature and theory from different disciplines, recording reflective discussions). These cycles of activity have been mutually informing, often unpredictably so. The implementation of such an unpredictable, emergent research design can be challenging for a transdisciplinary and bicultural team, and for research involving collaborations with Māori artists and others outside academia. We have drawn on principles from mātauranga Māori (Māori knowledge) frameworks, including whanaungatanga (cultivating relationships), manaakitanga (hospitality, kindness, uplifting each other's mana), tino rangatiratanga (self-determination, sovereignty), and taonga tuku iho (cultural continuance) (Tuhiwai Smith 1999, Macfarlane 2006, Hiha 2016). These principles, together with the concept of the hyphen space, have guided our interdisciplinary and bicultural collaborative relationships (Hobbs 2018). The hyphen space was proposed by Alison Jones and Kuni Jenkins (2014) as a way of understanding Māori-Pākehā collaboration on writing and research as a process of "learning *from* difference [from the hyphen] rather than learning about the Other" (Jones and Jenkins 2014:480). In an arts context, this can mean providing space for Māori to carry out their own practices (Hobbs 2018). Hobbs (2018) argues that the tension present in this hyphenated relationship, where differences are irreconcilable, produces creative possibilities. This concept has informed our approach to working across Māori-Pākehā relationships and at the interface of different knowledge systems: mātauranga Māori, science, and the arts.

In claiming to work with mātauranga Māori, we acknowledge ongoing debates within Māori scholarship over what mātauranga Māori refers to and who has access to it (Royal 2012, Stewart 2020). Toi Taiao Whakatairanga aligns with the argument made by Lambert et al. (2018:110) that mātauranga Māori is "dynamic and expanding," allows a "contrast with 'Western' science and philosophy" and has a critical role to play in forest management in Aotearoa. Our engagement with science proceeds from the understanding that European science has and still does serve coloniality (Schiebinger 2005). But we also resist anti-scientism (Page 2021), and view scientific knowledge, in all its diversity, as essential to understanding and combating threats to forest health. Scientists in Aotearoa and elsewhere are actively changing structures of power and control over knowledge production (Lambert et al. 2018, Page 2021). The arts are also a colonial construct that has contributed to the marginalization and erasure of Indigenous worldviews and practices (Lagi-Maama Academy and Consultancy 2020). Toi Taiao Whakatairanga works with an expanded definition of the arts, as encompassing multiple forms of creative and cultural expression. But we are yet to resolve our restless interdependency with a range of colonial cultural institutions (that will be another paper). Toi Taiao Whakatairanga is focused on what can emerge from the interface between mātauranga Māori, science, and the arts, and recognizes them as distinct ways of relating to and understanding ngahere ora (forest health).

We report on the outcomes of an early stage of the research during which we explored key ideas and concepts by reflecting on our own experiences and disciplinary backgrounds and engaging with key literature from māatauranga Māori, science, and the arts. Our primary aim was to understand the role of the arts in raising public awareness of ecological threats. It seemed essential, therefore, to ask what we meant by "public awareness" in the context of this project. This cycle of research activity began with a discussion about what we each assumed public awareness to be. Then, each

member of the research team reviewed literature from their area of expertise and identified understandings of, and debates about, the concepts of "public" and "awareness," particularly in relation to ecological threats. These initial reviews were then circulated around the team and discussed. We then shared our experiential knowledge of the ecological, cultural, and political contexts of kauri dieback and myrtle rust, and reviewed related literature, media commentary, and policy. Finally, we did a second reading of our material and rethought our reviews in light of the specific context in which we were working. We bring together the outcomes of this cycle of reflecting, reading, and review.

SCIENTIFIC RESPONSES TO KAURI DIEBACK AND MYRTLE RUST

Kauri trees are the third largest conifer in the world and can live for more than 600 years. They are of immense significance to Māori (Bradshaw et al. 2020, Hill et al. 2022). Kauri dieback was first reported in 1972 on Aotea (Great Barrier Island). It has since been found in at least seven kauri forests in the northern parts of Aotearoa (Bradshaw et al. 2020). Kauri dieback is caused by a microscopic soil and waterborne pathogen, *Phytophthora agathidicida*. This pathogen has devastating effects on kauri trees. It infects and rots their roots, which causes excessive resin production from lesions that ringbark the trunk, as well as crown decline and eventually the death of the tree (Hill and Waipara 2017). Kauri are now recognized as a threatened species, and because of their role as an ecosystem engineer, ecologists stress the risk kauri dieback poses to the broader ecosystem of coevolved dependent native species (De Lange et al. 2018).

