



## Indigenous knowledge, architecture, and nature in the context of Oceania

Derek Kawiti<sup>a</sup>, Albert Refiti<sup>b</sup>, Amanda Yates<sup>b</sup>, Elisapeta Heta<sup>c</sup>, Sibyl Bloomfield<sup>b,d</sup>,  
Victoria Chanse<sup>a,d</sup>, Maibritt Pedersen Zari<sup>b,c,\*</sup>

<sup>a</sup> Te Herenga Waka Victoria University of Wellington, Wellington, New Zealand

<sup>b</sup> Te Wānanga Aronui O Tāmaki Makau Rau Auckland University of Technology, Auckland, New Zealand

<sup>c</sup> JASMAX, Auckland, New Zealand

<sup>d</sup> NUWAO (Nature-based Urban design for Wellbeing and Adaptation in Oceania) Research Project, Te Moananui a Kiwa Oceania, New Zealand

### ARTICLE INFO

#### Keywords:

Pacific  
Indigenous  
Architecture  
Ecology  
Climate change adaptation  
Māori  
Samoan

### ABSTRACT

This perspective article is derived from conversations between leading Indigenous academics and practitioners in the fields of architecture and urban design recorded at a keynote panel at the 2023 NUWAO International Symposium on Nature-based Urban Climate Adaptation for Wellbeing, held at Te Herenga Waka Victoria University of Wellington, Aotearoa New Zealand. The focus of the discussion was Indigenous design for adaptation to climate change in *Moananui* Oceania with an emphasis on relationships to nature. Given the diversity of *Moananui* Oceania in terms of languages, cultures, histories, and worldviews, this discussion represented a unique convergence of Indigenous leadership and thought in the field. It highlighted key themes related to Indigenous design for climate change adaptation and offered a novel, distinctive perspective aimed at advancing thinking around nature-based solutions (Nbs). It is important to recognise and integrate Indigenous values and approaches to knowledge generation, particularly within academic settings. In the context of *Moananui* Oceania this can require adapting oral traditions and formats, such as *talanoa*, and *hui* or *kōrero*, into conventional Western-based research formats such as the journal article. This paper is an attempt to capture important Indigenous knowledge and discussion in a western format to enable further dissemination and sharing. This means the format and methodologies described in the paper do not align exactly with traditional scientific journal article formats, however the discussions and findings help to meet the motivation of the authors, which is to transform traditional Indigenous ways of sharing information into a perspective article format and share insights with a wider audience. This methodology aligns well with the special issue call that this paper resides in (Just, Socio-ecological Urban Transformation: Nature-based Solutions and Traditional Ecological Knowledge), underpinning the relevance and potential contribution to the field. Two key themes were explored within the context of the importance of working with nature; relationships between ecologies and *tikanga* (customary practices), and looking backwards to generate innovation and resilience.

### 1. Introduction

*Moananui* Oceania is diverse in its languages, cultures, histories, and world views. The islands vary greatly in terms of geology, ecology, and climate change impacts. Despite these differences, many parts of *Moananui* Oceania are linked through ancient ancestry and the Ocean itself; *Te Moana*, expertly navigated and inhabited by Oceanic peoples for millennia. Shared concepts of relationality and circular time also connect the people of *Moananui* Oceania [1].

Many Pacific Island nations are highly vulnerable to weather-related disasters, earthquakes, volcanic eruptions, and tsunamis [2]. Some

Pacific researchers argue that this ‘vulnerability’, viewed through a Westernised lens [3], can instead be considered expert resilience because the dynamic nature of island living has led to increased capacity to practise and demonstrate resilience [4,5].

The low-lying atoll islands of Kiribati, The Marshall Islands, Tuvalu, and Tokelau are at particular risk from sea level rise, despite contributing minimally to global greenhouse gas emissions [6,7]. This emphasises that climate change adaptation has significant social justice implications in *Moananui* Oceania [8,6]. Globally, Indigenous people and vulnerable groups are more likely to be negatively affected and in greater magnitudes by climate change [9]. Most Pacific Island nations or

\* Corresponding author at: 55 Wellesley Street, CBD, Auckland, New Zealand.

E-mail address: [maibritt.pedersen.zari@aut.ac.nz](mailto:maibritt.pedersen.zari@aut.ac.nz) (M.P. Zari).

<https://doi.org/10.1016/j.nbsj.2025.100213>

Received 19 March 2024; Received in revised form 5 January 2025; Accepted 8 January 2025

Available online 10 January 2025

2772-4115/© 2025 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

territories have majority Indigenous populations, except for Aotearoa New Zealand, New Caledonia, and Hawai'i [10].

The practice of working with nature to design resilient human settlements, while maintaining healthy ecosystems, has always been a cornerstone of traditional *Moananui* Oceania cultures including in Te Ao Māori (world/worldview of Māori - Aotearoa New Zealand's Indigenous peoples). Indigenous knowledges have long held that human wellbeing is inextricably connected to ecosystem health, with no nature-culture dualism [11]. Building on Indigenous framings of wellbeing and partnering Indigenous knowledge (IK) with NbS leads to place-based, local, urban design responses that offer long-term benefits in diverse Moananui Oceania contexts [12]. This understanding of interconnected relationships with the living world aligns with ecosystem services frameworks often used in climate change adaptation design in *Moananui* Oceania [13]. This makes NbS significant in the region [19].

Including Indigenous peoples in climate change adaptation efforts provides more benefits than relying solely on governments or the private sector [14]. Research highlights the potential negative impacts when NbS fail to consider complex justice issues in relation to Indigenous knowledges, colonial realities, and land tenure [15]. However, most NbS literature excludes discussion of Indigenous knowledge or the participation of Indigenous communities in NbS projects [16]. This research emphasises the importance of understanding Indigenous and local knowledge in climate adaptation interventions, addressing these issues in the *Moananui* Oceania context.

A defining feature of indigeneity is the intrinsic relationships of reciprocity between humankind and the natural world, with Indigenous cultures tending to pay attention to the responsibilities these relationships generate [17]. Indigenous worldviews tend to position humans as inseparable from living ecologies [1,11]. Despite the region's cultural diversity, this is a thread that runs through many socio-ecological systems in *Moananui* Oceania, particularly where traditional values and knowledge thrive. Ecological and climate wellbeing are inseparable as demonstrated in the *Te Reo Māori* (Māori language) term *Te Taiao*, which often is translated as 'the environment' but encompasses climate within it and embeds people as part of the whole living system [18]. In Aotearoa New Zealand, in *Te Ao Māori*, humans have *Whakapapa* (kinship) relationships with the land, as well as specific mountains, rivers, waterways and even certain plants, animals, and rocks. People are literally related to the land; illustrated in the term *Tangata Whenua* meaning Indigenous peoples of Aotearoa and translating literally as 'people-earth'. In Kiribati, people refer to the sea as their 'mother ocean' [19]. In Samoa, the word for earth, *Ele'ele*, also translates to 'blood', highlighting that an integral part of being or existing is the land [20,21]. Holistic health, wellbeing, and the identity of people is therefore inherently connected to the ecosystem in the region. This relational worldview is fundamentally of *Moananui* Oceania and is at the foundation of Oceanic understandings of the world. This means that working with nature in *Moananui* Oceania as a climate adaptation strategy holds different meaning and significance than in other parts of the world [19].

