

**Testimony Before the
United States House of Representatives
Committee on Science, Space, and Technology
Hearing on “*Now or Never: The Urgent Need for Ambitious Climate Action*”
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Chairwoman Johnson, Ranking Member Lucas, and distinguished members of the committee: Thank you for the invitation to participate in today’s hearing to discuss our nation’s concerns regarding the urgent need for climate action in light of the recent Intergovernmental Panel on Climate Change (IPCC) assessment working group reports.

In our Indigenous Island Arawakan language of the U.S. Caribbean, I will share, *mabrika hahóm guaitiao*, which is to welcome and greet you as extended relatives and to give thanks for this opportunity to share in this important discussion. This is the original language of Taíno or Arawakan peoples in my maternal homeland of Borikén also known as the U.S. territory of Puerto Rico, a place where Indigenous Peoples have understood and been adapting to extreme climate events for centuries. Our Indigenous and local knowledge and value systems, including within the Indigenous language I am sharing with you this morning, continue to serve as resources for enhancing climate resilience.

For this hearing, I have been invited to testify regarding, 1) the concern of disproportionate impacts of climate change faced by Indigenous Peoples and marginalized communities, 2) the importance of Indigenous knowledge systems for climate adaptation and mitigation efforts, and 3) key policy and research recommendations to ensure Federal resources can support community-led climate resilience initiatives.

In addressing these concerns, I draw from my experiences and expertise as an Indigenous community member and as a research scientist with a decade of experience working on community-based climate and environmental research with Indigenous communities. In my professional roles I serve as Assistant Professor of Indigenous Natural Resource Stewardship and Director of the Indigenous Land and Data Stewards Lab at Colorado State University, and as an Associate at the Native Nations Institute, University of Arizona Udall Center for Studies in

Public Policy. I also contribute service to the Climate Adaptation Partnership at Colorado State University, NCAR-UCAR Rising Voices Center for Indigenous and Earth Sciences, and as a co-author for the Tribes and Indigenous Peoples chapter for the Fifth National Climate Assessment currently underway.

Amidst the challenges and crises that we and future generations now face due to human-induced climate change, we are also facing unique opportunities for systemic change and innovation in policy and research design. Our societies and our nation are in a transitional time of reconciliation, both in terms of reconciling historic legacies of oppression towards Indigenous, Black African-American, and other marginalized communities, and in terms of reconciling our relationships and responsibilities as human beings to the natural resources and lifeways that sustain us.

Through scientific research and large-scale collaborative assessment efforts we are developing a clearer understanding of the drivers of global environmental change and our critical relational responsibilities as stewards of the Earth. In recent IPCC reports, it is well established that Indigenous Peoples and marginalized local communities, whose lifeways are intimately tied to natural resources, burden disproportionate impacts and risks due to climate change. Yet these same communities also steward time-tested Indigenous knowledge systems – deep, place-based collective bodies of knowledge, that include scientific ways of knowing, and traditional ecological knowledge, formed over generations of observation of Earth’s physical processes.

Scientists now understand, with substantial evidence, the potential of Indigenous knowledges for guiding us through this difficult transitional time in our human history. We recognize the longstanding oppression and exclusion of Indigenous Peoples and knowledge systems through legacies of colonization, dispossession of lands, assimilation, and discriminatory policies. Within this duality where diverse knowledges and peoples are vital for our adaptive capacity, yet continually marginalized, we need integrated efforts that address reconciliation and relationship-building across our communities. Thankfully, I can share with this distinguished committee that the same solutions and strategies needed to address historical inequities can dually serve to benefit the broader public, as critical sources in helping us in our capacity to address climate change.

This most recent IPCC assessment models numerous pathways ahead dependent on the choices we make today. These pathways highlight opportunities for meeting sustainable development goals and ensuring protection of future shared lifeways through climate resilient development that hinge on policy actions supporting knowledge diversity, ecosystem stewardship, equity, justice, and inclusion (see figure 1).

