STATUS OF TRIBES & CLIMATE CHANGE REPORT

VOLUME 2, 2025

Cover Art Design
Sister Spirits
Kylie Wanatee, age 19, Rosebud Sioux Tribe

Artist's statement: **"***This is a 24 x 36 gouache painting of the Three Sisters: the Corn, the Bean, and the Squash. Indigenous Peoples throughout North America cultivate varieties of this trio because of their ability to thrive once planted together; this is known as companion planting. The top sister is the corn stalk, the bottom right sister is the squash, as her dress becomes the shade that keeps the soil moist, and the bottom left sister is the bean that grows hanging onto the corn stalk."*

Artist Positionality Statement: Kylie Wanatee Thunderhawk is a self-taught artist and member of the Sičangu and Oglala Lakota from the Titowan band of the Oceti Sakowin. Kylie's artistic journey has been shaped by her participation in the Oscar Howe Summer Art Institute, where she studied under renowned artists such as Malanie Yazzie, Henry Payer, Keith BraveHeart, and Joe Williams. A two-time Lakota Nation Invitational art contest winner for consecutive years in South Dakota, Kylie's deep connection to her people and culture is evident in her choice of subjects and themes.

Convened by:
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We acknowledge all Indigenous Peoples across Mother Earth who have inhabited the lands since time immemorial. We continue to honor their past, present, and future Knowledges, cultures, and lifeways for tending and preserving Mother Earth. We extend gratitude to all our human and nonhuman relatives and the land, plants, waters, and air. We recognize all voices of our relatives, Knowledge Holders, Elders, and young leaders striving to protect our ways of life for the next seven generations.

Status of Tribes and Climate Change Working Group (STACCWG), 2025

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Acknowledgements

The *Status of Tribes and Climate Change* (STACC), *Volume 2* report is the culmination of efforts from a diverse and expansive community of Knowledge Holders who have given their time, energy, and writings to this collaborative effort. The Status of Tribes and Climate Change Working Group (STAC-CWG) was convened by the Institute for Tribal Environmental Professionals (ITEP), supported by the Bureau of Indian Affairs (BIA) Branch of Tribal Community Resilience (TCR) and consisted of the individuals listed below.

The convening of this report was led by Bazile Minogiizhigaabo Panek, Nikki Cooley, Karen Cozzetto, Kelsey Morales, and Ashley Gries.

The steering committee met every other week beginning in May 2023 and then once a month beginning in September 2023. This committee was made up of members of diverse ages, locations, identities, Tribal or non-Tribal affiliations, and professional affiliations. They had deep conversations regarding everything from the overall goal of the report to details as specific as the formatting. ITEP sincerely thanks our Steering Committee relatives: Ann Marie Chischilly, Bazile Minogiizhigaabo Panek, Coral B. Avery, Jade Begay, James Rattling Leaf, Joe Graveen, Kailea Loften, Karen Cozzetto, Kelsey Jensen, Kelsey Leonard, Kelsey Morales, Kyle Whyte, Maddy Nyblade, Mike Durglo, Nikki Cooley, Nisogaabokwe Melonee Montano, and Taryn Bell.

One of the aspects of this report that makes it not only unique but also personal is the inclusion of the voices of Tribes and Tribal People who are on the front lines experiencing and responding to climate change. ITEP sincerely appreciates all the narrative contributors: Brooke Damon, Cherry Yamane, Devon Parfait, Freddie R. Olin IV, Hillary Renick, Joelene Tamm, Raymond Martinez, Robin Clark, Todd Mitchell, Tynya Kee, and Vincent C. Salgado.

The authors of this report offered not only their time and knowledge, but also their hearts. ITEP thanks Allison M. Scott, Althea Walker, Amber Pairis, Amelia AM Marchand, Anastasia Miller-Youst, Andrew Kalani Carlson, Anagali (Shace) Duncan, Ashley Gries, Bazile Minogiizhigaabo Panek, Benjamin Barnes, Brook Thompson, Brooke Damon, Cherry Y.E.W. Yamane, Chevaun Toulouse, Cheyenne I. Reuben-Thomas, Coral B. Avery, Courtney Greiner, Cynthia R. Harris, Davidene Joaquin, Devina Shah, Devon Parfait, Elisha Flores, Enrique Andrés del Castillo, Freddie R. Olin IV, Hannah Panci, Heather Sauyaq Jean Gordon, Illeana Alexander, Dr. Jamie Donatuto, Jennifer Santry, Jessica Lambert, Joe Graveen, Ben Barnes, Joel Barnes, Jonathan James Fisk, Joshua Manitowabi, Julie Barber, Karen Cozzetto, Karen Rittenhouse Mitchell, Kathryn Champagne, Kaylen James, Kelsey Leonard, Kelsey Morales, Krista Horvath, Kyle X. Hill, Kyle Whyte, Kylie Avery, Dr. Lara A. Jacobs, Lonyx B. Landry, Lydia Jennings, Madeline Nyblade, Marcy Delos, Melinda M. Adams, Megan Mucioki, Myk Heidt, Nadira Mitchell, Niiyokamigaabaw Deondre Smiles, Nikki Cooley, Nisogaabokwe Melonee Montano, Ňkwi Flores, Raffaele Sindoni, Raven B. Mingo, Rhode Grayson, Robert Newman, Samuel Schimmel, Sara Smith, Saraya Hamidi, Shavonne Smith, siwəlc?? Alana Quintasket, Squi-Qui Joe Williams, Steph Courtney, Stephanye Zarama-Alvarado, Summer Huff, T. R. Heydman, Todd Mitchell swəlítub, Tynya Kee, Vincent C. Salgado, Wario Malicha, and Wanaseah Larry Campbell.

The peer review process for the STACC report involved four layers: 1) an internal peer review by the chapter leads, steering committee, and ITEP staff, 2) a federal agency representative review, 3) a single blind external peer review made up of three highly qualified scholars, and 4) a final author and steering committee review. This extensive review process aimed to not only be thorough but to include reviews by a diversity of identities, perspectives, and knowledges.

ITEP would like to acknowledge the work of all the internal ITEP peer reviewers: Ashley Gries, Callum Cintron, Coral B. Avery, Jamie Donatuto, Kyle Whyte, Dr. Lara Jacobs, Max Benning, Mike Durglo, Nisogaabokwe Melonee Montano, and Vincent Salgado; as well as the federal agency reviewers: Alyssa Morris (BIA), Angela M. Waupochick (BIA), Conception Flores (USFS), Crystal Stiles (NOAA), Frank K. Lake (USFS), Harold Peterson (BIA), John Mosley (BIA), Kristen Schmitt (USFS), Luke Jones (EPA), Matthew Laramie (BIA), and Stephen Handler (USFS). While the external peer reviewers will remain anonymous to protect the integrity of the peer review process, we sincerely appreciate the time and effort they put into making this a more robust report. Thanks also go to Risa Jacobson for her copy-editing expertise.

Special thanks to Kylie Wanatee, 19, Rosebud Sioux Tribe, for providing the beautiful cover art titled *Sister Spirits*.

We also express our gratitude to the illustrators and art team, Brook Thompson, Coral Avery, Kailea Loften, Kelsey Morales, and Rhode Grayson, as well as Ashley Gries for her incredible layout design.

We extend our sincere gratitude to everyone who contributed to the report, including those whose efforts may not have been specifically highlighted: Briki Cajandig, Charitie Ropati, Dominique David Chavez, and Hilbert Lee.

Lastly, ITEP thanks the authors of the National Climate Assessment and their efforts to include Indigenous Peoples in their publications; they have contributed immensely to the breadth and depth of awareness in the U.S. of climate change's impacts on Tribes.

It is impossible to attribute proper credit to all the conversations held, research conducted, webinars and conferences attended, and more that led to the thoughts, insights, and information included in this report. A heartfelt thank you to anyone whose contributions may not have been mentioned by name.

—The Status of Tribes and Climate Change Working Group, 2025

Acronyms Used in This Report

ADRIP	American Declaration on the Rights of Indigenous Peoples
AFWA	Association of Fish and Wildlife Agencies
ANCSA	Alaska Native Claims Settlement Act
APIS	Apostle Islands National Lakeshore
BIA	Bureau of Indian Affairs
CARE	Collective Benefit, Authority to Control, Responsibility, Ethics
CASC	Climate Adaptation Science Center
CBP	Columbia Basin Project
CFN-GBI	Coastal First Nations Great Bear Initiative
CHIRP	California Heritage: Indigenous Research Project
COP	Conference of the Parties
CPF	Cascadia Partner Forum
CRT	Columbia River Treaty
CSA	Climate Science Alliance
CTKW	Climate and Traditional Knowledges Workgroup
DAPL	Dakota Access Pipeline
DEP	Department of Environmental Protection
DESCRM	Department of Environmental Sciences and Cultural Resource Management
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOJ	U.S. Department of Justice
EPA	Environmental Protection Agency
FOIA	Freedom of Information Act
FPIC	Free, Prior, and Informed Consent
GCD	Grand Coulee Dam
GLIFWC	Great Lakes Indian Fish & Wildlife Commission
GPTWA	Great Plains Tribal Water Alliance
GSOB	Goldspotted oak borer
HAB	Harmful algal bloom
IFMAT	Indian Forest Management Assessment Team
IIYC	International Indigenous Youth Council
IK	Indigenous Knowledges
IKS	Indigenous Knowledge Systems
INRSEP	Indian Natural Resources, Science and Engineering Program
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services
IPCC	Intergovernmental Panel on Climate Change
IIPFCC	International Indigenous Peoples Forum on Climate Change
ISN	Indigenous Sentinels Network
ITBC	Intertribal Buffalo Council
ITC	Intertribal Timber Council
ITEP	Institute for Tribal Environmental Professionals
KTREX	Klamath Prescribed Fire Training Exchange
LEO	Local Environmental Observer
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer
L.I.G.H.T.	Leadership, Indigenous, Guardian, Honor, and Teach Foundation
NAU	Northern Arizona University
NAFWS	Native American Fish and Wildlife Society
NCA	National Climate Assessment
NCAI	National Congress of American Indians
NEPA	National Environmental Policy Act
NERRS	National Estuarine Research Reserve System
NFWPCAN	National Fish, Wildlife and Plants Climate Adaptation Network
NHPA	National Historic Preservation Act
NIDIS	National Integrated Drought Information System
NIYC	National Indian Youth Council
NOAA	National Oceanic and Atmospheric Administration
NWCG	National Wildfire Cooperating Group
NYCALC	Native Youth Climate Adaptation Leadership Congress
OHA	Office of Hawai‘ian Affairs
OMB	Office of Management and Budget
RMP	Relocation, managed retreat, and protect-in-place
RoN	Rights of Nature
SGP	Seven Generations Principle
SITC	Swinomish Indian Tribal Community
SLIP	Shawnee Language Immersion Program
STACC	Status of Tribes and Climate Change
STACCWG	Status of Tribes and Climate Change Working Group
SUNY ESF	State University of New York College of Environmental Science and Forestry
SWAP	State Wildlife Action Plan
TAS	Treatment as a State

Acronyms Used in This Report Continued

TCR	Tribal Community Resilience
TEK	Traditional Ecological Knowledge
TERA	Tribal EcoRestoration Alliance
TMT	Thirty Meter Telescope
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNDRIPA	United Nations Declaration on the Rights of Indigenous Peoples Act
UNITY	United National Indian Tribal Youth
USET	United South and Eastern Tribes
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WHEJAC	White House Environmental Justice Advisory Council
WKRP	Western Klamath Restoration Alliance
YEE	Youth and Environment Europe

Executive Summary

We, as Indigenous Peoples, continue to endure the disproportionate effects and impacts of human-caused climate change on our communities, cultures, economies, worldviews, languages, ecological relationships, and knowledge systems. At the same time, a range of forces—including laws, policies, media, and beliefs of private citizens—attempt to erase our ways of knowing, being, and doing. Yet, we continue to lead in responses to the climate crisis (Etchart, 2017). Since time immemorial, our intimate relationships with Land, Water, and the beings dwelling within them have formed the basis of our advanced Knowledges and our resilience. For those reasons, the overarching and intentional theme of this volume of the *Status of Tribes and Climate Change* (STACC) report series is the significance of Indigenous Knowledges.

The STACC report series elevates the voices and efforts of Indigenous Peoples, Nations, and communities and provides a space within published literature to share our own stories about the climate change impacts we are experiencing and the solutions we are implementing. The reports, now published in two volumes, are acts of resilience and self-determination intended to uplift Indigenous experiences and Indigenous Knowledge Systems (IKS) in local, national, and global conversations. In doing so, these reports work to counteract the erasure of our ways of knowing, being, and doing. The report also aims to combat continued attempts at erasure of IKS in climate science. Indigenous Peoples face erasure through nonrepresentation, underrepresentation, and misrepresentation in climate change literature and reports. We acknowledge the efforts of many champions for Indigenous rights in climate science and the gains and progress made over the decades to reduce erasure. It is our intention that these reports provide energy to our human and nonhuman relatives (animal, plant, earth beings, and all of creation) who have, continue to, and will face climate challenges that are both daunting and urgent and that they will inspire all to act.

Within this report, we have used the expression Indigenous Knowledge Systems (IKS) to describe reliable forms of knowledge, data, and information that are inseparable from the intergenerational relationships, values, and practices of the plurality of Indigenous Peoples who originated them. In recent years, the federal government and western non-Indigenous academic and community-led organizations have recognized IKS as such. It is imperative that IKS continue to be recognized by non-Indigenous cultures, state, and local governments as *essential Knowledges* in the response to the climate crisis. Such recognition is an important element of the broader movement to ensure that all people can live in harmony with our relations, and in sustainable ways, for generations to come.

What Is the Status of Tribes and Climate Change Report?

Since 2019, the STACC reports have been convened by the Tribes and Climate Change Program, which is housed under the Institute for Tribal Environmental Professionals (ITEP) at Northern Arizona University.

This second volume of the STACC Report series builds off of the 2021 report by presenting updated information, sharing emerging topics, and emphasizing Indigenous-led initiatives. A Steering Committee of 17 Knowledge Holders, Elders, young leaders, Tribal representatives, and scientists from across Turtle Island oversaw the report development. This report includes 79 authors. All eight chapters within this volume were led by enrolled members of federally recognized Tribes. Together, the Steering Committee and authors comprise the STACC Working Group (STACCWG). ITEP is honored by the participation of all who have been a part of the STACCWG and by the artists whose beautiful renderings are included on the cover and throughout the report.

This report has been through an extensive four-tier peer-review process, including an internal ITEP and chapter-lead peer review, a review by representatives from seven different federal agencies, a blind external review by three Indigenous scholars, and a final internal peer review. These reviews by specialists with diverse expertise demonstrate the rigor and vitality of this volume.

The case studies, narratives, stories, and scholarly work within this report demonstrate Indigenous climate resilience and how IKS are proven and effective ways to approach climate change. Our Ancestors and immediate past generations have fought to ensure that we would be able to exist and thrive on our Indigenous Lands and Waters, practicing and living our brilliant lifeways and IKS. Within this volume, we continue to explore how we can honor our Ancestors and become honorable Ancestors for future generations.

Cross-cutting Key Messages: Deep Relational Understanding and the Essentiality of IKS in Responding to the Climate Crisis

A full list of the report's key messages and recommendations can be found in the report's conclusion. The two main themes that appear consistently across the chapters' key messages include:

1. Respectful, reciprocal relationships with our human and nonhuman relatives are essential for harmony and balance. Respectful, reciprocal relationships strive to continually honor the interconnectedness of all creation.

2. Indigenous philosophies and IKS are essential in responses to the climate crisis that aim to guarantee sustainable futures of harmony and balance, for all our relations, for the next seven generations.

Cross-cutting Recommendations

A full list of report recommendations can be found in the report's conclusion. *Recommendations throughout the report emphasize how crucial it is to include IKS in all environmental stewardship.* The chapters show why it is critical to continue to ignite change to ensure that Indigenous Peoples can be further emboldened in their continuance as generational stewards of the Land and the Water.

Specific recommendations identified in some of the chapters include:

- Generate Indigenous-led conservation and resource management by shifting from western control and extraction to relationship and reciprocity. (Highlighted in Chapters 2—4, 6, 7)

- Work toward changing knowledge hierarchies to be more inclusive of reciprocal language that points to the care of the earth rather than domination and control. (Highlighted in Chapter 2, Chapter 3, Chapter 6, Chapter 8)

- Consider and be mindful of historical trauma brought on by colonial actions within our work (Reed and Diver, 2023). (Highlighted in Chapter 1, Chapter 2, Chapter 5, Chapter 8)

- Acknowledge and foster intergenerational knowledge sharing as a significant part of Indigenous stewardship. (Highlighted in Chapter 4, Chapter 5, Chapter 8)

Conclusion: Relationships and Responsibilities

The traditions, cultures, and Indigenous Knowledges that we, Indigenous Peoples, have maintained since time immemorial will continue to evolve and adapt in the face of anthropogenic climate change. We will continue to respond to climate change in time-tested yet innovative ways and invite others to join us, as *we all* have responsibilities to our relatives to develop and nurture a reciprocal relationship with them. Our reciprocity toward them is only fair because they have given us many

gifts throughout time. We owe our very existence and potential to these gifts. *If we disrespect their gifts, we face the loss of them.*

Throughout the report, there is a clear emphasis on the significance of including our Youth and Elders as key Knowledge Holders who have the responsibility to learn and pass on teachings. In addition, these Knowledge Holders have an integral role in helping our people heal from past trauma inflicted by colonization. The infliction of such trauma persists now in the experiences our communities are enduring from climate change. *This hurt remains but resilience continues to grow.*

As one of our young leaders, Na'ni'eezh Peter (Neetsaii Gwich'in and Diné), so eloquently stated at ITEP's National Tribes & Indigenous Climate Conference in 2024, "*What I would like to see is giving Indigenous Peoples a place at the table. Even better, coming to our tables. Because this is our land*" (Peter, 2024).

Come, join us. Sit at our table and read the *Status of Tribes and Climate Change, Volume 2*. It is important that you not just hear our words, but that *you listen and take action.* The IKS we protect and share are needed to ensure sustainability for our collective future generations.

—The Status of Tribes and Climate Change Working Group, 2025

Executive Summary References

Etchart, L. (2017) The role of Indigenous Peoples in combating climate change. *Palgrave Communications, 3*, 17085. https://doi.org/10.1057/palcomms.2017.85

Peter, N. (2024, September 12). *How do we incorporate, elevate, and advocate for different knowledge systems in climate resilience?* [Plenary presentation]. 2024 National Tribes & Indigenous Climate Conference, Anchorage, AK, United States. https://sites.google.com/view/nticc2024

Reed, R., & Diver, S. (2023). Pathways to healing: Indigenous revitalization through family-based land management in the Klamath Basin. *Ecology and Society, 28*(1), 35. https://ecologyandsociety.org/vol28/iss1/art35/

Status of Tribes and Climate Change Working Group (STACCWG). (2021). *Status of Tribes and climate change report* (D. Marks-Marino, Ed.). Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. http://nau.edu/staccreport ◀◆

Introduction:

Indigenous Peoples Are Leading in Responses to Climate Change

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Chapter Author Positionality Statements

Bazile Minogiizhigaabo Panek is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. He serves as an Indigenous consultant for the Institute for Tribal Environmental Professionals and is the founder and CEO of Good Sky Guidance, a consulting firm specializing in the use of Indigenous Knowledges in environmental initiatives.

Coral B. Avery *(they/them)* is a citizen of the Shawnee Tribe of mixed-European and Shawnee heritage. Coral was born on Kalapuya Lands, raised on Kumeyaay Lands, and is now living on the homelands of the Anishinaabeg—Ojibwe, Odawa, and Potawatomi Nations, as well as the Wyandot Nation. Coral is a climate planning specialist at the BIA Branch of Tribal Community Resilience, a community language preservationist for the Shawnee Language Immersion Program, and a first-generation graduate student at the University of Michigan School for Environment and Sustainability.

Nikki Cooley (asdzáá/she/her) is Diné and from the lands of Shonto and Blue Gap located in what is now known as Arizona. She is of the Towering House Clan, born for the Reed People Clan, maternal grandfathers are of the Water that Flows Together Clan, and paternal grandfathers are of the Many-goats Clan. Nikki grew up herding sheep and goats, riding horses, helping to plant and grow corn, squash and melons, and is fluent in the Diné language. As a co-director for the Institute for Tribal Environmental Professionals (ITEP), she is dedicated to helping and elevating Tribal and Indigenous people and communities and their efforts to maintain their culture, language and environment. Nikki has a master's degree in forestry from Northern Arizona University and has worked with the Eastern Band of Cherokee Indians and the Kaibab Paiute.

Karen Cozzetto is the Co-manager of the Tribes and Climate Change Program at the Institute for Tribal Environmental Professionals (ITEP), where she has been instrumental since 2015 in developing climate change curricula, coordinating trainings and webinars, and supporting the creation of climate adaptation plans for Tribal communities. Karen has a Ph.D. in hydrology from the University of Colorado Boulder. She was the lead on a Native American Communities and Climate Change Preparedness project at CU Boulder and was a contributing author for the Indigenous Peoples chapter of the third National Climate Assessment and for the North America chapter of the 6th Intergovernmental Panel on Climate Change's Sixth Assessment Report, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*.

Ashley Gries is a settler of European and Scandinavian descent and is the Sr. Program Coordinator for the Institute for Tribal Environmental Professionals Tribes and Climate Change Program, where she leads efforts to support Tribal biocultural restoration initiatives and international Indigenous climate adaptation planning. She holds an M.S. in Environmental Conservation from the University of Wisconsin—Madison, where her work focused on co-developed, Indigenous-led aquatic restoration projects, water policy, and conservation management.

Kelsey Morales is Chicana, of Mexican American descent, and is the former Assistant Manager of the Institute for Tribal Environmental Professionals Tribes and Climate Change Program. Kelsey is also an adjunct faculty at Fort Lewis College and is a climate and social justice organizer and activist across the Southwest.

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Introduction:

Indigenous Peoples Are Leading in Responses to Climate Change

Winter in Mukuntuweap (so-called Zion National Park, UT).
Photo Credit: Ashley Gries

The *Status of Tribes and Climate Change* (STACC) report seeks to uplift and honor the voices of Indigenous Peoples across the U.S. to increase understanding of Tribal lifeways, cultures, and worldviews; the climate change impacts Tribes are experiencing; the solutions they are implementing; and ways that all of us can support Tribes in adapting to our changing world.

Indigenous Peoples have long experienced genocide, land theft, environmental injustices, and climate change caused by Western extractive practices and systematic oppression. Colonialism's search for more land, more resources, and ultimately more profit has affected the traditional lifeways of Indigenous Peoples across the globe. Various scientific studies have stated that Indigenous Peoples are the most vulnerable to the effects of climate change (United Nations, n.d.). While this is most definitely the case, Indigenous Peoples are also the most resilient to the effects of climate change. Our Knowledge Systems, adaptation practices, and traditions have existed since time immemorial. While aspects of our Knowledges and traditions have been lost, we have acted upon the opportunity to relearn the knowledge that our Ancestors held and are currently implementing cutting-edge climate change responses. These responses are accompanied by action to disrupt historic and ongoing colonial systems that perpetuate environmental harm, injustices, and the death of all our relations.

Notes on Phraseology, Positionality Statements, and Capitalization

The *Status of Tribes and Climate Change, Volume 2* report utilizes various terminology surrounding Indigenous Knowledges, Indigenous languages, concepts, and new terms. Readers are invited to interpret the various terms described by the chapter teams, as diverse choices have been made about them. As described in the "Elevating Tribal Voices: Methodology and Processes" section below, chapter teams were given the autonomy and authority to make their own choices about terms and definitions of those terms.

Generalized terms such as "culture" or "traditions" are used with the acknowledgement that these are incomplete terms that do not fully relay the depth and complexities of Indigenous Peoples' culture, traditions, lifeways, and Knowledges. Translations of Indigenous languages are used throughout the report, but they also do not perfectly relay the depth of Indigenous Knowledges. Words such as *asabikeshiinh* in the Ojibwe language translate literally into "the net maker," while English calls this being the spider. Another humorous example to relay the depth of Indigenous language is the word for blueberry pie in Ojibwe: *miini-baashkiminasigani-bii-toosijigani-bakwezhigan*, which describes the process of boiling blueberries until the point that they explode and putting them in between bread.

Indigenous Peoples

"Indigenous Peoples" is used throughout the report as an all-encompassing term that includes all federally and state-recognized Tribes in the United States, Native Hawai'ians, Alaska Natives, and unrecognized Tribes and Peoples across the world. Terms including American Indians/Alaskan Natives and Native Hawai'ians are used when needed to describe the legal declarations applied to Nations/Tribes. All the various identity terms used throughout this report are used as appropriate to the context.

Positionality Statements

Positionality statements offer a short bibliographical insight into each author throughout the report. These statements are important to consider before reading the chapter as they display possible biases, diverse qualifications, and different lived experiences of chapter contributors. Both the personal and the professional experiences are important to understanding each individual's unique perspectives and frameworks for contributing to this work. Additionally, centering the lived experiences and stories of Indigenous individuals in this publication challenges the common written histories of Indigenous Peoples from predominantly White scholars or an otherwise colonial perspective. It also challenges the way in which White scholars often omit personal identity, establishing Eurocentric identity as the assumed norm (Liboiron, 2021). Together, Indigenous and non-Indigenous scholars bring their unique perspectives and experiences forward for this publication.

> From a bird's-eye view, the content of this report overwhelmingly demonstrates that *climate change is here, climate change is now, and Indigenous Peoples are leading in climate change responses and actions.*

Capitalization

Various terms, such as Land, may be capitalized throughout the report despite not fitting traditional academic or Western writing standards. When capitalization is used, it is meant to respect animacy and personhood; for example, Indigenous Knowledges, Indigenous Peoples, Native Nations, Tribe/Tribal, and Land are capitalized to relay reverence and respect. Much like the first STACC report, "The decisions about capitalization in this report reflect the will of the authors and steering committee who sought to focus on being respectful of Indigenous self-determination and being vigilant about past and continuing textual assumptions that can marginalize Indigenous Peoples' presence" (STACCWG, 2021).

Elevating Tribal Voices: Methodology and Processes

The STACC Report has been convened by the Tribes and Climate Change Program housed under the Institute for Tribal Environmental Professionals (ITEP). ITEP was established in 1992 at

Northern Arizona University by our late relative and Hopi Elder Virgil Masayesva and former NAU Professor William Auberle. Since its inception, ITEP has emerged as a leading institute focused on helping Tribes build capacity and the knowledge base to facilitate and care for their lands, air, animals, and plants. This is accomplished through programs focused on air quality issues, waste and response, water, environmental education, internship opportunities, clean transportation, pesticides, and more. The Tribes and Climate Change Program was initiated at ITEP in 2009 and has been supported through a cooperative agreement with the Bureau of Indian Affairs' Tribal Community Resilience Program since 2015. The program offers workshops, webinars, a biennial national conference, and other resources and services focused on climate adaptation and mitigation planning efforts with and for Tribal communities across Turtle Island.

The design of the STACC report reflects the intention to uplift and honor Indigenous voices. Seventeen steering committee relatives, 79 authors, and nine narrative authors contributed their voices to this report.

The ITEP Lead Team carefully and thoughtfully identified and invited individuals to serve on the steering committee. Many were past colleagues or inspiring, dedicated folks that we hoped would become future colleagues. There was a special commitment made to create an inclusive space of various ages and gender identities while prioritizing Indigenous Peoples. Of the 14 steering committee members, 5 self-identified as young leaders (an open-ended identification category) and 3 self-identified as Elders.

All chapters within this report were led by an Indigenous person, a requirement decided upon by the steering committee. This act is a form of self-governance and expresses Indigenous Peoples' authority to demonstrate their own experiences of climate change and their responses to it. Chapter leads are from various Indigenous communities, including the Citizen Potawatomi Nation, Muscogee (Creek) Nation of Oklahoma, N'dee San Carlos Apache Tribe, Red Cliff Band of Lake Superior Chippewa, Shawnee Tribe, and Shinnecock Indian Nation. Additionally, only two of the six chapter leads identify as male, which is in contrast to the often male-dominated fields of environmental and climate-change sciences (Tandon, 2021).

The ITEP Lead Team encouraged chapter teams to practice self-governance and steer their chapters toward their unique objectives. Writing styles, nuance in definitions, and creation of new terms were left up to each team. The power and authority left with these teams represent the distinct backgrounds, heritages, and perspectives of this work's diverse authors.

Narratives are interspersed throughout each chapter as a way to honor Indigenous oral storytelling through written text. These firsthand narratives are authored by community members and Tribal representatives from across what is currently called the United States and represent experiences of climate change responses through an Indigenous lens. Some examples of these powerful narratives include collaboratively developed Climate Action Plans that included Elders, Youth, resource managers, and the Tribal Council of the Pueblo de San Ildefonso community (see the "Cultural Preservation and Revitalization in the Face of Climate Change" chapter), Tribally led research on the goldspotted oak borer on the La Jolla Indian Reservation (see the "Good Fire and Climate Change: The Return of Indigenous Fire Stewardship" chapter), and giizhik's (northern white cedar) response to climate change (see the "Indigenous Ways of Not Knowing" chapter). Additionally, some narratives were metaphorically based, which is understood as a valid medium of Indigenous Knowledge transfer (see "Nation of Trees" within the "Cultural Preservation and Revitalization in the Face of Climate Change" chapter).

STACC, Volume 2 builds off of the 2021 STACC report, which informs the work of the U.S. National Climate Assessment, Tribes across the United States, and policymakers. It covers a wide variety of topics, including topics from the 2021 report and new topics such as Good Fire. Chapter 1 provides the historical, political, social, and cultural contexts for Indigenous Peoples in the past, present, and future. Chapter 2 discusses Indigenous Peoples' resiliency in preserving and revitalizing cultures even in the face of climate change. Chapter 3 focuses on Indigenous water justice and shares water teachings that come from diverse Indigenous Nations. Chapter 4 calls for the return of Indigenous fire stewardship and Good Fire to our landscapes and offers policy recommendations and cases in which Good Fire practices are alive and well. Chapter 5 was written mainly by authors who belong to the "Seventh Generation," who share how Indigenous identities can be rebuilt and honored, how social media can be a tool for change, and how technology can help to revitalize Indigenous languages. Chapter 6 covers both political challenges and opportunities for Indigenous-led conservation within the current complex legal landscape of the United States. Chapter 7 provides numerous examples of where Indigenous Peoples can lead conservation efforts such as in the fields of forestry, renewable energies, ocean food systems, and climate change adaptation. Finally, Chapter 8 asks us to employ humility and respect in climate change work and honor Indigenous ways of not knowing.

Even with the immense diversity of authors, contributors, and content, readers will be able to find commonalities among the messages gained from each chapter. From a bird's-eye view, the content of this report overwhelmingly demonstrates that *climate change is here, climate change is now, and Indigenous Peoples are leading in climate change responses and actions.* ◀◆

Introduction References

Liboiron, M. (2021). *Pollution is Colonialism.* Duke University Press. https://doi.org/10.2307/j.ctv1jhvnk1

Status of Tribes and Climate Change Working Group (STACCWG). (2021). *Status of Tribes and climate change report* (D. Marks-Marino, Ed.). Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. http://nau.edu/staccreport

Tandon, A. (2021, October 6). *Analysis: The Lack of Diversity in Climate-Science Research.* Carbon Brief. https://www.carbonbrief.org/analysis-the-lack-of-diversity-in-climate-science-research/

United Nations Department of Economic and Social Affairs—Indigenous Peoples (n.d.). *Climate change.* Retrieved June 5, 2024, from https://www.un.org/development/desa/indigenouspeoples/climate-change.html ◀◆

01 Historical, Political, Social, and Cultural Contexts

CHAPTER LEAD

Kyle Whyte

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KEY MESSAGES

- **Indigenous Peoples' Knowledge Systems and self-governance should be recognized as solutions to mitigating the causes and negative impacts of human-induced climate change.**
- **Historical trauma is a major aspect of how Indigenous Peoples are harmed by climate change.**
- **Respect for ethical relationships and procedures help to reduce threats that Indigenous Peoples face when they share their Knowledge.**

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Chapter Author Positionality Statements

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Nikki Cooley (asdzáá/she/her) is Diné and from the lands of Shonto and Blue Gap located in what is now known as Arizona. She is of the Towering House Clan, born for the Reed People Clan, maternal grandfathers are of the Water that Flows Together Clan, and paternal grandfathers are of the Manygoats Clan. Nikki grew up herding sheep and goats, riding horses, helping to plant and grow corn, squash and melons, and is fluent in the Diné language. As a co-director for the Institute for Tribal Environmental Professionals (ITEP), she is dedicated to helping and elevating Tribal and Indigenous people and communities and their efforts to maintain their culture, language and environment. Nikki has a master's degree in forestry from Northern Arizona University and has worked with the Eastern Band of Cherokee Indians and the Kaibab Paiute.

01

Historical, Political, Social, and Cultural Contexts

The Purpose of This Chapter

For generations, Indigenous Peoples around the world have rigorously tracked environmental change. They have developed diverse Knowledge Systems that contain systematic strategies for sustaining the well-being of plants, animals, insects, people, ecosystems, lands, and waters through dynamic and constantly changing conditions. The term Indigenous Knowledge (IK) Systems refers to the full sets of interrelated values, sciences, kinship relations, cultural and social institutions, economic enterprises, languages, and political organizations that Indigenous Peoples have engendered for the sake of supporting life, well-being, and planetary health. Indigenous self-governance refers to Indigenous Peoples' right to determine how they practice those Knowledge Systems, including what they choose to keep as traditions, who they share their Knowledges with, and how they choose to change and adapt in response to new and anticipated challenges.

This chapter offers some grounding in IK Systems and contextualizes the issues, knowledge, experiences, and recommendations to which this report bears witness. Discussions of IK Systems can use many concepts; while in this chapter there's a focus on Knowledge Systems and Knowledges, other chapters bring connected terminology, including terms such as worldviews, place-based knowledge, and value systems. This chapter is a revised and updated version of some writing from the 2021 STACC report, and some of the text from that report is repeated in this current chapter.

Knowledge Systems and Indigenous Self-Governance Concepts

Indigenous Peoples' self-governance and Knowledge Systems have many dimensions. We recognize here that the very terms "knowledge," "systems," and "self-governance" can have many meanings. Although Indigenous Peoples are diverse internally and across peoples in terms of who they are, there is an overlapping dialogue among many Indigenous People about how Indigenous cultures, histories, societal institutions, and sciences provide critical context, knowledge, and practical wisdom about how to adapt to and mitigate climate change and the importance of humans taking responsibility for implementing adaptive and mitigative measures.

Part of this overlapping dialogue is the idea that, for many centuries, Indigenous Peoples have experience exercising their own self-governance through diverse and self-determining institutions that stewarded the relationships among human societies, ecosystems, and particular plants, animals, inanimate objects, insects, and other beings and entities recognized through Indigenous languages and cultures. Indigenous Peoples have created strategies for learning and passing on knowledge about the environment.

Indigenous self-governance, then, refers to the wisdom from generations of collective actions and the knowledge derived over time from that combined experience (Kidwell & Velie, 2005; Deloria & Lytle, 1998). Indigenous self-governance and Knowledges are referred to here as systems because they seek to make interventions in support of human and more-than-human beings, learn from experience, and develop improvements based on what is learned.

Despite enduring centuries of colonization, land dispossession, oppression, and marginalization, Indigenous Peoples are steadfast in their exercise of sovereignty through self-governance. *The Status of Tribes and Climate Change* (STACC) report arises from the long tradition of Indigenous Peoples' advocacy within the very institutions of science and engineering that were established by colonizing societies, settler states, and other nations. These institutions historically excluded IK Systems and Indigenous self-governance. They remain, for the most part, exclusionary today, but there are some notable exceptions and important reform movements afoot to foster change across various science and engineering institutions. In resistance to colonialism, Indigenous Peoples have taken action to protect their IK Systems. Indigenous Peoples have fought to make space for their values and wisdom in decision-making processes that impact the major issues that affect them. As scientific institutions played roles in the development and advocacy of different forms of colonialism, Indigenous Peoples approached these institutions as venues for resisting the abuses of Indigenous rights and as locations where they could push for greater access to resources.

When the United States established the U.S. Global Change Research Program through the Global Change Research Act of 1990 and offered its first National Climate Assessment (NCA) in 2000, Indigenous Peoples came to the table to ensure that the NCA authors honored IK Systems and the issues Indigenous Peoples were facing with respect to climate change. For NCA1 (U.S. Global Change Research Program, 2000), Indigenous Peoples' issues and thoughts were combined in Chapter 12 and other areas of the published information (Houser et al., 2001). NCA2 paid little attention to Indigenous issues. NCA3 (Bennett et al., 2014) established a chapter focused on Tribes and Indigenous Peoples as a stand-alone chapter that continued in NCA reports through NCA5 and will be the case again with NCA6. This specific chapter has opened the door for expressing IK Systems, Indigenous values, and Indigenous perspectives. The movement supporting the development of the chapter also enriched efforts to increase Indigenous involvement and good representation of Indigenous issues across the other NCA report chapters. NCA chapters have low word counts, which creates a disadvantage for any chapter expected to provide an assessment of populations as diverse culturally, geographically, and politically as Indigenous Peoples. To address this challenge, various individuals formed collectives and issued reports on climate change and Indigenous Peoples that could be cited more compactly in future NCAs and other scientific assessment (Norton-Smith et al., 2016; Vinyeta et al., 2015)

> The *Status of Tribes and Climate Change* report arises from the long tradition of Indigenous Peoples' advocacy within the very institutions of science and engineering that were established by colonizing societies, settler states, and other Nations … that historically excluded Indigenous Knowledge Systems and Indigenous self-governance.

In late 2018, in anticipation of NCA5, Northern Arizona University's Institute for Tribal Environmental Professionals' (ITEP) Tribes and Climate Change Team and the Bureau of Indian Affairs (BIA) Branch of Tribal Community Resilience (TCR) developed a strategy for a stand-alone report dedicated to highlighting the efforts of Tribal Nations and Indigenous Peoples within the United States who had been and were continu-

ing to address climate change impacts on their culture, languages, and lands. It was also established to fill the topical gaps within NCA3 (Melillo et al., 2014) and NCA4 (Jantarasami et al., 2018). The STACC 2021 report (STACCWG, 2021) was born out of this strategy.

The STACC 2021 report (STACCWG, 2021) had many more authors than previous reports and featured testimonies from practitioners and Knowledge Holders. STACC authors ensured that the report and its testimonies could be cited under the Information Quality Act, which required an iterative four-tier review process, including 1) an internal review made up of the authors and ITEP staff; 2) a federal agency review from BIA representatives; 3) a single blind external peer review, made up of three highly qualified scholars; and 4) a final author and steering committee review. This STACC Vol. 2 report replicates a peer review process similar to that of the 2021 report.

STACC 2021 was written from a holistic approach to describe how Indigenous communities are impacted by, interact with, and are interconnected to local environments. The Indigenous Holistic Worldview Illustration (Avery & Tankersley, 2021), featured in the first report, portrays the interconnection of broad climate topics such as water, air, health, well-being, and many more, all of which act as the foundational chapters of the report. Climate-related experts were convened from across disciplines and professional fields to lead the various topical chapters.

The *Fifth National Climate Assessment* (NCA5; Crimmins et al., 2023) was the fourth time in which the assessment had a chapter devoted to Tribes and Indigenous Peoples. Additionally, the NCA5's author team featured the largest number, thus far, of Indigenous authors and other specialists in Indigenous climate change issues across the report. NCA5 determined that "Climate change continues to cause negative effects on critical aspects of Indigenous Peoples' well-being, including their livelihoods, health, nutrition, and cultural practices, as well as the ecological resilience of their territories" (Whyte et al., 2023). The information in NCA5 strongly suggests that the empowerment of IK Systems and Indigenous self-governance is crucial for advocacy toward meaningful climate action. While the report documents some of the new abundance of resources that have been promised to Indigenous Peoples, there remain concerns about whether those resources will be truly transferred to Indigenous Peoples for implementation at meaningful scales.

After the Biden administration was inaugurated, a set of new initiatives came from the White House. The White House restored its Council on Native American Affairs, resuming annual conferences with Tribal Nations. The White House Office of Science and Technology Policy launched a set of public meetings and consultations to develop an executive memo entitled "Indigenous Traditional Ecological Knowledge and Federal Decision Making" (Lander & Mallory, 2021). This memo "ensur[es] that federal agencies conduct regular, meaningful, and robust consultation with Tribal officials in the development of federal research, policies, and decisions that may affect Tribal Nations and the peoples they represent." In 2022, based on that memo, the White House Council on Environmental Quality and the White House Office of Science and Technology Policy "jointly released new government-wide guidance and an accompanying implementation memorandum for Federal Agencies on recognizing and including Indigenous Knowledge in Federal research, policy, and decision making."

In 2021, the White House seated a new White House Environmental Justice Advisory Council (WHEJAC), with four Indigenous representatives: Carletta Tilousi (Havasupai), Jade Begay (Diné and Tesuque Pueblo), Kyle Whyte (Citizen Potawatomi), and Vi Waghiyi (Sivuqaq Yupik). The WHEJAC was charged with developing executive policies that would assess federal agencies' performance in ensuring at least 40% of major infrastructure, climate, and energy investments flowed directly to communities facing disadvantages (Justice 40 Initiative). In 2023, President Biden signed Executive Order No. 14096, "Revitalizing Our Nation's Commitment to Environmental Justice for All," which, among other achievements, enhanced recognition of Indigenous issues, including in relation to the subject matter of this report.

The White House and several federal agencies made high-level appointments of Indigenous Peoples, including Deb Haaland (Pueblo of Laguna) as Secretary of the Interior, Charles F. Sams III (Confederated Tribes of the Umatilla Indians) as National Park Service Director, Bryan Newland (Bay Mills Indian Community) as Assistant Secretary of the Bureau of Indian Affairs, Janie Hipp (Chickasaw Nation) as General Counsel of the U.S. Department of Agriculture, and Wahleah Johns (Diné) as Director of the Office of Indian Energy. This era of Indigenous leadership ushered in more direct reports, policies, and resources for supporting understanding of and solutions for critical Indigenous issues and fostering opportunities for greater Indigenous territorial self-governance. For example, the BIA published a report on boarding schools (Newland, 2022) that cited land dispossession as a major motivation of assimilation. There similarly has been a rise of co-management agreements within DOI and other agencies—in 2023 there were 120 new agreements, up from 60 in 2022 (USDA, 2023; DOI, 2022). They include agreements ranging from those rooted in Tribal consultation to those having formal agreements and long-term partnerships with Tribes (Murray, 2023). Many Tribes today seek to establish formal co-management agreements (Joselow, 2022; Smith, 2023). In addition, United States federal legislation sets aside approximately $14 billion solely for 574 federally recognized American Indian tribes and Alaska Native Villages for renewable energy projects, and climate resilience funds under President Biden have totaled more than $50 billion (The White House, 2023). Yet there is concern that these funds will be fully used, given the barriers that Tribes face in accessing the funding and the relatively short funding timelines in some cases, among other challenges (*Tribal Voices, Tribal Wisdom: Strategies for the Climate Crisis*, 2021; Yazzie et al., 2024).

Meanwhile, Indigenous Peoples continue to struggle against climate change–inducing infrastructure such as oil and gas pipelines and have continued to be left out of prominent conservation agendas. For example, while the Biden administration blocked the Keystone XL pipeline, it's also the case that Enbridge Line 5, the Dakota Access Pipeline, and other pipelines are still in operation, in some cases illegally (Bad River Band of Lake Superior Chippewa, 2024; *Bad River v. Enbridge*, 2024). And the 30x30 Initiative, a new conservation agenda in the U.S., often called America the Beautiful, has not yet adequately acknowledged the important contributions of Indigenous Peoples' historic and contemporary stewardship of land as significantly contributing to conservation of land and landscapes, which could alter understanding of what 30% conserved may encompass.

Small alpine lake in so-called Desolation Wilderness near Lake Tahoe, CA, on the homelands of the Washoe Tribe.
Photo Credit: Ashley Gries

This moment is certainly a time of crossroads and dilemmas. Yet there is a tremendous upwelling of respect, support, and resources for Indigenous Peoples to grapple with climate and energy and to honor IK Systems. At the same time, the continuation of racism and the legacy impacts of colonialism in the U.S. have meant that Indigenous Peoples face barriers to fully take advantage of opportunities. This report aims to both uplift Indigenous brilliance in climate and energy and offer sobering accounts of the barriers and challenges to Indigenous self-governance.

Social Impacts on Indigenous Peoples from Climate Change

Climate change has multiple and interconnected impacts on Indigenous governance systems. Impact-based language in risk and vulnerability assessments can take the form of victimhood where Tribes are viewed as passively and adversely affected by climate drivers beyond their control (Cameron, 2012; Haalboom & Natcher, 2012; Callison, 2014; Whyte, 2013, 2018). However, this report will demonstrate how Indigenous Peoples are active, self-determining societies. The report features how Indigenous Peoples are working to negotiate and heal historical traumas, rebuild their identities, and strengthen resilience to address climate change impacts. The following section must be read with great care. This is because the section covers some of the social dimensions of climate change impacts that differ greatly across diverse Indigenous Peoples and that call forward painful issues and histories that negatively affect many Indigenous communities today.

It is important to understand what Indigenous Peoples are up against from climate change. For many Indigenous Peoples, the influence of historical trauma is a prominent dimension of their recent histories and experiences with climate change. For example, the U.S. and some religious organizations forced the conscription of many Indigenous persons into assimilative schools that imposed suffering on students by stripping them of their language, culture, and self-esteem as Indigenous persons. The boarding and mission school era coincided with a period of government-imposed land loss on Indigenous Peoples. That land loss and the cultural denigration caused by the assimilative schooling, several generations later, have threatened climate change response options and the ability of communities to access historical ecological knowledge and stories of historical climate adaptation. It is necessary to respect traumas, such as those just described, in some depth to appreciate the ongoing challenges that Indigenous Peoples face in addressing climate change (Billiot et al., 2019a). Historical trauma interacts with social determinants of health, vulnerability, and resilience, such as through enduring economic hardship, lack of financial savings, lack of information, inadequate housing, prevalent chronic diseases, inaccessibility for people with disabilities, negative racialization, and linguistic vulnerability (see review in the context of COVID-19, Hathaway, 2021).

Keet Seel Canyon in Navajo Nation, which is facing increasing water scarcity issues due to climate change.
Photo Credit: Kelsey Jensen

While Indigenous cultures and livelihoods are important sources of adaptation Knowledge, the very interconnectedness that this Knowledge arises from becomes threatened through the shrinkage of Indigenous landbases and through barriers to the use of their own stewardship practices. This colonially induced increase in exposure to negative climate impacts compounds the aforementioned issues of historical trauma, discrimination, and marginalization (Clarke et al., 2018; Lawrence et al., 2020).

Extreme climatic events such as floods or extreme heat, in addition to impacts from longer-term climate changes, can harm health and make economic and cultural activities risky, dangerous, or impossible, e.g., outdoor work and traditional activities under extreme heat events, harvesting of driftwood during breakup of river ice, or hunting over thinning sea ice (Hansen et al., 2013; Jones et al., 2015; Sharma et al., 2020). These multiple and sometimes cascading impacts can interrupt the transmission of traditional Knowledge and norms and lead to the loss of trust in traditional institutions and external partnerships and cooperation (Billiot et al., 2019b; McKinley et al., 2019; Lyver et al., 2019; Tribal Public and Environmental Health Think Tank, 2019).

While the threats are plainly real, this report is based on how Indigenous self-governance and IK Systems are key frameworks for understanding and responding to climate change for Indigenous Peoples. Indigenous self-governance and Knowledge Systems are concepts and practices that express interconnections across spatial, physical, spiritual, cultural, political, and temporal dimensions. IK Systems are sometimes articulated as place-based, yet they are far from static or limited in their geographic usage. Scholarship has covered how Tribes have used their Knowledge Systems to rebuild their societies after forcible relocation to territories hundreds and sometimes thousands of miles away from their homelands (see Carroll, 2015), and NCA5 discusses regional, Indigenous-led climate change initiatives.

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Stories and lifeways frame and draw on time-tested Knowledge Systems. Indigenous Peoples have depended on such Knowledge Systems for surviving and maintaining continuity in complex, uncertain environments to sustain food, medicine, and materials and develop methods to successfully negotiate shortages and crises. Such histories, memories, and experiences can motivate recognition of the need to honor the wisdom and decisions of Ancestors and the profound responsibility to carefully consider the consequences of decisions and actions on behalf of future generations.

Indigenous self-governance and Knowledge Systems are critical because Indigenous lifeways, well-being, and political sovereignty are vulnerable to climate change. Many traditional activities occur outdoors on the land. The elements of the natural world that they depend upon are affected by climate impacts (Houser et al., 2001; Maldonado et al., 2014; McNeeley, 2017; Jantarasami et al., 2018; Donatuto et al., 2020). Their ways of life are fundamentally relational—they do not just utilize the environment,

they inhabit it and maintain spiritual and mutual relationships with multiple tangible and intangible beings that may also be affected by climate change and nonclimate stressors (Chisholm Hatfield et al., 2018; Thomas et al., 2019).

Indigenous responses to climate change attempt to solve climate issues through ensuring that solutions involve the movement of the collective whole of Indigenous ways of being, knowing, and doing that are active, engaged, resilient, and sustainable. People work to renew and continue their cultures and IK Systems as wholes rather than focus narrowly on technical solutions implemented by experts (Maldonado et al., 2014; Whyte, 2017).

Indigenous frameworks and Knowledges can be partnered with Western science to offer holistic responses to climate change that employ multiple ways of knowing. For example, *Aanji-bimaadiziimagak o'ow aki*: *Climate Change Vulnerability Assessment Version 2* (GLIFWC Climate Change Team, 2023) shares both Traditional Ecological Knowledge (TEK) and Western science alongside each other as valid forms of knowledge and measures the vulnerability of beings to the effects of climate change based on these Knowledge Systems. Knowledge offered by Elders and Knowledge Holders through semi-structured interviews contained stories of interconnectedness, reciprocity, and genuine worries about the stressors that climate change will have on their plant and animal relatives.

Activities that work to restore relations with the and, waters, and living world are necessary to restore balance in societal systems (Maldonado, 2018; McGinnis et al., 2019; Donatuto et al., 2020). For Indigenous Peoples, responses to climate change must be holistic. They must be approached in an interconnected way that is aligned with the values and IK Systems of the communities. Actions are not just about solving a single physical problem, such as flooding, or about establishing a single solution, such as solar power. Rather, they are about empowering the community to restore, revitalize, and strengthen their cultures, collective well-being, and political sovereignty. For many Indigenous Peoples, it is about achieving good relationships of interdependence with the diverse nonhumans that share the environment.

Indigenous Ways of Knowing

Addressing climate change is inherently connected with the issue of how people come to know climate change (Callison, 2014). Indigenous Peoples have diverse cultures, histories, social institutions, and Knowledge Systems that are highly relevant to understanding environmental change whether changes are seasonal, intermittent, or long-term. Stories passed down through generations and kept by Indigenous Peoples tell of social and environmental disruptions and convey lessons learned from the observations, experiences, and responses of their Ancestors (Therrell & Trotter, 2011). Many Indigenous families, communities, and governments practice or are guided by traditions of living that pay close attention to the dynamics of seasonal and climatic change (Child, 2012; Chisholm Hatfield et al., 2018).

Across the world, cities, towns, and communities have their unique social systems based on a variety of factors, including geography, economy, history, demographics, and heritage. In particular, history and heritage have shaped the foundation of communities and have transformed through their responses to external and internal factors. The same factors are certainly present in Indigenous communities. However, what makes Indigenous Peoples unique is their open recognition of and respect for their innate connection to and interdependence with the natural environment, which supports their traditional ways of life (Redvers et al., 2023; Hill et al., 2024). Traditional practices such as subsistence farming, hunting and gathering, ceremonial life, and languages have been and continue to be taught through intergenerational sharing. In contexts of intercultural communication, these practices are often referred to as Traditional Ecological Knowledge, traditional and Indigenous Knowledges, or Indigenous Knowledge Systems.

IK Systems are considered to be the lifelines of communities due to the deep seeded connection to the earth that has been with the people since time immemorial and has fostered crucial knowledge ranging from how to maintain food systems to how to support positive mental health. The collective information sharing is entwined with multiple aspects of society, such as ceremonies, songs, prayers, dances, clothing, food gathering and preparation, and so on. This interconnectedness serves as context for understanding how and why the health of Indigenous communities is a reciprocal relationship with the natural environment. Indigenous self-governance relies heavily on being able to care for the land with IK Systems (Parsons & Makey, 2024) without heavy oversight from external forces such as the colonial federal or state governments.

TEK refers to some dimensions of larger Knowledge Systems described in the previous section, but there are some challenges with delineating traditional Knowledge by definition. Both the words "traditional" and "knowledge" carry much baggage in English and can inappropriately objectify, essentialize, or interject foreign understandings and assumptions. "Traditional" tends to characterize what is being referred to as "old" in time, passed in a material way from generation to generation. While this is a common way that traditional Knowledge is transmitted and characterized by Indigenous Peoples, IK keepers may also receive knowledge through spiritual means, ceremonies, and direct communication with more-than-human beings, persons, and entities (Alaska Native Science Commission, n.d.; Simpson, 2000). What makes such Knowledge traditional is not its age in the Western time system, but its spiritual origins and relational validity—the way it fits into the First Instructions or ancestral teachings of the Tribes and serves the well-being of communities (Marsden, 2004).

Indigenous Peoples sometimes rely upon English language terms and expressions such as "cosmology" or "all our relations" to try to convey the importance of recognizing and respecting the interconnections on which their worldviews and IK Systems are based. It is critical to understand that the worldviews of Indigenous Peoples deeply tie the past to the present and the present to the future. Societal continuity of Indigenous Peoples means that Indigenous Peoples seek to acknowledge explicitly that their decisions and actions of today are influenced by the experiences of their Ancestors. Their past is colored by a long, painful history of social and economic disruption from broken treaties, land theft, assimilative education, territorial trespass, cultural erasure, and the denial of their rights to self-determination (Hartmann & Gone, 2016).

The languages of Indigenous Peoples often relay insights to the ingrained care of the environment. Various words can reference or describe local places, events, timing of flowering, physical descriptions of wildlife, plant life cycles, or medicinal properties. The Ojibwe word for bog goldenrod (*Solidago uliginosa*), for example, is *giizisomashkiki* (Ganawenindiwag Team, 2023), which roughly translates to "sun medicine," imparting the medicinal power of the plant. Indigenous linguistic scholarship has demonstrated important relationships between how language connects to Knowledge and a sense of responsibility for protecting the environment (see Noodin, 2018, and Oh et al., 2021, for example).

Using Indigenous languages in climate change mitigation and adaptation helps limit the dominance of Western scientific perspectives over Indigenous responses to climate change risk. Words such as "stewardship" or even "management" can have troublesome connotations. The

For Indigenous People, responses to climate change must be holistic. ... Actions are not just about solving a single physical problem, such as flooding, or about establishing a single solution, such as solar power. Rather they are about empowering the community to restore, revitalize, and strengthen their cultures, collective well-being, and political sovereignty. ... It is about achieving good relationships of interdependence with the diverse nonhumans that share the environment.

term management can imply a top-down, human supremacist view of controlling the environment under the premise that "we humans" know best (Lertzman, 2009). Indigenous languages can offer terms and phrases that are more caring and holistic and that carry reverence for all of our relatives as deserving of the recognition of personhood (Kimmerer, 2015). The Ojibwe language, for example, has words such as *bakaan ingoji gaa-ondaadag*, which roughly translates to "that which comes from somewhere else and now resides here" (Tribal Adaptation Menu Team, 2019). This is an understanding of "invasive species" that recognizes the being as deserving of life and respect while acknowledging that the being may not be in its homelands.

Indigenous Sovereignty and Justice

Indigenous Peoples have their own social and cultural norms of behavior and action governing interactions between people and the land, water, air, plants, and animals that all share environments together. These norms include IK Systems and self-governance regarding protection and transfer of Knowledge that have been developed over countless generations. They are commonly expressed through language, practices, ceremonies, traditions, educational programs, mentorship bonds, and kinship networks (e.g., clans, lodges) (Trosper, 2009; Menzies, 2006; Kimmerer, 2015). Today, Indigenous Peoples also commonly employ methods adopted from other cultures to formalize and record their expectations for normative behavior and action by enacting written laws, policies, codes, regulations, rights, rules, resolutions, procedures, and protocols as self-determining sovereign governments (Chief et al., 2016; Royster et al., 2018). As political sovereigns, Indigenous Peoples engage in diplomatic relations with local, regional, state, national, and international governments through multilateral laws and policies, including treaties, statutes, and agreements that set forth rights, requirements, obligations, duties, and responsibilities.

Indigenous Peoples' IK Systems and self-governance affect how they approach climate change adaptation and mitigation, informing how they address impacts on their cultures, economies, multilateral governance relationships, and stewardship responsibilities toward the environment and future generations. As contemporary political sovereigns, Indigenous Peoples recognize that self-determination and intergovernmental relations are cornerstones of solutions for addressing global issues of climate change as well as opportunities for adaptation and mitigation. Yet their sovereignty is both protected and limited, operating within the bounds of treaties, acts of Congress, executive orders, administrative agreements, and court decisions. For federally unrecognized Tribes, Native Hawai'ians, and other Indigenous Peoples, their externally acknowledged sovereignty is more limited than that of federally recognized Tribes.

In the United States, "government-to-government (or nation-to-nation) relationship" is a term used to describe some Indigenous relations with the U.S. federal government and to set forth expectations of how Tribes must relate to other units of government (whether those expectations are satisfied in practice). Due to long histories of legal relationships evolving between federally recognized Tribes and the U.S., the exercise of Indigenous sovereignty is tethered to U.S. sovereignty, which is sometimes referenced by the term "nations within a nation;" however, Indigenous sovereignty predates colonial rule. U.S. settlers had to create myths about and impose arrangements on Indigenous sovereigns to make U.S. sovereignty possible in the first place.

Many U.S. laws, policies, and practices subsequent to the signing of treaties have led to the loss of access and inherent rights to the Lands, water, and plant and animal species. This loss of access and inherent rights is a major factor creating challenges for Indigenous Peoples to adapt to and mitigate climate change, to which some of the material in this report bears witness. As a matter of general context, the U.S. allotment policy of the 1880s, for example, dispossessed Indigenous Peoples of 90 million acres of land. The effects of colonialism on economic, social, environmental, and educational systems have altered, disparaged, and disregarded lifeways, traditions, practices, customs, and values of Indigenous Peoples, creating generational and intergenerational trauma (Walters et al., 2011). The long-lasting effects of such deeply rooted historical trauma may not be perceived outside of Tribal communities but are leading concerns within these communities (Evans-Campbell, 2008).

Indigenous Peoples have, at the same time, worked ingeniously to create legal and policy avenues to recover and protect their lands and self-government. Many such avenues are crucial to addressing climate change. The expansion of Tribal lands through bringing fee land into trust (a repudiation of the General Allotment Act) and legislation like the Indian Self-Determination and Education Assistance Act of 1975, as amended (25 U.S.C. 450 et seq.), and the Tribal Self-Governance Act of 1994 (25 U.S.C. 458aa et seq.) involves Tribes taking on programs and services the federal government had administered in the past. Court decisions have led to partial victories for Tribes, such as the Boldt Decision that affirmed treaty rights to the fishery in Washington State (Boldt Decision, 1974). Under the Biden administration, new policies continued to add dimensions to Indigenous self-determination that Tribes are using to exercise self-governance over a greater number of responsibilities.

Some state-recognized and unrecognized Tribes, working without federal affirmation and recognition of their self-government, have strategically used incorporation as 501(c)(3) nonprofits and private conservation tools as a way to build capacities to provide services for their members and protect lands (Middleton Manning, 2011). The United Houma Nation, for example, recently secured a $56 million grant from NOAA to address climate risks across six parishes in Louisiana where their members live. Native Hawai'ians have organized through institutions such as the Office of Hawai'ian Affairs (OHA), a self-governing corporate body established in the 1978 state constitution of Hawai'i (OHA, 2021). Organizations led by Native Hawai'ians engage in climate action in support of Indigenous rights. The Ho'āhu Energy Cooperative Moloka'i recently received federal support from DOE to expand renewable energy on the island of Moloka'I, where Indigenous and local residents have extremely high energy bills. Inter-Indigenous organizations, such as the Intertribal Timber Council (ITC), have developed strategies for sustainable economies (IFMAT, 2013). Other organizations such as the National Congress of American Indians, United South and Eastern Tribes, and Affiliated Tribes of Northwest Indians have active environment and climate change programs and staff.

Ethics of Multicultural Knowledge Exchange

For Indigenous Peoples, IK Systems are not simply information; rather, they are deeply and inextricably linked to Indigenous origins, Ancestors, lands, and traditions (Forbes, 2001;

Wa'a (outrigger canoes) leaving from Hale'iwa Harbor on the north shore of Hawai'i.
Photo Credit: Ashley Gries

Greenwood & Lindsay, 2019). Going back to the 18th century (and in some cases much earlier), Indigenous Peoples have fought for their sovereignty, self-determination, self-governance, and respect from settlers and others for their knowledge. Successive generations of Indigenous leaders, Knowledge Holders, and scholars have fostered concepts and movements to be able to give voice to the importance of IK Systems and their rights to use their knowledge free from exploitation. Some ways that Indigenous Peoples use and share their Knowledge are more in the form of practical information, and IK Holders often share the informational aspects of their Knowledge while keeping the spiritual aspects to themselves (SAMHSA, 2009).

Indigenous data sovereignty (or governance), or the right of Indigenous Peoples to control and govern their ideas and data, has gained attention but limited traction in the U.S. and abroad. Internationally, there has been some work to establish core principles related to Indigenous data governance, namely the CARE Principles, which stands for Collective Benefit, Authority to Control, Responsibility, Ethics (Carroll et al., 2020), and the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) (United Nations, 2007), which in Article 31 outlines that Indigenous Peoples "have the right to maintain, control, protect, and develop their intellectual property over their cultural heritage, traditional knowledge, and traditional cultural expressions." In the United States, the White House released Executive Orders No. 14072 (2022) and No. 13990 (2021) and a White House guidance memo on IK (Prabhakar & Mallory, 2022) that have referenced the importance of TEK/IK within federal agency practices. While these frameworks are a step forward, work remains to ensure that there are appropriate legal, policy, and ethical protections in the U.S. and abroad wherever IK is shared outside of Indigenous lands and governance systems (Walter et al., 2020; Garba et al., 2023; Kukutai & Taylor, 2016).

Meanwhile, in the U.S., the current emphasis on utilizing and integrating TEK within federal agencies exposes the risk of undue extraction of knowledge from Tribes. The Freedom of Information Act (US DOJ OIP, n.d.) outlines that any information collected by federal agencies is eligible to be requested by and publicized to any member of the public, including IK shared under Knowledge Holder agreements, unless that information falls under one of nine exemptions, none of which provides explicit protection to IK or explicit reference to Indigenous data sovereignty.

In 2014, the Climate and Traditional Knowledges Workgroup developed the *Guidelines for Considering Traditional Knowledges in Climate Change Initiatives* (CTKW, 2014), which were approved by then-DOI Secretary Sally Jewell. These were the first set of federally approved guidelines for Indigenous Peoples, scientists, and government professionals when working with IK and content with strong cultural and economic values for Indigenous Peoples. These guidelines created by the workgroup were intended to cover, in particular, traditional Knowledge in relation to climate change within the context of potential risks to Indigenous Peoples in the U.S. for sharing traditional Knowledge in federal and other non-Indigenous climate change initiatives.

The guidelines focus on two formative ethical principles: "Cause No Harm" and "Free, Prior, and Informed Consent." Broadly, these principles establish a foundation for equitable and meaningful relationships. The consent principle recognizes that each Tribal community has its own governance norms and expectations that guide and structure how different facets of traditional Knowledge are treated by Indigenous and other entities and more broadly regulates interactions. The Cause No Harm principle involves the identification and avoidance of risks that could lead to loss or harmful misappropriation of traditional Knowledge (CTKW, 2015). It is important to note that Tribal sovereignty must certainly mean sovereignty over their Knowledge, too, including the right to decide not to share it, withdraw permissions from others to use it, or even oppose types of research.

Traditional Knowledge has been shared most successfully where Indigenous protocols are respected and followed. Several pathways exist for researchers and partners to ethically engage with and apply TEK/IK, including through Knowledge-Holder agreements, cultural committees, and Tribal institutional review boards. Used in compliance with appropriate protocols, traditional Knowledge can be essential in providing solutions to climate change impacts (Earthzine, 2015). ◀◆

Historical, Political, Social, and Cultural Contexts Chapter References

Alaska Native Science Commission. (n.d.). *What is traditional knowledge?* Traditional Knowledge Systems in the Arctic. https://www.uaf.edu/ankn/indigenous-knowledge-syst/alaska-native-science-com/

Avery, C., & Tankersley, M. (2021). *Indigenous wholistic worldview illustration* [Illustration]. Status of Tribes and climate change (D. Marks-Marino, Ed.). Institute for Tribal Environmental Professionals, Northern Arizona University. http://nau.edu/staccreport

Bad River Band of Lake Superior Chippewa. (2024, April 10). *Bad River Band: Responds to US brief on Line 5* [Press release]. https://www.wispolitics.com/2024/bad-river-band-responds-to-us-brief-on-line-5/

Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation v. Enbridge Energy Company, Inc. and Enbridge Energy, L.P. (Bad River v. Enbridge) appeal (2024). https://www.narf.org/nill/documents/20240410-line5-bad-river-us-amicus.pdf

Bennet, T. M. B., Maynard, N. G., Cochran, P., Gough, R., Lynn, K., Maldonado, J., Voggesser, G., Wotkyns, S., & Cozzetto, K. (2014). Indigenous Peoples, lands, and resources. In J. M. Melillo, T. C. Richmond, & G. W. Yohe (Eds.), *Climate change impacts in the United States: The third national climate assessment* (pp. 297–317). U.S. Global Change Research Program. http://nca2014.globalchange.gov/report/sectors/indigenous-peoples

Billiot, S., Beltrán, R., Brown, D., Mitchell, F. M., & Fernandez, A. (2019a). Indigenous perspectives for strengthening social responses to global environmental changes: A response to the social work grand challenge on environmental change. *Journal of Community Practice*, *27*(3–4), 296–316. https://doi.org/10.1080/10705422.2019.1658677

Billiot, S., Kwon, S., & Burnette, C. E. (2019b). Repeated disasters and chronic environmental changes impede generational transmission of Indigenous Knowledge. *Journal of Family Strengths, 19*(1), 1–29. https://doi.org/10.58464/2168-670X.1407

Boldt Decision (1974). *United States v. State of Washington*, 384 F. Supp. 312 (1974).