## 1.2. Context and background: expert conversations

NUWAO (Nature-based Urban design for Wellbeing and Adaptation in Oceania) was a research project funded by the New Zealand Government through a Royal Society of New Zealand Marsden grant, aiming to develop nature-based urban design solutions, driven by Indigenous knowledges that support climate change adaptation and wellbeing in Oceania urban settings. In 2023, the NUWAO International Symposium on Nature-based Urban Climate Adaptation for Wellbeing was held at Te Herenga Waka Victoria University of Wellington, in Aotearoa New Zealand. The Symposium invited participants to engage in envisioning innovative, Indigenous-driven nature-based urban design solutions for climate change adaptation and wellbeing. The keynote panel, "Indigenous design for adaptation in Oceania," discussed adaptation and resilience concepts through design with Indigenous leaders in Te

Moananui Oceania, featuring Derek Kawiti, Albert Refiti, and Amanda Yates, chaired by Elisapeta Heta. This paper curates the rich conversation, unpacking key themes and presenting them within the context of NbS for adaptation and resilience in Moananui Oceania.

### 1.2. Positionality: *Ko wai mātou* (who are we)?

An important aspect of decolonising research practices is making researcher positionality clear [22,23]. The authors of this chapter include Māori, Indigenous Samoan, and Tokelauan researchers and practitioners, alongside Pākehā (New Zealanders of European descent) and Tauīwi (other non-Indigenous New Zealanders) involved in research on well-being, climate change adaptation, and spatial design in Moananui Oceania. In Aotearoa New Zealand and across Moananui Oceania, establishing relationships through *whakawhanaungatanga* (building good relationships) is a culturally significant tradition, beginning with introductions that acknowledge one's ancestry and iwi (sub-tribal affiliations) for Māori. To honour this tradition, brief introductions of the four panellists (co-authors of this paper) are provided. All are based in Aotearoa New Zealand. Expanded details about the positionality of other authors can be found in supplementary material.

Professor Derek Kawiti is Ngāti Hine, Ngāti Porou, Ngāti Tūhoe and Ngāpuhi and works at the School of Architecture at Te Herenga Waka Victoria University of Wellington. He heads the new Māori Designed Environments and Indigenous Technologies specialisation and seeks to understand the complex intersection between technology and Indigenous knowledge and how they can either merge or become hybridised, re-versioned or rebooted. An expert in advanced digital tools (generative software) and robotics, he heads SITUA (Site of Indigenous Technologies Understanding Alliance), Indigenous Material Domains (IMD) and Corporate Spheres - Indigenous Workspaces. The labs play a significant role in the 're-Indigenising' of architectural knowledge through exploration of customary methods of spatial organisation (*tikanga/kawa*), engineered structures and patterns, Māori geometries and materials utilising computation and digital fabrication.

Leali'ifano Dr Albert L. Refiti (Samoa: Fasito'outa, Vaovai, Vailima) is a Professor of Art and Design at Te Wānanga Aronui O Tāmaki Makau Rau Auckland University of Technology (AUT). He is co-leader with Engel-Schwarzpaul and Waerea of the Vā Moana Research Cluster. He is co-editor of *The Handbook of Contemporary Indigenous Architecture* (2018) and *Pacific Spaces: Translations and Transmutations* (2022).

Associate Professor Amanda Yates is Ngāti Rangiwewehi, Ngāti Whakaue, Te Aitanga a Māhaki, and Rongowhakaata. She leads the Architecture Programmes at the Huri Te Ao School of Future Environments at AUT, focusing on regenerative practices and Indigenous knowledge. Yates is the Programme Leader and Principal Investigator of the National Science Challenge funded Urban Wellbeing Research Programme and directs He Puna Ora, a regenerative action lab focused on urban system change.

Elisapeta Heta is Samoan and Tokelauan, and Ngāti Wai, Waikato, Tainui, and Ngāpuhi. She is a practising architect and principal at Jasmox in Tāmaki Makaurau Auckland, and leads Waka Māia there to guide Jasmox on an inter-generational journey towards becoming an authentically bicultural design practice. In 2022, she received the prestigious NZIA President's Award, reflecting her influence as a cultural leader in Indigenous design in Aotearoa New Zealand and internationally.

In recognition of efforts to decolonise the language used to describe the region and to emphasise the interconnected nature of *Moananui*, we refer to *Moananui* Oceania rather than 'Micronesia, Melanesia, and Polynesia'. We have used Te Reo Māori and Samoan words throughout the paper. These are in italics and include a translation in brackets to English where they first appear.

Table 1 summarises non-English words in a glossary.

**Table 1**  
Glossary of non-English terms.

Te Reo Māori	Translation to English
Ae	Yes
Aotearoa	Literally ‘the land of the long white cloud’; a common Te Reo Māori name for New Zealand
Atamira	Stage, platform - raised platform.
(Marae) Atea	Courtyard, public forum - open area in front of the <i>wharenui</i> where formal welcomes to visitors takes place and issues are debated.
Atua	God/s, spirits, deities, ancestor/s with continuing influence. Also power, strength.
Hākari	A sumptuous meal, feast, banquet, celebration, entertainment
Hākari Stages	Food display structure/stage for a feast - high wooden framework on which food was placed for a feast in traditional times.
Hapu	Kinship group, clan, tribe, subtribe - section of a large kinship group and the primary political unit in traditional Māori society.
Hawaiki	The traditional Māori place of origin.
Hui	Gathering, meeting, assembly, seminar, conference.
Iwi	An extended kinship group, tribe, nation, people, nationality, race - often refers to a large group of people descended from a common ancestor and associated with a distinct territory
Kai karanga	Caller - the woman (or women) who has the role of making the ceremonial call to visitors onto a marae, or equivalent venue, at the start of a <i>pōwhiri</i> .
Kawa	Governing protocol and policy
Kōrero	To talk, speak, discuss. A conversation, discussion, or meeting; narrative, account, speech
Koru	Fold, loop, coil, curled shoot. A spiral motif.
Mahau	Porch, verandah.
Mahi	Work, job, employment, trade (work), practice, occupation, activity, exercise, operation, function. To work, do, perform, make, accomplish, practise.
Mana whenua	Māori who hold direct whakapapa ties to an area or territory.
Manuhiri	Visitor, guest.
Marae	Courtyard - the open area in front of the <i>wharenui</i> , where formal greetings and discussions take place. Often also used to include the complex of buildings around the <i>marae</i> .
Mata	Prophetic song. Spell, charm, incantation.
Māori	Indigenous people of Aotearoa New Zealand, (also <i>māori</i> - normal, ordinary, natural, usual, common).
Mātauranga	Knowledge, wisdom, understanding, skill - sometimes used in the plural.
Mātauranga Māori	Indigenous Māori knowledge. Traditional environmental knowledge.
Mātauranga-a-iwi	Iwi specific indigenous Māori knowledge, and specific to their environmental context. [24]
Mātaturanga tuku iho	Ancient, traditional indigenous Māori knowledge and knowing
Mauri	Life force, life essence, life-field, the ephemeral. Life force that binds all living aspects of the world (including rivers, oceans, mountains, forests and other ‘entities’ not often acknowledged as being alive in western science).
Mauri ora	Wellbeing (social and ecological), life essence flourishing with potential ideas and connections.
Moana	Sea, ocean, large lake.
Ngāpuhi	The iwi whose lands centre around the Hokianga Harbour, Bay of Islands and Whangarei in Northland.
Pā Auroa	Eel ( <i>Tuna</i> ) weir.
Papa	Board, timber, floor, slab, plank, chart, plane surface, bed (of a lake or the sea), Earth, shell of crayfish and molluscs - anything broad, flat and hard. Also a foundation of sorts, and occasionally a shortened form of <i>Papatūānuku</i>
Papatūānuku	The earth mother.
Pākehā	New Zealanders of European descent.
Pōwhiri	Invitation, rituals of encounter, welcome ceremony on a marae, welcome.