There is a rapidly narrowing window of opportunity to enable climate resilient development

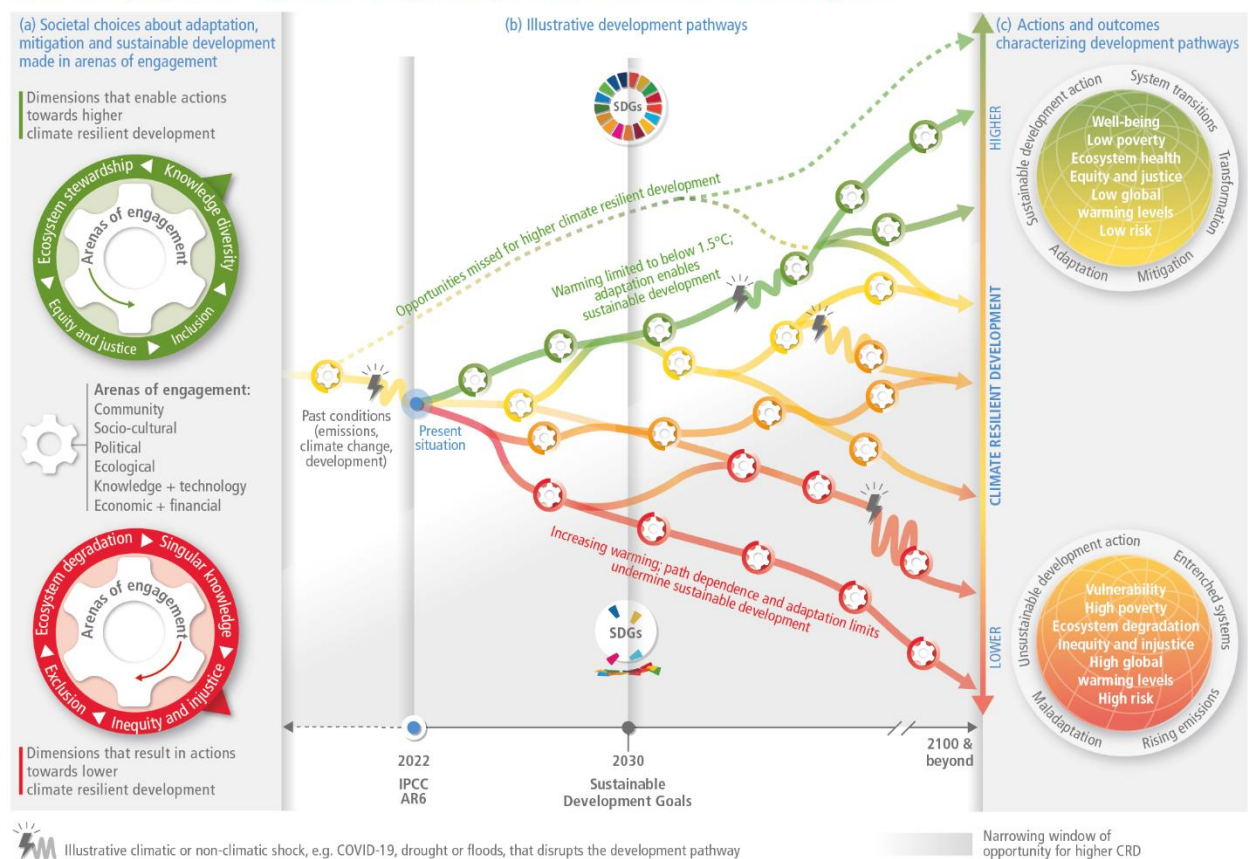


Figure 1: IPCC WGII Figure SPM.5 pathways for climate resilient development

A growing consensus of scientists and community leaders across diverse disciplines and sectors likewise observe that our most hopeful pathways are mapped through supporting Indigenous rights of sovereignty and self-determination, including supporting Indigenous and local communities' rights to uphold their traditional and customary responsibilities and protocols to steward our nations lands, waterways, and natural resources.¹ These pathways also provide support towards upholding articles affirmed in the UN Declaration on the Rights of Indigenous Peoples (UNDRIP)² which the U.S. has agreed to support as a signatory nation. Through upholding numerous UNDRIP articles observed in the IPCC WGII Report³ (see table 1), the U.S. Federal