Scientists predicted myrtle rust as a potential pre-border biosecurity threat to native species years before it was first reported in Aotearoa in 2017 (Teulon et al. 2015). Myrtle rust is a fungal disease caused by the airborne pathogen *Austropuccinia psidii*, and since its arrival in Aotearoa, it has rapidly spread and become widely distributed in the North Island and as far south as the West Coast/Canterbury in the South Island, and has even reached the remote Chatham Islands 850 km east of Aotearoa. This invasive fungal disease infects actively growing shoots of plants in the myrtle family (Myrtaceae) and causes leaf and stem lesions, defoliation, dieback, flower and fruit death, stunted growth, and sometimes plant death (Sutherland et al. 2020). There are 28 formally identified species of native myrtles in Aotearoa, many of which are endemic. Many were already threatened with extinction prior to the arrival of myrtle rust (Teulon et al. 2015). Myrtles, like kanuka and manuka, play essential roles in restoring native landscapes and/or sustaining ecosystems. Both native and introduced myrtles are taonga species for many iwi and hapū (Teulon et al. 2015). Early research indicates that the native ramarama (*Lophomyrtus bullata*), rōhutu (*Lophomyrtus obcordata*), and pōhutukawa (*Metrosideros excelsa*) are particularly susceptible to infection and damage by myrtle rust (Sutherland et al. 2020).

Scientific research has produced respected knowledge about the two pathogens, how they spread, their effects, and the effectiveness of some management strategies (Black and Dickie 2016). This research has informed policy, strategy, and public education campaigns (https://www.landcareresearch.co.nz). However, it is widely accepted that knowledge gaps remain, and there is broad agreement that more, sustained action is needed from diverse actors, including government ministries and policymakers, researchers, and commercial and recreational forest users (Bradshaw et al. 2020). For example, following initial research into the spread and effects of kauri dieback, the Ministry for Primary Industries made *Phytophthora agathidicida* an unwanted organism under the Biosecurity Act 1993 in 2008, and initiated a biosecurity response in 2009 focused on containment. This response included creating kauri zones (restricting access) and targeted and generalized education and awareness-raising activity (Hill et al. 2022). However, a lack of targeted funding from key research agencies contributed to some knowledge gaps not being resolved, which in turn impeded the progress of management strategies, education campaigns, and community engagement. A new national management plan was released in 2022, which sets out explicit rules for going into kauri forests, growing kauri, working with or near kauri, and conducting mandatory reporting of kauri dieback symptoms (https://www.kauriprotection.co.nz/national-plan/rules-summary). Evaluations of the earlier response indicated some successes but also considerable resistance to management/containment measures, as well as a lack of recognition/valuing of Māori knowledge (Hill and Waipara 2017, Bradshaw et al. 2020, Hill et al. 2022). Significant investment in both research (https://bioheritage.nz/research/saving-our-iconic-trees) and management (National Pest Management Plan for Kauri Dieback) by government reflects both a new direction and high priority for tackling the disease and protecting healthy kauri. This response has led to the inception and funding of Ngā Rākau Taketake under which Toi Taiao Whakatairanga is resourced.

The Ministry for Primary Industries initiated an urgent eradication response when myrtle rust was first detected, and it was made an unwanted organism in 2018 (Lambert et al. 2018). However, the initial response was stepped down after 6 months because the response program could not contain the rapid spread of the pathogen (Lambert et al. 2018). The national Myrtle Rust Strategy, launched in 2019, states that eradication is not possible in the short term (Ministry for Primary Industries 2019). Instead, the focus is on better understanding myrtle rust and how it can be managed, as well as conserving genetic material/seeds and supporting affected tangata whenua (people of the land/Indigenous Māori). A priority of the 2019 plan is to raise both scientific and public knowledge (Ministry of Primary Industries 2019). But, due to myrtle rust's recent detection, rapid geographical spread onto an increasing number of new plant hosts, and its different effects on different species, it has been difficult to fully understand and communicate the risks posed by myrtle rust and ways to manage it (Ministry of Primary Industries 2019). Science communication about myrtle rust is further complicated by the need to communicate with multiple "publics" that have a role to play in managing myrtle rust, including home gardeners, nurseries, seed collectors, and bush visitors.

