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Incorporating Indigenous voices in regional climate change adaptation: opportunities and challenges in the U.S. Pacific Northwest

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Abstract
As the impacts of climate change increasingly and disproportionately affect indigenous peoples, equitable approaches to regional climate change adaptation must center the voices, needs, and priorities of Indigenous communities. Although the tribal climate change principles identify actionable recommendations to address the unique needs of Indigenous peoples in the contexts of climate change adaptation efforts undertaken at the Federal level in the United States (U.S.), there has yet to be exploration of how such principles might be applied at the regional level. Through semi-structured qualitative interviews with 18 representatives from inter-Tribal organizations and non-Tribal organizations engaged in regional climate adaptation in the U.S. Pacific Northwest, this research sought to describe challenges faced by, and opportunities available to, non-Tribal entities when engaging with Tribes on regional climate adaptation initiatives. All respondents reported high levels of motivation to work with Tribes on climate adaptation and identified several perceived benefits of integrating Tribal partnerships and indigenous ways of knowing into regional climate adaptation initiatives. Respondents underscored the need for strong, trusted relationships that respect the sovereignty and priorities of Tribal nations to guide engagement. However, non-Tribal organizations' own capacity constraints, perceived Tribal capacity constraints, and institutional cultures rooted in colonialism and structural racism were discussed as obstacles to meaningful engagement. As such, we identify an urgent need to prioritize sustained investments in both Tribal and non-Tribal actors' partnership capacities and climate change adaptation capabilities to place Indigenous voices and needs at the forefront of regional climate change adaptation planning and implementation.

Keywords Climate change adaptation · Indigenous peoples · Tribes · Collaboration · Engagement

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1 Introduction

Climate change is resulting in significant environmental changes, with cascading effects to human health and well-being that disproportionately affect Indigenous lands and Indigenous peoples (Status of Tribes and Climate Change Working Group (STACCWG), 2021). Accelerated sea level rise and extreme weather events have already precipitated the displacement and forced relocation of entire Indigenous communities, and experts warn that this may continue for hundreds of communities living within the borders of the United States (Maldonado et al. 2013; Stern 2020). These impacts are exacerbated by the effects of poverty, dispossession, and globalization that challenge the adaptive capacities of Indigenous populations throughout the world (Ford 2012). Moreover, given the importance of place and connections to land that are particularly salient for many Indigenous communities, the environmental threats of a changing climate constitute substantive threats to the wellbeing and the very survival of Indigenous communities (Berkes 2017; Companion 2015; Maldonado et al. 2015; Maldonado et al. 2014; Whyte 2013). As such, many in the Indigenous climate justice movement echo warnings from leading scientific consortia (e.g. IPCC, 2022; Reidmiller et al. 2018) and "agree resolutely on the urgency of action to stop dangerous climate change" (Whyte 2020:1).

1.1 Big *challenges and local nuance require collaborative adaptation efforts*

The intensity and the nature of climate-related impacts in the United States are regionally specific (Reidmiller et al. 2018), varying based on natural environment (Giorgi et al. 1994; Rasmussen et al. 2020) as well as regionally specific human activity (Diffenbaugh et al. 2008). Though historically underexplored in academic literature (Birkeland et al. 2018), cultural nuances also mediate climate-related vulnerability and risk perception (Gautam et al. 2013; Rühlemann and Jordan 2021; Thomas et al. 2019). For many American Indian and Alaska Native communities[1] in particular, the devastating effects of climate change on cultural survival play a significant role in determining Tribes' priorities for climate adaptation (Cochran et al. 2013; Maldonado et al. 2016).

Recognizing the scope of the challenges presented by climate change, organizations throughout the world advocate for climate adaptation strategies developed through cross-sector collaboration, government-to-government partnerships, and collectives of multinational non-government organizations (National Academies of Sciences, Engineering, and Medicine 2021). Dierwechter and Hale (2014:2) advocate for strengthening regional planning processes and argue that multi-jurisdictional planning "should be at the center of how we ameliorate most of our major developmental challenges," including climate action. However, the variation of regional climate change impacts and the nuances of cultural norms and values in affected communities also require that adaptation efforts are tailored to the communities in which they are implemented, in order to reflect communities' needs and priorities (Schramm et al. 2020). The breadth of climate-related challenges, combined with the importance of nuanced solutions, enhances the attractiveness of developing adaptation strategies that are tailored to fit the communities in which they are implemented, but also robust enough to be effective (Kalafatis et al. 2015; Termeer et al. 2011).

[1] Also referred to as "Tribal" and "Indigenous" in this paper.

Climate adaption entails an iterative process in which communities assess risks and vulnerability and continually act to reduce risk (Lempert et al. 2018). Though mitigation (e.g., reduction of greenhouse gases) has dominated climate policy debates for decades, adaptation strategies have more recently become crucial for addressing the effects of climate change (Moser 2015; Moss et al. 2013). However, significant gaps remain between adaptation theory and practice (Biagini et al. 2014), as reflected in the Fourth National Climate Assessment (Reidmiller et al. 2018), which indicates that implementation of adaptation activities is on the rise, but "is not yet commonplace" (Lempert et al. 2018:1310). Moreover, the policy landscape where adaptation strategies might be implemented is characterized by confusion about the goals that should be pursued, and by whom, and consists of a broad range of strategies and policies (some of which are sector- or jurisdiction-specific) that, Moser (2015:570) writes, "reflects the fact that adaptation policy must meet many different demands created by already apparent or expected climate changes, which vary across regions, sectors and time, and often also non-climatic goals."