¹ Status of Tribes and Climate Change Working Group (STACCWG). (2021). Status of Tribes and Climate Change Report, Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. [Marks-Marino, D. (ed.)] <http://nau.edu/stacc2021>

² United Nations General Assembly, "United Nations Declaration on the Rights of Indigenous Peoples," Resolution No. 61/295 (United Nations General Assembly, 2007).

³ IPCC, 2022: *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Lösschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. In Press.

Government also strengthens the ability to effectively uphold federal trust responsibilities to the 574 sovereign Tribal nations with whom they hold government-to-government relations.

UNDRIP ARTICLE	REFERENCE SECTION
Article 3, Right to self-determination	14.4
Article 23, Right to development	18 Cross-Chapter Box INDIG
Article 25, Right to maintain relationships to lands, waters, and resources, and related responsibilities to future generations	18 Cross-Chapter Box INDIG
Article 26, Right to protections, control, ownership, and use of customary lands, territories, and resources	18 Cross-Chapter Box INDIG
Article 31, Right to maintain, control, protect, and develop cultural heritage and knowledge resources, including intellectual property	1.3.2.3

Table 1: UN Declaration on the Rights of Indigenous Peoples, articles referenced in IPCC AR6 WGII

This most recent IPCC report affirms, with *high confidence*, that effective adaptation will require a holistic approach grounded in the recognition of Indigenous rights and governance systems.⁴ In the sections to follow, I will contextualize needs and opportunities for ambitious climate action within this rights and responsibilities-based framing.

In an overview of the IPCC WG Assessment Report findings on impacts disproportionately burdening marginalized populations, especially Indigenous Peoples, I will highlight the WGII report on climate change impacts, adaptation and vulnerability which determines with *very high confidence* disproportionate impacts and harms for Indigenous Peoples’ livelihoods and economies,⁵ as well as threats to knowledge transmission,⁶ and direct and indirect harmful impacts on health and well-being (physical, spiritual, and mental).⁷ These impacts are also observed in the USGCRP Fourth National Climate Assessment⁸ and recent Status of Tribes and Climate Change Report, released by the Institute for Tribal Environmental Professionals.⁹

These concerns are especially critical for Indigenous Peoples and marginalized communities with natural resource-based livelihoods, such as traditional subsistence practices, farming, and marine harvests. Coastal erosion and sea level rise continue to decrease Indigenous territories,

⁴ IPCC WGII 2022, 5.14.2.2 Incorporating Indigenous Knowledge and Local Knowledge

⁵ IPCC WGII, 2022, 14.4 Indigenous Peoples and Climate Change

⁶ IPCC WGII 2022, Cross-Chapter Box INDIG: The Role of Indigenous Knowledge and Local Knowledge in Understanding and Adapting to Climate Change

⁷ IPCC WGII 2022, Box 7.1: Indigenous Peoples’ Health and Wellbeing in a Changing Climate

⁸ Jantarasami, L.C., R. Novak, R. Delgado, E. Marino, S. McNeeley, C. Narducci, J. Raymond-Yakoubian, L. Singletary, and K. Powys Whyte, 2018: Tribes and Indigenous Peoples. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 572–603. doi: 10.7930/NCA4.2018.CH15

⁹ Status of Tribes and Climate Change Working Group (STACCWG), 2021: *Status of Tribes and Climate Change Report*, Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. [Marks-Marino, D. (ed.)] <http://nau.edu/stacc2021>

forcing resettlement, and threatening cultural continuity.¹⁰ Climate change impacts compound existing impacts to Indigenous Peoples from colonization and related legacies of territorial dispossession, resulting in barriers to accessing and caring for natural resources and cultural sites.¹¹ Within these contexts, we must also consider unique impacts shared by Indigenous Peoples displaced from other parts of the world, including migrant farmworkers, formerly enslaved African-American descendant communities, and refugee communities.

