

# STATE AGENCIES AND RESEARCHERS ENGAGING WITH INDIGENOUS COMMUNITIES ON CLIMATE CHANGE ADAPTATION PLANNING

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## A systematic review

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### Abstract

This systematic review centres planning, policy and/or strategic developments and implementation of climate change adaptation with Indigenous groups in Australia, Pacific Islands, Canada and the United States. We used PRISMA protocols to search five databases. The search was organised around three core areas: Indigenous people groups, climate change strategic planning, and Indigenous knowledge and active participation. A total of 6,338 articles from five databases were identified. Records were screened by title and abstract, leaving 87 articles that were assessed by full text. A total of 22 studies were included. The He Pikinga Waiora Implementation Framework was used as a matrix to analyse included articles. While studies included Indigenous groups in their research, most did not score highly for active inclusion of Indigenous knowledge, integrated knowledge translation or systems change. In general, studies had mediocre processes of inclusion that resulted in average responses and modest influence in decision-making forums.

### Keywords

climate change, Indigenous, knowledge transfer, systems change

### Introduction

Indigenous communities across the globe have been negatively affected by colonising activities imposed by settler groups and state agencies (Lewis et al., 2020). In recognition of the continuing negative impacts on Indigenous people, the United Nations Declaration on the Rights of

Indigenous Peoples (2007) was formed to establish a universal framework of minimum standards for the survival, dignity and well-being of Indigenous peoples. Indigenous groups from Aotearoa New Zealand, Australia, the Pacific Islands, Canada and the United States have all experienced colonisation processes. These processes have resulted in

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alienation, dispossession and harm enacted against Indigenous groups that have been affected across generations.

Climate change science research typically excludes an examination of the sociocultural risks and aspects of life and how climate change affects people's lives (Tam et al., 2021). More recently, the body of work on the impacts of climate changes on people and communities has been growing (Awatere et al., 2021). Nonetheless, scientific research is also predominantly empirically based within a Western framework, which tends to exclude all facets of Indigenous knowledge and delegitimise Indigenous cultural beliefs (Lewis et al., 2020). Instead, Indigenous knowledge is regarded as local, anecdotal or non-scientific (L. T. Smith, 2012). Subsequently, Indigenous information has not been systematically included in climate change literature. This has implications for wider responses to climate change (Petzold et al., 2020). Decolonising of scientific research is needed to ensure the inclusion of, and value for, Indigenous knowledge and associated records of changes in environment, climate, plant growth and marine environments.

There is widespread consensus that climate change will have negative impacts on human health (Beggs, 2004; Campbell-Lendrum & Corvalán, 2007; Costello et al., 2009; Ebi et al., 2006; Jones et al., 2014; McMichael et al., 2012; Raju et al., 2016). According to Campbell-Lendrum and Prüss-Ustün (2019), "The World Health Organization (WHO) has identified climate change as one of the greatest health threats of the 21st century" (p. 160). Furthermore, the WHO estimates the direct costs to individual health (i.e., excluding costs from health-related sectors such as agriculture and sanitation), to be between 2 and 4 billion USD a year by 2030 (WHO, 2021). Climate change is anticipated to deliver weather-related events that include increasingly high temperatures, extreme weather events causing damage such as storms, high rainfall and flooding, droughts and sea level rise (Bolton et al., 2019; Jones et al., 2014; Royal Society of New Zealand/Te Apārangi, 2017). These climate change events have impacts on social and environmental determinants of health for Indigenous groups (Divakaran et al., 2016; Veenema et al., 2019), including clean air (Cromar et al., 2021; Owusu & Sarkodie, 2020), safe drinking water (Rankoana, 2022), sufficient food (Bhor & Kumar, 2016; Gunaratne et al., 2021), connections to land (Cunsolo Willox et al., 2012), and psychological well-being (Clayton, 2020). Recent literature claims that climate-sensitive health risks

will be disproportionately experienced by the most vulnerable and disadvantaged (Mathiarasan & Hüls, 2021; Mayahara et al., 2022; Méndez et al., 2020; G. S. Smith et al., 2022). Indigenous groups in particular face health-related risks from climate change trends (Beggs et al., 2021; Deen et al., 2021).

The focus of this systematic review is the relationships and processes of communications between Indigenous communities and government agencies (central, regional, local), administrative bodies, scientists and industry personnel. The review centres the actions of planning, policy and/or strategic developments, and implementation of interventions to address the impacts of climate change for Indigenous communities. In doing so we aim to determine the degree to which Indigenous communities participate in and contribute to institutional responsiveness to climate change in order to identify strategies and leverage points for introducing climate change responses in a Māori health context.

## Method

A meta-synthesis provides tools for integrating and analysing findings in ways that produce new knowledge and understandings in a substantive area (Sandelowski & Barroso, 2007), and is a valuable approach for qualitative research (Dixon-Woods et al., 2007). The review process involved a systematic literature search, screening articles for relevance to the research question, selection and appraisal of studies, analysis, and synthesis of findings.