Yet, indigenous peoples have been assessing and adapting to climate-related risk since time immemorial. In the words of a Swinomish Indian Tribal Community member: "We've always been good at adaptation. You look at the 500 years that the western civilizations have been here… And the Tribes are probably one of the best adapters of being able to survive right along next to the western cultures"(SITC 2010:19). Traditional practices have "been sustained through previous world-altering changes … it stands to reason that they will again carry the people through this changing world, too" (Donatuto et al. 2021:160). Often, the climate adaptation strategies implemented among Tribes are rooted in traditional knowledges that prioritize "attachment to the local environment as a unique and irreplaceable place" (Berkes 2017:11). Many Indigenous peoples and Tribal communities emphasize the importance of first foods, for example, that have, "supported and nourished this land's first stewards in a reciprocal relationship kept in a harmonic balance" (Donatuto et al. 2021:159). Several Tribal nations have developed and executed effective climate adaptation strategies, including, e.g., Karuk Tribe (Norgaard 2014), Makah Tribe (Chang 2018), Swinomish Indian Tribal Community (SITC 2010).

Notably, the accelerating urgency of Tribes' need to implement climate adaptation strategies is largely due to human activity occurring outside of Tribal lands and beyond the control of Tribal governments. More broadly, as described in a collaborative report on climate change and indigenous peoples (Norton-Smith et al. 2016:3), "Indigenous vulnerability and resilience to climate change cannot be detached from the context of colonialism, which created both the economic conditions for anthropogenic climate change and the social conditions that limit indigenous resistance and resilience capacity." As such, immediate action to redress these dilemmas is a moral imperative (Jerolleman 2019; Whyte 2013).

1.2 Trust *responsibilities and tribal engagement*

Though collaborative efforts are often espoused as important solutions for addressing climate change, those that link Tribal communities and non-Tribal entities require particular attention. Relationships between Tribes and Federal government entities are shaped by Federal trust obligations to Tribes in which, "the United States has recognized and must protect the Tribal right to self-government, the right to exist as distinct peoples on their own lands, as well as remaining Indian trust assets" (NCAI, 2015, p. 1). In practice, a variety of policy strategies are used to meet these obligations. When it comes to how Federal employees should engage with Tribes, for example, Executive Order 13,175 (Exec. Order No. 13175

2000) articulates Federal agencies' obligations to consult and coordinate with Tribal governments when developing policies that have Tribal implications, and was recently reaffirmed and extended in a Presidential Memorandum (Memorandum 2021) that called on agencies to strengthen existing Tribal Consultation policies. However, funding issues and policy constraints continue to emerge as barriers for practical progress on climate-related collaboration with, or support for, Tribal nations (Bierbaum et al. 2013). Continued debate about how these obligations should be realized is further complicated by the rapidly apparent impacts of climate change that have displaced Tribal communities from the land that these obligations are designed to protect (Jessee 2020; Maldonado et al. 2013; Stern 2020).

1.2.1 Partnering on a ***regional scale***

Federal policies and initiatives that are subject to these trust obligations are often implemented at regional and local levels, in Federal offices located throughout the country (Jones 2018). Tribal nations have collaborated with Federal agencies on a number of climate-related projects in the Pacific Northwest and throughout the United States. These collaborations include, for example, direct partnerships between the Makah tribe and the U.S. Coast Guard (McLelland and Kennard 2021), and between the Swinomish Indian Tribal Community and the U.S. Geological Survey (USGS 2021). There are also a number of multi-party regional collaborations that bring together actors from a several different entities (e.g., tribal nations, universities, non-profit organizations, and government agencies from multiple levels). The Tribal Coastal Resilience Portfolio, developed by the Northwest Climate Resilience Collaborative, for example, is a collaboration between the Affiliated Tribes of Northwest Indians, University of Washington, the Washington Sea Grant, and the National Oceanic and Atmospheric Administration (Climate Impacts Group 2022). Similarly, University of Oregon's Tribal Climate Change Project began as a collaboration between the University and the U.S. Forest Service, and now includes partners from a wide range of sectors, including multiple levels of government, Tribal-serving organizations, and education and advocacy organizations (University of Oregon 2022).

At the regional level, where organizations seeking to engage with Tribal nations include Federal entities as well as state and local governments and non-government organizations, the complexity of collaboration for climate adaptation is further amplified. In this context, to the extent that the number of entities who might engage with Tribes increases, so too does the number of policies and best practices, which often vary from State to State and agency to agency. However, despite this complexity, and despite the importance of regionally and culturally nuanced adaptation solutions, less attention has been paid to regionally specific processes for direct partnerships between tribes and non-Tribal entities.

One explanation for this may be the central importance of protecting nation-to-nation relationships at the federal level that recognize and reaffirm the sovereign nation status of federally recognized Tribes. While the National Congress of American Indians (NCAI) emphasizes this importance, they also expressly support and encourage collaborative relationships and formal agreements between tribal governments and state and local government entities (NCAI, n.d.). However, collaboration at this level is often complicated by the fact that relationships between Tribal nations and the State (or States) that border their lands are often fraught with historical tensions, political issues, and legal battles in which Tribal Nations seek to assert and retain sovereign rights and augment self-determination (Hanna et al. 2011).

The State of Washington's Centennial Accord (and the subsequently implemented New Millennium Agreement) represents an attempt to codify the nature of what a government-to-government relationship could or should look like between a state and a tribal nation. This arrangement specifies that the development and implementation of government-to-government policies, and the associated accountability for doing so, are the responsibility of each individual state agency (GOIA 1999, 1989). However, it does not provide guidance for many of the nuances that may affect relationship-building at state and local levels, including, for example, the range of barriers to this type of work reported by Hanson et al. (2020) that include issues of trust and transparency, unclear expectations, and institutional mismatches.