Regarding the importance of recognizing and including Indigenous, traditional, and scientific knowledges emphasized in the IPCC Working Group Reports, this 6th IPCC assessment report, similarly to the 4th and 5th IPCC reports, recognizes the importance and value of applying Indigenous knowledges in collaboration with formal/institutionalized scientific knowledge for enhancing adaptive capacity.

Indigenous Peoples and local community members who retain close ties to the land often serve as our primary climate scientists and monitors of change (e.g., farmers, fisherfolk, those who continue traditional harvesting practices, those who hold knowledge of traditional seasonal cycles including biological, ecological, and atmospheric indicators of change). Indigenous knowledge systems reflect high-level earth system science understandings and blueprints for sustainable planning and development contained in moral and ethical responsibilities-based framework.¹²

Indigenous knowledge systems applied for climate resilience include, yet are not limited to, climate smart agriculture,¹³ fire-adapted management,¹⁴ opportunities for combatting desertification,¹⁵ understanding community responses to environmental risks,¹⁶ gathering baseline data over long cycles of time regarding ecosystem change, and conveying Indigenous language concepts and interconnections not grasped by settler-colonial science conventions alone.¹⁷ For example, the Karuk Tribe’s Climate Adaptation Plan draws from traditional ecological knowledge to determine fire treatments for forest and grasslands, identifying cultural

¹⁰ IPCC WGII, 2022, 14.4 Indigenous Peoples and Climate Change

¹¹ IPCC WGII, 2022, Box 14.1: Integrating Indigenous ‘Responsibility-Based Thinking’ into Climate Change Adaptation and Mitigation Strategies

¹² Ibid.

¹³ Dominique M David-Chavez and Norma Ortiz, “Intergenerational Research on Indigenous Agricultural Knowledge, Climate Resilience, and Food Security in the Caribbean,” North Carolina State University Southeast Climate Adaptation Science Center, *Global Change Forum* (blog), April 9, 2018, <https://globalchange.ncsu.edu/intergenerational-research-on-indigenous-agricultural-knowledge-climate-resilience-and-food-security-in-the-caribbean/>

¹⁴ IPCC WGII 2022, 1.3.2.3 Indigenous Knowledge and Local Knowledge

¹⁵ IPCC WGII 2022, 4.8.4 Inclusion of Indigenous Knowledge and Local Knowledge

¹⁶ IPCC WGII 2022, 4.3.8 Observed Impacts on the Cultural Water Uses of Indigenous Peoples, Local Communities and Traditional Peoples

¹⁷ IPCC WGII 2022, Cross-Chapter Box INDIG: The Role of Indigenous Knowledge and Local Knowledge in Understanding and Adapting to Climate Change

indicator species which can guide stewardship responsibilities, and adaptation measures for caring for health effects (mental and physical) resulting from climate change.¹⁸

Yet numerous barriers remain for inclusion of Indigenous rights-holders and local stakeholders and the diverse ways of knowing that they carry within climate assessments, related policy development, research, and decision-making.¹⁹ For example, among climate studies which are accessing Indigenous knowledges, in a systematic review analyzing 125 climate studies across 140 published records, 87%, or nearly 9 out of 10 studies practiced extractive methods for accessing Indigenous knowledge in which Indigenous community knowledge keepers and decision-makers held little to no authority regarding what research questions were asked, or how data was gathered, held and disseminated back to their community²⁰ (see figure 2).