### *Systematic search and screening process*

We used PRISMA protocols (Moher et al., 2009) to search five databases: SAGE, Science Direct, Taylor & Francis, Wiley and Springer. The SAGE, Science Direct and Taylor & Francis publisher databases were directly searched. Springer and Wiley were searched via the University of Waikato library database. The systematic search was organised around three core areas: Indigenous groups, climate change strategic planning and Indigenous knowledge/active participation. These three core areas were selected because of their relevance to the aims of the study and to capture as widely as possible research processes of engagement when seeking to engage Indigenous perspectives and responses to climate change that have an impact on Indigenous people. We systematically searched each of the five databases using three distinct search levels (Table 1). The capacity of database search engines required breaking down certain search

**TABLE 1** Search terms used

Level	Search terms
Level 1: Indigenous people groups	A: “indigenous people” OR “oceanic ancestry group” OR “American native Indian” OR “Indigenous” B: “Inuit” OR “eskimo” OR “first nations” OR “native” C: “aboriginal” OR “asti” OR “Torres Strait Islander” OR “tribal” D: “Maori” OR “Polynesian” OR “Pacific Island” OR “Hawaiian” E: “aleut” OR “inupait” OR “Kalaallit” OR “metis”
Level 2: Climate change strategic planning	A: “policy” OR “planning” OR “strategy” B: “decision making” OR “decision-making” C: “climate change”
Level 3: Indigenous knowledge	A: “Indigenous knowledge” OR “traditional knowledge” B: “participation” OR “involvement”

terms into multiple searches (e.g., Level 1 required five distinct searches). The search terms were used to search across article titles, abstracts, whole articles and keywords in each database.

Indigenous groups associated with the search terms that are included in the review are from Aotearoa New Zealand (Māori), Australia (Aboriginal, Asti, Torres Strait Islander), Pacific Islands (Polynesian, Pacific Island), Canada (First Nations, Metis), and the USA (Inuit, Eskimo, Aleut, Inupait, Kalaallit, Metis, Hawaiian, American Native Indian). Generic search terms (Indigenous people, Indigenous, tribal, native, oceanic ancestry group) were also employed. We wish to note that some terms used are considered an ethnic slur (e.g., Eskimo) and we only included terms such as this to ensure confidence that our systematic search included all items related to Indigeneity, whether from an Indigenous or from a non-Indigenous perspective. We intentionally searched more broadly for institutional responsiveness because there were insufficient responses when searching for health institutions alone. Additionally, responses from policy and planning more broadly offered increased depth of results to support our research question.

### ***Study selection and appraisal***

A total of 6,338 articles from five databases were identified. Citations from each search were extracted into EndNote. The study selection was completed in EndNote. Duplicate records ( $n = 13$ ) were deleted, leaving 6,325 for screening. Records

were screened in EndNote by title and abstract for inclusion of Indigenous people/groups and climate change strategic planning. Articles that did not show inclusion of Indigenous people/groups AND climate change strategic planning were excluded. The screening process left a total of 87 articles. Figure 1 summarises this process. These 87 articles were appraised by full text. Systematic review checklists (e.g., CASP) for appraising qualitative research prioritise “dominant colonial-based expectations of methods, irrespective of academic contributions” (Graham & Masters-Awatere, 2020, p. 195). These checklists do not include responsiveness to Indigenous groups or inclusion of Indigenous knowledge, and are not created with Indigenous epistemologies at their centre. Additionally, even so-called low-quality articles can include data and findings that are relevant and useful (Mbuji et al., 2017). Subsequently, rather than undertake a quality assessment with inappropriate tools, we created an Indigenous-centred framework for further screening.

Based on three core areas (Inclusion, Active Participation and Future Focus), the assessment process asked the following questions of each article:

1. Inclusion
  - a. Did the study authors include Indigenous people/groups in the study design or as participants in the study?
  - b. Did the research incorporate Indigenous knowledge or ways of knowing?