Callison, C. (2014). *How climate change comes to matter: The communal life of facts.* Duke University Press.

Cameron, E. S. (2012). Securing Indigenous politics: A critique of the vulnerability and adaptation approach to the human dimensions of climate change in the Canadian Arctic. *Global Environmental Change, 22*(1), 103–114. https://doi.org/10.1016/j.gloenvcha.2011.11.004

Carroll, C. (2015). *Roots of our renewal: Ethnobotany and Cherokee environmental governance.* University of Minnesota Press.

Carroll, R. S., Garba, I., Figueroa-Rodríguez, O. L., Holbrook, J., Lovett, R., Materechera, S., Parsons, M., Raseroka, K., Rodriguez-Lonebear, D., Rowe, R., Sara, R., Walker, J. D., Anderson, J., & Hudson, M. (2020). The CARE Principles for Indigenous data governance. *Data Science Journal, 19*, 1–12. https://doi.org/10.5334/dsj-2020-043

Chief, K., Meadow, A., & Whyte, K. (2016). Engaging southwestern tribes in sustainable water resources topics and management. *Water, 8*(8), 350. https://doi.org/10.3390/w8080350

Child, B. J. (2012). *Holding our world together: Ojibwe women and the survival of community.* Penguin.

Chisholm Hatfield, S. C., Marino, E., Whyte, K. P., Dello, K. D., & Mote, P. W. (2018). Indian time: Time, seasonality, and culture in Traditional Ecological Knowledge of climate change. *Ecological Processes, 7*, 25. https://doi.org/10.1186/s13717-018-0136-6

Clarke, L., Nichols, L., Vallario, R., Hejazi, M., Horing, J., Janetos, A. C., Mach, K., Mastrandrea, M., Orr, M., Preston, B. L., Reed, P., Sands, R. D., & White, D. D. (2018). Sector interactions, multiple stressors, and complex systems. In D. R. Reidmiller, C. W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, & B. C. Stewart (Eds.), *Impacts, risks, and adaptation in the United States: Fourth national climate assessment, Volume II* (pp. 638–668). U.S. Global Change Research Program. https://doi.org/10.7930/NCA4.2018.CH17

Climate and Traditional Knowledges Workgroup (CTKW). (2014). *Guidelines for considering traditional Knowledges in climate change initiatives.* http://climatetkw.wordpress.com

Climate and Traditional Knowledges Workgroup. (2015, July 31). *The ethics of traditional Knowledge exchange in climate change initiatives.* Earthzine. https://earthzine.org/the-ethics-of-traditional-knowledge-exchange-in-climate-change-initiatives/

Crimmins, A. R., Avery, C. W., Easterling, D. R., Kunkel, K. E., Stewart, B. C., & Maycock, T. K. (Eds.). (2023). *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023

Deloria Jr., V., & Lytle, C. M. (1998). *The nations within: The past and future of American Indian sovereignty.* University of Texas Press.

Department of the Interior (DOI). (2022). *First annual report on Tribal co-stewardship: Implementing joint secretarial order 3403 on fulfilling the trust responsibility to Indian Tribes in the stewardship of federal lands and waters.* http://bia.gov/sites/default/files/dup/inline-files/doi_annual_report_on_co-stewardship.pdf

Donatuto, J., Campbell, L., & Trousdale, W. (2020). The "value" of values-driven data in identifying Indigenous health and climate change priorities. *Climatic Change, 158*, 161–180. https://doi.org/10.1007/s10584-019-02596-2

Evans-Campbell, T. (2008). Historical trauma in American Indian/Native Alaska communities: A multilevel framework for exploring impacts on individuals, families, and communities. *Journal of Interpersonal Violence, 23*(3), 316–338. https://doi.org/10.1177/0886260507312290

Exec. Order No. 13990, 86 FR 7037. (2021). https://www.federalregister.gov/d/2021-01765

Exec. Order No. 14072, 87 FR 24851. (2022). https://www.federalregister.gov/d/2022-09138

Forbes, J. D. (2001). Indigenous Americans: Spirituality and ecos. *Daedalus, 130*(4), 283–300. http://www.jstor.org/stable/20027728

Ganawenindiwag Team (2023). *Ganawenindiwag: Working with plant relatives to heal and protect Gichigami shorelines.* Lake Superior Estuarine Research Reserve and Great Lakes Indian Fish & Wildlife Commission. https://glifwc.org/sites/default/files/uploads/documents/2024-09/ganawenindiwag.pdf

Garba, I., Sterling, R., Plevel, R., Carson, W., Cordova-Marks, F. M., Cummins, J., Curley, C., David-Chavez, D., Fernandez, A., Hiraldo, D., Hiratsuka, V., Hudson, M., Jäger, M. B., Jennings, L. L., Martinez, A., Yracheta, J., Garrison, N. A., and Carroll, S. R. (2023). Indigenous Peoples and research: Self-determination in research governance. *Frontiers in Research Metrics and Analysis, 8*. https://doi.org/10.3389/frma.2023.1272318

Great Lakes Indian Fish and Wildlife Commission (GLIFWC) Climate Change Team. (2023). *Aanji-bimaadiziimagak o'ow aki: Climate change vulnerability assessment Version 2.* Great Lakes Indian Fish & Wildlife Commission. http://data.glifwc.org/download/archive.bio/Aanji-bimaadiziimagak_o_ow_aki_digital_02212023.pdf

Greenwood, M., & Lindsay, N. M. (2019). A commentary on land, health, and Indigenous Knowledge(s). *Global Health Promotion, 26*(3): 82–86. https://doi.org/10.1177/1757975919831262

Haalboom, B., & Natcher, D. C. (2012). The power and peril of "vulnerability": Approaching community labels with caution in climate change research. *Arctic, 65*(3), 319–327. https://jstor.org/stable/41758938

Hansen, A., Bi, L., Saniotis, A., & Nitschke, M. (2013). Vulnerability to extreme heat and climate change: Is ethnicity a factor? *Global Health Action, 6*(1). https://doi.org/10.3402/gha.v6i0.21364

Hartmann, W. E., & Gone, J. P. (2016). Psychological-mindedness and American Indian historical trauma: Interviews with service providers from a Great Plains Reservation. *American Journal of Community Psychology, 57*(1–2), 229–242. https://doi.org/10.1002/ajcp.12036

Hathaway, E. D. (2021). American Indian and Alaska Native People: Social vulnerability and COVID-19. *The Journal of Rural Health, 37*(1), 256–259. https://doi.org/10.1111/jrh.12505

Hill, K. X., Johnston., L. J., Blue, M. R., Probst, J., Staecker, M., and Jennings, L. L. (2024). Rematriation and climate justice: Intersections of Indigenous health and place. *The Journal of Climate Change and Health, 18*, Article 100314. https://doi.org/10.1016/j.joclim.2024.100314

Houser, S., Teller, V., MacCracken, M., Gough, R., & Spears, P. (2001). Potential consequences of climate variability and climate change on Native Peoples and homelands. In *Climate change impacts on the United States: The potential consequences of climate variability and change* (pp. 351–377). U.S. Global Change Research Program. https://www.globalchange.gov/reports/climate-change-impacts-united-states-potential-consequences-climate-variability-and-change

Indian Forest Management Assessment Team (IFMAT). (2013). *An assessment of Indian forests and forest management in the United States: Final report, Volume 1.* Indian Forest Management Assessment Team, Intertribal Timber Council. https://bia.gov/sites/default/files/dup/inline-files/ifmat_iii_vol_i.pdf

Jantarasami, L. C., Novak, R., Delgado, R., Marino, E., McNeeley, S., Narducci, C., Raymond-Yakoubian, J., Singletary, L., & Whyte, K. P. (2018). Tribes and Indigenous Peoples. In D. R. Reidmiller, C. W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, & B. C. Stewart (Eds.), *Impacts, risks, and adaptation in the United States: Fourth national climate assessment, Volume II* (pp. 572–603). U.S. Global Change Research Program. https://doi.org/10.7930/NCA4.2018.CH15

Jones, C. E., Kielland, K., Hinzman, L. D., & Schneider, W. S. (2015). Integrating local knowledge and science: Economic consequences of driftwood harvest in a changing climate. *Ecology and Society, 20*(1), 25. http://dx.doi.org/10.5751/ES-07235-200125

Joselow, M. (2022, June 20). *Native American Tribes to co-manage national monument for first time: The unprecedented agreement gives five Tribes more input in the management of Bears Ears National Monument in Utah.* Bears Ears Inter-Tribal Coalition. http://bearsearscoalition.org/coalition-to-co-manage-bears-ears/

Kidwell, C. S., & Velie, A. (2005). *Native American studies.* University of Nebraska Press.

Kimmerer, R. W. (2015). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants.* Milkweed Editions.

Kukutai, T., & Taylor, J. (2016). *Indigenous data sovereignty: Toward an agenda.* ANU Press.

Lander, E. S., & Mallory, B. (2021, November 15). *Indigenous Traditional Ecological Knowledge and federal decision making* [Memorandum for the heads of departments and agencies]. Executive Office of the President. https://www.denix.osd.mil/na/denix-files/sites/42/2022/08/111521-OSTP-CEQ-ITEK-Memo.pdf

Lawrence, J., Blackett, P., & Cradock-Henry, N. A. (2020). Cascading climate change impacts and implications. *Climate Risk Management, 29*, Article 100234. https://doi.org/10.1016/j.crm.2020.100234

Lertzman, K. (2009). The paradigm of management, management systems, and resource stewardship. *Society of Ethnobiology, 29*(2), 339–358. https://doi.org/10.2993/0278-0771-29.2.339

Lyver, P. O., Timoti, P., Davis, T., & Tylianakis, J. M. (2019). Biocultural hysteresis inhibits adaptation to environmental change. *Trends in Ecology & Evolution, 34*(9), 771–780. https://doi.org/10.1016/j.tree.2019.04.002

Maldonado, J. K. (2018). *Seeking justice in an energy sacrifice zone: Standing on vanishing Land in coastal Louisiana.* Routledge.

Maldonado, J. K., Colombi, B., & Pandya, R. (Eds.). (2014). *Climate change and Indigenous Peoples in the United States: Impacts, experiences, and actions.* Springer.

Marsden, D. (2004). Expanding Knowledge through dreaming, wampum and visual arts. *Pimatisiwin 2*(2), 53–73. https://journalindigenouswellbeing.co.nz/volume-2-2-winter-2004/expanding-knowledge-through-dreaming-wampum-and-visual-arts/

McGinnis, A., Kincaid, A. T., Barrett, M. J., Ham, C., & Community Elders Research Advisory Group. (2019). Strengthening animal–human relationships as a doorway to Indigenous holistic wellness. *Ecopsychology, 11*(3), 162–173. https://doi.org/10.1089/eco.2019.0003

McKinley, C. E., Scarnato, J. M., Liddell, J., Knipp, H., & Billiot, S. (2019). Hurricanes and Indigenous families: Understanding connections with discrimination, social support, and violence on PTSD. *Journal of Family Strengths, 19*(1), 10. http://ncbi.nlm.nih.gov/pmc/articles/PMC7059777/

McNeeley, S. M. (2017). Sustainable climate change adaptation in Indian country. *Weather, Climate, and Society, 9*(3), 393–404. https://doi.org/10.1175/WCAS-D-16-0121.1

Melillo, J. M., Richmond, T. C., & Yohe, G. W. (Eds.). (2014). *Climate change impacts in the United States: The third national climate assessment.* U.S. Global Change Research Program. http://nca2014.globalchange.gov

Menzies, C. R. (Ed.). (2006). *Traditional Ecological Knowledge and natural resource management.* University of Nebraska Press.

Middleton Manning, B. R. (2011). *Trust in the Land.* The University of Arizona Press.

Murray, M. J. (2023, May 18). *Tribal co-management of federal lands: Overview and selected issues for Congress.* Congressional Research Service. https://crsreports.congress.gov/product/pdf/R/R47563

Newland, B. (2022). *Federal Indian Boarding School Initiative investigative report.* United States Department of the Interior. https://www.bia.gov/sites/default/files/dup/inline-files/bsi_investigative_report_may_2022_508.pdf

Noodin, M. (2018). Ganawendamaw: Anishinaabe concepts of sustainability. In J. Haladay & S. Hicks (Eds.), *Narratives of educating for sustainability in unsustainable environments* (pp. 245–260). Michigan State University Press. https://doi.org/10.14321/j.ctt1trkk1t.17

Norton-Smith, K., Lynn, K., Chief, K., Cozzetto, K., Donatuto, J., Redsteer, M. H., Kruger, L. E., Maldonado, J., Viles, C., & Whyte, K. P. (2016). *Climate change and Indigenous Peoples: A synthesis of current impacts and experiences* [General Technical Report No. PNW-GTR-944]. U.S. Forest Service. https://www.fs.usda.gov/pnw/pubs/pnw_gtr944.pdf

Oh, S., Seekamp, E., Hotchkiss, C., Goldstein, D., Thornbrugh, C., St. John, I., & Durglo Jr., M. (2021). *Speaking of language: A look into how language reflects differing approaches to climate adaptation* [Tourism Extension Report No. 2021-001]. North Carolina State University. https://repository.lib.ncsu.edu/handle/1840.20/38513

OHA. (n.d.). *Legal basis.* https://www.oha.org/about/abouthistory/aboutabouthistoryconstitution/

Parsons, M., & Makey, L. (2024). The resurgence of Indigenous environmental governance in coastal and marine spaces: Indigenous Knowledge, co-governance, and environmental guardianship in the twenty-first century. In D. Baird & M. Elliott (Eds.), *Treatise on Estuarine and Coastal Science, 2nd ed., (pp. 370-410).* https://doi.org/10.1016/B978-0-323-90798-9.00116-5

Prabhakar, A., & Mallory, B. (2022, November 20). *Guidance for federal departments and agencies on Indigenous Knowledge* [Memorandum for heads of federal departments and agencies]. Executive Office of the President. https://www.bia.gov/sites/default/files/dup/inline-files/ik_guidance_implementation_memo.pdf

Redvers, N., Aubrey, P., Celidwen., Y., & Hill, K. (2023). Indigenous Peoples: Traditional knowledges, climate change, and health. *PLOS Global Public Health 3*(10). https://doi.org/10.1371/journal.pgph.0002474

Royster, J. V., Blumm, M. C., & Kronk Warner, E. A. (2018). *Native American natural resources law: Cases and materials.* Carolina Academic Press.

SAMHSA. (2009). *CultureCard: A guide to build cultural awareness* [Infographic]. U.S. Department of Health & Human Services, Substance Abuse and Mental Health Services Administration. https://ncwwi.org/files/Cultural_Responsiveness__Disproportionality/CultureCard_-_A_Guide_to_Build_Cultural_Awareness_with_American_Indian_and_Alaska_Native.pdf

Sharma, S., Blagrave, K., Watson, S. R., O'Reilly, C. M., Batt, R., Magnuson, J. J., Clemens, T., Denfeld, B. A., Flaim, G., Grinberga, L., Hori, Y., Laas, A., Knoll, L. B., Straile, D., Takamura, N., & Weyhenmeyer, G. A. (2020). Increased winter drownings in ice-covered regions with warmer winters. *PLOS One, 15*(11). https://doi.org/10.1371/journal.pone.0241222

Simpson, L. (2000). Stories, dreams, and ceremonies: Anishinaabe ways of learning. *Tribal College Journal of American Indian Higher Education, 11*(4). https://tribalcollegejournal.org/stories-dreams-ceremonies-anishinaabe-ways-learning/

Smith, A. V. (2023, February 1). What does the nation's commitment to tribal co-stewardship mean for public lands? *High Country News.* https://www.hcn.org/issues/55-2/indigenous-affairs-public-lands-what-does-the-nations-commitment-to-tribal-co-stewardship-mean-for-publc-lands/

Status of Tribes and Climate Change Working Group (STACCWG). (2021). *Status of Tribes and climate change report* (D. Marks-Marino, Ed.). Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. http://nau.edu/staccreport

Therrell, M. D., & Trotter, M. J. (2011). Waniyetu Wówapi: Native American records of weather and climate. *Bulletin of the American Meteorological Society, 92*(5), 583–592. https://doi.org/10.1175/2011BAMS3146.1

Thomas, K., Hardy, R. D., Lazarus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., Roberts, J. T., Rockman, M., Warner, B. P., & Winthrop, R. (2019). Explaining differential vulnerability to climate change: A social science review. *WIREs Climate Change, 10*(2), Article e565. https://onlinelibrary.wiley.com/doi/full/10.1002/wcc.565

Tribal Adaptation Menu Team. (2019). *Dibaginjigaadeg Anishinaabe ezhitwaad: A Tribal climate adaptation menu.* Great Lakes Indian Fish & Wildlife Commission. http://glifwc.org/ClimateChange/TribalAdaptationMenuV1.pdf

Tribal Public and Environmental Health Think Tank (2018). *Priorities in Tribal public health.* American Public Health Association. https://www.apha.org/-/media/files/pdf/topics/environment/partners/tpeh/priorities_tribal_health_2018.

Tribal voices, Tribal wisdom: Strategies for the climate crisis: Hearing before the Select Committee on the Climate Crisis, 117th Congress (2021). U.S. Government Publishing Office. https://www.govinfo.gov/content/pkg/CHRG-117hhrg46891/pdf/CHRG-117hhrg46891.pdf

Trosper, R. (2009). *Resilience, reciprocity and ecological economics: Northwest coast sustainability.* Routledge.

UN General Assembly. (2007). *United Nations declaration on the rights of Indigenous Peoples: resolution / adopted by the General Assembly,* (Resolution No. A/RES/61/295). United Nations. https://www.refworld.org/legal/resolution/unga/2007/en/49353

U.S. Department of Justice Office of Information Policy. (n.d.) *Freedom of Information Act.* https://www.foia.gov/

U.S. Department of Agriculture. (2023). *Annual report on Tribal co-stewardship: Implementation of Joint Secretarial Order 3403: Fulfilling the trust responsibility to Indian Tribes in the stewardship of federal lands and waters.* http://www.usda.gov/sites/default/files/documents/co-stewardship-authorities-november-508.pdf

U.S. Global Change Research Program (2000). *Climate change impacts on the United States: The potential consequences of climate variability and change.* https://www.globalchange.gov/reports/climate-change-impacts-united-states-potential-consequences-climate-variability-and-change-foundation

Vinyeta, K., Whyte, K. P., & Lynn, K. (2015). *Climate change through an intersectional lens: Gendered vulnerability and resilience in Indigenous communities in the United States* [Technical report]. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. https://doi.org/10.2737/PNW-GTR-923

Walter, M., Kukutai, T., Carroll, S. R., & Rodriguez-Lonebear, D. (Eds.). (2020). *Indigenous data sovereignty and policy* (1st ed.). Routledge. https://doi.org/10.4324/9780429273957

Walters, K. L., Mohammed, S. A., Evans-Campbell, T., Beltrán, R. E., Chae, D. H., & Duran, B. (2011). Bodies don't just tell stories, they tell histories: Embodiment of historical trauma among American Indians and Alaska Natives. *Du Bois Review, 8*(1), 179–189. https://doi.org/10.1017/S1742058X1100018X

The White House. (2023, June 19). *Biden–Harris administration makes historic investments to build community climate resilience* [Fact sheet]. https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2023/06/19/fact-sheet-biden-harris-administration-makes-historic-investments-to-build-community-climate-resilience/

Whyte, K. P. (2013). Indigenous women, climate change impacts, and collective action. *Hypatia: Journal of Feminist Philosophy, 29*(3), 599–616. https://ssrn.com/abstract=2319080

Whyte, K. P. (2017). Indigenous climate change studies: Indigenizing futures, decolonizing the Anthropocene. *English Language Notes, 55*(1–2), 153–162. https://doi.org/10.1215/00138282-55.1-2.153

Whyte, K. P. (2018). Is it colonial déjà vu? Indigenous Peoples and climate injustice. In J. Adamson & M. Davis (Eds.), *Humanities for the environment: Integrating Knowledge, forging new constellations of practice* (pp. 88–104). Routledge. https://dx.doi.org/10.2139/ssrn.2925277

Whyte, K., Novak, R., Laramie, M. B., Bruscato, N. G., David-Chavez, D. M., Dockry, M. J. Johnson, M. K., Jones Jr., C. E., & Leonard, K. (2023). Tribes and Indigenous Peoples. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023.CH16

Yazzie, K. C., Whyte, K., Begay, S., Glavin, J., Jones, T., Leni-Konig, K., Pratte, C., Madden, D., Reicher, D., & Field, C. B. (2024). Opportunities to grow Tribal clean energy in the US. *Science 384*(6692), 163–165. https://doi.org/10.1126/science.adk8298 ◂◆

Cultural Preservation & Revitalization in the Face of Climate Change

CHAPTER LEAD

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KEY MESSAGES

Indigenous Knowledge Systems offer a profound perspective on sustainability and ethics that are rooted in deep, relational understanding with lands and communities. These philosophies challenge the dominant ways of thinking by presenting holistic approaches to climate resilience that emphasize reciprocity, respect, and interconnectedness. Indigenous Knowledges provide pivotal roots to create sustainable and equitable paths moving forward.

RECOMMENDATIONS

Incorporating Indigenous Knowledges and wisdom into climate action is necessary. Honoring the land is central to moral and ethical considerations, so we must ensure Indigenous voices, cultures, and ways of knowing guide climate resilience. Policymakers and environmental stakeholders should establish partnerships with Indigenous communities and ensure their leadership and Indigenous Knowledges are prioritized in climate initiatives. These partnerships should honor consent, respect, Indigenous sovereignty, and reciprocity with peoples and lands.

CHAPTER SUMMARY

This chapter explores the multifaceted relationship between Indigenous communities and their efforts to preserve cultural identity amidst the challenges posed by climate change. Through narratives, personal stories, and case studies, the chapter illuminates how Indigenous Knowledge Systems, storytelling, education, and traditional practices such as basketry and subsistence farming serve as means of cultural preservation and embody forms of resistance against colonialism and environmental degradation. An overarching theme emerges about Indigenous Knowledges, languages, and stories being vital for maintaining connections to the land, promoting community health, and ensuring the transfer of ecological wisdom across generations. The chapter underscores the importance of integrating Indigenous perspectives and Traditional Ecological Knowledge (TEK) into broader climate resilience efforts, advocating for policies and initiatives that honor Indigenous sovereignty, promoting #LANDBACK, and recognizing Indigenous communities as crucial leaders in global sustainability endeavors.

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Coral B. Avery *(they/them)* is a citizen of the Shawnee Tribe of mixed-European and Shawnee heritage. Coral was born on Kalapuya Lands, raised on Kumeyaay Lands, and is now living on the homelands of the Anishinaabeg—Ojibwe, Odawa, and Potawatomi Nations, as well as the Wyandot Nation. Coral is a climate planning specialist at the BIA Branch of Tribal Community Resilience, a community language preservationist for the Shawnee Language Immersion Program, and a first-generation graduate student at the University of Michigan School for Environment and Sustainability.

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Vincent C. Salgado is of Mestizo and Mexican descent, specifically from the forests of Michoacán and the deserts of Baja California. He is a research associate at the University of Michigan and NERRS Science Collaborative, and he is a writer for the Michigan Tribal-State Manoomin Stewardship Plan. With inspiration from Anishinaabe ways of knowing and Anarchist ideals, Vincent pursues decolonizing dominant perspectives, methods, and models of "environmentalism."

Ben Barnes is a citizen of the Shawnee Tribe where he has been the elected Chief since 2019 and was second Chief for seven years prior. Chief Barnes is a member of the White Oak Ceremonial Grounds, has worked to revitalize Shawnee language and traditional ceramic practices, is an advocate for truth and reconciliation of Indian boarding schools and reeducation centers, and is dedicated to advancing Tribal law and policy at the state and national level.

Joel Barnes is a citizen of the Shawnee Tribe and currently is the director of the Shawnee Language Immersion Program. He is also a member of the White Oak Ceremonial Grounds and currently sits on the Ceremonial Council. His work focuses primarily on language and cultural preservation.

Wanaseah Larry Campbell enrolled in the Swinomish Indian Tribal Community, guided multiple generations of Indigenous and allied people in working to uplift the health and well-being of all Indigenous Peoples. He worked for his Tribe for more than 35 years and several on countless committees and boards across Washington State and nationally. A traditional speaker and well-loved Elder, he generously shared his wisdom with all who would listen. He walked on February 1, 2023.

Dr. Jamie Donatuto is a settler and Community Environmental Health Analyst for the Swinomish Indian Tribal Community (SITC), located in present-day Washington State, where she has worked for the past 24 years. She completed her doctoral work at the University of British Columbia, Canada, developing a set of Indigenous health indicators in collaboration with SITC.

Jonathan James Fisk is a Taíno Boricua born and raised on Tongva land in Long Beach, California, and is a researcher for the Cooperative Institute for Marine and Atmospheric Research on Oʻahu focusing on Indigenous environmental relationalities, dynamics between natural resource management agencies and Indigenous communities, and food and material sovereignty. They are also on the Board of Directors and Grantmaking Committee for Hawaiʻi Peoples Fund, an Indigenous-led organization that supports, funds, and amplifies Hawaiʻi-based grassroots organizations challenging systems of oppression.

Michal (Myk) Heidt is a settler and wild foods certified instructor for the 13 Moons program with the Swinomish Indian Tribal Community. She has worked for the Tribe for the past 12 years, building the community gardens and teaching community harvest and preservation workshops. Myk has been instrumental in developing the Swinomish 13 Moons curriculum.

Saraya Hamidi is a Cherokee Nation citizen (Ross, Downing). She is an Indigenous Partnerships Manager at Blue Forest, a nonprofit that finances and attracts new funding to ecosystem restoration projects. She earned a Bachelor of Arts in Financial Economics at Columbia University and is pursuing a Master of Tribal Resource and Environmental Stewardship at the University of Minnesota Duluth.

Jessica Lambert *(she/her)* is an enrolled citizen of the Choctaw Nation and a first-generation descendant of the Eastern Band of Cherokee Indians. She received a bachelor's degree in Legal and Political Anthropology with certificates in Environmental Science & Engineering and Technology & Society from Princeton University in 2022, where she was also a founding member of the Native American and Indigenous Studies Initiative. Jessica currently works as a Policy Fellow for The Wilderness Society.

Lonyx B. Landry is a Citizen of the Nor Rel Muk Wintu Nation born, raised, and residing on Wiyot ancestral territory. He is a member of the Northern California Indian Development Council, Director of the Inter-Tribal Student Services, and leader within the Redwood Region Climate and Community Resilience (CORE) Hub. Lonyx is a self-determined Indigenous biologist who serves historically underrepresented developing scientists and engineers in the Indian Natural Resources, Science and Engineering Program (INRSEP) at Cal Poly Humboldt.

Bazile Minogiizhigaabo Panek is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. He serves as an Indigenous consultant for the Institute for Tribal Environmental Professionals and the founder and CEO of Good Sky Guidance, a consulting firm specializing in the use of Indigenous Knowledges in environmental initiatives.

Cherry Y. E. W. Yamane *(they/them)* is a Kanaka Maoli from Waianae, Oahu. They are a PhD student in the Indigenous Health program at the University of North Dakota's School of Medicine and Health Sciences Department. Their doctoral work focuses on community-based and culturally-driven interventions centered on land-based healing with Indigenous communities.

Samuel Schimmel is Kanaitze and St. Lawrence Island Siberian Yupik from Kenai, Alaska. He is a graduate of Stanford University and current student at Georgetown University studying Native law and plans to return to Alaska with his degree. Sam also serves on the Youth Advisory Council for Cook Inlet Tribal Council, was a member of the Alaska Climate Action Leadership Team, and organized the 2021 Operation Fish Drop.

Figure 2.1. *Culture as a Nation of Trees*, by Rhode Grayson.

Nation of Trees

Narrative by Vincent C. Salgado

If we consider culture as a Nation of Trees, then each part of the tree [e.g., the roots, leaves, xylem (the veins that transport water and nutrients from the roots), and phloem (the veins that transport sugars from the leaves)] plays a vital role in nurturing and sustaining the community. Each of these elements also mirrors the essential functions of Indigenous Elders (roots that hold the community together and accountable to their cultures), scholars (leaves who receive gifts of Knowledge from the Creator and make sense of them), teachers (xylem that maintain the flow of generational Knowledges), and students (phloem that energize and guide older generations to use new Knowledge) within Indigenous cultures (Fig. 2.1). This symbiosis between elements fosters cultural expression and innovation, from art and music to dance and storytelling, thus encouraging growth and adaptation across generations.

As these cultural trees flourish, they face the encroaching shadow of colonialism, which threatens the physical environment and the spiritual and communal bonds that have sustained Indigenous Peoples since time immemorial. Colonialism may be thought of as a forest fire that has run rampant in a colonially managed forest and burns hotter, faster, and more destructively than cultural fires managed by Indigenous Peoples. Colonial fires force Mother Earth to bear the destructive scars of colonial exploitation and neglect, and she calls upon humanity to choose a new path that forsakes the relentless pursuit of colonial and capitalistic growth at the expense of harmony and sustainability.

The Nation of Trees narrative warns of the dangers imposed by a colonial mindset that prioritizes economic expansion over cultural, ecological, and social well-being. These dangers reinforce the resistance from Indigenous and non-Indigenous communities against unsustainable colonial futures. Fires, both literal and metaphorical, serve as purifying forces that challenge humanity to emerge from the ashes with renewed respect for Indigenous Knowledges and wisdom. Amidst this turmoil, this narrative emphasizes the potential for renewal and healing of all parties and underlines the need for a collective return to practices grounded in love, respect, and reciprocity instead of colonialism. Indigenous teachings, like the medicinal fire, offer a path through the shadow of colonialism and promise to cleanse the road to the future so humans may live in harmony with Mother Earth and each other. Through love, respect, and reciprocity, humanity should strive to heal our Lands, our communities, and our souls (Fig. 2.2).

May Mother Earth and the Great Spirit guide us safely during our return to them. ◀◆

Figure 2.2. *Wacink'sabya* (To Live a Natural Life as the Creator Intended) by Kylie Wanatee (Rosebud Sioux Tribe, age 19). Acrylic. This painting depicts the spirit of *Unci Maka* (Mother Earth), the Star Nation, and Turtle Island in harmony and prayer for the well-being of future generations of the Indigenous Peoples of North America.

02

Cultural Preservation & Revitalization in the Face of Climate Change

Irrigation of corn on the Diné Nation at Leupp Family Farms. *Photo Credit: Kelsey Jensen*

Paving a Path Forward with the Seven Generations Principle and Indigenous Philosophies

The Seven Generations Principle (SGP) originates from Haudenosaunee Law (ICTINC, 2020) and directs Indigenous communities toward sustainability by ensuring that the well-being of future generations supersedes the immediate demands of the present. This approach embodies a regenerative cycle and reflects an Indigenous worldview that acknowledges the complexity of life through a web of relationships spanning the rational, physical, emotional, and spiritual realms. Indigenous philosophies recognize the myriad realities shaped by diverse socioecological communities and underscore the need for a balanced, holistic approach to Knowledge (Latulippe, 2015; Reid et al., 2020). Together, the SGP and Indigenous philosophies advocate for living in harmony with the world's cyclical patterns and the interconnectedness of all life, thus challenging the linear, progress-focused mindset prevalent in Western thought. This emphasis on collective reality and intergenerational responsibility guides the creation of policies and practices that honor the fabric of community and ecological relationships. In essence, the SGP and Indigenous philosophies converge on the principle that sustainable and ethical living necessitates recognizing the vast array of realities and the interconnectedness of existence and advocates for environmental stewardship that prioritizes future generations, challenges colonial narratives, and fosters a life-affirming path forward.

Indigenous Wisdom and Euro-Western Perspectives: Navigating Paths to Sustainability

Sustainability is a critical concern in the face of climate change and is approached differently by Indigenous and Euro-Western frameworks. These distinct perspectives are rooted in divergent understandings of ethics, value systems, and the relationship between humans and the environment. Indigenous institutions prioritize a values-centered standard that facilitates information verification through cultural immersion within community value systems (Whyte, 2013). This process involves the entire community, including children, Elders, and Ancestors, whose insights are pivotal for the socialization and development of Indigenous Knowledges (Whyte, 2015). Unlike hierarchical knowledge systems, this approach values a mosaic of decentralized Knowledge and fosters respect across diverse cultures during climate discourse. It calls for acknowledging each system's validity, exploring common ground, and negotiating outcomes in good faith.

Furthermore, in Indigenous paradigms, the land is the foundational moral guide that teaches right and wrong through direct engagement and ancestral wisdom (Simpson, 2008). This place-based morality is inherent in Indigenous Peoples' relations with land and more-than-human relatives. It also supports localized ethical frameworks that advocate for responsibility and reciprocity. Such perspectives challenge centralized decision-making and urge a collaborative approach to defining ethical actions that respect all affected communities' integrity and autonomy.

In contrast, Euro-Western models typically depict sustainability as balancing competing interests among people, economy, and environment (Dockry et al., 2015; depicted in Fig. 2.3) and often result in policies that favor one at the expense of others. This perspective legitimizes central authority as the arbiter and manager of such conflicts and enables them to prioritize economic and environmental initiatives that can marginalize less influential communities, often done for "the greater good" or "national interest." Conversely, Indigenous frameworks advocate for a convergence of human, economic, and environmental interests into a reciprocal system, where enhancing one benefits the others (Fig 2.3). This model places community consent, rights, and well-being at the forefront and promotes decentralized authority and direct control over local resources and decision-making (Simpson, 2008). The College of Menominee Nation Sustainable Development Institute's theoretical model (SDI model) expands this idea to six dimensions of sustainability: Land and sovereignty; natural environment (including human beings); institutions; technology; economy; and human perception, activity, and behavior (Dockry et al., 2015). Indigenous paradigms call for cultural revitalization and genuine sustainability while ensuring that collective climate responses do not sacrifice communities or lands involuntarily.

Understanding these contrasting perspectives is crucial for addressing climate change in a manner that respects and incorporates Indigenous wisdom and values. Such inclusive approaches may enrich global sustainability efforts and offer pathways forward that honor the interconnectedness of life and the planet.

Cultural Preservation Across the Diaspora

Indigenous Peoples in the present-day United States include hundreds of Native Americans and Pacific and Caribbean Island communities (as self-identified through culture, language, and histories) that have possessed sovereignty and self-determination-based rights since before European colonization (Whyte et al., 2023). Political identities of Indigenous Peoples in the present-day United States include state and federally recognized Tribes and Alaska Native Villages as well as unceded Island Kingdoms and other unrecognized Indigenous communities and Nations. Across these varying identities,

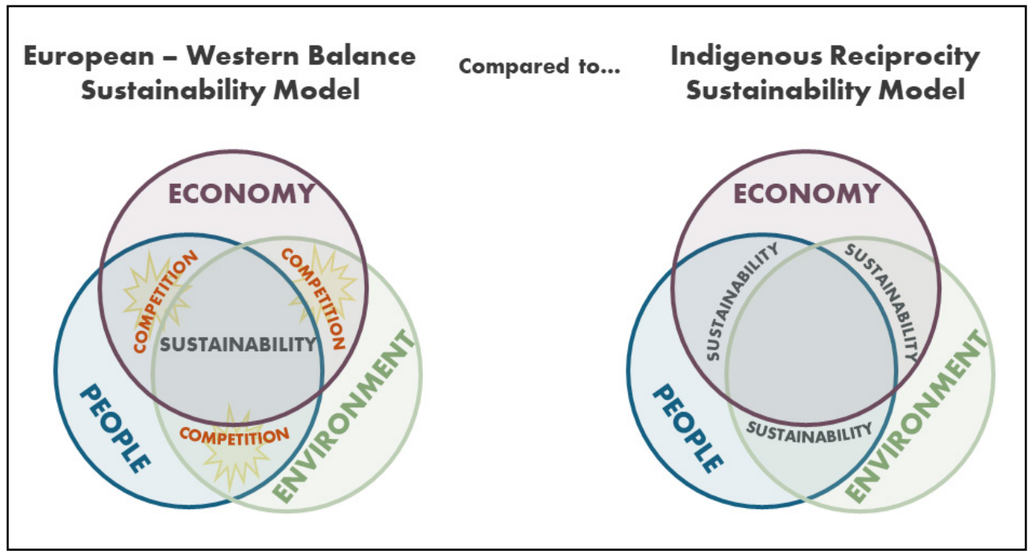

Figure 2.3. Returning to Ancestral Sustainability. The European-Western Sustainability Model (left) amounts to finding the middle ground of these three supposedly competing forces. Contrary to this view, the Indigenous Reciprocity Sustainability Model (right) emphasizes the need to converge all forces to reach a reciprocal system in which advancing one will benefit the rest. Concept by Vincent Salgado with graphic by Brook Thompson.

Indigenous Peoples at large face disproportionate impacts of climate change and work to build resilience in the face of such impacts (Whyte et al., 2023).

Barriers of State Recognized and Unrecognized Tribal Communities

Indigenous communities without federal recognition face additional challenges in preserving cultures in the face of climate change. State-recognized Tribes experience challenges to enacting their rights on their ancestral lands and waters in areas that are managed by the federal government. Additionally, non-federally recognized Tribes are ineligible for many forms of governmental aid to support disaster recovery, including funding to restore and preserve cultural resources and sites (e.g., funding from the Federal Emergency Management Agency). In the case that a catastrophic weather event causes such damage that the land becomes uninhabitable or waters severely impaired, Indigenous Peoples face increased risks of losing access to their homelands and community. For example, the Jean Charles Choctaw Nation, a state-recognized Tribe in Louisiana, began pursuing resettlement as their 22,400-acre homeland diminished to just 320 acres due to sea-level rise, land sinking, coastal erosion, and saltwater intrusion caused by canals dredged by oil and gas companies (*The Island*, n.d.; The Jean Charles Choctaw Nation, 2022). While pursuing a funded proposal for relocation and reunification, the Tribe asserted that a state agency ignored their rights to sovereignty and self-determination, thus increasing barriers.

However, non-federally recognized Tribes are employing various mechanisms to preserve culture and ancestral territories despite significant barriers. For example, the Nevada City Rancheria Nisenan Tribe has not managed land since they were terminated by Congress and their reservation was sold at auction in 1964 (*Homeland Return*, 2024). In 2023, the Tribe submitted a petition to bring their federal recognition restoration case before the assistant secretary of Indian Affairs but was denied and directed to the Federal Acknowledgement office, which cannot work with terminated Tribes. Until their recognition is restored, they must rely on their status as a 501(c)(3) supporting organization [(California Heritage: Indigenous Research Project (CHIRP)] to hold land in fee status and ensure the preservation and protection of Nisenan culture (Nisenan, n.d.). To address some of these barriers, CHIRP is actively working to reacquire their homelands in order to reconnect their Peoples with their Land. CHIRP also works with a local stewardship collaborative called the North Yuba Forest Partnership to restore 275,000 acres of forest within their ancestral territory (North Yuba Forest Partnership, n.d.).

Island Diaspora and Cultural Preservation

The Hawai'i wildfires of 2023 burned over 2,100 acres across Lahaina, Maui. Carmen Lindsey, chair of the Office of Hawai'ian Affairs Board of Trustees, describes this region as home to "some of the most historically significant cultural properties and highest-ranking sacred remains of [Native Hawai'ian] Ancestors" (LaPier, 2023). The wildfires damaged cultural resources and threatened to displace thousands of Native Hawai'ians whose rights to their homelands are not federally protected. Local reporters shared, "In Lahaina, where one out of every three inhabitants were Native Hawai'ian and 12% of all people lived below the poverty line, many evacuees have already left for the mainland or are considering it" (Kaleem & Kambhampati, 2023). This disaster, exacerbated by climate change, drought, and nonnative species encroachment, amplifies pressures for Native Hawai'ians to leave their homelands and communities that hold their cultural identities (Rush et al., 2023). As Native Hawai'ians pursue sacred site and historic site restoration, some are centering conversations about Hawai'ian sovereignty and *ho'omana lāhui* (power building) as an avenue to ensure cultural preservation in the face of climate change and environmental degradation (Nawaz & Couzens, 2023; Yam, 2023).

Puerto Rico's status as a U.S. territory makes its Indigenous population particularly vulnerable to natural disasters exacerbated by climate change. This is demonstrated by policies such as the Jones Act, which historically "choked hurricane relief efforts" by restricting aid onto the islands (De Onís, 2018). In 2017, Hurricane Maria killed approximately 3,000 people and left many others unhoused, pushing nearly 123,000 people, or 4% of Puerto Rican and Taíno families, to migrate to the continental U.S. (Sanchez, 2022; Schachter & Bruce, 2020). In 2022, Hurricane Fiona forced Indigenous families to consider whether recovery resources would be sufficient for them to remain on their homelands. Puerto Rican artist Jorge González said that this exodus pushes out Indigenous artists and culture bearers and prevents the passing of Knowledge from experienced practitioners to young emigrants (Piñero, 2023). To support cultural continuation, Javier Piñero leads "Survived by Few," a project that photographs and collaborates with Indigenous artists, including González, practicing Taíno, Native, and Afro-Caribbean art forms, including pottery, dance, and music, to promote the continuation of these cultural cornerstones.

Building Urban Native and Inter-Tribal Community

The changing climate impacts Indigenous Peoples' homelands and causes additional issues that are felt across the Indigenous diaspora. The consequences of climate change intensify existing challenges on Tribal Lands, including unfavorable economics and unequal access to services, driving many Indigenous Peoples within the U.S. to urban areas for employment, transportation, and education (CCUIH, n.d.). As of 2022, 60% of American Indians and Alaska Natives lived in metropolitan areas (Office of Minority Health, 2022). Despite many Urban Native Peoples facing the physical removal from their homelands through political legacies (e.g., the Indian Relocation Act or present-day pressures), Indigenous Peoples' connections with and responsibilities to care for Mother Earth remain strong. Urban Native communities typically exist farther away from many of their culturally significant plant and animal relatives and significant land sites in which Native Peoples actively practice subsistence and ceremonies. Urban Natives face many barriers to accessing these areas, including travel time, high financial costs, and limited physical accessibility. Despite these barriers, Urban Natives living on other Indigenous Peoples' Lands often hold a moral, cultural, and/or spiritual obligation to maintain respect for significant places and the historic relationships and stewardship of local Tribes with the environment. Building community offers an avenue to connect to, maintain practices with, and learn new practices and connections to the Land, while identifying similarities to and differences from their own People's teachings.

Digital Reconnection Across the Diaspora

Despite the challenges posed by an increasingly technology-dependent world, many Tribal Nations are using technology to connect with members at-large. For example, the Cherokee Nation and the Muscogee (Creek) Nation host free online language classes, with high numbers of participation from their Tribal members who live around the world, giving members new language to describe their current realities and to better connect with their cultures and Ancestors (Cherokee Nation, n.d.; The Muscogee Nation, 2024).

Native Hawai'ians launched a partnership between Kamehameha Schools, Kanaeokana, and

Duolingo to offer a Hawai'ian language program used by 600,000 people (*Celebrating Mahina 'Ōlelo Hawai'i: Duolingo Sees Surge of Hawaiian Language Learners*, 2023). Partners credit the success of the program, in part, to the people's interest in connecting with culture and *'āina* (Land).

During the early stages of the COVID-19 pandemic, virtual powwows were hosted by various Nations and Urban Native community groups through social media sites to promote healing and celebrate relations safely when many were unable to connect in person (Leonard et al., 2020). Social media offers platforms for educational content, event planning, and community building both locally and beyond. In that sense, while technology has separated Indigenous Peoples from Indigenous lifeways, it also presents opportunities for cultural preservation and revitalization. Although there are many challenges to preserving and revitalizing Indigenous cultures, there have also been numerous strategies to ensure Indigenous cultures continue and thrive.

Indigenous Language, Storytelling, and Teachings

The Role of Indigenous Languages in Cultural Preservation

Indigenous languages are born from and have co-evolved with Indigenous Peoples' ancestral Lands and ecologies; therefore, they are deeply laden with Indigenous values, worldviews, and cosmologies (Fisk, 2022; Neethling, 2014). The vitality of Indigenous languages is paramount to upholding Indigenous relationships with the land (Chew et al., 2019; Leonard, 2021; Oliveira, 2014). Similarly, language diversity is a fundamental component of biocultural diversity (Maffi & Woodley, 2010), and therefore preserving, tending to, and reclaiming Indigenous languages remain paramount to establishing biocultural resilience and ensuring the welfare of Indigenous communities, cultures, and ecologies in the face of climate change (Fisk, 2022; Goodyear-Ka'ōpua, 2013). These elements are particularly integral to Indigenous ways of naming and communicating with and about Indigenous Lands and ecologies, especially in regard to place names, because language facets carry biocultural histories and cultural values (Fisk, 2022; Oliveira, 2014; Osorio, 2021; Puniwai, 2020).

As climate change trends and aberrations continue to reshape Indigenous ecologies and Indigenous Peoples' understandings of them similarly evolve, Indigenous ways of communicating about and relating with our ecologies and each other may also continue to evolve. Such language evolution may include neologisms (new words and terms) for increasingly relevant climate-related concepts and phenomena. Michael Waasegiizhig Price, Traditional Ecological Knowledge Specialist at the Great Lakes Indian Fish & Wildlife Commission and Anishinaabe language teacher, addresses the gap in addressing climate change from a culturally appropriate framework by offering dynamic words and phrases in the Anishinaabe language to describe climate change events from an Anishinaabe perspective, including:

- ***Aanjikamigaa***: changing landscape (*aanji* = changing; *-kamig* = earth, land; *-aa* = state or condition)—changes on the landscape due to climate change (Price, 2022).
- ***Baatekamigaa***: the land is dry (*baate* = it is dry; *-kamig* = earth, land; *-aa* = state or condition)—drought periods brought on by climate change (Price, 2022).
- ***Bakwenemagad***: it is smoky or hazy (*bakwene* = it is smoky or hazy; *-magad* = inanimate emphatic suffix)—wildfire-induced smoky skies (Price, 2022).
- ***Zaasigaakwii***: barely hanging on (*zaasi* = barely hanging onto something; *-aakw* = wood, stick; *-ii* = state or condition)—struggle to survive due to unusual and out-of-sync weather conditions (Price, 2022).

In addition to neologisms, language evolution may also occur through the adoption of terms from other languages (Indigenous and otherwise), particularly as the geographic ranges of species change and communities find themselves in relation with new taxa. For example, the coconut rhinoceros beetle (*Oryctes rhinoceros*) is a nonlocal beetle rapidly destroying *niu* (coconut trees; *Cocos nucifera*), *hala* (*Pandanus tectorius*), and other culturally invaluable plants across O'ahu and more recently Maui and Hawai'i Island, as well as other islands throughout the Pacific. This relatively new insect to Hawai'i has been described with the neologism *pu'u laehaokela 'ai kumu niu* (beetle with a brow with a protruding horn that eats coconut trees; Shearer, 2023), a name adopted by the Big Island Invasive Species Committee (J. Shearer, personal communications, 2024). Conversely, as Indigenous languages evolve and expand to encompass new biocultural realities, a vital component of biocultural preservation will be in safeguarding the names and terms for taxa and land features that might change or even be lost to climate change so that Indigenous Peoples' traditional relationalities with the land can live on in their cultural memories even as their ecosystems change. Because of this interconnectedness between Indigenous languages and Indigenous relationalities with ecologies, the use of Indigenous languages has been increasingly focused on efforts to adapt to, mitigate, and ensure biocultural welfare during this era of climate change, whether led by Indigenous Peoples or sympathetic non-Indigenous organizations.

The increasing use of Indigenous languages can be a site of genuine transformation in the midst of climate change by increasing the usage and normalization of Indigenous languages while evolving Indigenous relations with the land to be in greater accordance with the values and worldviews modeled by Indigenous languages (Chew et al., 2019). Such has been the case with the revitalization and institutional adoption of Native place names and Native names for Indigenous Peoples' floral, faunal, and fungal kin, many of whom are under considerable threats due to climate change (Leonard, 2021; Leonard, 2017). However, the use of Indigenous languages alone is insufficient for achieving the fullest vision of decolonization and #LANDBACK (the return of Indigenous homelands to Indigenous Peoples: NDN Collective, 2021), especially without internalizing and operationalizing Indigenous paradigms and lifeways. Cultural garnishing (Fisk, 2022)—the sprinkling of Indigenous cultures and languages onto otherwise normative or even harmful programs, plans, and activities—can mask the maintenance of colonial norms of relating with the land through the adoption and potential misuse of Native names and terminologies. For example, Imua TMT invoked the Hawai'ian term *imua* to frame the construction of the Thirty Meter Telescope (TMT) on Mauna Kea as scientific and local progress, despite strong opposition from many Kānaka Maoli (Native Hawai'ians) and allies due to cultural, ecological, and procedural concerns (Alegado, 2019; Gushiken, 2019; Kahanamoku et al., 2020). However, promoting Indigenous languages without centering Indigenous values risks masking ongoing colonialism within such endeavors and detaches language revival from the authentic perspectives and self-determination of Indigenous communities. This reinforces the critical roles of Indigenous cultural practitioners in leading and ensuring genuine efforts to reclaim and sustain Indigenous languages amidst climate challenges.

Indigenous cultural practitioners play a vital role in ensuring that language reclamation efforts authentically reflect and respect the meanings and paradigms of Indigenous languages, especially as biocultural systems adapt to climate change. Ensuring that these efforts remain accountable to Indigenous communities remains essential to prevent the misappropriation of Indigenous place names and respect biocultural priorities (Henne-Ochoa et al., 2020; McCarty et al., 2018). Such initiatives are key to cultural revitalization, achieving #LANDBACK, and restoring Indigenous lifeways amidst climate and anthropogenic challenges.

Cultural garnishing–the sprinkling of Indigenous cultures and languages into otherwise normative or even harmful programs, plans, and activities–can mask the maintenance of colonial norms of relating with the land through the adoption and potential misuse of Native names and terminologies.

Moreover, restoring Indigenous place names is important for connecting Indigenous Peoples to their lands and cultures. Place names embody relationships with the land and remain integral to Indigenous identities and cultures (McGill et al., 2022). The colonial erasure of these names attempted to sever these connections and often replaced them with terms that perpetuate stereotypes and White supremacy (The Wilderness Society, 2022). Mike Bruised Head, Ninna Piiksii in the Blackfoot language, highlights the profound impact of this erasure, and explains that "...the colonizers, the early mapmakers, land surveyors, so-called explorers, putting their names or other peoples' names broke that very true and deep connection that we had with the mountains" (Bruised Head, 2022). Reclaiming Indigenous names is therefore a powerful act of healing and reconnection that can transform spaces marked by violence into ones of reconciliation and cultural reclamation. The same is true for reclaiming other factors that are important for Indigenous cultures such as Indigenous storytelling.

Storytelling and Cultural Resistance

In the face of climate change, the preservation of Indigenous Knowledges and storytelling emerge as a vital mechanism for cultural continuity and environmental stewardship. This section explores the intricate ways in which Indigenous communities use storytelling, education, and Knowledge preservation to navigate the challenges posed by a changing climate with resilience and adaptation while providing foundational strategies for maintaining the vital connection between Indigenous Peoples, culture, Knowledge, and the land. Focusing on these elements helps create a roadmap for preserving cultural heritage, Indigenous data, and Indigenous Knowledges amidst the impacts of climate change, colonialism, and globalization.

Indigenous Storytelling

In the story of St. Lawrence Island (an island located in so-called Alaska), the Creator looked down on Earth and saw that land and water were out of balance. He reached down to the bottom of the ocean and grabbed a handful of land. He wrang it out and created Sivuqaq, an island that looks like a squeezed rag (Apassingok, 1985). Although this is how it all began, the island today is slipping back into the ocean. Rising sea levels, increased occurrence of storms, and lack of sea ice—all caused by climate change—are eroding the Land and threatening the way of life for local Indigenous communities.

As Indigenous societies live these stories, lessons, and values through cultural and social relationships and institutions, they reinforce them as reality. As a result, Indigenous storytelling transcends the boundaries of serving as just mere entertainment: it embeds itself as a core component of Indigenous governance, cultural revitalization, and educational practices (Corntassel et al., 2009; Archibald, 2008). Contrary to the reduction of Indigenous storytelling to myths or folklore, Indigenous stories are vessels of profound Knowledge and lived values (Corntassel et al., 2009). Indigenous storytelling serves as repositories of cultural wisdom, instruments of resistance against colonial erasure, transfer of scientific knowledge, and frameworks for understanding and interacting with the world (Fig. 2.4).

Indigenous storytelling is a dynamic and vital tradition that nurtures communities, affirms diverse experiences and ways of knowing, articulates the life experiences of Indigenous Peoples, and fosters relationships alongside the exchange of Knowledge (Iseke, 2013). Indigenous storytelling is also adept at adapting narratives to fit the audience's knowledge level and sociocultural contexts (Iseke, 2013; Fernández-Llamazares & Cabeza, 2018). This adaptability ensures that stories remain relevant and engaging and fosters a deep connection between the storyteller and the audience. This adaptability will be crucial to their persistence as climate change alters key elements of cultural stories, such as shifting seasons and climatic patterns or fluctuating ranges and phenology of more-than-human populations, within a Tribe's land- and waterscapes or forces a Tribe to relocate elsewhere for refuge.

Figure 2.4. *Traditional Storytelling*, by Rhode Grayson.

Furthermore, storytelling is a vital tool in the preservation of cultural memory and the transmission of Knowledges across generations. Indigenous stories are imbued with values and emotions and can blend understandings of the physical reality with moral and ethical lessons. Through storytelling, abstract concepts like morality are transformed into tangible experiences, which empowers listeners to critically engage with the narrative and apply its lessons to their own lives (Datta, 2018). Also, the integration of values and emotions helps listeners to forge a strong sense of identity and connection to their lands and cultures while guiding them in their roles and responsibilities (Corntassel et al., 2009; Fernández-Llamazares & Cabeza, 2018).

The persistence of Indigenous storytelling practices challenges colonial narratives and affirms the indomitability of Indigenous Peoples and their Knowledge Systems (Sium & Ritskes, 2013). Indigenous storytellers play a crucial role in resisting settler colonialism and reasserting Indigenous definitions of land and identity. Through their stories, Indigenous Peoples can counteract the homogenizing and erasive tactics of colonialism and ensure their cultures, languages, and histories continue to thrive.

> "Our health comes from our culture, and our culture comes from our homelands…We have to take care of Mother Earth because there are uses for just about every bit of our environment. You can't get this from a couch, sitting there watching television."
>
> **—Wanaseah Larry Campbell,**
> Swinomish Elder

At the heart of storytelling practices exists the concept of "storywork," which encapsulates principles such as respect, responsibility, reciprocity, reverence, holism, interrelatedness, and synergy (Archibald, 2008). These principles guide the interpretation and application of stories and underline their roles in education and community cohesion. Because Indigenous stories are deeply rooted in traditional education and passed down through generations, they stand as testaments to the resilience of Indigenous education and Knowledge Systems against colonial attempts to diminish and erase them (Sium & Ritskes, 2013).

The 13 Moons Curriculum: A Climate Change Adaptation Strategy Founded on Teaching Indigenous First Foods and Technologies

This section is dedicated to Swinomish Elder Wanaseah Larry Campbell, whose vision and guidance held us every step of the way and will continue to do so for our entire lives and for many generations to come.

As part of the Swinomish assessment of climate impacts to Indigenous health, Swinomish staff asked community members what they prioritize when thinking about climate adaptation strategies. Community members of all ages and ways of life overwhelmingly chose *x̌əc̓usadad* (education) as their top priority (Donatuto et al., 2020). Education does not refer to Western learning and graduation rates but to Swinomish teachings and the ability for Swinomish Elders and expert Knowledge Holders to pass those teachings on to the next generations. This is how the 13 Moons curriculum (SITC, 2006) was born.

The 13 Moons curriculum is named after the seasonal harvest calendar followed by many Indigenous communities. Each moon, which is named for an important seasonal event or harvest that takes place (SITC, 2006), contains two to three activities that work with a plant or animal species. A complete lesson plan is provided for each activity and includes background on the food, medicine, or technology; learning objectives; time to complete the activity; target age group; materials needed; words to learn in the Swinomish language (Lushootseed), Knowledge transfer goals (from Elders to Youth);

guiding questions for discussion; identification of environmental health connections; optional additional activities; additional resources list; and citations. The entire curriculum is guided by eight principles: 1) definition of Indigenous environmental health; 2) culturally relevant framework; 3) place and natural resources as cultural resources; 4) intergenerational Knowledge transfer; 5) integration and repetition; 6) resilience; 7) honoring the language; and 8) adaptable module design (Donatuto et al., 2019; SITC, 2019; Fig 2.5).

The 13 Moons curriculum is available on the Native Plants and Foods curriculum portal, which was published in early 2019 as a free online resource for Indigenous and ally educators to connect with plants, places, and cultural traditions in the Pacific Northwest/Coast Salish region. The portal includes educational resources about native and naturalized plants and foods and centers Indigenous Knowledges, stories, and traditions. The portal also includes Indigenous Knowledge about how to stay healthy and well with traditional foods and medicines that has been passed down through generations of Indigenous Peoples in Coast Salish communities and beyond. This website also provides an essential method for preserving Indigenous Knowledges, which remains an important objective for many Indigenous communities in the U.S. and around the globe (Native Plants and Foods, n.d.).

Preserving Indigenous Knowledges

The United Nations Permanent Forum on Indigenous Issues held a 2019 forum on "Indigenous Peoples' Traditional Knowledge: Generation, Transmission, and Protection" (United Nations, n.d.) that underscored the importance of globally recognizing, valuing, and preserving Indigenous Knowledges and languages because Indigenous Peoples around the world continue to face challenges and impacts to their Knowledges from climate change, colonialism, and globalization. Speakers at the forum called for educational practices that respect and integrate Indigenous Knowledges, financial and technical support to safeguard Indigenous languages, and the empowerment of Indigenous voices within international governance frameworks. The forum reflected the collective global urgency to preserve Indigenous languages as repositories of ecological wisdom, cultural heritage, and spiritual values and advocated for more inclusive policies and practices that support Indigenous Peoples' rights and Knowledge Systems. These calls and the requests for action remain pivotal to sustainable development and environmental and climatic stewardship.

Figure 2.5. Swinomish Youth exploring a beach and painting a clam shell as a gift to an Elder; part of a Moon of the Salmonberry activity. Photos by Myk Heidt, 2017.

However, many challenges exist in the preservation of Indigenous Knowledges, including collection, intellectual property rights, data sovereignty, access, and preservation media (Ngulube, 2022). To support some of these challenges, especially those relating to intellectual property rights, data sovereignty, and access, University of Arizona's Native Nations Institute and many Indigenous scholars have been working diligently to create databases and frameworks that support Indigenous Peoples' rights.

For example, the Native Nations Institute houses an online database with tools for rebuilding Native Nations through online classes; a collaboratory for Indigenous Data Governance to transform institutional governance and ethics for Indigenous control of Indigenous data; an Indigenous Governance Program that offers professional and educational development for understanding Indigenous governance, law, and policy; and a Constitutions Resource Center to support Indigenous Nations in creating constitutions and constitutional reform (Native Nations Institute, n.d.).

Scientific research has also been under reform by Indigenous scholars who are underscoring the importance of integrating Indigenous Peoples' rights to control and access their data through the alignment of FAIR (Findable, Accessible, Interoperable, and Reusable) principles with CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) principles for Indigenous data governance to resist the advancing big data and open science pushes and to build a data revolution for Indigenous communities (Carroll et al., 2021, 2023; Jennings et al., 2023; Rodriguez-Lonebear, 2016).

Much work is being done in the U.S. and globally to preserve Indigenous Knowledges for further generations. Such work remains vital for the continuation of Indigenous Peoples' ways of being and for cultural continuity. It also helps support acts of Indigenous revitalization and self-determination that allow Indigenous Peoples to maintain relations and responsibilities with their lands and Knowledges in a changing climate. The next section, "Maintaining Relations with the Land," includes examples from two cultures that identify some of the risks climate change poses to Indigenous Knowledges.

Maintaining Relations with the Land

As climate change reshapes the world's landscapes and ecosystems, Indigenous communities face unprecedented challenges in maintaining their deep-rooted connections to the land and preserving their cultural practices. This section explores how Indigenous Peoples operationalize their Traditional Ecological Knowledge (TEK) and resilient agricultural practices to navigate the complex interplay between environmental changes and cultural preservation.

Seasonal Shifts

Ojibwe TEK meticulously maps the seasonality of various beings and their readiness to harvest. For example, Ojibwe Peoples have observed since time immemorial that *waawaashkeshiwag* (white-tailed deer) are almost harvest-ready after the first sighting of *waawaatesiwag* (fireflies). However, the impacts of climate change are disrupting these seasonal patterns and creating shifts in Ojibwe stories. As mentioned above, Indigenous stories are adaptable and dynamic and can evolve to incorporate new indicators as environmental conditions change (GLIFWC Climate Change Team, 2018). The deep-rooted connections and extensive understandings (e.g., TEK) that Indigenous Peoples have of their local ecosystems empower them to quickly recognize and adjust to changes in climate and biodiversity (Hernandez et al., 2022).

TEK is a repository of Indigenous Knowledges, Indigenous storywork, and observational data that has evolved with local ecosystems since time immemorial. These evolutions underline how TEK adapts to external and internal stressors, including new environmental, social, or economic conditions (Berkes, 2012; Gómez-Baggethun, 2013). Therefore, despite the accelerated changes of climate and global biodiversity, Indigenous communities hold long histories of observing and adapting to environmental transformations. Such adaptability ensures that TEK and the ecological narratives it informs remain dynamic and relevant while evolving in concert with the surrounding environment.

Hasiski Kotakfenwi—Saawanooki (Climate Change Effects—Shawnee Tribe)

For centuries, Shawnee villages could be found along the Ohio River Valley. The Shawnee have

historical ties to lands in what are now known as Ohio, Kentucky, West Virginia, Indiana, and Illinois with collective influence that spanned many regions to the south, the east, the north, and even as far as Canada. The Ohio River Valley gifted the Shawnee People with fertile land to grow crops vital for their survival and ceremonial use. Their most important crop was their *lokhaana taami* (/lokhaːnətaːmi/, Shawnee white flour corn; Fig. 2.6). The Shawnee People used this nutrient- and vitamin-rich corn to make flour that was instrumental in providing food through the winter months and for use in ceremonies. They also grew *m'skoci'faki* (/mʔskoo̯tʃiʔθəki/, beans) and *waapiko* (/waːpiko/, pumpkins), among other plants, each of which played an integral part in Shawnee society. The fertile lands of the Ohio River Valley remained a perfect place for the well-being of the Shawnee People until American expansionism forcibly removed the Shawnee to the west, altering the future of the People as well as the agricultural landscape.

Prior to the Indian Removal Act, large groups of Shawnee sought safety from American expansionism by moving westward into Illinois, Missouri, Arkansas, and even as far as Texas. Three reserves remained in Ohio, but the American military ultimately moved many of them to Kansas, with a small number being relocated to Oklahoma. Eventually, the majority of the Tribe lived on a reservation in Kansas. After the Civil War, American settlers stole their land and sent Kansas-based Shawnees to Oklahoma. Throughout each of these removals, the Shawnee People maintained their culture, religious practices, and agricultural practices. Once they reached Oklahoma, they found the land far less fertile than the Ohio River Valley, but the Shawnee, with their extensive agricultural Knowledge, managed to continue growing *lokhaana taami* and other traditional crops. Because the soil in Oklahoma lacked the nutrients for their crops to thrive, they grew far smaller yields than what they were previously accustomed to, compelling Shawnee People to find other ways to feed themselves, including growing foods native to Oklahoma and adapting to White society.

Up until the late 1990s to early 2000s, the Shawnee People were still thriving and managed to produce what they needed to carry on with their ceremonial practices. However, during this period, they faced the unintentional consequences of genetically modifying corn for more modern uses (e.g., animal feed, consumer sweet corn, and ethanol). Prior to the 1990s, field corn was infrequently grown in Oklahoma. Corn crops were not seen on farms in Oklahoma like they were in Iowa, Nebraska, or states east of the Mississippi River. Once the settler society escalated their use of ethanol, corn crops with seed specifically engineered for ethanol production could be seen all over northeastern Oklahoma.