Likewise, the IPCC WGII report observes “lack of recognition of Indigenous sovereignty and exclusion of Indigenous Peoples from decision-making institutions” as structural barriers constraining adaptation (*high confidence*).²¹

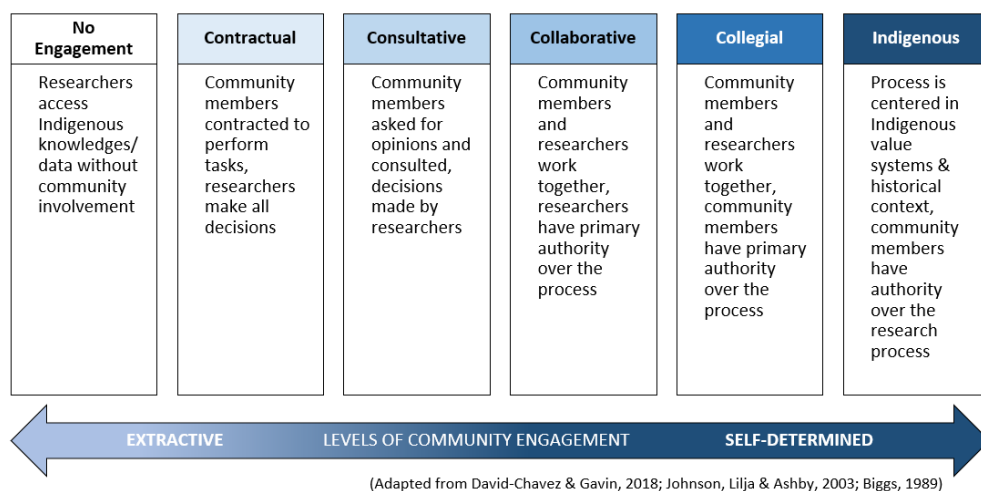


Figure 2: Scale assessing Indigenous community engagement based on who holds self-determination and authority in the research process.

Rather than viewing Indigenous knowledges as a supplemental data source, the IPCC, along with Indigenous scholars and a growing number of research bodies recognize the value of directly involving Indigenous scientists and researchers to support ethical and equitable knowledge exchange, and to support Indigenous governance.²²

¹⁸ IPCC WGII 2022, Box 5.6: Contributions of Indigenous and local knowledge

¹⁹ Julie Maldonado et al., “Engagement with Indigenous Peoples and Honoring Traditional Knowledge Systems,” ed. Katharine Jacobs, Susanne Moser, and James Buizer 135 (2015): 111–26, <https://doi.org/10.1007/s10584-015-1535-7>; James D. Ford et al., “Including Indigenous Knowledge and Experience in IPCC Assessment Reports,” *Nature Climate Change* 6, no. 4 (April 2016): 349–53, <https://doi.org/10.1038/nclimate2954>.

²⁰ Dominique M David-Chavez and Michael C Gavin, “A Global Assessment of Indigenous Community Engagement in Climate Research,” *Environmental Research Letters* 13, no. 12 (December 14, 2018), <https://doi.org/10.1088/1748-9326/aaf300>

²¹ IPCC WGII 2022, 4.6.9 Adaptation of the Cultural Water Uses of Indigenous Peoples, Local Communities and Traditional Peoples

²² IPCC WGII 2022, 1.3.2.3 Indigenous Knowledge and Local Knowledge; Whyte, Kyle. “What Do Indigenous Knowledges Do for Indigenous Peoples.” In *Traditional Ecological Knowledge: Learning from Indigenous Practices for Environmental Sustainability*, edited by M Nelson and D Shilling. Cambridge, UK: Cambridge University Press, 2018. <https://bit.ly/3MthCA3>

While the IPCC and other high level scientific forums have generated a push for inclusion of Indigenous knowledge systems such as traditional ecological knowledge, here in the U.S. we lack policy, and have limited protocols or guidance regarding how to engage Indigenous knowledge and data stewards and regarding principles for Indigenous research and data governance which uphold sovereignty and self-determination.²³ This leads me towards key recommendations for addressing this deficit.