Established models of environmental education and environmental communication tend to aim for the effective communication of selected knowledge to generate pro-environmental attitudes and action (Talero 2004, Anderson 2015). With kauri dieback, the call to action for the forest visitor has been relatively clear (Lambert et al. 2018). Public education and awareness-raising tools have focused largely on phytosanitary instruction: stay away from closed tracks and forests that have been put under rāhui (customary restrictions), spray boots and shoes when entering

kauri areas that are still open, stay on boardwalks, and keep the soil locally sourced when moving species. There is some evidence that these tools have prevented further human-induced infection, at least on government-controlled land (Hill and Waipara 2017). But surveillance in the Auckland region indicated that despite increased awareness among regional park users of kauri dieback and the importance of containment measures, there was still very low compliance with cleaning procedures, and people were continuing to use closed tracks (Lindsay et al. 2022).

Lack of funding for the long-term management of myrtle rust has contributed to the lack of any ongoing, large-scale public awareness, education, and engagement of communities (Lambert et al. 2018). Also, for myrtle rust, there is not yet a clear picture of what is to be done to protect different myrtle species, which are affected by the disease in different ways (Ministry of Primary Industries 2019). As stated in the national management plan for myrtle rust, there is a degree of uncertainty about what actions growers, sellers, domestic gardeners, or forest users should be taking. This means that raising awareness of myrtle rust requires a very different approach to kauri dieback. What seems common across both myrtle rust and kauri dieback research is that while a unilateral "one size fits all" approach to awareness-raising and management is not likely to be effective, collaborative research and action with Māaori iwi and hapū and other communities can be (Lambert et al, 2018, Lawrence et al. 2019, Ministry of Primary Industries 2019, Bradshaw et al. 2020, Hill et al. 2022).

TE TIRITI, PARTNERSHIPS, AND MĀORI-LED RESPONSES

Māori cultural practices, knowledge, and frameworks have gained wider acceptance within science research and public policy; however, Māori are often excluded from biosecurity management (Lambert et al. 2018). The 1975 Treaty of Waitangi Act and the formation of the Waitangi Tribunal enabled Māori, iwi, and hapū to make claims against Crown breaches of the founding document of New Zealand, Te Tiriti o Waitangi (Orange 1987, Walker 2004). Bennett (2017:192) wrote, "Many of those breaches have related to the environment in some way, because they have involved the alienation, by taking or other means, of land and other resources." In 2011, the Waitangi Tribunal, the standing commission into grievances based on the breach of Te Tiriti o Waitangi, declared many Indigenous species in Aotearoa, including those affected by kauri dieback and myrtle rust, as "taonga species." The term taonga species is used to refer to species:

> *…of flora and fauna that are significant to the culture or identity of Māori iwi or hapū—for example, because there is a body of inherited knowledge relating to them, they are related to the iwi or hapū by whakapapa, and the iwi or hapū is obliged to act as their kaitiaki* (Waitangi Tribunal 2011:1).

The Tribunal also stated that the current laws of Aotearoa do not protect the unique biosphere or the interests and rights of iwi/hapū as kaitiaki (guardians) over their whenua and other taonga (Waitangi Tribunal 2011:1). The government is pulling together a whole-of-government response to a Treaty claim over taonga, including flora and fauna, called Wai 262 (https://www.wai262.nz/). But at the time of writing, Te Tiriti has legal force only when it is incorporated into government statutes, which means that taonga species remain unprotected by law (Bennett 2017). The Biosecurity Act does not have a clause pertaining to the Treaty; it requires consultation with tangata whenua over pest management strategies, not power sharing (Parliamentary Counsel Office 1993). There is, however, a significant if somewhat patchy history of partnership with Māori and of supporting iwi/hapū to lead forest health management in their rohe (territories) (Bennett 2017).