This created problems of cross-pollination that were exacerbated by farmers growing feed corn. At this point in time, lokhaana taami grew in several locations, mainly at homes of the Shawnee People. Because of the cross-pollination, the Shawnee lost much lokhaana taami and several locations where they grew it. For the past two decades, the Shawnee People have grown what they could but have also relied on buying corn wherever it could be found. When corn is purchased from a third party, it remains unknown whether the appropriate respect and religious practices involved in processing flour corn have been followed. This is another barrier for Shawnee access to corn, as it reduces the spiritual nutrition and limits the availability of lokhaana taami for ceremonies.

> "When we were being removed, no one told our corn that she was to be moved (from the Ohio Valley) to Oklahoma. Shawnee corn was bred in Appalachia and along the waterways that feed the Ohio River; it was never meant to be grown in Oklahoma."
>
> —**Chief Barnes** of the Shawnee Tribe

Today, the Shawnee are experiencing the uncertainty of climate change, including extreme heat events and more frequent torrential rains during spring plantings. This has caused the Tribe and Shawnee households to lose lokhaana taami crops over the past two years (2022–23). Additionally, spring flooding forces the Shawnee to replant corn, beans, and other crops. As summer progresses, the temperatures get so extreme that crops burn. For example, in 2023, local heat indexes rose to over 115 degrees on Shawnee Lands (Rahn, 2023). The trifecta of climate change, cross-pollination, and inferior soil poses a monstrous challenge for the Shawnee People to grow their necessary crops. However, today, the Shawnee are seeking new solutions to these conditions.

In December 2023, the Shawnee Tribe met with members of the Agriculture Department at the University of Illinois at Urbana-Champaign. The university has an arboretum and was looking for suggestions for growing native plants that have medicinal or cultural applications. The Agriculture Department and the Shawnee Tribe agreed that the university will collaborate with the Tribe by growing Shawnee white corn at the arboretum. This project should secure the seedstock of the Shawnee for some years, as the weather in central Illinois is more suitable for corn.

Although this is promising for the Shawnee People and the future of lokhaana taami, the Tribe has concerns regarding the future of this project and similar ones that may follow. Currently, Native communities and Tribal Nations lack the legal processes to secure the intellectual property of the genomic data of seeds they have curated for centuries. The mechanisms that should exist for Tribal Nations have yet to be built within agencies of the United States government. This issue is not isolated to the Shawnee Tribe and is experienced globally by Indigenous Peoples (Farah & Prityi, 2024).

Furthermore, international protections, such as those discussed at the World Intellectual Property Organization, are frustrated by global interests opposed to giving rights to the world's Indigenous Peoples. The Shawnee Tribe engages in international forums in attempts to make their concerns heard, but Tribal Nation attendees (e.g., Shawnee Tribe and Cherokee Nation) are forced to attend as nongovernmental organizations. This status is contrary to the treaty relationships that the Shawnee Tribe and the Cherokee Nation have with the United States and the prior European nations that colonized Turtle Island. One solution for which Tribal Nations and the Native American Rights Fund have advocated is for the U.S. Department of State to create a vehicle for Tribal Nation representation at the United Nations, the World Intellectual Property Organization, and other international climate conferences, such as the Conference of the Parties gatherings.

The Shawnee People have endured much during their long and rich history and have managed to maintain their cultural practices throughout this adversity while striving to find solutions to resolving their agricultural problems. However, the complicated issue of climate resilience and cultural preservation is not just one of growing seeds. It is also a public policy issue that is creating existential threats to Indian country's agricultural businesses and traditional foodways.

Figure 2.6. Shawnee red corn grown by Brett Barnes for use in Shawnee ceremonies. Photos by Benjamin Barnes, Chief of the Shawnee Tribe.

Climate "Solutions" Impacting Traditions

As the world reconciles with the environmental and cultural impacts of Big Oil and hydropower dams, renewable energies such as solar and wind are on the rise. However, renewable "solutions" have posed ongoing challenges to Tribal sovereignty, cultural preservation, and the environment. If leading governments and insti-

tutions cannot address the underlying systems of the climate crisis in a way that upholds Tribal sovereignty, Tribes and Indigenous communities may face the threat of green colonialism (Pearl, 2024, pp. 95–96). Lonyx Landry (he/him, Nor Rel Muk Wintu Nation citizen) reflects on the role of Indigenous communities in the national renewable energy transition: "I don't want to see this next iteration of manifest destiny happen TO US again. If it's going to happen, it has to happen WITH US" (2024). In this section, offshore wind is utilized as an example to illustrate some of the ways in which renewable energy initiatives continue to pose challenges to Indigenous communities.

One of the most ambitious offshore wind projects in the world has been proposed in Humboldt County, California, an area which is home to nine federally recognized Tribes (Pipa, 2024, 1:45) and several more unrecognized but organized Tribes. The project proposes to generate 13% of the state's energy needs, which could power 25 million homes by 2045, decreasing the United States' dependence on fossil fuels that further the climate crisis (Pipa, 2024, 3:36). To reach that goal, the federal government auctioned nearly 600 square miles off Humboldt Bay and Morro Bay (farther south) to five energy companies in December 2022 with the intent to establish wind generators 21 miles off the Pacific Coast of Humboldt County (Pipa, 2024, 2:58). With these plans in motion, local Tribes and community members are considering the costs and benefits of the future that offshore wind promises. New local impacts, such as changes to marine life and the construction of new transmission lines, as well as the nonlocal impacts to source and transport materials for turbines, may pose not only environmental but also cultural impacts (Mirza et al., 2024). Importantly, the Tribes are considering that the energy produced here, on their unceded ancestral homelands, will not necessarily reach the rural residents of the county; rather, they would primarily benefit the urban hubs of California (Pipa, 2024, 44:40). Equity must be prioritized by offshore wind and other renewable energy developers. Some equitable actions would include establishing microgrids to reach rural areas, creating renewable job training programs geared toward historically excluded groups (including Indigenous Youth), and providing start-up funding for communities to organize local dialogues centering on renewable energy proposals.

Several proposed renewable energy projects have proved a detriment to Tribes, as federal agencies host consultation late in the planning process. For equitable information sharing and decision-making processes, Tribes must be included from the beginning (Mirza et al., 2024). In the early 2000s, the Cape Wind offshore wind project in Nantucket Sound, Massachusetts threatened areas of spiritual and cultural significance to the Wampanoag Tribe of Gay Head (Aquinnah) (Seonwoo, 2023). The Tribe cited the "destruction of historical, cultural, and spiritual tribal resources" in their 2011 lawsuit against the Bureau of Ocean Energy Management and noted problematic Tribal consultation that did not appropriately address their concerns (Seonwoo, 2023). Consultation must not only occur early, but must respect Tribal input to honor sacred sites, cultural heritage, and ongoing Indigenous stewardship practices and must invest in the economic future of the community. Legally binding community agreements can help ensure that such aspects are agreed upon and upheld to advance collaborative renewable energy initiatives.

If offshore wind and other renewable energy infrastructure continues to grow, Tribal communities need to be prepared, engaged, and proactive in decision-making for proposed development. To meet the Biden administration's goal of deploying 30 gigawatts of offshore wind energy by 2030, federal agencies must ensure improved consultation practices and deliberate and accessible public engagement processes, support Tribal capacity to benefit from renewable energy projects, and minimize environmental impacts of development (Mirza et al., 2024). If the federal government and corporations respect the positionality and considerations of Tribes and Indigenous communities, renewable energy sources may have the potential to further cultural preservation and revitalization in the face of climate change.

Cultural Preservation of Traditional Crafts

At the intersection of cultural heritage and environmental stewardship, traditional practices such as Indigenous basketry remain important for connecting Indigenous Peoples to their local and ancestral homelands. This section describes the significance of basketry within Indigenous cultures and showcases how Indigenous basketry serves as a vital conduit for cultural connections, Indigenous Knowledges, preservation, and climate and environmental awareness. Two personal stories are included to explore basketry as a dynamic form of cultural conservation and preservation that intricately weaves together the threads of Traditional Ecological Knowledge with the sacredness of plants while interweaving the complications of climate change and colonial legacies. These stories underline the multifaceted roles of basketry in maintaining cultural identity, fostering intergenerational learning, and advocating for the protection and restoration of traditional plant species.

Basketry for Cultural Connections and Preservation

Indigenous basketry is an important tool for Indigenous Peoples to remain connected to their Ancestors, cultural traditions, Indigenous Knowledges, and sacred plants. Indigenous basketry is also a form of conservation documentation that allows Indigenous Peoples to document and conserve each of the aforementioned factors into the future (Pearstein et al., 2023). This section provides information about how two Indigenous Peoples from distinct Indigenous communities use their weaving as a form of cultural conservation and as a method to connect to culture and remain in good relations with traditional plants, Indigenous Knowledges, and cultural practices.

Lara A. Jacobs [Citizen of Muscogee (Creek) Nation with Choctaw heritage] and Cherry Y. E. W. Yamane (Kanaka Maoli) share an interest in basketry, weaving practices, and preserving these traditions for future generations of their families. They were taught weaving and plant-specific Knowledges from Elders or cultural teachers and mentors. In the weaving spaces they create and share together currently, Lara and Cherry discuss the histories of their Peoples and the environmental supplies used for weaving [e.g., longleaf pine needles and lauhala (pandanus leaves)], teach one another weaving techniques, create culturally specific weaving products, and use their weaving spaces for storytelling. For both Lara and Cherry, weaving is an act of resistance against colonial distractions and assimilation, a medicine for mental and emotional wellness, and a continuation of the practices of their Ancestors and communities. Additionally, weaving provides them with a continued connection to the plants and ecosystems from their ancestral territories and serves as an educational resource for understanding how climate change is impacting their homelands and traditional plants.

Lara sources her weaving supplies (i.e., longleaf pine needles from *Pinus palustris* and pine needles from *Pinus ponderosa*, Fig. 2.7) locally in Oregon (ponderosa) but mainly from longleaf pines in the ancestral lands of the Muscogee (Creek) Peoples who once stewarded the areas now referred to today as Alabama, Georgia, Florida, and the Carolinas. Longleaf pine trees once were the predominant pine species covering many large sections of the Muscogee Peoples'

Figure 2.7. Lara Jacobs' process for weaving pine needle mats through various techniques. Photos by Lara Jacobs.

ancestral lands (Outcalt, 2000; NC Longleaf Coalition, n.d.). Due to the impacts of colonialism (e.g., timber harvesting, fire suppression, habitat fragmentation, agricultural land conversion, development, and urbanization), longleaf pine tree ranges decreased from over 37 million hectares (from Texas to Virginia) to less than three to five percent of their original range (Frost, 1993; Outcalt, 2000; Clark et al., 2018; Oswalt et al., 2012; FNAI, 2022). However, their ranges may contain more resilience to the impacts of climate change (e.g., droughts, storms, wildfire, and insect and disease outbreaks; Clark et al., 2018; Wilson et al., 2001; Stanturf et al., 2007; Johnsen et al., 2009; Samuelson et al., 2012; Costanza et al., 2015; Hodges et al., 1979; Martinson et al., 2007). Because of the changing climate, longleaf pine trees are currently being monitored to inform conservation and restoration throughout the southeastern U.S. (FNAI, 2022). However, their significance as a culturally traditional species should also remain as a priority focus of conservation efforts.

Cherry gathers and preserves weaving materials (i.e., *kūkaʻa* from *pūhala*, *Pandanus tectorius*, Fig. 2.8) in their ancestral homelands in Hawaiʻi. Pūhala is one of the most important plants in the Pacific, especially in Hawaiʻi, as it provides materials for cultural heritage and the survival of Pacific Islanders (Gallaher, 2014). The presence of pūhala perpetuates cultural ecosystem services, provides cultural navigation guidance throughout the Pacific, and encourages higher rates of plant and animal biodiversity (Pascua et al., 2017; Winter et al., 2020; McGuire, 2022). Native Hawaiʻian Knowledges show that coastal pūhala are known to serve as protective barriers from coastal storm surges due to their tolerance for high salinity. However, pūhala have been almost entirely eliminated due to colonial impacts (Gallaher, 2014), thus creating cultural stressors for tradition preservation, issues for plant and animal biodiversity, and hazards for other culturally specific plants that use pūhala as shields from coastal storm surges. Newer colonial impacts include the introduction of invasive species such as the Pandanus scale insect (*Thysanococcus pandani*), which infects the leaves and fruit of the pūhala and causes its premature death, as well as the rapidly spreading coconut rhinoceros beetle (*Oryctes rhinoceros*), thus furthering the impact it has on cultural practices connected to the pūhala and the environment (HDOA, 2015). In a changing climate that will continue to strengthen storms in Hawaiʻi (Shan, Lin, Chu, et al., 2023) and in a colonially occupied area that is continuously focused on development and urbanization, the conservation of pūhala remains a vital need for cultural preservation of a vital species.

Figure 2.8. Cherry Yamane's weaving materials and baskets. Photos by Cherry Yamane.

Conclusion

In a changing climate, Indigenous Peoples are preserving their cultural heritage and remain at the forefront of its revitalization. Indigenous Peoples' efforts underscore their inherent resilience and deep-rooted connections to the Land and their more-than-human kin. This chapter highlights a range of strategies employed by Indigenous communities to combat the adverse effects of climate change and colonialism while preserving their cultures. Indigenous Peoples are building cohesive communities across the diaspora, revitalizing endangered languages, developing Indigenous-led educational curricula, and championing food sovereignty—all of which act as forms of cultural preservation and environmental stewardship. Furthermore, this chapter's emphasis on storytelling as a medium of Indigenous Knowledge transmission, collaborative efforts in environmental restoration, and advocacy for Indigenous intellectual property rights on national and global platforms exemplifies how U.S.-based Indigenous Peoples have similar challenges to those of global Indigenous Peoples and how Indigenous Peoples around the world are collectively engaging to strategize for a better future.

By putting Indigenous voices, philosophies, and practices at the center of this chapter, it challenges the narrative of Indigenous Peoples as victims of climate change and positions them as leaders in the movement toward a more sustainable and equitable world. The collective wisdom of Indigenous communities along with their sustainable practices and Knowledges offers invaluable insights and solutions for contemporary environmental challenges. As highlighted throughout the chapter, integrating Indigenous Knowledges and perspectives into global climate action is beneficial and imperative for Indigenous cultural preservation. Therefore, this chapter presents a call to action for all readers to support, recognize, and engage with Indigenous-led initiatives. These efforts represent beacons of hope and provide practical and sustainable solutions for addressing the planet's most pressing issues while urging a collective move toward a future that honors Indigenous principles of respect, reciprocity, and interconnectedness. ◀◆

Po’ Who Geh Owinge (Where the Water Cuts Through)

Narrative by Raymond Martinez, Pueblo de San Ildefonso

Ancestors of the Pueblo people migrated from Mesa Verde and the Chaco Canyon to occupy the mesa and cliffs of the Pajarito Plateau. Drought and other factors caused the people to migrate to present-day San Ildefonso and settle along the banks of the Rio Grande, where water for crop irrigation was plentiful. Historically, the Pueblo’s economy was based on agriculture.

Nan pi’in nan in ge, Ge’ taa whan, (Pajarito Plateau) Tsideh’e pin, (Black Mesa) tunyo pin, (Rio Grande River) p’okay’ge. Nang’e Thaa’ego, Phaa’tsa wa, Pin phaa. *Nah* p’okay’ge de ha di taa ye. P’oe na bah yen. Da’ p’oe ami inbe nava.

Climate change affects Pueblo life, including traditional uses of water, birds, animals, plants, wood, clay, deer, rabbit, turkey, and elk, as well as the spiritual well-being of our Pueblo. There are also human impacts due to the proximity of the Los Alamos National Laboratory, which left a legacy of contaminants in the local environment; for example, wildfires, rainfall, and flooding increase the risk of exposure to these contaminants on the Pueblo.

Na’ inbe wo’wahaa’tsi din’ pidin’an, Nain’be towa kuu gin, Gin’kon ma’a gin te’e, paa, puu, pindee, daa, p’oe tsideh’e, Tsee’wee’ay, son, pi’in nan. Nang inbin wo’watsi nacha’muu. Los Alamos National Laboratory nako ho’ pin k’eweh bugeh. Wen p’oe de yoe’an Na’ oepaa p’in k’e weh. Na’e pin’paa, kwan, kwan po. Na’e pin’paa(eeyaa) e’haa’ho, p’oe a suwa de’. Ba’ge na’inbe towa de’haybo.

Through a collaborative approach, the community—including Elders, Youth, resources managers, and the Tribal Council—identified key aspects of Pueblo life that are critical to preserve and protect and developed a vision for the community. This community vision integrates four aspects of Pueblo life (Fig. 2.9; the four quadrants)—traditional activities, traditional places, community health, and infrastructure and governance—with broad cross-cutting themes that overlap with these aspects of community life that include traditional Knowledge, language, income, spiritual health, water, and food sovereignty (the outer circle). The Pueblo then assessed the vulnerability of each aspect of the community vision and identified adaptation actions that could reduce its vulnerability to climate change.

THAA’EGO— Na’inbe Owinge, Kweeyoe, Saydoe, Ayyaa, heda in Than’the’kiieeay, na’inbe un’shaa. Wowa’tsi nacha’muu. Na’inbe Nava ay e’hee ami. Nain’be towa kuu, Nain’be Nan ochu kwiyo, K’uu kwa’yeh, Na’inbe Owinge Ge’hay puwi pidi’ee, hadaa in’ Menekana be’kuu, Na’in PO’WHO GEH OWINGE be K’uu, un’shaa de ta’nanmidi.’

Founded in a collective vision for the community, our Climate Action Plan aims to ensure that the Pueblo de San Ildefonso’s culture and traditions thrive for future generations; see our Climate Change Story map: https://abtmeetings.com/climatechangeplan/.

We are now implementing the high priority climate change actions identified in our Climate Action Plan. We have documented the traditional agricultural knowledge of the Pueblo Elders, including climate-resilient traditional agricultural practices, on a Youth-accessible platform to pass the traditional agricultural knowledge from Elders to Pueblo Youth; see the Climate Change Knowledge Transfer website: https://abtstories.com/pueblo/index.html. We are also working to protect springs that are traditionally important sacred places by removing invasive vegetation, such as tamarisk trees and Russian olive that are known to lower shallow groundwater levels, and replacing them with native vegetation, and protecting areas around through fencing to deter cattle from the springs. We recently started a project to mitigate the risk of wildfire around residential areas, critical infrastructure, and sacred sites.◀◆

Figure 2.9. Pueblo de San Ildefonso “Four Quadrants.”

Cultural Preservation & Revitalization in the Face of Climate Change Chapter References

Alegado, R. (2019). Opponents of the Thirty Meter Telescope fight the process, not science. *Nature, 572*, 7. https://doi.org/10.1038/d41586-019-02304-1

Apassingok. (1985). *Sivqam Nangaghnegha: Sivanllemta Ungipaqellghat—Lore of St. Lawrence Island: Echos from our Eskimo Elders, Vol. 1: Gambell.* Bering Strait School District.

Archibald, J. (2008). *Indigenous storywork: Educating the heart, mind, body, and spirit.* UBC Press.

Berkes, F. (2012). *Sacred ecology (3rd ed.).* Routledge. https://doi.org/10.4324/9780203123843

Bruised Head, M. (2022). *The colonial impact of the erasure of Blackfoot Miistakisti place names in Paahtomahksikimi, Waterton Lakes National Park* [Doctoral dissertation, University of Lethbridge] University of Lethbridge. https://hdl.handle.net/10133/6371

California Consortium for Urban Indian Health (CCUIH). (n.d.). *Who are urban Indians?* https://ccuih.org/about/about-urban-indians/

California Heritage: Indigenous Research Project. *Homeland Return.* (2024). https://chirpca.org/homelandreturn

Carroll, S. R., Garba, I., Figueroa-Rodriguez, O. L., Holbrook, J., Lovett, R., Materechera, S., Parsons, M., Raseroka, K., Rodriguez-Lonebear, D., Rowe, R., Sara, R., Walker, J., Anderson, J., Hudson, M., & Martinez, A. (2023). Operationalizing the CARE and FAIR principles for Indigenous data futures. *Nature Scientific Data, 10*(1), 1–9. https://doi.org/10.1038/s41597-021-00892-0

Carroll, S. R., Rodriguez-Lonebear, D., & Martinez, A. (2021). Indigenous data governance: Strategies from United States Native Nations. *Data Science Journal, 20*(1), 31. https://doi.org/10.5334/dsj-2021-031

Kamehameha Schools. (2023, February 1). *Celebrating Mahina ʻŌlelo Hawaiʻi: Duolingo sees surge of Hawaiian language learners.* https://www.ksbe.edu/article/celebrating-mahina-lelo-hawaii-duolingo-sees-surge-of-hawaiian-language-learners

Cherokee Nation. (n.d.). *Language department.* https://language.cherokee.org

Chew, K. A. B., Anthony-Stevens, V., LeClair-Diaz, A., Nicholas, S. E., Sobotta, A., & Stevens, P. (2019). Enacting hope through narratives of Indigenous language and culture reclamation. *Transmotion, 5*(1), 1. https://doi.org/10.22024/UniKent/03/tm.570

Clark, S., Hallgren, S. W., & Engle, D. M. (2018). Fire ecology of the longleaf pine ecosystem. In J. E. Keeley & W. J. Bond (Eds.), *Fire in Mediterranean ecosystems: Ecology, evolution and management* (pp. 295–325). Cambridge University Press. https://doi.org/10.1017/CBO9781139033091

Corntassel, J., Chaw-win-is, & T'lakwadzi. (2009). Indigenous storytelling, truth-telling, and community approaches to reconciliation. *ESC: English Studies in Canada, 35*(1), 137–159. https://doi.org/10.1353/esc.0.0163

Costanza, J. K., Terando, A. J., McKerrow, A. J., & Collazo, J. A. (2015). Modeling climate change, urbanization, and fire effects on *Pinus palustris* ecosystems of the southeastern U.S. *Journal of Environmental Management, 151*, 186–199. https://doi.org/10.1016/j.jenvman.2014.12.032

Datta, R. (2018). Traditional storytelling: An effective Indigenous research methodology and its implications for environmental research. *AlterNative: An International Journal of Indigenous Peoples, 14*(1), 35–44. https://doi.org/10.1177/1177180117741351

De Onís, C. M. (2018). Energy colonialism powers the ongoing unnatural disaster in Puerto Rico. *Frontiers in Communication, 3*(2). https://doi.org/10.3389/fcomm.2018.00002

Dockry, M. J., Hall, K., Van Lopik, W., & Caldwell, C. M. (2015). Sustainable development education, practice, and research: An Indigenous model of sustainable development at the College of Menominee Nation, Keshena, WI, USA. *Sustainability Science, 11*, 127–138. https://doi.org/10.1007/s11625-015-0304-x

Donatuto, J., Campbell, L., LeCompte, J. K., Rohlman, D., & Tadlock, S. (2020). The story of 13 Moons: Developing an environmental health and sustainability curriculum founded on Indigenous first foods and technologies. *Sustainability 12*(21), 8913. https://doi.org/10.3390/su12218913

Donatuto, J., Trousdale, T., & Campbell, L. (2019). The "value" of values-driven data in identifying Indigenous health and climate change priorities. *Climatic Change, 158*(2), 161–180. https://doi.org/10.1007/s10584-019-02596-2

Farah, D. H., & Prityi, M. (2024). When John Locke meets Lao Tzu: The relationship between intellectual property, biodiversity, and Indigenous Knowledge and the implications for food security. *Duke Environmental Law & Policy Forum, 33,* 77–112. https://scholarship.law.duke.edu/delpf/vol33/iss2/3

Fernández-Llamazares, A., & Cabeza, M. (2018). Rediscovering the potential of Indigenous storytelling for conservation practice. *Conservation Letters, 11*(3), Article e12398. https://doi.org/10.1111/conl.12398

Fisk, J. J. (2022). *Speaking of abundance: Taíno ecolinguistic ontologies, pre-colonial biocultural systems, and decolonial pathways to food and material sovereignty in Puerto Rico* [Doctoral dissertation, University of Hawaiʻi at Mānoa]. ProQuest Dissertations & Theses. https://www.proquest.com/dissertations-theses/speaking-abundance-taíno-ecolinguistic-ontologies/docview/2699713571/se-2

Florida Natural Areas Inventory (FNAI). (2022). *Longleaf pine ecosystem geodatabase: A spatial database of longleaf pine ecosystems in Florida* [Data set]. Florida Natural Areas Inventory. https://www.fdacs.gov/Forest-Wildfire/Our-Forests/The-Florida-Longleaf-Pine-Ecosystem-Geodatabase

Frost, C. C. (1993). Four centuries of changing landscape patterns in the longleaf pine ecosystem. In S. M. Hermann (Ed.), *The longleaf pine ecosystem: Ecology, restoration, and management* (pp. 17–43). Proceedings of the Tall Timbers Fire Ecology Conference No. 18.

Gallaher, T. (2014). The past and future of hala (*Pandanus tectorius*) in Hawaiʻi. In L. O'Neill, M. A. Keawe, M. MacDowell, & C. K. Dewhurst (Eds.), *Ike Ulana Lau Hala: The vitality and vibrancy of Lau Hala weaving traditions in Hawaiʻi.* Hawaiʻi Scholarship Online. https://doi.org/10.21313/hawaii/9780824840938.003.0008

Great Lakes Indian Fish and Wildlife Commission (GLIFWC) Climate Change Team (2018). *Climate change vulnerability assessment: Integrating scientific and traditional ecological knowledge (Version 1).* Great Lakes Indian Fish & Wildlife Commission. https://glifwc.org/ClimateChange/GLIFWC_Climate_Change_Vulnerability_Assessment_Version1_April2018.pdf

Goodyear-Kaʻōpua, N. (2013). *The seeds we planted: Portraits of a Native Hawaiian charter school.* University of Minnesota Press. https://www.upress.umn.edu/9780816680481/the-seeds-we-planted/

Gómez-Baggethun, E., & Barton, D. N. (2013). Classifying and valuing ecosystem services for urban planning. *Ecological Economics, 86,* 235–245. https://doi.org/10.1016/j.ecolecon.2012.08.019

Gushiken, P. (2019, December 30). "Know where you stand": ʻŌiwi refusals of settler futurities and carceral violence. *Abolition Journal.* https://abolitionjournal.org/know-where-you-stand-ʻoiwi-refusals-of-settler-futurities-and-carceral-violence-/

Hawai'i Department Of Agriculture. (2015). *Hala scale: A threat to Hawaii's hala* [Flyer]. https://hdoa.hawaii.gov/pi/files/2015/05/hala-scale-flyer-for-weavers.pdf

Henne-Ochoa, R., Elliott-Groves, E., Meek, B. A., & Rogoff, B. (2020). Pathways forward for Indigenous language reclamation: Engaging Indigenous epistemology and learning by observing and pitching in to family and community endeavors. *The Modern Language Journal, 104*(2), 481–493. https://doi.org/10.1111/modl.12652

Hernandez, J., Meisner, J., Jacobs, L. A., & Rabinowitz, P. M. (2022). Re-centering Indigenous Knowledge in climate change discourse. *PLOS Climate, 1*(5), Article e0000032. https://doi.org/10.1371/journal.pclm.0000032

Hodges, J. D., Elam, W. W., Watson, W. F., & Nebeker, T. E. (1979). Oleoresin characteristics and susceptibility of four southern pines to southern pine beetle (Coleoptera: Scolytidae) attacks. *The Canadian Entomologist, 111*(8), 889–896. https://doi.org/10.4039/Ent111889-8

Indigenous Corporate Training Inc. (2020, May 30). *What is the Seventh Generation Principle?* https://www.ictinc.ca/blog/seventh-generation-principle

Iseke, J. (2013). Indigenous storytelling as research. *International Review of Qualitative Research, 6*(4), 559–577. https://doi.org/10.1525/irqr.2013.6.4.559

Isle de Jean Charles. (n.d.). *The Island.* https://www.isledejeancharles.com/island

Jennings, L., Carroll, S. R., & Hudson, M. (2023). Building a data revolution for Indigenous communities: CARE principles in practice. *International Journal of Information Management, 66*(2), Article 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Johnsen, K. H., Butnor, J. R., Kush, J. S., Schmidtling, R. C., & Nelson, C. D. (2009). Hurricane Katrina winds damaged longleaf pine less than loblolly pine. *Southern Journal of Applied Forestry, 33*(4), Article 178181. https://doi.org/10.1093/sjaf/33.4.178

The Jean Charles Choctaw Nation. (2022, August 24). *The Jean Charles Choctaw Nation: Tribal-guided and led, whole community resettlement and cultural preservation* [Press release]. https://static1.squarespace.com/static/5672cfb1d82d5e366e753691/t/63066872adf17070b316c9b1/1661364339115/JCCN_ongoing+resettlement+%281%29.pdf

Kahanamoku, S., Alegado, R. 'A., Kagawa-Viviani, A., Kamelamela, K. L., Kamai, B., Walkowicz, L. M., Prescod-Weinstein, C., De los Reyes, M. A., & Neilson, H. (2020). *A Native Hawaiian-led summary of the current impact of constructing the Thirty Meter Telescope on Maunakea.* ArXiv. https://doi.org/10.48550/arXiv.2001.00970

Kaleem, J., & Kambhampati, S. (2023, August 29). Maui residents consider the unthinkable: Las Vegas, the "ninth island." *Los Angeles Times.* https://www.latimes.com/world-nation/story/2023-08-29/hawaii-fire-migration

Landry, L. (2023, December 21). *It's time for the offshore wind industry to commit to community investments* [Opinion]. Lost Coast Outpost. https://lostcoastoutpost.com/2023/dec/21/opinion-its-time-offshore-wind-industry-commit-com/

LaPier, R. R. (2023, August 12). *Analysis: Burning of Lahaina's sacred sites is a major loss for Native Hawaiians. But their history will live on.* PBS. https://www.pbs.org/newshour/nation/analysis-burning-of-lahainas-sacred-sites-is-a-major-loss-for-native-hawaiians-but-their-history-will-live-on

Latulippe, N. (2015). Bridging parallel rows: Epistemic difference and relational accountability in cross-cultural research. *International Indigenous Policy Journal, 6*(2). https://doi.org/10.18584/iipj.2015.6.2.7

Leonard, K. (2021, January 19). Putting Indigenous place-names and languages back on maps. *ArcNews.* https://www.esri.com/about/newsroom/arcnews/putting-indigenous-place-names-and-languages-back-on-maps/

Leonard, K., Welch, N., & Ali-Joseph, A. (2020). Covid-19 in Indigenous communities: Five protective factors of "exercising" sovereignty. In P. M. Pedersen, B. J. Ruihley, & B. Li (Eds.), *Sport and the Pandemic* (pp. 236–246). Routledge.

Leonard, W. Y. (2017). Producing language reclamation by decolonising "language." *Language Documentation and Description, 14,* 15–36. https://doi.org/10.25894/ldd146

Maffi, L., & Woodley, E. (2010). *Biocultural diversity conservation: A global sourcebook.* Routledge.

Martinson, S., Hofstetter, R. W., & Ayres, M. P. (2007). Why does longleaf pine have low susceptibility to southern pine beetle? *Canadian Journal of Forest Research, 37*(10), 1966–1977. https://doi.org/10.1139/X07-066

McCarty, T. L., Nicholas, S. E., Chew, K. A. B., Diaz, N. G., Leonard, W. Y., & White, L. (2018). Hear our languages, hear our voices: Storywork as theory and praxis in Indigenous-language reclamation. *Daedalus, 147*(2), 160–172. https://doi.org/10.1162/DAED_a_00499

McGill, B. M., Borrelle, S. B., Wu, G. C., Ingeman, K. E., Koch, J. B. U., & Barnd, N. B. (2022). Words are monuments: Patterns in US national park place names perpetuate settler colonial mythologies including white supremacy. *People and Nature, 4*(3), 683–700. https://doi.org/10.1002/pan3.10302

McGuire, G. K. (2022). Nurturing coasts: Hala and the legacy of mutual care in coastal forests. *Parks Stewardship Forum, 38*(2), 1915–1930. https://doi.org/10.5070/P538257519

Mirza, Z., Landry, L. & Goldstein, M. (2024, June 3). 4 ways the Biden Administration can ensure offshore wind development benefits tribes and indigenous people. *Center for American Progress.* https://www.americanprogress.org/article/4-ways-the-biden-administration-can-ensure-offshore-wind-development-benefits-tribes-and-indigenous-people

The Muscogee Nation. (2024, February 21). *Mvskoke language program* [Press Release]. https://www.muscogeenation.com/department-of-education-and-training/mvskoke-language-program/

Native Nations Institute. (n.d.). *Resources for rebuilding Native Nations.* https://nni.arizona.edu/tools-resources

Native Plants and Foods. (n.d.). *The 13 moons curriculum.* https://nativeplantsandfoodsportal.org/videos/thirteen-moons

Nawaz, A., & Couzens, I. (2023, October 9). *Native Hawaiians push to preserve history and heritage following Maui wildfires.* PBS. https://www.pbs.org/newshour/show/native-hawaiians-push-to-preserve-history-and-heritage-following-maui-wildfires

NDN Collective. (2021, June 15). *NDN Collective launches "Landback U": A curriculum on how to join the fight to return land to Indigenous hands* [Press release]. https://ndncollective.org/ndn-collective-launches-landback-u-a-curriculum-on-how-to-join-the-fight-to-return-land-to-indigenous-hands/

Neethling, B. (2014). Xhosa Onomastics as Part of Indigenous Knowledge Systems (IKS). *Names, 62*(4), 218–228. https://doi.org/10.1179/0027773814Z.00000000092

Nisenan. (n.d.). https://www.nisenan.org

North Carolina Longleaf Coalition. (n.d.). *North Carolina Longleaf Coalition.* https://www.nclongleaf.org

North Yuba Forest Partnership. (n.d.). https://www.yubaforest.org

Ngulube, P. (2022). *Handbook of Research on Records and Information Management Strategies for Enhanced Knowledge Coordination.* IGI Global.

Oliveira, K.-A. R. K. N. (2014). *Ancestral places: Understanding Kanaka geographies.* Oregon State University Press.

Osorio, J. H. (2021). *Remembering our intimacies: Mo'olelo, aloha 'āina, and ea.* University of Minnesota Press.

Oswalt, C. M., Cooper, J. A., Brockway, D. G., Brooks, H. W., Walker, J. L., Connor, K. F., Oswalt, S. N., & Conner, R. C. (2012). *History and current condition of longleaf pine in the Southern United States: A summary report* (General Technical Report SRS–166). U.S. Department of Agriculture Forest Service, Southern Research Station. https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs166.pdf

Outcalt, K. W. (2000). The longleaf pine ecosystem of the South. *Native Plants Journal, 1*(1), 42–53. https://doi.org/10.3368/npj.1.1.42

Pascua, P., McMillen, H., Ticktin, T., Vaughan, M., & Winter, K. B. (2017). Beyond services: A process and framework to incorporate cultural, genealogical, place-based, and indigenous relationships in ecosystem service assessments. *Ecosystem Services, 26*, 465–475. https://doi.org/10.1016/j.ecoser.2017.03.012

Pearl, M. A. (2024). Green colonialism: Sidelined while on the front lines. *Case Western Reserve Journal of International Law, 56*(1), 8. https://scholarlycommons.law.case.edu/jil/vol56/iss1/8

Piñero, J. E. (2023, June). How artisans in Puerto Rico sustain native culture. *Smithsonian.* https://www.smithsonianmag.com/arts-culture/artisans-puerto-rico-sustain-native-culture-180982110/

Pipa, T. (Host). (2024, May 14). Will offshore wind be good for Humboldt County, California? (No. 13) [Audio podcast episode]. In *Reimagine rural.* Brookings Podcast Network. https://podcasts.apple.com/us/podcast/reimagine-rural/id1654532511

Price, M. W. (2022, December 22). Climate change and the Anishinaabe language. *Duluth Reader.* https://duluthreader.com/articles/2022/12/22/123742-climate-change-and-the-anishinaabe-language

Puniwai, N. (2020). *Pua ka wiliwili, nanahu ka manō*: Understanding sharks in Hawaiian culture. *Human Biology, 92*(1), 11–17. https://doi.org/10.13110/humanbiology.92.1.03

Rahn, M. (2023, August 22). *All-time heat index record broken for 2nd time in Jay, Oklahoma.* News on 6. https://www.newson6.com/story/64e546f09e2842072186dd85/all-time-heat-index-record-broken-for-2nd-time-in-jay-oklahoma

Reid, A. J., Eckert, L. E., Lane, J.-F., Young, N., Hinch, S. G., Darimont, C. T., Cooke, S. J., Ban, N. C., and Marshall, A. (2020). "Two-eyed seeing": An Indigenous framework to transform fisheries research and management. *Fish and Fisheries, 22*(2), 243–261. https://doi.org/10.1111/faf.12516

Rodriguez-Lonebear, D. (2016). Building a data revolution in Indian Country. In T. Kukutai & J. Taylor (Eds.), *Indigenous data sovereignty: Toward an agenda* (pp. 253–272). ANU Press. https://doi.org/10.22459/CAEPR38.11.2016.14

Rush, C., Borenstein, S., & McDermott, J. (2023, August 10). *Maui's fire became deadly fast. Climate change, flash drought, invasive grass and more fueled it.* AP News. https://apnews.com/article/hawaii-wildfires-climate-change-92c0930be7c28ec9ac71392a83c87582

Samuelson, L. J., Stokes, T. A., & Johnsen, K. H. (2012). Ecophysiological comparison of 50-year-old longleaf pine, slash pine and loblolly pine. *Forest Ecology and Management, 274*, 108–115. https://doi.org/10.1016/j.foreco.2012.02.017

Sanchez, R. (2022, September 24). *Misery, yet again, for Puerto Ricans still recovering from Maria.* CNN. https://www.cnn.com/2022/09/24/us/puerto-rico-hurricane-fiona-aftermath/index.html

Schachter, J., & Bruce, A. (2020, August 19). *Estimating Puerto Rico's population after Hurricane Maria.* U.S. Census Bureau. https://www.census.gov/library/stories/2020/08/estimating-puerto-rico-population-after-hurricane-maria.html

Seonwoo, E. (2023, March 22). Aquinnah Wampanoag tribe uneasy with offshore wind industry. *The Martha's Vineyard Times.* https://www.mvtimes.com/2023/03/22/complex-relationship-offshore-wind-aquinnah-tribe/

Shan, K., Lin, Y., Chu, P. S., et al. (2023). Seasonal advance of intense tropical cyclones in a warming climate. *Nature, 623*, 83–89. https://doi.org/10.1038/s41586-023-06544-0

Shearer, J. (2023, October 14). *'A'ohe mālama, pau i ka CRB. Honolulu Star-Advertiser.* https://www.staradvertiser.com/2023/10/14/editorial/kauakukalahale/column-aeaaeohe-malama-pau-i-ka-crb/

Simpson, L. (2008). Looking after Gdoo-naaganinaa: Precolonial Nishnaabeg diplomatic and treaty relationships. *Wicazo Sa Review 23*(2), 29–42. https://doi.org/10.1353/wic.0.0001

Sium, A., & Ritskes, E. (2013). Speaking truth to power: Indigenous storytelling as an act of living resistance. *Decolonization: Indigeneity, Education & Society, 2*(1), 1–10. https://jps.library.utoronto.ca/index.php/des/article/view/19626

Stanturf, J. A., Goodrick, S. L., & Outcalt, K. W. (2007). Disturbance and coastal forests: A strategic approach to forest management in hurricane impact zones. *Forest Ecology and Management, 250*(1–2), 119–135. https://doi.org/10.1016/j.foreco.2007.03.015

Swinomish Indian Tribal Community (SITC). (2006). *13 moons: The 13 lunar phases, and how they guide the Swinomish People.* Swinomish Indian Tribal Community, Office of Planning & Community Development.

Swinomish Indian Tribal Community. (2019). *13 moons: First foods and resources curriculum.* Swinomish Indian Tribal Community.

The Wilderness Society (2022, March 28). *Movement to change racist names on public lands moves forward.* https://www.wilderness.org/articles/blog/movement-change-racist-names-public-lands-moves-forward#

U.S. Department of Health and Human Services Office of Minority Health. (2022). *American Indian/Alaska Native health.* https://minorityhealth.hhs.gov/american-indianalaska-native-health

Wilson, S. (2001). What is an Indigenous research methodology? *Canadian Journal of Native Education, 25*(2), 175–179. https://ojs.library.ubc.ca/index.php/CJNE/article/view/196968

Winter, K. B., Lincoln, N. K., Berkes, F., Alegado, R. A., Kurashima, N., Frank, K. L., Pascua, P., Rii, Y. M., Reppun, F., Knapp, I. S. S., McClatchey, W. C., Ticktin, T., Smith, C., Franklin, E. C., Oleson, K., Price, M. R., McManus, M. A., Donahue, M. J., Rodgers, K. S., … Toonen, R. J. (2020). Ecomimicry in Indigenous resource management: Optimizing ecosystem services to achieve resource abundance, with examples from Hawai'i. *Ecology and Society, 25*(2), 26. http://doi.org/10.5751/ES-11539-250226

Whyte, K. P. (2013). On the role of traditional ecological knowledge as a collaborative concept: A philosophical study. *Ecological Processes, 2*, 7. https://doi.org/10.1186/2192-1709-2-7

Whyte, K. P. (2015). *How similar are Indigenous North American and Leopoldian environmental ethics?* Social Science Research Network. http://dx.doi.org/10.2139/ssrn.2022038

Whyte, K., Novak, R., Laramie, M. B., Bruscato, N. G., David-Chavez, D. M., Dockry, M. J., Johnson, M. K., Jones Jr., C. E., & Leonard, K. (2023). Tribes and Indigenous Peoples. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023.CH16

Yam, K. (2023, August 24). *Why Hawaiian sovereignty has undeniable context for the Maui fires.* NBC News. https://www.nbcnews.com/news/asian-america/hawaiian-sovereignty-undeniable-context-maui-fires-rcna100972 ◀◆

Water Justice

CHAPTER LEAD

Kelsey Leonard

CHAPTER AUTHORS

Coral B. Avery

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Chevaun Toulouse

Shavonne Smith

KEY MESSAGES

Indigenous Peoples are affirming inherent relationships for Water protection through Water declarations, law, and policy. New advancements for #WATERBACK stem from innate Water teachings advocating for restoring connection to Water, ecosystems, and Water-dependent nonhuman relatives. Protecting Water protects future generations and cultural continuity for species of cultural importance such as *wampum*, *manoomin*, salmon, and more. Water is Life.

CHAPTER RECOMMENDATIONS

Transboundary Water governance must be led by Indigenous Peoples and Indigenous Water institutions. Indigenous Water law, diplomacy, and treatymaking are key to restoring Indigenous Water rights and responsibilities. Indigenous Water scientists are actively leading Water data collection, and access initiatives should be supported through fiscal resources and capacity building for Tribal governments.

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Chapter Author Positionality Statements

Kelsey Leonard is an enrolled citizen of the Shinnecock Nation and Canada Research Chair in Indigenous Waters, Climate and Sustainability in the School of Environment, Resources, and Sustainability in the Faculty of Environment at the University of Waterloo, Waterloo, Ontario, Canada, where her research focuses on Indigenous Water justice and climate adaptation science.

Coral B. Avery *(they/them)* is a citizen of the Shawnee Tribe of mixed-European and Shawnee heritage. Coral was born on Kalapuya Lands, raised on Kumeyaay Lands, and is now living on the homelands of the Anishinaabeg—Ojibwe, Odawa, and Potawatomi Nations, as well as the Wyandot Nation. Coral is a climate planning specialist at the BIA Branch of Tribal Community Resilience, a community language preservationist for the Shawnee Language Immersion Program, and a first-generation graduate student at the University of Michigan School for Environment and Sustainability.

Joshua Manitowabi (BA, McMaster University; MA, McMaster University; PhD, Brock University) is an assistant professor of Indigenous history. His research has centered on Indigenous histories and Indigenous education. Josh's master's thesis, *It Sometimes Speaks to Us: Decolonizing Education by Utilizing Our Elders' Knowledge*, explored the experiences and recommendations of Elders in introducing Indigenous knowledge and teaching methods into the curricula of Anishinaabe schools. His doctoral dissertation, *Manitoulin Island Treaties: Anishinaabe Diplomacy, Agency, and Persistence*, is an ethnohistoric study of Odawa agency and perspectives regarding 18th and 19th century treaties made with the British Crown.

Dr. Maddy Nyblade is a settler and an assistant professor of environmental studies at the State University of New York College of Environmental Science and Forestry (SUNY ESF). She is also one of the faculty co-directors for the Center for Native People and the Environment within SUNY ESF. She completed her doctoral work on the interconnected impacts of climate and land cover change on Wild Rice in collaboration with several Tribes and inter-Tribal organizations across the Great Lakes.

Niiyokamigaabaw Deondre Smiles (Leech Lake Band of Ojibwe) is an assistant professor in the department of geography at the University of Victoria. Smiles is an Indigenous geographer whose research interests are multifaceted, including Indigenous geographies/epistemologies, science and technology studies, and Tribal cultural resource preservation/protection. They hold a PhD in geography from The Ohio State University (2020). Smiles serves as the director of the Geographic Indigenous Futures Collaboratory, or GIF Lab, a lab that focuses on Indigenous geographic methods and collaborations with Indigenous communities. They also serve as a member of the editorial board of the journal *Native American and Indigenous Studies* and serve on the board of trustees of Leech Lake Tribal College.

T. R. Heydman is a citizen of the Cherokee Nation and a PhD student in the Department of Forest and Rangeland Stewardship at Colorado State University. He is a researcher who studies the effects of settler-colonial and Indigenous Water relationships and a council member of the Colorado Cherokee Circle.

Chapter Author Positionality Statements Continued

Chevaun Toulouse is Pike Clan from Sagamok Anishinabek First Nation. A passionate advocate for species at risk, Toulouse aims to blend her traditional Knowledge and formal training to ensure a healthier planet for generations to come. She has recently completed an undergraduate degree in biology and Indigenous environmental science at Trent University. Toulouse has worked in the environmental conservation field for many years as a species-at-risk technician for the Toronto Zoo, Magnetawan First Nation, Sagamok First Nation, and the Ministry of Northern Development, Mines, Natural Resources, and Forestry.

Shavonne Smith is a Tribal member and the Environmental Director for the Shinnecock Indian Nation and leads initiatives that protect and sustain Shinnecock homelands for future generations. Rooted in her ancestral responsibility, she guides efforts in food sovereignty, climate change response, Water quality protection, solid waste management, and sustainable shellfish harvesting. Her work focuses on preserving the natural balance between the land, plants, animals, and her people. By fostering community education and building partnerships with external organizations, she ensures that Shinnecock values and environmental stewardship remain central to all conservation efforts.

03 Water Justice

"We recognize that all life is interrelated. If the waters are to fulfill their responsibilities, then we must ensure that they have the opportunity to do so. This is what is meant by keeping them clean so that a heart attack does not one day come to our Mother Earth. If our blood becomes contaminated, it will spread throughout our bodies and reach our heart, killing us. We must view the waters of the world the same way and ensure the health of our Mother Earth."

—James Ransom explaining the Thanksgiving Address of the Haudenosaunee (Haudenosaunee Environmental Task Force, 1992, p. 27)

Introduction: Indigenous Water Justice

It has been more than 400 years since settlers first arrived in the Lands of the Haudenosaunee—more than 400 years of ecological, social, cultural, Land, and Water transformation and genocide. Yet the Haudenosaunee Confederacy, along with Indigenous Nations across Turtle Island, remains in solidarity with Water, honoring its foundational role on Mother Earth through caretaking and protection. Many Indigenous communities have faced displacement, environmental degradation, and encroachment on our Lands by the United States over hundreds of years, affecting our access to clean and safe Water and our interconnected cultures and lifeways.

The connection to climate change becomes evident as rising temperatures and changing precipitation patterns contribute to the vulnerability of Water sources. As a result, the Waters of Turtle Island reflect the cumulative scars of colonization, including anthropogenic climate change. The climate crisis of today has been caused by the rapid and widespread burning of fossil fuels, particularly by industrial nations such as the United States. This warming is changing the Water, land, and ecology of this planet in support of settler lifeways at the expense of Indigenous ones protected under the *United Nations Declaration of the Rights of Indigenous Peoples* (UN General Assembly, 2007). With climate change, we have seen rising sea levels, shrinking snowpacks, increased flooding, droughts and severe weather events, and reduced river and lake levels, all of which are threatening Indigenous Peoples in urban and rural areas and the ecosystems and other relatives that rely on Water. Climate change compounds these challenges by intensifying scarcity of clean Water through pollution and extreme events, disproportionately impacting Indigenous communities. Climate change and its impacts on Water are an extension of colonization, the impacts of which violate Indigenous Peoples' right to self-determination under the *United Nations Declaration of the Rights of Indigenous Peoples*.

Not only does climate change's impact on Water threaten Indigenous lifeways and Lands, but so do dominant adaptation strategies. As discussed in Chapter 2, "Cultural Preservation and Revitalization in the Face of Climate Change," Euro-Western sustainability presents two main paths: either humans take control to best manage ecosystems and more-than-human relatives, or humans distance themselves to not interfere with their living autonomy. Both of these approaches—"fortress and green militarized conservation"—employ Euro-Western/mainstream scientific worldviews of human–nature separation, human (specifically colonial institution) control over nature, and Euro-Western cultural assessment of what nature is worth preserving (Jacobs et al., 2022). For example, Indigenous Peoples' hunting, fishing, and gathering practices can be outlawed on waterways or in the Ocean in the name of conservation, further disrupting their lifeways and supporting the goals of colonization (Siurua, 2006). And in fact, many of these Nations are leading in, rather than preventing, conservation efforts, contradictory to common assumptions held by outsiders that Indigenous Nations typically overharvest because of their treaty rights (see Breda, 2023). In contrast, Indigenous philosophies prioritize relational value, as we as humans are not separate from the rest of the Water (and the Land) and depend on nurturing relationships to live and thrive with all beings.

Water justice, for Indigenous Peoples and the animals, Land, plants, and Water that they are connected to and accountable to, begins with respecting Water and all of its relations and expands to encompass the fair and equitable distribution of Water for all beings and ecosystems with attention to past and present colonial harms.

Water justice, for Indigenous Peoples and the animals, Land, plants, and Water that they are connected to and accountable to, begins with respecting Water and all of its relations and expands to encompass the fair and equitable distribution of Water for all beings and ecosystems with attention to past and present colonial harms. Indigenous Water justice specifically foregrounds recognition of traditional Water rights outlined in treaties and cultural protocols and involves repairing the historical and ongoing struggles of Indigenous Peoples in asserting our Water rights (Robison et al., 2018). This includes the right to maintain relationships to Water that sustain our lifeways and cultural practices.

Effective responses to the intersection of climate change and Indigenous Water justice require recognizing and rectifying historical injustices while fostering resilient and sustainable Water systems through committed, inclusive collective

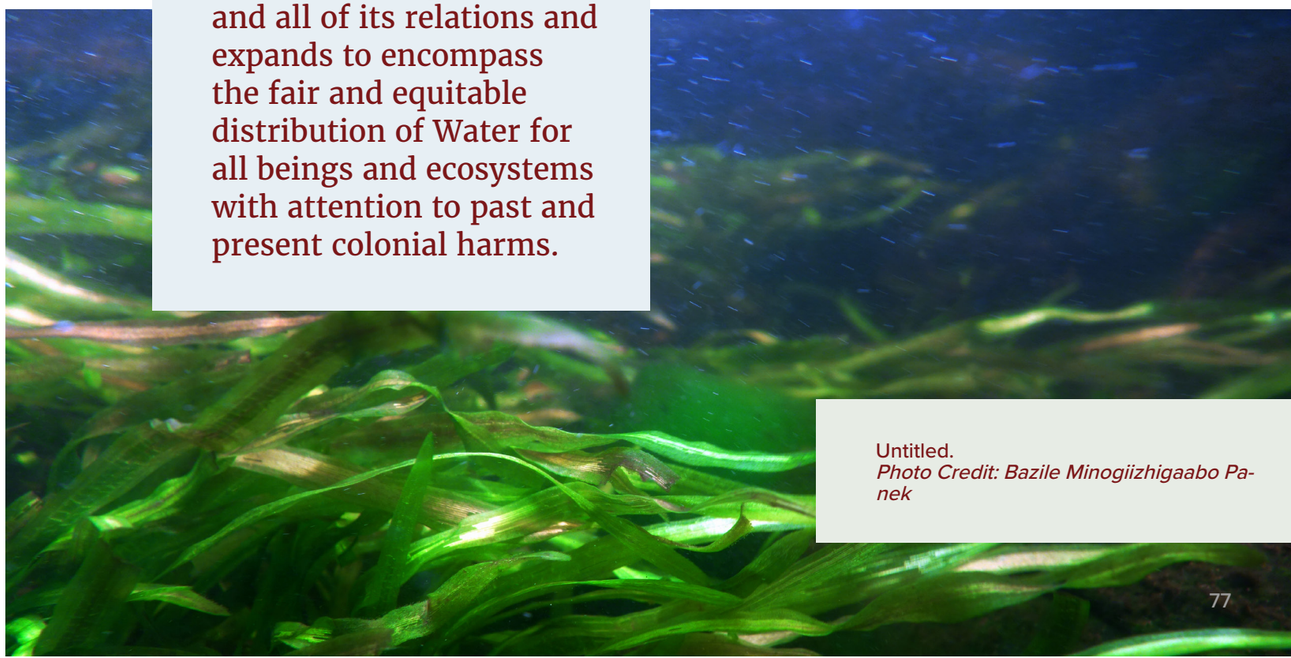

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Photo Credit: Bazile Minogiizhigaabo Panek

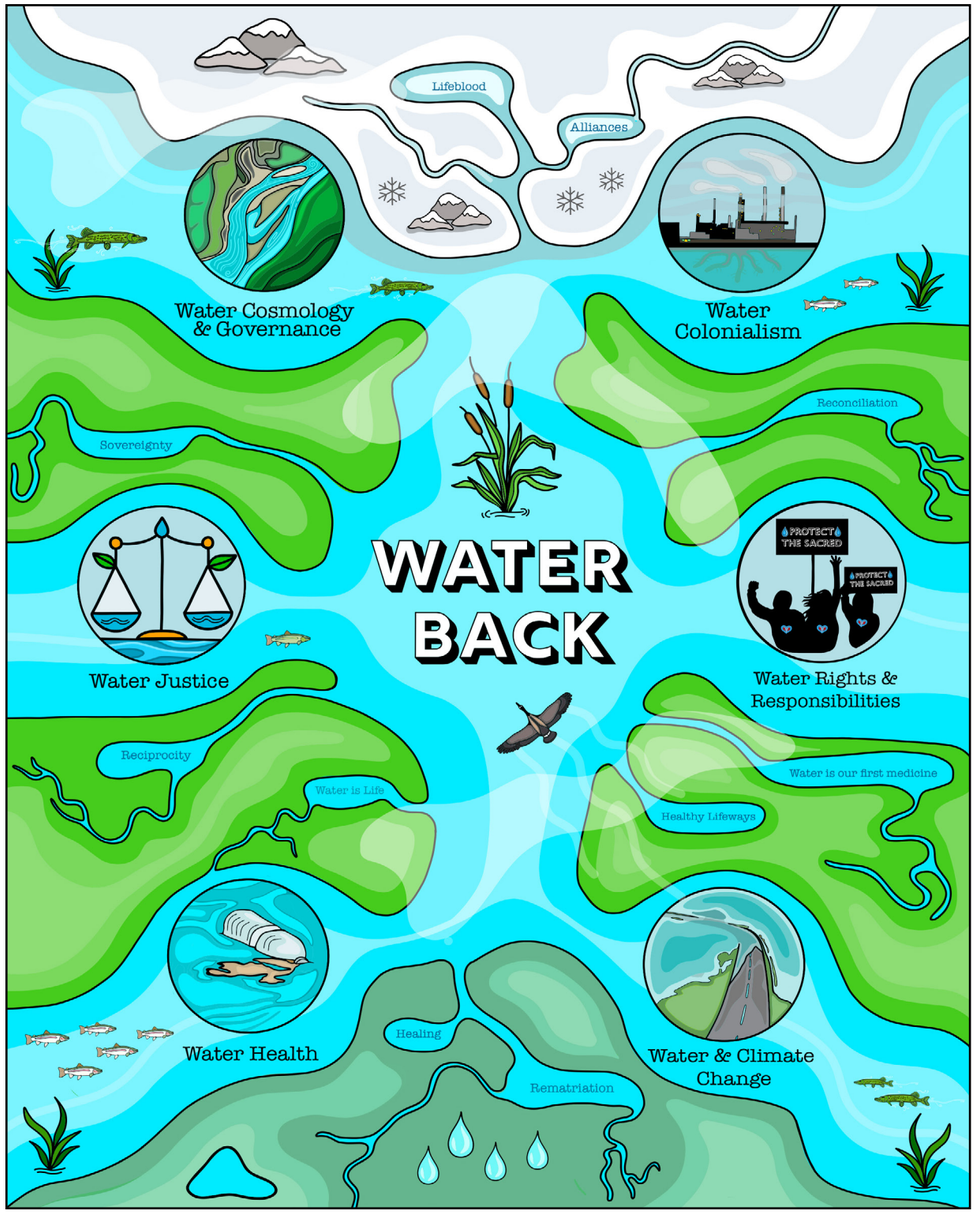

Figure 3.1. Water Back Framework. Source: Leonard et al. (2023). Artist: Hawlii Pichette.

action (Leonard et al., 2023). Today many Indigenous Peoples and Tribal Nations are act- ively calling for Water Back, the return of Water to Mother Earth and communities (Fig. 3.1). Policies and initiatives must be developed through meaningful, sustained leadership from and consultation with Indigenous communities, considering our unique cultural, social, and ecological contexts. This means incorporating Indigenous Knowledges and cosmologies to guide in Water management strategies and upholding our Water and Land rights, including the rights to free, prior, and informed consent, and addressing the systemic issues that contribute to Water insecurity. To achieve Water justice for Indigenous Peoples and the animals, Land, plants, and Water that they are connected to and accountable to, we must support Indigenous-led solutions, empower communities to adapt to changing Water conditions, and address the root causes of environmental injustice.

Water Is Life: Indigenous Water Teachings

The Waters have always been vital to all Indigenous Peoples. Indigenous worldviews recognize the inherent spirit of Water and its important place in life and culture. Disruption and loss to Water is a loss of lifeways, culture, language, and self-determination, because Water is fundamental to Indigenous life. Therefore, climate-driven disruptions and losses related to Water constitute violations of Indigenous People's rights to culture and self-determination articulated by the *United Nations Declaration of the Rights of Indigenous Peoples*. There are many Indigenous teachings about Water, too many to respectfully convey here in their entirety. Instead we share a few key examples from across Turtle Island:

Anishinaabek: For millennia the Anishinaabek (Odawa, Ojibwe, and Potawatomi) occupied the Lands and Waters in Wisconsin, Michigan, Minnesota, and Ontario surrounding the western Great Lakes (McGregor et al., 2023). Like other cultures around the world, the Anishinaabek have stories of a great flood. It is said that Nanabush gathered all the animals onto a huge floating tree during the flood. All the animals attempted to dive into the Water to retrieve some soil, but it was the muskrat who dove to the depths to retrieve the soil of the earth. It was here on Lake Huron where Nanabush planted that piece of soil onto the back of the Great Turtle at the island of Michilimackinac (Blair et al., 1911).

The Anishinaabek also have stories of Water spirits that help protect the Water. One of the spirits is known as Mishipizhu, the underwater panther (Nelson, 2013; Manitowabi, 2017; Smith, 1995). The home of Mishipizhu is at Mnidoowanshing (Manitowaning, Canada), meaning the Den of the Spirit. The town on Manitoulin Island is named after this magnificent Water spirit. There is an underwater tunnel under the ground connecting two bodies of Water, Manitowaning Bay and South Bay, and it is here where the Water spirit travels and makes his home (Paquin, 1937). The Anishinaabek have always respected both the underworld home of Mishipizhu and the sky world, home of the Thunderers and their sacred relationships to Water. Each spring the Thunderbirds travel east from the Rocky Mountains and bring the rain to replenish the earth (Smith, 1995).

Grounded in these teachings, Josephine Mandamin started the Anishinaabek Kwe Water Walkers' initiative, where Water Walkers prayed for the Water as they walked around the Great Lakes. These women started their first walk around Lake Superior in 2003, then around Lake Michigan in 2004, Lake Huron in 2005, and Lake Ontario in 2006. The women carry a copper pail or kettle of Water while they walk. Copper plays a vital role in the ceremonies of the Anishinaabek, as our people have utilized copper for thousands of years. Their "Statement of Mother Earth Water Walkers" says:

> "Our Ancestors have inhabited the Great Lakes Basin since time immemorial, long before the current political boundaries were drawn. Our spiritual and cultural connections to our Mother Earth are manifest by our willingness to embrace the responsibility of protecting and preserving the land and waters."
>
> **—Hand,** 2007

In May 2015, there was a Water Walk in Wikwemikong, Ontario, Canada—a community walk around the perimeter of the First Nations' unceded lands. Since Wikwemikong is surrounded by Water, it is important for its citizens to maintain the responsibilities of taking care of the Water to preserve the health and well-being of the community. During the Water Walk, it is the responsibility of the men to walk in the front of the line. The men act as protectors and guard the people while they walk along the Water's edge. The women take turns carrying the copper pail of Water. Other men walk in the back of the line as well, to make sure nobody is left behind during the walk.

In the Treaty #3 territory of Canada, the Anishi-

naabek Women's Council and the Elders created the Nibi Declaration (Craft & King, 2021). As Craft and King (2021) state,

> *The Nibi Declaration voices the relationship with water and jurisdictional responsibility that all Anishinaabe citizens have within the territory. It also affirms the responsibilities and relationships that others living within the territory should have with the water in it. In many ways, and, including through the ceremonial and community engagement process, The Declaration is responsive to the water and its desire to be engaged with through the terms of The Declaration. [...] we situate the Nibi Declaration process as an affirmation of jurisdiction, based on Anishinaabe laws. Its purpose is to give effect to the Manito Aki Inakonigaawin (MAI or Mother Earth Law) and to help advance the watershed management planning in the Treaty #3 territory.*

The return of Manito Aki Inakonigaawin to the Water and Land led by Anishinaabe citizens and grandmothers is a rippling example of Water Back and self-determined justice for Water sovereignty.

The Haudenosaunee Confederacy: According to the oral tradition of the Haudenosaunee, the Waters play an important role within their Creation Story. Before the Land was formed, the world was made up of Water. It was the waterfowl who greeted Sky Woman as she fell from the Sky World upon the turtle's back to create Turtle Island (Ransom, 1999).

One of the precolonization treaties among the Indigenous Nations that protected the Water was the Dish with One Spoon wampum agreement (Six Nations Polytechnic, 2016). This was an agreement between the Anishinaabek and Haudenosaunee Nations at the Great Peace of Montreal in 1701 (Jacobs & Lytwyn, 2020) But the Dish with One Spoon idea is much older than that. The Haudenosaunee give thanks to all of Creation during their ceremonies and daily living through the Thanksgiving Address. They give thanks for the Thunderers and Waters that both give us life. The Two Row Wampum agreement was the first treaty between settlers and Indigenous Peoples when it was signed in 1613 between the Haudenosaunee and the Dutch. It was through this treaty, known as the Kaswentha (Lyons, 2008), that both Nations affirmed they would share the Lands and Waters while living side by side traveling down the river of life.

Cherokee Nation: Since time immemorial, the Cherokee people have practiced the ritual of "going to Water." Going to Water is a daily ritual and practice of submerging oneself in ᎠᏰᏍ (Water) for the purpose of communing with nature and realigning oneself (Kilpatrick, 1991). The age-old custom is a conscious practice of entering Water to experience healing and to recognize the significant role that Water plays as a life-giving force for every living being across Turtle Island. The Cherokees' belief system and worldview are centered around reciprocity and their role to all living things within the landscape. Cherokee ontology anthropomorphizes the rivers and streams into a person recognized as ᏣᎾᏓᏔ ᎠᏁᎴᏍᏫ (Long Man) (Gritts, 2024). Representing the watershed, Long Man extends from the tops of the mountains all the way to the coastlines and has his feet in the sea. The Cherokees believe that the Water and rivers are their way of carrying messages and prayers to all of their more-than-human relatives (plants, animals, and all other beings). Based on recognition of interconnectedness, the Cherokees' practices and spirituality are rooted upon their relationship with Water. Therefore, any degradation of Water quality/quantity or loss of habitat is detrimental to their duties and rights as a protector and a steward (Kilpatrick, 1991; Lefler, 2015). "The Cherokee relationship with Water is sacred and is given to us as the basis and sustainer to our very existence by ᎤᏓᎳᏫᏗ (Creator)" (Gritts, 2024).

Climate Change Impacts on Water and Indigenous Nations

Climate change is impacting Water at all stages of the Water cycle, which is disproportionately disrupting Indigenous lifeways. Climate change has shifted patterns of precipitation, altering seasonal cycles and increasing the severity of extreme events of both too much and not enough Water. Droughts increase Water security concerns for Indigenous Nations compounded by already present disparities. In northern California, the Bishop Paiute Tribe is confronting significant Water challenges exacerbated by climate change (Bennett-Begaye, 2023). The Bishop Paiute Tribe faces Water injustices as the City of Los Angeles acquires land surrounding their territory to secure conveyed Water rights, diminishing the Tribe's access to essential resources. Climate change exacerbates these challenges by reducing snowpack levels in the basin, further straining Water availability for the Nation and surrounding communities. Additionally, Los Angeles's utilization of Water from the Owens Valley, constituting approximately one-third of its Water supply, disproportionately impacts the Bishop Paiute Tribe and highlights broader issues of Water allocation and equity. The severity of the drought crisis further compounds their struggle for Water security. Chairwoman Picard emphasizes the urgency of elevating this issue as a human concern, underscoring the need for external assistance to navigate the complexities of contending with a substantial entity like the City of Los Angeles. The Bishop Paiute Tribe's call for support in addressing water-related challenges highlights the broader vulnerability of Native Nations in the face of climate change–induced threats to Water resources. This situation emphasizes the imperative for collaborative and equitable approaches to ensure the Water security and resilience of Indigenous communities in the changing climate landscape.