1.3 Tribal *perspectives on climate-related engagement*

Tribal perspectives on climate-related collaboration provide insight for this research, and are particularly useful for contextualizing the recommendations we have developed based on this research (which appear in "Sect. 4"). The Tribal Climate Change Principles (TCCPs) (Gruenig et al. 2015) were developed in order to address the needs of Indigenous peoples for climate adaptation, through advancing recommendations for federal action. These principles are supported by many Indigenous groups, yet remain under-utilized in practice, and fall into the following four categories: (1) strengthen tribal sovereignty in the climate change era; (2) support tribes facing immediate threats from climate change; (3) ensure tribal access to climate change resources; and, (4) ensure an understanding of when and how the use of traditional knowledge may be applied. The TCCP report also contains recommendations for TCCP implementation, as well as identifies inherent challenges for doing so. While the specific recommendations contained in the TCCPs are aimed primarily at broad federal processes/interactions, the core principles offer a useful framework for understanding challenges related to supporting tribal nations, and provide context for the process of developing and maintaining tribal partnerships at regional levels.

1.4 Research aims

This research is part of a larger tribally led project designed to develop an Indigenous model to address climate adaptation and climate-related health issues at the community level. Previous work on this project has developed the Indigenous Health Indicators and Indigenous Building Resilience Against Climate Effects (I-BRACE) model, each of which were designed and produced by the Swinomish Indian Tribal Community to illustrate Swinomish world views on health and to integrate such worldviews into a climate adaptation approach for state and local public health agencies. The I-BRACE model is adapted from the U.S. Centers for Disease and Prevention climate health assessment model, BRACE (Schramm et al. 2020). It is our hope that these types of indigenous models will be useful for informing best practices for climate adaptation among both tribal and non-tribal entities, and that, in keeping with best practices and recommendations about Indigenous knowledge sovereignty, they will be incorporated into the climate adaptation work of non-tribal entities via collaborative partnerships with the tribal nations that chose to use them. To that end, our research is interested in exploring the kinds of opportunities and challenges that shape the actions and decisions of those who work in non-tribal institutions, in order to better understand the nuances of developing regional partnerships that both advance shared climate adaptation goals and consider the unique goals, challenges, and

capacities of tribal partners. Specifically, this study sought to understand challenges faced and opportunities available to non-tribal entities wishing to engage with tribes on regional climate change adaptation initiatives, and is complementary to work such as the TCCPs (Gruenig et al. 2015) that explores tribal perspectives on these issues.

Semi-structured interviews that inform this research leverage the experience of key informants who work in organizations that engage in the development or implementation of climate adaptation policy, and whose professional responsibilities include activities that serve these policy-related goals and/or that focus on tribal engagement in the U.S. Pacific Northwest. This qualitative approach allows us to explore respondents' perceptions about policy issues, institutional goals and priorities, and their potential tribal partners, and to capture the richness of respondents' institutional knowledge and experiences that elucidate the nuances of the challenges they describe. As a result, the findings of this research contribute an increased understanding of tribal engagement processes at the regional level, and inform recommendations designed to support the key components advanced by the TCCPs as they may be applied to the regional level.

2 Methods

2.1 Study design

We conducted semi-structured key informant interviews, and analyzed the information gathered using a modified grounded theory approach that incorporates flexible coding and thematic analysis. Using a purposive sampling approach to iteratively select participants based on their unique capacities to inform the research (Rubin and Rubin 2012) and to highlight the array of knowledges that inform this study (Glaser and Strauss 2017), we interviewed individuals who work in public and/or non-profit agencies in the Northwest region of the United States. We identified key informants through professional networks, and additional participants were identified using a snowball sampling approach, wherein participants recommended others who met inclusion criteria (Becker 1963; McNamara 1994). Sampling sought to balance the types of organizations represented, including both government and non-government organizations, and to ensure that government organizations represented multiple levels (e.g., local, state and federal). Similarly, sampling sought to ensure diverse professional expertise and activities, including climate, health, and tribal engagement. Throughout data collection, we continually reassessed our sampling strategy to target participants that could further illuminate developing themes.

2.2 Data *collection and analysis*

We recruited participants via email, where we provided them with an overview of the study and an invitation to participate in a video or telephone interview at a mutually convenient time. All interviews occurred during regular business hours via video conference (e.g., Zoom). Interviews were recorded (audio and video), and audio recordings were professionally transcribed for data analysis.

A semi-structured interview guide was developed a priori based on the study aim and objectives, and asked questions clustered around three main topics: (1) climate

change activities that respondents' organizations currently pursue or wish to pursue (2) what tribal engagement looks like for them, what they want it to look like, and the barriers and opportunities for getting there and (3) the types of variations in approaches to climate change adaptation that they have observed between tribes and their own organizations. The interview guide was developed/reviewed by four research team members and piloted with the fifth member, to ensure that questions were understandable and answerable.