**Table 1 (continued)**

Te Reo Māori	Translation to English
Pūrākau	Traditional oral Māori stories - these stories hold important knowledge, names and relationships to place/s, kinship stories.
Tāmaki Makaurau	Auckland, specifically the Auckland isthmus. Also, Tāmaki.
Taonga	treasure, anything prized - applied to anything considered to be of value including socially or culturally valuable objects, resources, phenomenon, ideas and techniques. Also, property, goods, possession, effects, objects.
Taonga tuku iho	Māori cultural heritage.
Tangi	Sound, intonation, mourning, grief, sorrow, weeping, lament, salute, wave.
Tauīwi	Non-Māori New Zealanders
Teina	A younger brother (of a male), younger sister (of a female), cousin (of the same gender) of a junior line, junior relative. Also means a junior, apprentice, learning from a senior.
Te Ao Māori	The Māori world and world view.
Te Arawa	The iwi (tribal confederation) whose lands stretch from Māketu on the coast through the thermal district of Rotorua and Taupo to the central plateau. Te Arawa iwi includes: Ngāti Rangiwēhē and Ngāti Whākau.
Te Kawenata o Rata	A covenant between Ngā Aho (A network of Māori and Indigenous design professionals) and the NZIA (New Zealand Institute of Architecture), recognising Te Tiriti o Waitangi
Te Moana-nui-a-Kiwa	The great ocean of Kiwa, the Pacific Ocean, Oceania. Also, Te Moananui or Moananui.
Te Reo Māori	The Māori language.
Te Taiao	The living world, nature, the eco-sphere, planetary living systems including climate.
Te Tiriti o Waitangi	The Treaty of Waitangi - importantly the Te Reo Māori version of the Treaty - signed by the British Crown and Rangatira Māori (Māori chiefs, leaders), the founding document of Aotearoa New Zealand.
Tika	To be correct, true, upright, right, just, fair, accurate, appropriate, lawful, proper, valid. Also, truth, correctness, directness, justice, fairness, righteousness, right.
Tikanga	Appropriate Māori customary practices and behaviours
Tipuna	Ancestors, grandparents - plural form of <i>tipuna</i> and the eastern dialect variation of <i>tipuna</i>
Tūhoe	Also Ngāi Tūhoe, the iwi whose lands are centred around Te Urewera in the central eastern mountainous backbone of the North Island
Tūpuna	Ancestors, grandparents - plural form of <i>tupuna</i> and the western dialect variation of <i>tipuna</i> /tipuna
Waiata tangi	Lament - song of mourning
Waikato Tainui	The iwi (tribal grouping) whose lands encompass the central north island area of Waikato from Tāmaki Makaurau in the north to the Mōkau River in the south west.
Whakapapa	Genealogy, lineage. Also the kinship of human and non-human encompassing the complex relations between people and the land
Whakataukī	Māori proverb, significant saying, aphorism where the original origin/speaker is unknown
Whakatauaūki	Māori proverb, significant saying, aphorism where the person who first said it is known
Whakawhanaungatanga	The process of establishing, building and maintaining authentic relationships and connections; and relating well to others.
Whanaunga	Relative, relation, kin, blood relation.
Wharenui	Meeting house, large house - main building of a marae where guests are accommodated.
Whare Tapere	House of entertainment, theatre, community centre, arena, auditorium - traditionally a place where people gathered for entertainment.
Samoa	Translation to English
‘Ava	Also Kava. A beverage made from the root of the <i>Piper methysticum</i> plant used in the South Pacific for ceremonies and relaxation.

(continued on next page)

Table 1 (continued)

Te Reo Māori	Translation to English
‘Ava Ceremony	A solemn ritual or ceremony in which the ceremonial beverage ‘ava is shared to mark important occasions in Samoan society.
Ele’ele	Earth, also blood
Fale nui	Big house
Fono	Councils, meetings, great or small in size.
Mau	Resolute, resolved, decided, unwavering in opinion or testimony. Denotes firm strength.
Mauli	Similar to <i>Mauri</i> in Māori. <i>Segia mauli</i> - lifted, heightened or unsettled awareness/presence/ expression of <i>mauli</i> .
Palagi	(in Samoa) a white or non-Samoan person.
Talanoa	Conversation, discussion. Respectful sharing of ideas, dialogue, storytelling.
Tumau	Constant, permanent/permanence, steady, lasting, perpetuity.
Tufuga	Craftsman. Denotes the status of master craftsman who have achieved the highest rank in skill and knowledge in a particular traditional art form.
Western Moana Oceania region	Translation to English
Tok stori	“Tok stori, a form of discursive communication, is an everyday occurrence in the Western Moana Oceania region.” [25]

## 2. Methods: discussion to generate innovative conceptual thinking

In *Te Moananui* Oceania, Indigenous traditions *hui*, *talanoa*, and *tok stori* are central to discussion, storytelling, and oral transmission of ideas and knowledge [26,27]. Western academic work typically involves individuals writing about concepts, while in Indigenous settings, key ideas emerge through dialogue, even in online settings since the Covid pandemic [28–30]. This approach reflects a relational worldview where relationships between space, people, and the living world drive innovation [1]. Such discussion-based methodologies have led to well-regarded Indigenous-driven research methods [29–31]. This paper therefore, translates an important conversation between Indigenous design leaders into narrative written form, maintaining a conversational tone where possible and using direct quotes. The conversations were recorded, transcribed, and grouped into themes by the NUWAO research team and panel members. Where necessary, we have added supporting citations to the discussion.

The research methodology engages with Indigenous perspectives, focusing on knowledge generation through dialogue (*kōrero*) and cultural context. Excerpts from the panel’s dialogue are used to generate knowledge in the context of Indigenous perspectives. This approach draws on Tuhiwai Smith’s “Decolonising Methodologies,” which challenges traditional Western research methods [23].

Oral traditions such as *kōrero*, *hui*, and *talanoa* aim to generate shared knowledge, using different processes than Western paradigms. A key consideration in these methodologies is place, framing research within a specific cultural or geographical context.

It is important to recognise and integrate Indigenous approaches to knowledge generation, particularly within traditional academic dissemination vehicles such as this journal article. The methodology of moving from oral traditions to a Westernised manuscript included several steps. The keynote panel discussion was recorded, transcribed by a non-Māori speaker, and then co-author Bloomfield ensured accuracy of non-English terms, normalising the use of Te Reo Māori and Samoan in written academic contexts.

## 3. Results: concepts and themes

Several key themes emerged during the panel discussion including relationships between ecologies and *tikanga* (customary practices), and the idea of looking to the past to generate innovation and resilience.

### 3.1. Ecologies and tikanga

This theme relates to the foundational relationship between the ecologies people live within and *Tikanga* (cultural practices). Heta began the discussion with a quote from Toi Ngāpuhi (a Te Tai Tokerau/Northland-based creative arts and cultural advocacy and support agency):

*‘Environment breeds tikanga (cultural lore). Our tūpuna (ancestors) arrived on these shores with knowledge of how to exist through time and careful observation of the taiao (the natural environment). Tikanga was shaped and formed to harmonise with the ebbs and flows of Aotearoa, the land of long abiding light. We exist because of this. We are the land, and the land is us.’* [32]

She noted that *tikanga* supports our relationship with the environment, but there is a tension, because *tikanga* has been shaped by the environment, which is now changing rapidly due to climate change, a phenomenon people have contributed to. The panellists were asked, “How might the idea that the environment breeds *tikanga* appear in your research or thinking?”