The kauri dieback program established in 2009 was the first biosecurity/pest management program established by the Crown in partnership with tangata whenua; a partnership that came about because of Māori advocacy (Lambert et al. 2018). The program involved tangata whenua from areas with naturally occurring kauri, along with the Ministry for Primary Industries, Department of Conservation, Auckland Council, Northland Regional Council, Waikato Regional Council, and Bay of Plenty Regional Council (Lambert et al. 2018). The program was underpinned by a charter that outlined the roles and responsibilities of the partners, what resources they brought to the table, and how they intended to work together. Māori determined how they wanted to be engaged in the program and formed a Tangata Whenua Roopu. This is recognized as "the first case in which Māori have been represented at all levels of a management programme" (Lambert et al. 2018:121). As Lambert et al. (2018:122) note, however, the inclusion of mātauranga Māori into the kauri dieback program was met with "strong resistance," and Māori felt frustrated by the "missed opportunities."

Informed by the kauri dieback program and its limitations, a Māori Biosecurity Network formed, with guidance from iwi, hapū, and whanau (individual Māori family groups). The network was one of the first responders to the first identification of myrtle rust in Aotearoa (Lambert et al. 2018). The Myrtle Rust Governance Group, which produced the 2019 New Zealand Myrtle Rust Strategy, included tangata whenua representation (Ministry of Primary Industries 2019). The 2019 strategies focus on long-term management rather than eradication and containment, but conflicted with the recommendations of the Māori Biosecurity Network, which argued iwi and hapū could be equipped to contain and eradicate the disease locally. The 2019 strategy does reflect the network's recommendation for the involvement of Māori at all levels, and explicitly references Te Tiriti as the basis for partnerships between the Crown and tangata whenua in the management of myrtle rust.

Another example of iwi working together with Crown regulation and science is the response to kauri dieback in Te Wao Nui o Tiriwa (Waitākere Forest) in Tāmaki Makaurau (Auckland). In 2017, Te Kawarau a Maki, an iwi with mana whenua (to have territorial rights over a region) in that area, placed a rāhui (temporary prohibition) to restrict access to the forest for recreational purposes. This was based on scientific surveillance evidence that human activity on and around walking tracks was assisting the spread of the disease (Hill et al. 2022). Kauri are part of Te Kawarau a Maki's whakapapa (genealogy), and protecting them is of utmost importance (Hill et al. 2022). The purpose of the rāhui was to create conditions in which the mauri (life force) of the ngahere could be replenished while protection measures could be found and implemented (Harvey 2021, Hill et al. 2022). In response to the rāhui and substantial community pressure,

Biosecurity Act legislation was used by the Ministry of Primary Industries in 2019 to declare a Controlled Area Notice, which enforced public compliance with biosecurity measures, including track closures (Harvey 2021, Taua-Gordon 2021). As previously mentioned, compliance with the rāhui and Controlled Area Notice has been mixed. As Robin Taua-Gordon, Te Kawarau ā Maki's Heritage and Environment Officer, noted in a public talk, most tools for protecting the forests, including legislation, research, and direct conservation methods, can align with and uplift the values and priorities of iwi and hapū (Taua-Gordon 2021).

While power-sharing with Māori is not stated in the Biosecurity Act, specific biosecurity strategies and research programs state the expectation that responses to kauri dieback and myrtle rust will support tangata whenua leadership, recognize Māori as kaitiaki and landowners, and draw on mātauranga Māori and science (Lambert et al. 2018). Analysis of kauri dieback and myrtle rust responses argue that the involvement of Indigenous representatives, knowledge, and practices "can enhance and inform the long-term protection of kauri ecosystems and myrtacae across the country" (Lambert et al 2018:129; Hill et al. 2022). But historic experience and social science research suggest that greater awareness of the need for power-sharing and the inclusion of mātauranga Māori is needed; otherwise, the arduous work of advocacy and activism will continue to fall on Māori.

PUBLIC ENGAGEMENT APPROACHES THAT SUPPORT MANA MOTUHAKE

Evidence discussed thus far suggests that a reorientation toward Indigenous Māori rights and knowledge is critical for the long-term health of people and the ngahere in Aotearoa. Supporting Māori rights, we propose, requires the recognition of the significance of mātauranga Māori, of Māori sovereignty as outlined by Te Tiriti o Waitangi, and of mana motuhake for iwi/hapū over their whenua, awa (waterways) and taonga (tangible and intangible treasures). The concept of mana motuhake is central to the intention of Toi Taiao Whakatairanga. Demands for mana motuhake have underpinned ongoing Māori activism and resistance to colonization (Mutu 2019). Mana can also be understood to permeate through all living and many "inanimate" things, including maunga (mountains) and ngahere (Mutu 2019). Māori conceptions of health and well-being emphasize the enhancement or uplifting of individual and collective mana through the preservation of wairua (feeling and spirit), hauora (continued health), and whakapapa connections to ancestors (human and otherwise) and to whenua (Durie 1998, Higgins 2018). Dance scholar Tia Reihana (2018:287) conceptualizes mana motuhake as autonomous, embodied authority. She proposes that equitable and ethical inter/cross-cultural engagements in contexts like Aotearoa are those that "increase the authority of Indigenous perspectives."