Transcribed interviews were coded using the main constructs that reflect the interview questions, including climate change adaptation and health-related activities and goals, the nature of tribal partnerships, and the processes of acknowledging and integrating a variety of knowledge and approaches to these topics. Initial coding followed the logic of the first stages of Deterding and Waters' (2018) flexible coding approach, in which descriptive index codes, developed based on the concepts that organize the interview guide, are applied throughout each interview. The converse of the line-by-line open coding (e.g., in vivo coding) that often guides grounded theory approaches, this approach is designed to encourage data familiarization (Deterding and Waters 2018:15). Data is reduced by indexing the transcripts, through the application of broad codes that are derived from the interview protocol (which reflects the study's research objectives). Six index codes were applied to interview transcripts:

1. Respondent's climate change adaptation activities, goals, and challenges
2. Tribes' climate change adaptation activities, goals, and challenges
3. Partnership activities
4. Barriers to partnership
5. Facilitators and best practices of partnerships
6. Integrating diverse climate change adaptation approaches

Next, respondent memos (5–6 pages each) used for cross-case analysis in later analytical phases were developed by summarizing and synthesizing the main themes represented by each of these six index codes, for each individual interview. For each of these memos, segments were summarized and then synthesized, proceeding in code order, as enumerated above (rather than in the order in which segments appeared in the transcript). Transcripts were annotated concurrently with the coding process; for example, with the letters "A," "G," and "T" to represent "Activities," "Goals," and "Challenges," or one or two words that describe the nature of the barrier or facilitator being discussed. Memos included thematic summaries and supporting quotations.

Each memo was sent to the respective respondent in order to check the credibility of the synthesized data (i.e., member checking) (Lincoln & Guba 1985). Respondents were informed that these summaries would be the basis of ongoing analysis and were invited to offer comments or revisions. About 20% of participants provided feedback, and their revisions were reflected in the final respondent memos.

In the second main stage of analysis, respondent memos were treated as data, following Averill (2002), where matrix analysis allowed for cross-case comparison of memo segments, grouped by index code. Through this process, segments were further reduced to a few key analytic themes in each matrix cell and reassembled based on thematic common thematic elements across cases. Thematic memos were developed and cross-checked with the original interview transcript to ensure confirmability and increase the trustworthiness of each theme (Lincoln & Guba 1985).

3 Results

3.1 Participants *and engagement characteristics*

Eighteen of the 22 invited individuals chose to participate in the study (response rate 81.8%). Respondents represent 14 different agencies and organizations and have expertise that spans climate change, environmental health, hazards mitigation, and tribal engagement (Table 1).

Respondents' characterizations of their own occupational responsibilities for tribal engagement range from those who have no direct or specific responsibilities in this area to those whose primary job is to directly support tribal work and act on behalf of tribes in non-tribal settings (Table 2). Note that these descriptions reflect respondents' characterizations of their individual responsibilities as assigned to them by their respective organizations; they do not necessarily reflect respondents' beliefs about their personal responsibilities, nor do they reflect overall organizational responsibilities or constraints that may restrict working with tribes.

All respondents from non-tribal organizations indicated interest in engaging with tribes. Many respondents explicitly articulated their interest, and several also demonstrated their interest by describing examples of successful partnership activities that they have pursued in the past. Characteristics of tribal relationships by organization type are described in Table 3. Respondents from federal entities report relationships that are primarily based

Table 1 Descriptive statistics

Organization type
University/research organization (2)
Inter-tribal organization (5)*
County government (2)
State government (4)
Federal government (5)**
Role/subject expertise
Climate change (9) (3 tribally focused)
Environmental health (4) (1 tribally focused)
Hazard mitigation (1)
Health (1)
Tribal Liaison (3)

*Includes 1 participant with a joint federal/inter-tribal appointment

**Includes 2 national and 3 regional employees

Table 2 Respondents' occupational responsibilities for tribal engagement

Responsibilities for tribal engagement	Associated organization types
Direct: Engages on behalf of government (5)	Federal (4); county (1);
Direct: Supports tribally-initiated projects and Tribe-identified needs (5)	Inter-tribal (5)*
Incidental: Oversees general partnership/equity programs (4)	State (3); county (1); federal (1)
None (4)	University/research organization (2); State (1)

*Includes 1 participant with a joint federal/inter-tribal appointment

Table 3 Relationships with tribes by organization type

Org type	Relationship characteristics	Descriptions and examples
Federal	Limited relationships, based on specific funding opportunities	Support tribes that apply for and are awarded funding through the program that respondents oversee
State	General lack of relationships	Though they have monthly meetings with local jurisdictions, “we’re doing nothing with Tribes … but I do feel like we could be doing more and want us to be doing more.”
		“We are in the process of growing our program to better serve all communities in this area – including for Tribes, so please understand these efforts are still very much in the learning phase.”
Local	Mixed	Some strong relationships based on specific collaborative projects that affect both entities
		Challenges with engaging tribes in county-level projects
University/research organization	Strong relationships based on Tribally led/co-led projects	One-on-one projects that are co-developed and Tribally developed projects
		Co-developed tools designed for use by many tribes
		Large projects with multiple tribes and other non-Tribal organizations

on tribes' being awarded federal funding. State government entities describe attempts to develop relationships by inviting tribes into their organization's projects, but report that they generally lack strong relationships with tribes. Respondents at the county level describe strong one-to-one partnerships on specific projects with neighboring tribes where both entities are facing the same climate-related challenges, but that (like states) they struggle to develop collaborative relationships based on their own projects. Finally, respondents in research settings report very strong relationships with tribes, characterized by tribally led or co-led projects that they have the opportunity to support (with funding and/or expertise). Respondents from inter-tribal organizations echo these sentiments, "For the most part, the states are willing and would like to work with the Tribes."