Kawiti responded: Quite often we are thinking of *tikanga* or customs as pure things but often, in today’s environment, we are trying to forensically piece together and reconstruct our cultural identity from fragments; a ramification of the colonisation process... We are always going to have to look from our 21st-century lens and reach back into the 17th century... It is important to take heed of writers such as Māori Marsden [33,34] and those whose ideas and philosophies are fundamental and timeless... [Marsden] worked with old people who had that knowledge... We don’t have access to those people who practised and behaved naturally and organically with those *tikanga*, so we are always trying to reinvent or repurpose or reboot... What I am trying to teach is a responsibility to reach back and to bring back, especially within the realm of architecture, the archetypes that have been suppressed or forgotten, such as the *hākari* (special feast) stages [35], *pā auroa* (eel weir), *atamira* (stages or platforms), and *whare tapere* (theatre, arena) to try to get a sense of how they fit within our current lens, and how we might repurpose them within today’s design spheres where they become more visible. The *wharenui* (meeting house) and the *marae* (complex of space and buildings around a wharenui) [36] are really fascinating because to an extent they managed to escape the gauntlet of colonisation. They have a deep archetypal relationship back to the Pacific, back to our roots. We have a *tangi* (intonation) or *whakataukī* (proverb) or *mata* (prophetic song) from the north that says “*Kei takahia e koutou ngā papa pounamu a o koutou tūpuna e takoto nei. Titiro atu ki ngā taumata o te moana*” [37] which means, “When your lands are devastated and taken and destroyed, reach back to your origins”. In my *whānau* (Ngāti Hine), we interpret ‘*ngā taumata o te moana*’ as, ‘look back to your origins or look back to the Pacific in this case.’

### 3.2. Looking backwards to generate innovation and resilience

The second theme explored how looking back to one’s origins can inspire future-focused ideas, and the tension this creates for Indigenous peoples. The conversation centered on new *tikanga* and how contemporary environmental changes affect these relationships. Heta introduced the discussion with a set of questions.

Heta: When we think about our *iwi* and *hapu* as well as urban peoples, we are often going as far back as we can and then trying to pull that forward. So, when I think about *tikanga* relative to say *kawa* (protocols), *tikanga* is *tika* meaning something that is right or correct and *ngā* is the pluralisation of that, meaning thinking about the many right ways to do something. Some of the work that all of you are doing is trying to go back as far as is reasonable and bring forward what is relevant to be adaptive, to be thoughtful, and to be mindful of today’s conditions. What are the new kinds of *tikanga* or protocols or customs in relation to the tools you are creating? Is this an adaptation of an old way of thinking to the

problems of today? How you are trying to evolve tools or think about something as old and charged as mauri (life force) which comes from the Pacific and exists here in Aotearoa as an idea, so that it is something that is applicable to our designed environment and the challenges we currently have? The concept of resilience emerges here in terms of re-indigenisation of the built environment and how that relates to the idea of *tikanga* or *whakatauki/whakataūāki* (proverbs), as things that give people guidance.

In considering the concept of resilience in the *Moananui* Oceania context, and in response to the question about her work with the concept of mauri [38], Yates responded.

Yates: We need to shift from ecological degeneration to ecological regeneration. We need to think of our cities as always, already, ecological. They are always part of the living world. So, there is that shift to ecological regeneration, working with nature-based systems, working with ecological systems, working with the more than human, making cities for the more than human, not just for ourselves. Not as a poetic, but really as a very pragmatic response and a resilience response. But also, as an ethical act because the more-than-human are our *whanaunga* (kin). We are *teina* (the junior sibling); we need to be much more respectful in the way that we engage with the living world and our built environments need to respect and give care to the more than human.

Refiti discussed the *whakapapa* (genealogy) relationships at the foundation of understanding of Indigenous identity tying human and ecological resilience together intrinsically.

Refiti: Resilience for a lot of Pacific communities that live 'in island' is different. I grew up in Samoa in the mid to late '60s and early '70s and there were always cyclones. People, neighbours, etc. were always rebuilding. So, the idea of 'making place', the idea of making a community, was always this active thing. People were having to engage with cyclones and with droughts. We didn't try to build and stabilise the environment so that we could build something to last for 100 years. Building was always predicated on the idea that you have to remake all the time, so the notion of resilience for us is not to build something permanent so that you are secure from this very variable ecological and climate context that is always changing, but that you have to live *with* it. You take the force, you internalise it, and you are always moving and changing with that.

The discussion went on to emphasise the embedded relationship humans have with the natural environment. *Tikanga* and *kawa* guide interactions with the environment, informing and being informed by resilience strategies. It was noted that many contemporary adaptation challenges stem from the application of Western worldviews, technologies, and ideologies.

Heta: We had visiting academics recently. They were talking about the early writings about *whareniui* (Māori meeting house) and that they were always written from the perspective of *pākehā* academics standing outside of the house looking at it. The prevalence of Christianity meant that there were certain things that were biased towards those academics' view of what they are looking at. This is where the idea that the right side of the house was the right relative to standing outside of it and looking at it comes from. When I draw the *whareniui* to explain a *pōwhiri* (welcoming) process for example, I always position myself inside the house and draw from the inside of the house, looking out through the verandah to the *atea* (ceremonial space in front of the *whareniui*) to the *manuhiri* (visitors) coming on. I wondered if that was because I grew up next to the nannies that were always the *kai karanga* (the callers of the greetings) standing on the *mahau* (porch/verandah) greeting the visitors, but I realised that it was something that we, the perspectives I find most Indigenous people hold, is that we exist on the inside of the conversation living it, not on the outside looking at it. A commonality that I'm hearing in this discussion is around using tools that you have at your disposal to centre an Indigenous way of thinking and looking out at the field around you. Maybe the universal Indigenous thinking here is that we are often inside of the house looking out. Even the concept of 'nature' concerns me often because we talk about it as if it's something other

than ourselves.

#### 4. Discussion

In discussing Indigenous design for adaptation in Moananui Oceania, questions arose about what constitutes Moananui or Māori design environments, how to improve these through research and application, and how decolonisation may manifest in architectural design. The following sections summarise key themes, address emerging questions, and serve as a provocation for architecture professionals, researchers, and teachers.

Heta: There are so many threads to pull on here. What that indicates is the breadth of the discussion and the sheer multifaceted nature of what we collectively need to do to be able to approach the issues discussed. Multiple methods are being discussed to approach resilience and our relationship with nature.

Yates: My research seeks a *papa* (foundation/base) rooted in the past but always present: our inherent interconnectedness with the living world. Every time that we breathe in, we are becoming one with the living world and every time we breathe out, the living world is becoming us. When we have been socialised in a Western nature-culture split mode, we understand ourselves to be separate. But it is always impossible to be separate from the living world we are in relation with. We eat a carrot and we become that carrot (steak, moro bar...)!