Colonial governance involved the disruption of Indigenous political systems and the creation of new publics (Walker 2004). In Aotearoa, colonization brought the concept of the public as a nation's citizen as a whole (Salmond 2018). Recognizing mana motuhake and Māori sovereignty, we argue, requires a substantial questioning of notions of public awareness that leave universal, colonial understandings of "public" unquestioned. It calls for an approach to raising awareness of, and generating action in response to, ecological threats that uplifts or supports Māori authority, knowledge, and practices, and aligns with an understanding of the interrelatedness of all things (Hill et al. 2022). An example of a framework that is recognized for embedding iwi and hapū values and mātauranga Māori into the development of cultural and physical landscapes is Te Aranga: Māori cultural landscape strategy (Te Aranga 2008). Designer Fleur Palmer (2021:225–226) writes that the principles set out in Te Aranga call for "promoting Indigenous values, including the recognition of tino rangatiratanga" of iwi/hapū that are mana whenua "with decisions that impact their communities and future generations." The principles are as follows (Te Aranga 2008):

- Rangatiratanga: the right to exercise authority and self-determination within one's own iwi/hapū realm
- Kaitiakitanga: managing and conserving the environment as part of a reciprocal relationship, based on the Māori world view that humans are part of the natural world
- Manaakitanga: the ethic of holistic hospitality whereby Mana Whenua have inherited obligations to be the best hosts they can be
- Wairuatanga: the immutable spiritual connection between people and their environments
- Kotahitanga: unity, cohesion, and collaboration
- Whanaungatanga: a relationship through shared experiences and working together that provides people with a sense of belonging
- Mātauranga: Māori/Mana Whenua knowledge and understanding

Te Aranga is intended to intervene in processes of development and planning that have historically failed to support mana motuhake or engage with te ao Māori (Paul and Kake 2019). Enacting these principles requires long-term, multi-generational thinking and a complete reframing of how property and ownership are conceived, which involves moving away from exploitation for wealth accumulation and toward holistic/relational well-being (Palmer 2021). These principles have been adopted by some local authorities and private developers (Paul and Kake 2019). Both the principles themselves and the way they have been taken up and integrated into policy, practice, and governance can be a useful reference for thinking about what it might mean to raise awareness of kauri dieback in ways that support mana motuhake for iwi and hapū.

THE ARTS, ENVIRONMENTAL, AND ECOLOGICAL AWARENESS

Artists have been working for decades to determine exactly what the arts might do in the face of urgent ecological threats. Internationally, research literature shows that the arts provide multiple, multifaceted possibilities for drawing attention to, and promoting care for, the natural environment within the context of the climate emergency and other ecological crises. Ecological or environmental arts scholars propose that to contribute to environmental justice, artists/practitioners need to go beyond taking nature as a subject and move beyond representational practices that position the natural world as "other"/secondary/background, and thus affirm human's dominion over nature

(Giannachi and Stewart 2005, Demos 2009). Creative practices have distinct potential in relation to environment/ecology based on their capacity to disrupt the nature–culture binary and allow more complex relations to emerge, to de-center the human and explore the "agency" of the natural world, and to reconnect people with a sense of "the ecological" (Harrison and Harrison 1993, Blandy et al. 1998). The arts can also make complex ecological ideas, processes, and "political ecologies" visible or tangible (Swyngedouw and Heynen 2004), and make it possible to imagine, or even enact, new ecological solutions (Harrison and Harrison 1993).