Flooding events similarly disproportionately impact Indigenous Peoples. For example, Native Americans in Oklahoma are more likely to be impacted by floods compared to the general state population. This heightened susceptibility to flooding is attributed to historical settlement patterns, socioeconomic factors, and limited access to resources, revealing a specific instance of how layers of colonial practices and policies emerge today as Water injustice (see Li et al., 2024).

Changes in precipitation also impact Water quality present in surface and groundwater storage such as rivers, lakes, aquifers, reservoirs, and so on. Increased precipitation can increase stormwater runoff and nutrient loading that can cause downstream Water quality issues, especially critical for hunters and gathers whose food and foodways are directly impacted by that contamination. For example, the Yurok, Port Gamble S'Klallam, and Puyallup Tribes are concerned about 6PPD, which is commonly found in tires and breaks down into 6PPD-quinone. This chemical can be carried in storm runoff and pose a threat to coho salmon and other aquatic species. In response to this issue, these three Native Nations submitted a petition and asked Environmental Protection Agency (EPA) to develop regulations that prohibit the use of the chemical 6PPD in tires. On November 2, 2023, EPA granted the petition and sent a letter to the

Mono Lake, California, home of the Mono Lake Kutzadika'a Tribe, whose Waters also face injustices as the City of Los Angeles siphons the basin. *Photo Credit: Ashley Gries*

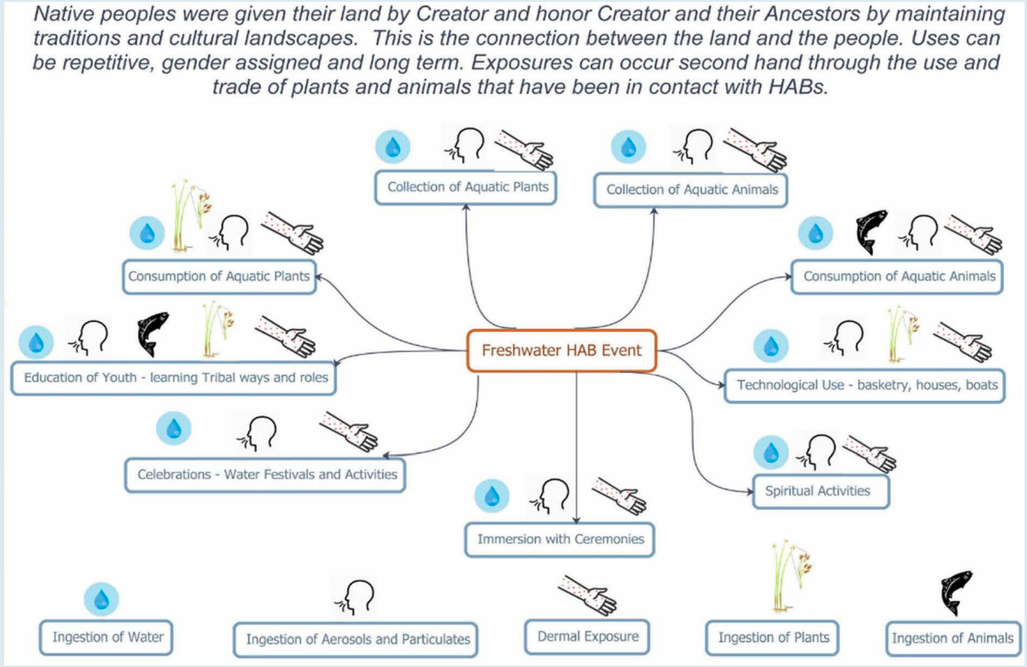

Figure 3.2. Tribal cultural use of fresh Water and potential pathways for exposure to harmful algal blooms (HABs). Adapted from an image by the Big Valley Band of Pomo Indians and the Karuk Tribe (with assistance from Meyo Marrufo and Dr. Jeanine Pfeiffer) (Smith et al., 2021).

petitioners laying out its plan to address 6PPD. EPA's plans include the issuance of an advance notice of proposed rulemaking for 6PPD under Toxic Substance Control Act Section 6 and additional data gathering activities under the act. Environmental toxins, such as 6PPD, pose increasing risks to Water as storm events increase in the region, further exacerbating runoff events and overloading watercourses with various forms of anthropogenic toxins.

Additionally, saltwater intrusion from rising sea levels and altered precipitation patterns from climate change pose profound challenges to Water quality for Tribal Nations, Native Hawai'ians, and other Indigenous Peoples across mainland and island territories. For example, in Alaska and Hawai'i, Native communities grapple with the intrusion of saline Water into freshwater rivers and aquifers, compromising both the quality of drinking Water and the availability of essential resources and, therefore, food security. For mid-Atlantic Tribes, saltwater intrusion is also a major concern, and they have been applying Indigenous Knowledges to successfully adapt to these changes (Leonard, 2021). In 2015, when the Shinnecock Indian Nation began to implement portions of their Climate Change Adaptation Plan, the Nation avoided non-Indigenous strategies that centered around hard armoring of shorelines, which redirects wave energy rather than lessens it. Instead, the Nation and their partners acknowledged the design and efficiency of nature. They supported and restored the ecosystem that already existed. The sand replenishment and planting of native grasses slowed the Waters coming in during storm surges, creating more space between the bay and upland (Leonard, 2021).

Harmful algal blooms (HABs) are another source of Water quality injustice induced by climate change. HABs, fueled by warming temperatures and altered precipitation patterns associated with climate change, can lead to the proliferation of cyanobacteria, producing toxins harmful to human health. Exposure pathways of these HABs within Tribal communities are exacerbated by climate change, as outlined in EPA's report on Clear Lake cyanotoxins (Ryan, 2022). Tribes relying on Water bodies that are increasingly prone to HABs for sustenance and cultural practices face heightened exposure risks through the consumption of contaminated Water and aquatic foods, as well as through direct contact during ceremonial, cultural, and recreational activities, as depicted in Fig. 3.2.

More frequent and intense weather events, coupled with sea-level rise, amplify the risk of groundwater contamination.

In the face of this threat, the project by the National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Coastal Ocean Science actively collaborates with Tribal Nations both locally and through regional partnerships to create workshops tailored to community needs, focusing on monitoring and detecting toxins to mitigate health threats related to HABs. A notable collaboration is with the Tribal Marine Stewardship Network, demonstrating a commitment to implementing Tribal-coordinated programs. This partnership aligns with existing initiatives, such as those with the Southeast Alaska Tribal Ocean Research, Chugach Regional Resources Commission, First National Health Authority,

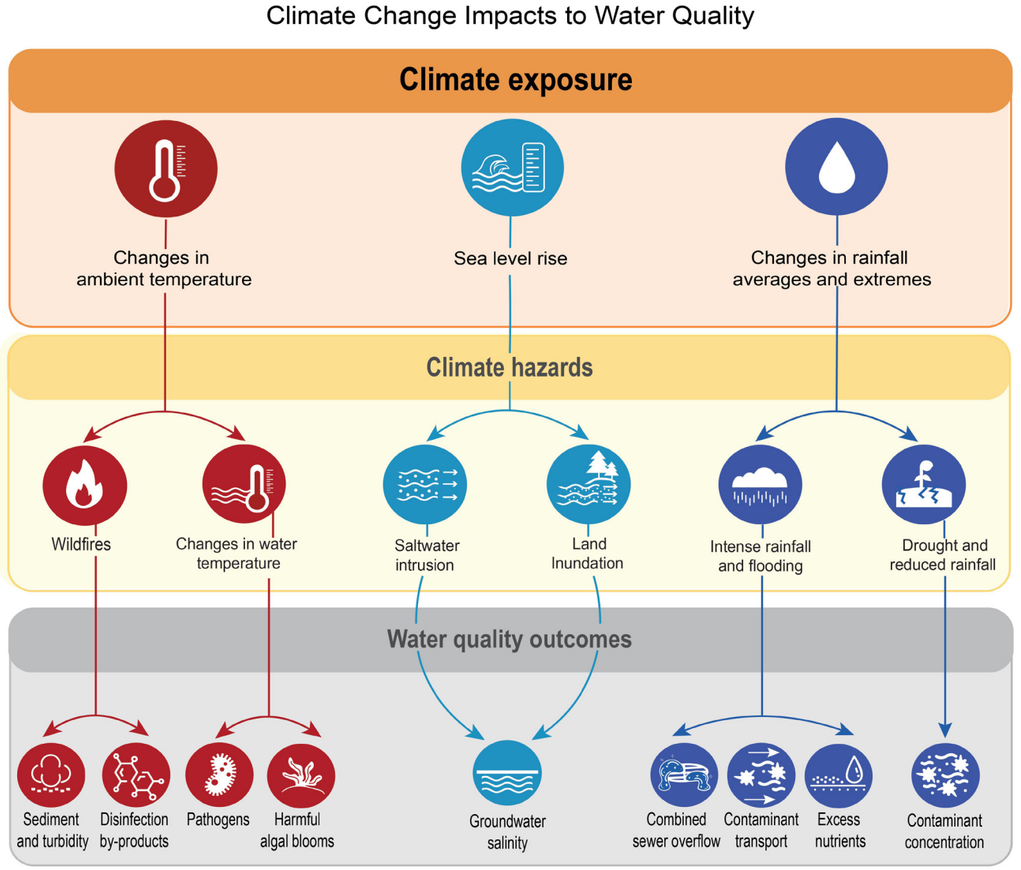

Figure 3.3. Climate change impacts to Water quality. The figure highlights the exposure pathways of increased temperatures, rainfall, and sea level rise across various emergent hazards and Water quality outcomes (Payton et al., 2023).

and Norton Sound Health Corporation. Through these collaborations, National Centers for Coastal Ocean Science seeks to enhance the resilience of Indigenous communities by co-developing strategies that address the specific challenges posed by HABs and promote the well-being of both marine ecosystems and the cultural practices tied to them (NCCOS, 2023). Other possible methods for Water-quality issues exacerbated by climate change are detailed in Fig. 3.3.

> There is an urgent need for non-siloed access to the best available science and data on hydrology to empower Native Nations to make informed decisions that safeguard their Water resources and ensure resilience in the face of environmental changes.

In addition to declining Water quality, shifting Water quantity with climate change can disproportionately impact Indigenous Nations (Cozzetto et al., 2013). This is present in Water scarcity and declining Water security in drought situations, as mentioned earlier, but also through cascading ecological relationships. With changing waterways and chemistry, aquatic species are disappearing and migrating. Aquatic species, integral to the sustenance of Tribal communities, face a multitude of impacts due to climate change, ultimately affecting the food resources of those reliant on them. The convergence of multiple stressors, including warming Waters, oxygen depletion, and Ocean acidification, poses a significant threat to the viability of shellfish and finfish populations, jeopardizing food security and dietary nutrients crucial to the well-being of coastal Tribal people who depend on these resources, such as the Shinnecock Nation. The increased prevalence of invasive species, outcompeting native counterparts, further compounds the challenges. Notably, the proliferation of harmful algal blooms, such as those causing paralytic shellfish poisoning, exemplifies the intricate interplay of climate change impacts (Cozzetto et al., 2013). These events not only directly endanger shellfish populations but also pose serious risks to coastal Tribal communities that rely on these aquatic resources, emphasizing the urgent need for adaptive and resilient strategies to safeguard both traditional food sources and the nutritional well-being of Indigenous populations.

For another example, we can turn to Hawai‘i. A recent study conducted by a team at University of Hawai‘i at Manoa showed how climate change and increased groundwater pumping may reduce the native *limu palahalaha*, a culturally significant seaweed, while promoting an invasive seaweed. Limu, vital as a traditional food and ecologically important, relies on fresh Water, forming a public trust use of Water. The research highlights the impact of climate change, urban development, and watershed changes on limu habitats, stressing the need for Water conservation and sustainable practices to address climate-induced shifts in limu ecosystems along the Kona coast of the Keauhou aquifer (The Maui News, 2023).

The effects of the changing Water levels are particularly of concern in wetlands, riparian zones, and other waterways of cultural significance. For example, Wild Rice (Ojibwemowin: manoomin; Dakodiapi: Psiŋ; Latin: *Zizania palustris*), an annual aquatic grass growing in the shallow lakes and streams of the upper Great Lakes, has also experienced habitat threats due to changing Water levels and temperatures with climate change. Wild Rice “provides spiritual, cultural, and physical sustenance as a sacred food for Anishinaabe, Dakota, Menominee, and many other Indigenous Peoples in this region” but is in decline due to a confluence of environmental factors (Nyblade, 2023). This decline reduces off-reservation Tribal harvest, a right guaranteed by treaties with the U.S. government (Thompson, 2017; Bouayad, 2020). Notably, Wild Rice on ceded territories outside of reservations in northeastern Minnesota and northern Wisconsin is declining by about six to seven percent per year, in part due to anthropogenic climate change (Nyblade, 2023). Specifically, increases in early summer precipitation and warmer winters with less snow and shorter ice duration negatively impact Wild Rice (GLIFWC Climate

San Pedro River Watershed, November 2023.
Photo Credit: Colleen Cooley

Change Team, 2023; Nyblade, 2023). These threats are further exacerbated by land cover change, including development furthering fossil fuel consumption, the major cause of anthropogenic climate change. The construction of oil pipelines has also caused major disruptions to surface and groundwater flows, harming Wild Rice beds (Marohn, 2023). And increased competition for Water resources with settler agricultural land use in places such as Northern Minnesota has led to deep impacts on manoomin cultivation and harvesting by Tribal Nations in the broader region (Searcey & Rojanasakul, 2023).

Changes in winter temperatures and ice do not just impact Wild Rice, but they also stress aquatic life, which must try to adapt to these conditions. For example, there have been mass mortality events among turtles due to winter oxygen changes (Lynn et al., 2014). Loss of sea ice is of particular concern because it impacts plant and animal relatives, subsistence practices, safety, and the cultural lifeways of Inuit Peoples (Knopp et al., 2022; Calista Elders Council, 2023).

Beyond changes in sea ice, the Ocean is experiencing other drastic shifts in response to increased atmospheric CO_2, impacting coastal Indigenous communities, Lands, and interconnected lifeways. Because of these connections, Indigenous Water justice includes Ocean justice and has spurred many collaborations between Tribal Nations, Alaska Native Villages, and Indigenous communities on sea level rise adaptation and relocation efforts. Indigenous Water justice includes exploring climate-based Ocean solutions where the needs of environmental conservation and Indigenous Nations are balanced (Villagomez & Johnson, 2024).

With warmer climate, Ocean temperatures are rising, causing Water to expand and contribute to sea-level rise along with the influx of Water from melting continental glaciers. This sea-level rise displaces and will continue to displace coastal Indigenous communities, saddling Tribes with millions of dollars in relocation efforts and loss of traditional Lands and cultural resources (Diaz, 2022), including sacred sites (e.g., the Caribbean and Hawai‘i). With increased sea levels compounded with development, deforestation, and urban infrastructure, flooding, erosion, and saltwater intrusion all exacerbate socio-ecological challenges for coastal Indigenous communities [see for example case studies in Arctic (Shishmaref), Louisiana Gulf Coast, and island Nations and communities]. These rising Waters

can ultimately lead to infrastructure decommissioning, loss of essential services, and costly rebuilding projects.

For example, rising sea levels are posing immediate and tangible threats to the Jamestown S'Klallam Tribe, prompting a comprehensive vulnerability assessment of the region (Swanson, 2023). Already, the Tribe has decommissioned one building due to elevated sea levels in Sequim Bay, while tidal Waters encroach upon a second. The Tribe's Natural Resources Department is closely monitoring its lab building, as recent king tides have come perilously close to inundating the facility. With the imminent relocation of the lab and a broader plan to address other buildings, homes, groundwater wells, and septic systems in the area over the next few years, the Tribe anticipates significant challenges. Given the severe drought conditions in much of the Olympic Peninsula, seawater contamination of groundwater wells could exacerbate Water supply issues. Additionally, compromised septic systems due to tidal Waters pose threats to public health and may result in toxic plankton or algae blooms, jeopardizing the shellfish upon which the Tribe relies. The Tribe is navigating a multifaceted impact scenario, ranging from immediate infrastructure concerns to long-term risks to Water supply and ecological resources.

Rising Ocean temperatures and acidification have contributed to coral bleaching, changing the distribution and migration of species important to many Indigenous foodways. For example, warming Waters and a strong El Niño (fueled by changing climate) brought a Central/South American venomous sea snake to Southern California shores in 2018 (Sahagún, 2018).

Access to comprehensive hydrology data and capacity building for data analysis and interpretation is imperative for Native Nations to make informed decisions regarding Water resource management amidst the impacts of climate change. Despite the significant challenges Indigenous Peoples face due to climate change's effects on Water, such as altered precipitation patterns and dwindling snowpack, there remains a glaring lack of accessible data specific to these communities. As highlighted by Leonard et al. (2023), the current data deficit hampers Indigenous Nations' ability to understand and address these issues effectively. Therefore, there is an urgent need for non-siloed access to the best available science and data on hydrology to empower Native Nations to make informed decisions that safeguard their Water resources and ensure resilience in the face of environmental changes. The following examples outline how Native Nations have worked to address these various challenges and changes.

Groundwater

The future availability of groundwater is influenced by climate change and anthropogenic pumping impacts. Climate change affects snowmelt, rainfall patterns, and rates of evapotranspiration, ultimately reducing groundwater replenishment. Groundwater availability is a concern for Tribal communities now in the arid Southwest and will continue to be in the future. The court case *Agua Caliente Band of Cahuilla Indians vs. Coachella Valley Water District* was a big step toward Tribes asserting their rights to access and manage vital groundwater resources (Lankford, 2018).

Flood Events

According to the *New York Times*, Indigenous "homeowners are less likely to have flood insurance, making it harder to rebuild. Of 574 federally recognized tribes, fewer than 50 participate in the National Flood Insurance Program, according to a review of FEMA data" (Flavelle & Goodluck, 2021). Factors that contribute to such a low number include the cost often being prohibitive to some Tribal households and the federal government having only completed flood maps for one-third of the federally recognized Tribes (Flavelle & Goodluck, 2021). In 2019, Tribal members on parts of the Pine Ridge Indian Reservation were left stranded for two weeks in a humanitarian crisis caused by an abundance of snow and flooding. This situation is becoming increasingly common and poses extreme risk to health and safety.

Drought Events

Droughts threaten the survival of plants and animals, including those that have cultural significance to some Indigenous communities. Reduction in plants and wildlife can directly impact food sources for hunting and gathering communities. Increased frequency of droughts and their detrimental effects prompted the Eastern Shoshone and Northern Arapaho Tribes of Wind

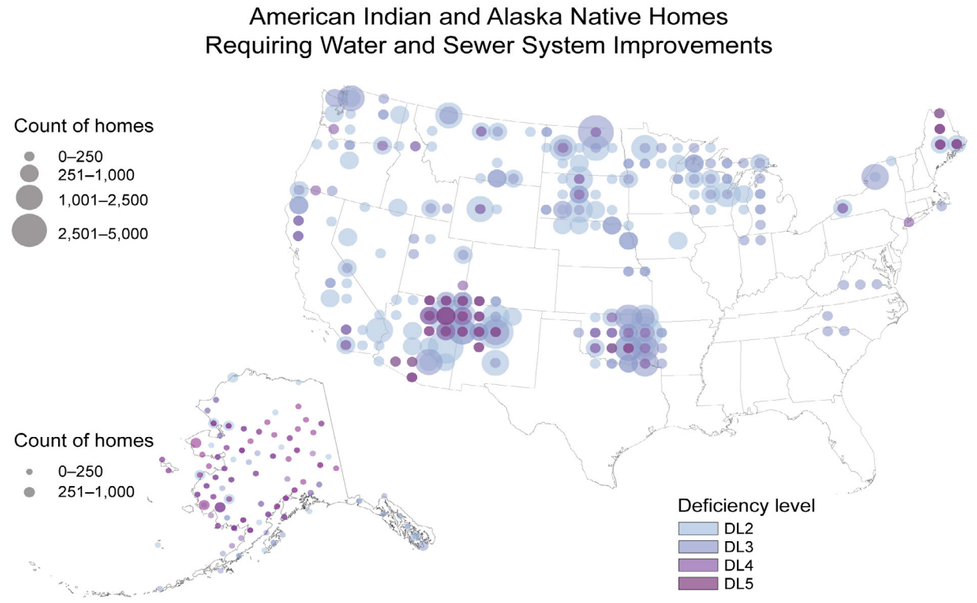

Figure 3.4. "The Indian Health Service (IHS) maintains a database of American Indian and Alaska Native (AI/AN) homes requiring sanitation facility improvements within IHS service areas. The figure shows sanitation deficiency levels in AI/AN homes across the country ranging from Level 2 (capital improvements are necessary to meet domestic sanitation needs) to Level 5 (lacks a safe Water supply and a sewage disposal system). The IHS does not collect data for Hawai'i, the U.S.-Affiliated Pacific Islands, or the U.S. Caribbean, but elevated rates of plumbing deficiencies are documented in those regions. Figure credit: Indian Health Service." (Payton et al., 2023)

River, who have experienced low Water supply, to work with federal agencies and academic partners to develop tools to assist with drought management (NIDIS, n.d.a). They developed quarterly summaries and an online dashboard of climate data to assist with decision-making (Stiles et al., 2020).

Water Infrastructure

On top of changing Water relations due to changing climate, Tribal Nations and Indigenous communities must grapple with an increasingly precarious situation as aging Water infrastructure, originally designed under regulations and standards tailored to a static climate, now faces accelerated deterioration. The impact of climate change, discussed previously, has strained these outdated systems beyond their intended capacities, as seen in Fig. 3.4 (Payton et al., 2023). The resultant degradation also poses a significant threat to public health, as compromised Water infrastructure jeopardizes the delivery of safe and reliable drinking and irrigation Water, the disposal of wastewater, protection from floods, and mitigation of droughts.

Drinking Water contamination is of particular concern for humans and more-than-human relatives. Often, existing Water contamination is exacerbated by climate change, creating a confluence of environmental injustices that negatively impact Indigenous Peoples. For example, the Red Hill (Kapūkakī) Water contamination crisis in Hawai'i centers around the U.S. military's Red Hill Bulk Fuel Storage Facility, where leaks from massive underground fuel tanks have contaminated the local Water supply (Hofschneider, 2023). Intensified weather patterns and sea-level rise have increased stress to existing fuel storage infrastructure and ultimately vulnerability of nearby Water resources to contamination by potential leakages, heightening the risk of events like those witnessed at Red Hill

(Kaomea, 2024). Therefore, the intersection of climate change and inadequate infrastructure intensifies the challenges faced by Indigenous communities.

Infrastructure and Water

Not all infrastructure upgrades enacted and proposed will benefit Indigenous Nations. Many recent infrastructure projects, even justified by their potential protection for clean Water, can cause considerably more damage to waterways and their interconnected Indigenous People and ecological communities. For example, the Line 3 pipeline constructed across the state of Minnesota was proposed to replace an existing, aging pipeline. Enbridge, the company proposing the pipeline, claimed this new pipeline was needed to prevent future spills. However, the new pipeline they proposed and eventually built was three times bigger than the existing one, and they did not (and never planned to) remove the old pipeline.

An example of Indigenous-led infrastructure action is how some communities across Boriken (Puerto Rico) shifted from fossil fuel dependency to solar power following Hurricane Maria and the resulting crisis (Avery, 2023). The juxtaposition between antiquated systems and the dynamic challenges of a changing climate underscores the urgent need for targeted investments and adaptive measures to fortify Water infrastructure within Tribal Nations and Indigenous communities, ensuring the resilience and well-being of their populations in the face of evolving environmental conditions. Indigenous Water protectors play a pivotal role in advocating for sustainable solutions, emphasizing the need for climate-resilient infrastructure and challenging practices that jeopardize not only their immediate well-being but the long-term environmental health of their ancestral Lands (see Hofschneider, 2023).

Legal and Policy Issues: State/Federal Agency Relationships with Indigenous Peoples for Water Justice

Indigenous Water teachings compel Indigenous Water justice activists to counter the 500-year legacy of colonization enacted through the United States' laws and policies at both the state and federal level. Tribal Nations, often at the forefront of environmental vulnerabilities, confront the compounded impacts of lax Water pollution controls and the exacerbating effects of climate change on Water resources. As climate change intensifies—altering precipitation patterns and elevating the risk of pollution events—the need for robust regulatory mechanisms becomes paramount. Water justice for Indigenous Nations works to advance law and policy changes to support Indigenous self-determination, sovereignty, and adaptation in the face of Water injustice exacerbated by climate change. Specifically, many Indigenous Nations entered into treaties with the United States that guaranteed access to existing Water within their territories and treaty boundaries, as well as off-reservation access. These Water rights have not all been upheld by the United States, furthering the diminishment of Indigenous People's ability to continue their cultural lifeways and achieve self-determination.

Transboundary Indigenous Water Governance

Climate change has intensified challenges in the Colorado River Basin, including prolonged droughts and unpredictable precipitation patterns, making it imperative to integrate Tribal voices into decision-making processes. The potential repercussions of neglecting Tribal inclusion in negotiations could result in inadequate policies that fail to address the unique vulnerabilities faced by Indigenous communities, leading to a diminished capacity to navigate the escalating impacts of climate change on Water resources in the Colorado River Basin (Hager, 2023). But recently, the Supreme Court denied the Navajo Nation Water rights for the Lower Colorado River (Maguire & Klobas, 2023). As Water becomes increasingly scarce on the Navajo Nation with the changing climate, this Supreme Court ruling further limits the Nation's ability to adapt and becomes a direct example of continued acts of colonial oppression.

The need for transboundary Water governance collaboration and partnerships is not limited to the Colorado River of the Intermountain West but also extends down from Canada and into the Midwest, as is the case of the Missouri River Basin. The Missouri Basin is home to 62 federally recognized Tribal Nations (Bamford et al., 2020). Increased average temperatures, drought, and flooding are becoming more frequent and causing widespread negative impacts across the basin. Major flooding occurred on the Missouri River in 2011, followed by widespread drought across the region in 2012. A flash drought developed across this region in 2017, resulting in an estimated

$2.6 billion in agricultural losses (NIDIS, n.d.b). These impacts are not limited to the Native Nations or one economic sector but extend outward to the "breadbasket" within Kansas and Nebraska (NCA, 2018). Ineffective practices and lack of planning have the potential to inflict major consequences for the Midwest agrarian communities. Watersheds do not recognize political boundaries or colonial borders and require transdisciplinary partnerships and holistic approaches for continued longevity.

For example, NOAA's National Integrated Drought Information System (NIDIS) has recognized the value of the centuries of observations and collective knowledge that these Native Nations carry. In 2020, NIDIS launched a Tribal drought engagement strategy with Native Nations in the Missouri River Basin and Midwest regions to ensure the inclusion of Indigenous perspectives in the implementation of NIDIS (NIDIS, n.d.b). This initiative has resulted in rich engagement on drought issues and the development of inter-Tribal partnerships with Native Nations of the Missouri River Basin and beyond (Bamford et al., 2020).

Furthermore, the intersection of Tribes, the Clean Water Act, and climate change forms a complex nexus revealing gaps in regulatory frameworks that disproportionately affect Indigenous communities. This has been underscored by the challenges in Washington State's Water pollution oversight (Mohr, 2023). The Clean Water Act, designed to protect Water quality, is a critical tool in this context. However, the inadequacies highlighted in the 2018 Government Accountability Office report underscore the urgency of addressing systemic deficiencies, ensuring that compliance processes are not only enforcing the Clean Water Act but also adaptable to the evolving challenges posed by climate change. The Treatment as a State (TAS) provision under the Clean Water Act allows Tribal governments to be treated similarly to state governments regarding certain regulatory responsibilities under the act. This provision acknowledges the authority of Tribes to manage water-quality programs on their Lands. Under TAS, eligible tribes can apply to EPA for authority to develop and implement Water quality standards, monitoring, permitting, and enforcement programs on their reservations or

Overlooking the put-in (launching point) for the Desolation/Gray Canyon section of the Green River.
Photo Credit: Colleen Cooley

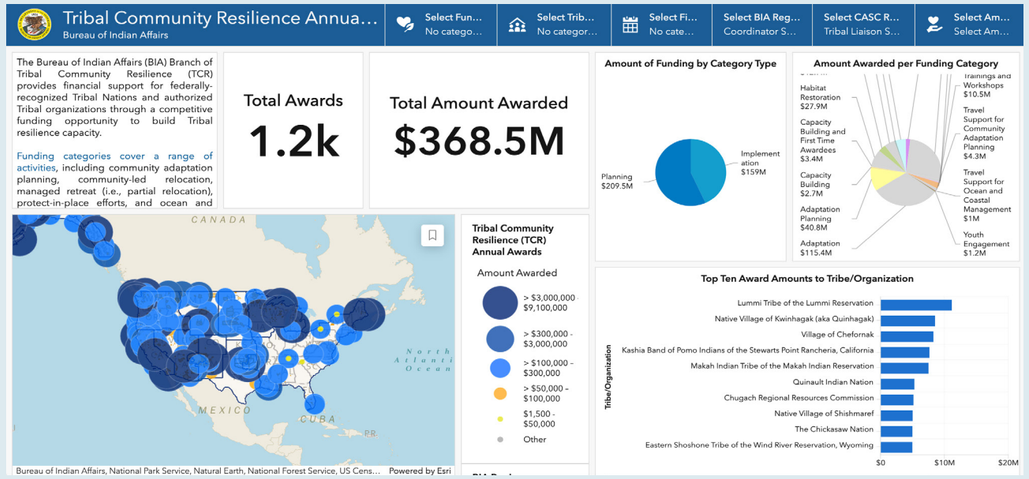

Figure 3.5. The Bureau of Indian Affairs Branch of Tribal Community Resilience Annual Award Dashboard houses data listing all TCR funding awarded to Tribes and Tribal organizations since TCR's founding in 2011. This tool allows users to filter results by BIA or U.S. Geological Survey Climate Adaptation Science Center region, individual Tribe or Tribal organization, funding category, and funding amount. This figure shows all awards from fiscal years 2011 to 2024 in the funding categories Ocean and coastal management; travel support for Ocean and coastal management; relocation, managed retreat, and protect-in-place (RMP) planning; RMP Implementation; and RMP coordinator. A summary of all past solicitations and awards is also available on the TCR Annual Awards Program webpage: www.bia.gov/service/tcr-annual-awards-program.

Tribal Lands. Once designated, the Tribe assumes regulatory authority over these programs within its jurisdiction, akin to states' authority over Water quality within their boundaries. To qualify for TAS status, Tribes must demonstrate their capability to administer these programs effectively and meet specific criteria outlined in the Clean Water Act and EPA regulations. Once approved, Tribes have the authority to set Water quality standards, issue permits for point source discharges, conduct monitoring and assessments, and enforce Water quality regulations (Diver, 2018). Revisions to the TAS mechanism within the Clean Water Act must also be made to uphold Indigenous Nations' Water rights and their capacity to adapt with climate change. Tribal involvement and empowerment in shaping Water management policies emerge as key components in fostering environmental justice and resilience within Indigenous communities.

This type of collaboration between state, federal, and Tribal agencies is underway. Specifically, the Bureau of Indian Affairs (BIA) Branch of Tribal Community Resilience (TCR) has awarded millions of dollars in Tribal projects centering relocation, managed retreat, and protect-in-place (RMP) activities and Ocean and coastal Management, among other categories, since it began in 2011 (Fig. 3.5). The BIA offers funding through their Annual Awards Program for Tribal Community Resilience (BIA, n.d.) in addition to other federal agencies such as EPA and FEMA. Additionally, $135 million from the federal government has been awarded to fund community-driven relocation of Tribes affected by sea-level rise and other consequences of climate change (DOI, 2022; BIA, 2023). The U.S. Geological Survey (USGS) Climate Adaptation Science Centers (CASCs) have funded Tribal climate adaptation research related to Indigenous Water justice (NCASC, n.d.; Midwest, 2020), as has the National Science Foundation (Rising Voices, Changing Coasts, n.d.). Given the complex bureaucracy, federal agencies do struggle to work through BIA to distribute funds to Tribes. Deeper multiagency collaboration is required to fully meet the needs of Tribes and leverage these resources in support of Indigenous self-determination and adaptation in the face of climate-driven Water injustice.

It is important that this work respects Tribal sovereignty, as in Public Law 93-638 (BIA, 1996), and does not take the form of paternalism. This can happen by centering Indigenous cultural sovereignty and resurgence in environmental governance, adaptation, and harm reduction (Tribal Adaptation Menu Team, 2019). Additionally, stewardship practices have long differed between Indigenous communities and Western institutions, posing significant challenges for building and maintaining meaningful partnerships. For meaningful partnerships between Tribal Nations/Indigenous Peoples and other government institutions, agency staff need cultural competency training to begin to understand such differences. Examples include Portland State University Institute for Tribal Government's Certificate in Tribal Relations (PSU, 2024) and the Tribal Governance Certificate from the University of Alaska Fairbanks (UAF, n.d.).

The Columbia River is one site of culturally competent collaboration. As climate impacts intensify in the Columbia River Basin, there is a growing recognition of the need for a more inclusive and adaptive approach to governance. The emphasis on incorporating the perspectives of Tribal Nations acknowledges their historical connections to the river and its ecosystems. The envisioned treaty revision aims to underscore a commitment to environmental stewardship, resilience, and the interdependence of Tribal well-being and the health of the Columbia River. This approach advocates for a more equitable and sustainable transboundary governance framework in response to the evolving challenges posed by climate change (Ritzman & Everett, 2023). The need for such collaborations is echoed and underway across the Great Lakes region as well (Leonard, 2019; McGregor et al., 2023; Mussett et al., 2023), with concerns about warming Waters and also anticipated requests for Water exports to increasingly water-stressed areas (Ross, 2023; Looby & Vaisvilas, 2023).

Tribes in other areas have taken different approaches, including legally recognizing the rights of Waters and Rivers as understood within their Indigenous worldviews and governance. In 2019, the Yurok Tribe declared the rights of the Klamath River (Jacobs et al., 2022). Following this declaration, dams along the River are being removed by Native Nations in order to restore ecosystems and their connectivity. Dam removal has proven successful in the past. For example, the Elwha and Glines Canyon dams were removed over a decade ago in Washington State and salmon have returned to the Elwha River, supporting the cultural revival and revitalization of the Lower Elwha Klallam Tribe (Munsch et al., 2023). This is especially significant in the face of climate change, as Chinook salmon are highly vulnerable to predicted seasonal flow changes on the Olympic Peninsula (Pess et al., 2023). These examples underscore how Tribes are employing adaptive strategies, community involvement, and collaboration to navigate the environmental challenges exacerbated by climate change.

> Water teaches us, through its own beauty and language, the importance of connecting science, art, and storytelling to bring people together, to learn, and to create solutions for Indigenous Water justice.

Importantly, not all Native Nations and Indigenous communities that share geography with the United States are recognized by the federal government and therefore do not qualify for federal funding and programs. This lack of recognition creates barriers to participation in Water governance decisions (Emanuel & Wilkins, 2020). This is particularly apparent for Indigenous Peoples of Hawai'i, Puerto Rico, and other islands losing beach access and connection to marine relatives at a higher rate than other communities because they do not have the same rights as federally recognized Tribes.

Solutions Through Cross-Cultural, Multigenerational Water Collaboration and Connection

Indigenous teachings share with us the important understanding that Water is life. Water connects us all, from the tiny droplets in the air we breathe to the Ocean to the aquifers and rivers we drink from. Water is the connection between

all things on this planet, and when clean and healthy, it can sustain the magnificent diversity of life. It is from this teaching that we can find the path illuminated by Indigenous Water justice: connection. Working toward Indigenous Water justice means connecting respectfully with our relatives to listen, learn, collaborate, and transform our homes for better, just futures. And Indigenous Peoples have always been doing this, always collaborating with neighbors, both human and more-than-human, young and old, to share knowledge, insights, and innovations. This continues today, as Tribal Nations gather together to share success stories of adaptation in the face of changing Water due to climate change. Stories such as micro-hatcheries and sturgeon reintroduction inspire and instruct others on similar projects deeply grounded in their own communities.

One example of such collaboration happened around Wild Rice. With the decline of Wild Rice, in part driven by climate change, resource managers, students, researchers, and leaders from Tribal, state, and federal agencies, universities, and NGOs/nonprofits gathered in November 2023 to share knowledge and build relationships with Wild Rice (Ojibwemowin: manoomin; Dakodiapi: Psiŋ; Latin: *Zizania palustris*). This knowledge-sharing symposium drew people from across what are now known as Minnesota, Wisconsin, Michigan, and Canada to engage in workshops, community panels, and poster sessions on monitoring, harvesting, processing, restoration, stewardship, and culture. This conference also grew out of long-term partnerships. Beginning in 2017, upper Great Lakes Tribes, inter-Tribal treaty organizations, and the University of Minnesota Twin Cities came together to protect Wild Rice through the Kawe Gidaa-naanaagadawendaamin Manoomin (First We Must Consider Wild Rice) collaborative (Nyblade, 2023; EPA, 2022). This collaborative approach allows the science to connect to deeper understandings of the physical and relational dimensions of the environment (Nyblade et al., 2023; Matson et al., 2021). By coming together to share knowledge across this multifaceted group, participants strengthened both their technical and relational capacity across the region for climate change and the long-term care of Wild Rice. Importantly, these collaborations must happen between Knowledge Holders and Youth to pass on Traditional Knowledge and bring the voices of young people to the table about their future with climate change.

Figure 3.6. This beadwork is included in the publication, "Unsettling Marine Conservation: Disrupting Manifest Destiny-Based Conservation Practices Through the Operationalization of Indigenous Value Systems" (Jacobs, 2022, p. 287). The piece, *The 7 R's*, represents the connection of Indigenous values of respect, relevancy, reciprocity, responsibility, rights, reconciliation through redistribution, and relationships. Although each R has distinct defining characteristics, they are woven together by the fabric of Indigenous realities. The bead loom weaving represents the tight bonds and connections between value systems and how each R is deeply rooted in the fabric of others. It utilizes modern symbology and storytelling for each of the 7 R's as an Indigenous approach to the facts and figures of Western academia. It ties in traditional values and teachings while respecting the privacy of stories that belong to individual Tribes. The 7 R's framework underlines the need for marine conservation efforts to center Indigenous voices and futures and Tribal management of marine systems.

Water also teaches us, through its own beauty and language, the importance of connecting science, art, and storytelling to bring people together, to learn, and to create solutions for Indigenous Water justice. The collaborative Indigenous author team of Dr. Lara A. Jacobs, Coral Avery, Rhode Grayson, and Katheryn Champagne is leading the way in this effort with their recent publication on marine conservation that incorporates beadwork and storytelling (Jacobs, 2022) (Fig. 3.6).

As Federal Indian Law scholar Alexandra Fay underscores, "[t]he recognition of Tribal Sovereignty will be critical to how this country—and all the Nations therein—navigate the existential threat of climate change" (Fay, 2023, p. 2). ◀◆

Future Challenges, Key Messages, and Recommendations

Encouraging increased collaboration and partnership between Indigenous Nations and external entities will support comprehensive, community-driven solutions that effectively combat climate change impacts on Water for Indigenous Peoples and other dependent life. Moreover, there is a pressing need for policymakers and resource managers to prioritize the provision of accessible and non-siloed hydrology data to Indigenous communities, empowering them to make informed decisions and actively participate in shaping resilient Water management practices.

Since many Indigenous communities still rely on hunting, fishing, and agricultural systems for their livelihood, access to clean Water is crucial. Many Indigenous communities are feeling the detrimental effects of climate change. Policies that are developed by Indigenous communities and Tribal experts, rather than state or federal officials, would be more effective when Indigenous Nations advocate for community-based programs that augment existing Knowledge around the health risks that stem from climate change (Schramm et al., 2020).

Indigenous Water declarations are emerging globally. Treaty #3 and the Chiefs of Ontario have recently issued Water declarations (Chiblow, 2025, 2019; Craft & King, 2021). There could be more collaboration between the Anishinaabek communities around the Great Lakes for a Water declaration for both Canada and the U.S. This may have a ripple effect on how Tribal Nations in the U.S. and First Nations in Canada can have more collaboration on Water governance at the international level. Leveraging UNDRIP (UN General Assembly, 2007) as a base foundation for Water governance for Indigenous Peoples would be a legal strategy to approach Water governance on the international stage. By embracing a collaborative approach rooted in mutual respect and shared stewardship, Indigenous Nations can lead the way in charting a sustainable path forward in the face of climate uncertainty.

Water Justice Chapter References

Avery, D. (2023, September 2). *With a crippled energy grid, Puerto Rico turned to solar power. (Spoiler: It's working).* CNET. https://www.cnet.com/home/energy-and-utilities/with-a-crippled-energy-grid-puerto-rico-turned-to-solar-power-spoiler-its-working/

Bamford, E., Parker, B., Shiple, M., Weight, E., & Woloszyn, M. (2020). *NIDIS Tribal drought engagement strategy 2021–2025: For the Missouri River Basin and Midwest drought early warning systems (DEWS).* NOAA NIDIS. https://www.drought.gov/sites/default/files/2020-11/NIDIS-Tribal-Engagement-Strategy-2021-2025.pdf

Bennett-Begaye, J. (2023, December 14). *Climate talk among many topics at White House Tribal Summit.* KUNC. https://www.kunc.org/news/2023-12-14/climate-talk-among-many-topics-at-white-house-tribal-summit

Blair, E. H., Robertson, G. M., Radin, P., Forsyth, T., Marston, M., Bacqueville de La Potherie, M. de (C.-C. Le Roy), & Perrot, N. (1911). *The Indian Tribes of the Upper Mississippi Valley and region of the Great Lakes as described by Nicolas Perrot, French commandant in the Northwest; Bacquevile de la Potherie, French royal commissioner to Canada; Morrell Marston, American Army officer; and Thomas Forsyth, United States agent at Fort Armstrong, Vol. 1.* Arthur H. Clark Co. https://www.google.com/books/edition/_/yonhAAAAMAAJ?hl=en&gbpv=1

Bouayad, A. (2020). Wild rice protectors: An Ojibwe odyssey. *Environmental Law Review*, *22*(1), 25–42. https://doi.org/10.1177/146145292091290

Breda, I. (2023, November 18). Quinault Nation calls off fall coastal coho fishery for conservation. *The Seattle Times.* https://www.seattletimes.com/seattle-news/environment/quinault-nation-calls-off-fall-coastal-coho-fishery-for-conservation/

Bureau of Indian Affairs Branch of Tribal Community Resilience (BIA TCR). (n.d.). *Tribal Community Resilience Annual Awards Program.* U.S. Department of the Interior. https://www.bia.gov/service/tcr-annual-awards-program

Bureau of Indian Affairs Department of Health and Human Services (BIA DHHS). (1996). *Public law 93-638: Indian Self-Determination and Education Assistance Act.* U.S. Department of the Interior. https://www.bia.gov/sites/default/files/dup/assets/bia/ots/ots/pdf/Public_Law93-638.pdf

Bureau of Indian Affairs Branch of Geospatial Support. (2023). *Tribal Community Resilience: Community driven relocation* [ArcGIS StoryMap]. U.S. Department of the Interior. https://biamaps.geoplatform.gov/TCR-CDR/

Calista Education and Culture, Inc. (CEC). (2023). *Yup'ik Environmental Knowledge Project interactive atlas* [Interactive Map]. Exchange of Local Observations and Knowledge in the Arctic. https://eloka-arctic.org/communities/yupik/atlas/index.html

Chiblow, S. (2019). Anishinabek women's nibi giikendaaswin (water knowledge). *Water, 11*(2), 209. https://doi.org/10.3390/w11020209

Chiblow, S. (2025). Anishinaabek responsibilities and relationships are demonstrated in N'bi (Water) Declarations. *Wiley Interdisciplinary Reviews: Water, 12*(1), Article e1754. https://doi.org/10.1002/wat2.1754

Cozzetto, K., Chief, K., Dittmer, K., Brubaker, M., Gough, R., Souza, K., Ettawageshik, F., Wotkyns, S., Opitz-Stapleton, S., Duren, S., & Chavan, P. (2013). Climate change impacts on the water resources of American Indians and Alaska Natives in the U.S. In J. K. Maldonado, B. Colombi, & R. Pandya (Eds.), *Climate change and Indigenous Peoples in the United States: Impacts, experiences and actions* (pp. 61–76). https://doi.org/10.1007/978-3-319-05266-3_6

Craft, A., & King, L. (2021). Building the Treaty #3 Nibi Declaration using an Anishinaabe methodology of ceremony, language and engagement. *Water, 13*(4), 532. https://doi.org/10.3390/w13040532

Department Of the Interior (DOI). (2022, November 30). *Biden-Harris administration makes $135 million commitment to support relocation of Tribal communities affected by climate change* [Press release]. https://www.doi.gov/pressreleases/biden-harris-administration-makes-135-million-commitment-support-relocation-tribal

Diaz, J. (2022, December 1). *3 Tribes dealing with the toll of climate change to get $75 million to relocate.* NPR. https://www.npr.org/2022/12/01/1139949450/tribes-climate-change-relocation-department-of-interior

Diver, S. (2018). Native water protection flows through self-determination: Understanding tribal water quality standards and "treatment as a state." *Journal of Contemporary Water Research & Education, 163*(1), 6–30. https://doi.org/10.1111/j.1936-704X.2018.03267.x

Emanuel, R. E., & Wilkins, D. E. (2020). Breaching barriers: The fight for Indigenous participation in water governance. *Water, 12*(8), 2113. https://doi.org/10.3390/w12082113

Fay, A. (2023). Toward a Tribal role in groundwater management. *American Indian Law Journal, 11*(2), 1. https://digitalcommons.law.seattleu.edu/ailj/vol11/iss2/1

Flavelle, C., & Goodluck, K. (2021, June 27). Dispossessed, again: Climate change hits Native Americans especially hard. *The New York Times.* https://www.nytimes.com/2021/06/27/climate/climate-Native-Americans.html

Great Lakes Indian Fish and Wildlife Commission (GLIFWC) Climate Change Team. (2023). *Aanji-bimaadiziimagak o'ow aki: Climate change vulnerability assessment Version 2.* Great Lakes Indian Fish & Wildlife Commission. http://data.glifwc.org/download/archive.bio/Aanji-bimaadiziimagak_o_ow_aki_digital_02212023.pdf

Gritts, J. (2024). *A-ma i-da-go-lv-a i-gi-ni-gv-go-i yu-da-ha-i.* Colorado Cherokee Circle. https://docs.google.com/document/d/1UWKCfa7VNjk-GQAfqhYFB2fUOj4WDPqTTmoZMVJC55dk/edit

Hager, A. (2023, December 10). *'Clearer heads' and calls for tribal inclusion as Colorado River bigwigs prep for Las Vegas meeting.* KUNC. https://www.kunc.org/news/2023-12-10/clearer-heads-and-calls-for-tribal-inclusion-as-colorado-river-bigwigs-prep-for-las-vegas-meeting

Hand, J. P. (2007). Protecting the world's largest body of fresh water: The often overlooked role of Indian Tribes' co-management of the Great Lakes. *Natural Resources Journal, 47*(4), 815–847. https://www.jstor.org/stable/24889537

Haudenosaunee Environmental Task Force. (1992). *Words that come before all else: Environmental philosophies of the Haudenosaunee.* Native North American Travelling College.

Hofschneider, A. (2023, October 19). *Water protectors in Hawai'i took on the US military and won.* Grist. https://grist.org/global-indigenous-affairs-desk/water-protectors-in-hawai%CA%BBi-took-on-the-u-s-military-and-won/

Jacobs, L. A., Avery, C. B., Salonen, R., & Champagne, K. D. (2022). Unsettling marine conservation: Disrupting manifest destiny-based conservation practices through the operationalization of Indigenous value systems. *Parks Stewardship Forum, 38*(2), 275–304. https://doi.org/10.5070/P538257522

Jacobs, D. M., & Lytwyn, V. P. (2020). Naagan ge bezhig emkwaan: A dish with one spoon reconsidered. *Ontario History, 112*(2), 191–210. https://doi.org/10.7202/1072237ar

Kaomea, J. (2024). Teaching environmental justice in U.S. occupied Hawai'i: Defamiliarizing the impacts of militarism and tourism on Native landscapes. *Environmental Justice,* (Ahead of print). https://doi.org/10.1089/env.2023.0035

Kilpatrick, A. E. (1991). "Going to the water": A structural analysis of Cherokee purification rituals. *American Indian Culture and Research Journal, 15*(4), 49–58. https://escholarship.org/uc/item/8973c50j

Knopp, J. A., Levenstein, B., Watson, A., Ivanova, I., & Lento, J. (2022). Systematic review of documented Indigenous Knowledge of freshwater biodiversity in the circumpolar Arctic. *Freshwater Biology, 67*(1), 194–209. https://doi.org/10.1111/fwb.13570

Lankford, A. (2018). *Agua Caliente Band of Cahuilla Indians v. Coachella Valley Water District.*

American Indian Law Review, 43(1), 203–221. https://www.jstor.org/stable/26632877

Lefler, L. J. (2015). Water and Cherokee healing. *Proceedings of the Annual Meeting of the Southern Anthropological Society, 43*(1), 8. https://doi.org/10.56702/MPMC7908/saspro4301.7

Leonard, K. (2019). *Nipi Mamoweenene: Indigenous water governance to protect the heart of Ohke (Mother Earth) the Great Lakes, Nayanno-Nibiimaang Gichigamiin, Kanyatare'Kó: Wa* [Doctoral dissertation, McMaster University]. MacSphere. http://hdl.handle.net/11375/24837

Leonard, K. (2021). WAMPUM adaptation framework: Eastern coastal Tribal Nations and sea level rise impacts on water security. *Climate and Development, 13*(9), 842–851. https://doi.org/10.1080/17565529.2020.1862739

Leonard, K., David-Chavez, D., Smiles, D., Jennings, L., 'Anolani Alegado, R., Tsinnajinnie, L., Manitowabi, J., Arsenault, R., Begay, R. L., Kagawa-Viviani, A., Davis, D. D., Van Uitregt, V., Pichette, H., Liboiron, M., Moggridge, B., Russo Carroll, S., Tsosie, R. L., & Gomez, A. (2023). Water Back: A review centering rematriation and Indigenous water research sovereignty. *Water Alternatives, 16*(2), 374–428. https://www.water-alternatives.org/index.php/alldoc/articles/vol16/v16issue2/707-a16-2-10/file

Li, Z., Tsoodle, T., Chen, M., Gao, S., Zhang, J., Wen, Y., Yang, T., King, F., & Hong, Y. (2024). Future heavy rainfall and flood risks for Native Americans under climate and demographic changes: A case study in Oklahoma. *Weather, Climate, and Society, 16*(1), 143–154. https://doi.org/10.1175/WCAS-D-23-0005.1

Looby, C., & Vaisvilas, F. (2023, November 29). Great Lakes Tribes teach 'water is life.' But they're forced to fight for its protection. *USA Today.* https://www.usatoday.com/story/news/nation/2023/11/29/indigenous-tribes-fight-for-great-lakes-water-quality/71603553007/

Lynn, K., Daigle, J., Hoffman, J., Lake, F., Michelle, N., Ranco, D., Viles, C., Voggesser, G., and Williams, P. (2014). The impacts of climate change on Tribal traditional foods. In J. K. Maldonado, B. Colombi, & R. Pandya (Eds.), *Climate change and Indigenous Peoples in the United States (*pp.37–48). Springer. https://doi.org/10.1007/978-3-319-05266-3_4

Lyons, O. (2008). A democracy based on peace. In M. K. Nelson (Ed.), *Original instructions: Indigenous teachings for a sustainable future.* Bear& Company.

Maguire, R. P., & Klobas, N. D. (2023, November 1). The Supreme Court's decision in Arizona v. Navajo Nation: A tale of scarce water and treaty rights in the Southwest. American Bar Association. https://www.americanbar.org/groups/environment_energy_resources/resources/trends/2023-november-december/supreme-court-decision-in-arizona-v-navajo-nation/#:~:text=The%20Court%20denied%20the%20Navajo,Basin%20of%20the%20Colorado%20River

Manitowabi, J. (2017). *It sometimes speaks to us: Decolonizing education by utilizing our Elders' Knowledge* [Master's thesis, McMaster University]. MacSphere. http://hdl.handle.net/11375/22292

Marohn, K. (2023, July 28). *DNR confirms new Line 3 aquifer breach in northern Minnesota.* Minnesota Public Radio News. https://www.mprnews.org/story/2023/07/28/new-line-3-aquifer-breach-minnesota-oil-pipeline?gad_source=1&gclid=Cj0KCQiAgq-GrBhDtARIsAM5s0_mfvQZzLQPS6ZuDz52tMn-QtiO93NeIWd-J5BNanZ8FewgP5Pwc73gEaAmbUEALw_wcB

Matson, L., Ng, G. H. C., Dockry, M., Nyblade, M., King, H. J., Bellcourt, M., Bloomquist, J., Bunting, P., Chapman, E., Dalbotten, D., & Waheed, A. (2021). Transforming research and relationships through collaborative tribal-university partnerships on Manoomin (wild rice). *Environmental Science & Policy, 115,* 108–115. https://doi.org/10.1016/j.envsci.2020.10.010

The Maui News. (2023, July 31). Study aims to protect limu amid climate change, increased groundwater pumping. *The Maui News.* https://www.mauinews.com/news/local-news/2023/07/study-aims-to-protect-limu-amid-climate-change-increased-groundwater-pumping/

McGregor, D., Latulippe, N., Whitlow, R., Gansworth, K. L., McGregor, L., & Allen, S. (2023). Towards meaningful research and engagement: Indigenous Knowledge Systems and Great Lakes governance. *Journal of Great Lakes Research, 49*, S22–S31. https://doi.org/10.1016/j.jglr.2023.02.009

Midwest Climate Adaptation Science Center. (2020). *Impacts of climate change on vegetation, ecohydrology, and management of Manoomin (wild rice) watersheds.* https://mwcasc.umn.edu/node/301

Mohr, K. (2023, December 14). Washington lags behind in water pollution oversight. *High Country News.* https://www.hcn.org/articles/water-washington-lags-behind-in-water-pollution-oversight/

Munsch, S. H., McHenry, M., Liermann, M. C., Bennett, T. R., McMillan, J., Moses, R., & Pess, G. R. (2023). Dam removal enables diverse juvenile life histories to emerge in threatened salmonids repopulating a heterogeneous landscape. *Frontiers in Ecology and Evolution, 11,* Article 1188921. https://doi.org/10.3389/fevo.2023.1188921

Mussett, K. J., Chiblow, S. B., McGregor, D., Whitlow, R., Lauzon, R., Almack, K., Almack, K., Boucher, N., Duncan, A. T., & Reid, A. J. (2023). Wise practices: Indigenous-settler relations in Laurentian Great Lakes fishery governance and water protection. *Journal of Great Lakes Research, 49*(1), S12–S21. https://doi.org/10.1016/j.jglr.2022.09.010

National Centers for Coastal Ocean Science (NCCOS). (2023, December 7). *California Tribal communities ready to monitor culturally important marine resources impacted by harmful algal blooms.* https://coastalscience.noaa.gov/news/california-tribal-monitor-culturally-important-marine-resources-impacted-habs/#:~:text=Traditional%20shellfish%20resources%20are%20often,shellfish%20and%20poison%20local%20communities

Nelson, M. K. (2013). The hydromythology of the Anishinaabeg: Will Mishipizhu survive climate change, or is he creating it? In J. Doerfler, N. J. Sinclair, & H. K. Stark (Eds.), *Centering Anishinaabeg studies: Understanding the world through stories* (Vol. 9781609173531, pp. 213–233). Michigan State University Press. https://asu.elsevierpure.com/en/publications/the-hydromythology-of-the-anishinaabeg-will-mishipizhu-survive-cl

National Integrated Drought Information System (NIDIS). (n.d.a). *Case study: Wind River Tribes create new drought monitoring tools.* https://www.drought.gov/case-study-wind-river-tribes-create-new-drought-monitoring-tools

National Integrated Drought Information System (NIDIS). (n.d.b). *Drought early warning system: Missouri River Basin.* https://www.drought.gov/dews/Missouri-River-Basin?agency=All&dews_component=All&page=3&state=All&text_filter=

Northwest Climate Adaptation Science Center (NCASC). (n.d.). *Projects.* https://nwcasc.uw.edu/science/projects/?topic=tribal-support&state=0&-funding-year=0&project-search=

Nyblade, M. (2023). *First we must consider manoomin/psiŋ: Impacts of climate and land cover change on wild rice* [Doctoral dissertation, University of Minnesota]. University Digital Conservancy. https://hdl.handle.net/11299/260660

Paquin, J. (1937). *Modern Jesuit Indian missions in Ontario* [Unpublished manuscript]. Regis College Archives, Toronto.

Payton, E. A., Pinson, A. O., Asefa, T., Condon, L. E., Dupigny-Giroux, L.-A. L., Harding, B. L., Kiang, J., Lee, D. H., McAfee, S. A., Pflug, J. M., Rangwala, I., Tanana, H. J., & Wright, D. B. (2023). Water. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023.CH4

Pess, G. R., McHenry, M. L., Denton, K., Anderson, J. H., Liermann, M. C., Peters, R. J., McMillan, J. R., Brenkman, S. J., Bennett, T. R., Duda, J. J., & Hanson, K. M. (2024). Initial responses of Chinook salmon (Oncorhynchus tshawytscha) and steelhead (Oncorhynchus mykiss) to removal of two dams on the Elwha River, Washington State, U.S.A. *Frontiers in Ecology and Evolution, 12*, Article 1241028. https://doi.org/10.3389/fevo.2024.1241028

Portland State University (PSU). (2024). *Certificate in Tribal Relations program. Institute for Tribal Government, Portland State University.*

https://www.pdx.edu/tribal-government/certificate-in-tribal-relations

Rising Voices, Changing Coasts. (n.d.). https://www.rvcchub.org/

Ritzman, D., & Everett, R. (2023, November 24). *New Columbia River treaty must prioritize local tribes and ecological concerns.* Truthout. https://truthout.org/articles/new-columbia-river-treaty-must-prioritize-local-tribes-and-ecological-concerns/

Robison, J., Cosens, B. A., Jackson, S., Leonard, K., & McCool, D. (2018). Indigenous Water justice. *Lewis & Clark Law Review, 22*. http://dx.doi.org/10.2139/ssrn.3013470

Ross, I. (2023, November 21). As Great Lakes warm, collaboration and Indigenous self-determination are keys to adapting. Great Lakes Now. https://www.greatlakesnow.org/2023/11/as-great-lakes-warm-collaboration-and-indigenous-self-determination-are-keys-to-adapting/

Ryan, S. (2022, March 22). *Clear lake cyanotoxins monitoring program: Toxins and Tribal beneficial uses* [Power Point slides]. EPA. https://www.epa.gov/system/files/documents/2022-03/clear-lake-cyanotoxins-3-22-2022.pdf

Sahagún, L. (2018, January 11). Rare, venomous sea snake found slithering on Southern California shores. Are more coming? *Los Angeles Times*. https://www.latimes.com/local/california/la-me-sea-snake-newport-beach-20180111-story.html

Schramm, P. J., Al Janabi, A. L., Campbell, L. W., Donatuto, J. L., & Gaughen, S. C. (2020). How Indigenous communities are adapting to climate Change: Insights from the climate-ready Tribes initiative. *Health Affairs, 39*(12), 2153–2159. https://doi.org/10.1377/hlthaff.2020.00997

Searcey, D., & Rojanasakul, M. (2023, September 3). Big farms and flawless fries are gulping water in the land of 10,000 lakes. *The New York Times*. https://www.nytimes.com/interactive/2023/09/03/climate/minnesota-drought-potatoes.html

Siurua, H. (2006). Nature above people: Rolston and "fortress" conservation in the south. *Ethics and the Environment*, *11*(1), 71–96. https://www.jstor.org/stable/40339115

Six Nations Polytechnic. (2016, January 29). *Ecological Knowledge and the dish with one spoon: Conversation in cultural fluency #2* [Video]. YouTube. https://www.youtube.com/watch?v=RL-83GvOO_C0

Smith, J., Sutula, M., Bouma-Gregson, K., & Van Dyke, M. (2021). *California Water Boards' framework and strategy for freshwater harmful algal bloom monitoring: Full report with appendices* [Technical report]. Southern California Coastal Water Research Project. https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/1141_FHABStrategy_FullReport.pdf

Smith, T. S. (1995). *The Island of the Anishnaabeg: Thunderers and water monsters in the Ojibwe life-world.* University of Idaho Press.

Stiles, C. J., Umphlett, N. A., and Cottenoir, M. (2020). Building adaptive capacity in Tribal communities of the Missouri River Basin to manage drought and climate extremes: A case study from the Wind River Indian Reservation. *Journal of Indigenous Research, 8*, Article 3. https://doi.org/10.26077/x429-5d77

Swanson, C. (2023, December 11). How WA's king tides amp up flood risks amid global sea level rise. *The Seattle Times*. https://www.seattletimes.com/seattle-news/environment/how-was-king-tides-amp-up-flood-risks-amid-global-sea-level-rise/

Thompson, D. P. (2017). *The right to hunt and fish therein: Understanding Chippewa treaty rights in Minnesota's 1854 ceded territory.* 1854 Treaty Authority. https://www.1854treatyauthority.org/images/ToHuntandFish.updated2020.pdf

Tribal Adaptation Menu Team. (2019). *Dibaginjigaadeg Anishinaabe ezhitwaad: A Tribal climate adaptation menu.* Great Lakes Indian Fish & Wildlife Commission. http://glifwc.org/ClimateChange/TribalAdaptationMenuV1.pdf

University of Alaska Fairbanks (UAF). (n.d.). *Tribal governance certificate.* University of Alaska Fairbanks. https://catalog.uaf.edu/certificates/tribal-governance/

UN General Assembly. (2007). *United Nations declaration on the rights of Indigenous Peoples: resolution / adopted by the General Assembly,* (Resolution No. A/RES/61/295). United Nations. https://www.refworld.org/legal/resolution/unga/2007/en/49353

U.S. Environmental Protection Agency (EPA). (2022). *Clean Water Act Section 106 Tribal guidance: Integrating Indigenous knowledge.* https://www.epa.gov/system/files/documents/2022-12/clean-water-act-section-106-tribal-guidance.pdf

U.S. Global Change Research Program. (2018). *National climate assessment 2018.* https://nca2018.globalchange.gov/

U.S. Government Accountability Office (GAO). (2018). *Drinking water and wastewater infrastructure: Opportunities exist to enhance federal agency needs assessment and coordination on tribal projects* (Report No. GAO-18-309). https://www.gao.gov/assets/gao-18-309.pdf

Villagomez, A., & Johnson, S. M. (2024). Disavowing the doctrine of discovery: Indigenous healing, decolonization, and implications for environmental justice in the Pacific Remote Islands area. *Environmental Justice* (Ahead of print). https://doi.org/10.1089/env.2023.0048 ◀◆

Good Fire and Climate Change:

The Return of Indigenous Fire Stewardship

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KEY MESSAGES

Good Fire stewardship led by Indigenous Peoples has been practiced over millennia and is proven to be sustainable and healthy for landscapes. Cultural fire stewardship, often different from agency and prescribed fire approaches, is unique to each Tribe/Indigenous group in terms of goals and technique. The acknowledgement of Traditional Good Fire implementation presents culturally grounded solutions to the escalating threats of wildfires, biodiversity loss, and climate change.

CHAPTER RECOMMENDATIONS

Legal frameworks and policy must adapt to incorporate and prioritize Indigenous-led Good Fire practices. Acknowledging the legitimacy of these practices through supportive legislation will enhance ecosystem health and resilience in numerous locations across the United States. Policymakers should ensure that Indigenous voices are central in the dialogue, decision-making, and codification of these Indigenous-led, place-specific fire management processes.

Chapter Author Positionality Statements

Melinda M. Adams belongs to the N'dee, San Carlos Apache Tribe and is an Assistant Professor in the Department of Geography and Atmospheric Science and Indigenous Studies at the University of Kansas (Kaw Nation of Kansas). A cultural fire practitioner and scholar, her research focuses on the revitalization of cultural fire with Tribes in California and more recently with Tribes in the Midwest (USA). Her work with Indigenous communities lives at the intersection of ecology/environmental science, environmental policy, and Indigenous research methodology.

Kelsey Leonard is an enrolled citizen of the Shinnecock Nation and Canada Research Chair in Indigenous Waters, Climate and Sustainability in the School of Environment, Resources, and Sustainability in the Faculty of Environment at the University of Waterloo, Waterloo, Ontario, Canada, where her research focuses on Indigenous Water justice and climate adaptation science.

Nisogaabokwe Melonee Montano is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. She is a graduate student at the University of Minnesota-Twin Cities in the Natural Resources Science and Management Program of the Forestry Department, where her research is focused on the use of fire as a traditional land management tool by the Indigenous people of the Great Lakes region.

Althea Walker is a descendant of the Nez Perce, Hopi, and Gila River people and is an enrolled member of the Gila River Indian Community. As the Director of Community Resilience for the Climate Science Alliance, Althea works closely with community partners to identify priority management needs and strategies that foster dialogue and partnership building for climate adaptation and resilience.