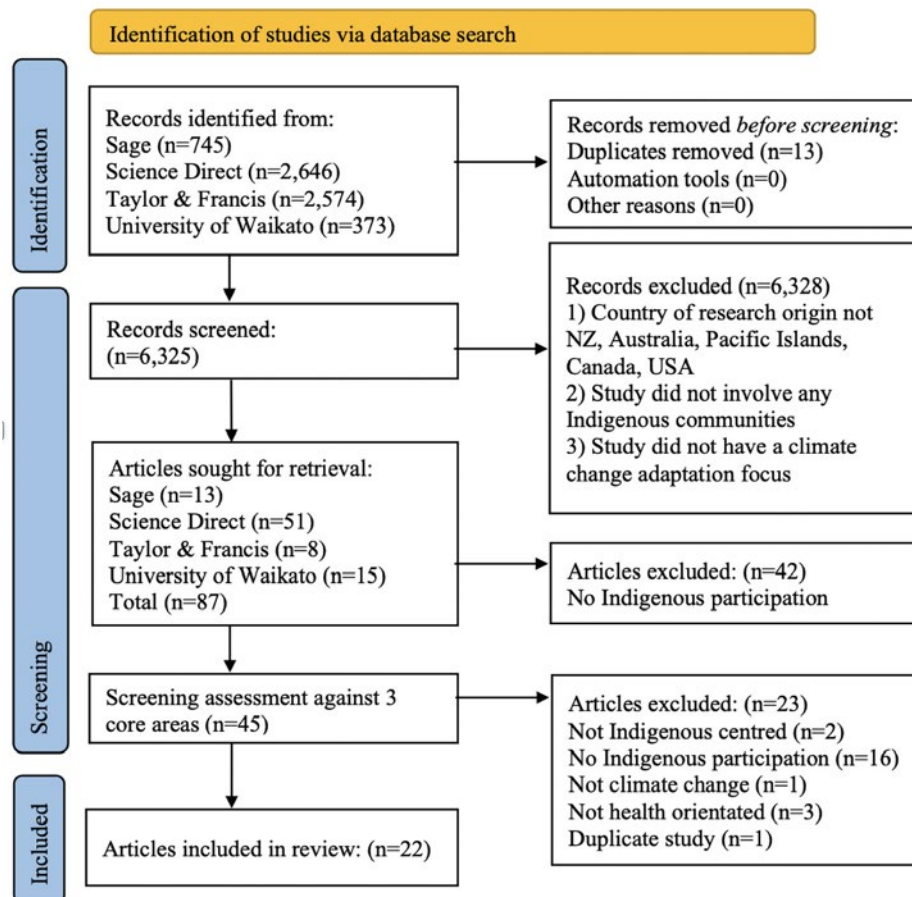


FIGURE 1 Flowchart of identification of included studies (Page et al., 2021)

2. Active Participation
  - c. Did Indigenous people/groups actively participate in research-related decision-making and planning?
  - d. Was the research driven by Indigenous people/groups?
3. Future Focus (for climate change strategic planning)
  - e. Did the research focus on strategies to address Indigenous issues with regard to climate change?
  - f. Did the research provide opportunities for Indigenous people/groups to lead or share in climate change related strategic planning?
  - g. Did the research take a strategic approach to climate change?

Following this process, 42 articles were excluded because of a clear absence of Indigenous participation. Twenty-four (n = 24) articles were read in full, with exclusions due to not being

Indigenous centred (n = 3), having no Indigenous participation (n = 16), not being focused on climate change strategic planning (n = 1) or not being Indigenous health orientated (n = 3). This process ensured that the focus of included studies remained on Indigenous involvement in climate change strategic planning.

### Analysis

The He Pikinga Waiora (HPW) Implementation Framework (Oetzel et al., 2017) was used in our analysis. This framework was developed for people working with Indigenous communities and intentionally centres Indigenous knowledges. HPW provided a matrix for assessing Indigenous inclusion along four components: cultural centeredness, community engagement, integrated knowledge translation (IKT) and systems thinking. These components have been identified as key to ensuring appropriate and relevant Indigenous engagement that can then be transferred to health policy. In this instance we are interested in transferability to

health policies and institutional responsiveness to climate change for Māori, with a focus on structural elements and systems change. Despite the absence of publications that focus on Indigenous and Māori vulnerabilities (Jones et al., 2020), climate change is an area in which Indigenous people are severely at risk. In undertaking our analysis, we took an iterative thematic approach (Braun & Clarke, 2006). Each article was initially read by the second author (PY) and initial themes, challenges and research approaches were identified. After a series of iterative discussions on the themes with the research team, each article was summarised into a comparative table for quick reference (Table 2).

### Methodology limitations

A core limitation of our systematic review is that its systematic searches of academic databases does not readily include grey literature or Indigenous-centred journals such as *AlterNative* or *MAI*. A separate search of these two journals was specifically undertaken (outside of the PRISMA protocols). Indigenous-centred studies are not always published in traditional academic settings and are more likely to be published in Indigenous-specific journals or in grey literature such as reports (Rolleston et al., 2020). We have included grey literature (such as ministerial reports) in the discussion; however, we are aware that this remains a limitation of systematic review processes. One finding from the approach we undertook was that systematic review methodologies are inadequate for including Indigenous writing and commentary. There is room for reviews of Indigenous writing and commentary published outside of academic publication databases. This would require careful attention to methodological processes (which may not then fit within the PRISMA protocols).

Another limitation is that our review does not include Indigenous responses to climate change research projects outside of the included countries. While Aotearoa was not the focus of this systematic review, the systematic search found a limited number of studies that examined the specific climate change health impacts on Indigenous or Māori people (Jones et al., 2020). Our intention was to consider the international landscape with regard to including or excluding Indigenous people before engaging in a literature search that was more focused on Māori.

### Findings

Altogether 22 studies were identified as suitable for inclusion in the review. Included studies

came from Fiji (n=1), Samoa (n=1), Aboriginal and Torres Strait Islands (Australia) (n=10), and First Nations and Inuit communities (Canada/USA) (n=10). The review includes multiple methods and analyses, including, but not limited to, case studies, community-based research studies, Indigenous research studies, participatory research studies, community action studies and decolonising research studies. Of the included studies, only two explicitly mention health. One study named a health institution as a state actor (McClymont Peace & Myers, 2012), while another (Healey et al., 2011) directly considered health impacts of climate change on the community and health systems. The remaining studies are related to health in that they consider environmental impacts, land use and cultural practice. However, the links to health were not explicitly made by these studies. Tables below summarise the included studies.