Regardless of the nature or extent of engagement respondents describe, all discuss wanting to improve these efforts, with some describing specific strategies or plans to do so. Respondents in federal organizations report wanting to include a greater number of tribes in the programs they oversee by reducing barriers for tribes to access funds. Respondents at the state and county levels describe wanting to improve engagement by more intentionally and systematically reaching out to tribes and describe potential avenues to do so, such as hiring additional staff devoted to tribal outreach, and planning future events designed specifically to support tribes. One of these respondents also describes the value of their professional networks, and reports that having tribal representatives in leadership roles has been a beneficial avenue for developing relationships with tribes. Among researchers, where tribal engagement is strong, respondents report that because their engagement is largely in response to tribes who request support, they are working on developing relationships with a greater number of tribes (in order to increase the opportunities for tribes to request support).

Though respondents were not explicitly asked what motivates them to work with tribes, some respondents from non-tribal organizations did articulate their rationales for engaging with tribes, which included (in descending order of frequency mentioned): (a) identifying common best practices for addressing climate change, which might be mutually beneficial collaborative activities; (b) getting a more complete picture of climate-related vulnerability (at the state and federal levels, for tribes with land in their region); and (c) coordinating with neighbors on regionally specific climate risks (which is crucial because, as one respondent stated, "risks don't care about borders").

Respondents also describe the potential benefits of non-tribal organizations developing a better understanding of Indigenous approaches to climate change. As one respondent from a state agency points out, "those Tribal perspectives and knowledge and values can only help us, so including them from the beginning will actually make your project stronger." A few respondents describe their understanding of Indigenous approaches to addressing climate change and explain that some of the most common features of indigenous ways of knowing are beneficial for informing climate adaptation and environmental health strategies. For example, some point to the principles of intergenerational equity that is often associated with viewing climate change on a longer term basis, and a connection to the natural environment that positions humans as stewards of the land rather than its settlers. Respondents with expertise in environmental health point out the subjectivity of the concept of health, and praise indigenous frameworks that include cultural survival, natural surroundings and a thriving community as important components of health. They also describe the commitment of many tribes to gathering community input and explain that these commitments would enhance the efforts of their own agencies to engage in "whole community health." One respondent adds that indigenous perspectives on environmental and human interconnectedness may be beneficial for helping non-Indigenous people better

see the interconnectedness in their own cultures, thereby helping to increase the urgency of addressing climate change.

3.2 Goals and best practices for tribal engagement

Nearly all respondents argued that the most effective partnerships with tribes for climate change adaptation are those based on meaningful relationships built on mutual trust and respect. They explain that these kinds of relationships are developed over a significant period of time, often through existing personal and professional connections where trust has already been established. Respondents offered several examples of strategies for pursuing these kinds of relationships in a tribal context. One respondent in a government setting relied on relationships with tribes that they had developed in their previous work in the private sector. Others describe working on small collaborative climate initiatives for the express purpose of developing strong personal relationships. A number of respondents also report relying on intermediaries who have more established relationships with tribes, including tribal liaisons, inter-tribal coalitions, and tribal leaders with whom they have already worked (creating something of a snowball effect).

Respondents identified several principles and best practices viewed as crucial for developing high-quality relationships, including communication, goal alignment, and mutually beneficial relationships and projects. Most respondents in non-tribal organizations describe these principles as ideals to which they aspire in their work (for which inter-tribal coalition representatives also indicated support). However, these practices were sometimes discussed in the context of additional steps that should be taken when working with tribes, or as a way of describing how current/common standards are insufficient for achieving these ideals.

Many respondents from government agencies referred to the process of Tribal Consultation as a standard practice for working tribes. Tribal Consultation, as described by respondents, is a legally required process designed to encourage government agencies to consider the impact of their work on tribes, inform tribes of that potential impact, and invite tribes to participate or be represented in that work. However, many respondents argued that existing Tribal Consultation requirements are insufficient for developing the quality of relationships that support successful collaboration with tribes. For example, one respondent working in a state agency explains that the "Dear Tribal Leader" letter is "kind of the checkbox that we are meeting the statutory requirement. It definitely does not replace the programmatic relationships and meetings and interactions. I think, for me, that has been where most of our work has gotten done."

3.3 *Barriers* for tribal engagement

Respondents described a wide variety of barriers for tribal engagement, which were developed into the three main analytical themes. Capacity limitations among organizations of all types as well as tribal nations stand out as the most commonly identified barrier to developing partnerships on climate change related initiatives. Limitations for all of these entities include financial support and staffing, as well as other resources such as climate expertise and professional social capital. Respondents also described the institutional dynamics that underlie these capacity issues, and create additional barriers, often in the form of policies and institutional norms, that constrain respondents' abilities to effectively engage tribes.

3.3.1 Non-tribal organization capacity constraints

The majority of respondents in non-tribal organizations pointed out that they do not have steady streams of funding dedicated to tribal engagement, and instead must depend on ad hoc congressional appropriations and competitive grants. They explained that without such funding, their engagement with tribes is often limited to (1) responding to tribes who approach their offices with specific requests for support and/or (2) developing strong relationships with only a very limited number of tribes. A few respondents expanded on these limitations, explaining that with finite funding and broad responsibilities “choosing to do work with Tribes necessarily means limiting other activities.”

Relatedly, respondents explained that they lack sufficient personnel for developing strong relationships with tribes, and often must rely on a tribal liaison (if one exists within their organization) or inter-tribal organizations as their primary avenues for developing relationships. The tribal liaisons who participated in this study added that, as a result of these personnel issues, they often feel as though they are the sole connection between thousands of agency employees and all of the tribes in their region. One of the respondents representing an inter-tribal organization added that while they are glad to support these relationships, it should be the responsibility of each government agency to ensure that their employees have the necessary training and capacities to work with tribes, so that the responsibility of coordinating with tribes is not shifted to tribally-led organizations or to tribes themselves.