Raffaele Sindoni is a doctoral candidate at Yale University, where he focuses on Indigenous sovereignty, climate change, rights of nature, and environmental sociology. He is a research scientist for the National Indian Carbon Coalition and has served as an Environmental Justice Summer Fellow for the Yurok Tribe.

Bazile Minogiizhigaabo Panek is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. He serves as an Indigenous consultant for the Institute for Tribal Environmental Professionals and the founder and CEO of Good Sky Guidance, a consulting firm specializing in the use of Indigenous Knowledges in environmental initiatives.

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Good Fire Terminology/Glossary

Good Fire The term Good Fire describes purposefully placed fire for the removal of dead and decaying vegetation; it can also be used to infer Indigenous use of intentional fire. It also has origins to Indigenous Peoples in Australia as traditional ecological and cultural Knowledge in "taking care of Country" (Steffensen, 2020) and bringing back traditional fire management (Eriksen & Hankins, 2014; Clark et al., 2022).

Beneficial Fire A term used to collectively refer to prescribed fire, cultural burning, and fire managed for resource benefit (California Wildfire & Forest Resilience Task Force, 2022).

Cultural Fire Indigenous-led burning that promotes intergenerational teachings and active responsibility to the land and enhances diversity and productivity of species, food, medicine, and ceremony (Long et al., 2020, 2021; Hoffman et al., 2022a); it actively involves communities and families to support overall community health (Hoffman et al., 2022b).

Indigenous Fire Stewardship Indigenous fire stewardship is the intergenerational teachings of fire-related Knowledge, beliefs, and practices among fire-dependent cultures regarding fire regimes, fire effects, and the role of cultural burning in fire-prone ecosystems and habitats (Lake & Christianson, 2019).

Indigenous Cultural Burning Practices These practices are distinguished from other fire management (e.g., local, state, and federal agencies) in terms of Indigenous goals, outcomes, and the right to burn (Clark et al., 2022).

Prescribed Fire Prescribed and controlled fire are planned burns conducted by trained fire practitioners to manage and restore lands and waters. Unlike wildfires, prescribed burns take place under specific weather conditions, often requiring significant environmental compliance review [i.e., the National Environmental Policy Act (NEPA)], burn and smoke management plan preparation, and explicit safety protocols for both the public and the fire practitioners (The Nature Conservancy, 2024).

A Note on Capitalization, Possessive Words, and Word Choice

This highly collaborative report presents an opportunity to nuance the density and diversity of terminology and writing stylistics when referring to Native Tribes, Alaska Native Villages, and Native Hawai'ians within the United States. The practice and protocol of this writing stylistic comes from Younging's (2018) *Elements of Indigenous Style*, in which he offers culturally appropriate publishing principles to guide writing with and about Native American Peoples. The goal here is to present culture in a realistic and insightful manner, with the highest possible degree of verisimilitude (Younging, 2018). Our approach seeks to reject a colonial practice of presenting information about Indigenous Peoples, embracing instead a praxis of sharing Indigenous Peoples' perspectives with, by, and for our Peoples (Younging, 2018) using appropriate capitalization, plurals, and word choice. The Good Fire chapter deploys:

Capitalization: We will capitalize terms that hold significant meaning to the co-authors. This capitalization signals proper noun practices within written documents and garners agency for Indigenous researchers, authors, and community members. It also asserts our relationality with people and more-than-human relatives (beings), which our communities hold in high regard (see Younging Principle 13).

Possessive words: We refer to Tribes, Alaska Native Villages, and Native Hawai'ians, terms, and places in our/Tribes' own languages as appropriate (see Younging Principle 15).

Past tense: The report encourages readers to develop the practice of refraining from using solely past tenses when referring to Native Peoples. Speaking of Native Peoples in the present tense asserts Native identity and existence and emphasizes Native Peoples in the now and always into the future (see Younging Principle 22).

Fire: Indigenous Covenant to Protect the Land

Narrative by Hillary Renick

Hillary Renick, *JD, LLM, MS, Sherwood Valley Band of Pomo, Qualified Fire Archaeologist on the U.S. Department of Interior Burned Area Emergency Response, and President of the California Indian Land Institute*

Fire, powerful and often feared, has been a fundamental part of the life of healthy forests throughout history. Utilizing skills acquired by living in place for millennia and learning the rhythm of the seasons through observation, experimentation, and practice, Indigenous cultures use fire as a land management tool. By developing low-risk land management practices, Indigenous communities achieve the same effect as wildfire but minimize the length of ecosystem disruptions.

Indigenous people understand how the health of their physical environment is directly connected to their well-being. The food chain is impacted by livable habitat. Economy and trade are dependent on available natural resources. Partaking in an intergenerational practice and tradition unites people, connects them to their Ancestors, and opens doors for generations to come. As documented in early newspapers and journals, Indigenous fire practices were well-known to the initial settler colonizers of the U.S. The Blackfoot Indians who practiced controlled burns, for example, were named as such by colonizers who observed their blackened moccasins from walking on recently burned terrain. While the benefit of their ecological stewardship was observed, many settlers promoted the false idea that Indigenous use of fire was a danger to society.

The 2024 wildfire season opened with extreme weather conditions and red flag warnings that many are now accustomed to. Seasonal wildland fire crews are now year-round, and land management agencies have moved from only fire suppression to restoring fire to the landscape through multiagency team approaches. As we face more frequent and extreme wildfires, learning from Indigenous communities about how to manage land and fire is vital. Reconnecting Indigenous Knowledge to the land is occurring in fire management with Indigenous communities in the U.S., Canada, Finland, and Australia. Fire crews often employ fire archeologists to teach wildland firefighter teams about ancient fire burning techniques. Indigenous fire experts are joining these teams at an increasing rate and sometimes include an all-Indigenous team. Traditional Knowledge is combined with modern wildfire science that utilizes the latest technology, advanced predictive modeling, and satellite data to ensure wildland firefighter safety and success.

Transmission of Knowledge

There is much to learn from taking the Knowledge of the past and the experience of the present and blending them for future generations. Indigenous Knowledge is key to sustainability in ecosystems, establishing balanced land stewardship, and understanding the symbiotic relationships that humans hold with our planet.

Web of Life

Lessons from the past will prepare us for the future as we work to reharmonize our relationship with nature. Working with university partners, Tribal Nations, and local Knowledge keepers is essential to being a good steward of the changing landscape. One way to promote sustainable land management is to support local Tribal Nations who actively manage lands with ancient fire practices. Contacting a Tribe's historic preservation officer may provide valuable information on the topic. By learning to read the landscape and working with nature, it is possible to be part of the rhythm that has always sustained humanity. ◀◆

04

Good Fire and Climate Change:

The Return of Indigenous Fire Stewardship

Dr. Melinda Adams (N'dee San Carlos Apache) instructs cultural fire placement with UC Davis students, academics, and members of the local Native American community at the Tending and Gathering Garden in the Cache Creek Nature Preserve (Woodland, CA).
Photo Credit: Alysha Beck/UC Davis

Introduction

Since time immemorial, many Indigenous Peoples and Nations have been practicing cultural burning and related stewardship practices to tend and care for our lands. Many Indigenous cultures are fire dependent, having adapted to climate and environments that rely on fire adapted species and living in fire prone ecosystems. Over time, the cultural systems modified fire regimes, diversifying the frequency, seasonality, and specificity of fire occurrence across the landscape while also recognizing the spiritual and ecological significance of lightning's role in landscapes.

Indigenous fire placement has helped shape myriad ecosystems across the United States and beyond, replenishing nutrients, stimulating growth, and increasing biodiversity (Hankins, 2013; Lake et al., 2017; Lake 2021; Lake & Christianson, 2019; Long et al., 2020; Marks-Block, 2019; Adams, 2023a). Cultural burns are fires deeply rooted in Indigenous Knowledge Systems (Kimmerer & Lake, 2001) and are purposely placed for the rejuvenation of culturally significant resources (Goode et al., 2018, 2022; Marks-Block, 2019; Adams, 2023b). Many tactics have forcefully removed Indigenous fire stewardship from landscapes, contributing to present-day wildfire crises on top of depleting ecosystem function and diversity. Across the country, as a result of fire exclusion, forest management practices, increased fuel, and now climate influence conditions, destructive wildfires are posing ever-greater threats to human lives, livelihoods, and public safety. Further, the drivers of wildfire crises are numerous and complex and are influenced by multiple forces and factors at all scales (The Wildland Fire Mitigation and Management Commission, 2023).

Our chapter presents stewardship of cultural fire revitalization in five specific places within the United States: Northern California, Southern California, New York, and the Great Lakes Region of Minnesota and Michigan. Although this is not all-encompassing of the territories in which Indigenous Good Fire work is being done, the information here serves as an invitation for support of the return of cultural fire in all landscapes and all Indigenous lands.

This report reflects our collaborative narrative and is a current snapshot of the landscape of select fire activities occurring across what is currently known as the United States. Although the report limits our reach to the United States, as global relatives, we consciously make it a point to recognize the outstanding Good Fire work of Indigenous Peoples in Australia (Cavanaugh, 2020; Steffenson, 2020), Canada (Christianson, 2020, 2022), and Latin America (Welch & Coimbra Jr., 2021). Similar to other documents centering Indigenous fire stewardship and/or cultural fire, it is to be considered a living document; therefore, changes, updates, and modifications will be necessary as we continue to experience climate change and the effects of wildfire and seek to center Indigenous Knowledge Systems as solutions to these micro- and macrocosmic issues.

Cultural Fire: History, Creation Stories, and Cultural Understandings

Fire, as a more-than-human relative, holds significant regard in many Indigenous Peoples' stories of creation, cultural storytelling, and lessons in land stewardship. Ojibwe Peoples refer to fire as *ishkode* (ish-koh-deh); many Bodéwadmi refer to fire as *shkodé* (schkoh-deh) or *shkwedé* (scqui-deh) (Baird et al., 2023). The Oceti Sakowin Nations of the Lakota, Dakota, and Nakota are joined together as the Seven Council Fires. Karuk stories acknowledge fire as a Relative. The Three Fires Confederacy of the Great Lakes carries stories of the Seventh Fire Prophecy, where languages and land will return to us. In Kānaka Maoli (Hawai'i) culture, Pele is the goddess of fire, and the islands and all born from them are an extension of her and have a responsibility to understand the power of volcanic fire as creator of life. Indigenous author and scholar Robin Wall Kimmerer in *Braiding Sweetgrass* shares, "The land gives us so many gifts; fire is a way we can give back—our people were given the responsibility to use fire to make things beautiful and productive; it is our art and our science" (Kimmerer, 2015). Indeed, fire serves as a spiritual, social, cultural, and ecological connector to many of our Indigenous Nations and has the power to regenerate our identities and stewardship responsibilities through shared worldviews and stories, or our "original instructions" (Adams, 2023b).

In opening this chapter, it is important to acknowledge that for some Indigenous Peoples and Nations, fire is both a treaty right and a treaty resource. We also find it important to reemphasize the cultural significance of fire as a part of our kin networks and an ancestral responsibility. Although it is not the intent to storytell every Nation's relationship with fire, we use this space to instead amplify the communities we are in close relation/allyship with in the return of our right to steward and work with fire.

The Yurok Tribe (Northwest California): Fire, Food, Ecosystem Stewardship

Figure 4.1. 2024 Yurok Reservation and ancestral territory, Yurok Tribe (retrieved from https://www.yurok-tribe.org/is-git).

For thousands of years, the Yurok Tribe has resided on the northwestern coast of what is now known as California. Ancestral Yurok land begins deep in the Siskiyou Forest and follows the Klamath River until its mouth empties into the mighty Pacific Ocean. Ancestral Yurok land continues for miles north, east, and south of Klamath (see Fig. 4.1). The Yurok Tribe is a people known as "great fishermen, eelers, basket weavers, canoe makers, storytellers, singers, dancers, healers, and strong medicine people" (Yurok Tribe, n.d.).

Since time immemorial, fire has been central to the Yurok origin story, a central pillar of well-being of the Yurok people, and an essential role in the health of Yurok ecosystems. Good Fire was constantly tended in the landscape by stewards to promote the collective well-being of both human and more-than-human ecosystems (Marks-Block, 2021; Clark et al., 2022). For instance, redwood trees, which the Yurok enter into relationships with to carve long canoes used for fishing and ceremony, often require frequent disturbances of fire in the landscape so they can healthily regenerate, sprout new seedlings, and germinate (Ramage et al., 2010). In the act of spreading Good Fire onto the landscape, the Yurok participate in the age-old act of reciprocity and stewardship, assisting the redwood with regeneration while clearing parts of the forest for food, game, and medicines. This, in turn, allows for the thriving of grasses used for weaving and bird habitat, oak trees for acorns and forage, and wide stretching savannah that elk and deer could enjoy as well. In addition to being a fundamental part of Yurok cosmology, fire has served an essential role in the holistic health of both human and more-than-human Yurok ecologies.

> *"Before humans lived here there were spirit beings that went into the sky and stole fire. They passed it from one animal to the next to bring it to humans to use. That is how we got fire. Some of those spirit beings stayed on Earth and took a physical form, we see them in the world around us—as trees, water, animals, rocks, and fire. These spirits had an agreement with the humans that we would take care of each other. Fire is one of the methods we use to take care of each other and the land."*
>
> *— **Margo Robbins,** Yurok Tribe, Executive Director of Cultural Fire Management Council (McCann, 2020)*

The Karuk Tribe (Northwest California): Fix the World People

Located in the Klamath-Siskiyou Mountains in the mid-Klamath River region, the Karuk Tribe is one of the largest and most geographically dispersed Indigenous groups in California. Across remote terrain, lands located in northwest California have been traditionally managed by Karuk people for thousands of years. Self-described as "fix the world people," Karuk Peoples continue ceremonies that restore balance and renew the world, including subsistence harvesting (Karuk Tribe Department of Natural Resources, 2019), prescribed burning (Karuk Tribe Department of Natural Resources, 2019), and watershed management (Reed & Diver, 2023). Tribal codes and

Tribally Led Fire-Pest Research

Narrative by Jolene Tamm

Jolene Tamm, *Squaxin Island Tribal Member, Natural Resources Director, La Jolla Band of Luiseno Indians, master's student, University of California Riverside*

Tribally led research on the goldspotted oak borer (GSOB) (*Agrilus auroguttatus*) is underway on the La Jolla Indian Reservation. For over 200 years, Indigenous Peoples were prohibited from burning in California. For the past 30 years, prescribed burns could not be conducted without copious amounts of paperwork (for permits and to fulfill environmental regulations), essentially prohibiting the use of prescribed fire for managing forest health. The absence of fire caused some oak woodlands to become overgrown, which increased the severity of wildfires. Lack of fire created an unbalanced ecosystem ready to be devastated by invasive insects, like the GSOB. The GSOB has killed almost 1,000 mature oak trees on the La Jolla Indian Reservation, and current research and modern knowledge do not give us the tools needed to slow or prevent ongoing tree mortality.

It is possible that fire will reduce GSOB survival, because Traditional Ecological Knowledge tells us that insect activity is reduced by burning. GSOB also undergoes metamorphosis just underneath the outer bark, primarily on the lower portions of the main tree trunk, which are areas that will be impacted by cultural and prescribed burns.

The GSOB research plan to assess fire for control of this pest was developed using local and Traditional Ecological Knowledge, incorporated with Western knowledge on the deleterious effects of heat and invasive species biology and management. In the process of preparing areas for burn experiments, we were able to see firsthand how smoke reduced insect activity near burn sites when we collected yucca a few days later. One of the yucca gatherers, Emily Burgueno, a Kumeyaay cultural burn practitioner, noted that usually the flowers are covered in insects. This was amazing to see and to then understand what the Elders were saying. At this moment I understood that "knowing" and "Knowledge" were not the same.

To develop prescribed burning as a landscape-level management tool based on historical Indigenous land management practices, we have designed laboratory trials and field experiments to assess impacts of heat and fire on GSOB survivorship. For our field studies, we are monitoring GSOB-infested trees that have been treated with prescribed burns and monitoring the infestation rates in areas that have and have not had prescribed burns to determine how large an impact fire has on GSOB survival rates. The preliminary results on the field experiment indicated that pile burning infested oak rounds (or large woody debris) yielded a 98% reduction in beetle emergence from infested logs. Our preliminary laboratory trial data consisted of a series of heat treatment studies that indicate that heating the core temperature of infested oak firewood to 60° Celsius for 60 minutes is sufficient to kill GSOB larvae within infested firewood. The results from these studies will be analyzed to develop best management practices for firewood producers who handle GSOB-infested oak. The next challenge will be to write Western research papers using rigorously analyzed data that reflect TEK while interpreting the results we found within a scientific-method framework so that findings can be used in the larger scientific community.

We envision that these lab and field research studies will help to determine a baseline kill temperature that will help predictions of the impacts of fire on the GSOB and provide land managers with the best information that can be used to plan for cultural and prescribed burning, not only for management of insect pests but also, as Fire Chief Wesley Ruise Jr. says, "keeping the forests clean."

While this research is challenging on many levels, it inspires me because it has increased the number of Tribal people who work in our precious native woodlands, and this is essential for truly knowing and protecting our forests. ◀◆

laws managing Karuk Traditional Knowledge Systems have been passed on for thousands of years; as Tribal people, Karuk understand the value of this knowledge, their reciprocal responsibilities, and obligation to preserve, perpetuate, and pass on this cultural heritage to succeeding generations (Karuk Tribe et al., 2017; Meyer 2022). Leaders within the return of Good Fire, Karuk Peoples are shifting fire management by partnering with public fire agencies as well as nongovernmental organizations.

The Ojibwe Tribe (Great Lakes): Fire and Crow

Since time immemorial, the Ojibwe people of the Great Lakes region have known of climate change and its many various aspects, including fire, particularly regarding how catastrophic it can be and how important it is to continue using it as a gift. Prophecies warning of climate change have been passed down through generations, and it is also the subject of many traditional Ojibwe stories. One story tells of a time when the Anishinaabeg People were suffering, cold, hungry, and without much light. A crow in a nearby tree observed this and felt bad for them, so he traveled up to the Creator's lodge in the sky to share his concerns. The creator provided fire from his lodge to the crow and asked him to bring it down to the Anishinaabeg People with teachings and instructions on how to respect and use it. The Creator explained that it was a gift that would help them survive by keeping them warm and could be used as a tool to grow food. The Creator offered the reminder that if they do not use the fire, they will lose it, and it could turn on them. When the Anishinaabeg received the fire and began caring for it, their climate returned to one in which they could survive and thrive. Their respect, love, and appreciation for the gift of fire are still expressed today, especially with ceremonial fires when proper ceremonial protocol is followed. By returning to the use of fire as a traditional land management tool, they are also being proactive in addressing the many aspects of climate change currently and into the future.

The use of *Asemaa* (traditional, not commercial, tobacco) is key to the identity of the Anishinaabeg people. Without Asemaa, Anishinaabeg would no longer be able to ask for help, gather medicines, harvest food, give thanks, and perform ceremonies. Asemaa and the gifting of Asemaa is central to their daily traditional-based lifestyles. It is also known that Asemaa is made of different mixtures of plants that are all predominantly fire dependent to grow. Therefore, the absence of fire would result in the inability to perform many acts that are inherent rights of the Anishinaabeg.

When reflecting about the importance of cultural fire to her people, Vikki Preston, Cultural Resources Technician for the Karuk Tribe Deptartment of Natural Resources, emphasizes that her People come from a living culture and that fire is a significant part of their cultural identity. She also shares that to forward cultural, or Good Fire, more in her Peoples' territory, she envisions federal agencies adapting flexible policies that permit prescribed burning during wildfire season when weather and climactic conditions are conducive to low severity burns.

"Fire is a huge part of our identity, and we are not allowed to do it how we want to do it or when we want to do it, and you're also often told you don't know how to do it.

Fire suppression tactics in places that are significant to Karuk People and an increase in wildfire is an increase in harm to cultural resources (creation of line, dozers, etc.). The suppression tactics mostly used in wildfire, and perpetuated in wildfire culture, are often harmful to places and cultural places; on the other side, you're not allowed to place beneficial fire to these places in the times conducive to low intensity fire."

— Remarks from Vikki Preston (Karuk/Yurkok/Paiute/Pit River), a key partner on the Intentional Fire podcast (Karuk Tribe/SWCASC, 2022), Karuk stories and perspectives related to cultural and prescribed burning and intentional fire practices (Murveit et al., 2023). The podcast served as a follow-up to the *Good Fire* report (Clark et al., 2021), which describes the barriers to intentional burning and identifies potential solutions.

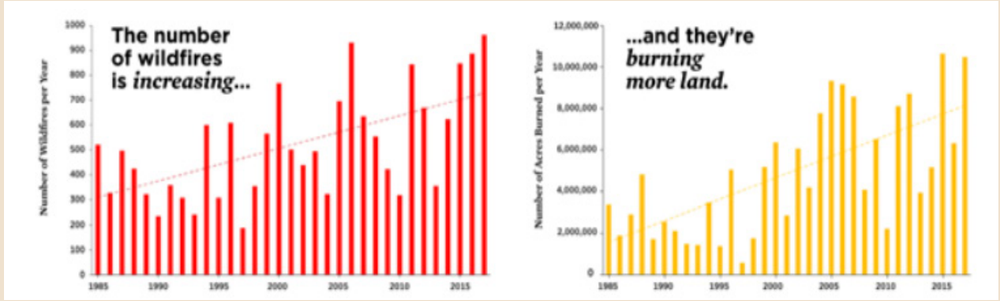

Figure 4.2. Data from the Monitoring Trends in Burn Severity program (MTBS, 2022), which includes large fires in the United States (>500 acres for the eastern U.S., >1,000 acres for the West), with prescribed fires removed (Hatchett & Koshkin, 2023).

The Effects of Fire Suppression in the Face of Climate Change

Before the presence of settler colonists on Turtle Island, Indigenous Peoples such as the Shawnee, the Karuk, and the Yurok maintained a strong presence of Good Fire on landscapes. Once European settlers set foot in the U.S., this changed greatly. In 1850, California passed the Act for the Government and Protection of Indians (Norgaard, 2019). This anti-Indigenous law solidified the settler conquest of European ecosystem dominance by forbidding the use of Good Fire in the newly formed state. Throughout the early 1900s, the U.S. Forest Service seized thousands of acres of Native land, like that of the Karuk, and imposed strict Eurocentric models of fire suppression, which often framed fire as a threat to economic development and the idea of a pristine or untouched wilderness in the eye of European settlers (Fisk et al., 2023; Vinyeta, 2022; Moura et al., 2019). According to Karuk descendant and research ecologist Dr. Frank Kanawha Lake, "Fire suppression legacies emerge in various forms of trauma in communities that are trying to revitalize their relationships with fire today." These legacies play themselves out on the landscape through continued no-burn policies (Norgaard, 2019).

As a continuance of these fire suppressive policies, wildfire in the West has now become seasonal, setting records in acres burned and rising economic costs (Cart, 2022). The combination of drought, warmer summers, and high winds has led to a devastating pattern of catastrophic mega-fires. These trends are broadly consistent with those expected from anthropogenic climate change. Climate change itself is thoroughly tied to colonial practices, as anthropogenic activities have hinged on the dispossession of Indigenous land and resources (The Red Nation, 2021; IPCC, 2021). Concerns addressing health disparities linked to rising wildfires are necessary (STACC, 2021). As we begin to experience more intense and prolonged fire seasons, data shows that wildfire will be compounded by cascading climate impacts, including prolonged drought, quicker depletion of snowpack, hotter summers, higher winds, and generally more severe and unpredictable weather patterns (Fig. 4.2) (Hatchett & Koshkin, 2023).

A global awakening to the increasing frequency and far-reaching impact of wildfires occurred in June 2023 when New York City, and much of the eastern coast of the United States and Canada, was inundated by wildfire smoke from wildfires originating in northern Quebec and Ontario, Canada (Roush, 2023). Tribal Nations along the eastern coast, such as the Shinnecock Nation, issued state of emergency orders requiring all citizens to remain indoors due to debilitating air-quality conditions. The Shinnecock Territory, among other Indigenous territories along the coast, was covered in thick orange smoke that lasted for nearly a week (see image on opposite page).

On August 9, 2023, the onset of fierce winds and dry conditions led to devastating wildfires

that consumed Maui's Lahaina—one of the deadliest fires in the United States in more than a century (PBS News Hour, 2023). Statistically, the Indigenous population in Lahaina is 8.5%. According to Carmen Lindsey, chair of the board of trustees of the Office of Hawaiian Affairs, from a cultural perspective, "Lahaina holds some of the most historically significant cultural properties and highest ranking sacred remains of our Ancestors; the fires of today are in part due to the climate crisis, a history of colonialism in our islands, and the loss of our right to steward our *'aina* and *wai* [land and water]" (Office of Hawaiian Affairs, 2023). Kānaka Maoli scholar Keolu Fox remarks the wildfires are "a sad, stark reminder of the environmental pressures on the Hawai'ian Islands caused by overdevelopment and industrial tourism" (Fox, 2023). This now fire-prone region was once a vast wetland (Adler, 2023) drained for tourism expansion and is now emblematic of climate coloniality (Sultana, 2022; Ka'anapu, 2023). Lahaina's wildfire has not only revealed the effects of climate change stemming from colonialism, but it has also called attention to issues such as emergency preparedness, electrical grid capacity, and water scarcity. Indeed, the Lahaina wildfire reminds us that in order to mitigate the wildfire crisis among Indigenous communities, Kānaka Maoli and Indigenous relatives must be able to exercise their sovereign rights to steward their homelands with Good Fire and other land-care practices that alleviate the impact felt by those disenfranchised the most. Fox further remarks, "The knowledge of how to recover from disasters already lives in Hawai'i, but Indigenous community voices often get lost; Hawai'i can successfully recover if a new environmental governance emerges that intertwines sustainable ecosystem resilience with the profound cultural knowledge of its Indigenous communities" (Fox, 2023). Although the United States has a history of imposing fire-suppression policies, even through the onset of climate catastrophe, Indigenous Peoples have remained resilient in our use of Good Fire.

> *"Fire suppression is cultural suppression."*
>
> —**Althea Walker**, Nez Perce/Hopi/Gila River, Co-Director & Community Resilience Lead of the Climate Science Alliance

At present, there are several examples of Tribes leading efforts, as more agencies and nonprofit organizations turn to Indigenous Peoples to aid in solving the wildfire and climate crisis. Although we present a select vignette of case studies, we acknowledge the information presented is not all-encompassing of the Good Fire work being done by Tribes and Indigenous Peoples across the country and beyond.

Shinnecock Territory wildfire smoke conditions, June 2023.
Photo Credit: Kelsey Leonard

Kindles of Hope: Current Fire Stewardship Case Studies

TERA: Strengthening Tribal Ecologies and Economies

An example of successful cultural fire return is that from the Tribal EcoRestoration Alliance (TERA), located in Lake County, California. TERA is a nonprofit, cross-cultural, multi-organizational collaborative that works to revitalize ecology, economy, and culture through Indigenous-led stewardship. With partners that include the California Department of Forestry and Fire Protection (CAL FIRE), the U.S. Forest Service, and the Watershed Research and Training Center, TERA's mission is to "cultivate land stewardship, livelihood, and leadership skills that weave collaborative relationships between Tribal members and the community at large for the benefit of all lands and beings" (TERA, n.d.). Goals include:

- Connect Tribal members with **meaningful livelihoods and culturally relevant work** in our ancestral territories
- **Build Tribal capacity** to engage in ecological restoration work that mitigates the impacts of climate change and reduces the risk of uncharacteristic wildfire
- **Support Native American voices** and worldview to play a central role in land stewardship
- **Regenerate the ecosystems** of the North Coast ranges

Partners include Robinson Rancheria Pomo Indians of California; Scotts Valley Band of Pomo Indians; and the United States Forest Service—Mendocino National Forest. Present-day sovereign Nations in Lake County include Big Valley Rancheria, Elem Indian Colony, Middletown Rancheria, Robinson Rancheria, Scotts Valley Band of Pomo Indians, Habematolel, and Koi Nation (TERA, n.d.). TERA has so far provided several opportunities for community members to obtain National Wildfire Cooperating Group (NWCG) federal fire certifications, including Basic 32 Firefighter Type 2, RT-130 Fireline Refresher, S-219 Firing Operations and Tactical Fire, and Fire Effects Monitoring. In addition to certifying Tribal and community members, TERA holds several cultural burn demonstrations, allowing space for cultural-led objectives and approaches to Good Fire return (for further work on the integration of Traditional Ecological Knowledges into fuels treatment, see Wynecoop et al., 2019).

In September 2023 TERA held several cultural burns, in partnership with CAL FIRE and the U.S. Forest Service, in Cobb County and Lake County to improve oak savannah health, help native plant species thrive, and enhance wildlife habitat. A high priority for the TERA crew is to restore a wetland reed species, tule (*Schoenoplectus acutus*), found along the edges of lakes. Tule is a natural water filter and a culturally significant material that Tribes in the Clear Lake Basin use for making mats and boats. Controlled fires for tule have long been used by the Tribes in the Lake County area to keep plants healthy, but these were banned when laws passed in the late 1800s and early 1900s made cultural burns illegal (Nguyen, 2023). Clear Lake, a culturally significant waterscape, has sustained Native Peoples for millennia. Through different iterations of industrialization, the lake has endured many environmental and cultural harms: runoff has leached into the water from an abandoned mercury mine, which is now a Superfund site, and runoff also comes from nearby gravel mines, cannabis farms, and vineyards, which has led to a flux of harmful algal blooms. TERA is working to apply fire to tule for rehabilitation efforts to improve water quality and repopulate fish populations.

> "We're just trying to do our best to survive from what has happened to us historically — being relocated from our lands to where we are today, trying to eliminate us as people and our way of life. Just the act of bringing back fire really is historical, especially for Robinson and other Tribes here in Lake County, because that was taken away from us. And just to be able to do that means a lot. A lot of the hard work of our Elders in our communities or families before us, they've put in all the work and so I honor them for getting us here, and being strong for people to survive. And now I'm trying my best as a community member to stay strong for our next generation."
>
> —**TeMashio Anderson**, TERA board chair and the former environmental director at Robinson Rancheria (Fishman, 2022)

TERA is also partnering on the North Shore Restoration project to restore and reforest acres of

Figure 4.3. Adapted from *Life from Ashes: Learning from Indigenous Fire Use to Heal Neglected Ecosystems* (Woodruff & Salgado, 2023).

burned area as a result of the 2018 Ranch Fire. Located in one of the largest wildland urban interfaces in the Mendocino National Forest, TERA will engage in prescribed and cultural burning, pile burning, hand thinning, and/or mechanical treatment over a 40,000-acre area and reforestation on 2,600 acres as wildfire mitigation (Fishman, 2022). Overall, the portfolio of trainings offered by TERA not only equips Tribal members to be wildfire-ready in defense of their homelands, the work also contributes to local economies by providing employment opportunities while stewarding fire for ecosystem improvement.

Anishinaabe Cultures: Historical and Continued Fire Practices

A second case study of successful recognition of the importance of cultural fire is that from the Anishinaabeg Peoples in southern Michigan. In May 2023, the University of Michigan School for Environment and Sustainability released the "Prescribed Burn Program Best Practices for Southern Michigan: From Indigenous Partnerships to Communication and Burn Plans" (Baird et al., 2023). The report provides a deep understanding of fire history in southern Michigan, including the culture, rights, Knowledges, and histories of Anishinaabeg Peoples, in order to build respectful and informed fire reintroduction partnerships; guidance and recommendations to engage, communicate, and build trust with a variety of stakeholders, partners, and rights holders; and recommendations to develop an effective and informed burn plan with the best available information and approaches to increase pyrodiversity (the spatial and temporal variability in fire effects across a landscape) (Fig. 4.3).

The report serves as a call to reclaim Tribal fire history, placing it in the context of environmental decision-making; identifies deployment of Tribal sovereignty in the just return of fire to landscapes; and offers best practices in building trust, consent, and accountability with stakeholders (research partners and collaborators) and rightsholders (a term invoked to Tribes that encompasses rights and responsibilities to steward lands and waters).

Wiisaakodewan: Ojibwe Cultural Fire

Wiisaakodewan-minis (known as Stockton Island since the 1800s) is a 4,000-hectare, ecologically heterogeneous island located in western Lake Superior within the Apostle Islands National Lakeshore (APIS). It's also within the homeland of the Anishinaabeg (Ojibwe People). The islands are often referred to as the final stopping place of the Anishinaabeg, who arrived in the area after a long migration journey from the east. The meaning of the Ojibwe name for the island, Wiisaakodewan-minis, speaks to the influence of cultural fire. *Wiisaakodewan* refers to

A collaborative cultural burn at the Cache Creek Nature Preserve (Woodland, CA). *Photo Credit: CALFIRE*

"half-burned trees" (charred on one side), which occur after surface fires due to the influence of wind. *Minis* is simply the Ojibwe word for island. The cultural fires contributed to the globally rare barren community on the island, but later it experienced structural changes that occurred after the federal suppression of cultural burning (Booth et al., 2023).

Generations of cultural fire use by the Anishinaabe likely contributed to the increased ecological resistance and resilience of the pine forest and barren vegetation through past periods of climatic change. Therefore, maintaining the health of these ecosystems with the consistent use of fire is integral through future changes in climate. Due to the APIS's commitment to management policies such as the Wilderness Act, burning may be prevented and therefore cause unintended harm to these fire-dependent ecosystems.

Due to the criminalization of cultural use of fire practices by the Anishinaabeg and overall fire suppression policies of the early 1900s, specifically direct wildfire suppression by the National Park Service since the 1970s, the tombolo on the south side of Wiisaakodewan-minis shows a significant increase in tree density of the pine woodland and barrens since the 1930s. The history of fire suppression is evident through a comparison of historical photographs of the 1930s to present-day aerial images. To help understand and assess the ideal stewardship goals for these forested communities, paleoecological records consisting of vegetation, fire, and hydrological change were developed, which showed that fire had been a major component of the ecological history on the island for at least 6,000 years, determined by a char analysis of macroscopic charcoal records.

In April 2016, these records aided APIS managers in making more Tribally inclusive management decisions for the island, specifically whether to return fire to the island. Before this period, management objectives focused more on recreation and biodiversity conservation but from a narrowed lens. The paleoecological records prompted the APIS managers to recognize and honor Indigenous Peoples' treaty rights and cultural practices.

Indigenous oral histories regarding the use of fire were gathered from the local Tribal community (specifically the Red Cliff Band of Lake Superior Chippewa). During the sharing of these oral histories from multiple individuals, it was shared that before the criminalization of the use of fire, it was used every four to eight years on Wiisaakodewan-minis, primarily favoring blueberry (*Vaccinium spp.*) production and overall management of the ecosystems of which blueberry is a part. The combination of Knowledge from Indigenous Knowledge Holders, Western science, and historical records, and the willingness of the APIS to try different management approaches for the critically imperiled barrens, has successfully resulted in the return of fire to Wiisaakodewan-minis, beginning in 2017. Conversations, decisions, and similar efforts are continuing, which have already had numerous positive results (Booth et al., 2023).

Lighting the Flame: Workforce and Pathway Opportunities

Current workforce development opportunities are important in returning Good Fire back to the land while establishing Tribal and Indigenous fire and fuels crews to provide a unique perspective and approach to wildland fire management. This includes not only understanding NWCG certification (federal fire certification) but also Tribal and Indigenous perspectives of being in relationship with fire and all that it provides for us.

In the industry of wildland fire management, it is important to have more presence of Tribal and Indigenous burn bosses (a qualified person with appropriate NWCG fire certifications), fire line resource advisors, fire effects monitors, equipment operators, incident leadership, and individuals who are red carded (NWCG fire certification) to reduce the barriers and challenges for cultural fire and cultural burners. This is also connected to the importance of co-stewardship and having Tribal and Indigenous Peoples in these roles to reduce the barriers to access and management of lands that they were previously denied access to after the establishment of certain jurisdictions (lands held in trust under the jurisdiction of the federal government as opposed to the Tribe, for example).

The Climate Science Alliance, a nonprofit organization sponsored by the California Wildlife Foundation and established in 2015, has been particularly attentive in meeting the fire capacity needs of several Tribes in Southern California.

> *"Fire is codified in the law of the land, and it has been so since time immemorial; it has always been here and always will be. … To recognize that fire is the law of the land is to recognize that it is part of the laws of nature. … Indigenous fire knowledge encompasses a complex understanding of the environment and reading of a landscape's needs and indicators for when, where, and what type of fire should be used to achieve desired outcomes for the land."*
>
> —**Don Hankins** (Miwko?), Professor in Geography and Planning at California State University Chico, explains cultural burning (Clark et al., 2024)

With a mission to "lead activities and create partnerships which increase awareness of climate change impacts, promote solutions, and facilitate action" (Climate Science Alliance, n.d.-a). while nourishing relationships with Tribal partners, the Climate Science Alliance works to uplift Tribal and Indigenous communities' ways of life and worldviews. Through successful collaboration, the Climate Science Alliance has developed the Stewardship Pathways program (Climate Science Alliance, n.d.a). The Stewardship Pathways program supports people from across the Southern California region who are interested in creating or expanding a career focused on advancing Indigenous climate stewardship. With a foundation around the equal valuation of ways of knowing and an emphasis on the integration of climate science and cultural Knowledge, the Stewardship Pathways program's intent is to build capacity, support economic and workforce development, and advance co-stewardship of ancestral lands through various training pathways.

Further workforce and pathway challenges to Tribes are presented in the workforce development section of the Indian Forest Management Assessment Team's (IFMAT, 2023) report and the internship program offered at the center for Tribal Research and Education in Ecosystem Science (TREES, n.d.) at Salish Kootenai College.

Indigenous Fire Stewardship Pathway

A specific pathway offered by the Climate Science Alliance through the Stewardship Pathways program is the Indigenous Fire Stewardship Pathway, where participants receive technical training combined with regional climate science and Traditional Ecological Knowledge. They learn valuable skills that can help build a career path around wildland fire management, Tribal fire stewardship, and fuels reduction. Most importantly, participants learn about Tribal fire stewardship and prescribed fire while receiving the certifications necessary to become a wildland firefighter and Tribal monitor working on the fire line. The program would not be possible without the Southern California Interagency Wildland Fire and Fuels Cadre (Climate Science Alliance, n.d.-b), a group of agency partners who contribute their time and expertise to plan and implement training opportunities. By investing in this capacity-building opportunity, we are:

- Working with partners to establish support systems for Indigenous crews to be trained in fire, forestry, and fuels management that will advance resilient and adaptive pathways for conserving the land in the face of climate change.
- Creating pathways toward equitable and sustained professional opportunities, all under the umbrella of climate-informed conservation, stewardship, and restoration.
- Building toward a network of year-round Indigenous-led forestry and fuels crews to work on the ground to reduce the potential for high severity wildfire by engaging in creating defen-

Cultural Fire by David Streamer, taken on the homelands of the Los Coyotes Band of Cahuilla and Cupeño Indians. *Photo Credit: Condor Visual Media*

sible space and fuels abatement, restoration, and land stewardship—serving as a model for economic and workforce development.

For further materials on Southern California Tribal fire stewardship, see *Maathaaw, the Fire Within Us* (Pittman, n.d.), an Indigenous-led feature-length documentary from the Condor Visual Media team that documents the cultural, emotional, and scientific relationships of Southern California Tribes with the gift of fire.

Successful Partnerships and Autonomy

Great Lakes Fire Collaborative Focused Work and Partnership

Despite extreme challenges, such as the Indian Removal Act of 1830, the Indian Appropriation Act of 1851, the General Allotment (Dawes) Act of 1887, the Indian Reorganization Act of 1934, and the BIA's Voluntary Relocation Program of the 1950s, fire remains integral to the culture and identity of the Ojibwe People today. In the early 2000s in Tribal communities located in the southwest region of Lake Superior, conversations began regarding the traumatic history of fire criminalization and the need for returning to fire as a land management tool. It was acknowledged that although fire was still being used culturally and a component of most ceremonies, the use of it in land management practices predominantly ceased in the early 1900s. It was also recognized that many ecosystems were changing, especially in light of climate change, and the populations of more-than-human relatives were also being impacted by the long-term absence of fire on the ground.

This led to fire revitalization efforts in the region, resulting in an informal collective being formed consisting of Tribal Knowledge Holders, fire practitioners, fire researchers, and others. This collective has been successful in leading various Tribal, local, state, and federal fire research projects as well as prescribed burns involving, and at times led by, Tribal leaders. A few of the monumental burns that occurred involving Tribes occurred within treaty-ceded territory and reservation boundaries, particularly at the University of Minnesota Cloquet Forestry Center, which lies within the Fond du Lac Band of Lake Superior Chippewa Reservation and on Stockton Island, Apostle Islands National Lakeshore, which lies just outside of the Red Cliff Band of Lake Superior Chippewa Reservation and within the 1842-ceded territory.

In addition, various Tribes, such as Red Cliff, have also taken the initiative to adopt Tribal codes and ordinances that address the need for ceremonial fires to continue even during times of state burn bans. Within this movement, Red Cliff has not only acknowledged that ceremonial fires, such as for funerals, still need to burn, but that fires are a treaty right and adopting culturally relevant legal codes is a form of asserting sovereignty and providing healing from trauma caused by the prior federal illegalization of fire (Booth et al., 2022).

Meeting the Fire Training and Capacity Needs of Southern California

The Southern California Interagency Fire and Fuels Cadre (Cadre) (Climate Science Alliance, n.d.b) is composed of agency partners from Tribal fire departments, the Bureau of Indian Affairs, CAL FIRE, California State Parks, the U.S. Forest Service, and other entities that oversee fire management departments to establish support systems to meet the fire training and capacity needs of Southern California. Under the expert guidance of the La Jolla Band of Luiseño Indians Tribal fire chief, Wesley Ruise, Jr., and in collaboration with the Climate Science Alliance and its Tribal Working Group (Climate Science Alliance, n.d.c), this interagency Cadre was convened in 2022 with the goal of advancing efforts to build economic and climate resilience in Tribal and non-Tribal communities across Southern California.

The Cadre meets virtually on a monthly basis to discuss training interests, needs, and opportunities to build the fire capacity across agencies and communities. Uniquely, the Cadre includes cultural practitioners and burners who provide the additional perspective of the importance of having Tribal and Indigenous leadership in wildland fire management. The leadership of cultural practitioners and burners in the Cadre has led to incorporating cultural burning perspectives in NWCG training opportunities as well as cultural burning events that build the understanding for non-Tribal partners. The Tribal and non-Tribal participation in the Cadre builds relationships across agencies and Tribal communities and, most importantly, collectively addresses the barriers and challenges of getting Good Fire on the land.

Figure 4.4 Published call for the 2023 Karuk Indigenous Women + Training Exchange. It is worth noting Karuk leaders made the decision to cancel the fall WTREX 2023 due to wildfire impacts in their Homelands.

Figure 4.5. Artwork for the 2022 Karuk Indigenous Women's Training Exchange. Held in Karuk Territory, it was the first Indigenous women's TREX, a gathering of Indigenous fire practitioners from around the world. This artwork by Vikki Preston depicts Karuk women burning beargrass together, an important cultural basket-weaving material.

The Western Klamath Restoration Alliance

The Western Klamath Restoration Alliance (WKRP, n.d.) began in 2007 with a mission to build trust and a shared vision for restoring fire resilience at the landscape scale. WKRP is a collaborative land and fire management effort between Tribal, federal, and nongovernmental stakeholders in the Western Klamath Mountains of Northern California (Marks-Block et al., 2019). This partnership is based on 20 years of collaborative work between diverse partners, ultimately forming the WKRP in 2013 (Vinyeta et al., 2015). A hallmark of the partnership is the Karuk Tribe's Knowledge of fire; through intergenerational TEK, the Karuk show that traditional human and fire relationships of the past can guide strategies for the future. Representatives from the Karuk Tribe, Mid Klamath Watershed Council, Salmon River Restoration Council, and the U.S. Forest Service are co-leads of the collaborative group, but many other stakeholders, communities, and organizations are involved (WKRP, n.d.). Central to WKRP is the Klamath Prescribed Fire Training Exchange (KTREX), which commenced in 2014. KTREX is among the largest national TREX events hosted by The Nature Conservancy's Fire Learning Network Program and co-led by local partners, including the Karuk Tribe, the Mid Klamath Watershed Council, and the Salmon River Restoration Council. Here, international participants gather to "learn and burn together" on the Klamath landscape to learn fire as a tool (WKRP, n.d.).

Wildland fire management agencies are predominantly White and around 90% male (Oaster, 2022). In an effort to counterbalance the hypermasculine firefighting culture, the Karuk Tribe led the first-of-its-kind women's TREX event (Karuk Tribe, 2022) on the Klamath and Salmon Rivers in September 2022. Focused on Indigenous leadership and prescribed burning for cultural objectives, this event brought together Indigenous women, femmes, and nonbinary Peoples representing 43 distinct groups from across the world. The goals were to promote intergenerational learning and burning, learn about and support basket weavers within communities, center Indigenous women and families in burning practices, and create a safe space for Indigenous women in fire. Among community members and within the fire world, Karuk Women's TREX was considered overwhelmingly successful and showcased the positive benefits of returning fire stewardship, management, and decision-making back to Indigenous Peoples (Figs. 4.4 and 4.5).

The successful partnerships and autonomy elevated in the previous section serve as potential frameworks for other Indigenous Nations to follow in the reclamation of our stewardship responsibilities. It is the authors' intent to emphasize that the examples listed represent place-specific dynamics, protocol, and relationships and that goals, objectives, and capacities often differ across Tribal communities. Additionally, nation-state law and policy often present obstacles that slow or prohibit a Tribe's ability to exercise sovereignty in land management. To streamline jurisdictional barriers, the next section provides newly generated frameworks of fire policy recommendations.

Law and Legality: A Synthesis of U.S. Fire Policy Recommendations

STACC Vol. 2 presents an opportunity to iterate the important fire stewardship work Indigenous Peoples are leading across the United States and beyond. Although this chapter concentrates on certain regions of the U.S., we emphasize that there is a growing number of communities advocating for and implementing the return of fire to our Lands and cultures. To support communities in the successful reclamation of fire practices, we have consolidated 10 policy recommendations taken from published works at the Tribal, federal, and state level for implementation into climate strategies (see Adams, 2024). Through the hard work and advocacy of on-the-ground Indigenous cultural fire practitioners and scholars, these policy recommendations are now contemplated at the federal level.

Policy recommendations come from (1) The Report of the Wildland Fire Mitigation and Management Commission (2023), which was conceived after Congress took action to establish the Wildland Fire Mitigation and Management Commission through the 2021 Infrastructure Investment and Jobs Act (Pub. L. No. 117-58; § 40803, 135 Stat. 1097, 2021) and approached the 50-member commission to produce a set of policy priorities; (2) the *Good Fire* II report (Clark et al., 2024), a key document that identifies impediments to implementing both cultural and prescribed burns in California; and (3) the *IPCC Climate Change 2022* report (IPCC, 2022).

A synthesis of these documents specifically identifies the following key and actionable next steps toward the return of cultural fire in myriad regions across the U.S.:

- Indigenous Peoples should be hired to assist cultural fire practitioners within each agency [Natural Resources Agency, state fire agencies, state parks, U.S. Forest Service, National Parks Service, Natural Resource Conservation Service, U.S. Fish and Wildlife Service (USFWS), etc.].
- A cultural fire practitioner training and certification program should be developed specifically for our communities but also as tasks toward federal/state fire certifications. Recognize cross-deputization by Tribal Nations of Indigenous fire practitioners.
- Modifications to NEPA regulations should be implemented (higher level plans to focus on emissions from cultural and prescribed fire rather than forest management strategies or wildfire).
- Federal agencies should be encouraged to work with Tribes, Alaska Native Villages, Native Hawai'ians, states, and local partners to develop strategic plans for the implementation of prescribed fire with cultural objectives at a larger scale.
- National and international Indigenous-led training centers should be created with leadership from Tribes, Alaska Native Villages, Native Hawai'ians, and other indigenous fire-based organizations.
- Congress should require the Bureau of Indian Affairs to acknowledge that federally recognized Tribes, Alaska Native Villages, and Native Hawai'ians may develop fire programs on Tribal trust lands under approved Tribal laws, regulations, ordinances, policy, or other Tribal decision-making processes.
- Congress should codify Tribal cultural burning in federal law and ensure it is not confused with prescribed fire. Agencies should be granted authority to coordinate with Tribes, Alaska Native Villages, and Native Hawai'ians on the conduct of Tribal cultural burning on federally administered lands. Cultural fire should also be acknowledged under NWCG. Congress should ensure that federal agencies have the capacity and authority to enter into equitable co-stewardship and co-management agreements for multi-jurisdictional lands and support Tribal self-governance in order to address wildfire risk reduction, management, and recovery and to enable beneficial fire practices.
- There should be recognition of "tiered stewardship," in that while returning fire may initially begin with "co-stewardship" and "co-management" with agencies, the eventual goal is full fire stewardship, autonomy, governance, and sole management by Tribes, Alaska Native Villages, and Native Hawai'ians.
- To ensure Tribes, Alaska Native Villages, and Native Hawai'ians have adequate funding and staffing to accomplish management goals on Tribal lands, Congress should consider the results of the Indian Forest Management Assessment (BIA, n.d.) and National Congress of American Indians resolutions (NCAI, n.d.) when creating new laws, regulations, or other authorities.
- Government agencies working with Tribes should take on the responsibility of funding Tribal forestry and fire programs to fulfill trust obligations to Tribes and Indigenous Peoples.

Cultural Fire Sovereignty

Beyond policy recommendations, Indigenous fire practitioners and culture bearers are re-

claiming fire through story sharing and place-based Knowledge, exercising a time-honored practice of sovereignty. This understanding of sovereignty, rather than held through a government or colonized lens, is evoked through the agreements, stewardships, and covenants Indigenous Peoples held and continue to hold with fire as a stewardship tool and as our relative. Cultural fire sovereignty, therefore, is rooted in ground truthing with cultural fire practitioners, ceremonial leaders, community members, basket weavers, and language carriers, each with a desire to practice Good Fire through good relationships, responsibilities, and a deep respect for individual and collective self-determination (Adams, 2023b). Cultural fire sovereignty calls on proposed frameworks by Indigenous scholars, including Leanne Simpson, Mississauga Nishnaabeg: "...when Indigenous Peoples use the English word sovereignty in relation to our own political traditions, we use it to mean authentic power coming from a generated consensus and a respect for dissent rather than sovereignty coming from authoritarian power or power over style of governance. Our ways of thinking come from the land, our intellectual sovereignty is rooted in place" (Simpson, 2007).

Robert Warrior, Osage, draws on Vine Deloria Jr.'s understanding of sovereignty as an open-ended process that involves critical and kinetic contemplations of what sovereignty means at different historical and paradigmatic junctures and that intellectual sovereignty can signify political movement for land and self-determination (Warrior, 1992). Warrior's vision informs fire land-care practices as a political act of reclaiming lessons passed intergenerationally, inter-Tribally, and for the betterment of our Indigenous futures. By deploying cultural fire, we make conscious decisions to honor reciprocity and responsibilities we hold with more-than-human relatives while governing ourselves through land keeping. This work on the land rebuilds our spiritual and cultural connection to fire as our Relative while centering our intergenerational connections to our Peoples and as practice in collective decision-making. Here, we uphold our conceptualization of "Cultural Fire Sovereignty."

The current state of wildfire and climate crisis necessitates the inclusion of Indigenous voices, perspectives, and lived experiences toward mitigation implementation. We keep these policy recommendations in mind while also recognizing the federal government has a trust responsibility to Tribes and Alaska Native Villages, reaffirmed in 2014 by 333-5: Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries (Sec. Order 3335-Jewell 2014). More broadly, under international law and the *United Nations Declaration on the Rights of Indigenous Peoples*, the United States has a responsibility to ensure all Indigenous Peoples' rights to Good Fire are protected in perpetuity (UN General Assembly, 2007). Indigenous Peoples have always understood fire as not only a stewardship tool but kin that helps shape the land, create new life, and keep our cultures intact. As actionable steps, we encourage rightsholders and stakeholders at the local, state, federal, and Tribal levels to fold recommendations into current and future wildfire and climate mitigation plans toward a more just and Indigenized climate future.

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Conclusion: The Future of Fire

Fire will always be a part of our futures, and with the growing concerns of wildfire stemming from the effects of climate change, fire stewardship must be culturally centered and next-generation focused. As Indigenous Peoples, we have always understood the importance of our Youth. A clear example of fire forward is the FireGeneration Collaborative (FireGen, n.d.). FireGen is a diverse group of emerging leaders in the wildland fire space, supported by people with expertise in fire management, policy, and environmental justice. The work of this Youth team has so far included policy recommendations to the U.S. federal commission, including supporting Indigenous rights to revitalize cultural management practices in and beyond workforce frameworks; creating a high-performing fire workforce that is inclusive of women and underrepresented communities; and investing in intergenerational decision-making as a strategic asset for sustainable and collaborative results. This team strives to provide wildfire and climate solutions that are culturally grounded, forward-thinking, and beneficial for Tribal communities.

At the 2023 10th International Fire Ecology and Management Congress (Association for Fire Ecology, 2023) held in Monterey, California, and hosted by the Esselen Tribe of Monterey County, not only was space created for Indigenous Peoples and their deep connection to fire, but their voices were elevated and celebrated. In a particular session, carried out mainly by Indigenous Youth from the Great Lakes region, the information sharing served as an example of how fire can heal our Peoples and our Lands. The session, ironically entitled "Fire Ecology in the Forgotten Landscapes of the Upper Great Lakes," was especially empowering during several presentations on Indigenous fire efforts. Here, a powerful all-female Youth team representing the Fond du Lac Band of Lake Superior Chippewa and LGBTQ community stood in front of the room to share their story on how researching and reconnecting with historical fire use in the Great Lakes region is leading to a return of land management with fire. In the packed room of both Native and allied scholars, the group relayed that reconnection to fire for the next generation is not just about research, education, and land management, but about cultural resurgence, deep healing of both people and place, and a pathway to healing from historical trauma (Tom et al., 2023). Through the many tears shed in the room while the next generation stood and shared their shaking hearts, it was known that the importance of fire ecology around the world has not been forgotten, especially by Indigenous Peoples.

For Vikki Preston, an Indigenous fire practitioner and leading voice in the return of Indigenous woman–led fire return in California, the future of fire is a part of the larger conversation among Indigenous communities around landback, that is, the return of Indigenous homelands to Indigenous Peoples, the original stewards of these lands (NDN Collective, 2021). She calls on the state to leverage more authority to Tribal Nations in exercising their autonomy over protecting their homelands from catastrophic wildfire, ecological collapse, and impending effects of climate disaster.

"My positionality comes from being raised in and living in Karuk territory; gaining more of a land base back and having more authority to exercise our sovereignty is what the future looks like. Karuk people are a part of the unratified treaties Tribes, we don't have a reservation, we are a landless Tribe that have slowly purchased back, 98% of our aboriginal territory is still on Forest Service and public lands; a lot of that is a reason why we can't do as much beneficial burning which also speaks to lack of access to lands and lack of autonomy. Moving forward, with regard to regulations around Tribally led fire, I'd like to see cultural burning processes more clear cut, more understood, so that Tribes can do it more regularly. I'd like for it to be less confusing so that fire practice is more readily available (same for fishing, hunting, and gathering with regard to climate change); all of that is a part of the future I hope for. "

*—**Vikki Preston**, Karuk/Yurok/Paiute/Pit River, Cultural Resources Technician for Karuk Tribe Department of Natural Resources*

The time for fire return is now. While this report encapsulates a snapshot of individual communities and agencies that have initiated the undoing of decades of fire exclusion and centuries of colonial suppression, the rise in wildfire and climate catastrophe has signaled the necessity of Indigenous fire Knowledges and practices. A recall of our Ancestral Knowledge presents not only opportunity, but responsibility to protect and restore landscapes while invoking our inherent right to sovereignty. As we continue to demonstrate Cultural Fire Sovereignty, we lead with the decision-making protocols held by our Ancestors and do so with the inclusion of our Indigenous Women, Youth, Elders, and more-than-human Relatives for the return of Good Fire. ◀◆

Good Fire Chapter References

Adams, M. M. (2023a). Indigenous ecologies: Cultivating fire, plants, and climate futurity. *Artemisia*, *49*(2), 20–29. https://www.cnps.org/artemisia-journal/indigenous-ecologies-cultivating-fire-plants-and-climate-futurity-36553

Adams, M. M. (2023b). *Storytelling through fire: The socio-ecological and cultural reclamation of Indigenous cultural fire in Northern California* [Doctoral dissertation, The University of California Davis]. eScholarship. https://escholarship.org/uc/item/4083f1gs#author

Adams, M. M. (2024). Indigenous fire data sovereignty: Applying Indigenous data sovereignty principles to fire research. *Fire, 7*(7), 222. https://doi.org/10.3390/fire7070222

Adler, B. (2023, August 14). *Development, tourism and climate change: How humans made Maui's catastrophic wildfires worse.* Yahoo! News. https://www.yahoo.com/news/development-tourism-and-climate-change-how-humans-made-mauis-catastrophic-wildfires-worse-215135003.html

Association for Fire Ecology. (2023). *10th International Fire Ecology and Management Congress.* https://fireecology.org/past-conference-resources

Baird, A., McAtee, A., Salgado, V., & Woodruff, F. (2023). *Prescribed burn program best practices for southern Michigan: From Indigenous partnerships to communication & burn plans.* [Master's thesis, University of Michigan]. Deep Blue Documents. https://dx.doi.org/10.7302/7102

Booth, R. K., Schuurman, G. W., Lynch, E. A., Huff, M. G., Bebout, J. A., & Montano, N. M. (2023). Paleoecology provides context for conserving culturally and ecologically important pine forest and barrens communities. *Ecological Applications, 33*(6), Article e2901. https://doi.org/10.1002/eap.2901

Bureau of Indian Affairs. (n.d.). *Indian Forest Management Assessment.* https://www.bia.gov/service/indian-forest-management-assessment

California Wildfire & Forest Resilience Task Force. (2022). *California's strategic plan for expanding the use of beneficial fire.* https://wildfiretaskforce.org/wp-content/uploads/2022/05/californias-strategic-plan-for-expanding-the-use-of-beneficial-fire.pdf

Cart, J. (2022, September 4). Welcome to the age of fire: California wildfires explained. *Santa Maria Times.* https://calmatters.org/explainers/california-wildfires-explained/

Cavanagh, V., & Standley, P. (2020). Walking in the landscapes of our Ancestors–Indigenous perspectives critical in the teaching of geography. *Interaction, 48*(1), 14–16. https://search.informit.org/doi/10.3316/informit.039036093412381

Christianson, A. C., Caverley, N., Diabo, D. A., Ellsworth, K., Highway, B., Joe, J., Joudry, S., L'Hirondelle, L., Skead, W., Vandevord, M., & Ault, R. (2020). *Blazing the trail: Celebrating Indigenous fire stewardship.* FireSmart Canada. https://firesmartcanada.ca/wp-content/uploads/2024/06/Booklet_Blazing-the-Trail_Web-version.pdf

Christianson, A. C., Sutherland, C. R., Moola, F., Gonzalez Bautista, N., Young, D., & MacDonald, H. (2022). Centering Indigenous voices: The role of fire in the boreal forest of North America. *Current Forestry Reports, 8*, 257–276. https://doi.org/10.1007/s40725-022-00168-9

Clark, S. A., Miller, A., & Hankins, D. L. (2022). *Good Fire: Current barriers to the expansion of cultural burning and prescribed fire in California and recommended solutions.* Karuk Tribe. https://karuktribeclimatechangeprojects.wordpress.com/wp-content/uploads/2021/03/karuk-prescribed-fire-rpt_final-1.pdf

Clark, S. A., Tripp, B., Hankins, D. L., Rossier, C. E., Varney, A., & Nairn, I. (2024). *Good fire II: Current barriers to the expansion of cultural burning and prescribed fire in the United States and recommended solutions.* Karuk Tribe. https://karuktribeclimatechangeprojects.wordpress.com/wp-content/uploads/2024/03/good-fire-ii-march-2024.pdf

Climate Science Alliance. (n.d.a). *Stewardship pathways: Advancing Tribal stewardship of all ancestral lands.* https://www.climatesciencealliance.org/stewardship-pathways

Climate Science Alliance. (n.d.b). *Southern California Interagency Fire and Fuels Cadre.* https://www.climatesciencealliance.org/fire-cadre

Climate Science Alliance. (n.d.c). *Tribal Working Group.* https://www.climatesciencealliance.org/tribal-working-group

Eriksen, C., & Hankins, D. L. (2014). The retention, revival, and subjugation of Indigenous fire knowledge through agency fire fighting in eastern Australia and California. *Society & Natural Resources*, *27*(12), 1288–1303. https://doi.org/10.1080/08941920.2014.918226

FireGen. (n.d.). *Our work.* FireGeneration Collaborative. https://www.firegencollab.org/

Fishman, K. (2022, November 10). *"Bringing back those relationships with the land": TERA returns cultural burning to Lake County.* The Mendocino Voice. https://mendovoice.com/2022/11/bringing-back-those-relationships-with-the-land-tera-returns-cultural-burning-to-lake-county/

Fisk, J. J., Leong, K. M., Berl, R. E. W., Long, J. W., Landon, A. C., Adams, M. M., Hankins, D. L., Williams, C. K., Lake, F. K., & Salerno, J. (2024). Evolving wildlife management cultures of governance through Indigenous Knowledges and perspectives. *Journal of Wildlife Management, 88*(6), Article e22584. https://doi.org/10.1002/jwmg.22584

Fox, K. (2023). Hawai'i, from ashes to sustainability. *Science, 381*(6660), 815. https://doi.org/10.1126/science.adk4197

Goode, R., Gaughen, S., Fierro, M., Hankins, D., Johnson-Reyes, K., Middleton, B. R., Red Owl, T., & Yonemura, R. (2018). *Summary report from Tribal and Indigenous communities within California: California's fourth climate change assessment.* State of California. https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-010_TribalCommunity-Summary_ADA.pdf

Goode, R. W., Beard, S. F., & Oraftik, C. (2022). Putting fire on the Land: The Indigenous people spoke the language of ecology, and understood the connectedness and relationship between land, water, and fire. *Journal of California and Great Basin Anthropology, 42*(1), 85–95. https://www.pepperwoodpreserve.org/wp-content/uploads/2019/09/JCGBA_42-1_Goode-etal_final.pdf

Hankins, D. (2013). The effects of Indigenous prescribed fire on riparian vegetation in central California. *Ecological Processes. 2*, 24. https://doi.org/10.1186/2192-1709-2-24

Hatchett, B., & Koshkin, A. (2023, February 15). *Severe summer wildfires are impacting western U.S. mountain snowpack during winter and spring.* National Integrated Drought Information System (NIDIS). https://www.drought.gov/news/severe-summer-wildfires-are-impacting-western-us-mountain-snowpack-during-winter-and-spring

Hoffman, K. M., Christianson, A. C., Dickson-Hoyle, S., Copes-Gerbitz, K., Nikolakis, W., Diabo, D. A., McLeod, R., Michell, H. J., Al Mamun, A., Zahara, A., Mauro, N., Gilchrist, J., Myers Ross, R., & Daniels, L. D. (2022a). The right to burn: Barriers and opportunities for Indigenous-led fire stewardship in Canada. *FACETS*, *7*(1), 464–481. https://doi.org/10.1139/facets-2021-0062

Hoffman, K. M., Christianson, A. C., Gray, R. W., & Daniels, L. (2022b). Western Canada's new wildfire reality needs a new approach to fire management. *Environmental Research Letters*, *17*. https://iopscience.iop.org/article/10.1088/1748-9326/ac7345

Indian Forest Management Assessment Team (IFMAT). (2023). *Breaking point: The state of Tribal forestry today* [StoryMap]. https://storymaps.arcgis.com/stories/c1f1ca11f6774341b70550e8b8cc1801

Intergovernmental Panel on Climate Change. (2021). *Climate change 2021 - The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press. https://doi.org/10.1017/9781009157896

Intergovernmental Panel on Climate Change. (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. Cambridge University Press. https://doi.org/10.1017/9781009325844

Ka'anapu, K. (2023). Paradise on fire: How Hawai'i developed one of the worst wildfire problems in America. *Intersections*, *1*(1). https://lir.byuh.edu/index.php/intersections/article/view/3336

Karuk Tribe. (2022). *Indigenous women-in-fire training exchange (TREX)*. https://www.karuk.us/index.php/information/62-announcements/610-wtrex-indigenous-women-trex-event

Karuk Tribe Department of Natural Resources. (2019). *Karuk climate adaptation plan.* https://www.karuk.us/images/docs/dnr/FINAL%20KARUK%20CLIMATE%20ADAPTATION%20PLAN_July2019.pdf

Karuk Tribe, Hillman, L., Hillman, L., Harling, A. R. S., Talley, B., & McLaughlin, A. (2017). Building Sípnuuk: A digital library, archives, and museum for Indigenous Peoples. *Collection Management*, *42*(3–4), 294–316. https://doi.org/10.1080/01462679.2017.1331870

Karuk Tribe/Southwest Climate Adaptation Science Center (SWCASC) (Hosts). (2022). *Intentional fire* [Audio podcast]. Spotify. https://open.spotify.com/show/6oBy0J7FWiYBVop9kENWOj

Kimmerer, R. W. (2015). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants.* Milkweed Editions.