### Climate change and adaptation strategies

Patterning of the included studies found three common areas of focus: climate change research (n=12), climate change adaptation (n=4) and a combination of climate change research and climate change adaptation (n=6). While the majority of publications fall within climate change research, it was interesting to note that within a short period climate change adaptation became an area of interest across each of the regions (Pacific, Australia, USA/Canada). Australian-based research dominated and was predominantly published between 2012 and 2017. Two-thirds of the included studies that focused on both climate change research and adaptation were from the USA or Canada.

The included studies had varying levels of focus with regard to climate change adaptation strategies. Five articles had a clear focus on climate change adaptation strategies. Neef et al. (2018) considered climate change adaptation strategies in Fiji, and the ways in which village systems have had an impact on decision-making regarding such strategies. Hill et al. (2020) identified Indigenous health needs for climate change adaptation strategies and the barriers to achieving these. The research team found a clear link with the adaptations that Aboriginal people have already had to undertake in order to remain on their land. Leonard et al. (2013) detailed the role of Indigenous culture and traditional knowledge in climate change adaptation and the need to ensure that these are included in strategies. Lyons et al. (2020) identified adaptation strategies relating to Indigenous connections to cultural sites and subsequent strategies for working with industry



**TABLE 2** List of included studies and HPW Framework Analysis\*

Indigenous people, Nation	Citation	Cultural centeredness			Community engagement	Integrated knowledge transfer	Systems thinking		
		Community voice	Reflexivity	Structural change			Sys perspectives	Sys relationships	Sys levels
Samoa, Fiji, S. Pacific	Crichton, R. N., Esteban, M., & Onuki, M. (2020).	H	L	L	M	M	H	M	L
	Neef, A., Bengel, L., Boruff, B., Pauli, N., Weber, E., & Varea, R. (2018).	H	L	L	M	L	H	M	L
Aboriginal and Torres Strait communities, Australia	Hill, R., Walsh, F. J., Davies, J., Sparrow, A., Mooney, M., Central Land Council, Wise, R. M., & Tengo, M. (2020).	H	M	H	H	H	H	M	H
	Leonard, S., Parsons, M., Olawsky, K., & Kofod, F. (2013).	H	L	M	H	H	M	M	L
	Lyons, I., Hill, R., Deshong, S., Mooney, G., & Turpin, G. (2020).	H	M	M	H	M	H	M	M
	McIntyre-Tamwoy, S., Fuary, M., & Buhrich, A. (2013).	H	M	M	M	M	M	M	L
	McNamara, K. E., Westoby, R., & Smithers, S.G. (2017).	M	L	L	L	L	M	M	L
	Nikolakis, W., Grafton, Q., & Nygaard, A. (2016).	M	L	M	M	M	H	M	M
	Nursey-Bray, M., Palmer, R., Stuart, A., Arbon, V., & Rigney, L.-I. (2020).	H	H	H	H	H	H	H	H
	O'Neill, C., Green, D., & Lui, W. (2012).	H	M	M	M	M	M	M	L
	Petheram, L., Zander, K. K., Campbell, B. M., High, C., & Stacey, N. (2010).	H	H	M	M	H	L	L	L
	Veland, S., Howitt, R., Dominey-Howes, D., Thomalla, F., & Houston, D. (2013).	H	M	L	M	M	M	M	L
First Nations and Inuit communities, Canada/USA	Fayazi, M., Bisson, I-A, & Nicholas, E. (2020).	H	M	M	H	M	M	M	M
	Ford, J. D., Labbé, J., Flynn, M., Araos, M., & IHACC Research Team. (2017).	H	M	M	M	M	H	M	M
	Ford, J. D., Pearce, T., Duerden, F., Furgal, C., & Smit, B. (2010).	M	M	M	M	M	L	L	L
	Ford, J. D., Smit, B., Wandel, J., Allurut, M., Shappa, K., Ittusarjuat, H., & Qrunnut, K. (2008).	H	M	M	M	M	L	L	L
	Galappaththi, E. K., Ford, J. D., Bennett, E. M., & Berkes, F. (2019).	H	M	L	M	L	L	L	L
	Golden, D. M., Audet, C., & Smith, M. A. (2015).	H	M	M	H	M	M	M	M
	Healey, G. K., Magner, K. M., Ritter, R., Kamookak, R., Aningmiuq, A., Issaluk, B., MacKenzie, K., Allardyce, L., Stockdale, A., & Moffit, P. (2011).	H	M	M	H	M	M	L	L
	McClymont Peace, D., & Myers, E. (2012).	H	L	M	H	L	M	M	M
	Pearce, T., Smit, B., Duerden, F., Ford, J. D., Goose, A., & Kataoyak, F. (2010).	H	M	M	M	M	M	L	L
	Petrasek MacDonald, J., Harper, S. L., Cunsolo Willox, A., Edge, V.L., & Rigolet Inuit Community Government (2013).	H	M	M	H	L	M	M	M

\*Rated high (H), medium (M), low (L) or negative (N) as per the He Pikinga Waiora Framework. See <https://www.hpwcommunity.com/applying-the-framework>

and Western scientists. This paper identified that climate change planning relies on future-oriented risk, that those vulnerable to climate change are disempowered by discussions and that recognising the impacts of colonisation must be taken into consideration in climate change planning. Finally, Ford et al. (2017) noted that Indigenous cultural values and traditional knowledge must underpin climate change adaptation strategies and readiness. The research team highlighted that leadership is vital to systemic change, and that there is a need for climate change adaptation champions to shift adaptation strategies into everyday use.