There is a strong body of research-based and critical/philosophical literature that argues that the arts can contribute to public environmental or ecological awareness, but the concept of "public awareness" itself is rarely defined or critiqued. For example, "public awareness" is often glossed over as the reception and retention of predefined information by an undefined mass (Curtis 2011, Mendes et al. 2012). Data and practice examples in the literature, however, can be reread for a more nuanced, multifaceted conception of public awareness in which "publics" are multiple, shifting, heteronomous individuals, groups, or communities. In relation to biosecurity issues, Foote et al. (2017) concluded that the arts have a role to play in "promoting conversation and debate about controversial issues" and challenging people's preconceptions. Quotes from Curtis's (2011) interviews with environmental extensionists on the arts and awareness-raising provide further insights into how awareness-raising involves more than a linear process of message communication, reception, and retention. Interviewees describe awareness-raising as feeling inspired to act or having one's heart and mind opened so you can see/feel a different/deeper/more expanded perspective or see/feel something as valuable that might previously have been taken for granted; for example, the tree canopy (Curtis 2011). Brown's (2021) account of a cross-disciplinary (arts, science, mātauranga Māori) performance focused on air/atmosphere evokes a sense of awareness among both the performers and audience as a fully embodied openness and attunement. By focusing on the act of breathing, Brown's (2021) project explored ways to go beyond representing and transmitting the urgent scientific message about air pollution and to create a sense of physical, emotional, and spiritual connectivity to what is ordinarily unseen and intangible.

Cucuzella et al. (2020:1) offer a useful distinction between the terms "environmental" and "ecological" in art, "where 'environmental' most often refers to concerns of world degradation…whereas the term 'ecological' points to the more comprehensive relationships between living and non-living organisms, and their environments." This seems consistent with the definition of environmental awareness by environmental education scholar Talero (2004:5) as, "the recognition by the public of environmental issues and values, and the implications they have in relation to economic issues and social standards of living." As well as understanding information about the environment, environmental awareness encompasses knowing how to respond or behave in a pro-environmental way. Artists move this idea of environmental awareness beyond the "deficit model" of environmental communication, which assumes that better educating the public about the right facts will generate the correct behaviors (Anderson 2015). Instead, many arts projects draw attention to the interrelationship between the political, cultural, economic, and environmental/natural (Page 2021), what Demos (2009) and Swyngedouw and Heynen (2004) call "political ecology." This includes arts projects that raise questions about the causes and responses to environmental issues in settler-colonial contexts.

There is a well-documented tradition of Indigenous peoples from the United States, Canada, Latin America, Australia, and Aotearoa using the arts to call for the kind of environmental awareness we have outlined (Dawes and Maufort 2014, Steiner 2015, Page 2021). The River Talks in Aotearoa, for example, was a Māori-led project that aimed to restore a highly polluted urban waterway. As the audience walked together along the river, they encountered speakers (scientists, residents, artists, Māori, and Pākehā), artworks, and performances, which individually and collectively drew attention to the economic, political, and colonial policies and histories that played a part in the degradation of the river (Matthewman et al. 2015). Underpinning The River Talks is a mātauranga Māori-based understanding of awareness and action. As Tamati Patuwai, director of The River Talks, explains, "Look, I'm from here so for me it's a natural part of who I am. Kaitiakitanga means an ongoing obligation to the protection of the environment. So, it seems to me to be a natural thing—it hasn't ever been left out and has never not been taken up. It has always been there, but the point was to give it attention now" (Matthewman et al. 2015:444).

Māori whakapapa includes genealogical connections between humans and more-than-human ancestors and the understanding that "humans are not separate from phenomena but are a part of the mauri (life force, vigor, impetus, and potentiality) that connects everything" (Royal 2003) (Hindle and Matthewman 2017:33). This aligns with the idea of ecological awareness as conceptualized in some arts literature. The artist duo, the Harrisons, for example, define ecological awareness as more than being "conscious of" environment/environmental issues or pro-environmental behaviors. Instead, they propose a kind of expanded ecological sensibility. In reference to the Harrisons' work, Blandy et al. (1998:241) describe how it calls for a wholesale shift in culture for "people to think and live in connected, participatory ecological systems." The Harrisons' work, Lagoon Cycle, explores ecological awareness and represents a process of coming to be attentive "to the discourse between belief systems and environmental systems" (Blandy et al. 1998:372), and as an "enlarged perception" of "the business of the universe" (Blandy et al. 1998:374). The Harrison's work includes a 50-year collaboration with scientists and members of the Washoe Tribe in the Sagehen area of Sierra Nevada to find ways to save important plant species as global warming changes habitat conditions. The project has brought together tribal knowledge with scientists and science data in a way that has given tribal members control over restoration projects on their land and supported scientists to communicate information about the issues to a wider audience. This project is an example of how arts-led collaborations can "connect people and ideas that normally would not come into contact" (Veltman 2016 Feb:para 8). The Harrisons' recent work, and productions like The River Talks and Brown's (2021) atmosphere project, use the arts to establish stronger emotional, physical, spiritual, and political connections to tangible and intangible aspects of te taiao, and thus remind

communities that the whenua is not a resource to be exploited for economic gain but rather is a living, relational force in its own right. They also offer strong models for arts-science-mātauranga collaborations (Matthewman et al. 2015, Brown 2021).