Capacity limitations of non-tribal organizations determine not only whether engagement can happen, but also significantly impact the quality of that engagement. As respondents explained the importance of meaningful relationships for addressing the effects of climate change in front line communities, they lack the capacity to develop the kinds of relationships that they believe to be necessary for effective engagement or collaboration, which take time. For example, they discussed that partnering with tribes on climate issues requires long-term commitments of both personnel and resources: “We want to make sure that every interaction is meaningful and that we are able to commit to provide the level of relationships and assistance that is helpful for the Tribe.”

Finally, respondents (especially those in federal government roles) explained their beliefs that capacity limitations are rooted in the failure of their organizations to prioritize tribal engagement. As one tribal liaison puts it, “Agencies show their support through funding. …There may be initiatives going on, but it’s really through– agencies get the work done with funding.” Another participant explains, for example, that their agency’s leadership has made great strides to prioritize working with tribes, they are still dependent on congressional funding to move forward on any given project. With regard to climate-related projects that could help them engage tribes, they explain that,

> *Congress hasn’t created any of this. The agencies are doing what they can with the resources they have, but Congress has not created climate change programs. They haven’t said, "Here, guys. Each of you will set up a new division only for climate change. And here is funding to get that work done." … Leadership, I believe, really wants to do this. But the Congressional, the legislation to support the agencies, to open the door and the path, and give them the resources hasn’t been created.*

3.3.2 Perceived *tribal capacity limitations*

As respondents described their attempts to engage with tribal nations, most of them pointed to their perception of limited tribal capacities as a significant barrier that affects respondents' decisions about what kinds of engagement activities they pursue, and how successful they believe those to be. Notably, both government employees and those from tribal-serving organizations described this as a significant issue, and it is our intention to report respondents' perceptions about and experiences with tribal capacity limitations in the context of tribal partnerships. More importantly, these findings are not intended to speak for tribes about their capacity limitations, but rather to echo and support the concerns that many tribal leaders and scholars have already expressed (Bennett et al. 2014; Chino and Debruyn 2006; Chischilly et al. 2022) They explain that the most effective climate adaptation solutions are locally driven, and require capacities that many tribes lack. As one respondent in a state agency describes:

> "Even if state or federal programs did have more robust capacities, it's critical for communities to have resources and staff tolead planning efforts so solutions are tailored. In my experience, it seems like many Tribes, similar to local governments, simply don't have thecapacity to have someone working on climate change adaptation in any formal or full-time capacity. ***Solutions need tobe locally driven so they are tailored to fit each community."***

Respondents commonly described their perception that Tribes do not have the personnel capacity to respond to tribal consultation requests from the vast number of external agencies who contact them, nor the resources to devote to these multiple collaborative projects. For example, one respondent recalls his interaction with a tribal staff member responsible for reviewing tribal consultation letters who told him, "I review a hundred of these in a morning, and I maybe send one or two on to our leadership because we don't have a subject matter expert for each of these things who is going to take this issue on." Several respondents go on to explain their beliefs that because of these limitations, it is especially important to value any time the tribe is willing to invest, and some describe additional pressure that this can create to do engagement well. In the words of one respondent:

> I definitely feel at a loss for how to pursue those relationships and how to make sure that we're bringing *value, and not just a drain on people's time and resources, because they're understaffed and under-resourced, and have their own things going on.*

Several respondents emphasized the importance of a broader awareness among non-tribal entities about the effects of capacity limitations as they create policies that affect tribes and especially as they develop best practices with regard to tribal engagement. These respondents pointed out that current strategies to engage with tribes (such as the tribal consultation process described above) often fail to engage tribes who do not have the capacity to partner, and as a result, may perpetuate "lopsided development, where those Tribes most in need are the least likely to get resources."

Respondents also described several ways tribes are excluded at the institutional level, and the effects of this type of systematic exclusion on their attempts to develop effective partnerships with tribes. Exclusion from climate-related funding was the most common explanation given for the tribal capacity issues discussed above, and comes in

a variety of forms. As one inter-tribal organization representative explained, for example, tribes are denied access to funding "through [insufficient] guidance, through culturally inaccessible programs, through lack of effective communication. Access is a real problem." Other respondents echoed these sentiments and cited exclusion climate-related funding as a significant source of the capacity issues that hinder robust tribal engagement on climate-related projects.

Respondents working in government roles most commonly pointed to funding opportunities that fail to consider the needs (and the value) of tribal climate adaptation projects. They explain that the funding guidelines on which they must base their decisions lead them to reject a number of excellent climate adaptation projects that tribes are working on. As one respondent describes this phenomenon, "grant funding decisions are often times made by staff, based on programmatic guidelines [that need to be] revised to be more culturally appropriate."

Another respondent who works primarily in emergency management explained that the Federal Emergency Management Agency mitigation grants are designed specifically for critical infrastructure projects, rather than protection or management of natural resources. Since many tribes' mitigation plans focus on protection of the natural environment, rather than critical infrastructure, they are excluded from this funding. In another example, respondents in a federal government setting described emerging needs among tribal nations, for which there simply is no existing funding stream to support. As they explain,

> *I have one Tribe that I work with that is struggling to find funding for a lift station. As the tides are coming* in *higher, and the rivers are rising, their lift station at their sewer system needs to be upgraded,* $30,000. Don't have it. *Can't find it.* That's the climate change impact. And so just even a multimedia funding approach would be excellent -- just to fund the needs [described in funding applications] *I think would allow us to be more responsive.* ***We would be able to meet the Tribes where they are, with what they're already telling us their need is.***

Many respondents working in state and federal government roles argue exclusion from these funding mechanisms also limits opportunities for more individual engagement and professional connections. They explain that much of their work is focused on supporting jurisdictions that apply for and receive funding from their agencies, which creates a foundation for developing professional relationships.