Yates: So, that is the challenge at this time; for all of us Māori and non-Māori to return to earlier sensibilities and knowledges and to move past that nature-culture split thinking, which is conceptually and physically impossible. That is what my research focuses on; how do we draw through *mauri*-centred thinking, how do we draw through living systems, and wellbeing approaches to design the built environment. There are different ways of doing it. What we have been exploring is how system change occurs. We know that the planet has been systematically degraded by an extractive industrial culture. We know that we can not continue. We have reached many planetary boundaries and limits. We have to shift to a more regenerative, ecological, and in Aotearoa New Zealand, a *mauri*-centred cultural system.

Yates: Moving from carbon-based energy systems to renewable non-carbon energy is key. Our economy is currently a linear take, make, waste economy. We need to move to a more circular bio-based economy. These are massive changes in the way we engage with our ecosystems, changes in the way we construct and engage in our energy systems, changes in the way we do the whole economic and production base of our culture. It sounds impossible to shift all of those systems at once while also shifting our architectural and urban environments, but we know that change happens always over time. Our human culture is always shifting. Our urban cultures are always shifting. The key currently is to direct that change towards *mauri*-centered systems and approaches, and do so with pace.

Heta: My understanding of some of the *mahi* (work) you are doing (Refiti) is going back to those *tufuga* systems, the ways of doing things in the Pacific, particularly in Samoa. We often look to our proverbs as a means of guidance. They are metaphoric, but they're often grounding. You spoke of a particular proverb: '*E tumau le fa'avae ae fesuia'i faiga*' (The foundation remains but the ways of doing change) [39] but you also then chose to restructure that proverb to suit your current thinking, the English translation of which is 'resilience can be achieved if we change our footholds.'

Refiti: Being Samoan, we all have our own interpretation because the Samoan fish is cut up in so many ways and you can have your piece. '*E sui faiga ae tumau fa'avae*' is usually translated as, 'the way we practise, the way we engage in our work in the world, can take on many appearances, many ways of doing', but foundations remain. So, the logic of how we should, from an Indigenous perspective, relate to the environment or this thing called nature, is not just that it is a simple background that our cultures and behaviours and actions are set against. It is not that we do everything, and nature just stays still. We know from storms and

the cyclones, that is not the case. It is a very variable thing; this ‘background’ of nature. It is not mute. It is in fact, of multiple facets. When our ancestors passed away, they merged with this thing. From my work in architecture and the way landscapes form in a meaningful way for us, they look at us.

Heta: To say that our ancestors, our *tupuna* when they pass away, literally merge with our environment, and that it is not a mute background, indicates that is because we are of it. We go back to it. There’s a system and a cycle and an ecology.

Refiti: I was trying to think about the notion of ‘foothold’. Because *tumau* in Samoan is not as simple as ‘to hold your place’. You are always engaging with place. And, that notion of *mau*, (probably similar in other Polynesian languages) means when you stay. It is when you have a constitution. Therefore, Albert as Albert does not exist, but other things come through Albert. So, when you have *fono* (council sessions), I sit there not as Albert, but I have a title ‘*Leali’ifano*’ and other things come through Albert. I, as Albert, am the potentiality for those other ancestors and things to come through me because I’m no longer Albert, I am *Leali’ifano*. That is what *mau* means; it is to hold a fort for those other layers, those other things in me to be there, to be present. So, in a classic case of a *fono* and ‘*ava* ceremony, you are the past and present and become this really interesting kind of representation or incarnation. When you are in a *fale nui* (large building to gather in) and other gathering places in the Pacific, it allows for the potentiality of other things to come forward. So, the notion of *tumau* is not necessarily just being able to make things stable and stay the same; it is actually allowing for the potential of other things or other ways of doing things to come forward. It’s a lot more interesting and complex than just, say, the notion of ‘foundation’, which we know is stable.

Heta: What are some examples in your research that you are discovering that might be used to help re-indigenise the built environment or to help think about resilience in relation to our communities?

Refiti: One way to trans-Indigenise the language and the discourse is rather than routing it through some meaning in ‘science’ or in a European context, I talk sideways. This is the type of thinking that I’m grappling with. We are trying to indigenise knowledge and the frameworks from which we arrive at our customs and our identity. The current research that I am doing, and Yates and Kawiti too, relates to the re-Indigenising or rethinking, recovery, and rehabilitation of that knowledge. The question is how can we work with that in a meaningful way? I really like the idea that what we are doing is Indigenising knowledge, because from a Samoan perspective, and Māori perspective, and I know a lot of other Pacific Island scholars, we can start to exchange, rather than routing our discussions and discourse through the ‘master’s discourse’, which is English. Then we can start talking about commonalities and differences. For example you (Yates and Kawiti) are talking about *mauri*. I can talk about *mauli*, which is a cognate and similar kind of thing. For Samoans though, the only time you hear *mauli*, is when we are frightened or *segia mauli* (lifted, heightened or unsettled *mauli*). It comes from the idea that *mauli* should always settle in you. It should not show itself and only shows itself when you are startled. Therefore it’s an instinctive thing that comes through our primordial genetic disposition to regulate oneself relative to an environment. So, for Samoans, if there is a notion of *mauli*, there is trouble because a lot of *mauli* has been stirred up. Obviously, if we’re talking about *mauli* as a way to rehabilitate the environment, then we realise that the environment and our relationship to it as people, is in trouble.

Yates: Pilots and case studies are useful. System change tools can help. Tools that make it easier for people to understand the change that needs to happen and then what to do to activate the change are key. Working co-creatively with communities is a great way to make change. We have been exploring that in our work. We are trying to visualise and communicate a set of actions for energy system change, economic system change, land use change and so on, so that built environments and architecture are regenerative. We have a compass now [38] which helps people to talk about the changes they want to see in their communities,

and we have done co-creative workshops with Te Arawa and Rotorua Council to start on an urban compass. The compass is a test tool to co-create and communicate the change we need to make and through co-creation, communities take agency in the making of that change.

Kawiti: I’m an active digital tool user, either software or hardware. There are some things that can’t be made or conceived of via those tools, regardless of how sophisticated the tools are. At the Māori Arts and Crafts Institute, we realized 70 % of the items couldn’t be reproduced with tools; only hands could create them. So I am interested in the implications of technology in terms of our *kawa* and *tikanga* and the adoption of high-end technology. What is lost and what is gained? What do we give away as Indigenous people to these machines and to these tools? We are still in catch-up mode with our *mātauranga* (knowledge). The term *Mātauranga Māori* was socialised in the late 1980s, influenced by various forces from the 1970s. There is *Mātauranga-a-iwi* [24]. So, our concept of *Mātauranga Māori* needs to be unravelled as well. I am interested in the effects that some of these tools produce and how they might align with reconceptualising what our *Mātauranga* is in terms of emulating the way things are made through bolting different accessories onto robots with a low and high-tech approach as well. The Māori Arts and Crafts Institute have had the mandate to preserve, reproduce, and replicate Māori arts for 70 odd years. They said if Captain Cook had brought an ABB robot on the Endeavour, our *tupuna* would have embraced it, highlighting that adaptive capacity, not resilience, is a valuable trait. The key is having the right technology in the right hands.