Kimmerer, R. W., & Lake, F. K. (2001). The role of Indigenous burning in land management. *Journal of Forestry*, *99*(11), 36–41. https://doi.org/10.1093/jof/99.11.36

Lake, F. K. (2021). Indigenous fire stewardship: Federal/Tribal partnerships for wildland fire research and management. *Fire Management Today, 79*(1), 30–39. https://www.fs.usda.gov/sites/default/files/fire-management-today/00313%20FS%20Pubs%20FMT%2078%283%29_final%20508_c.pdf#page=30

Lake, F. K., & Christianson, A. C. (2019). Indigenous fire stewardship. In S. L. Mazello (Ed.), *Encyclopedia of wildfire and wildland–urban interface (WUI) fires.* Springer. https://doi.org/10.1007/978-3-319-51727-8_225-1

Lake, F. K., Wright, V., Morgan, P., McFadzen, M., McWethy, D., & Stevens-Rumann, C. (2017). Returning fire to the Land: Celebrating traditional knowledge and fire. *Journal of Forestry, 115*(5), 343–353. https://doi.org/10.5849/jof.2016-043R2

LaPier, R. R. (2023, August 12). Analysis: Burning of Lahaina's sacred sites is a major loss for Native Hawaiians. But their history will live on. *PBS News.* https://www.pbs.org/newshour/nation/analysis-burning-of-lahainas-sacred-sites-is-a-major-loss-for-native-hawaiians-but-their-history-will-live-on

Long, J. W., Lake, F. K., Goode, R. W., & Burnette, B. M. (2020). How traditional Tribal perspectives influence ecosystem restoration. *Ecopsychology, 12*(2), 71–82. https://doi.org/10.1089/eco.2019.0055

Long, J. W., Lake, F. K., & Goode, R. W. (2021). The importance of Indigenous cultural burning in forested regions of the Pacific West, USA. *Forest Ecology and Management, 500*, Article 119597. https://doi.org/10.1016/j.foreco.2021.119597

Marks-Block, T., Lake, F. K., & Curran, L. (2019). Effects of understory fire management treatments on California hazelnut, an ecocultural resource of the Karuk and Yurok Indians in the Pacific Northwest. *Forest Ecology and Management, 450*, Article 117517. https://doi.org/10.1016/j.foreco.2019.117517

Marks-Block, T., Lake, F. K., Bliege Bird, R., & Curran, L. M. (2021). Revitalized Karuk and Yurok cultural burning to enhance California hazelnut for basketweaving in northwestern California, USA. *Fire Ecology, 17*. https://doi.org/10.1186/s42408-021-00092-6

McCann, H. (2020, September 1). Using fire for good on Tribal Land. *Public Policy Institute of California.* https://www.ppic.org/blog/using-fire-for-good-on-tribal-land/

Meyer, M. R. (2022). Good Fire: A Yurok Tribe response to climate change. *Natural Resources & Environment, 37*(2), 30–33. https://www.americanbar.org/groups/environment_energy_resources/resources/natural-resources-environment/2014-2022/yurok-tribe-response-climate-change/

Monitoring Trends in Burn Severity (MTBS). (2022). *Monitoring trends in burn severity*. https://www.mtbs.gov/

Moura, L. C., Scariot, A. O., Schmidt, I. B., Beatty, R., & Russell-Smith, J. (2019). The legacy of colonial fire management policies on traditional livelihoods and ecological sustainability in savannas: Impacts, consequences, new directions. *Journal of Environmental Management*, *232*, 600–606. https://doi.org/10.1016/j.jenvman.2018.11.057

Murveit, A. M., Delphin, S., Domingues, C., Bourque, S. D., Faulstich, S. D., Garfin, G. M., Hutley, N., Meadow, A. M., & Preston, V. (2023). Stories as data: Indigenous research sovereignty and the "Intentional Fire" podcast. *Environment and Planning F*, *2*(1–2), 180–202. https://doi.org/10.1177/26349825221142293

National Congress of American Indians (NCAI). (n.d.). *Resolutions*. https://www.ncai.org/resolutions

The Nature Conservancy. (2024, January 10). Fire: A prescription for ecosystem health. https://www.nature.org/en-us/what-we-do/our-priorities/protect-water-and-land/land-and-water-stories/ira-funding-supports-prescribed-fire/

NDN Collective. (2021, June 15). *NDN Collective launches "LANDBACK U": A curriculum on how to join the fight to return land to Indigenous hands* [Press release]. https://ndncollective.org/ndn-collective-launches-landback-u-a-curriculum-on-how-to-join-the-fight-to-return-land-to-indigenous-hands/

Nguyen, T. (2023, August 9). *Reviving a famously polluted California lake.* Knowable Magazine. https://knowablemagazine.org/content/article/food-environment/2023/reviving-famously-polluted-california-lake

Norgaard, K. M. (2019). *Salmon and acorns feed our people: Colonialism, nature, and social action.* Rutgers University Press.

Oaster, B. (2022, December 30). What if Indigenous women ran controlled burns? *High Country News.* https://www.hcn.org/issues/55-1/indigenous-affairs-wildfire-what-if-indigenous-women-ran-controlled-burns/

Office of Hawaiian Affairs (OHA). (2023, August 9). *OHA Board Chair Carmen "Hulu" Lindsey statement on Maui wildfires* [Press release]. https://www.oha.org/news/oha-board-chair-carmen-hulu-lindsey-statement-on-maui-wildfires/

Pittman, A. J. (Director). (n.d., pre-release). *Maathaaw, the Fire Within Us* [Film]. Condor Visual Media. https://www.climatesciencealliance.org/maathaaw

Ramage, B. S., O'Hara, K. L., & Caldwell, B. T. (2010). The role of fire in the competitive dynamics of coast redwood forests. *Ecosphere 1*(6), 1–18. https://doi.org/10.1890/ES10-00134.1

The Red Nation. (2021). *The red deal: Indigenous action to save our Earth.* Common Notions.

Reed, R., & Diver, S. (2023). Pathways to healing: Indigenous revitalization through family-based land management in the Klamath Basin. *Ecology and Society 28*(1), 35. https://doi.org/10.5751/ES-13861-280135

Roush, T. (2023, June 7). New York goes Martian: Wildfire smoke engulfs city in eerie orange haze. *Forbes.* https://www.forbes.com/sites/tylerroush/2023/06/07/images-of-new-york-city-engulfed-by-canadian-wildfire-smoke/?sh=40a7bd953641

Status of Tribes and Climate Change Working Group (STACCWG). (2021). *Status of Tribes and climate change report* (D. Marks-Marino, Ed.). Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, AZ. http://nau.edu/staccreport

Steffensen, V. (2020). *Fire country: How Indigenous fire management could help save Australia.* Hardie Grant Explore.

Sultana, F. (2022). The unbearable heaviness of climate coloniality. *Political Geography, 99*. https://doi.org/10.1016/j.polgeo.2022.102638

Tribal EcoRestoration Alliance. (n.d.). https://www.tribalecorestoration.org/

Tom, E., Adams, M. M., & Goode, R. W. (2023). Solastalgia to soliphilia: Cultural fire, climate change, and Indigenous healing. *Ecopsychology, 15*(4), 1–9. https://doi.org/10.1089/eco.2022.0085

TREES. (n.d.). *Internships in natural resources.*

https://skctrees.org/

UN General Assembly. (2007). *United Nations declaration on the rights of Indigenous Peoples: resolution / adopted by the General Assembly,* (Resolution No. A/RES/61/295). United Nations. https://www.refworld.org/legal/resolution/unga/2007/en/49353

United Nations. (n.d.). *Permanent Forum on Indigenous Issues.* The UN Department of Economic and Social Affairs. https://press.un.org/en/permanent-forum-indigenous-issues

Vinyeta, K. (2022). Under the guise of science: How the US Forest Service deployed settler colonial and racist logics to advance an unsubstantiated fire suppression agenda. *Environmental Sociology, 8*(2), 134–148. https://doi.org/10.1080/23251042.2021.1987608

Vinyeta, K., Whyte, K. P., & Lynn, K. (2015). *Climate change through an intersectional lens: Gendered vulnerability and resilience in Indigenous communities in the United States* [Technical report]. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. https://doi.org/10.2737/PNW-GTR-923

Warrior, R. A. (1992). Intellectual sovereignty and the struggle for an American Indian future. Chapter 3 of Tribal Secrets: Vine Deloria, John Joseph Mathews, and the recovery of American Indian intellectual traditions. *Wicazo Sa Review, 8*(1), 1–20. https://doi.org/10.2307/1409359

Welch, J. R., & Coimbra Jr., C. E. A. (2021). Indigenous fire ecologies, restoration, and territorial sovereignty in the Brazilian Cerrado: The case of two Xavante reserves. *Land Use Policy, 104.* https://doi.org/10.1016/j.landusepol.2019.104055

The Wildland Fire Mitigation and Management Commission. (2023). *On fire: The report of the Wildland Fire Mitigation and Management Commission.* https://www.usda.gov/sites/default/files/documents/wfmmc-final-report-092023-508.pdf

Western Klamath Restoration Partnership (WKRP) (n.d.). *Homepage.* https://www.wkrp.network/

Woodruff, F., & Salgado, V. (2023). *Life from ashes: Learning from Indigenous fire use to heal neglected ecosystems* [Infographic]. University of Michigan School for Environment and Sustainability. https://drive.google.com/file/d/13UJikzcT-kGlwKkNVDTvBFH9lADfyhmu6/view

Wynecoop, M. D., Morgan, P., Strand, E. K., & Sanchez Trigueros, F. (2019). Getting back to fire sumêš: Exploring a multi-disciplinary approach to incorporating traditional knowledge into fuels treatments. *Fire Ecology, 15*, 17. https://doi.org/10.1186/s42408-019-0030-3

Younging, G. (2018). *Elements of Indigenous style: A guide for writing by and about Indigenous Peoples.* Brush Education.

Yurok Tribe. (n.d.). *Our history.* https://www.yurok-tribe.org/our-history ◀◆

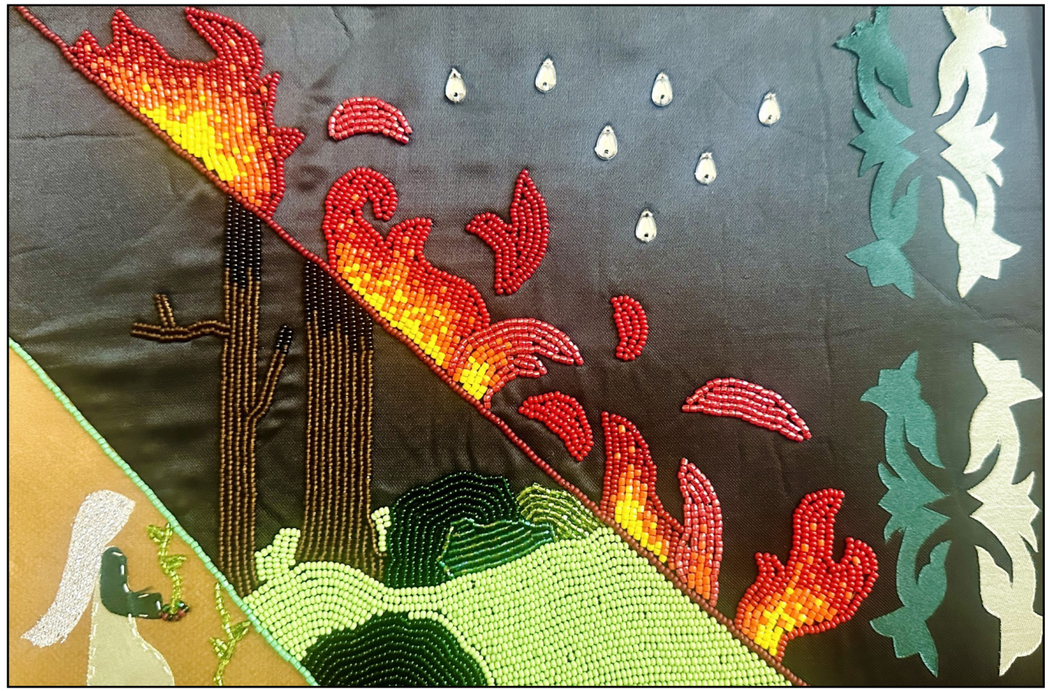

Figure 4.6. *Cultural Fire Sovereignty,* 2024. Beadwork created by Celina Hall (Ho Chunk and Narragansett) reflecting her experience during cultural burn demonstrations. Celina is an Environmental Studies & Indigenous Studies undergraduate student at the University of Kansas, KU Spencer Museum research fellow, and lab assistant in Dr. Melinda Adams' "Pyrogeography: fire, plants, and soils" lab group.

Seventh Generation:

Youth Leaders in Climate Action

CHAPTER LEAD

Coral B. Avery

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KEY MESSAGES

Indigenous Youth have especially been otherized because of the historical systematic disenfranchisement of Indigenous Peoples (Akopai, 2020) and sit at the intersection of systemic racial disenfranchisement and infantilization despite being disproportionately affected by the consequences of climate change. Indigenous Youth also hold the power to make positive change in climate action and resilience by recognizing climate harms and working toward paths to healing, engaging in local to international climate activism, and utilizing traditional teachings to Indigenize Western academia and collaborative approaches to climate adaptation.

CHAPTER RECOMMENDATIONS

Indigenous Youth can look to their identity and experiences as a source of power in rising to leadership roles at the local, regional, national, or even international level for climate resilience. Current leadership must create intentional space, provide resources, and empower Indigenous Youth on their journey to becoming responsible future Ancestors and stewards of Mother Earth.

Chapter Author Positionality Statements

Coral B. Avery (they/them) is a citizen of the Shawnee Tribe of mixed European and Shawnee heritage; born on Kalapuya Lands, raised on Kumeyaay Lands, and is now living on the homelands of the Anishinaabeg – Ojibwe, Odawa, and Potawatomi Nations, as well as the Wyandot Nation. Coral is a Climate Planning Specialist at the BIA Branch of Tribal Community Resilience, a Community Language Preservationist for the Shawnee Language Immersion Program, and a first-generation graduate student at the University of Michigan School for Environment and Sustainability.

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Brooke Damon (she/her) is a part of the Navajo Nation and a recent graduate of Northern Arizona University. Brooke has had experience working with ITEP, USGS, The Nature Conservancy, NAU’s Sedimentary Research Lab, Hopi Tribe, and the Grand Canyon National Park. She is currently a NAU Research and Mentoring Post Baccalaureate Program scholar.

Anagali (Shace) Duncan (he/him) was born and raised with his 14 siblings in District 7 of the Cherokee Reservation, Stilwell, Oklahoma. He is a first generation, low income student studying Ethnic Studies at Stanford University, focusing on how Indigenous communities are affected by environmental and colonial impacts. Raised with traditions of going to water, he has seen firsthand how environmental change has affected his community’s ability to safely practice tradition. His research at institutions including Brown University, Harvard University, and Stanford University aims to recenter Indigenous methods of land protection and remind the rest of the world that the Earth needs Indigenous communities to lead the fight for environmental sustainability.

Tynya Kee (she/her) is of the Navajo Nation and an undergraduate pursuing a bachelor of science in forestry at Northern Arizona University. She has experience in working with the Institute for Tribal Environmental Professionals and the Ecological Restoration Institute, researching on topics such as food sovereignty, Indigenous permaculture, and Traditional Ecological Knowledge.

Raven B. Mingo (he/him) is an enrolled member of the Mississippi Band of Choctaw Indians, where he serves as an environmental scientist within the Tribe’s Office of Environmental Protection focusing on outreach, wetlands, climate change, and air quality. Raven is a recent graduate from the University of Southern Mississippi, where he earned a bachelor in sociology with a focus on Indigenous Peoples. Raven is also an avid art enthusiast, with a particular interest in cultural representation within art.

Anastasia Miller-Youst (she/her) is of European, Shawnee, and Crow descent and currently lives on Karankawa, Atakapa, and Akokisa homelands. She is the Tribal linguist for the Shawnee Language Immersion Program of the Shawnee Tribe of Oklahoma, where she is also a language keeper and kciteeletaka (master) in the Master–Apprentice Program.

Bazile Minogiizhigaabo Panek is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. He serves as an Indigenous consultant for the Institute for Tribal Environmental Professionals and is the founder and CEO of Good Sky Guidance, a consulting firm specializing in the use of Indigenous Knowledges in environmental initiatives.

Chapter Author Positionality Statements Continued

Kelsey Morales is Chicana, of Mexican American descent, and is the former Assistant Manager of the Institute for Tribal Environmental Professionals Tribes and Climate Change Program. Kelsey is also an adjunct faculty at Fort Lewis College and is a climate and social justice organizer and activist across the Southwest.

Jenn Santry is a citizen of Choctaw Nation and is also Sicangu Lakota, Mdewakanton Dakota, and Yankton Dakota. Jenn holds a doctorate in Educational Sustainability and is the Associate Director for Community Tribal Schoolyards at the Trust for Public Land, where she works to transform underutilized school grounds into vibrant, culturally relevant outdoor learning spaces for Tribal and Indigenous children to have hands-on opportunities for learning with the land. Jenn is also a sustainable agriculture instructor at Peninsula College and UMASS Amherst in addition to a teacher of Indigenous Planning and Native Food Systems at Montana State University.

Brook M. Thompson is from the Yurok and Karuk tribes of Northern California. She has a B.S. in Civil Engineering from Portland State and an MS in Environmental Engineering from Stanford, and she is currently pursuing a PhD at the University of California Santa Cruz, studying salmon, water policy, TEK, and restoration with environmental justice for California tribes. Brook's goal is to bring together water rights and Native American Knowledge through engineering, public policy, and social action.

Cherry Y. E. W. Yamane (they/them) is a Kanaka Maoli from Waianae, Oahu. They are a PhD student in the Indigenous Health program at the University of North Dakota's School of Medicine and Health Sciences Department. Their doctoral work focuses on community-based and culturally-driven interventions centered on land-based healing with Indigenous communities.

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Seventh Generation Terminology/Glossary

Land is capitalized when referring to the Indigenous perspective of Lands, to include the physical and spiritual components with inclusion of all our relatives, in contrast to the Western perspective of land as a nonliving entity to be owned.

Indigenous communities hold a historic relationship with a given region that shaped their languages and cultures prior to European contact. In this chapter, Indigenous refers primarily to the Native American, Alaska Native, Pacific Islander, and Caribbean Islander communities located within present-day U.S. states and territories, unless specified with global context. Indigenous may also be used as an umbrella term when referring to individuals who self-identify as part of one or more Indigenous communities, although specific individuals in the chapter are also identified by their specific Tribal or Indigenous affiliations.

Indigenous Youth refers to any self-identifying individual generally between the ages of 15 and 24 years of age (as defined by the United Nations), regardless of citizenship status or geographic proximity to one's Indigenous community. This distinction is due to the history and ongoing displacement of Indigenous families, and individuals, from their communities through genocidal practices and policies including, but not limited to, forced removal, boarding schools, and blood quantum.

Native, or Native American, is occasionally used in this chapter when referring specifically to individuals or Tribal communities of the mainland United States.

"Minoritized" is used rather than "minorities" in this chapter, as these groups face discrimination due to the ideologies and policies of settler colonialism, regardless of whether they are actually a smaller, or minority, group (i.e., in the United States, the total population of women outnumber men; however, women and gender minorities, such as intersex and nonbinary individuals, have all been minoritized by the power structures of patriarchy—a product of settler colonialism).

05 Seventh Generation:
Youth Leaders in Climate Action

Chapter Summary

Youth in Westernized cultures have historically been kept out of leadership roles because of an assumption of incompetence due to limited years of experience (Akopai, 2020). There is no one definition for the term "youth," but for consistency, the United Nations uses 15–24 years of age (United Nations, n.d.b.). Indigenous Youth, especially, have been othered because of the historical systematic disenfranchisement of Indigenous Peoples (Akopai, 2020). Indigenous Youth sit at the intersection of systematic racial disenfranchisement and infantilization despite being disproportionately affected by the consequences of climate change.

Today, Youth routinely experience unprecedented natural disasters and conditions, such as drought and flooding, which cause disproportionately high rates of physical and mental health impacts compared to previous generations (World Health Organization, 2023; Brown et al., 2024). The response of Indigenous Youth to these challenges is deeply rooted in a sense of responsibility to protect and preserve traditional Lands and ways of life.

The visible and growing movement for climate action has long been led by Indigenous Peoples guided by the Knowledge of their Ancestors with outspoken leadership by Youth.

This chapter describes how Indigenous Youth are rising toward the responsibility of becoming honorable Ancestors for future generations. Main topics include the health impacts of climate change and paths to healing, Youth leadership from the local to the international scale, activism and methods for change, and recommendations for current leaders to support the Youth leadership of tomorrow. These topics include Western academic writing interwoven with the narratives and firsthand accounts of young Indigenous folks on the frontlines of climate action. Through generational healing, community building, and collective action, young Natives are creating an optimistic future for all despite the impacts of climate change.

Climate Impacts and Paths to Healing

Health Impacts

Stemming from historical and ongoing cultural trauma, the impacts of climate injustices have been attributed to the disruption of environmental ecology (Redvers et al., 2023). The health of the climate and the environment is directly linked with Indigenous ways of knowing and being, as Indigenous Peoples are genealogically connected with the lands (Braveheart et al., 2011; Walters et al., 2011). The health inequalities posed by climate change are felt most by Youth, Elders, those who experience disabilities, and by Indigenous communities at large due to the social, political, structural, and health inequalities posed by settler colonialism (Hill & Plume,

Figure 5.1. *Mother Earth* by Devon Borkowski (Rappahannock Tribe of Virginia, age 23). *Mother Earth* was a painting made for an Indigenous food sovereignty and food justice event. It depicts Native stewardship of the natural world, shown through an Indigenous mother caring for Earth as her own baby. This piece was submitted to the 2024 Bureau of Indian Affairs Division of Environmental Services and Cultural Resources Management (DESCRM) Young Tribal Leaders Art Contest (BIA, 2024), where it was selected for the feature gallery.

Figure 5.2. *Indigenizing the Environmental Justice Movement*, by Kimey Begaye (Navajo Nation, age 23). This piece is one of three winning artworks of the 2024 Young Tribal Leaders Art Contest (BIA, 2024) hosted by the BIA DESCRM. Artist description: I focused my project on the Cholla power plant located by my hometown in Winslow, Arizona. Opened in 1962, it is coal-fire powered. Navajo Land is abundant in gas, coal, water, and uranium. Currently, there are five extractive industries on our territories. Of those, there are three coal-fired power plants that are polluting our Lands and contributing greatly to climate change. What is Indigenous environmental injustice? Irresponsible and exploitative environmental policies that harm the physical and financial health of Indigenous communities, they also cause spiritual harm by destroying Land held in a place of exceptional reverence for Indigenous Peoples. Exposure to emissions from coal-fired power plants can be extremely harmful to human health—even deadly. Other community members described decades of watching the power plant and coal mine take precious water sources, pollute the air, extract materials from the earth, all while Navajo community members' health suffered and communities lacked electricity and running water. Art shows power, evokes emotions, and challenges paradigm. It is a way to inspire action that would otherwise remain unseen.

2024). Youth are still developing both physically and emotionally and are dependent primarily on adult caregivers, which puts them at higher risk of suffering from extreme climate events and the impacts of relocating due to those threats (EPA, 2024).

Some Indigenous Youth have reported that their personal health experiences, influenced by environmental racism and climate change, can have a heavy influence on their activism and career direction. Coral Avery (they/them, Shawnee Tribe) has been deeply involved in environmental action from a young age and continues to do so in a professional capacity largely due to their experience with childhood cancer.

> *"I didn't know then, but the environmental pollution that my pregnant mother and I were introduced to was likely a contributing factor to my leukemia. Nature played a significant role in aiding my healing. As the cancer was eating me away, so was the chemotherapy and the stress that my family and I faced throughout treatment. Although Western medication made my recovery possible, nature was my outlet to step away from those stressors and remind myself that life was worth fighting for. Nature healed and afforded me the opportunity to continue my responsibility to give back to the natural world as it gives to us."*
>
> —*Coral Avery*

Both pre- and postnatal exposure of pregnant mothers and infants to high levels of radiation, poor nutrition, and environmental contaminants, including pesticides and solvents, likely contributes to childhood cancers (EPA, n.d.; Melkonian et al., 2021). Climate impacts both cause and further compound existing health conditions, putting infants and children at especially high risk (World Health Organization, 2023). The indirect causal pathways are the aftermath of the direct climate injustices that impact the mental, physical, emotional, spiritual, and economic health of Indigenous and other minoritized Peoples (Brown et al., 2024).

The long-term, irreversible effects of the climate crisis pose an additional risk factor to mental health, especially for Indigenous Youth who are already impacted by ethno-stress caused by systemic and racial injustices (Grande et al., 2023; Redvers et al., 2023). The fear of present and future climate impacts is reinforced by the pressure for the youngest generations to solve the crisis, compared to those age 30 and above (Heeren et al., 2022; Patrick et al., 2023; Swim et al., 2022). This is commonly referred to as eco-anxiety (Clayton, 2020). Eco-anxiety has been proven to inhibit the ability to complete work or to socialize (Clayton & Karazsia, 2020)

Figure 5.3. Dead salmon on the Klamath River, CA, photographed by 7-year-old Brook M. Thompson (Yurok/Karuk) in September 2002.

> *"At the age of seven, I witnessed the death of over sixty thousand salmon on the Klamath River. I grabbed my mom's hand and said, "I need you to take photos of this. I need to show the rest of the world what is happening here." As a kid split between the reservation and the city, I knew that no one else understood the impact and devastation of the death of these salmon who were my cousins, my connection to my Ancestors, my food, and my recreation. However, I wanted non-Native kids to try and understand the havoc that the 2002 salmon fish kill caused our Tribal community. Moreover, how it would become even more likely to reoccur with climate change."*
>
> **—Brook M. Thompson**

and is associated with psychological distress (Reyes et al., 2023), depression (Sciberras & Fernando, 2022; Schwartz et al., 2022), and reduced well-being (Kulcar et al., 2022).

Many Indigenous Youth have been taught about, and have directly witnessed, challenges that their communities have faced over the generations in addressing environmental injustices (see Figs. 5.2 and 5.3). Indigenous Peoples have continually led at the forefront of environmental justice yet are regularly faced with feelings of despair through these ongoing barriers to change. To keep these anxieties from compounding, Indigenous communities and healthcare providers must address the lack of access to physical, mental, and spiritual health care (Nguyen et al., 2020). Politically, young people are not afforded the same respect or rights as adults. Youth are currently excluded from policy decision-making, although there is an increased need for Indigenous Youth advocacy in climate justice and the environmental impacts that affect the futurities of Indigenous Peoples for generations to come (Grande et al., 2023). Structural shifts and resources (money, proximity, communication skills, visibility, etc.) are necessary in order to give Indigenous Youth the means to continue their responsibility to steward the Land and seek environmental justice for their communities.

The Path to Healing

The disruption of Indigenous Peoples, specifically to their Lands as a result of land loss, is an ongoing form of cultural trauma that disrupts cultural connections to place, sense of self related to place, the social environment, and sense of community as a result of displacement (Brown, et al., 2024; Walters, et al., 2011). Many Indigenous communities define their connection to Earth through their self-identifying names, such as the ᎠᏂᎩᏳᎩᎩᏤ (a-ni gi-du-wa-gi) or the Keetoowah or Cherokee, people who traditionally refer to themselves as those who stem from the dirt of the Keetoowah Mound. The healing of our Earth is intricately tied to our healing as individuals. Unfortunately, colonization was, and remains, a deliberate effort to sever Indigenous ties to the Land, including forced removal and the decimation of essential food sources and medicines. To mend these wounds inflicted by colonization, it is imperative for Indigenous Youth in particular to reestablish their connections to the Land and, in doing so, begin the healing process from these generational traumas.

> *"ᎠᏂᎩᏳᎩᎩᏤ ᎦᏓᎾᏗ (a-ma-yi wa-da-s-di) (going to water; self-care ceremony) Rediscovering our Connection to Self-Care. Amidst the alarming pollution of our precious waters, the essence of our identity is diminishing. We find ourselves disconnected from the teachings, history, language, and culture tied to the sacred act of going to water. The absence of this ancestral practice reverberates in our daily lives, profoundly impacting the dynamics within our communities. What does it truly mean for our collective well-being when we are stripped of this vital self-care ceremony? A perpetual state of grief consumes us."*
>
> —**Anagali Duncan** (he/him), Cherokee Nation

Identity as a Tool for Change

Self-identification, Indigeneity, cultural belonging, and kinship profoundly shape Native identity (Pierce, 2017). However, for many Indigenous and multiracial individuals, Native identity remains complex due to the legacy of colonization. This complexity and racial ambiguity stem from the forced displacement of Indigenous people from their lands, leading to a disconnection from identity, culture, and communal knowledge (Calderon, 2014; Simpson, 2014). Specifically within the dispossession and relocation of lands, Indigenous Peoples have endured a sense of cultural disconnection, feelings of being ostracized, and shame about their identities when Indigenous identities are often at the core of politicized identities (D'Amico et al., 2021). Moreover, both historical and modern factors, including boarding schools, forced assimilation, racist policies (i.e., blood quantum), and physical and cultural genocide, disrupt the transmission of culture across generations. This may prompt Indigenous Youth to negatively internalize their sense of belonging and authenticity, as pictured in Fig. 5.5, questioning, "If I didn't grow up within my community, learning the language and culture, do I truly belong? Am I Native enough?"

Figure 5.4. Anagali Duncan visits a stream of water at Mantle Rock, Kentucky during his 1,000-mile bike ride, retracing his Ancestors' footsteps on the forced removal from their homelands to Oklahoma.

One glaring example of conflicting spaces of identity is the U.S. policy of blood quantum, a method of eugenics that quantifies "Indian blood" or Indigenous ancestry (McKay et al., 2019), contradicting Indigenous worldviews centered on collective and cultural identity (Tallbear, 2003). Many Native People find blood quantum dehumanizing, as it fragments their identities and perpetuates lateral violence. However, it must be noted that blood quantum policies are systematic in nature, imposed on Indigenous Nations by the settler U.S. federal governance as a means of further disrupting and separating Indigenous Peoples from their lands, culture, and kinship relations (Native Governance Center, n.d.). Over the years, some Tribes have embraced blood quantum, although the result of such policies includes fighting within Indigenous communities while also creating hostile debates about who is "authentic" and who is not (McKay et al., 2019; Native Governance Center, n.d.). Blood quantum can also cause an omission of the next generation as citizens, furthering the impacts of identity politics and lack of access to community, culture, and Lands—another aspect

Figure 5.5. Dr. Sabrina Suluai-Mahuka (Samoan) hosting a self-identity workshop for Native high school participants of the 2023 Native Youth Climate Adaptation Leadership Congress. Image by Melissa Gonzalez, USFWS.

of ongoing cultural trauma (D'Amico et al., 2021). Youth and future generations are also disadvantaged in the longer-term systemic impacts from such racialized identity constructs and policies, as these methods aim to lessen Indigenous claims to identity, Land, and sovereignty (Harmon, 2019).

While the impact of colonization and blood quantum politics affects Indigenous Nations, there is a growing number of individuals making their journeys home to reconnect to the Land and community. Striving toward Indigenous self-efficacy is pivotal for Indigenous Youth as they embrace and strengthen their resolve to embody Land-based healing and climate justice work. Particularly, there are a plethora of Indigenous scholars who encourage the culturally driven interventions that incorporate Indigenous traditional practices and community-driven initiatives to increase community, culture, and self-connection (D'Amico et al., 2020; Jernigan et al., 2020). D'Amico and colleagues utilized a strengths-based, culturally appropriate strategy for substance-use treatments utilizing traditions and connections for urban Natives across California (D'Amico et al., 2020, 2021). Within this substance-use intervention program, they sought to increase social connectedness and cultural identity while incorporating the medicine wheel and storytelling as part of teaching ancestral Knowledges (D'Amico et al., 2020, 2021). The protective factors of this intervention looked primarily at Indigenous cultural connectedness across Indigenous Nations that incorporated a pan-Indian approach to identity and connections within an inclusive space while also tailoring it to and encouraging Youth to learn about their own Tribal-specific heritage (D'Amico et al., 2020, 2021).

Indigenous Land-based pedagogies, such as *Akiikaa* (it is the Land) in Algonkian, encompass teachings of personhood rights for entities beyond humans—air, water, and plants—showcasing a practice of decolonization through the Land and the reclamation of Indigenous identity (Mashfield-Pringle & Stewart, 2019). The importance of reconnecting with *Uŋčí Makhá* (Grandmother Earth) through the practice of our culture, understanding our history and stories, revitalizing our food systems, and repairing relationships with our relatives cannot be overstated. These practices are essential for healing both the Land and the People. Returning to Indigenous roots is necessary for identity, as it relates to Indigenous health determinants as well as cultural continuity and Indigenous resilience (Johnson-Jennings et al., 2020; Reading & Wien, 2009). The Land is a healer that serves as a place of sacred intention, (re)connection, and cultural continuity that centers ancestral Knowledges through the inclusion of kinship relations to the Land and more-than-human kin as a way of not only mitigating the health effects through cultural buffers, but also of healing the Land, more-than-human kin, and future Ancestors and generations through the connections of remembrance (Johnson-Jennings et al., 2020; Loppie Reading & Wien, 2009; Redvers et al., 2023; Warne & Wescott, 2019). Returning to cultural roots is necessary for healing of Indigenous Youth, as Indigenous Nations, and also for the health of the environment through an act of reciprocity and respect for the Land.

Building Community Through Social Media and Language Revitalization

Culturally significant gatherings, including language classes, ceremonies, and celebrations, can create a strong sense of community, belonging, and pride in identity. This also aids in community building to recognize and face challenges, including climate change.

Social Media as a Tool for Change

Another way that Indigenous Youth are furthering cultural connections and their understanding of climate change is through social media. Many Native Youth use social media, as it can allow anyone to be heard, especially those whose voices have historically been oppressed, repressed, or overlooked. Out of all studied groups, 18 to 29 year olds have the highest social media use (Pew Research Center, 2021). YouTube, Instagram, Facebook, Snapchat, and TikTok are some of the most popular apps for these users (Sidoti, O. et al., 2021; Gutierrez, 2021).

Young Indigenous leaders are making waves online to bring awareness to environmental injustices locally and around the globe as well as to share Tribal histories, culture, language, stories, and moments of Indigenous joy. Notable Indigenous Youth on social media include Xiuhtezcatl (also known as X, born 2000), an Indigenous activist and hip-hop artist who has spoken on the effects of fossil fuels from a young age and led as the Youth director of environmental nonprofit Earth Guardians in 2019; Noah Green (born 2002), who began drumming and singing for climate change at the age of 9; Frank Waln (born 1989), who released "Oil 4 Blood" about the Keystone XL pipeline on YouTube at the age of 24; and Lily Joy (@Sheshortnbrown, born 2003), who uses TikTok to educate people about water protection, environmentalism, and activism. Groups such as Save California Salmon provide Youth with iPads and train them to use the technology for videography so they can tell their own stories (Save California Salmon, 2022). Social media is a medium to share and express art to audiences that may not otherwise be able to see it in person, connecting Indigenous Youth regardless of physical distance.

For these reasons, social media use among Native Youth continues to grow despite the "digital divide" (Taylor, 2023). About 18% of Indigenous People lack internet access, compared to 4% of people in non-Tribal areas (Curi, 2022). The inequality of internet access is essential to acknowledge, as it can stifle story sharing, education, and connection across Nations in addition to access to basic needs for many individuals in rural areas. In a world with growing reliance on digital devices, the digital divide puts Indigenous Youth at particular disadvantage in facing the climate crisis.

Nitaataakoomaape (We Are Renewing Our Relationships)

The section "Digital Reconnection Across the Diaspora" in Chapter 2 discussed some of the ways in which technology offers opportunities for cultural preservation and revitalization, including online language programs. For the Shawnee Tribe, passing their language on to young generations is increasingly necessary, as so few fluent speakers remain (AILDI, n.d.). In early 2020, Shawnee leadership declared a state of emergency to prioritize resources toward a comprehensive language learning

program with the goal that future generations of Shawnee children will again be fluent in their ancestral language (The Shawnee Tribe, n.d.). The Shawnee Tribe launched their online Shawnee Language Immersion Program (SLIP) due to the health risks posed by the COVID-19 pandemic to their in-person language classes as well as to reach the expanse of their Tribal membership dispersed across the globe (The Shawnee Tribe, n.d.). Language teachers from the three Shawnee Tribes (Absentee Shawnee, Eastern Shawnee, and Shawnee Tribe) transitioned from their in-person classrooms to Zoom.

Since 2021, the Shawnee Tribe Language Department has continued to develop additional teaching tools for the SLIP, including an online dictionary, a *ta keewaki* card game of numbers and colors, and an interactive Shawnee language learning website called SLIPStream. They have hosted summer internships for college students from the Tribes to expand the Indigenous Languages Digital Archive and further promote language learning among Youth. The Tribe has recruited young citizens to support the language department as cultural language practitioners, or language teachers in training, and hosts an annual language fair with both Youth and adult

> *"Being born as an Indigenous person in the U.S., living a healthy life, and learning language and culture are all forms of activism. Being proud of one's Indigenous heritage, living in a place with historical and systemic removal of lives and culture, and thriving despite that fact, is an act of active resistance."*
>
> —**Brooke M. Thompson**
> Yurok/Karuk

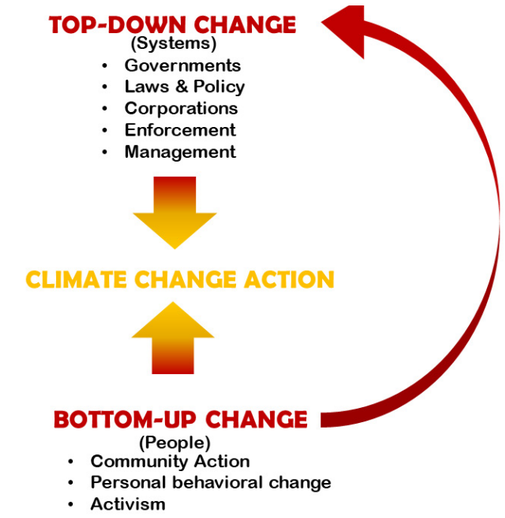

Figure 5.6. Top-down and bottom-up methods of change by Brook M. Thompson (Yurok & Karuk).

categories for all levels of language learning. Additionally, the Shawnee Tribe Language Department integrates the language in programs across Tribal departments and within the Tribe's social media posts.

These steps to preserve the language also work to reconnect Shawnee Youth to *saawanooki* (/saːwɑnoːki/, Shawnee) culture. Knowing the names of their plant and animal relatives such as *taami* (/tɑːmi/, corn) and varieties thereof such as *skwalicimi* (/skwɑlicimi/, flint corn) and *hoskipemi* (/hoskipɛmi/, sweet corn), as well as uses such as *taamilokhaana* (/tɑːmilokhɑːnɑ/, parched corn meal), assigns value that transcends generations going back to time immemorial. It reminds Shawnee People of their foundations on this Land and their ongoing responsibility of stewardship—past, present, and future. This virtual educational setting is one approach to reconnect Tribal members from across the diaspora and further traditional teachings with both Indigenous and Western educational frameworks.

Activism and Methods for Change

Methods for climate action include top-down and bottom-up change (Fig. 5.6). Community organizing, which includes those organizing to change behaviors or influence lawmakers, is a bottom-up method of change. In contrast,

Figure 5.7. *TEK v Tech* by Brook M. Thompson (Yurok/Karuk) (2020). Statement on TEK validity shared through traditional beadwork in contrast to peer-reviewed English written papers.

top-down change is generally considered to be changes made by lawmakers, those who decide policy, large corporations and governments, and those who enforce policy (Gallup, 2018). Because of the historical systematic oppression of Indigenous groups as well as the age requirements and time, resources, and experience requirements for top-down change, Indigenous Youth often find themselves situated in the bottom-up model. For example, elected officials attending the United Nations Climate Conference of Parties (COP) can return to their home countries and support carbon reduction policy and enforcement that creates top-down change. However, the Youth and Indigenous groups at COP can attempt to influence top-down change

through direct action at COP or through their advisory group roles. Bottom-up influence can also be achieved by Indigenous Youth organizing within their communities, voting, and running for office to have better representation in government roles.

The importance of Indigenous Youth in climate change conversations and actions has been increasingly recognized at local, regional, national, and international scales. The advancement of social media and other communication technologies has increased visibility for previously silenced narratives and the ability to coordinate over far distances. However, there are systemic barriers that still exist for Indigenous Youth that must be addressed to further empowerment, including racism, ageism, the digital divide, lack of funds, institutional discrimination, and lack of top-down change power. Understanding methods of change, finding community from local to international levels, and ensuring Indigenous Youth have more voting roles instead of just advisory roles, where those currently in power provide mentorship and resources, can assist in mitigating the current adversities.

Art Is Activism

Art is a powerful form of activism and cultural expression that can be used as a call for climate action. Beadwork and oral stories are Indigenous forms of information sharing that challenge the Western ideology that written forms of historical evidence are often seen as more legitimate. The piece *TEK v Tech* (Fig. 5.7) includes beaded, animated, and oral components that blend to tell a story, Indigenizing the Western understanding of human relations with the environment. This piece centers fire and water management, the three sister crops, and Maori wayfinding to exemplify how Traditional Ecological Knowledge (TEK) should be considered equally legitimate in all its forms. In an age of short-form media, imagery, music, sound, and video are relevant to reach audiences of many learning styles and interests across platforms.

The growing access to cameras and microphones, increased camera quality, and decreased upload time has expanded opportunities for the sharing of Indigenous arts, culture, and music. Social media can be a platform for climate education, community building, and organizing. It can bridge solidarity across Natives of mixed identities and federally and non-federally recognized Tribes and Island Nations. It can also support people of all generations and backgrounds in finding one's place in the climate movement. Social media has the potential to offer space for all to be heard in a world where diverse Indigenous Youth are often excluded from the spotlight. It is also a means to share firsthand accounts of climate change impacts and methods for mitigation, adaptation, and resilience.

Indigenizing Western Academia

In public education spaces, Native students must navigate different epistemologies (ways of knowing), ontologies (ways of being), and axiologies (assignment of value) around Indigenous and Western Knowledge systems, creating additional barriers to academic success compared to their non-Native peers (Castagno et al., 2022). This is particularly true in the sciences, where science is not something that you do in many Indigenous cultures but rather is inherent in all aspects of life (Castagno et al., 2022). Indigenizing curricula, braiding traditional and Western teachings, and utilizing higher education to invest back in Tribal communities are all ways in which Native Youth can lead to shift the dominant Western educational paradigm.

Indigenizing Climate Curriculum

The Institute for Tribal Environmental Professionals is currently working with Willow Bend Environmental Education Center (n.d.) in Flagstaff, Arizona, to Indigenize its current climate change curriculum. The project began in 2022 with ITEP's Tribes and Climate Change Program interns. At the start of the 2023–24 academic year, the development of new curriculum included an introduction to TEK, Indigenous teachings, and how climate change is impacting Indigenous Peoples. These concepts are taught in step with climate basics, solutions, and a hands-on project creating a windmill.

The Indigenous teachings included within the curriculum are those of the Navajo calendar, as it is local to Flagstaff and both interns involved with ITEP are members of the Navajo Nation. The Navajo calendar has different meanings for the months that relate to surrounding climate ...

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Using Higher Ed to Support Tribal Communities

Narrative by Brooke Damon, Navajo

When I went off to college, I met a professor that specialized in food forests, and I was immediately captivated by the food system with a fixed goal of providing a more sustainable living to families. Each layer in a food forest serves as a cog in the machine to produce a diverse abundance of food. I wanted to learn more techniques that served the same purpose as food forests, and my professor had fueled my curiosity by introducing me to Indigenous permaculture.

A whole new chapter opened in my life as I looked at a variety of techniques used by Indigenous people pre-colonization, and it dawned on me how I didn't see any of these methods currently used in my hometown. Further research made me more aware of the climate issues that impact Indigenous communities across the globe. More specifically, Indigenous environmental and cultural integrity is threatened by climate change, with issues such as: lack of food security, high rate of mortality, and pre-existing physical and mental health issues.

Not many Indigenous people are aware of what's happening, and some do not have the luxury I have in going to college to learn about ways to mitigate or adapt to the climatic change. Additionally, no classes are offered in Traditional Ecological Knowledge at universities to tie traditional Knowledge and education together. However, the Flowering Tree Permaculture Institute works to share TEK and encourage a sustainable living. Founded by Roxanne Swentzell and located in northern New Mexico, the non-profit organization works to preserve and expand cultural Knowledge. Furthermore, they host workshops anyone can attend, teaching how to weave, animal husbandry, adobe construction, and so on to maintain cultural knowledge. The Hopi Tutskwa Permaculture Institute, founded by Lilian Hill, also offers hands-on workshops in northern Arizona. Their projects incorporate Hopi teachings with a goal of building resilient and sustainable communities. Indigenous people can attend these workshops to expand their Traditional Ecological Knowledge in supporting their local food systems.

These institutes are opportunities for Indigenous People to pursue a higher education that ties traditional Knowledge with academia. Indigenous people have decades of Knowledge in stewardship of the Land passed down from their ancestors. They harbor Knowledge of the Land and reciprocal ecological relationships, thus leading to open opportunities in offering a variety of approaches to modern science and improving natural resource management. Traditional Knowledge is tied to values, socially and ecologically, and can reconnect individuals back to their cultural roots.

From my personal experience, I decided to major in environmental science despite all the craziness during the pandemic a couple of years ago. During that unprecedented time, my mom, who is a dental hygienist, was put on the front lines of the Navajo Nation and did routine check-ins with those who tested positive for the virus. One of her patients lived in an isolated area with no access to running water or electricity and was not doing well given these conditions. One day when she came home, I knew something wasn't right, and I knew that it was because this patient did not make it. I knew that I needed to do something so another crisis would not happen in the place that so many call home. This ambition guided me through my schooling. I feared that I lacked experience and would be at a disadvantage when helping Tribal communities. I began to apply to every opportunity that I saw, which resulted in a lot of elevator pitches and changes to my cover letter. Fortunately, I was given the opportunity to work with the United States Geological Survey Grand Canyon Research and Monitoring Center to create a guiding source for Tribal involvement within the Glen Canyon Dam Adaptive Management Program. Although this resulted in my researching countless documents and forcing myself to cite these documents properly, it gave me something else that I greatly needed, confidence in myself.

After this opportunity I began working with ITEP's Tribes and Climate Change Program and NAU's Sedimentary Record of Environmental Change Lab along with The Nature Conservancy. I gained knowledge and unforgettable experiences, although the most remarkable experience I have had is working with the Hopi Tribes Water Resources Department. I was able to see firsthand how higher education can create employment opportunities, such as a natural resources director. Learning from them and hearing their experiences as a Native American woman within the environmental field is something that I could not be more grateful for. It showed me that I too can do it as a Native woman. ◀◆

Braiding Academia and Traditional Teachings

Narrative by Tynya Kee, Navajo

My family has begun reconnecting with our Navajo roots through planting because of our reflection on our diet. We decided to plant again at my late great-grandfather's land just like he did when my mom was little. My mom would recount rows of cornstalks that would tower over her when she walked through and squash that were scattered across the field. We moved back to our hometown Pinon from the city as a way to reconnect with our cultural identity and our land. Our first year of planting wasn't a success, as our corn was stunted and we didn't have any crops to harvest, but from it, my mother began researching about planting. She shared with me how planting depends on the soil health, how the nitrogen, phosphorus, and potassium contribute to the growth of crops. My mom was able to create a backyard garden with rich soil and our crops grew abundantly, but there was a question on how we would be able to achieve that over a large land.

Attending NAU, I had the opportunity to work with Dr. Allen on the Food Forests in Northern Arizona project and discovered permaculture. Dr. Allen lectures on Indigenous permaculture, including food forests, a method I believed would be beneficial for my family to live more sustainably. I began further research to understand the land and create my forest garden. I created a topographic map of the land to learn where rainwater travels and researched more about rainwater harvesting. Indigenous practices of dry farming proved insightful, including a Zuni technique called waffle gardens, which is a structure designed to trap and retain moisture for the crops; terrace gardens, which are raised beds similar to stairs that allow planting on hillsides and allow water to distribute evenly to each level; and brush or rock weirs, which are small dams placed in streams to slow the flow of water and allow it to spread out on the land. There is a saying that to begin planting, you must first plant the rain. By doing so, my family was able to successfully plant orchids, pumpkins, and sunflowers.

Some Indigenous Peoples are highlighting the value of Traditional Ecological Knowledge through projects such as the Pueblo Food Experience Project and the Tuscarora Food Forest Project. The Pueblo Food Experience Project, conducted by sculptor Roxanne Swentzell (Santa Clara Pueblo), observed 14 volunteers over the course of three months who ate only foods that were available to their Pueblo Ancestors, grown in their own food forest. After the three months, the volunteers noted a significant loss of weight, a drop in their cholesterol and sugar levels, and a complete elimination of any painful physical body condition the volunteers had prior to the experiment. Not only did Swentzell notice an improvement in their physical health, but she also saw an improvement in their mental health—volunteers reported having less depression and more energy. Moreover, the project found that community engagement increased with their food forests, thus boosting human relations and empowerment within said communities. In the Pueblo Food Experience Project, Swentzell narrated how the diet was based on cultural identity and stated, "...there was a reconnection that none of us realized would happen. It was so strong. It's hard to even put words to it because it was something we all felt, a connection to something that was very, very old in ourselves, like we went home in a deep, deep sense... This was a belonging. This was an empowerment event" (West-Barker, 2016). The reconnection to their traditional Puebloan food has resurfaced their traditional values and strengthened their connection to their Indigenous roots.

Likewise, the Tuscarora Food Forest Project was created to reconnect the Tuscarora people of the Northeastern Woodlands to their traditional food. The Tuscarora people's historical diet came from fishing and gathering tree crops such as oak acorns, walnuts, and butternuts. The Tuscarora people still hold on to agriculture traditions and created the Tuscarora Food Forest Project to reconnect with their traditional foods. Through this project, nut trees were planted and workshops were created to teach younger generations how to process, prepare, and learn the traditional stories behind these nuts. Poe et al. (2013) observed, "Health has as much to do with social relations, Land, and cultural identity as it does with individual physiology." Reconnecting with food has proven to empower communities, as it enables the transfer of traditional Knowledge through generations and allows individuals to further connect with their cultural identity.

These projects are examples of Traditional Ecological Knowledge and the opportunities they provide in offering different scientific approaches to modern science and improving natural resource management. ◀◆

Figure 5.8. *Indigenous Resilience* by Devon Borkowski (Rappahannock Tribe of Virginia, age 23). The painting shows Native resistance in the face of harmful practices that threaten our food sources and ways of life. It was initially made for an Indigenous food sovereignty and food justice event. This piece was submitted to the BIA DESCRM 2024 Young Tribal Leaders Art Contest, where it was selected for the featured gallery (BIA, 2024).

patterns and situations. This example demonstrates that traditional Knowledges and teachings are being affected by climate change for many Nations, disrupting patterns observed from generation to generation. The goal in incorporating Indigenous perspectives has also extended to the Education Center's field trip to Picture Canyon. This student program established by Willow Bend exhibits the natural and cultural history of the park. Students are taught some of the cultural uses of native plants, whether in a ceremony or recreation. Moreover, teachings and stories can be integrated to understand how Indigenous People see the natural world.

Integrating TEK into a curriculum like this can be effective when voices of Tribal communities and members are centered in its development. The success of this project is due to the collaboration of project partners and flexibility to engage, understand, and incorporate the worldviews, values, and cultures of involved parties to produce a curriculum for multiple grade levels.

Youth Leadership Today

Indigenous Youth leadership today is seen at the local, regional, national, and international levels through grassroots activism, policy, academia, and when entering the workforce. This section is organized by the geographic scope of Youth leadership and includes the personal experiences of some of the chapter authors, well-known and inspiring examples of Youth leadership, resources and organizations for readers to engage with, and recommendations for older generations of leaders to empower Indigenous Youth.

Local and Regional Leadership

During the Red Power Movement (Blakemore, 2020), the 1969 occupation of Alcatraz Island (San Francisco, California) was led primarily by UC Berkeley students in their 20s (Bruchac, 2023; Brice, 2022). The 1868 Treaty of Fort Laramie promised unused federal lands would be returned to the "Indians" (Brice, 2022). Alcatraz fit that description, thus sparking a 19-month occupation of predominantly California Native students (Johnson, 2019). Today, the Red Power Movement is remembered for bringing an end to the termination era in which the United States sought to revoke the recognition of sovereign Tribal Nations, thereby stripping Tribal citizenship of Native Peoples (University of Massachusetts Lowell Library, 2022). The occupation has remained an inspiration for many Indigenous Peoples' protests since.

Figure 5.9. Brook at Standing Rock, age 20 in 2016. *Photo Credit: Brook M. Thompson.*

Another one of the most widely recognized Indigenous movements in the U.S. began with the construction of the Dakota Access Pipeline (DAPL) in 2016 near the Standing Rock Reservation in North Dakota. The DAPL was met by resistance from local communities to halt the construction of the pipeline. Oceti Sakowin (known to some as Sioux) Youth organized a run from North Dakota to Washington, D.C., to raise awareness for the issues with the DAPL (Smithsonian Museum of the American Indian, n.d.). This Youth-organized run is what many consider the start of the Standing Rock resistance. During the occupation, a Youth council was formed to advise the council at Standing Rock. Their objective was to "provide a collective voice and represent Tribal Youth in all matters that concern them; to serve as a means of mobilizing and coordinating the actions of Youth, other community members and organizations toward positive

Standing Rock 2016.
Photo Credit: Brook M. Thompson

Brook M. Thompson, Yurok/Karuk, reflects on her experience at Standing Rock:

"I had gone to rallies for Standing Rock in Portland, Oregon, where I was an engineering student at Portland State University. The situation at Standing Rock filled my every thought, as I know from the 2002 salmon kill on the Klamath River [Fig. 5.3] how important protecting water is. I wanted to be an asset to my cousins from other Tribes to enforce Native solidarity. I joined a group driving to North Dakota in September 2016 and arrived at what appeared to be a Native American city. The Youth presence was immediately clear as toddlers ran around and I found my cousins, high schoolers at the time, hanging out. Many college students, like myself, paused their education to join the movement. Youth Council meetings facilitated conversations between high schoolers and Elders on how to create effective solidarity and direct action. This intergenerational approach was effective, as Elders taught the histories and lessons learned from past movements while Youth introduced new ideas, energy, and technologies for future change. The power and success in combining those perspectives was, and remains, inspiring."

—**Brook M. Thompson,** Yurok/Karuk

"Youth are not just the future; we are the present. Our voices are not just valuable, but powerful, in conversations about climate resilience and environmental justice. Our perspectives, as Youth and as inheritors of a long lineage of land stewardship, deserve to be taken seriously when it comes to climate policy. "

—**Anagali Duncan** (he/him), Cherokee Nation

goals; to promote the development of future tribal leaders; to help solve problems facing Tribal Youth; to coordinate school and community service projects; and

provide opportunities for the Youth to interact for fun and fellowship" (Standing Rock Youth Council, n.d.). Those at Standing Rock generally framed the actions as disapproving of the pipeline, encouraging discontinuation of oil use, and, more importantly, protecting the Missouri River and its surrounding relatives; hence the term "water protector" (Zambelich & Alexandra, 2016) as opposed to "pipeline protester."

The Standing Rock Youth Council eventually transformed into the International Indigenous Youth Council (IIYC). The IIYC was started at Standing Rock by women and two-spirit individuals—a modern term encompassing Indigenous individuals of a distinct gender status (IIYC, n.d.; Indian Health Service, n.d.). It has grown to include multiple chapters devoted to inspiring young people to build bridges of solidarity and become leaders of their communities (IIYC, n.d.).

Figure 5.10. Raven Mingo presenting the Climate Adaptation Plan for the Mississippi Band of Choctaw Indians at the United South and Eastern Tribes Tribal Climate Resilience Camp, June 2024.

Speech at the 27th UN Conference of the Parties in Egypt, 2022
Photo Credit: Brook M. Thompson

To support the development of Youth leaders, Tribal governments and Tribal organizations should consider establishing Youth councils, as they provide space to further educate and empower Youth to rise as the next generation of Tribal leaders. They also offer a platform for Youth to provide input on decisions that will affect their futures. Other local and regional Youth leadership can begin with high school or college clubs, councils, and organized gatherings within local Tribes, across Tribes, in Tribal organizations, or within other 501(c)(3)s. Regional groups can also be the starting point for national or international movements and are essential in localizing the work on climate change and other sectors.

Federal agencies can also further local and regional opportunities for Indigenous Youth and young professionals by advancing support in higher education programs and by expanding workforce development training. Raven Mingo (he/him, Mississippi Band of Choctaw; pictured in Fig. 5.10) reflects on the impact of his BIA Pathways internship as a means to further his connection to and support the climate efforts of his Tribe:

"While completing my undergraduate degree in sociology, I happened across an internship opportunity promoted by my Tribe's scholarship program. This opportunity is how I joined the BIA DESCRM as a BIA Pathways intern. During my time with the BIA, I was exposed to an immense amount of not only environmental Knowledge, but also cultural Knowledge in a predominantly Native work setting and in my work with the Tribes we served. This environment was highly influential on my career, as it solidified my desire to work with Tribes and Tribal organizations. I also attended events and webinars in my coordination with the Branch of Tribal Community Resilience, which expanded my understanding of climate impacts faced by Tribes across the nation. These experiences led me to a career path that I hadn't previously considered. During the tumultuous time following my graduation and therefore completion of the BIA Pathways internship, I applied for another internship with my own Tribe's Office of Environmental Protection. I have now been with the Mississippi Band of Choctaw's Environmental Protection Office for five months and was recently converted to a full-time employee as an environmental

scientist, where I act as an outreach coordinator and wetlands specialist. In the short time I've worked here, I have learned a great deal about my community as well as about myself. To be in a position that directly helps my Tribe is a truly rewarding experience. This career path would have never been open for me if not for the Knowledge and experience that the BIA Pathways program provided me."

—Raven Mingo, *Mississippi Band of Choctaw*

"Always provide time for healing and community. It is important to utilize time effectively, but if you do not incorporate time for self-reflection and community building, you lose valuable insights and connections. It is also always important to be considerate of the asks of young people in these spaces. Most often the work comes from a deeply personal place and the asks on their time can be much more immense than you realize, not just with the amount of work, but also the emotional work that it takes to begin an effort and to see it through. We, as leaders, should find more opportunities to engage and involve without unnecessary onus."

—Devon Parfait

National and International Leadership

With increased globalization and means for information sharing, it has become easier for Indigenous Youth to connect nationally and internationally. Examples of national Indigenous Youth organizations in the United States include:

- **National Congress of the American Indians** (NCAI) Youth Commission works to ensure that Tribal Youth have the necessary resources to become leaders in their communities.
- **National Indian Youth Council** (NIYC) advocates for the rights of self-determination, the protection of sovereignty, and the fight to improve economic opportunity (Shreve, 2011). Today, NIYC is known as the Native Professional Advancement Center (NPAC, n.d.) and continues its original mission while also furthering education and career opportunities for Native people.
- **United National Indian Tribal Youth** (UNITY) hosts Youth conferences and webinars with leadership programming and has local chapters and awards to further Indigenous Youth empowerment and potential (UNITY, n.d.).

Examples of international Indigenous Youth organizations include:

- **Conference of Parties (COP) Youth and Indigenous Delegations**; the 2023 COP28 launched the International Indigenous Youth Forum on Climate Change (Lopez-Carmen, 2023).
- **International Indigenous Youth Council** (IIYC): an organization started by women and two-spirit peoples during Standing Rock (IIYC, n.d.).

Indigenous Peoples worldwide have experienced and continue to experience forms of colonial violence and discrimination, including removal from their ancestral Lands. Globally, Indigenous Peoples experience disproportionate impacts of climate change (Climate Change for Indigenous Peoples, n.d.). Indigenous community leadership is highly localized but requires global holistic action and community building to address equitable climate change solutions.

Supporting Youth Leadership of Tomorrow

The following subsections provide recommendations for Tribal governments, Tribal organizations, NGOs, governments, nonprofits, and more on how to support Indigenous Youth leaders.

Figure 5.10. *Indigenous Ways of Being* by Rhode Grayson

Communication—Real Communal Decision-Making Power

Organizations should invite Youth to the table to inform decision-making practices and as equal and respected participants in decision-making roles. Children understand how environmental and political conditions impact their lives more than most adults realize (Clark et al., 2020; Hayward, 2012). However, Indigenous Youth today must be better represented in decision-making processes surrounding climate change (Sambai Usek & Dunlop, 2022). When inviting Indigenous Youth to the table, it is important to recognize different relationships with resources. In Māori cosmologies, humans are considered kin to trees, birds, insects, and fish (Ritchie, 2020). At the same time, Western frameworks are grounded in nature's dominance, returning to the Doctrine of Discovery (Ritchie, 2020). When having honest conversations with Youth, respect for traditional Knowledge and wisdom must be upheld (Ritchie, 2020), which may require preliminary learning for those who are unfamiliar with Indigenous perspectives on Land, water, animals, plants, and minerals.

Reforming the future of leadership will also require dismantling colonial leadership structures for more inclusive and Indigenous-centric methods. Moving away from a top-down static individual power structure approach to one of

dynamic relational multicentered and nonhuman-centric traditional Indigenous approaches is necessary (Rosile et al., 2018). Understanding and moving toward relational and collectivist forms of leadership that do not perpetuate old colonial forms of leadership can help set up Indigenous leaders for success in the future. An example is heterarchical systems as opposed to hierarchical leadership methods through ensemble leadership theory (Rosile et al., 2018). A survey in New Zealand found that support for children and Youth having the opportunity to influence government decision-making showed more substantial support from Māori and others committed to social justice and grassroots democracy, which provides a counter-narrative to the myth that Youth are perceived as being politically disengaged (Phillips et al., 2019). There is value in the intersection of Youthful ambition and the reframing of nature in the politics of national and international forces of globalization and neo-colonization (Ritchie, 2020). The future of Indigenous Youth climate leadership should involve not only who is in power, but how that power is created and shared.

Recognition of Diversity in Identities

Concepts around intersectionality come from Black feminist and critical race theory studies by Kimberlé Crenshaw. Intersectionality describes how additional identities and barriers are created from intersecting identities, such as but not limited to race, gender, sexuality, age, ability, religion, class, and ethnicity. Frequently, these intersections of identity can be left out of conversations relating to a larger group because of historic prejudice and marginalization due to settler colonialism. However, climate change disproportionately affects women of color (Kasturirangan et al., 2018) and is suggested to also disproportionately impact other minoritized groups. For Indigenous People, spotlighting leaders who also identify as two-spirit/LGBTQIA+, Afro-Indigenous, disabled, or female can help create a more equitable future for all. Youth and Environment Europe has an intersectionality toolkit (YEE, n.d.) available for free, which provides tools for self- and organizational analysis. The document also includes terms to avoid and inclusive language alternatives to use so as not to tokenize peoples from minoritized backgrounds.

Decrease in Economic Barriers

At the Youth leadership meetings at the 2022 UN COP27 in Egypt, one of the most significant barriers to attending the conference was the financial burden. Many Youths travel to such gatherings on scholarships, grants, and fundraising or have to pay out of their own pockets—an option not feasible for many young people, particularly Indigenous Youth. Scholarships and access decisions are often announced shortly before conferences, limiting booking options and increasing the financial burden on attendees with higher travel rates and hotel costs. This can also result in longer travel times and coordination. The cost of transportation, safe accommodation, food, and visas creates barriers to entry for many Indigenous Youth to participate. Not only do Youth generally not have access to many liquid assets, but according to the U.S. Bureau of Labor Statistics, Native Americans make $0.77 per every dollar a White worker earns on average, which is even less for Native American women on average (U.S. Bureau of Labor Statistics, (2023).

Decreasing economic barriers includes paying Native American Youth livable and fair wages for their time and effort; volunteer and minimum-wage positions are not enough. Although a livable wage will depend on local housing, health care, and food costs, MIT determined a livable wage to be just under $40,000 per year for a single working adult with no children (Glasmeier, 2023). This rate has increased significantly due to inflation, although wages in the climate workforce (Torpey, 2019) and broadly have not necessarily followed suit (Spencer, 2022). Institutions must be intentional to recruit and maintain young Indigenous folks by creating a work environment where they can thrive.

Protection from Retaliation

Youth and young adults broadly are at risk of retaliation from authority figures for speaking to differences in views or participating in activism. A study of Indigenous Malaysian Youth activists found there was concern about their work not being seen as socially acceptable, and their fear of threats combined with emotional exhaustion decreased their participation (Sambai Usek & Dunlop, 2022). Organized groups of Youths of color can sometimes be stereotyped and criminalized (Kwon, 2013). The school-to-prison pipeline is a stark reality that exemplifies the injustices faced by Native students, as well as Black students and students of color. A 2004 study in a Denver, Colorado, school found that students

> *"We believe in a future with high principles derived from the values and beliefs of our Ancestors."*
>
> —**Mel Thom,** Statement of the National Indian Youth Council, March 1962 (Shreve, 2011)

of color were 70% more likely to be ticketed than their White peers (Rogers et al., 2012). In the 2008 to 2009 school year in Montana, Native students were five times as likely to be expelled and four times as likely to be suspended compared to white students, despite making up only 11% of the state's student population (Healey, 2014). Approaches to close the school-to-prison pipeline may include organizing alongside adult allies, publicizing the issue, and attending public meetings to pressure school districts, teachers' unions, and city councils to reform through revising discipline codes (Rogers et al., 2012). Creating a supportive environment, providing resources, and creating a plan for potential repercussions of activism work can contribute to a safer and more encouraging environment. Building a student coalition with faculty to hold accountability for possible retaliation and documentation of potentially unfair treatment through media can increase protection, too (Brooks, 2017).