KOTAHITANGA AND KŌRERO WITH AND WITHIN THE NGAHERE

Since the detection of kauri dieback, many Aotearoa artists have explored how they can use their practices to establish a deeper reflective connection between humans and plants. This practice context is a rich source of Indigenous-led creative approaches to raising ecological awareness in ways that manifest rangatiratanga, are embedded in mātauranga Māori, and express wairua. Painter Emily Karaka (Waikato, Ngāpuhi, Ngāi Tai ki Tāmaki, Te Kawerau ā Maki, Ngāti Tamaoho, Te Ākitai Waiohua, Te Ahi Waru, Ngāti Mahuta, Ngāti Tahinga, Ngāti Hine) has drawn attention to kauri dieback and how the ngahere and their descended people are suffering together. Natalie Robertson (Ngāti Porou, Clan Dhònnchaidh) focuses on her East Coast Ngāti Porou homelands, Te Tai Rawhiti, to explore the significance of her ancestral Waiapu River and the destructive impacts of colonization, deforestation, and agriculture. *Te Hā o Te Wao Nui a Tāne*, The Breath of Tāne (Auckland Art Gallery 2020) by Charlotte Graham (Ngāti Mahuta, Ngai Tai, Ngāti Tamaoho), offered an immersive experience of the ngahere that encouraged participants to engage as kaitiaki. Graham's participatory practice also aims to create whanaungatanga between people and with te Taiao.

Other examples of local practice take collaborative, conversational approaches to environmental awareness-raising and action. One such example is The Kauri Project, founded in 2013. Under curators Chris McBride and Ariane Craig Smith, and with bicultural governance, The Kauri Project commissioned several artists to make work about kauri health (2013–2018). They have persistently drawn attention to kauri through exhibitions, poster series, workshops, and events. Over time, The Kauri Project explored ways to use the arts and arts methodologies to bring together different, sometimes conflicting perspectives on forests and forest health in ways that uplift mana motuhake for Māori, iwi, and the forest. For example, in 2019, The Kauri Project brought together artists, scientists, iwi, government officials, and mātauranga Māori to discuss approaches to kauri dieback and kauri biodiversity. The wānanga (which means to meet and discuss, consider and learn, among other meanings) deliberately called together people and knowledge systems that are more often placed in competition with each other. Significantly, the event took place in the area of Te Roroa, mana whenua of the Waipoua Forest, which is home to some of Aotearoa's most iconic kauri. In an account of the event, co-organizer, Sophie Jerram (2020) explains how "the wānanga allowed artists to be scene-setters rather than specific knowledge holders, each sharing their process" (Jerram 2020:6). Page (2021:15) argues that art–science–Indigenous knowledge projects can "explicitly establish critical dialogues between Western science and Indigenous environmental thought [and] seek to reconnect a disembodied, abstracted scientific knowledge with the cultural, social, spiritual, and ethical spheres of experience from which it has been systematically excluded in the West since the Enlightenment." The wānanga was able to demonstrate how the arts could do more than serve science as a communication tool, and created a space in which knowledge systems could co-exist in respectful, sometimes generative, dialogue. For The Kauri Project's wānanga, it was manaakitanga that made this possible—the careful attention to how and where the event was hosted.

In thinking about how the arts might raise different kinds of awareness in ways that support mana motuhake and embody the principles of Te Aranga, we have been inspired by practices that use the modalities of the arts to bring different perspectives, worldviews, or paradigms into conversation with each other. The collaborative work of the Harrisons, Patuwai's The River Talks (Matthewman et al. 2015), and The Kauri Project's wānanga are all examples of how such a dialogic approach can also uphold or be embedded in the aspirations and authority of Indigenous communities, iwi, and hapū.