Kawiti: I try not to close down the space of exploration, but open it up. There are limits to it regarding Pacific and Māori ideas of collectivity and work provenance. There are limits to it in relation to bringing about Pacific and Māori notions of collectivity and provenancing of work. If you don’t have *tikanga*, you really don’t have anything. Without customs, traditions, and limits, you end up with things being picked up and dropped and adopted, and truth questioned, and we end in a phenomenological or epistemological crisis. Regarding technologies and the application to some of the ideas that Refiti and Yates are referring to, you will find a technology that will not so much replace it, but might enhance it, or collate it, or aggregate it. The elephant in the room is artificial intelligence (AI) and how you might interpret AI through an Indigenous lens. Deliberately setting up biases and positions (which AI claims not to be doing), within the tool; or building in a *tikanga* or a *kawa* to those tools. You can ask, ChatGPT 4, ‘can you create a Māori supermind, or can AI evolve into a Māori supermind through the adoption of biases?’ and, it will tell you, yes, it can do that within certain conditions.

Refiti: From a Samoan or Indigenous perspective, the core issue with AI is the relinquishment of human intentionality. For Samoan and most Indigenous people, this isn’t new; we have prayer because we don’t have all the answers. With chant and prayer, we surrender our intentionality to something beyond ourselves, beyond the human. This aligns with the idea that robotics, working autonomously, operates in the variable background (environment) in which we live, which is not controllable. As humans, we create to control the unpredictable, but AI, like other free-flowing intelligence, merges into the environment. AI is already a form of Indigenousness, as every virtual call, like prayer, engages with a world where humans no longer have control. We’re now encountering how knowledge interacts with these other things in the ether.

Kawiti: There are a lot of people actively engaging with AI from a Māori epistemological point of view; a Māori beliefs and values framework. Re-Indigenisation in Aotearoa New Zealand is about 30 years old and has been a slow process. When we (Kawiti and Refiti) were at Noel Lane Architects, motifs, symbolism, and iconography began to appear on facades, sparking an industry around this approach. It has since evolved into today’s more sophisticated facades. The problem I have with that sort of work is that while it signals a new shop front for re-indigenisation or re-naturing, I think it’s also a form of technological suppression in terms of not really unlocking the performative aspects of materials and pattern organisation, which is latent, and which is overlooked because of this surface applique. The current approach of embellishing facades

with patterns and using industry formats and materials is limited. It restricts the geometry, mathematics, and performative aspects that we can now finally explore and understand through computer access. We continue to suppress these elements in the built environment. Many Māori and Pasifika designs have relegated our formal syntax, language, and patterns to two-dimensional formats, separating them from craft and customary materials. With the advent of free-form digital software we may be better able to represent complex non-western geometry, which was originally in our cultural arts practices and guilds. These forms can become free from surface ornamentation approaches. It's a very exciting space.

Yates: In terms of the surface applique, it can be quite comforting. You think, 'we are landing some sort of Indigenous presence there,' but really, as you suggested, it's thin. And, what is much more powerful and much more important is landing the ontological shift; the shift in the way we understand ourselves to be in the world, and to be with the world, and to be as the world. If we do that, then we pattern a building that is respectful. If we gather and slow water, if we make the building generate energy, if we make it generate food, if we make it green or blue so that it slows water or increases biodiversity and makes the people in it happier, then we get all of these co-benefits. We get a sort of vital thriving; a wellbeing. We get *mauri* through that kind of ontological shift of wanting to bring wellness and 'thriving-ness' to the whole living system. The shift that needs to happen is profound and meaningful. If we can land it, even partially, it will be utterly transformative.

Refiti: Architecture is odd, because many of us started to put motifs on things because we wanted to name things. For Indigenous architects, when buildings do not reflect who we are and they have *palagi* (people of European descent) names, they have *palagi* intentions. They are stripped of ornamentation, though most of us in architecture know that the drive for stripping ornamentation was a particular logic in modernist architecture. So, there was a period where we wanted to name or mark buildings because in a Samoan context at least, when you name something, it is really important. I carry an ancestral name and that name has remained for over 500 years for example. We know that the notion of the symbol, which had a bad rap under my architectural education in deconstructivism, is important. The symbolic value of things has to return, especially for Indigenous people. We had legacies of remaking worlds when we moved across the Pacific by carrying our symbols and our *whakapapa* which we overlaid onto different environments as we moved. That's why the same names from *Hawaiki* (the traditional Māori place of origin) are here in Aotearoa New Zealand because we carried those symbolic values, those stories with us, and we laid them onto the landscape in a customary way.

Kawiti: While there's a strong push to re-Indigenise visually, we're not addressing the core issue: the environment is *tikanga*, guiding us through its performance, our relationship with it, and its forces and Atua (God/s, spirits, deities, ancestor/s with continuing influence). These elements are continually suppressed by a material approach to cultural expression, which I find unacceptable.

Heta: Decolonisation and re-Indigenisation is often set up as binary. I've come to a position where I find the two work hand in hand. I think what we are talking about is a reconnection to old systems we know and/or knew and bringing them forward, as well as getting them to make sense relative to the new world those old systems now have to exist in. There is this intrinsic link between the social structures of a people, the religious structures of that people, their understanding of the environment, and their relationship to it. Therefore, the architectural structure literally, both physically and symbolically, represents that. There is a big difference between applying a *koru* to something and working with a carver to place a piece of carving. The difference is the recodifying of our buildings to ensure that they reflect the social spiritual structures of the people that they've come from, but also reflect the environmental and climatic relationships of the place that they exist in. We know that our symbology, our motifs, our carvings, as well as the pragmatic layouts of buildings and spaces and our relationships to them

are all intrinsically linked. All of those things relate to one another. The severing of our relationship too, or that *whakapapa* iteration of our *pūrākau* (stories) that Holman-Wharehoka [19] illustrates, where we were handed things time and again, generation to generation, has meant that we are now in this tipsy place of grabbing at parts of that ecology to make the whole ecology work. The application of things like symbols to buildings was an overly simplistic way to try to grab at something to make the whole thing make sense.

Yates: Having gone through architecture school in the '80's, the whole "put a koru on it" idea is quite triggering for me, as that was the trend then. At that time it had been signalled that climate change was a real problem we were going to have to engage with, requiring a massive culture shift. And, yet, pattern making was at times seen as enough of a transformation. But this meant you were still putting Indigenous symbols onto buildings made of an extractive industrial culture within a colonial building framework. It is not just the pattern, the symbology, that makes a building powerful and beautiful. Such forms or processes should be integrated with an architectural and urban framework that's inherently regenerative, ecological, made from materials that go back into the earth and with energy that is renewable and zero-carbon. A framework more aligned with *tikanga*. It is exactly that process of getting to a coherent architectural ecology that is regenerative.

Kawiti: We don't need to stamp patterns on everything. Tūhoe, despite having iconic buildings on their estate, focus on the behavioural side. They offer courses or wānanga for Tūhoe people, where to join their housing programme, one must learn to live together as Tūhoe. This includes how to be a good neighbour so when you are transitioned into a new house, you forget detrimental habits, and focus on Tūhoe-centric behaviour. They do that with all their buildings. Fortunately, Tūhoe have 'living buildings' (as certified by the Living Building Challenge) and most of the living building petals are realised. They are accredited for Te Kura Whare in Taneatua for example [40]. Living buildings support a behavioural *tikanga* practice. In the north, we generally don't embellish our buildings at all either inside or outside, but they still manage to function with our *tikanga*. All *tikanga* behaviour is transferred virtually. You learn it. There are few physical cues. It's a learned way of using space and it changes dynamically with the different rituals that are engaged in at particular times. We need to focus on the things Yates is talking about, but how do you Indigenise that? How do you indigenise behaviour to complement spaces like a *wharenui*, where you activate the house at specific times, and apply this to both human and performative building behaviour?