The remaining 17 included studies contained varying levels of reference to climate change adaptation strategies. While climate change adaptation may not have been the focus, there were often suggestions or recommendations within the paper. For example, Petheram et al. (2010) suggested steps for policymakers that will support adaptive changes in communities, while Petrasek MacDonald et al. (2013) recommended that the perspectives of Indigenous youth be included in strategic climate change adaptation planning. Ford et al. (2008) explored Inuit cultural life with a view to climate change adaptation through existing adaptations to hunting practices. Pearce et al. (2010) continued this theme, noting that Arctic cultural practices and lifeways associated with hunting have already had to adapt because of changes in climate, weather and terrain. In contrast, O'Neill et al. (2012) examined why Indigenous leaders had previously refused to participate in climate change adaptation activities and gave recommendations for researchers on improving their practice.

### **He Pikinga Waiora Implementation Framework Analysis**

As described earlier, each study was analysed according to the four components of HPW. This section presents our findings from each component. A comparative summary is visually presented in Table 2.

#### ***Cultural centredness***

Cultural centredness comprises three elements: community voice, reflexivity and structural change. Across all the included studies there was a strong commitment to including community voice. Researchers were predominantly involved with Indigenous communities in defining the problem and developing the solution. However, there was less commitment to reflexive practice and to structural change. That is, the researchers did not

include explicit statements regarding their own positionality, or their reflexivity, and subsequently adjustments to the intervention did not always occur. Structural transformation did not always occur subsequent to the research project.

Indigenous communities from the included studies had previously voiced their concerns but they had not necessarily been heard. For example, the Yolngu community had a bauxite mine established on their land despite Yolngu objections, the Mohawk community have been prevented by the state from establishing their rights to ownership of their land, and the Warraber community felt their concerns about sea level rise and storm damage had been previously ignored by climate change researchers. Ensuring Indigenous worldviews are incorporated into climate change adaptation projects will better assist Indigenous communities to safeguard their place (Hill et al., 2020), and their land and environment, and to sustain their cultural knowledge associated with a sense of place (Golden et al., 2015; Petrasek MacDonald et al., 2013). Each of these components is central to Indigenous health and well-being, but links to health were not always made.

Strong Indigenous leadership played an important role in ensuring that the community had a strong voice, provided direction for researchers and gave guidance with regard to culturally appropriate engagement (Hill et al., 2020; Leonard et al., 2013; Lyons et al., 2020; Nikolakis et al., 2016; Nursey-Bray et al., 2020; Veland et al., 2013). For example, the Arabana Corporation ensured the Indigenous community were fully involved through signing a research protocol that set out clear guidelines regarding how the research was conducted and including Indigenous authorship on research-related papers (Nursey-Bray et al., 2020).

#### ***Community engagement***

Community engagement aims to establish partnering relationships with Indigenous communities and researchers during all phases of a project. This includes decision-making, shared communication and relationships that build capacity of the communities and the researchers. Examining community engagement considers the degree to which an Indigenous community contributes to shaping institutional responsiveness planning, policy and strategic development, and implementation to address climate adaptation.

Effective communication is critical to engagement, and the importance of communication is heightened when managing cross-cultural expectations (Nursey-Bray et al., 2020). How this was

managed was not always discussed as a practical consideration of the project (Golden et al., 2015; McIntyre-Tamwoy et al., 2013). Petheram et al. (2010) described the researchers' initial intentions as seeking to focus on the Indigenous community's perspectives of climate change and adaptation for policy and planning purposes. However, the Indigenous community preferred to focus on "ways of adapting to more pressing issues" (Petheram et al., 2010, p. 682). Negotiation between researchers and Indigenous community members determined an approach that sought "an understanding of factors that influence general vulnerability (and adaptive capacity) in the context of both poverty and climate change" (Petheram et al., 2010, p. 682). These types of communications are critical to support research work and ensure effective community engagement and benefits for community members.

The two health-related studies had high levels of community engagement. Healey et al. (2011) undertook a community-centred project regarding the health impacts of climate change and the impact on health systems in their community. McClymont Peace and Myers (2012) took a community-based participatory research approach with Indigenous communities. The aim was to build capacity and capability in research focusing on health and climate change adaptation, in partnership with Indigenous communities, researchers and government agencies.

### ***Integrated knowledge translation***

Integrated knowledge translation as per the HPW Framework (Oetzel et al., 2017) requires certain steps to be fulfilled: (a) Indigenous communities are co-partners in climate change adaptation research; (b) Indigenous knowledge is accepted as offering valid and robust input to climate change adaptation strategies; (c) state organisations, agencies, industry and other relevant stakeholders are able to work collaboratively with Indigenous communities; (d) assistance is provided for establishing relationships and communication pathways between Indigenous communities and state groups; and (e) governance of climate change adaptation strategies clearly partners with Indigenous communities to provide direction and guidance for future steps.