Education

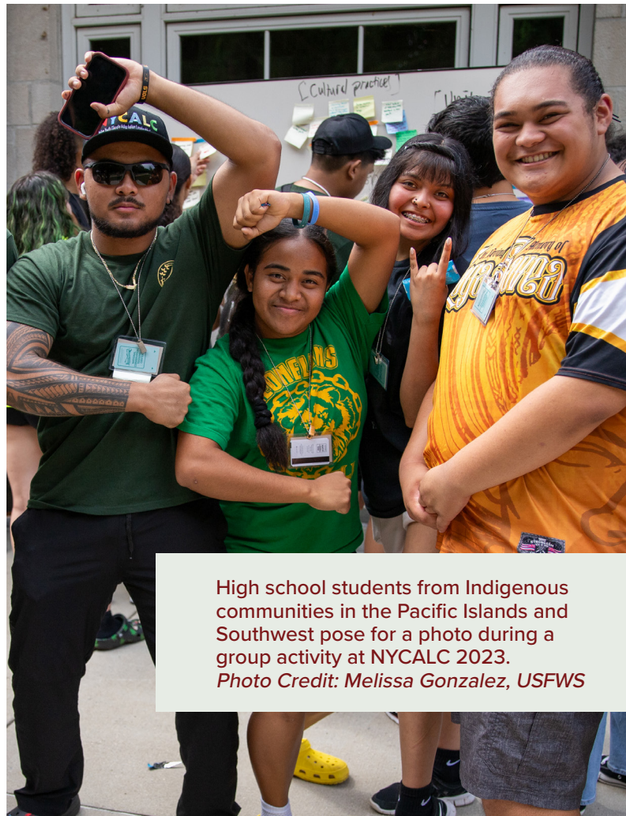
Educating Youth about activism is essential. Education around cultivating vocabulary, tools, history, networks, and understanding must be prioritized to participate successfully in climate activism. Within educational material, more appropriate representation of Indigenous narratives is needed (Sambai Usek & Dunlop, 2022). Educational materials for developing political literacy are vital for activism. Education does not need to be formal; it can be supported through social networking to better collectively exercise capabilities for self-determination (Sambai Usek & Dunlop, 2022). One way this can be done is through conferences, summits, or workshops.

Research has shown that classroom practices such as discussing current events, meeting with current leaders, and social study simulations increased civic participation (Rogers et al., 2012). However, low-income students of color receive these opportunities less than their more affluent White peers. Despite Youth of color generally having a more substantial interest in addressing racial inequality, social inequalities, and poverty, less than 10% in a 2003 study mentioned that topics around racism and injustice were mentioned in their classes (Rogers et al., 2012).

The value of traditional teachings and passing on ancient Knowledges cannot be understated. Youth play a vital role, like all generations, in preserving Indigenous Knowledges and histories, as described in Chapter 2, "Cultural Preservation and Revitalization in the Face of Climate Change."

Mentorship

A vital part of Youth leadership development is learning from past leaders to have a foundation for work to be continued or revitalized. Mentors are people that Youths can talk to, share stories



High school students from Indigenous communities in the Pacific Islands and Southwest pose for a photo during a group activity at NYCALC 2023.
Photo Credit: Melissa Gonzalez, USFWS

Group photo of the NYCALC 2023 participants and organizers at the National Conservation Training Center in Shepherdstown, West Virginia.
Photo Credit: Melissa Gonzalez, USFWS

Students add their thoughts on an intergenerational approach to environmental justice during the first Open Space Technology session of the congress.
Photo Credit: Melissa Gonzalez, USFWS

with, seek guidance from, and be motivated by (Aschenbrener et al., 2017). Mentorship of Indigenous Youth should be culturally relevant. One key aspect of mentorship is clear communication, which can be done through inclusive dialogue, transparency, and active listening (Reano, 2020). Boys & Girls Clubs of America also recommends leading with hope and optimism (Ampey, 2021). Boys & Girls Clubs of America received feedback from Youth that their ideas often needed to be taken more seriously. Building confidence, enthusiasm, and optimism in Youth can be done through a possibility mindset and assisting their mentees in bringing their ideas to

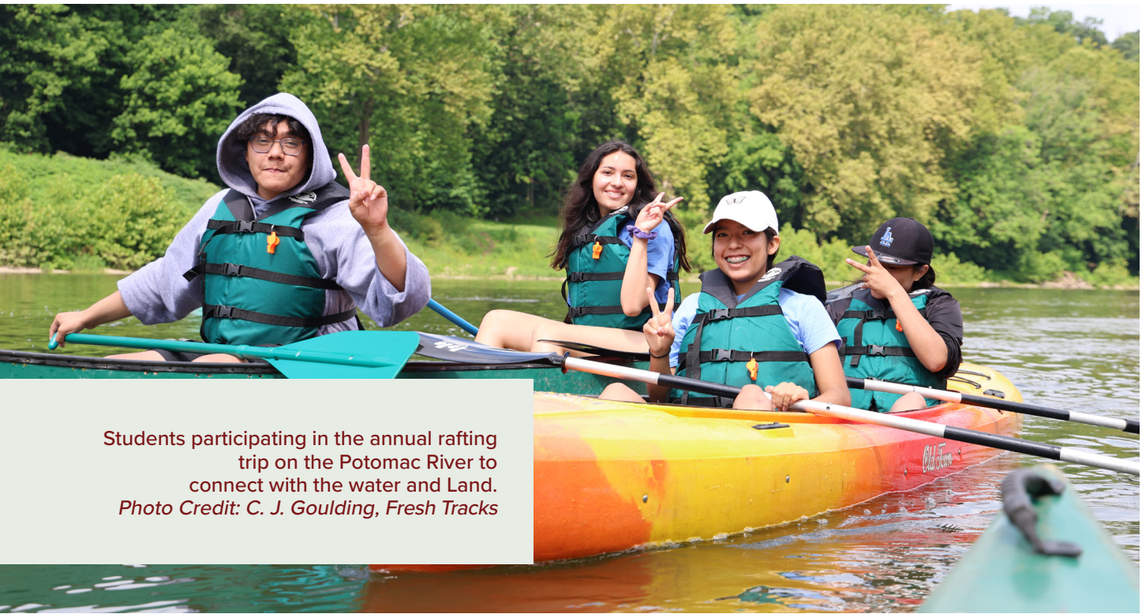
Raven Mingo, a citizen of the Mississippi Band of Choctaw Indians, participated in NYCALC as a BIA Pathways intern in 2023. He reflects on his experience:

"The Native Youth Climate Adaptation Leadership Congress (NYCALC) was an amazing opportunity that I luckily had a chance to be a part of. I had attended NYCALC for the first time this past year (2023) as a junior faculty member, and it was an experience that I will always remember. This was also consequently the first opportunity I had to attend an event that was geared toward Indigenous Youth–centered climate action, and it was truly an inspirational experience. As a junior faculty member, it was my duty to guide the high school aged students through the week of NYCALC as they attempted to solve the "big question" that was presented to them at the beginning of the week. This past year's big question was, "What does an intergenerational approach to Indigenous climate justice look like?"

Throughout the week of NYCALC, students are grouped into separate themes of their choosing and begin working on their answers to this big question (see photo, left). It was inspiring to see Indigenous students from various different backgrounds come together to help solve a problem that we as Indigenous People face as a whole. Along with these group work sessions, the students participated in extracurricular activities, service projects, and a cultural celebration, further strengthening their bonds with each other and with the Land.

After a week of hard work, it was time for the presentations. From eye grabbing video presentations to cleverly acted out scenes, the students exceeded my expectations for what the answer to such a complex question could be. This is what made NYCALC such an inspirational and unique experience! I had the chance to see what the future of Indigenous-led climate action could be, and I can safely say that the future of Indigenous climate action is in safe hands."

—**Raven Mingo**, Mississippi Band of Choctaw Indians



Students participating in the annual rafting trip on the Potomac River to connect with the water and Land.
Photo Credit: C. J. Goulding, Fresh Tracks

life (Ampey, 2021). Mentoring and passing down Knowledge is crucial to support the next generation of Youth leaders.

Some examples of organizations with Indigenous mentorship programs on Youth and climate change are:

- **Climate Change Resiliency Mentoring:** https://greenhealthcare.ca/climatechange/mentoring/
- **Earth Guardians Indigenous Youth Leadership Initiative:** https://www.earthguardians.org/indigenous-Youth-leadership-initiative
- **Generation Power Youth Cohort:** https://www.generationpower.ca/get-involved/generation-power-Youth
- **Indigenous Climate Action Climate Leadership Program:** https://www.indigenousclimateaction.com/programs/climate-leadership-training
- **Native Youth Climate Adaptation Leadership Congress:** https://www.bia.gov/service/tribal-climate-Youth-programs/nycalc
- **Youth Challenge International:** https://www.yci.org/InnovateMYFuture/Climate-Leader-mentor/

The Native Youth Climate Adaptation Leadership Congress

The Native Youth Climate Adaptation Leadership Congress (NYCALC) is a weeklong environmental program that strengthens the skills of aspiring Indigenous Youth leaders through peer-to-peer conservation education, ecological career pathways, and inter-Tribal cultural exchange. NYCALC is hosted by the U.S. Fish and Wildlife Service and Bureau of Indian Affairs Branch of Tribal Community Resilience

in collaboration with several Tribal organizations and other federal agencies. Participants include a diverse mix of urban and rural Indigenous communities—Native American, Alaska Native, Native Hawai'ian, and Pacific Islander. These participants represent over 50 Tribal Nations and Indigenous communities annually,

including participating high school students, their accompanying community mentors, and college-age junior faculty (BIA, n.d.). Students learn about environmental impacts and actions while empowering meaningful action within their communities. NYCALC is a powerful example of a national-level climate program that centers Indigenous Youth leadership development and empowers further action in their local communities.

Conclusion

The Youth leaders in climate action of yesterday, today, and tomorrow have made and will continue to make positive impacts on the world despite their humble years spent on this Earth. Youth face many challenges today, from disproportionate mental health impacts due to the fear of present and future climate impacts (Heeren et al., 2022; Patrick et al., 2023) to physical health conditions that may be influenced by environmental contaminants. However, Native Youth are resilient in fighting for a more climate-forward future for themselves and future generations.

To those who hold forms of power and serve as leaders, this is your call to action. Prioritize resources for Youth leadership development, create platforms to elevate Youth voices, and bring Youth to the decision-making table. Youth are facing undue burdens and pressure to solve the climate crisis, an issue adults in authority continually allow to grow. Corporations and governing powers allow for ongoing pollution of the Lands, water, and air that disproportionately impacts Youth and opportunities for generations to come. Give Indigenous Youth the same respect as adults. Assist them by advancing structural shifts that would enable Youth to make meaningful and lasting change.

Youth, this is your call to action. Continue to be unapologetic, strong, and deliberate in your actions and in your demands of action from the older generations who hold positions of power as you rise to your own. Utilize social media and emerging technologies in your efforts while drawing from traditional teachings. Build community spaces for Indigenous Youth, especially in urban areas. Visit and learn from your Elders. Envision how you will be a part of the Youth leadership of tomorrow. Ask yourself, "How am I going to become an honorable ancestor for future generations?"

When addressing the urgent need for climate action, it is essential to empower the Youth of today and tomorrow by investing in their education, providing resources, and ensuring they have a voice in environmental discussions. Supporting Native Youth is a direct investment in the futurity of our human and more-than-human relatives. ◂◆

Youth Responsibility:
Navigating Our Collective Path Toward the Future, Embraced in the Present, Enlightened by the Past

Narrative by Devon Parfait

There is a conglomeration of Native communities living on the Mississippi River Delta in the state of Louisiana. This delta, through river control, oil and gas drilling, carving of the landscape, hurricanes, and so on, is being lost to the gulf. Sea-level rise due to climate change is multiplying the impacts of an already eroding delta on communities who have experienced a harsh history. I see younger generations motivated to be involved and to help by documenting our language, restoring a sense of community in a nuclear-family world, and using the resources they can to make a difference. Although our capacity is low, we find it wherever we can. Trusted partnerships built on love for one another and the planet we call home make all the difference in the work.

When I was 12 years old, I was asked to be the future chief of the Biloxi-Chitimacha-Choctaw Tribe (GCDBCC, n.d.). It meant that I was viewed as someone with the capability to effectively lead. I knew this role was important, and this experience strengthened my path to leadership, higher education, and personal growth to fulfill the role of chief at the age of 24.

Figure 5.11. Devon in 2023 with his grandfather.

With the access to information that we have in this new era of the internet, the next generation sees the issues and knows what kind of future we don't want as well as what we should be fighting for. This generation is the most activated and knowledgeable generation in history. Utilizing this as a resource for decision-making has been instrumental in moving progress forward. I have also observed online and in my travels and conversations that Indigenous lifeways and philosophies are also becoming more mainstream and popular. I think this stems from a yearning for a better relationship to our fellow living beings as well as to our planet. As the older generation moves on, it will be the teachings that they carried and delivered to the next generation that will help us along our path as a society to a more considerate future. ◀◆

Figure 5.12. Devon participating in the Climate Emergency and Human Rights in the Americas Forum in Washington, D.C., in 2023. This event was organized by the Special Rapporteurship on Economic, Social, Cultural, and Environmental Rights under the Inter-American Commission on Human Rights.

Seventh Generation Chapter References

Ampey, L. (2021, January 26). *Mentoring for kids: 5 ways to be an effective mentor.* Boys & Girls Clubs of America. https://www.bgca.org/news-stories/2021/January/Mentoring-for-Kids-5-Ways-to-Be-an-Effective-Mentor

Arizona State University. (2022). *Tribal broadband resources.* American Indian Policy Institute. https://aipi.asu.edu/tribal-broadband-old#:~:text=Updated%2002%2F22%2F2022%3A,on%20smartphones%20for%20Internet%20service

Aschenbrener, C., Johnson, S., & Schulz, M. (2017). A new mentorship model: The perceptions of educational futures for Native American Youth at a rural Tribal school. *Journal of Child and Adolescent Behavior, 5.* https://doi.org/10.4172/2375-4494.1000348

Blakemore, E. (2020, November 25). The radical history of the Red Power movement's fight for Native American sovereignty. *National Geographic.* https://www.nationalgeographic.com/history/article/red-power-movement-radical-fight-native-american-sovereignty

Bombay, A., Matheson, K., & Anisman, H. (2014). The intergenerational effects of Indian residential schools: Implications for the concept of historical trauma. *Transcultural Psychiatry, 51*(3), 320–338. https://doi.org/10.1177/1363461513503380

Braveheart, M. Y., Chase, J., Elkins, J., & Altschul, D. B. (2011). Historical trauma among Indigenous Peoples of the Americas: Concepts, research, and clinical considerations. *Journal of Psychoactive Drugs, 43*(4), 282–290. https://www.tandfonline.com/doi/abs/10.1080/02791072.2011.628913

Brice, A. (Host). (2022, November 8). Exploring the sound of the American Indian Occupation of Alcatraz (No. 102) [Audio podcast episode]. In *Berkeley Voices*. Acast. https://news.berkeley.edu/2022/11/08/sound-and-music-of-alcatraz-occupation

Brooks, C. (2017, August 9). When the institution strikes back: How student activists can survive administration retaliation. *Everyday Feminism.* https://everydayfeminism.com/2017/08/institution-strikes-back-student-activists-can-survive-administration-retaliation/

Brown, M., Mirza, S., Lu, J., & Stewart, S. L. (2024). Walking forward together—The next step: Indigenous Youth mental health and the climate crisis. *Psych, 6*(1), 210-220. https://doi.org/10.3390/psych6010013

Bruchac, J. (2023). *Of all Tribes: American Indians and Alcatraz.* Harry N. Abrams.

Bureau of Indian Affairs (BIA). (n.d.). *Native Youth Climate Adaptation Leadership Congress* (NYCALC). Bureau of Indian Affairs. https://www.bia.gov/service/tribal-climate-Youth-programs/nycalc

Bureau of Indian Affairs (BIA). (2024). *2024 Young Tribal Leaders Art Contest Gallery.* https://www.bia.gov/service/art-contest/2024-gallery

Calderon, D. (2014). Uncovering settler grammars in curriculum. *Educational Studies, 50*(4), 313–338. https://doi.org/10.1080/00131946.2014.926904

Castagno, A. E., Ingram, J. C., Camplain, R., & Blackhorse, D. (2022). "We constantly have to navigate": Indigenous students' and professionals' strategies for navigating ethical conflicts in STEMM. *Cultural Studies of Science Education, 17*, 683–700. https://doi.org/10.1007/s11422-021-10081-5

Clark, H., Coll-Seck, A. M., Banerjee, A., Peterson, S., Dalglish, S. L., Ameratunga, S., ... & Costello, A. (2020). A future for the world's children? A WHO–UNICEF–Lancet Commission. *The Lancet, 395*(10224), 605–658. https://doi.org/10.1016/S0140-6736(19)32540-1

Clayton, S., & Karazsia, B. T. (2020). Development and validation of a measure of climate change anxiety. *Journal of Environmental Psychology, 69*. https://doi.org/10.1016/j.jenvp.2020.101434

Curi, M. (2022, October 25). *Native Americans long "left out" from broadband push for equity.* Bloomberg Government. https://about.bgov.com/insights/news/native-americans-long-left-out-from-broadband-push-for-equity/

D'Amico, E. J., Dickerson, D. L., Brown, R. A., Johnson, C. L., Klein, D. J., & Agniel, D. (2020). Motivational interviewing and culture for urban Native American Youth (MICUNAY): A randomized controlled trial. *Journal of Substance Abuse Treatment, 111*, 86–99. https://doi.org/10.1016/j.jsat.2019.12.011

D'Amico, E. J., Dickerson, D. L., Rodriguez, A., Brown, R. A., Kennedy, D. P., Palimaru, A. I., Johnson, C., Smart, R., Klein, D. J., Parker, J., McDonald, K., Woodward, M. J., & Gudgell, N. (2021). Integrating traditional practices and social network visualization to prevent substance use: Study protocol for a randomized controlled trial among urban Native American emerging adults. *Addiction Science & Clinical Practice, 16*, 56. https://doi.org/10.1186/s13722-021-00265-3

U.S. Bureau of Labor Statistics. (2023). *Labor force characteristics by race and ethnicity, 2022.* https://www.bls.gov/opub/reports/race-and-ethnicity/2022/

Environmental Protection Agency (EPA). (n.d.). *White House Environmental Justice Advisory Council.* https://bidenwhitehouse.archives.gov/environmentaljustice/white-house-environmental-justice-advisory-council/

Environmental Protection Agency (EPA). (n.d.). *Health—Childhood Cancer.* https://www.epa.gov/americaschildrenenvironment/health-childhood-cancer

Environmental Protection Agency (EPA). (2024, July 22). *Climate change and children's health.* https://www.epa.gov/climateimpacts/climate-change-and-childrens-health

Gallup, J. (2018, July 3). Top-down versus bottom-up: Two approaches to sustainability. *University of Wisconsin—Madison Office of Sustainability.* https://sustainability.wisc.edu/top-down-bottom-up-sustainability/

Grand Caillou/Dulac Band of Biloxi-Chitimacha-Choctaw (GCDBCC). (n.d.). *Aiokpanchi, bienvenue, welcome to Grand Caillou/Dulac.* https://www.gcdbcc.org/

Glasmeier, A. K. (2023). *Living wage calculator.* MIT Living Wage Calculator. https://livingwage.mit.edu/

Gutierrez, S. (2021, June 22). SurveyMonkey study: Gen Z social media and shopping habits. *SurveyMonkey.* https://www.surveymonkey.com/curiosity/gen-z-social-media-and-shopping-habits/

Harmon, A. (2019). *Reclaiming the reservation: Histories of Indian sovereignty suppressed and renewed.* University of Washington Press.

Hayward, B. (2012). *Children, citizenship and environment: Nurturing a democratic imagination in a changing world.* Routledge. https://doi.org/10.4324/9780203106839

Healey, M. A. (2014). Montana's rural version of the school-to-prison pipeline: School discipline and tragedy on American Indian reservations. *Montana Law Review, 75*(1), 15–66. https://scholarworks.umt.edu/mlr/vol75/iss1/2/

Heeren, A., Mouguiama-Daouda, C., & Contreras, A. (2022). On climate anxiety and the threat it may pose to daily life functioning and adaptation: A study among European and African French-speaking participants. *Climatic Change, 173*, 15. https://doi.org/10.1007/s10584-022-03402-2

Hill, K. X., & Plume, L. M. (2024). Landback: Climate justice and Indigenous Youth mental health in the Anthropocene. In E. Haase & K. Hudson (Eds.), *Climate change and Youth mental health: Multidisciplinary perspectives* (pp. 385–402). Cambridge University Press. https://doi.org/10.1017/9781009252904.022

Huyser, K. R., Angel, R. J., Beals, J., Cox, J. H., Hummer, R. A., Sakamoto, A., & Manson, S. M. (2019). Reservation Lands as a protective social factor: An analysis of psychological distress among two American Indian Tribes. *Socius, 4*. https://doi.org/10.1177/2378023118807022

Indian Health Service. (n.d.). *2SLGBTQ health information and resources.* https://www.ihs.gov/lgbt/health/

International Indigenous Youth Council (IIYC). (n.d.). *About the IIYC.* https://www.facebook.com/IIYCFamily/

Jernigan, V. B. B., D'Amico, E. J., & Kaholokula, J. K. (2020). Prevention research with Indigenous communities to expedite dissemination and implementation efforts. *Prevention Science, 21*, 74–82. https://doi.org/10.1007/s11121-018-0951-0

Johnson, T. (2019). *We hold the rock.* National Parks Service. https://www.nps.gov/alca/learn/historyculture/we-hold-the-rock.htm

Johnson-Jennings, M., Billiot, S., & Walters, K. (2020). Returning to our roots: Tribal health and wellness through Land-based healing. *Genealogy, 4*(3), 91. https://doi.org/10.3390/genealogy4030091

Kasturirangan, R., Damm-Luhr, D., & Newton, C. (Hosts). (2018, February 7). Intersectionality and climate justice (Season 2, Episode 11) [Audio podcast episode]. In *Climate conversations: A climate change podcast.* MIT Climate Portal. https://climate.mit.edu/podcasts/climate-conversations-s2e11-intersectionality-and-climate-justice

Kulcar, V., Agnoli, S., & Santi, M. (2022). Discovering emotional patterns for climate change and COVID-19 pandemic in university students. *The Journal of Climate Change and Health, 6*, 100125. https://doi.org/10.1016/j.joclim.2022.100125

Kwon, S. A. (2013). *Uncivil Youth: Race, activism and affirmative governmentality.* Duke University Press. https://doi.org/10.1215/9780822399094

Lopez-Carmen, V. A. (2023, December 13). Indigenous Youth establish new space in UN climate negotiations. *Forbes.* https://www.forbes.com/sites/victorlopez-carmen/2023/12/12/indigenous-Youth-establish-new-space-in-un-climate-negotiations/?sh=4f033da778ba

Mashford-Pringle, A., & Stewart, S. L. (2019). Akiikaa (it is the land): Exploring land-based experiences with university students in Ontario. *Global Health Promotion, 26*(3), 64–72. https://doi.org/10.1177/1757975919828722

McKay, D. L. (2021). Real Indians: Policing or protecting authentic Indigenous identity? *Sociology of Race and Ethnicity, 7*(1), 12–25. https://doi.org/10.1177/2332649218821450

Melkonian, S. C., Weir, H. K., Jim, M. A., Preikschat, B., Haverkamp, D., & White, M. C. (2021). Incidence of and trends in the leading cancers with elevated incidence among American Indian and Alaska Native populations, 2012–2016. *American Journal of Epidemiology, 190*(4), 528–538. https://doi.org/10.1093/aje/kwaa222

Native Governance Center (n.d.). *Blood quantum and sovereignty: A guide.* https://nativegov.org/resources/blood-quantum-and-sovereignty-a-guide/

Nguyen, N. H., Subhan, F. B., Williams, K., & Chan, C. B. (2020). Barriers and mitigating strategies to healthcare access in Indigenous communities of Canada: A narrative review. *Healthcare, 8*(2), 112. https://doi.org/10.3390/healthcare8020112

Native Professional Advancement Center (NPAC)(n.d.). *Home Page.* https://www.npacnm.org/

Office of the United Nations High Commissioner for Human Rights (OHCHR) & Asia Pacific Forum (APF). (2013). *The United Nations Declaration on the Rights of Indigenous Peoples: A manual for national human rights institutions.* https://www.ohchr.org/sites/default/files/Documents/Issues/IPeoples/UNDRIPManualForNHRIs.pdf

Patrick, R., Snell, T., Gunasiri, H., Garad, R., Meadows, G., & Enticott, J. (2023). Prevalence and determinants of mental health related to climate change in Australia. *Australian & New Zealand Journal of Psychiatry, 57*(5), 710–724. https://doi.org/10.1177/00048674221107872

Phillips, L. G., Ritchie, J., & Perales, F. (2019). Surveying support for child and Youth political participation in Australia and New Zealand. *Citizenship Studies, 23*(5), 460–485. https://doi.org/10.1080/13621025.2019.1620687

Pierce, J. M. (2017). Adopted: Trace, blood, and Native authenticity. *Critical Ethnic Studies, 3*(2), 57–76. https://doi.org/10.5749/jcritethnstud.3.2.0057

Poe, M. R., LeCompte, J., McLain, R., & Hurley, P. (2014). Urban foraging and the relational ecologies of belonging. *Social & Cultural Geography,*

15(8), 901–919. https://doi.org/10.1080/14649365.2014.908232

Reano, D. (2020). Using indigenous research frameworks in the multiple contexts of research, teaching, mentoring, and leading. *The Qualitative Report, 25*(11), 3902–3926. https://doi.org/10.46743/2160-3715/2020.4317

Reading, C. L., & Wien, F. (2009). *Health inequalities and social determinants of Aboriginal Peoples' health.* National Collaborating Centre for Aboriginal Health. https://www.ccnsa-nccah.ca/docs/determinants/RPT-HealthInequalities-Reading-Wien-EN.pdf

Redvers, N., Aubrey, P., Celidwen, Y., & Hill, K. (2023). Indigenous Peoples: Traditional knowledges, climate change, and health. *PLOS Global Public Health, 3*(10), Article e0002474. https://doi.org/10.1371/journal.pgph.0002474

Reyes, M. E. S., Carmen, B. P. B., Luminarias, M. E. P., Mangulabnan, S. A. N. B., & Ogunbode, C. A. (2023). An investigation into the relationship between climate change anxiety and mental health among Gen Z Filipinos. *Current psychology, 42*(9), 7448–7456. https://doi.org/10.1007/s12144-021-02099-3

Ritchie, J. (2020). Movement from the margins to global recognition: Climate change activism by young people and in particular Indigenous Youth. *International Studies in Sociology of Education, 30*(1–2). https://doi.org/10.26686/wgtn.13317281.v1

Rogers, J., Mediratta, K., & Shah, S. (2012). Building power, learning democracy: Youth organizing as a site of civic development. *Review of Research in Education, 36*(1), 43–66. https://doi.org/10.3102/0091732x11422328

Rosile, G. A., Boje, D. M., & Claw, C. M. (2018). Ensemble leadership theory: Collectivist, relational, and heterarchical roots from Indigenous contexts. *Leadership, 14*(3), 307–328. https://doi.org/10.1177/1742715016652933

Sambai Usek, V., & Dunlop, L. (2023). Indigenous Youth activism: The role of education in creating capabilities. *Journal of Youth Studies,* 1–18. https://doi.org/10.1080/13676261.2023.2261865

Save California Salmon (2022). *2022 year in review.* https://www.californiasalmon.org/2022

Schwartz, S. E. O., Benoit, L., Clayton, S., Parnes, M. F., Swenson, L., & Lowe, S. R. (2022). Climate change anxiety and mental health: Environmental activism as buffer. *Current Psychology, 42,* 16708-16721. https://doi.org/10.1007/s12144-022-02735-6

Sciberras, E. & Fernando, J. W. (2022). Climate change-related worry among Australian adolescents: an eight-year longitudinal study. *Child and Adolescent Mental Health, 27*(1), 22-29. https://doi.org/10.1111/camh.12521

The Shawnee Tribe. (n.d.). *Shawnee Language Immersion Program (SLIP).* https://shawnee-nsn.gov/slip

Shreve, B. G. (2011). *Red power rising: The National Indian Youth Council and the origins of Native activism.* University of Oklahoma Press.

Sidoti, O., Dawson, W., Gelles-Watnick, R., Faverio, M., Atske, S., Radde, K., & Park, E. (2021, April 7). *Social media fact sheet* [Fact Sheet]. Pew Research Center. https://www.pewresearch.org/internet/fact-sheet/social-media/?tabId=tab-81867c91-92ad-45b8-a964-a2a894f873ef

Simpson, L. B. (2014). Land as pedagogy: Nishnaabeg intelligence and rebellious transformation. *Decolonization: Indigeneity, Education & Society, 3*(3), 1–25. https://jps.library.utoronto.ca/index.php/des/article/view/22170

The Smithsonian Museum of the American Indian. (n.d.). *Treaties still matter: The Dakota Access Pipeline.* https://americanindian.si.edu/nk360/plains-treaties/dapl?fbclid=IwAR14DEKjxMhPAozBDkzq78hHEtsoqJ08BOVOatNfHGIZ6QS17AFe-x-t5HM

Spencer, D. (2022, June 9). *Wages: Why are they not keeping up with inflation?* World Economic Forum. https://www.weforum.org/agenda/2022/06/wages-why-are-they-not-keeping-up-with-inflation/

Standing Rock Youth Council [Facebook page] (n.d.). Facebook. https://www.facebook.com/StandingRockYouthCouncil/about_details

TallBear, K. (2003). DNA, blood, and racializing the tribe. *Wíčazo Ša Review, 18*(1), 81–107. https://dx.doi.org/10.1353/wic.2003.0008

Taylor, K. (2023, August 16). *The digital divide: What it is, and what's being done to close it.* Investopedia. https://www.investopedia.com/the-digital-divide-5116352

Torpey, E. (2019, April). *Earning green by working green: Wages and outlook in careers protecting the planet.* Bureau of Labor Statistics. https://www.bls.gov/careeroutlook/2019/article/careers-protecting-the-planet.htm

United Nations. (n.d.). *Climate change.* United Nations Department of Economic and Social Affairs Indigenous Peoples. https://www.un.org/development/desa/indigenouspeoples/climate-change.html

United Nations. (n.d.). *Youth in action.* United Nations Climate Action. https://www.un.org/en/climatechange/Youth-in-action?fbclid=IwAR04smCf6tOByU7-wmBaLBZOSZow-2GMV8ZPHsqfAMU9h70WhM4RP0wNrlJk

United National Indian Tribal Youth (UNITY). (n.d.). *United National Indian Tribal Youth.* https://unityinc.org/

United Nations. (n.d.). *Youth.* United Nations. https://www.un.org/en/global-issues/Youth

American Indian Language Development Institute (AILDI). (n.d.). *Shawnee Language Immersion Program of Oklahoma.* University of Arizona. https://aildi.arizona.edu/content/shawnee-language-immersion-program-oklahoma

University of Massachusetts Lowell Library. (2022). *The occupation of Alcatraz, 1969: The Red Power Movement.* https://libguides.uml.edu/c.php?g=945022&p=6820187

University of Southern California. (2023, October 17). Native American characters are nearly invisible in top films. *USC Annenberg School for Communication and Journalism.* https://annenberg.usc.edu/news/research-and-impact/native-american-characters-are-nearly-invisible-top-films

Walters, K. L., Mohammed, S. A., Evans-Campbell, T., Beltrán, R. E., Chae, D. H., & Duran, B. (2011). Bodies don't just tell stories, they tell histories: Embodiment of historical trauma among American Indians and Alaska Natives. *Du Bois Review: Social Science Research on Race, 8*(1), 179–189. https://doi.org/10.1017/S1742058X1100018X

Warne, D., & Wescott, S. (2019). Social determinants of American Indian nutritional health. *Current Developments in Nutrition, 3*, 12–18. https://doi.org/10.1093/cdn/nzz054

Waterkeeper Alliance. (2023). *Become a waterkeeper.* https://waterkeeper.org/become-a-waterkeeper/

Willow Bend Environmental Education Center. (n.d.). https://willowbendcenter.org/

World Health Organization. (2023). *Protecting maternal, newborn and child health from the impacts of climate change: A call for action.* https://www.who.int/publications/i/item/9789240085350

Year in Review. (n.d.) *Save California Salmon.* https://www.californiasalmon.org/2022yearinreview

Youth and Environment Europe (YEE). (n.d.). *Climate justice needs an intersectional approach: Toolkit.* Youth and Environment Europe. https://yeenet.eu/publications/climate-justice-needs-an-intersectional-approach-toolkit/

Zambelich, A., & Alexandra, C. (2016, December 11). In their own words: The "water protectors" of Standing Rock. *NPR.* https://www.npr.org/2016/12/11/505147166/in-their-own-words-the-water-protectors-of-standing-rock ◀◆

Political Challenges and Opportunities

For Indigenous-Led Conservation

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KEY MESSAGES AND RECOMMENDATIONS

Challenges and opportunities in various contexts: diverse challenges and opportunities exist for Tribal Nations and Indigenous communities in managing Indian forests and island ecosystems and implementing wildlife management at different scales. Indigenous leadership, equitable funding, data sovereignty, and cultural preservation are crucial elements for addressing climate change and promoting Indigenous-led conservation.

Importance of Indigenous Knowledges and Values: Indigenous Knowledges, such as Traditional Ecological Knowledges (as defined in Chapter 1), are vital to Indigenous-led conservation efforts and should be prioritized over colonial management norms, especially in management contexts surrounding Indigenous Peoples' more-than-human kin and climate.

Transforming governance and management approaches: an urgent need exists for paradigmatic shifts (e.g., reform of policy and practices) in how the more-than-human kin of Indigenous Peoples are managed, especially shifts that rectify the harms of conventional Tribal consultation models and colonial power dominance of Land, water, animal, plant, and climate management.

#LANDBACK and co-equity management paradigms: co-equity management and #LANDBACK initiatives provide crucial mechanisms for Indigenous-led conservation of all ecosystem elements, including climate. These paradigms support the reclamation of rights, governance, and stewardship of territories by Indigenous Peoples.

Funding for Indigenous-led conservation: federal, state, and Indigenous funding and philanthropic institutions offer support for Indigenous-led conservation efforts, but challenges exist for long-term, sustainable funding opportunities that respect, uphold, and benefit Indigenous values, sovereignty, and self-determination.

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Lydia Jennings (she/her) is a citizen of the Pascua Yaqui Tribe (Yoeme) and Huichol (Wixáritari) and is an environmental soil scientist. She earned her BS from California State University, Monterey Bay in Environmental Science, Technology, and Policy, and completed her PhD at the University of Arizona in the Department of Environmental Sciences. Her work focuses on soil health, environmental data stewardship, and science communication.

Robert Newman is a settler and professor in the biology department at the University of North Dakota. His work focuses on wildlife populations on human-dominated landscapes, climate adaptation, and supporting Tribal sovereignty in environmental, wildlife, and Land stewardship. He is a board member of the Native Peoples' Wildlife Management Working Group in The Wildlife Society, works with the Traditional Ecological Knowledge section of the Ecological Society of America, and is a member of the Equity and Climate Justice Working Group for the National Adaptation Forum.

Vincent C. Salgado is of Mestizo and Mexican descent, specifically from the forests of Michoacán and the deserts of Baja California. He is a research associate at the University of Michigan and NERRS Science Collaborative, and he is a writer for the Michigan Tribal-State Manoomin Stewardship Plan. With inspiration from Anishinaabe ways of knowing and Anarchist ideals, Vincent pursues decolonizing dominant perspectives, methods, and models of environmentalism.

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Alaska Native Corporations and Indigenous-Led Conservation

Narrative by Freddie R. Olin IV

Alaska Native for-profit corporations emerged because of the 1971 Alaska Native Claims Settlement Act (ANCSA). They comprise 12 land-based regional corporations and over 200 village corporations, collectively holding approximately 45.5 million acres of Land. These corporations are under the same laws as all Alaska corporations, which legally obligate them to ensure that every decision increases shareholder value (Robinson, 2016; University of Alaska Fairbanks, 1971; State of Alaska, 2019). However, many of these corporations amended their articles of incorporation to state that they aim to promote the economic, social, and cultural well-being of their shareholders (Robinson, 2016). These corporations are exclusively governed by Alaska Natives for Alaska Natives and value the maintenance of cultural values and practices, including subsistence (e.g., hunting, fishing, and marine mammal harvesting), alongside increasing share value. Because Indigenous Peoples in Alaska hold long histories as Land stewards that protect biodiversity and adapt to changes in climate, Alaska Native corporation boards and committees are reckoning with climate change related questions, such as how Land access, fish and game habitat, species behavior, and seasonal patterns are being changed by the warming climate.

While Alaska Native for-profit corporations lack the same sovereignty as federally recognized Tribal governments, they maintain self-determination and Indigenous-led management of their Lands (within Alaska Corporations Statutes and Regulations), which are guided by the collective decisions of shareholders voting for board representation (DCCED, 2023). Because these shareholders are often Tribal members, their perspectives commonly align with Tribal perspectives and needs from rural Alaska Native communities. However, Land management and governance in Alaska are complicated, with many rural Alaska Native communities having both a Tribal government and a municipal government under the state, as well as being within a borough within the state, and finally under the federal government. Additionally, Land management within Alaska is facilitated by the ANSCA for-profits (10%), the state (30%), and the federal government (60%; Gordon, 2022). All these governing bodies possess unique tools and approaches to use for climate mitigation and adaptation; however, recognizing Indigenous Knowledge and Indigenous leadership is key. Collaboration among these entities will play a crucial role in achieving community well-being while emphasizing a paradigmatic shift toward a more conservation-based model that addresses climate change for the benefit of future Alaska Native generations. ◀◆

Overlooking Eklutna Lake, Alaska.
Photo Credit: Colleen Cooley

06

Political Challenges and Opportunities

For Indigenous-Led Conservation

Indigenous Medicine for Climate Resilience Versus the Challenges of Federal Bureaucracy
by Rhode Grayson

Introduction

Indigenous Peoples' approaches to conservation are inherently sustainable, holistic, and woven into the fabric of Indigenous governance structures, societies, cultures, spiritual Traditions, value systems, Indigenous Knowledges (IK), and Knowledge-belief-practice systems [e.g., Traditional Ecological Knowledge (TEK)]. However, in the complex legal landscape of the United States (U.S.), a disconnect emerges between Indigenous-led conservation and federal policies, which highlights the systemic barriers that impede Indigenous-led conservation efforts.

This chapter delves into the complexities of this dissonance and underscores how U.S. legal mechanisms (e.g., federal policies, statutes, regulations, treaties, case law, and executive orders) are rooted in a colonial past and present that often clash with the deeply ingrained conservation leadership of Indigenous Peoples. These legal mechanisms infringe upon Indigenous sovereignty, neglect the substantial benefits of Indigenous-led conservation (which maintain biodiversity and ecological equilibrium), and create formidable challenges for Tribal Nations and Indigenous communities to manage their ancestral Lands in culturally appropriate ways.

This chapter provides a critical exploration of the need for reform at the policy and practice levels that respects the rights of Tribal Nations and Indigenous communities while honoring treaties and upholding the federal government's trust responsibilities. Such policy shifts require the recognition of the historical and ongoing challenges posed by U.S. legal mechanisms and the current opportunities that exist to create better frameworks. These paradigmatic shifts can empower Indigenous communities to lead climate and environmental conservation efforts in culturally meaningful ways.

Indigenous-Led Climate Stewardship and Conservation in a Colonial World

Indigenous Peoples have stewarded their more-than-human-kin (i.e., Lands, waters, plants, animals, and climate; Fig. 6.1) on Turtle Island (North America) while existing in good relations with all these beings since time immemorial (Jacobs et al., 2022a, 2022b). Indigenous stewardship, care, and nurturance of the world are deeply rooted in Indigenous Peoples' cultural and spiritual practices and informed by Indigenous ways of Knowing, ways of being, and Indigenous value systems (e.g., relationships, responsibilities, reciprocity, redistribution, reconciliation, respect, relevancy, rights, etc.; Gordon, 2023a; Jacobs et al., 2022a). As colonization on Turtle Island began, settler colonialism introduced disruptive practices that value resource extraction, human exceptionalism (an understanding of humans and society as independent from the environment and ecosystems), and European-centric and colonial forms of knowledge and ways of being that subsequently initiated a magnitude of disruption and disturbance to Indigenous Peoples and their more-than-human-kin (Jacobs et al., 2022a; Koch et al., 2019; Kim et al. 2023; Gray-Sharp, 2019). Consequently, a long disruption- and disturbance-filled history, dating back to the 1400s, exists on Turtle Island, including Indigenous Peoples' Land dispossessions, the largest human genocide in recorded history, colonial ecological violence, and willful disregard for the global climate (Bacon, 2019; Koch et al.. 2019; Jacobs et al., 2022a). Colonial worldviews, especially those pertaining to Western conservation, starkly contrast Indigenous Peoples' profound spiritual and cultural relationships with their local environments and Traditional kincentric relationships, wherein all ecosystem elements and beings are understood as interconnected and influential to the well-being of all surrounding life systems (Salmón, 2000; Wildcat & Voth, 2023).

Western conservation is characterized as a "settler move to innocence" (a strategy used by non-Indigenous Peoples to absolve their guilt and complicity in historical and ongoing injustices faced by Indigenous Peoples and Indigenous Lands) and an extension of settler colonialism due to various factors, including biases dictating access rights, geopolitical boundaries, decisions about what can be sacrificed for the sake of other beings, and the perpetuation of Euro-western standards (Jacobs et al., 2022a; Tuck & Yang, 2012). Consequently, Western conservation practices are directly attributed to the value systems entrenched and enforced by colonial forces, which have disrupted Earth's ecosystems, including the global climate (Jacobs et al., 2022a). In response to Western colonial conservation practices that prioritize Western norms and standards (Jacobs et al., 2022a), Indigenous-led conservation paradigms are founded on principles of kinship, relationships, and nurturance between humans, all beings, all environmental systems, and the climate. Therefore, Indigenous-led conservation paradigms are well-equipped to challenge, disrupt, and rectify the harms inflicted upon Indigenous Peoples' more-than-human kin by colonial practices. Indigenous-led conservation addresses the respect, responsibilities, and relations that Indigenous Peoples have to their more-than-human kin in advocating for their livelihoods and well-being (Gray-Sharp, 2019; Ceballos et al., 2015). Consequently, Indigenous-led conservation inherently constitutes a process of decolonization, in which Indigenous Peoples' value systems, Knowledges, ways of being, and worldviews take precedence in ecosystem and climate management. This process replaces colonial management norms with Indigenous Peoples' relational, kincentric, and culturally responsible stewardship practices (Salmón, 2000; Wildcat & Voth, 2023).

Indigenous-led conservation, or as some Indigenous Peoples define it, a "stewardship" approach, is uniquely positioned to address the consequences and potential impacts of colo-

nial-driven climate change across Turtle Island. Indigenous-led approaches also confront the repercussions of the ongoing sixth mass extinction, which is already underway and evident in current extinction rates far surpassing historic extinction levels (Gray-Sharp, 2019; Ceballos et al., 2015; Cowie et al., 2022). The sixth mass extinction and its detrimental effects on global ecosystems are directly linked to anthropogenic activities rooted in settler colonial values and human exceptionalism (Ceballos et al., 2015; Cowie et al., 2022; Gray-Sharp, 2019; Jacobs et al., 2022a). Although Indigenous Peoples actively engage in climate mitigation and adaptation efforts to prevent the continuation of mass extinction events (see Chapter 7, "Indigenous-Led Conservation"), they face many challenges to climate action, including those associated with Land and Indigenous Peoples' rights.

The following sections describe many of the barriers to Indigenous-led conservation, including a focus on Indigenous Peoples' Land stewardship, the rights of Indigenous Peoples and nature, and challenges with U.S. legal frameworks and mechanisms pertaining to Tribal consultation and IK. Each of these challenges presents many opportunities that can rectify each issue.

Indigenous Conservation

Globally, Indigenous Peoples represent approximately 5% of the world's population, manage over a quarter of Earth's land surface, and safeguard 80% of the world's biodiversity through Indigenous-led conservation (Garnett et al., 2018; IPBES, 2019; Sobrevila, 2008). Indigenous Peoples' Lands are estimated to comprise 37% of undeveloped lands across the world (Garnett et al., 2018). However, in the U.S., a different reality exists for Indigenous Peoples who were dispossessed of their Lands to make way for colonial and imperial nation-building processes. Indigenous Peoples in the U.S. lost almost 99% of their ancestral territories, or almost 94% of the total geographical areas they occupied prior to colonization, and 42% of Indigenous Peoples have no recognized lands today (Farrell et al., 2021). For Tribal Nations that possess Land rights through various treaties, they manage, on average, only about 2.6% of their ancestral territories (Farrell et al., 2021). As of 2023, the U.S. federal government manages 640 million land acres across the continental U.S., the settler state of Alaska, and the illegally U.S.-occupied Hawai'ian Kingdom (BIA, 2023). In contrast, federally recognized Tribes hold rights to administer only 326 Land areas as reservations, or approximately 56.2 million acres of Land total, albeit the U.S. still holds titles to these Lands in trust status (BIA, 2023; Jacobs et al., 2022b; Vincent et al., 2020).

Due to the long history of Land dispossession, colonial land management practices and power structures, and limited Land autonomy of Tribal Nations and Indigenous communities in the U.S., Indigenous-led/conservation efforts take place within Tribal reservations (where Tribal sovereignty allows for the prioritization of Indigenous Knowledge Systems, management foci, and projects) and outside reservations through cooperative arrangements (e.g., co-management agreements, memoranda of understanding, and other collaborative structures) with federal land management agencies, nonprofit organizations, various other governmental entities, and private owners. However, Indigenous Knowledges, such as TEK, do not always take precedence in conservation efforts due to colonial management frameworks—created and overseen by federal, state, and other governmental entities—that do not adequately support their inclusion or Tribal/Indigenous leadership and because of inadequacies in the colonial education system that produces managers. For example, federal land management agencies rely on frameworks like the Interagency Visitor Use Management Framework for managing outdoor recreation on public lands, but this framework provides no pathways for the incorporation of IK and Tribal leadership (Jacobs, 2023a). Moreover, the lack of Indigenous Peoples' rights to their ancestral territories in the U.S. creates situations where such frameworks have historically not been required or needed. A further problem is that Congress ended the Treaty-making era with Tribes in 1871, which provided federally recognized Tribes with (limited) land rights (BIA, n.d.). Today, federal relations with sovereign Tribal entities are facilitated through congressional acts, executive orders, and executive agreements (BIA, n.d.). However, these do not incorporate Indigenous Peoples' rights to solely manage their ancestral territories. Instead, current federal frameworks (e.g., laws, policies, etc.) for land management agencies center colonial control and management, which directly contrasts with international and national calls for the rights of Indigenous Peoples to manage their ancestral territories, including the climate.

The Rights of Indigenous Peoples and Nature

In the context of Indigenous Peoples' rights and Indigenous-led climate-based conservation efforts, the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP; United Nations, 2007), the *American Declaration on the Rights of Indigenous Peoples* (Organization of American States, 2016), and Canada's recent enactment of the *United Nations Declaration on the Rights of Indigenous Peoples Act* (UNDRIPA; CDJ, 2021) present opportunities and challenges for Tribal Nations. UNDRIP is a non-legally binding international framework, adopted in September 2007, that extends human rights and fundamental freedoms to Indigenous Peoples (UN General Assembly., 2007). Despite its widespread global acceptance and ratification by many nations worldwide, the U.S. has yet to ratify UNDRIP. However, ADRIP was ratified by the U.S. in June 2016 and recognizes Indigenous Peoples' rights to self-determination, cultural preservation, and participation in decision-making processes. Like UNDRIP, ADRIP is not legally binding and lacks the enforcement mechanisms to ensure the fulfillment of its articles by U.S. governing entities, thus providing ongoing challenges to Indigenous-led conservation efforts. ADRIP also limits the autonomy of Indigenous Nations and communities by allowing States to administer legal recognition and protection to specific areas, potentially excluding Indigenous Peoples' concerns for ancestral territories that exist outside of reservations or Treaty Lands.

Canada's enactment of UNDRIPA in June 2021 codifies UNDRIP into legally binding frameworks and presents a rights-based framework for other countries to follow, including the U.S. UNDRIPA

Figure 6.1. *Indigenous-Led Conservation of Our More-than-Human-Kin: Animals, Plants, Water, Land, and Climate* by Rhode Grayson.

Figure 6.2. *Tribal Consultation Does Not Equal Tribal Consent* (2023) by Rhode Grayson.

ensures that Canadian law aligns with UNDRIP principles, mandates annual progress reports, and establishes a review process to address inconsistencies between Canadian law and UNDRIP principles (CDJ, 2021). This legislation supports Indigenous-led conservation efforts, especially in response to climate change impacts on Indigenous Peoples and their Lands. However, UNDRIP and ADRIP remain underutilized in the U.S., despite Indigenous Peoples' proven effectiveness as stewards of biodiversity and carbon sinks (see Chapter 7, "Indigenous-Led Conservation"; Redvers et al., 2023).

In conjunction with the recognition of Indigenous Peoples' rights at national and international levels, noteworthy developments have occurred regarding the rights of Indigenous Peoples' more-than-human kin [i.e., the Rights of Nature (RoN)], which may offer some additional solutions for the challenges facing Indigenous-led conservation efforts. RoN is a legal framework that recognizes the inherent, legal, and/or personhood rights of elements of nature, encompassing both ecosystems and species (IPBES, n.d.). This shift is reflected in over 150 legislative instruments and court cases worldwide, underlining a transition from human-centered legal frameworks to a more Earth-centered jurisprudence, which corresponds to many Indigenous Peoples' worldviews (Putzer et al., 2022). These transformative changes have been observed in various countries, including Ecuador with its 2008 constitution, followed by Bolivia, New Zealand, Colombia, Australia, Uganda, and Mexico and even at international and local governing scales (Gilbert et al., 2023; Gilbert, 2022). For additional examples, the United Nations General Assembly Report on Harmony with Nature (United Nations General Assembly, 2020) highlights advances in Earth jurisprudence in recognizing the rights of natural entities in several countries from 2019 to 2022. At a more local level, in the U.S., legislative bodies enacted RoN-based laws resulting in protections for more than 30 areas (Surma, 2021).

While Earth jurisprudence recognizes nature and all its components as living entities with rights, critics caution against the potential colonial exploitation of the movement and the possibilities for undermining Indigenous laws and Knowledge systems (Tănăsescu, 2020). Despite these challenges, integrating Indigenous Peoples' human rights with nature's rights offers opportunities to create legislation and political frameworks that support Indigenous Peoples in addressing climate change, prioritize Indigenous-led conservation, and holistically protect the environment and humanity (Gilbert, 2022). However, current U.S. frameworks, especially those pertaining to Tribal consultation and Indigenous leadership, that do not prioritize Indigenous Peoples' rights provide ongoing barriers for Tribes to navigate

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Transforming Tribal Consultation and Advancing Indigenous Leadership in Federal Decision-Making Processes

Tribal consultation is a government-to-government process, acknowledged in Tribal treaties, through which Tribal Nations can engage in discussion with the U.S. federal government and share their perspectives on a wide range of diplomatic endeavors, such as environmental and cultural resource management topics, including those relevant to climate change (Jacobs, 2023a; Miller, 2015; NRCS, 2009). Consultation processes hold a complex history that reaches back to at least 1787 and has resulted in harmful consequences for Indigenous Peoples, including Land dispossessions and the diminishment of their Tribal rights (e.g., the 1787 Northwest Ordinance, Andrew Jackson's Indian Removal Act of 1830, Dawes Act of 1887, etc.; Jacobs, 2023a). However, no uniform policy exists across federal agencies for how Tribal consultation must be conducted, which offers challenges (e.g., learning to navigate distinct consultation processes, time, money, resources, etc.) for many Tribal Nations and Indigenous communities who must work through multiple consultation processes created and facilitated by federal entities (Jacobs, 2023a; Mengden IV, 2017). Moreover, no statutory obligations exist for federal entities to engage with state-recognized Tribes, which results in biases in representation that favor Indigenous communities with colonial recognition. This omission limits the ability of Tribes without federal recognition to provide their input on critical climate and environmental issues and therefore serves as a barrier to Indigenous-led conservation.

While consultation is required when federal actions have the potential to harm the more-than-human kin, communities, or objectives of federally recognized Tribal Nations, these processes often result in Tribes being considered as stakeholders rather than recognizing them as legal rightsholders (Eid, 2018; Fisk et al., 2021; Jacobs et al., 2022a, 2022b, 2023b). Stakehold-

er approaches mistakenly equate sovereign Tribal Nations with nongovernmental settler parties (e.g., nonprofit organizations and other community groups), often regarding their interests with equal weight in management decision-making processes and thus creating barriers for Indigenous Peoples' rights and Indigenous-led conservation to be prioritized (Jacobs et al., 2023). The challenge of Tribal Nations enacting Indigenous-led conservation is further exacerbated by the absence of legally binding obligations for federal agencies to address and integrate Tribal concerns into decision-making procedures (Fisk et al., 2021; Jacobs et al., 2022a, 2022b, 2023). Therefore, Tribal consultation processes do not equal Tribal consent of the subsequent federal decision-making and managerial processes that take place after consultation has concluded (Fisk et al., 2021; Jacobs et al., 2022a, 2022b, 2023; Fig. 6.2). This dynamic often relegates Tribal consultation processes to a mere box-checking exercise, leaving Tribal contributions unimplemented, thereby limiting Tribal sovereignty and rights and creating additional challenges for Indigenous-led conservation of areas outside of Tribal reservations (Fisk et al., 2021; Jacobs et al., 2022a, 2022b, 2023a).

In contrast, international commitments, exemplified by UNDRIP, acknowledge Indigenous Peoples as rightsholders with strengthened opportunities for managerial authority over their homelands. International organizations, such as the International Institute for Sustainable Development and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), also recommend that Indigenous Peoples worldwide should lead conservation efforts with their Knowledges due to the successes of Indigenous-led conservation (IPBES, 2019). These viewpoints are in accordance with worldwide endeavors to confront persistent colonial injustices, emphasizing the significance of refocusing on Indigenous-led conservation as a response to climate change and highlighting the necessity for fundamental changes in the Tribal consultation process within the U.S. (Fisk et al., 2021; Jacobs et al., 2022b).

Opportunities exist to transform Tribal consultation processes by prioritizing Tribes as rightsholders and placing them at higher levels of power than nongovernmental settler entities. Taking such an Indigenous rights–based approach would allow for more equitable consultation processes to emerge, especially when these processes involve all Tribal Nations, including those without federal recognition. Some examples of these processes may include identifying kincentric and climate-related concerns, collaborating on solutions, and obtaining Tribal approvals on acceptable management solutions (Jacobs, 2023a). Additionally, a Tribal-rights focused approach would legally obligate the federal government and other institutions to respect and integrate Indigenous Peoples leadership and relations with their more-than-human kin into Land, water, plant, animal, and climate management processes. This type of paradigmatic shift could establish mutually agreed-upon, consensual protocols, climate-related desired conditions, and disturbance indicators and thresholds and prioritize timely communication, coordination, cooperation, and collaboration with Tribal Nations (Jacobs, 2023a). However, such extensions in Tribal rights necessitate the protection of IK and Tribal Nations' and Indigenous communities' access to their ancestral territories and cultural resources. Some advances are currently underway for Indigenous Peoples in the U.S. that work toward these directions, especially those that focus on acknowledging and

Opportunities exist to transform Tribal consultation processes by prioritizing Tribes as rightsholders and placing them at higher levels of power than nongovernmental settler entities. Taking such an Indigenous rights—based approach would allow for more equitable consultation processes to emerge, especially when these processes involve all Tribal Nations, including those without federal recognition.

validating IK and forms of environmental justice by incorporating them into federal decision-making processes.

Recognizing and Protecting Indigenous Knowledges

In 2021, the White House Office of Science and Technology Policy and the Council on Environmental Quality initiated a strategic process to gather input from Indigenous Peoples and Tribal Nations on the integration of TEK into federal decision-making processes (Lander & Mallory, 2021). Subsequently, in 2022, the White House issued new guidance for federal agencies on working with Indigenous Peoples and IK, marking a pivotal shift in agency approaches (Prabhakar & Mallory, 2022a, 2022b). The new guidance and policies focus on working with Indigenous Peoples and recognizing and including IK Systems across federal agencies in federal research, policy, and decision-making processes. IK can be key to determining environmental and climate baselines and identifying particularly sensitive ecosystems and cultural spaces that warrant climate-centered action. However, the new federal guidance has been criticized for its lack of protection of Tribal data sovereignty, the high prioritization of federal leadership instead of Indigenous leadership, and the lack of land and recreation management frameworks to implement the new policies (Jacobs, 2023b).

Critiques of the new federal guidance underline how agencies may participate in interagency data sharing processes; thus, an innate challenge exists in which federal entities may obscure Tribal data sovereignty by sharing data internally and externally with other entities without Tribal consent and oversight (Jacobs, 2023b). There are also no straightforward exemptions for Tribes concerning the Freedom of Information Act, which provides the general public with the rights to access data and other information controlled by the federal government (Jacobs, 2023a).

Opportunities exist for Tribes to protect IK when working with the federal government. For example, existing FOIA exemptions can aid, if imperfectly, in protecting IK, TEK, and other sensitive information from disclosure, particularly when working on projects where the National Historic Preservation Act (NHPA), the National Environmental Policy Act, and other federal environmental and cultural resource laws are applicable. The Information Quality Act and the Office of Management and Budget's (OMB) government-wide Information Quality Act Guidelines acknowledge that information collected by agencies "may be confidential" and encourages agencies to "address ethical, feasibility, and confidentiality issues with care" (OMB, 2002, p. 8,453, 8,455–8,456). Two FOIA exemptions may provide opportunities for Tribes navigating these barriers: 5 U.S.C. § 552(b) at (3), statutorily exempt matters (matters that are already exempt by law), and at (5), deliberative process documents (documents involved in the decision-making process).

The Department of Justice's (DOJ) Office of Information Policy regularly publishes a list of statutes found to qualify under Exemption 3 of FOIA, providing Tribes with a helpful resource when developing data management agreements for IK protection and confidentiality (DOI, n.d.-a). A few relevant examples of statutory provisions exempted from disclosure, according to Exemption 3, include:

- Archaeological Resources Protection Act, 16 U.S.C. §§ 470bb and 470hh (archaeological resources at least 100 years of age; list is inclusive and not limited to the examples provided).
- Cultural and Heritage Cooperation Authority, 25 U.S.C. § 3056(a)(1) (information relating to human remains or cultural items reburied on National Forest System land; resources, cultural items, uses, or activities that have a traditional and cultural purpose and provided under an express expectation of confidentiality).
- Federal Cave Resources Protection Act, 16 U.S.C. § 4304 (any "significant cave" as defined at 43 C.F.R. § 37.11).
- NHPA 54 U.S.C. § 307103(a) (historic properties, traditional religious sites).
- National Parks Omnibus Management Act, 54 U.S.C. § 100707 (includes "objects of cultural patrimony within units of the National Park System").

Although Indigenous Knowledges are not yet on the DOJ's list of exemptions, Tribal governments have opportunities to use their authority to develop Tribal protocols, memoranda of understanding, data-sharing agreements, and other contracts to protect IK or other potentially sensitive and sacred data from disclosure. Such legal documents can require Tribal approvals and Tribal data sovereignty safeguards to protect IK. Tribes can also incorporate language from UNDRIP pertaining to the need for free, prior, and informed consent (FPIC) concerning any element related to their data. The principles of FPIC assert Indigenous Peoples' rights to freely choose whether to approve or reject actions impacting their communities and Lands (including data); ensure that consent is not coerced

and occurs prior to any action that impacts their communities and Lands; and require Indigenous communities to have opportunities to continuously consent or dissent throughout a project's duration.

Opportunities also exist for Tribes to protect IK when working with state governments. When Tribes collaborate with state government entities, they should understand that state legislatures can explicitly exempt information sensitive to Tribes from public records laws, providing an opportunity to overcome individual states' open records laws for state-managed lands while strengthening and reinvigorating relationships of trust with Indigenous Peoples. For example, California exempts records of Native American graves, cemeteries, and sacred places (Cal. Gov. Code, Section 7927.000). Additionally, the state of Washington exempts from disclosure information, shared by a Tribal government with state, local, or other Tribal governments, pertaining to archaeological sites, archaeological resources, and traditional cultural places (Wash. Rev. Code, Section 42.56.300). However, similar to working with the federal government, exempting IK may be best facilitated through Tribal data-sharing agreements and memoranda of understanding with state and other governmental entities.

Governmental entities at all scales also have opportunities to overcome the challenges Tribes face when protecting their IK. Governmental entities should see the deficiencies outlined above as opportunities to create legally enforceable policies that protect Tribal data sovereignty and self-determination by providing exemptions to open records laws, obligating agencies to enter into binding data-sharing agreements, foreclosing interagency data-sharing agreements, and providing legal support or assistance to Tribes for navigating these barriers. The federal government has recently emphasized the need to reduce barriers in other arenas (as described below), so an opportunity exists to reduce the challenges that Tribes may face when sharing their sacred data.

Environmental Justice

In April 2023, the White House issued Executive Order No. 14096 (2023) on environmental justice, which established the White House Environmental Justice Interagency Council and mandated federal agencies to create Environmental Justice Strategic Plans. A key provision of this order emphasized the federal government's commitment to eliminating barriers to meaningful involvement that offers potential progress to better engage Indigenous Peoples and other environmentally disenfranchised groups in agency decision-making processes. However, no shifts were made in considering Indigenous Nations as rightsholders. Instead, this executive order addressed the need for respecting the sovereignty of federally recognized Tribes through consultation, collaboration, and respect for subsistence ways of living (Gordon, 2023b). Therefore, significant questions persisted regarding the alignment of these legislative efforts with UNDRIP's Articles 25 and 26, which underscore Indigenous Peoples' rights to preserve their unique spiritual connections to their traditional Lands, territories, waters, coastal seas, and resources while securing their access to and ownership of these resources. Legislative and political opportunities exist to continue expanding on the rights of Indigenous Peoples in the U.S. However, thus far, only incremental progress has been made.

Section Conclusion

Indigenous stewardship of Indigenous Peoples' more-than-human kin is rooted in Indigenous ways of knowing that stretch back millennia and incorporate teachings that have been passed down generationally about living in a good way—through harmony, kinship, and sustainability with all life on the planet (Gordon 2023a; Salmón, 2000). Today, Indigenous Peoples are shifting into Indigenous-led conservation efforts to combat the impacts and effects of colonial-driven climate change and Western values. Indigenous-led conservation in the context of climate change rests on the bedrock of Tribal self-determination and sovereignty. Often, however, the opportunities for Indigenous-led conservation are challenged by federal and state bureaucracy and oversight (Whyte et al., 2023).

A clear need exists to transform Tribal consultation processes and advance Indigenous People's rights in the U.S. so that Indigenous-led conservation can occur without so many challenges. Recent moves to incorporate IK and environmental justice into federal frameworks look promising but still contain many challenges for Indigenous-led conservation, especially in the realms of Tribal sovereignty and self-determination. However, paradigmatic shifts toward increasing and maintaining Indigenous Peoples' rights and the Rights of Nature could catalyze a future in which Tribal self-determination and sovereignty prevail. Frameworks for these efforts can be drawn from international efforts, such as those found in UNDRIP and Canada's DRIPA. Enacting a legally binding version of either of these declarations in the U.S. via legislation could create a reality that influences how Indigenous Peoples' more-than-human kin are stewarded through Indigenous-led conservation paradigms. Such a reality would proffer a more Indigenous and holistic pathway to address climate change and ongoing mass extinction events while safeguarding the rights of Indigenous Peoples and nature. The next section of this chapter dives deeper into additional opportunities and challenges that exist for future Indigenous-led conservation initiatives.

Opportunities and Challenges for Indigenous-Led Conservation Initiatives

The responsibilities of Indigenous Peoples to safeguard and manage their territories and climate are vital for preserving their cultural heritage, honoring sacred commitments to their more-than-human kin, and securing the sustenance and autonomy of their communities, both in the present and for future generations. Securing Indigenous Peoples' rights transcends mere participation and inclusion processes and extends to the recognition of Tribal sovereignty and equitable standing for Tribal Nations as rightsholders. However, this also extends to recognizing Tribal Nations as co-beneficiaries, coequal partners in funding and regulatory mechanisms, and key decision-makers in determining the future of their territories and ancestral homelands. As climate impacts accelerate, additional challenges for Indigenous-led conservation will escalate, requiring more strategies for Tribal Nations and Indigenous communities to navigate in climate and environmental management. However, as increasing numbers of governmental bodies, academic institutions, industries, and nongovernmental organizations (NGOs) recognize the invaluable benefits of collaborating with Tribal Nations, opportunities will arise to fortify the resilience of Earth's climate and its diverse ecosystems.

This section examines challenges and opportunities for Indigenous-led conservation, beginning with the distinct but interconnected challenges in Tribal forestry management, island conservation, and the issues of scale and habitat connectivity in wildlife management. It provides information about how Tribal Nations and Indigenous communities navigate conservation along international borders and the resulting jurisdictional questions that underscore the need for better management paradigms (e.g., co-equity management and #LANDBACK) that center Tribal Nations' and Indigenous communities' leadership in stewarding their more-than-human kin. This section emphasizes existing opportunities (e.g., funding instruments) that Tribal Nations and Indigenous communities can leverage to empower Indigenous-led climate conservation efforts.