Heta: Decolonisation requires a significant disruption to a system that isn't working. Focusing solely on pattern making doesn't provide enough of that disruption. When you think not just about pattern making, but *why* those particular symbols existed in and on our houses, and the *tikanga* and *whakapapa concepts behind them*, not necessarily the pattern itself, then you get into conversations about behaviour, which is much more interesting.

Refiti: Decolonisation is not necessarily about pattern making. Pattern making is an important aspect of what we do as Indigenous designers. We have to Indigenise language and we do it badly sometimes, but decolonisation is to do with trauma, and architecture can't address that well at the moment. You can't deal with trauma through architecture. Well, maybe, I have no idea. To create a space for decolonisation, you really need to get the other partner, which is the coloniser, who has caused the harm, into the space. They need to be part of the discussion. Decolonisation cannot be left to those of us traumatised by the harm it is causing. Decolonisation can not be achieved just by us using our patterns and knowledge. The first part of the discussion is reconciliation, admitting the harm, and making sure it doesn't happen again. For Indigenous people, recovering and rethinking our knowledge allows us to compare with each other. Thirdly, is really looking at how we can make sure that the trauma, the harm, the violence can never happen again. Decolonisation is not a style. It is a really important political thing that has to happen.

Heta: This conversation is urgent and fascinating. In recent years, I've seen a reconnection between Aotearoa, Te Ao Māori, and mātauranga Māori to our Pacific relationships; that whakapapa that extends beyond just Aotearoa. This ongoing interweaving discussion, considering the greater body of the moana (ocean) and Te Moana nui a Kiwa (the Pacific Ocean), is strengthening our position.

## 5. Conclusion

This rich discussion, originally in an oral format appropriate for the Indigenous practitioners involved and focused on integrating Indigenous Māori and Pacific concepts into architectural design, has been represented in written form. It explores the integration of tikanga within the shifting ecological, climate, and cultural context of *Moananui* Oceania. A hybrid methodology to bridge oral and written knowledge generation was used to generate innovative thinking around Indigenous knowledge, working with nature, and resilience and adaptation in *Moananui* Oceania.

Central themes emerge around the relationship between ecologies people are part of and tikanga, the tension between origins and future-focused concepts, and resilience in Te Moananui Oceania. Key findings include that a Te Moananui or Māori design environment may be one that aims to reconcile living in climate and biodiversity crises and in a context of colonisation with both traditional wisdom and contemporary *mātauranga*, emphasising regeneration, community, and a deep fundamental connection to the natural world. This challenges Western dichotomies between nature and culture, promoting a worldview where humans are not separate from nature but are integrally enmeshed with it. This philosophy of relationality extends to the inherent functionality, and meaning of buildings and their surroundings. It encompasses human behaviour and the very process of designing and the tools used to create buildings. It drives a shift towards *mauri*-centred thinking, ecological regeneration, and circular bio-based economies. It is not simply how a building may look and the patterning upon it that makes architecture Indigenous.

Another finding is that *tikanga* continuously shapes and is shaped by the environment, requiring adaptation as it changes. There is a dynamic relationship to be understood and worked with; as the environment changes, so too must *tikanga* adapt, which is a process that can be seen in efforts to make the built environment more resilient and adaptable in a way that is reflective of Indigenous values. Understanding and integrating traditional Pacific architectural and environmental principles, and focusing on developing the capacity to adapt and change is key to a *Moananui* kind of resilience and a *Moananui* way of working with nature (including nature-based solutions). Traditional knowledge and practices can inform modern strategies for living with and designing for ecological and climatic changes.

A final finding relates to the complex interplay between technology and Indigenous knowledge, questioning what is gained and lost as these worlds intersect. Technology's potential to support the re-indigenisation of architecture should be explored, while retaining the human elements that form the core of traditions.

These findings and the wider discussion reflects a movement to incorporate Indigenous perspectives into design, advocating for a fundamental shift in the human-nature relationship. The motivation is to create spaces that are not only regenerative and resilient but also culturally meaningful, and that are not just respectful of, but actually are of the land, its peoples, and its histories. This movement is not merely about the stylistic aspects of design but encompasses a deeper philosophical and cultural shift towards an integrated approach to living with and within dynamic ecologies and climates, and therefore *tangata* (people) and *tikanga* that are unique to *Moananui* Oceania. This paradigm shift, though challenging, represents a step towards healing fractures between cultures and between people and the natural world, fostering a renaissance of Indigenous knowledge and practices that lead to a more resilient, symbiotic relationship with the Earth in architecture

and design.

## CRedit authorship contribution statement

**Derek Kawiti:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Albert Refiti:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Amanda Yates:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Elisapeta Heta:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Sibyl Bloomfield:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Victoria Chaise:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Maibritt Pedersen Zari:** Writing – review & editing, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgments

NUWAO is funded by the Royal Society of New Zealand through a Marsden Grant [grant number 20-VUW-058]. The 2023 NUWAO International Symposium on Nature-based Urban Climate Adaptation for Wellbeing was hosted by Te Herenga Waka Victoria University of Wellington, School of Architecture, with support from Te Wānanga Aronui O Tāmaki Makau Rau Auckland University of Technology, Zealandia, and Greater Wellington Regional Council. The New Zealand National Commission of UNESCO, Resene, and the People, Cities, and Nature research project, funded by the New Zealand Government through an Endeavour Fund sponsored the symposium's exhibition and awards ceremony. The authors acknowledge the input and help of all people involved in the organisation of the Symposium and wish to acknowledge the knowledge of Indigenous peoples whose work has been discussed and accessed here through personal experience and publication types other than traditional academic publications. This is in acknowledgement of oral traditions and the inaccessibility of academic publications to some Indigenous peoples.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.nbsj.2025.100213](https://doi.org/10.1016/j.nbsj.2025.100213).

## Data availability

The data used was the translation and transcription of the panelists who are all included as co-authors and are listed first. They have reviewed this.

## References

- [1] M. Koro, H. McNeill, H. Ivarature, J. Wallis, Tā, Vā, and Lā: re-imagining the geopolitics of the Pacific Islands, *Polit. Geogr.* 105 (2023) 102931.
- [2] Unicef (n.d.) Disaster risk reduction and emergencies. Unicef Pacific Islands. Retrieved from: <https://www.unicef.org/pacificislands/what-we-do/disaster-risk-reduction-emergencies>.
- [3] C.K. Weatherill, Sinking Paradise? Climate change vulnerability and Pacific Island extinction narratives, *Geoforum*. 145 (2023) 103566.
- [4] A. Latai-Niusulu, T. Binns, E. Nel, Climate change and community resilience in Samoa, *Singap. J. Trop. Geogr.* 41 (1) (2020) 40–60.
- [5] K. Beamer, T.M. Tau, P.M. Vitousek, Islands and Cultures: How Pacific Islands provide paths toward sustainability, Yale University Press, New Haven, 2022.
- [6] L. Kumar, Climate change and impacts in the Pacific, Springer Climate. Springer, Cham, 2020.
- [7] G.L. Kiddle, T. Bakineti, A. Latai-Niusulu, W. Missack, M. Pedersen Zari, R. Kiddle, D. Loubser, Nature-based solutions for urban climate change adaptation and