Researchers and those working in non-government organizations also described issues with funding mechanisms, which function differently but may have similar effects. Namely, they explain that the grant-funding they rely on to carry out their work functions within a system that privileges settler-colonial institutions (at the expense of tribes). As such, they argue that this type of funding often fails to honor tribal sovereignty and self-determination, diminishing the quality of engagement. For example, one researcher explains that,

> My work is not perfect. *There's* still a lot of problems with the way I do my work, right? I'm still working within existing power structures that give increased legitimacy to *Western science, and I'm in a settler-colonial institution, and I'm white. I mean, it's problematic still. And I'm getting the money -- I'm applying for grants. They're not giving the money directly to the Tribes, usually. I mean, increasingly, that's changing, but it's still super problematic.*

3.3.3 Institutional *constraints*

Respondents also describe a number of institutional/bureaucratic constraints that make Tribal engagement more difficult in their own work. Several respondents explicitly described the flexibility that researchers and non-government organizations have (compared to government agencies), in terms of the work they choose to do and how they carry it out. For example, some of the non-government employees described the freedom that they have to work on tribally led projects, as opposed to agency-led projects that may seek tribal representation. They echo the sentiment of one respondent who explained their belief that they probably have "much more flexibility than most people in government because I'm at an organization whose mission is to do this work and was set up to do it."

Respondents from government settings also described the constraints of processes and tools that comprise many of the best practices and standard operating procedures in their field (e.g., state and local planning requirements) yet are not applicable or helpful for tribes, and thus create barriers for effectively collaborating with and supporting tribes. They explain that because of this relative lack of freedom, it is more difficult for them to collaborate with their tribal neighbors who "often put energy into things and focus on things that non-Tribal communities cannot [because] there is a certain set of things they have to do that are defined by state law." Moreover, because these practices are so ingrained in the way they approach climate-related issues, they often feel as though they have little to offer tribes in terms of non-material support such as guidance or personnel.

4 Discussion

In a recent essay, leading indigenous climate change scholar, Kyle Whyte (2020, p. 1), reflects on the importance of meaningful relationships as a cornerstone of collaborative action to address climate change, and argues that a relational tipping point may have already been crossed, which will ultimately preclude the possibility for achieving climate justice for some indigenous groups. As Whyte (2020:1) writes, "the qualities of relationships connecting indigenous peoples with other societies' governments, nongovernmental organizations, and corporations are not conducive to coordinated action that would avoid further injustice against indigenous peoples in the process of responding to climate change."

Through this qualitative research, we provide nuanced descriptions of factors that challenge non-tribal actors from such meaningful engagement with tribes to advance climate adaptation and address adverse health effects of climate change. Insights from conversations confirm that meaningful collaboration with and support for tribes may be a long way off without a paradigmatic cultural shift in how climate change adaptation efforts are conceived and prioritized. Adequate and appropriate tribal engagement in regional climate adaptation activities is precluded by non-tribal organization capacity constraints, the effects of tribal capacity constraints, and underlying institutional dynamics rooted in colonialism and structural racism that constrain organizations from meaningful and equitable collaboration. However, we submit that opportunities to improve engagement—namely through prioritizing investments in capacity among tribal and non-tribal organizations for collaborative climate change adaptation, and dismantling colonial structures that prioritize western science and approaches to adaptation—can facilitate regional climate change adaptation collaborations that center the voices, needs, and prioritizes of Indigenous peoples and tribal nations.

4.1 Initiating and *developing engagement with tribes*

Practical barriers for initiating and developing relationships (of any kind) with tribes are evident throughout the results described here and include limited funding for personnel/activities dedicated to tribal partnerships, ambiguous policies, and unclear direction about whether and how to engage tribes, as well as programs and funding mechanisms that fail to meet tribes' specific needs. As a result, partnerships that may significantly enhance support for tribal nations at the greatest risk are thwarted by a lack of capacity among regional agencies as well as exclusionary policy and funding mechanisms that fail to consider tribes' unique needs and priorities and thus determine which tribes they ultimately partner with. Central to the TCCPs is the call for direct, equitable support for tribes to address the effects of climate change (Gruenig et al. 2015). However, developing tribal partnerships that help facilitate support that is both direct and equitable requires efforts that are intentional, rather than incidental. Doing so requires adequate staffing with flexible funding that can meet tribal nations where they are. Specifically, individuals in government agencies who are responsible for doing this type of work need clear policy directives that prioritize tribal engagement coupled with dedicated and flexible funding.

4.2 Building *high-quality relationships*

Respondents overwhelmingly reported wanting to engage with tribal nations more effectively, moving beyond statutory requirements for engagement that often view tribal engagement as a static binary (i.e., measuring whether they *did* or *did not* engage tribes). The findings above regarding the use of letters that fulfill tribal consultation requirements are evidence of this point. These statutory requirements are those developed in government settings, often to respond to broad executive orders and government-wide mandates that are often designed to address the unique socio-political relationships that tribes have with several levels of government (e.g., Exec. Order No. 13175 2000). Voicing their desires to move beyond what is merely required of them, respondents described several measures of quality that they aim for in their engagement activities (e.g., aligning goals with those of their tribal partners), as they develop meaningful relationships based on mutual trust and respect.