In considering the role of federal government and federal resources to develop community-based climate research to improve resilience and implement adaptation and mitigation strategies, the IPCC WGII report recognizes that:

Indigenous self-determination and self-governance are the foundations of adaptive strategies that improve understanding and research on climate change, develop actionable community plans and policies on climate change, and have demonstrable influence in improving the design and allocation of national, regional, and international programs relating to climate change (very high confidence)²⁴

The recommendations that follow emphasize opportunities for institutional change and systemic level improvements in policy and practice, which we can immediately channel resources towards for achieving near and long-term climate resilience goals. These integrative strategies hold dual benefit towards addressing historic inequities and barriers faced by Indigenous and marginalized peoples, while also facilitating self-determined, Indigenous and community-led climate resilience efforts that allow for mobilization of Indigenous knowledges.

Changes such as these are already happening globally, and though varying in context, reveal that the U.S. remains lagging in terms of national policy and standards addressing reconciliation of colonial impacts and Indigenous rights and ethics in research in relation to nations with similar colonial legacies (see table 2, and related references²⁵).

NATION	NATIONAL INDIGENOUS RESEARCH ETHICS POLICY
Aotearoa New Zealand	Vision Mātauranga policy
Australia	AIATSIS code
Canada	Tri-Council policy, OCAP, & Inuit Nunangat Policy
United States	none

Table 2: Overview of nations with similar colonial legacies and large Indigenous populations (all UNDRIP Signatories) federal guidelines and codes relating to Indigenous research and data governance

²³ See current sources of guidance: CTKW, “Guidelines for Considering Traditional Knowledges in Climate Change Initiatives” (Climate and Traditional Knowledges Workgroup, 2014), <https://climatetkw.wordpress.com/guidelines/>; Dominique David-Chavez et al., “Policy Brief: Supporting Tribal Data Governance for Indigenous Community Climate Resilience” (Native Nations Institute & Climate Assessment for the Southwest, University of Arizona, 2019), <https://indigenoustalab.org/policy-briefs/>

²⁴ IPCC WGII, 2022, 14.4 Indigenous Peoples and Climate Change

²⁵ Aotearoa New Zealand Vision Mātauranga policy, <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/vision-matauranga-policy/>; Australia AIATSIS Code of

Key opportunities and recommendations for federal support of climate resilient policy and research:

1) *Pathways for intergenerational knowledge transmission*

This recommendation concerns climate change threats to Indigenous knowledge transmission, asking how federal resources can support the sustenance or restoration of traditional pathways for knowledge transmission between knowledge holders and the inherent stewards of Indigenous knowledge—local youth representing future decision-makers and land managers. For example, these pathways can be supported through agency funded, community-engaged internships²⁶ or externships, that support youth and early career scholars in maintaining connections with community knowledge keepers and mentors. Where they can also be supported in partnering their local observational data sets with professional science and research trainings and external datasets.

2) *Capacity training for researchers, scientists, data practitioners, and administrative staff*

Specifically, culturally-relevant and responsive climate science trainings co-designed by Indigenous partners that fill knowledge gaps regarding colonial historical contexts and impacts on Indigenous Peoples, sovereignty, self-determination, and Indigenous data and research governance. Building this foundational knowledge base can support long-term relationship building and facilitate recommendations for including Indigenous traditional ecological knowledge for federal decision making determined in the recent 2021 Whitehouse Memorandum.²⁷

3) *Reconciliation processes for addressing historical challenges and building trust*

Provide seed funding opportunities supporting time for building relationships and trust between researchers and their institutions and community organizations and leadership.²⁸ Allow time for researchers and communities to co-develop protocols and memorandums of understanding for research integrity if they are not already in place.