- wellbeing: evidence and opportunities from Kiribati, Samoa, and Vanuatu, *Front. Environ. Sci.* 9 (2021) 723166.
- [8] D. Sanderson, L. Bruce, P. Sitko, Climate and disaster risks, challenges and opportunities for resilient Pacific towns and cities, *Disasters, Climate Change Resil. Built Environ.* (2020) 22–33.
- [9] D.E. Johnson, K. Fisher, M. Parsons, Diversifying indigenous vulnerability and adaptation: an intersectional reading of māori women's experiences of health, wellbeing, and climate change, *Sustain.* 14 (9) (2022) 5452, <https://doi.org/10.3390/su14095452>.
- [10] L. Lindstrom, Oceania: islands, Land, People. *Cult. Surv. Quart.* 17 (3) (2010).
- [11] G.R. Harmsworth, S. Awatere, Indigenous Māori knowledge and perspectives of ecosystems. *Ecosystem services in New Zealand—conditions and trends*, Manaaki Whenua Press, Lincoln, New Zealand, 2013, pp. 274–286.
- [12] G.L. Kiddle, M. Pedersen Zari, P. Blaschke, V. Chanse, R. Kiddle, An Oceania urban design agenda linking ecosystem services, nature-based solutions, traditional ecological knowledge and wellbeing, *Sustainability.* 13 (22) (2021) 12660.
- [13] R.A. McFarlane, P. Horwitz, K. Arabena, A. Capon, A. Jenkins, S. Jupiter, S. Saketa, *Ecosystem services for human health in Oceania*, *Ecosyst. Serv.* 39 (2019) 100976.
- [14] World Bank. (2009). Convenient solutions to an inconvenient truth: ecosystem-based approaches to climate change. Retrieved from [https://siteresources.worldbank.org/ENVIRONMENT/Resources/ESW\\_EcosystemBasedApp.pdf](https://siteresources.worldbank.org/ENVIRONMENT/Resources/ESW_EcosystemBasedApp.pdf).
- [15] M. Abbott, T. Bakineti, L. Carter, A. Latai-Niusulu, W. Missack, I. Puketapu, R. Kiddle, Indigenous thinking about nature-based solutions and climate change, *The British Acad.* (2022). Available online, <https://www.thebritishacademy.ac.uk/publications/indigenous-thinking-about-nature-based-solutions-and-climate-justice/?fbclid=IwAR2TPu5vvn47u-4-ouxnoHMoFyBc7NxVyvhrKOJyfl1n04L-kkG-As2v0m8>. Date accessed 17/08/23.
- [16] C. Cottrell, Avoiding a new era in biopiracy: including indigenous and local knowledge in nature-based solutions to climate change, *Environ. Sci. Policy.* 135 (2022) 162–168.
- [17] N. Tassell-Matamua, N. Lindsay, A. Bennett, B. Masters-Awatere, Māori cultural identity linked to greater regard for nature: attitudes and (less so) behavior, *Ecopsychology.* 13 (1) (2021) 9–18.
- [18] N. Redvers, A. Poelina, C. Schultz, D.M. Kobei, C. Githaiga, M. Perdrisat, D. Prince, et al., Indigenous natural and first law in planetary health, *Challenges.* 11 (2) (2020) 29. MDPI AG.
- [19] S. Mihaere, M. Holman-Wharekoha, J. Mataroa, G.L. Kiddle, M. Pedersen Zari, P. Blaschke, S. Bloomfield, Centring localised indigenous concepts of wellbeing in urban nature-based solutions for climate change adaptation: case-studies from Aotearoa New Zealand and the Cook Islands, *Front. Environ. Sci.* 12 (2024), <https://doi.org/10.3389/fenvs.2024.1278235>.
- [20] T. Powell, J. Fraser, The Samoan story of creation: a tala, *J. Polynes. Soc.* 1 (3) (1892) 164–189.
- [21] U.L. Vaai, We Are Therefore We Live": Pacific eco-relational spirituality and changing the climate change story, Toda Peace Institute, 2019. [https://toda.org/assets/files/resources/policy-briefs/t-pb-56\\_upolu-luma-vaai\\_we-are-therefore-we-live.pdf?v=0](https://toda.org/assets/files/resources/policy-briefs/t-pb-56_upolu-luma-vaai_we-are-therefore-we-live.pdf?v=0).
- [22] A. Latai-Niusulu, E. Nel, T. Binns, Positionality and protocol in field research: undertaking community-based investigations in Samoa, *Asia Pac. Viewp.* 61 (1) (2020) 71–84.
- [23] Tuhiwai Smith, P. L., *Decolonizing methodologies: research and indigenous peoples*, Otago University Press, Dunedin, 2012.
- [24] W. Doherty, PhD Thesis, 2009.
- [25] Sanga, K. (2020) Tok Stori Tuesdays. *Lagi Maama*. Retrieved from <https://lagi-maama.com/tok-stori>.
- [26] D. Robinson, K. Robinson, NZ Trade Consortium Working Paper, 2005.
- [27] T.I. Fasavalu, M. Reynolds, Relational positionality and a learning disposition: shifting the conversation, *Int. Edu. J.* 18 (2) (2019) 11–25.
- [28] L.L.A. Refiti, A.C. Engels-Schwarzpaul, L. Lopesi, B. Lythberg, L. Waerea, V. Smith, Vā at the time of COVID-19: when an aspect of research unexpectedly turns into lived experience and practice, *J. New Zealand Pacific Stud.* 9 (1) (2021) 77–85.
- [29] U.L. Vaai, A.eds Casimira, The 'whole of life' way unburying vakatabu philosophies and theologies for pasifika development, PTC Press, 2024.
- [30] U. Nabobo-Baba, Knowing and learning: an indigenous fijiian approach, Institute of Pacific Studies. University of South Pacific. IPS Publishing, 2006.
- [31] L. Tunufa'i, Pacific research: rethinking the Talanoa 'methodology, *New Zealand Sociol.* 31 (7) (2016) 227–239.
- [32] Toi Ngāpuhi [@toingapuhi]. April 2023. "Environment breeds tikanga. Our tūpuna arrived on these shores...".
- [33] M. Marsden, God, man and universe: a Maori view, *Aspects of Maoritanga* (1992) 117–137.
- [34] B. Rangiwai, Ko au ko te taiao, ko te taiao ko au—I am the environment and the environment is me: a Māori theology of the environment, *Te Kaharoa* 11 (1) (2018).
- [35] B. Rangiwai, Some brief notes on kai Māori, *Te Kaharoa* 14 (1) (2021).
- [36] D. Brown, J. Treadwell, Māori Architecture, Birkhauser, 2019.
- [37] Waitangi Tribunal. (2021) Kōrero Taunaki ā Moe Milne. *Mana Wahine Kaupapa Inquiry* WAI 2700 at 106. Retrieved from: [https://forms.justice.govt.nz/search/Documents/WT/wt\\_DOC\\_173841144/Wai2027002C20A062.pdf](https://forms.justice.govt.nz/search/Documents/WT/wt_DOC_173841144/Wai2027002C20A062.pdf).
- [38] A. Yates, K. Dombroski, R. Dionisio, Dialogues for wellbeing in an ecological emergency: wellbeing-led governance frameworks and transformative Indigenous tools, *Dialogues. Hum. Geogr.* 13 (2) (2023) 268–287.
- [39] D. Enari, A.M. Fa'aea, E tumau le fa'avae ae fesua'i faiga pasifika resilience during COVID-19, *Oceania* 90 (S1) (2020) 75–80, <https://doi.org/10.1002/occe.5269>.
- [40] J. Partington, M. Pedersen Zari, Ngāi Tūhoe's Te kura whare: our living building. *Ecologies Design*, Routledge, 2020, pp. 212–221.