Ultimately, these meaningful relationships of trust are critical to honoring the sovereignty and self-determination of tribes as described in the first major component of the TCCPs (Gruenig et al. 2015). These high-quality relationships may allow for more consistent and thorough communication that ensures the free, prior, and informed consent of tribal partners and enhances the likelihood that tribal partners will be represented in spaces where climate change adaptation decisions are being made. However, as respondents from all sectors and organization types affirm, developing these relationships requires significant investments of time and effort. This is in part because tribal nations—even those in the same geographic regions—are unique independent entities with varied histories, cultures, and practices. The relationships that are developed with these tribes must therefore be equally unique. Moreover, the unique socio-historical context of relationships between tribes and government entities requires additional attention and care on the part of non-tribal actors, which may not be required for other non-tribal communities and groups. As such, in addition to the funding and clear directives that are foundational for developing partnerships, a cultural shift in how this work is approached in government organizations is necessary to meaningfully encourage and support the development of relationships with tribal partners.

4.3 Building *tribal capacity for partnership*

One of the most significant issues that respondents described is their perceptions about tribal capacity being insufficient to adequately address the effects of climate change or to devote time and resources to climate-related partnerships with non-tribal institutions. These perceived capacity issues are exacerbated by the number of agencies and organizations that ask tribes to engage with them on a vast range of issues, which may be the result of statutory requirements for tribal engagement that respondents described. These findings demonstrate a range of underlying issues that, if not addressed, will ultimately preclude any hope of developing climate adaptation solutions in partnership with tribal nations. As addressed in the TCCPs, climate change programs and resources are often inaccessible or unavailable for tribal nations. The need to redress this issue is exigent (Gruenig et al. 2015). Our findings demonstrate the additional effects of deeper issues that require long-term, systematic support for capacity-building in tribal nations. Specifically, absent of the capacity-building that takes place over generations, many tribes do not have the personnel and resources to devote to partnerships, which, our findings reveal, have significant bearing on how non-tribal actors approach and engage tribal partners to develop relationships. As such, we echo the recommendations of the TCCPs that call for equitable access to funding initiatives to provide crucial support for both immediate and long-term climate-related issues. We also advocate for systematic program funding that will support the continued development of tribal personnel who can consistently serve to represent the needs and priorities of their nations in collaborations that involve non-Tribal agencies.

4.4 Tribally led climate engagement

Our findings reveal important insights about how non-tribal agencies engage with tribes, specifically in terms of whether and to what extent respondents (and their organizations) are supporting tribally led projects versus seeking tribal representation in their own ongoing work. The findings presented in Table 3 reveal a potential pattern in which state agencies may be more focused on seeking input from tribes on their own projects, compared to those at the federal level, where engaging with tribal nations is typically tied to funding mechanisms that support tribes' adaptation solutions (notably, however, several conditions for that support limit the eligibility of many of these tribally led projects). As we compare the work of those in government agencies with those working in research settings, it is apparent that the relative freedom and flexibility that researchers enjoy in their work may lead to more robust relationships that support initiatives that are tribally led.

As is evident throughout the TCCPs, when it comes to government settings, each of these types of activities (ensuring meaningful representation and supporting tribally led initiatives) are essential to advance climate adaptation solutions that will benefit tribal nations. However, effectively engaging in both types of activities requires each of the foundational components that we have recommended thus far, as well as significant and meaningful institutional changes that center equity and justice as their core purpose.

4.5 Limitations and *future research*

This exploratory research intentionally focused on the barriers facing non-tribal actors and organizations when engaging with tribes on regional initiatives for climate change

adaptation, as well as perceived opportunities to enhance collaboration and partnership. Although our findings align with and build on challenges identified in the TCCPs, which were developed through contributions of Tribal representatives, the TCCPs focus is on principles for federal partnership. Future research must center the perspectives of tribal representatives on these issues to ensure challenges and solutions identified integrate their perspectives and align with their needs and priorities. Additionally, while our qualitative approach, including use of purposive sampling to include diverse perspectives in terms of organization type, sector, and professional role, allowed for deep exploration of contextual nuances, our study sampling frame is geographically constrained to the U.S. Pacific Northwest. Given regionally specific climate impacts Diffenbaugh et al. 2008), along with divergent state and local approaches to climate adaptation and tribal engagement, follow-up research should seek to expound on findings in different geographic and political contexts, both within and outside of the United States. Moreover, this research sought to explore common challenges faced by sub-national actors, not to identify differences among sectors or stakeholder groups (e.g., public health or forestry). Future research should explore differences in barriers to tribal engagement, as well as to highlight successful strategies that have been implemented, to promote more equitable and inclusive approaches to climate change adaptation that can be adopted by other sectors.

5 Conclusions

Equitable approaches to climate change adaptation require centering the voices, needs, and priorities of indigenous peoples. As such, tribal nations must be intentionally and meaningfully engaged in regional climate change adaptation initiatives. Despite tribally led recommendations for federal actions that address the needs of indigenous peoples in climate adaptation (i.e., the TCCPs), sub-national actors still face substantial organizational capacity and bureaucratic constraints to collaborating with tribes on regional climate adaptation. Given regional impacts of climate change, it is imperative that sustained investments are injected in both tribal and sub-national non-tribal actors' (including state and local government agencies, inter-tribal organizations, and universities/research organizations) partnership capacity and technical capabilities to ensure indigenous voices and needs are at the forefront of localized approaches to adaptation.

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Declarations

Competing interests The authors declare no competing interests.

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