Ethics for Aboriginal and Torres Strait Islander Research, <https://aiatsis.gov.au/research/ethical-research/code-ethics>; Canada, Tri-Council policy for Research Involving the First Nations, Inuit and Métis Peoples of Canada, https://ethics.gc.ca/eng/tcps2-eptc2_2018_chapter9-chapitre9.html; Inuit Nunangat policy, <https://www.rcaanc-cirnac.gc.ca/eng/1650556354784/1650556491509>; also see recent UNDRIP legislation in Province of British Columbia, <https://www2.gov.bc.ca/gov/content/governments/indigenous-people/new-relationship/united-nations-declaration-on-the-rights-of-indigenous-peoples>

²⁶ NOAA Seagrant, Community Engaged Internship for Undergraduate Students, <https://seagrant.noaa.gov/Community-Engaged-Internship>

²⁷ Memorandum on Indigenous Traditional Ecological Knowledge and Federal Decision Making, November 15, 2021, <https://www.whitehouse.gov/wp-content/uploads/2021/11/111521-OSTP-CEQ-ITEK-Memo.pdf>

²⁸ Diamond Tachera, “Reframing Funding Strategies to Build Reciprocity,” *Eos*, October 13, 2021, <https://doi.org/10.1029/2021EO210546>.

4) *Indigenous data sovereignty and governance for stewardship of Indigenous knowledge* How can we ensure Indigenous data rights are built into data systems? Agencies should adopt a policy regarding Indigenous data sovereignty and governance. For example, the CARE Principles for Indigenous Data Governance (see figure 3) have now been applied for federal research code in Australia and are being operationalized for environmental data repositories here in the U.S.²⁹ These policies should include mechanisms and incentives for maintaining accountability.

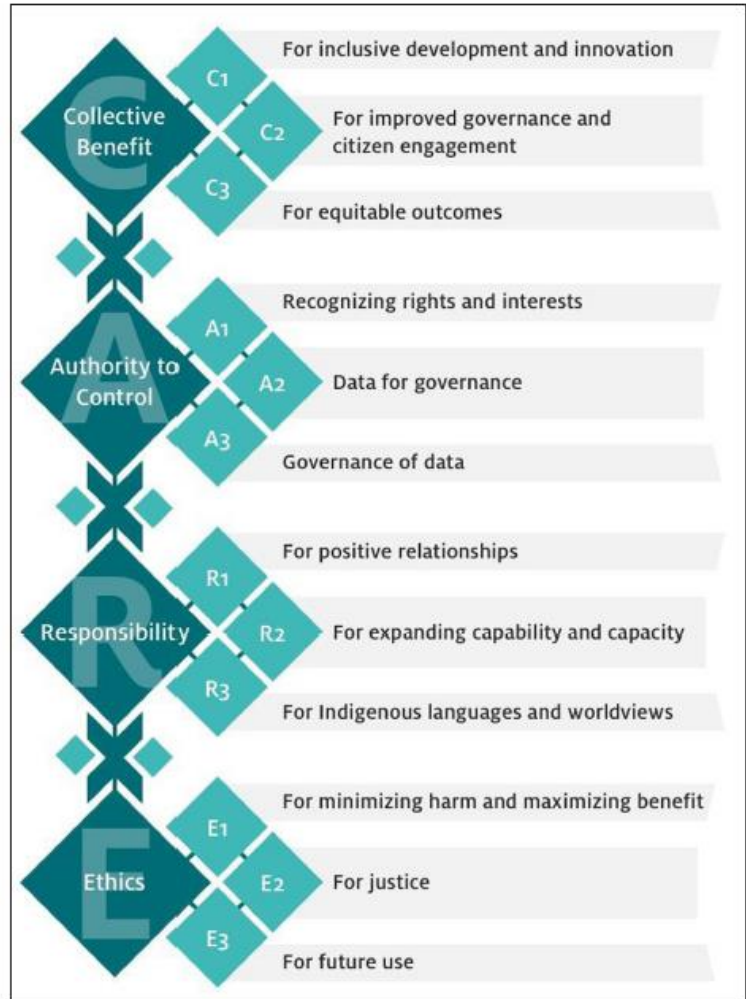


Figure 3: CARE Principles for Indigenous Data Governance

5) *Equitable partnerships with Indigenous and local community knowledge holders and decision-makers*