CONCLUDING REMARKS: RETHINKING PUBLIC AWARENESS FOR TOI TAIAO WHAKATAIRANGA

Our aim was to generate theories to inform Toi Taiao Whakatairanga's approach to curating Māori artists to generate artworks about kauri dieback and/or myrtle rust, and to researching with and alongside them to understand how those artworks raised awareness of forest health. Our contextualized review of literature, policy, and practice examined a range of issues related to what it means to be raising public awareness of plant pathogens, forest health, and forest management in Aotearoa and other settler-colonial contexts.

Forest health, threats, and responses need to be understood within ecological, cultural, and political contexts. Responses to ecological and biosecurity threats in settler-colonial contexts, we argue, need to begin by acknowledging sovereignty issues and to make addressing those issues central to management approaches. In Aotearoa, relationships with ngahere, from regulatory relationships through to individual behaviors, are (or should be) framed by Te Tiriti o Waitangi. Māori have been the kaitiaki of the ngahere for a long time, and although mātauranga Māori and power-sharing are now accepted, even required, by some public and research agencies, they are not universally recognized. There is some evidence that this, along with other funding issues, is impeding progress in the response to kauri dieback and myrtle rust. Researchers have also argued that an overall reorientation of the policy space to acknowledge Indigenous worldviews is likely to benefit the mana of iwi and hapū, other forest users, and the health of ngahere (Bradshaw et al. 2020, Taua-Gordon 2021).

Our examination of the science research and contexts of kauri dieback and myrtle rust inform our argument that a nuanced, dialogic approach to public awareness, grounded in a commitment to mana motuhake, is needed. To achieve this, we propose a principles-based approach, giving Te Aranga as an example of a framework proposed by Māori to guide Māori-led and cross-cultural environmental projects. Models such as Te Aranga can guide approaches to awareness-raising in which mātauranga Māori and te ao Māori are central and not engaged with in tokenistic ways. We have examined how Aotearoa artists/practitioners are working in ways that, we propose, align with Te Aranga principles. We have also argued that the arts have distinct contributions to make to awareness-raising of ecological threats in ways that go far beyond communicating the messages decided upon by scientists or policymakers. The arts can contribute to

ecological and environmental awareness in ways that support Indigenous aspirations, with artists setting the scene or creating spaces and structures for different knowledges and perspectives to come together.

In conclusion, we propose a collaborative, principles-based approach to public environmental awareness that creates a space for learning at the interface between mātauranga Māori, colonial science, and the arts. This interface is understood as consistent with Jones and Jenkins' (2014) concept of the hyphen space. Specifically, we propose that arts–science–mātauranga Māori collaborations offer a distinct potential to increase awareness among specific and diverse audiences in a way that acknowledges different paradigms, reveals complex incomplete information, and supports the mana motuhake of iwi/hapū and the ngahere. The project Toi Taiao Whakatairanga is developing this emergent approach iteratively, in collaboration with artists, iwi, and hapū, as the research progresses.

GLOSSARY

Te reo Māori does not translate directly into English. The meanings of many words are multiple and contingent upon context. This glossary is a guide only and draws on definitions given by Rauika Mangai (2020), www.maoridictionary.co.nz, and our Māori co-authors. We encourage readers to explore these resources further.

Aotearoa: New Zealand

Awa: waterway, river, stream

Hapū: subtribal groups

Iwi: tribal group or groups

Kaitiaki: guardian, steward, trustee, custodian

Kaitiakitanga: guardianship, stewardship, trusteeship, custodianship

Kōrero: discussion, story, account, statement, talk

Mana: prestige, authority, power, influence, status, spiritual power. Mana can be in a person, a living thing, and at times, inanimate things

Mana whenua: to have territorial rights over a region

Manaaki: hospitality, kindness, uplifting each other's mana

Ngahere: forest

Rōpū/ Roopu: group

Roto: lake

Taiao: environment, nature

Tangata whenua: local people, Indigenous people

Taonga: treasure, anything prized

Te Ao Māori: the Māori world

Te Reo Māori: the Māori language

Tikanga: Māori protocols and correct customs

Tino rangatiratanga: self-determination, autonomy, sovereignty

Pākehā: New Zealander of European descent

Wairua: spirit

Wairuatanga: spirituality

Wānanga: conference, to meet and discuss, deliberate

Whakapapa: lineage, genealogy

Whakatairanga: to raise up, elevate, promote

Whanaungatanga: to cultivate familial relationships

Whenua: land

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