Four studies (Hill et al., 2020; Leonard et al., 2013; Nursey-Bray et al., 2020; Petheram et al., 2010) showed a high level of mutual learning and of achieving integrated knowledge translation. The remaining studies showed medium to low levels of support for tailoring information and

implementing interventions. Achieving IKT led to activities beyond the life of the project, such as with the Arabana community as they implemented their strategic climate change adaptation plan (Nursey-Bray et al., 2020), and with Hill et al. (2020), who identified adaptation pathways. Veland et al. (2013) highlighted the non-consideration of the impacts of colonisation for Indigenous communities in climate change research as a procedural vulnerability that limits effective IKT.

A key challenge for effective IKT across the included studies were state organisations such as governments, agencies, land trusts and management boards, all of whom struggled to genuinely engage with Indigenous communities (Leonard et al., 2013). As a result, state organisations found it challenging to negotiate appropriate, equitable and effective strategies to prepare for, and respond to, climate change (Leonard et al., 2013). State organisations and other groups (such as non-Indigenous researchers) that seek development of culturally appropriate climate change adaptation strategies must work on facilitating relationships and fostering trust with Indigenous communities (Petheram et al., 2010). Clear pathways on how to achieve this were not necessarily described. For example, Galappaththi et al. (2019) suggested co-management of fisheries between Inuit groups and state agencies, but did not examine how this might be progressed or how to ensure Inuit communities are treated as co-partners. Instead, relationships between Indigenous communities and state agencies replicated existing power imbalances and previous disadvantage for Indigenous communities.

### ***Systems thinking***

These systems include the cultural functions of Indigenous communities, systemic connections and interactions between community organisations and state agencies (national, regional and local) that have oversight or management over Indigenous lands, and the system that drives climate change adaptation activities (internationally, nationally, regionally and locally).

Across all included studies there was a clear tension between state systems thinking and Indigenous systems thinking. This was particularly evident with regard to issues of land ownership and management of Indigenous land. For example, local council members resisted coordinating communication between Indigenous community members and land developers because of Indigenous community members wanting to limit development (Lyons et al., 2020). Similarly, in



the Murray Darling River Basin (Australia), the Indigenous management organisation wanted to allow flooding of a part of the basin to refill sacred sites, but the Murray Darling group wanted to retain control of the water flow to allow irrigation of farmed land (Nikolakis et al., 2016). The Mohawk community is disadvantaged by flooding and there is no resolution to land ownership by the Canadian or state government. The Warraber community has concerns regarding sea level rise and storm damage, yet local agencies are unclear on which state agency should address their concerns (O'Neill et al., 2012). Without clarity at each level of government, be that national, regional or local, the direction of how to address issues within Indigenous communities means that positive and coordinated action is not forthcoming. Acknowledging and managing the impacts of colonisation on Indigenous communities requires leadership and direction across all systems to ensure issues are addressed and needs met.

Climate change adaptation plans require Indigenous community input. However, the communication and consultation processes had multiple challenges. For example, two Indigenous groups in Queensland participated in a project to develop a climate change adaptation plan (Lyons et al., 2020). Using the project to strengthen their cultural knowledge, the Indigenous groups identified the importance of protecting remaining flora and fauna. During this process, state partners excluded colonisation impacts from the management and decision-making processes. This marginalised the Indigenous participants, despite their rightful place as partner and highlighted their powerlessness, leaving them feeling like the “Council don't engage us . . . to do what we want to do” (Lyons et al., 2020, p. 44). Similarly, in work with Indigenous communities in the Murray Darling River Basin, industry and commercial interests of stakeholders clashed with Indigenous values of preserving the land and water body for cultural purposes (Nikolakis et al., 2016).

Another challenge is that state agencies struggle to move beyond planning into implementation. For example, in one study, a federal-level climate change adaptation leadership plan existed but there was little implementation of action. One project conducted with the government of Nunavut, a Canadian Arctic territory, found that climate change adaptation planning had commenced but that most departments had not followed through with implementation (Ford et al., 2017). Where state agencies do move beyond planning, they typically implement a top-down approach to

Indigenous communities. This autocratic attitude hinders the implementation of local solutions developed by Indigenous communities to meet their needs (Crichton et al., 2020; Fayazi et al., 2020; McNamara et al., 2017; Neef et al., 2018; Nursey-Bray & Palmer, 2018).

Identifying intervention points for Indigenous community involvement in government policy and implementation can address barriers or gaps in climate change planning and strengthen responses. Ford et al. (2010) identified five key policy intervention points to climate adaptation for Inuit communities in northern Canada. McIntyre-Tamwoy et al. (2013) in their research with nine Aboriginal traditional owner groups in the Cardwell region of Australia found that while Indigenous groups had oversight of nationally recognised parks and World Heritage Sites, group members needed more effective communication pathways with government institutions, science researchers and industry members. Subsequently, the research team trained organisations to listen to Indigenous communities, accept Indigenous worldviews and work constructively alongside. Another example is the Warraber community in the Torres Strait Islands, where Indigenous community leaders had refused to allow any further scientific research to be conducted (O'Neill et al., 2012). This decision was a result of a history of non-consultation in research projects and absence of government assistance when managing impacts of climate change. These articles highlight the gaps in Western research processes and government interventions. Through recommending steps to working with Indigenous communities, this form of responsive research acted as an intervention point. Other entry points identified were linked to the activities of communities where climate adaptation policy could be introduced (Ford et al., 2008). However, this approach limits the effect to one community at a time and does not necessarily achieve systemic change.