How can we ensure that unproductive and oppressive power imbalances are not perpetuated when Indigenous knowledge and data are engaged for climate resilience efforts? Ensure access (including funding support, administrative support, and formal leadership roles) for local and Indigenous leadership in research design, proposal review, and related policy development.

6) *Streamlined and flexible federal funding sources for Tribes and Indigenous communities* Create streamlined grant programs for Tribes and Indigenous community organizations that make it possible for grantees to spend flexibly to reduce common obstacles faced for channeling federal funds towards critical needs, such as climate-resilience infrastructure

²⁹ Stephanie Russo Carroll et al., “The CARE Principles for Indigenous Data Governance,” *Data Science Journal* 19 (November 4, 2020): 1–12, <https://doi.org/10.5334/dsj-2020-043>; Stephanie Russo Carroll et al., “Operationalizing the CARE and FAIR Principles for Indigenous Data Futures,” *Scientific Data* 8, no. 1 (December 2021): 108, <https://doi.org/10.1038/s41597-021-00892-0>.

investments and protection of Indigenous lands and resources.³⁰ These should allow for flexible timelines that accommodate community concerns and relationship building. Funds should also ensure that equitable portions can be allocated to community and Tribal partners, who may hold different credentials in their community roles as knowledge holders than standard academic degrees.

7) *Protocols for consultation and consent*

Ensure that federal protocols for consultation and consent align with UNDRIP articles for Indigenous and human rights regarding rights to self-determination and free, prior, and informed consent (FPIC).³¹ Consultation should occur early and often, should adhere to protocols set by Indigenous governing bodies, and should be mandatory for all development and decision-making impacting Indigenous Peoples, their territories, and resources.³²

These integrated strategies, which focus on policy needs regarding reconciliation, upholding Indigenous rights and responsibilities, and supporting Indigenous and local knowledge systems and knowledge holders in climate resilience initiatives, serve broader social impacts that extend benefit even beyond Indigenous and marginalized communities to the wider public. Consider these actions and recommendations to support those who have led stewardship for countless generations, to continue to do so for the benefit of all who share these territories and the lifegiving resources within them today.

Lastly, I invite the distinguished committee members to share a vision with me in which respectful and balanced knowledge exchanges long overdue, suppressed by five centuries of colonization, finally occur. Our current and future generations will need all the tools and insights available to them to address the complex and unique challenges that human-induced climate change has set before us. Let us ensure that the knowledge, the value systems, the time-tested wisdom of our ancestors is there to guide them. Help us to apply ethical and effective policy and institutional change to allow for the innovation, problem-solving potential, and ability to share in generation of new knowledge needed for our shared lifeways and our shared futures.

Hahóm – thank you for this opportunity to speak with you today. I look forward to our discussion.

³⁰ National Congress of American Indians, April 13, 2021, Infrastructure Legislative Proposal, https://ncai.org/NCAI_Indian_Country_Infrastructure_Letter_-FINAL_Update-.pdf; The White House Tribal Nations Summit Progress Report, November 15-16, 2021, <https://www.bia.gov/whcnaa>

³¹ United Nations General Assembly, “United Nations Declaration on the Rights of Indigenous Peoples.”

³² Status of Tribes and Climate Change Working Group (STACCCWG). (2021). Status of Tribes and Climate Change Report, Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. [Marks-Marino, D. (ed.)] <http://nau.edu/stacc2021>; Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships, January 26, 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/26/memorandum-on-tribal-consultation-and-strengthening-nation-to-nation-relationships/>