Finally, the dominance of Western science in state approaches is deeply problematic. Western science imposes particular views of vulnerability and resilience that do not fit within Indigenous communities' positive experiences of “survival and agency” (Nursey-Bray et al., 2020, p. 148). This has resulted in feelings of mistrust and anger by Indigenous communities (McIntyre-Tamwoy et al., 2013; O'Neill et al., 2012). McClymont Peace and Myers (2012) documented efforts to establish two knowledge systems to strengthen climate adaptation responses in the region and ensure that they were appropriate for each

community. This contrasted with Healey et al. (2011), who considered how to change existing health systems but did not move beyond the existing Western paradigm of health. While Indigenous and Western approaches have different epistemological approaches (Nursesey-Bray et al., 2020), there are ways for researchers to work that ensure Indigenous views are valued and incorporated. Understanding climate change is broader than just scientific measures and modelling, and worldviews are an important aspect in developing perceptions of climate change. Indigenous environmental observations offer crucial understanding of and responses to climate change (Leonard et al., 2013). Consideration of worldviews and environmental perceptions is crucial to effective climate change responses.

### Discussion

There remains an underlying assumption by non-Indigenous researchers that Indigenous communities are a homogeneous group and that Indigenous people have a collective desire to *improve* their circumstances and are always *open for access* to non-Indigenous researchers (L. T. Smith, 2005, 2012). This positioning is the foundation for ill-informed expectations that Indigenous people will comply with requests from agencies and researchers for contributions to projects or policy development. Assumptions about capability and capacity are often positioned from a place of non-Indigenous privilege. Where partnership engagements are pledged, non-Indigenous researchers typically position themselves as experts on climate change, with Indigenous groups to be *consulted* only for *cultural issues*. The studies included in this review may have had high levels of engagement with Indigenous groups, but when disagreement occurred, settler state solutions ultimately took preference over Indigenous-led ones.

Indigenous communities in the included studies identified that their community members were dispersed, largely as a result of colonisation. However, the included studies did not necessarily incorporate suggestions about where diaspora community members can be involved in climate change planning. Climate change projects were used as opportunities to strengthen cultural centredness with community members (Nursesey-Bray et al., 2020). Climate change projects were also seen as key sites for including young people in order to pass on cultural knowledge (Petrasek MacDonald et al., 2013). Nevertheless, linking with Indigenous diaspora remains an ongoing challenge for Indigenous groups, and climate

change responses are no exception. Overall, studies included in the review did little beyond invitational processes that relied heavily upon Indigenous knowledge. Sadly, the translation of Indigenous knowledge into action and policy by countries similar to Aotearoa was left wanting. Again, we see examples of people with the least power to influence policy and the fewest resources to engage or respond to situations of stress and urgency being discarded when their inclusion became *too difficult*.

The process of accessing Indigenous communities was not always clearly described. Researchers appeared to recognise the importance of observing cultural protocols when setting up their projects but did not necessarily fully describe the basis of their relationships. In contrast, two studies established formal research protocols or contracts between themselves and Indigenous community leadership to ensure transparency and to guide the research relationship (Golden et al., 2015; Nursesey-Bray et al., 2020). Such guidelines assisted the research team to ensure that research and cultural obligations were met and resulted in higher levels of IKT and systems change. Nevertheless, issues with poor organisational and agency connections, role confusion in management of land and sea climate change impacts, and unacknowledged land ownership prevented state agencies from effective climate change adaptation responses. Supporting and empowering Indigenous communities to establish their own working relationships with state agencies, creating pathways for communication and action to facilitate culturally appropriate actions are needed.

Community leadership and leadership structures varied across the included articles. The structure itself is less important than ensuring Indigenous knowledge and experience are included in strategies for climate change adaptation. The United Nations continues to affirm that Indigenous knowledge is necessary to ensure that ongoing planning, policy and strategic development meet the needs of Indigenous communities (United Nations Declaration on the Rights of Indigenous Peoples, 2007). Adaptation actions need to be based on relevant and appropriate Indigenous information and to incorporate culturally appropriate practice (Trundle, 2019). Scientists and state institutions should respond by requiring that policy and management be made with the full participation of Indigenous people, by institutionalising participation at all levels of scientific activity, and by respecting and valuing Indigenous knowledge (Mauro & Hardison, 2000). Basing

adaptation activities within Indigenous knowledge will strengthen Indigenous capacity and capability for the future and assist Indigenous communities to deal with future crises or climate events.

Considering our overall research aim (to determine the degree to which Indigenous communities participate in and contribute to institutional responsiveness to climate change) and key goal (to identify strategies and leverage points for introducing climate change responses in a Māori health context), we have identified a gap in the research literature with regard to health institutional responsiveness to climate change that centres Indigenous communities. Only two of the included studies explicitly mentioned health systems or health institutions as state actors. As visible in the tables and analysis, neither of these two studies “stood out” with regard to their systems thinking or their research approach. The other 20 studies had aspects related to health, but these links were not always explicitly made or considered, for example, the connection between Indigenous health and access to land and types of land use allowed. There is room for links to health to be made more explicit by climate change adaptation research and for health institutions to respond to the impacts of climate change more intentionally with regard to Indigenous health. Consideration of Indigenous health is important given the shift in focus from climate change mitigation to climate change adaptation. Ideally, emphasis should be on minimising the negative impacts on Indigenous people in the context of climate change.

Considering this review in light of the work being done in Aotearoa, specifically that of the Office of the Māori Climate Change Commissioner (<http://www.maoriclimatocommission.co.nz/>) and the Ministry of Health’s (2020) Māori Health Action Plan 2020–2025, it is heartening to see government agencies prioritising activities of relevance to climate change. Nevertheless, Māori continue to carry a greater burden of disease (Jones, 2019). This greater burden warrants a higher level of inclusion and prioritisation for Māori in Aotearoa’s climate change responses. The climate change risks associated with increased temperatures and an increased frequency of flooding events (Hallegatte et al., 2015; Hallegatte & Rozenberg, 2017) have an impact on Māori health, both physically (through climate-sensitive conditions such as infectious diseases, and chronic heart and lung diseases) and psychologically (through mental illness) (Clayton et al., 2015; Doherty & Clayton, 2011; Jones, 2019). There is also a risk that resources for mental health services for Māori

will be redeployed elsewhere because of increased pressure on health services due to climate change. Inequities already experienced by Māori within the health system (Brown, 2018; Cormack et al., 2018; Graham & Masters-Awatere, 2020; Harris et al., 2012) make it likely that Māori will be disproportionately affected by climate change.

Climate change also has impacts on Māori culturally through the loss of culturally significant land and associated sites (such as wāhi tapu, urupā, whare nui, kāpata kai). A Māori-centred systems approach is vital when developing climate change health policy in Aotearoa. A more focused literature review on the climate change risks and impacts for Māori health and the implications for health institutions in Aotearoa is needed. There is also room for climate change adaptations and responses that are Indigenous led and centred, and which have as part of their research the funding and levers necessary to enact meaningful change for Indigenous communities. Knowledge transfer and systems change take time, funding and energy to enact. Embedding these as essential components of any research project will contribute to improved outcomes for Indigenous groups.

## Conclusion

The focus of this systematic review was to identify (a) the relationships and processes of communications between Indigenous communities and government agencies (central, regional and local), administrative bodies, scientists, industry personnel; and (b) the actions of planning, policy and/or strategic developments and implementation of interventions or approaches to address the impacts of climate change for the Indigenous communities. Subjecting each article to two sets of analyses meant we were able to clarify the nature and extent of Indigenous community involvement and knowledge contribution in the climate change research process. As a result, our findings highlight the degree to which Indigenous communities participate in and contribute to institutional responsiveness to climate change in order to identify strategies and leverage points for introducing climate change responses in a Māori health context.

Overall, the climate change researchers included Indigenous people in their research design and processes. However, the level of engagement by way of enabling translation into policy processes and giving voice to opportunities that would benefit Indigenous people was less clear. For example, when opportunities to influence decision-making power were presented to the researchers, these

seemed more likely to be seized by the researchers, leaving Indigenous voices excluded. Similarly, where there were differences in opinion between the government agencies, researchers and the Indigenous communities, or different suggested strategies for moving forward, Indigenous perspectives were sidelined or overridden. Less than half of the articles reviewed scored highly for active inclusion of Indigenous knowledge and voice in both IKT and systems change. The majority of studies had mediocre processes of inclusion that resulted in average responses and modest influence in decision-making forums. The absence of Indigenous-led and -centred research on climate change is not due to the absence of Indigenous voices on the impacts of climate change. Rather, it reflects funding and publication processes that prioritise Western-led projects and epistemologies. In this way, climate change research replicates colonising practices.

These articles highlight that progress has been made in terms of including Indigenous people, their voices and their cultural practices in research. However, translation of research into active engagement in decision-making processes has been much slower. There is still room for improvement. These countries all have different treaty relationships between the government and the Indigenous people, and the complexities of multiple treaties makes comparison difficult and likely to yield false or inaccurate comparisons when examining from a treaty-centric position. Looking ahead, there is a need for an examination centred on the climate change health impacts on Indigenous communities. Levers and strategies include a review focused on the climate change risks and impacts for Māori health, implications for health institutions in Aotearoa and a consideration of Māori-led climate change adaptations and responses. Enacting meaningful systems change for Indigenous communities takes time, funding and energy. Embedding HPW components (cultural centeredness, community engagement, IKT and systems thinking) into a research project will contribute to improved outcomes in this regard. These recommendations for health institutional responsiveness to climate change can be implemented into contracting processes in Aotearoa.

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### Glossary

kāpata kai	food sources
urupā	burial grounds
wāhi tapu	sacred sites
whare nui	meeting houses

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