Forest, Island, and Wildlife Challenges and Opportunities

Indigenous-led climate conservation spans a diverse range of contexts, including but not limited to the management of Indian forests, island ecosystems, and the implementation of state wildlife action plans. Additionally, climate mitigation and adaptation frameworks recognize the importance of protecting biodiversity across large, interconnected landscapes. In these distinct contexts, challenges and opportunities exist that emphasize the importance of Indigenous leadership, equitable funding, and cultural preservation in addressing climate change and promoting sustainable environmental stewardship.

Indian Forest Management Act

The Fourth Indian Forest Management Assessment Team (IFMAT) for the Intertribal Timber Council concluded the most recent 10-year review of Indian forests and forest management in the U.S. and highlighted the persistent need for a holistic nationwide forest management approach, which aligns with the unique Tribal vision of stewardship for large, landscape-scale management projects (IFMAT, 2023). Although some Tribes proactively integrate holistic perspectives and climate analyses into their forest management plans, a significant climate-related challenge lies in an existing policy gap. The 1990 National Indian Forest Resources Management Act does not require Tribal plans to address climate change. This lack of policy guidance, coupled with limited funding for capacity building and training, poses a substantial challenge for Tribal Nations seeking to initiate forest management, climate vulnerability assessments, or climate adaptation plans that conserve and restore their forest ecosystems. For over 30 years, IFMATs have consistently identified significant funding disparities for Indian trust forest lands, which receive approximately one-third of funding per acre compared to federal forests (IFMAT, 2023). Addressing the challenges with funding and lack of requirements to address climate change remains a critical challenge that requires swift action by the Department of the Interior (DOI) to advance Tribal climate priorities, protect environmental heritage, and preserve the cultural ecology of forest systems.

Within these challenges also exists opportunities for the DOI to rectify these disparities and there-

by foster deeper relations with Tribal Nations by ensuring that equitable funding supports the conservation and restoration of Tribal forest lands. With adequate funding, an opportunity exists to invest in Indigenous-led conservation and shift forest management strategies toward climate resilience. Tribal Nations should receive financial and capacity-building support to update or create integrated resource management plans, forest management plans, and climate mitigation and adaptation plans that prioritize a diversity of culturally significant species (e.g., traditional foods, fibers, and medicines) beyond commercial timber species. These species may be classified as nontimber forest products under the National Indian Forest Resources Management Act and are often neglected in research and federal management priorities (Krosby & Morgan, 2018). However, they remain integral to the biodiversity and climate resilience of forest ecosystems. The DOI has numerous opportunities to address the identified challenges faced by Tribes in the realm of Tribal forestry, particularly concerning federal policy gaps related to climate change, funding disparities, and investments in Tribal Nations' capacity to prioritize climate and culturally significant species. These challenges also become opportunities for the DOI to fulfill trust responsibilities to Tribes and support Indigenous-led climate conservation priorities (Lynn, 2023; IFMAT, 2023).

Indigenous-Led Conservation for Islands

Indigenous Peoples have been connected to and have played active roles in stewarding island and marine environments, such as those in Hawai'i and throughout the Pacific, since time immemorial (Jacobs et al., 2022a). Indigenous scholars have critiqued Western marine conservation efforts for excluding and marginalizing Indigenous perspectives and Indigenous Peoples' rights, resulting in detrimental conservation efforts that pose negative impacts to Indigenous communities and the local ecosystems (Jacobs et al., 2022a). Island environments also face an onslaught of human-driven climate impacts, including sea-level rise, invasive-species encroachment, habitat shifts, storm surge, and land management actions from infrastructure and industry (IPCC, 2023).

Case studies from Hawai'i have demonstrated that Indigenous-led conservation offers effective and resilient approaches for integrating Indigenous Peoples' collective goals, attaining conservation objectives, and involving government bodies and various organizations in the stewardship and administration of marine island ecosystems (Winter et al., 2021). However, Native Hawai'ian communities face challenges to their cultural agency to enact Indigenous-led conservation due to the illegal U.S. occupation of Hawai'i, subsequent federal and state laws and policies, and the establishment of parks and protected areas, which have historically led to the exclusion and displacement of Native communities and their cultural rights (Fisk et al., 2021; Sai, 2004). Nevertheless, Native Hawai'ians are asserting their agency to engage with government institutions and others for Indigenous-led and collaborative management practices (Winter et al., 2021).

Opportunities exist for island and climate conservation in Hawai'i to streamline pathways toward equitable and more productive partnerships by enhancing comprehension of legal frameworks; safeguarding the rights and customs of Indigenous Peoples; acknowledging the diverse expressions of Indigenous self-determination and influence; and deliberately engaging in shared power systems (Winter et al., 2020). Indigenous community groups and environmental organizations can play a substantial role in moving forward such efforts; however, they, too, often face barriers. For example, Native Hawai'ian NGOs experience compounding challenges of being under-resourced, undervalued, and overlooked when working to restore their cultural practices and relationships with the environment (Asuncion et al., 2022). Advancing Indigenous-led, community-based conservation in island ecosystems will increase the climate resiliency of urban and rural communities by strengthening local food systems, supporting biodiversity, and enriching intergenerational Knowledge exchange and problem-solving for long-term, Indigenous-centered natural resource management (Chang et al., 2019; Asuncion et al., 2022).

Additional opportunities exist, including through building legal and policy frameworks that enhance Native Hawai'ians' rights to their ancestral homelands; paradigmatic shifts by the federal and Hawai'i governments that work toward Indigenous-led stewardship or co-management of parks and protected areas; additional legal and political shifts that recognize and respect Native Hawai'ians' agency and self-determination; and increasing resources and funding for Native Hawai'ian communities and organizations. Each of these opportunities can empower Indigenous-led conservation in island environments and potentially support climate mitigation and adaptation efforts in communities that face the brunt of climate impacts.

Considering Scale for Wildlife

Most climate adaptation frameworks applied to biodiversity conservation and natural resource stewardship recognize the need to plan and act across wide areas, both in terrestrial, freshwater, and marine contexts [e.g., the National Fish, Wildlife, and Plants Climate Adaptation Network (NFWPCAN, 2021) and the Association of Fish and Wildlife Agencies (AFWA, 2022); Steen-Adams et al., 2023]. These frameworks are significant because most lands are highly fragmented, severely degraded, or completely converted and subject to numerous harmful impacts of human economic activity [e.g., mineral or fossil fuel extraction, extensive timber harvest, chemical pollution, industrial-scale agriculture (Díaz et al., 2019; Olimb & Robinson, 2019)]. Moreover, climate adaptation frameworks emphasize the importance of protecting refugial areas and maintaining landscape connectivity for wildlife, especially in the face of climate change (NFWPCAN, 2021; AFWA, 2022; Kauffman et al., 2022; Montana Fish, Wildlife and Parks, 2022). Scale must be considered because the role of large areas is essential for the survival of many species, including migratory kin such as caribou, elk, waterfowl, and salmon and nonmigratory species such as bison, elk, and wolves (Geremia et al., 2019; Suzukawa et al., 2023; Tulalip Tribes, n.d., 2018). The same is true for entire ecosystems, such as forests, grasslands, and rivers, particularly if they are subject to environmental disturbances such as fire and flooding (Lake et al., 2017; Ward et al., 2023).

Planning and implementation at scale remain a political and social challenge that extends beyond the technical complexities of identifying refugial areas and corridors, understanding how wildlife interact with land use and hydrology, and understanding climate impacts and projections. Tribal Nations should consider questions relating to how their climate adaptation objectives can be achieved on reservations and Tribally owned lands, the roles of cooperation with external entities, and how to develop partnerships that promote Tribal interests (GLIFWC Climate Change Team, 2023). Options available for Tribes with fixed reservation Lands include stewarding Lands to be resilient and provide the best chance for maintaining the ecosystems and culturally important beings under their jurisdiction. Having already recognized that this is not always possible or sufficient, particularly as ecosystem conditions shift because of climate change, partnerships with other Tribes [e.g. neighboring Tribes, organizations such as GLIFWC, the Intertribal Buffalo Council (ITBC)] can play important roles (Berger, 2023; ITBC, n.d.).

Co-management with federal, state, and local governmental agencies and NGOs provides another opportunity (discussed in greater detail elsewhere in this chapter). For example, forest management to achieve greater climate resilience at forest scales is an area under active discussion (Steen-Adams et al., 2023), with the added benefit of maintaining cultural practices and access to culturally significant species, habitats, and sites. Restoration of buffalo to Tribal

Ka'ena, Waialua, O'ahu, Hawai'i, a *wahi pana*, or sacred site in Hawai'ian culture, where the National Park Service is considering a National Heritage Area designation.
Photo Credit: Ashley Gries

Young pronghorn antelope (*Antilocapra americana*), on homelands of the Ute, Paiute, Diné, Hopi, Zuni, and other Pueblo Tribes in so-called Canyonlands National Park, Utah.
Photo Credit: Ashley Gries

Lands is another example that provides climate resilience to grasslands (Ratajczak et al., 2022) and requires cooperative arrangements between the ITBC and federal agencies, including the National Park Service (Berger, 2023). Tribes also play an essential role in facilitating large-scale, functional connectivity across wide areas that are used by migratory ungulates and other beings (NAFWS, n.d.; Ryan, 2022).

Additionally, states are being called to enhance engagement with Tribes in developing State Wildlife Action Plans (SWAPs), as recommended by the *Voluntary Guidance for States to Incorporate Climate Adaptation into State Wildlife Action Plans and Other Management Plans* (AFWA, 2022). This includes assessing the needs of marginalized communities and recognizing the value and validity of IK (NFWPCAN, 2021). However, evidence shows limited productive engagement with Tribes, with many Tribal fish and wildlife managers feeling excluded or disregarded in SWAP developments (AFWA, 2022; Schmidt et al., 2023; NAFWS, n.d.). Additional problems exist because Tribal Nations are still identified as stakeholders instead of rightsholders. In some cases, such as in Idaho, Tribes with territorial, cultural, and ancestral ties to the state-managed lands are not identified in the SWAP (IDFG, 2022). This does not have to be the case: recommendations exist for improving the process and prospects for meaningful engagement (e.g., Fisk et al., 2024; Ramos & Culver, 2024; Steen-Adams et al., 2023), increasing the chance of realizing the potential benefits of state–Tribe cooperation listed in the NFWPCAN report (2021). Outside of U.S. and state governmental Tribal relations, international partnerships and collaborations also offer opportunities for Indigenous-led conservation to occur in climate contexts, albeit they come with their own sets of challenges and opportunities.

International Collaborations for Biodiversity Conservation

Indigenous-led conservation requires partnerships and collaboration that often take place at international scales. This section explores the complexities of international collaborations for Indigenous-led biodiversity and climate conservation. It reveals the challenges and emerging opportunities for Indigenous-led approaches in transboundary ecosystem management that can prove difficult because of distinct geopolitical regulations and boundaries.

Cascadia Partner Forum—Indigenous Governance Strategy

In the Cascades Mountains region, the Cascadia Partner Forum (CPF) exists as a volunteer network of entities, including Tribal partners, that coordinate on transboundary habitat, biodiversity, and climate issues (CPF, n.d.). CPF faces the challenge of coordinating conservation efforts across a fragmented jurisdictional landscape, including Washington State, British Columbia, and many Indigenous territories. However, the initial patchwork governance structure in this multigovernment jurisdiction proved problematic for building cohesive climate adaptation and biodiversity conservation strategies, especially those relating to Tribal and First Nations' needs and leadership (Krosby et al., 2023). Therefore, CPF's core team collaboratively developed a climate adaptation strategy and subsequently the *Blueprint for a Resilient Cascadia*, which incorporated Indigenous Peoples' concerns and was based upon principles of responsibility, reciprocity, relevance, rationality, and resources (CPF, 2022; Krosby et al., 2023). The blueprint identified six climate adaptive regional strategies and a key outcome to "center Indigenous leadership, sovereignty, and values in all aspects of transboundary, large-landscape climate resilience efforts to promote reconciliation and long-term success" (CPF, 2022, p. 16).

A result of this shift from Indigenous engagement to Indigenous leadership, and recognizing the difference between stakeholders and rightsholders, has reinvigorated the blueprint steering committee with Indigenous consultants from British Columbia and the Tribal-serving NGO Affiliated Tribes of Northwest Indians Climate Resilience Program. Enhancing and advancing Indigenous sovereignty, governance, and priorities through the CPF continues, with plans to support Indigenous-led grant proposals, develop partnerships with Tribal governments, First Nations, and Indigenous organizations to lead efforts and coordinate Indigenous conservation and climate priorities in the region (Krosby et al., 2023).

However, a lack of funding to support Indigenous-led conservation and climate work in the U.S. and Canada remains a challenge to capacity-building and project implementation, particularly when funding is piecemeal and limited in scope or application. The effort and focus of CPF to elevate and follow Indigenous Peoples' leadership in the Cascadia region provide an ethical, logical, and actionable answer to the biodiversity, conservation, and climate challenges posed by the 49th Parallel. As an exercise of accountability to Indigenous Nations and Peoples within co-management arrangements, embracing restorative and transformative justice principles (e.g., those employed by CPF's core team) can aid in redressing historical and contemporary injustices and power imbalances, providing guidance for how to reconfigure and transform co-management arrangements and approaches to conservation more broadly, which is critical for Indigenous-led conservation in climate change contexts (Fisk et al., 2021; Stark et al., 2022).

Transforming Transboundary Columbia River Watershed Governance

Transboundary governance of the Columbia River Watershed underscores a large-scale, multi-ecosystem, and multi-jurisdictional issue with challenges and opportunities for Indigenous-led conservation. Indigenous Peoples have resided in the Columbia Basin Plateau since time immemorial, practicing reciprocal trade economies that varied during different seasons and brought thousands of diverse Indigenous Peoples to the region (Ortolano et al., 2000). Due to colonialism, Indigenous Peoples in the region faced significant challenges and disruptions [e.g., colonial settlement, the U.S. reservation system, the construction of the Grand Coulee Dam (GCD) and the Columbia Basin Project (CBP)]. The GCD and CBP were established without the consent of Indigenous Peoples and subsequently resulted in severe impacts on their traditional food systems and local ecosystems (e.g., halting salmon migration, flooding Indigenous Lands, initiating construction of power transmission infrastructure into the abundant root grounds, and transforming food structures into mono-crop industrial agriculture; Ortolano et al., 2000; Gonzaga Climate Institute, 2023; O'Riordan et al., 2023). These challenges are compounded by subsequent adverse impacts on Indigenous Peoples' food and water security and sovereignty throughout the Columbia River watershed.

Although many Indigenous communities have found opportunities to rectify these issues through Indigenous-led conservation efforts (e.g., conserving the shrinking root grounds of sagebrush steppe habitat, reintroducing salmon, and restoring cultural traditions), their efforts continue to be challenged by GCD and CBP operations as well as industrial agricultural interests, energy development interests, and climate change (Gonzaga Climate Institute, 2023). Concerning climate change, the Columbia River watershed's projected impacts will include significant temperature increases that will alter precipitation, subsequently causing less summer water flow, higher average water temperatures, less natural water storage (e.g., glaciers, snowpack, etc.), reduced groundwater recharge, increasing rain on snow events, and more extreme heat events that threaten human ecosystem health (O'Riordan et al., 2023).

The Columbia River Treaty (CRT) of 1961 was ne-

gotiated between the U.S. and Canada without Tribal and First Nations' input. The CRT focused on sharing power generation and flood control benefits, which led to the construction of several dams (e.g., Libby Dam in Montana and Duncan Dam, Mica Dam, and Keenleyside Dam in British Columbia) that adversely affected Indigenous communities, local ecosystems, and food security (U.S. Department of State, n.d.). The Confederated Tribes of the Colville Reservation sought compensation from the U.S. government for the waterpower values of lands affected by the GCD and Lake Roosevelt, which led to Congress approving a settlement in 1994 (Ortolano et al., 2000). However, no other Indigenous Peoples received settlements nor had the opportunity to enter into negotiations about the damages from GCD or CBP (Ortolano et al., 2000).

In 2008, the Federal Columbia River Power System Columbia Basin Fish Accords were enacted with six Tribes and two states in an attempt to resolve hydropower operation compliance issues under applicable environmental laws specific to salmon and steelhead fish populations (e.g., Clean Water Act, Endangered Species Act, etc.; U.S. Bureau of Reclamation, n.d.). However, these Fish Accords have not produced successful salmon recovery outcomes, despite billions of dollars in investment. Since 2018, the CRT has been under renegotiation, with substantial Indigenous and public advocacy for the inclusion of Tribal and First Nations and the integration of ecosystem services, especially for salmon (U.S. Department of State, n.d., 2023a, 2023b; Gonzaga Climate Institute, 2023; O'Riordan et al., 2023). The U.S. CRT negotiation delegation includes expert advisors from various Tribal Nations, but no Tribal representative has decision-making authority (U.S. Department of State, 2023b).

A historic development occurred in 2023 under the Biden-Harris administration, in which $200 million was allocated for Indigenous-led conservation by the Upper Columbia United Tribes, including salmon reintroduction, juvenile salmon out-migration survival studies, genetic sampling, and development of fish passage designs to facilitate spawning runs above Grand Coulee Dam and increase survival (DOI, 2023). Similar efforts are occurring in Canada, where the five partner governments of the Ktunaxa Nation, Secwépemc Nation, Syilx Okanagan Nation, Canada, and British Columbia are leading salmon reintroduction, habitat enhancement, and watershed revegetation initiatives (e.g., the Bringing the Salmon Home project; Rowlands, 2023).

The importance of conserving water, natural habitats, biodiversity, and Indigenous food security is a global climate crisis issue that is not limited to the Columbia River Basin. Large-scale systemic ecosystem issues that span governmental jurisdictions must be addressed through transboundary governance practices that are inclusive of all sovereign governments, including Tribal Nations and Indigenous communities. Opportunities to move into more equitable transboundary governance paradigms exist and are demonstrated through initiatives such as the One River, Ethics Matter conference series and the Draft Proposal for Transforming Transboundary Water Governance, which offer innovative paths for conservation and collaboration (OREM, n.d.; O'Riordan et al., 2023; Schmeier et al., 2023). These efforts suggest a shift toward more inclusive governance models that integrate Indigenous perspectives and Knowledge Systems, thereby centering Indigenous leadership in climate and conservation efforts. Wicks-Arshack (2023) notes that the Draft Columbia River Basin Proposal calls for:

- Indigenous leadership in the CRT process and an organization designed to align with the rights of Indigenous Peoples;
- The "protection of Indigenous cultural values as a co-equal purpose of the treaty" (p. 3);
- The "full engagement and consent from Tribes and First Nations" during any modifications to the CRT "or subsequent inter- or intra-national agreements" (p. 4);
- "The inclusion of sovereign representation, including the full participation and leadership of Indigenous Nations, states, provinces and local government" (p. 5);
- Indigenous scientists and knowledge-keepers included on a knowledge and science advisory board; and
- "Support opportunities for Indigenous Nations to engage internally and externally to ensure that all governance is informed by Indigenous Peoples' governance principles and values" (p. 6).

Implementing the Draft Columbia River Basin Proposal would allow Indigenous Peoples in the Columbia River Basin to fulfill their sacred responsibilities to the Creator and their more-than-human kin because it emphasizes the importance of preserving diverse habitats for traditional plants, foods, fibers, and medicines and the IK connected to the resources, which are crucial for climate resilience in the watershed (Gonzaga Climate Institute, 2023). Therefore, an opportunity exists to enhance and support the culturally sensitive sharing of IK, particularly in regenerative agriculture and aquaculture, and to consider establishing Rights of Nature (as previously mentioned in this chapter) for the watershed (Na'ah Illahee Fund, 2022; U.S. Department of State, 2023a; Gonzaga Climate Institute, 2023; O'Riordan et al., 2023). Opportunities also exist for better and more relational transboundary governance between the U.S. federal, local, and state and Canadian provincial governments and the many Tribal Nations and Indigenous communities of the Columbia River Basin as well as for paradigmatic shifts that center Indigenous-leadership in all aspects of transboundary governance, including those focused on managing the more-than-human kin of Tribal and First Nations and Indigenous communities.

More equitable management approaches and the transference of resources and decision-making powers engender more generative co-equity-based management arrangements that can redress historical injustices programmatically and structurally.

Co-equity Management and #LANDBACK Directions

Although most parks and protected areas in the U.S. are currently managed by colonial agencies at federal and state levels, two land management paradigms support Indigenous-led conservation in public lands: 1) Co-equity-based management of parks and protected areas, in which state, federal, and local agencies share managerial powers with Tribal Nations and communities; and 2) #LANDBACK processes, in which Indigenous Peoples reclaim rights, responsibilities, governance, relationships, and stewardship of their territories (Fisk et al., 2021; Jacobs et al., 2022a, 2022b, 2023a, 2023b).

The Co-equity Management Paradigm

Co-management is a broad term that encapsulates a vast spectrum of ways that cross-jurisdictional, cooperative, and participatory environmental governance takes place, with a similarly vast range of power dynamics that can either be redressed or perpetuated by co-management arrangements. Conventional approaches to co-management by the U.S. government focus primarily on consultation and collaboration, whereby Tribes and Indigenous Peoples are given opportunities to provide input and critique in Land management actions and decision-making processes, with very limited agency and decision-making powers, as described earlier in this chapter (Stark et al., 2022; Jacobs et al., 2022b). By maintaining relationships restricted to consultation, such arrangements often perpetuate harmful power dynamics wherein Indigenous voices are sought at the surface level, often for tokenization, without exercising any substantive trust in the ability of Indigenous Peoples to govern and steward Lands in equitable partnership with or in the place of federal and state agencies. In light of this, more-equitable management approaches and the transference of resources and decision-making powers engender more generative co-equity-based management arrangements that can redress historical injustices programmatically and structurally (Fisk et al., 2021; Jacobs et al., 2022b).

Co-management is also defined as "cross-jurisdictional, cooperative, participatory collaboration in decision-making, planning, and enforcement" of social-environmental systems (Cozzetto et al., 2021). It is an approach to environmental governance and conservation that has been leveraged to extend and restore greater agency to Tribes and Indigenous Peoples. Co-management arrangements establish formal agreements to facilitate Indigenous stewardship over and incorporate Tribal Nations' and Indigenous communities' input regarding the management of public lands (e.g., Brown, 2023). Given that the history of parks and protected areas in the U.S. has been explicitly premised on the exclusion of Indigenous Peoples (Spence, 1999; Jacobs et al., 2022b), co-equity-based management provides an opportunity to begin to atone for such dispossession and restore Indigenous customs of relationships with Land (Stark et al., 2022; Stevens, 2014; Jacobs et al., 2022a, 2022b; Fisk et al., 2021).

Shifting away from collaboration- and consultation-centric models of co-management requires the foregrounding of Indigenous leadership and accountability to Indigenous communities as part of the design and function of co-management arrangements (Jacobs et al., 2022a, 2022b). This requires embracing restorative and transformative justice principles that can aid in redressing historical and contemporary injustices and power imbalances, providing guidance for how to reconfigure and transform co-management arrangements and

Figure 6.3. *#LANDBACK* (2023) by Rhode Grayson.

approaches to conservation more broadly, which is critical for Indigenous-led conservation in climate change contexts (Fisk et al., 2021; Stark et al., 2022). Fundamental to such transformation of co-management approaches will be cultural evolution within environmental governance, emphasizing Indigenous leadership within arrangement, design, purpose, conduct, and evaluation, thus facilitating the expression of Indigenous worldviews and the conduct of Indigenous lifeways within co-management arrangements (Fisk et al., 2021; Quiocho et al., 2023).

The #LANDBACK Paradigm

The second land management paradigm, #LANDBACK, is considered a pivotal mechanism through which Indigenous Peoples operationalize Indigenous-led stewardship and conservation practices that meet the growing demands of climate change. #LANDBACK has been exemplified at global and national scales through the return of ancestral territories directly to Tribal Nations and Indigenous communities (particularly parks, protected areas, and other trust lands; Fig. 6.3). Alternatively, Tribes also initiate #LANDBACK by directly purchasing their lands back on the open market (Kay, 2021). For example, between 2012 and 2022, the DOI offered a land buy-back program for Tribes who were interested in and capable of purchasing fractional interests in trust or restricted lands from sellers at fair market value (DOI, n.d.-b). Although many forms of #LANDBACK have occurred over the last several years, the few examples below demonstrate how this paradigm can lead to co-management objectives, while other times work toward empowering Tribes to conduct Indigenous-led conservation on their own terms without the interference or collaboration of external agencies.

- **2010:** A collection of state and federal grants, Tribal funds, and private donations made it possible for Kukutali Preserve to be established on the Swinomish Reservation, which is co-equally managed by the Swinomish Indian Tribal Community and Washington State Parks. This is the first Tribal state park in U.S. history (SITC, n.d.; Jacobs, 2023b; see Chapter 7, “Indigenous-Led Conservation”).

- **2016:** Tolowa Dee-ni’ Nation reacquired Xaawan’-k’wvt, a 60-acre oceanfront property that includes Ship Ashore and Salmon Harbor Resorts. These Lands were used in 2023 to house displaced Indigenous and non-Indigenous residents seeking shelter due to climate-related fire evacuations (Bommelyn, 2016).

- **2020:** The Esselen Tribe regained 1,199 acres of redwood forest for the purpose of conservation and cultural resilience due to a $4.5 million land deal brokered by Western Rivers Conservancy (Smith & Sturgill, 2020; Jacobs, 2023b).

- **2021:** The Eastern Kuku Yalanji Community and the Australian government agreed on the return of four Australian National Parks, including Daintree National Park, to the Traditional stewards of the Lands (Diaz, 2021).

- **2021:** The Five Tribes of the Wabanaki Confederacy had a 150-acre island returned to them through the help of land trusts (Robbins, 2021).

- **2021:** The City of Boston, in partnership with the Massachusett Tribe at Ponkapoag and the National Park Service, initiated an archaeological Climate Action Plan for the Boston Harbor Islands to preserve archaeological sites at risk from climate change impacts (Bagley et al, 2023; CAP, 2023).

- **2022:** In Washington State, the Confederated Tribes of the Colville Reservation received 328 acres of their land from the Methow Conservancy and 9,243 acres from Conservation Northwest (Ryan, 2022).

- **2023:** The Trust for Public Land purchased a 31,000-acre tract of forest (called Wáhsehtək^{w} by the Penobscot Nation) in Maine and announced it will return it to Tribal stewardship once the loans for the land were fully paid (Venkatarman, 2023).

- **2023:** The Upper Sioux Agency State Park is being returned to the Upper Sioux Community by the state of Minnesota (Ahmed, 2023; Jacobs, 2023b).

- **2023:** After years of lobbying efforts, the Chumash Tribe’s proposal for co-management and the creation of the Chumash Heritage National Marine Sanctuary was finally proposed by the Biden administration (Sommer, 2023; Jacobs, 2023b).

- **2023:** The Hoopa Valley Tribe reclaimed over 10,000 acres of ancestral lands (Robinson, 2023).

Indigenous-led conservation, co-equity management, #LANDBACK practices, and other efforts by Tribal Nations and Indigenous communities are essential for confronting the risks and challenges associated with climate change. However, finding funding for such efforts presents additional challenges for Tribal Nations and Indigenous communities to navigate.

Indigenous-centric Funding for Conservation

In addition to state and federal opportunities that offer funding for Tribal Nations, Indigenous institutions fund Indigenous-led groups and initiatives, particularly in regard to biocultural restoration and the proliferation of Traditional and/or culturally immersed relationalities with Indigenous Peoples’ more-than-human kin. In contrast to state and federal opportunities, Indigenous-led funding institutions adopt a values-explicit approach to philanthropy. The following is an itemized but not comprehensive listing for Tribal Nations and Indigenous communities seeking funding for Indigenous-led conservation efforts. However, funding opportunities can vary by organization and year.

Federal Funding Opportunities

- **Bureau of Indian Affairs Branch of Tribal Community Resilience Annual Awards Program:** https://www.bia.gov/bia/ots/tcr
- **Environmental Protection Agency Grants for Tribes**: https://www.epa.gov/tribal/grants-tribes
- **U.S. Department of Agriculture Programs and Services:** https://www.usda.gov/tribalrelations/usda-programs-and-services

Indigenous Funding Institutions

- **Indian Land Tenure Foundation:** https://iltf.org/grants/
- **First Nations Development Institute:** https://www.firstnations.org/
- **Hawai'i People's Fund:** https://www.hawaiipeoplesfund.org/
- **Na'ah Illahee Fund:** https://naahillahee.org/
- **Native Americans in Philanthropy:** https://nativephilanthropy.org/
- **NDN Collective:** https://ndncollective.org/
- **Potlatch Fund:** https://www.potlatchfund.org/

Indigenous funding institutions typically prioritize addressing systemic oppression through community-based, grassroots efforts that desire meaningful socioeconomic and biocultural change rather than superficial philanthropy. This approach often includes community vetting and trust-based giving, which emphasize relationship-building to facilitate access to funding and technical assistance for Indigenous-led conservation without the bureaucratic hurdles prevalent in federal and state funding opportunities. Moreover, non-Indigenous foundations are also recognizing the importance of community involvement and Indigenous leadership in conservation by extending funding opportunities to new projects and to the countless Indigenous community members already engaged in conservation work. However, challenges exist for Tribal Nations and Indigenous communities to find sustainable long-term solutions that help them address the need for co-equity-based management, #LANDBACK, and other climate change initiatives that allow them to prioritize their Indigenous Knowledges, values, sovereignty, and self-determination in the management of their more-than-human kin.

Conclusion

Tribal Nations and Indigenous communities are at the forefront of Indigenous-led conservation, effectively protecting global biodiversity and critical ecosystems with minimal funding. This chapter reviews the legal challenges Tribal Nations and Indigenous communities face to enhance these efforts and identifies opportunities to mitigate the barriers. The current conservation model in the U.S. is dominated by federal and state governments and supported by nongovernmental organizations yet fails in stopping biodiversity loss and ecosystem degradation. However, Indigenous-led conservation approaches offer a compelling alternative that remains limited by a colonial legal system that disregards Indigenous Peoples' rights, treaty obligations, and the intrinsic value of Indigenous Knowledges. To counter these issues, a paradigm shift is needed in which conservation work is led by Indigenous communities in accordance with their deep understandings of the ecosystems they have been part of and sustained for millennia. Such transformations remain challenging, given the existing political and social barriers. However, significant improvements can be attained by focusing on and ameliorating specific barriers that impede Indigenous-led conservation efforts.

The intersection of Indigenous human rights and the Rights of Nature offers opportunities for innovative legislation and political frameworks that support Indigenous-led conservation efforts, address climate change, and protect the environment. Frameworks for these approaches can be drawn from the *United Nations Declaration on the Rights of Indigenous Peoples* and the *American Declaration on the Rights of Indigenous Peoples*. Additionally, the recent push to incorporate Traditional Ecological Knowledges in federal planning and decision-making processes offers an immediate avenue for improving Indigenous-led conservation work, but ongoing discussions about the protection of Indigenous data sovereignty should be supported, with the goal of achieving an acceptable standard and practice of how Indigenous Knowledges can be used, by whom, and for what purposes. It is also important to clearly and unambiguously recognize Tribal Nations as rightsholders and not simply stakeholders in any context that involves their data, sacred Knowledges, Indigenous-led conservation efforts, and other matters impacting their ancestral and current territories. The failure to recognize Tribal Nations and Indigenous communities as rightsholders is the basis for historical and ongoing failures to engage with Tribal Nations and Indigenous communities in a meaningful and adequate way, for example, when consultation is conflated with consent.

Beyond improvements in the legal framework and at the policy level, implementation and the practice of conservation work need to reflect the necessary co-equity management roles of Tribal Nations and Indigenous communities in planning and management or stewardship. This needs to be critically examined whenever any conservation action is undertaken, whether it be forest stewardship and the use of cultural burning practices, allocations of water, damming of rivers, harvesting of plants or animals that may be critical for food sovereignty and security, or approval and siting of any infrastructure that impacts Indigenous Peoples' more-than-human kin and the ecosystems they depend on. At the federal or international levels, these are issues that arise in stewardship of Lands and waters and decisions about species protections. At the state level, this relates to considerations in state wildlife action plans for protection of so-called nongame species. One of the biggest weaknesses of current conservation models is that they are all treated as separate problems, when in fact, all are interconnected components of socio-ecological systems, often at scales that span multiple jurisdictions (including Tribal Lands). Tribal climate adaptation plans are much more likely to reflect cross-sectoral and holistic thinking than agencies-as-islands planning has historically, although there have been discussions at a theoretical level in federal agencies about improvement.

Planning and implementation require funding, and here, too, the current practice needs to be restructured, because Indigenous-led conservation requires adequate and sustained funding. The proposed Recovering America's Wildlife Act promises to do this but has yet to progress in the last three Congresses. If passed, it offers substantially more funding than current conservation-funding models, is not restricted to harvest species as current funding models mostly are, and does not require Tribes to compete for a very small allocation of short duration funding. If not the Recovering America's Wildlife Act, some other source of significant and sustained funding is essential, given the size of the problem.

Beyond the very real need for immediate and continued conservation action, there is a compelling social justification for investing in Indigenous-led conservation work. In addition to co-equity management, the U.S. can begin to address the long-standing historical trauma resulting from colonization and repeated treaty violations by viewing decisions through a restorative and transformative justice lens. #LANDBACK has already had some successes, which help illuminate how this can be done and where there are opportunities to expand such efforts. Knowing that more biological diversity has been sustained on Indigenous stewarded lands, despite the immense challenges Tribal Nations and Indigenous communities have faced, inspires confidence that we will be better able to achieve conservation goals, adapt to and mitigate the effects of climate change, and put Earth's climate on a better path when Indigenous stewardship is the norm again. ◀◆

Political Challenges and Opportunities Chapter References

Organization of American States. (2016, June 15). *American declaration on the rights of Indigenous Peoples* (ADRIP). https://www.oas.org/en/sare/documents/DecAmIND.pdf

Ahmed, T. (2023, September 2). *Tribe getting piece of Minnesota back more than a century after Ancestors died there*. The Associated Press. https://apnews.com/article/minnesota-native-american-land-back-b09c0dc8dd6289a1545684e04599f94f

Association of Fish and Wildlife Agencies (AFWA). (2022). *Voluntary guidance for states to incorporate climate adaptation into state wildlife action plans and other management plans* (2nd Ed.). Association of Fish and Wildlife Agencies. https://www.fishwildlife.org/application/files/6316/7336/2905/AFWA_Voluntary_Climate_Adaptation_Guidance_for_SWAPs_2nd_Edition.pdf

Asuncion, B., Tamanaha, M., Chang, K. K. J., & Moa, K. (2022, December 12). Fisheries and stewardship: Lessons from Native Hawaiian aquaculture. *Nonprofit Quarterly Magazine.* https://nonprofitquarterly.org/fisheries-and-stewardship-lessons-from-native-hawaiian-aquaculture/

Bacon, J. M. (2019). Settler colonialism as eco-social structure and the production of colonial ecological violence. *Environmental Sociology, 5*(1), 59–69. https://doi.org/10.1080/23251042.2018.1474725

Bagley, J., Solomon, E., Herbster, H., & Hughes, Z. (2023). *Proposal: Reconnaissance archaeological survey for a collaborative Boston Harbor Islands archaeological Climate Action Plan in Boston, Hingham, Weymouth, Quincy, Hull, and Winthrop, MA* [Permit application]. https://www.boston.gov/sites/default/files/file/2023/05/Recon%20Permit%20Boston%20Harbor%20Island%20ACAP%20%281%29.pdf

Berger, B. R. (2023). The promise of intertribal wildlife management. In S. J. Hoagland & S. Albert (Eds.), *Wildlife stewardship on Tribal Lands: Our place is our soul* (pp. 99–119). Johns Hopkins University Press.

Bommelyn, L. M. (2016). *The acquisition of Xaawan'-k'wvt.* Tolowa Dee-ni' Nation. https://www.tolowa-nsn.gov/247/The-Acquisition-of-Xaawan-kwvt

Brown, A. (2023, September 25). In new collaborations, Tribes become stewards of parks and monuments. *Idaho Capital Sun.* https://idahocapitalsun.com/2023/09/25/in-new-collaborations-tribes-become-stewards-of-parks-and-monuments/

Bureau of Indian Affairs (BIA). (2023). *Frequently asked questions.* U.S. Department of the Interior. https://www.bia.gov/bia

Bureau of Indian Affairs (BIA) Branch of Tribal Community Resilience. (n.d.). *Tribal Community Resilience Annual Awards Program.* U.S. Department of the Interior. https://www.bia.gov/service/tcr-annual-awards-program

Canada Department of Justice (CDJ). (2021). *About the act.* https://www.justice.gc.ca/eng/declaration/legislation.html

Cascadia Partner Forum (CPF). (n.d.). *What we do.* https://www.cascadiapartnerforum.org/what-we-do

Cascadia Partner Forum (CPF). (2022). *Blueprint for a resilient Cascadia: A transboundary adaptation plan for our shared natural systems.* A product of the Cascadia Partner Forum and its collaborators across the transboundary region of Washington and British Columbia. https://static1.squarespace.com/static/60c836fa2c0dd261af41d701/t/61f04ce2f6917a57bee-a1e86/1643138292034/CascadiaBlueprint2022_RedSize.pdf

Ceballos, G., Ehrlich, P. R., Barnosky, A. D., García, A., Pringle, R. M., & Palmer, T. M. (2015). Accelerated modern human–induced species losses: Entering the sixth mass extinction. *Science Advances, 1*(5), Article e1400253. https://doi.org/10.1126/sciadv.1400253

Chang, K. K. J., Young, C. K. H., Asuncion, B. F., Ito, W. K., Winter, K. B., & Tanaka, W.C. (2019). Kua'āina ulu 'auamo: Grassroots growing through shared responsibility. In D. A. Mihesuah & E. Hoover (Eds.), *Indigenous food sovereignty in the United States: Restoring cultural Knowledge, protecting environments, and regaining health* (pp. 122–154). University of Oklahoma Press.

City Archaeology Program (CAP). (2023, July 6). *Boston Harbor Islands archaeological Climate Action Plan.* City of Boston. https://www.boston.gov/departments/archaeology/boston-harbor-islands-archaeological-climate-action-plan#content

Cowie, R. H., Bouchet, P., & Fontaine, B. (2022). The sixth mass extinction: Fact, fiction or speculation? *Biological Reviews, 97*(2), 640–663. https://doi.org/10.1111/brv.12816

Cozzetto, K., Marks-Marino, D., & Status of Tribes and Climate Change Working Group. (2021). Executive summary. In D. Marks-Marino (Ed.), *Status of Tribes and climate change report* (pp. 6–14). Institute for Tribal Environmental Professionals. https://www7.nau.edu/itep/main/docs/publications/ITEP.STACC.Report_2021.pdf

Department of Commerce, Community, and Economic Development (DCCED) Division of Corporations, Business and Professional Licensing. (2023). *Statutes and Regulations.* State of Alaska. https://www.commerce.alaska.gov/web/portals/5/pub/CorporationsStatutesandRegulations.pdf

Department of the Interior (DOI). (n.d.a). *FOIA guidance.* https://www.doi.gov/foia/news/guidance

Department of the Interior (DOI). (n.d.b). *Land buy-back program for Tribal Nations.* https://www.doi.gov/buybackprogram

Department of the Interior (DOI). (2023, September 21). *Biden-Harris administration, Tribes reach /historic agreement supporting efforts to restore healthy and abundant salmon populations to Upper Columbia Basin* [Press release]. https://www.doi.gov/pressreleases/biden-harris-administration-tribes-reach-historic-agreement-supporting-efforts-restore

Diaz, J. (2021, October 5). *A historic rainforest and other lands have been returned to Indigenous Australians.* National Public Radio. https://www.npr.org/2021/10/05/1043256101/indigenous-australians-get-land-back-queensland

Díaz, S., Settele, J., Brondízio, E. S., Ngo, H. T., Agard, J., Arneth, A., Balvanera, P., Brauman, K. A., Butchart, S. H. M., Chan, K. M. A., Garibaldi, L. A., Ichii, K., Liu, J., Subramanian, S. M., Midgley, G. F., Miloslavich, P., Molnár, Z., Obura, D., Pfaff, A., … Zayas, C. N. (2019). Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science, 366*, Article eaax3100. https://doi.org/10.1126/science.aax3100

Eid, T. A. (2018). Beyond Dakota Access Pipeline: Energy development and the imperative for meaningful Tribal consultation. *Denver Law Review, 95*(3), 593–607. https://digitalcommons.du.edu/cgi/viewcontent.cgi?article=1021&context=dlr

Exec. Order No. 14096, 88 Fed. Reg. 80. (April 26, 2023). https://www.energy.gov/sites/default/files/2023-04/eo-14096-revitalizing-commitment-to-environmental-justice.pdf

Farrell, J., Burow, P. B., McConnell, K., Bayham, J., Whyte, K., & Koss, G. (2021). Effects of land dispossession and forced migration on Indigenous Peoples in North America. *Science, 374*(6567), Article eabe4943. https://doi.org/10.1126/science.abe4943

Fisk, J. J., Jacobs, L. A., Russo, B. U. K., Meier, E., Nakachi, 'A., Spencer, K. K. P., Kaulukukui-Narikawa, K., Datta, A. W., & Quiocho, K. (2021). Cultivating sovereignty in parks and protected areas: Sowing the seeds of restorative and transformative justice through the #LANDBACK movement. *In Parks Stewardship Forum, 37*(3), 517–526. https://doi.org/10.5070/P537354734

Fisk, J. J., Leong, K. M., Berl, E. W., Long, J. W., Landon, A. C., Adams, M. M., Hankins, D. L., Williams, C. K., Lake, F. K., & Salerno, J. (2024). Evolving wildlife management cultures of governance through Indigenous Knowledges and perspectives. *Journal of Wildlife Management, 88*(6), Article e22584. https://doi.org/10.1002/jwmg.22584

Garnett, S. T., Burgess, N. D., Fa, J. E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C. J., Watson, J. E. M., Zander, K. K., Austin, B., Brondizio, E. S., Collier, N. F., Duncan, T., Ellis, E., Geyle, H., Jackson, M. V., Jonas, H., Malmer, P., McGowan, B., Sivonogxay, A., & Leiper, I. (2018). A spatial overview of the global importance of Indigenous lands for conservation. *Nature Sustainability, 1*, 369–374. https://doi.org/10.1038/s41893-018-0100-6

Geremia, C., Merkle, J. A., Eacker, D. R., Wallen, R. L., White, P. J., Hebblewhite, M., & Kauffman, M. J. (2019). Migrating bison engineer the green wave. *Proceedings of the National Academy of Sciences* (PNAS), *116*(51), 25707–25713. www.pnas.org/cgi/doi/10.1073/pnas.1913783116

Gilbert, J. (2022). The rights of nature, Indigenous Peoples and international human rights law: From dichotomies to synergies. *Journal of Human Rights and the Environment, 13*(2), 399–415. https://doi.org/10.4337/jhre.2022.02.04

Gilbert, J., Soliev, I., Robertson, A., Vermeylen, S., Williams, N. W., & Grabowski, R. C. (2023). Understanding the Rights of Nature: Working together across and beyond disciplines. *Human Ecology, 51*, 363–377. https://doi.org/10.1007/s10745-023-00420-1

Gonzaga Climate Institute for Climate, Water, and the Environment. (2023, September 19). *Rights of Nature, Indigenous and advocacy perspectives* [Video]. YouTube. https://www.youtube.com/watch?v=qB4bb4l30UE

Gordon, H. S. J. (2022). Alaska native subsistence rights: Taking an anti-racist decolonizing approach to land management and ownership for our children and generations to come. *Societies, 12*(3), 72. https://doi.org/10.3390/soc12030072

Gordon, H. S. J. (2023a, November 1). 5 things to know about Indigenous Knowledge when working with Indigenous children, Youth, and families. *Child Trends.* https://doi.org/10.56417/3504n5609v

Gordon, H. S. J. (2023b, September 5). Current policy landscape prevents subsistence protections and practices necessary for Alaska Native children and families' well-being. *Child Trends.* https://doi.org/10.56417/4514n241c

Gray-Sharp, K. (2019). *Mass extinction and responsibility* [Video]. 2019 Australasian Animal Studies Conference. YouTube. https://www.youtube.com/watch?v=s13NBdco8o4

Great Lakes Indian Fish and Wildlife Commission (GLIFWC) Climate Change Team. (2023). *Aanji-bimaadiziimagak o'ow aki: Climate change vulnerability assessment Version 2.* Great Lakes Indian Fish & Wildlife Commission. http://data.glifwc.org/download/archive.bio/Aanji-bimaadiziimagak_o_ow_aki_digital_02212023.pdf

Idaho Department of Fish and Game (IDFG). (2022). *Draft: Idaho State wildlife action plan.* https://idfg.idaho.gov/sites/default/files/state-wildlife-action-plan-draft-2022-0822.pdf

Indian Forest Management Assessment Team (IFMAT). (2023). *Assessment of Indian forests and forest management in the United States.* Intertribal Timber Council. https://www.bia.gov/sites/default/files/media_document/ifmat_iv_report.pdf

Intergovernmental Panel on Climate Change (IPCC). (2023). Small islands. In *Climate Change 2022: Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 2043–2122). Cambridge University Press. https://doi.org/10.1017/9781009325844.017

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). (n.d.). *Rights of Nature.* https://www.ipbes.net/policy-support/tools-instruments/rights-nature-ron

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). (2019). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Version 1).* https://doi.org/10.5281/zenodo.3831673

InterTribal Buffalo Council (ITBC). (n.d.). *About ITBC.* https://www.itbcbuffalonation.org/about-us

Jacobs, L. A. (2023a) *Tracing the pathogenic impacts of outdoor recreation and understanding the need for Indigenous management (#LANDBACK) of parks and protected areas* [Unpublished doctoral dissertation]. Oregon State University.

Jacobs, L. A., (2023b, October 5). *Models of equitable co-stewardship and the importance of data sovereignty* [Keynote presentation]. Wyoming Wilderness Association Intertribal Gathering, Jackson Hole, WY, United States. https://www.wildwyo.org/_files/ugd/dc80f2_2ba425d8dc144eb8a4bd93aefc47e29f.pdf

Jacobs, L. A., Avery, C. B., Salonen, R., & Champagne, K. D. (2022a). Unsettling marine conservation: Disrupting manifest destiny–based conservation practices through the operationalization of Indigenous value systems. In *Parks Stewardship Forum, 38*(2), 275–304. https://doi.org/10.5070/P538257522

Jacobs, L. A., Hazelwood, S. P., Avery, C. B., & Sangster-Biye, C. (2022b). Reimagining U.S. federal land management through decolonization and Indigenous value systems. *Journal of Park and Recreation Administration*, *40*(1). https://doi.org/10.18666/JPRA-2021-10973

Jacobs, L. A., Yamane, C. Y., Hernandez, J., McAllister, T., Carlson, A. K., Fisk, J., Milligan-McClellan, K., Wolf, J. G., & Jennings, L.L. (2025). A critical declaration of decolonization and Indigenization for scientific research and the academy. In L. A. Jacobs (Ed.), *Indigenous voices: Critical reflections on Traditional Ecological Knowledge*. OSU Press.

Kauffman, M., Lowrey, B., Beck, J., Berg, J., Bergen, S., Berger, J., Cain, J. W., III, Dewey, S., Diamond, J., Duvuvuei, O., Fattebert, J. G., Garcia, J., Greenspan, E., Hall, E., Harper, G., Harter, S., Hersey, K., Hnilicka, P., Hurley, M., … Tatman, N. (2022). *Ungulate migrations of the western United States, Vol. 2* (Report No. 2022-5008). U.S. Geological Survey Scientific Investigations. https://doi.org/10.3133/sir20225008

Kay, K. (Correspondent). (2021, October 16). PBS News Hour: Why Native Americans are buying back ancestral land. [Video]. PBS. https://www.pbs.org/video/why-native-americans-are-buying-back-ancestral-land-1634415203/

Kim, J. J. H., Betz, N., Helmuth, B., & Coley, J. D. (2023). Conceptualizing human–nature relationships: Implications of human exceptionalist thinking for sustainability and conservation. *Topics in Cognitive Science, 15*(3), 357–387. https://doi.org/10.1111/tops.12653

Koch, A., Brierley, C., Maslin, M. M., & Lewis, S. L. (2019). Earth system impacts of the European arrival and Great Dying in the Americas after 1492. *Quaternary Science Reviews, 207,* 13–36. https://doi.org/10.1016/j.quascirev.2018.12.004

Krosby, M., & Morgan, H. (2018). *Colville Tribes natural resources climate change vulnerability assessment.* Climate Impacts Group, University of Washington. https://cig.uw.edu/wp-content/uploads/sites/2/2018/11/1.-Colville-VA-Report-FINAL.pdf

Krosby, M., Bridge, G., Asinas, E. T., & Hall, S. A. (2023). Moving transboundary conservation from Indigenous engagement to Indigenous leadership: Working across borders for a resilient Cascadia. *Parks Stewardship Forum, 39*(1), 47–59. https://parks.berkeley.edu/psf/wp-content/uploads/2023/01/psf_391_krosby_final_web.pdf

Lake, F. K., Wright, V., Morgan, P., McFadzen, M., McWethy, D., & Stevens-Rumann, C. (2017). Returning fire to the Land: Celebrating traditional Knowledge and fire. *Journal of Forestry, 115*(5), 343–353. https://doi.org/10.5849/jof.2016-043R2

Lander, E. S., & Mallory, B. (2021, November 15). *Indigenous Traditional Ecological Knowledge and federal decision making* [Memorandum for the heads of departments and agencies]. Executive Office of the President. https://isoo-overview.blogs.archives.gov/2022/12/16/indigenous-knowledge-guidance-for-federal-agencies/

Lynn, K. (2023). *Tribal climate change project.* PNW Tribal Climate Change Network, University of Oregon. https://tribalclimate.uoregon.edu/network/

Mengden IV, W. H. (2017). Indigenous people, human rights, and consultation: The Dakota Access Pipeline. *American Indian Law Review, 41*(2), 441–466. https://digitalcommons.law.ou.edu/ailr/vol41/iss2/8

Miller, R. J. (2015). Consultation or consent: The United States' duty to confer with American Indian governments. *North Dakota Law Review,*

91(1), 37–98. https://commons.und.edu/ndlr/vol91/iss1/2/

Montana Fish, Wildlife and Parks. (2022). *Montana Action Plan update 2022*. https://commerce.mt.gov/_shared/ConPlan/docs/2023/2023-2024-AAP-DRAFT-FINAL.pdf

Na'ah Illahee Fund. (2022). *2022 Rights of Nature grant participants & projects.* Indigenous Rights of Nature Cohort. https://naahillahee.org/rights-of-nature-grant-cohort/

National Fish, Wildlife, and Plants Climate Adaptation Network (NFWPCAN). (2021). *Advancing the national fish, wildlife, and plants climate adaptation strategy into a new decade.* Association of Fish and Wildlife Agencies. https://www.fishwildlife.org/application/files/4216/1161/3356/Advancing_Strategy_Report_FINAL.pdf

Native American Fish and Wildlife Society (NAFWS). (n.d.). *Habitat connectivity.* https://www.nafws.org/initiatives/tribal-wildlife-corridors/

Natural Resources Conservation Service (NRCS). (2009). *Tribal consultation: A guide for NRCS employees.* https://www.nrcs.usda.gov/sites/default/files/2022-09/Tribal%20Consultation%20Guide%20for%20NRCS%20Employees.pdf

Office of Management and Budget (OMB). (2002). Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies (Republication). *Federal Register 67*, 8452–8460. https://www.federalregister.gov/documents/2002/02/22/R2-59/guidelines-for-ensuring-and-maximizing-the-quality-objectivity-utility-and-integrity-of-information

Olimb, S. K., & Robinson, B. (2019). Grass to grain: Probabilistic modeling of agricultural conversion in the North American Great Plains. *Ecological Indicators, 102*, 237–245. https://doi.org/10.1016/j.ecolind.2019.02.042

One River, Ethics Matter (OREM). (n.d.). *OREM: Ethics consultation for a critically-ill river.* https://riverethics.org/about-orem/

O'Riordan, J., Osborn, R., Barquin, B., Thurston, P., Thomas, M., & Paisley, R. (2023, November 29). *The Columbia River basin; Governance of water, and emerging issues: Past, present and future* [Panel 1, day 1]. Columbia River Transboundary Water Governance and Ethics Symposium 2023, "Re-engaging in Public Dialogue." https://columbiabasingovernance.org/agenda

Ortolano, L., Cushing, K. K., Carter, N. T., Green, W., Gotsch, C., May, K., Newton, T., Pitzer, P., Pierre, S., Smienk, J., Soules, M., & Watkins, M. (2000). *Grand Coulee Dam and Columbia basin project USA final report.* World Commission on Dams Secretariat. https://doi.org/10.13140/RG.2.2.29567.87200

Prabhakar, A., & Mallory, B. (2022a, November 30). *Implementation of guidance for federal departments and agencies on Indigenous Knowledge* [Memorandum for heads of federal departments and agencies]. Executive Office of the President. https://www.fda.gov/media/181332/download

Prabhakar, A., & Mallory, B. (2022b, November 30). *Guidance for federal departments and agencies on Indigenous Knowledge* [Memorandum for heads of federal departments and agencies]. Executive Office of the President. https://www.bia.gov/sites/default/files/dup/inline-files/ik_guidance_implementation_memo.pdf

Putzer, A., Lambooy, T., Jeurissen, R., & Kim, E. (2022). Putting the rights of nature on the map. A quantitative analysis of rights of nature initiatives across the world. *Journal of Maps, 18*(1), 89–96. https://doi.org/10.1080/17445647.2022.2079432

Quiocho, K., Kikiloi, K., Kuoha, K., Miller, A., Wong, B. K., Pousima, H. K., Andrade, P., & Wilhelm, 'A. (2023). Mai Ka Pō Mai: Applying Indigenous cosmology and worldview to empower and transform a management plan for Papahānaumokuākea Marine National Monument. *Ecology and Society, 28*(3), 21. https://doi.org/10.5751/ES-14280-280321

Ramos, S. C., & Culver, M. (2024). Integration of Indigenous research methodologies, Traditional Ecological Knowledge and molecular scatology in an assessment of mesocarnivore presence, diet and habitat use on Yurok ancestral Lands. *Molecular Ecology Resources, 25*(2), Article e13963. https://doi.org/10.1111/1755-0998.13963

Ratajczak, Z., Collins, S. L., Blair, J. M., Koerner, S. E., Louthan, A. M., Smith, M. D., Taylor, J. H., & Nippert, J. B. (2022). Reintroducing bison results in long-running and resilient increases in grassland diversity. *PNAS*, *119*(36), Article e2210433119. https://doi.org/10.1073/pnas.2210433119

Redvers, N., Celidwen, Y., Cloud, Q. Y., Jensen, A., & Githaiga, C. (2023). Indigenous solutions to the climate and biodiversity crises: A reflection on UNDRIP. *PLOS Global Public Health, 3*(6), Article e0002060. https://doi.org/10.1371/journal.pgph.0002060

Robbins, J. (2021, June 3). *How returning Lands to Native Tribes is helping protect nature.* Yale Environment 360. https://e360.yale.edu/features/how-returning-lands-to-native-tribes-is-helping-protect-nature

Robinson, A. (2023). *Hoopa Valley Tribe reclaims 10,000+ acres of ancestral lands in historic deal.* KRCR. https://krcrtv.com/north-coast-news/hoopa-valley-tribe-reclaims-10000-acres-of-ancestral-lands-in-historic-deal

Rowlands, G. L. (2023, September 26). *Bringing the salmon home: Tribes in U.S. secure $200m for Columbia River salmon.* Wildsight. https://wildsight.ca/2023/09/26/bringing-the-salmon-home-tribes-in-u-s-secure-200m-for-columbia-river-salmon/

Ryan, J. (2022, May 29). *Methow Valley land in Washington returned to Colville Tribes.* The Associated Press. https://apnews.com/article/politics-united-states-washington-salmon-5f0c10762392742bf805e283c15e7805

Sai, D. K. (2004). American occupation of the Hawaiian State: A century unchecked. Hawaiian *Journal of Law and Politics, 1*, 46. https://www.academia.edu/7895818/American_Occupation_of_the_Hawaiian_State_A_Century_Unchecked

Salmón, E. (2000). Kincentric ecology: Indigenous perceptions of the human–nature relationship. *Ecological Application*s, *10*(5), 1327–1332. https://doi.org/10.1890/1051-0761(2000)010[1327:KEIPOT]2.0.CO;2

Schmeier, S., Hearns, G., Wicks-Arshack, A., Ndjiki, J., & Wolf, A. (2023, November 30). *Global perspectives on governance models* [Panel 2, day 1]. Columbia River Transboundary Water Governance and Ethics Symposium 2023, "Re-engaging in Public Dialogue." https://columbiabasingovernance.org/agenda

Schmidt, P., Humpert, M., & Cervantes, L. (2023). *Perspectives on and voluntary guidance for improving Tribal engagement in State Wildlife Action Plans.* Association of Fish and Wildlife Agencies. https://www.fishwildlife.org/application/files/5216/8234/3740/SWAP_Tribal_Engagement_Guidance_Final_Ver1.1.pdf

Smith, H., & Sturgill, K. (2020, July 31). After 250 years, Esselen Tribe regains a piece of its ancestral homeland. *Los Angeles Times.* https://www.latimes.com/california/story/2020-07-31/after-250-years-esselen-tribe-regains-a-piece-of-its-ancestral-homeland

Sobrevila, C. (2008, May 1). *The role of Indigenous Peoples in biodiversity conservation: The natural but often forgotten partners.* World Bank Group. http://documents.worldbank.org/curated/en/995271468177530126/The-role-of-indigenous-peoples-in-biodiversity-conservation-the-natural-but-often-forgotten-partners

Sommer, L. (2023, August 24). *Biden proposes vast new marine sanctuary in partnership with California Tribe.* National Public Radio. https://www.npr.org/2023/08/24/1195653011/biden-proposes-vast-new-marine-sanctuary-in-partnership-with-california-tribe

Spence, M. D. (1999). *Dispossessing the wilderness: Indian removal and the making of the national parks.* Oxford University Press.

Stark, K. J., Bernhardt, A. L., Mills, M., & Robison, J. A. (2022). Re-Indigenizing Yellowstone. *Wyoming Law Review, 22*(2), 397–487. https://doi.org/10.59643/1942-9916.1467

Steen-Adams, M. M., Lake, F. K., Jones, C. E., Jr., & Kruger, L. E. (2023). *Partnering in research about land management with Tribal nations—Insights from the Pacific West* [General Technical Report PSW-GTR-275]. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. https://doi.org/10.2737/PSW-GTR-275

Stevens, S. (Ed.). (2014). *Indigenous Peoples, national parks, and protected areas: A new paradigm linking conservation, culture, and rights.*

University of Arizona Press.

Surma, K. (2021, September 9). *Does nature have rights? A burgeoning legal movement says rivers, forests and wildlife have standing, too.* Inside Climate News. https://insideclimatenews.org/news/19092021/rights-of-nature-legal-movement/

Suzukawa, J., Ramos, S. C., & Williams-Claussen, T. M. (2023). Yurok Traditional Ecological Knowledge as related to elk management and conservation. In S. J. Hoagland & S. Albert (Eds.), *Wildlife stewardship on Tribal Lands: Our place is in our soul* (pp. 366–378). Johns Hopkins University Press.

Swinomish Indian Tribal Community (SITC). (n.d.). *Kukutali history.* Swinomish Department of Environmental Protection. https://www.swinomish-nsn.gov/natural-resources/page/kukutali-history

Tănăsescu, M. (2020). Rights of Nature, legal personality, and Indigenous philosophies. *Transnational Environmental Law, 9*(3), 429–453. https://doi.org/10.1017/S2047102520000217

Tuck, E., & Yang, K. W. (2012). Decolonization is not a metaphor (Spanish). *Tabula Rasa, 38*, 61–111. https://doi.org/10.25058/20112742.n38.04

Tulalip Tribes. (n.d.) *Salmon and climate change.* https://nr.tulaliptribes.com/Topics/ClimateChange/SalmonAndClimateChange

Tulalip Tribes. (2018). *Introduction—Salmon and climate change.* https://nr.tulaliptribes.com/Base/File/Salmon_climate_impacts_final_11-26-18

UN General Assembly. (2007). *United Nations declaration on the rights of Indigenous Peoples: resolution / adopted by the General Assembly,* (Resolution No. A/RES/61/295). United Nations. https://www.refworld.org/legal/resolution/unga/2007/en/49353

United Nations General Assembly. (2020). *Harmony with nature: Report of the Secretary-General* (Document No. A/75/266). United Nations. https://digitallibrary.un.org/record/3892593?ln=en&v=pdf

U.S. Bureau of Reclamation. (n.d.). *Federal Columbia River Power System Columbia Basin Fish Accords.* https://www.usbr.gov/pn/fcrps/fishaccords/index.html

U.S. Department of State. (n.d.). *Columbia River Treaty.* https://www.state.gov/columbia-river-treaty/

U.S. Department of State. (2023a, May 31). *Columbia River Treaty listening session* [Video]. https://www.state.gov/columbia-river-treaty/

U.S. Department of State. (2023b, August 14). *18th round of negotiations to modernize the Columbia River Treaty regime and announcement of public virtual listening session.* https://2021-2025.state.gov/18th-round-of-negotiations-to-modernize-the-columbia-river-treaty-regime/

Venkataraman, B. (2023, November 1). In Maine, a return of Tribal land shows how conservation can succeed. *The Washington Post.* https://www.washingtonpost.com/opinions/2023/11/01/tribes-land-return-conservation-maine-penobscot/

Vincent, C. H., Bermejo, L. F., & Hanson, L. A. (2020). *Federal land ownership: Overview and data.* Congressional Research Service. https://fas.org/sgp/crs/misc/R42346.pdf

Ward, N. K., Lynch, A. J., Beever, E. A., Booker, J., Bouska, K. L., Embke, H., Houser, J. N., Kocik, J. F., Kocik, J., Lawrence, D. J., Lemon, M. G., Limpinsel, D., Magee, M. R., Maitland, B. M., McKenna, O., Meier, A., Morton, J. M., Muehlbauer, J. D., Newman, R., … Wilkening, J. L. (2023). Reimagining large river management using the Resist–Accept–Direct (RAD) framework in the Upper Mississippi River. *Ecological Processes, 12*(48). https://doi.org/10.1186/s13717-023-00460-x

Whyte, K., Novak, R., Laramie, M. B., Bruscato, N. G., David-Chavez, D. M., Dockry, M. J., Johnson, M. K., Jones Jr., C. E., & Leonard, K. (2023). Tribes and Indigenous Peoples. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023.CH16

Wildcat, M., & Voth, D. (2023). Indigenous relationality: Definitions and methods. *AIterNative: An International Journal of Indigenous Peoples, 19*(2), 475–483. https://doi.org/10.1177/11771801231168380

Winter, K. B., Lincoln, N. K., Berkes, F., Alegado, R. A., Kurashima, N., Frank, K. L., Pascua, P., Rii, Y. M., Reppun, F., Knapp, I. S. S., McClatchey, W. C., Ticktin, T., Smith, C., Franklin, E. C., Oleson, K., Price, M. R., McManus, M. A., Donahue, M. J., Rodgers, K. S., … Toonen, R. J. (2020). Ecomimicry in Indigenous resource management: Optimizing ecosystem services to achieve resource abundance, with examples from Hawai'i. *Ecology and Society, 25*(2), 26. https://doi.org/10.5751/ES-11539-250226 ◀◆

Indigenous-Led Conservation

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KEY MESSAGES & RECOMMENDATIONS

Indigenous-led conservation and climate change mitigation: Indigenous practices and Knowledge Systems are essential for effective climate change mitigation. Indigenous traditional stewardship methods demonstrate proven track records in sustaining and preserving ecosystems, which is crucial for reducing global carbon emissions and enhancing biodiversity.

Indigenous-led conservation and climate change adaptation: Indigenous Knowledges (IKs) are deeply intertwined with local ecosystems and offer invaluable insights and practices that are being used by Tribal Nations and Indigenous communities for adapting to climate change. Indigenous climate adaptation practices offer models for broader societal adaptation strategies. Western approaches are insufficient to address the complex cultural and ecological relationships that Indigenous Peoples have understood for millennia.

Organizations and partnerships that center Indigenous conservation: A crucial need exists to form respectful, equitable partnerships between Tribal Nations and Indigenous communities, conservation organizations, and governments. Successful collaborations should involve Indigenous Peoples and actively center and prioritize their Knowledges, rights, and leadership to achieve effective and ethical conservation outcomes.

Lessons learned from Indigenous perspectives: Indigenous narratives have broad applicability and value for conservation policy and practice. Indigenous approaches contain holistic views of ecosystems and sustainability and offer valuable lessons and methods that can be integrated into global strategies to address climate change in policy and practice.

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Chapter Author Positionality Statements

Dr. Lara A. Jacobs is a Citizen of Muscogee (Creek) Nation and has Choctaw heritage. She is a complex-systems scientist who focuses her research on understanding the ecological and pathogenic impacts of outdoor recreation activities on Tribal treaty Lands, co-management and #LANDBACK frameworks, Traditional Ecological Knowledge, climate change, Indigenous value systems, Indigenous Land management, and liberation-based research frameworks for Indigenous communities. She is currently a research associate at Michigan State University. Her contributions to this report are based upon work supported by the National Science Foundation under Award No. DGE-2222234. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Ňkwi Flores (sibling) is a citizen of Apya Yala (Turtle Island), Kara-Kichwa Nation, Kutakachi Pueblo, Chichupamp Clan, deeply rooted in the Andes and Amazon of Ecuador. As an Indigenous "nature of things philosopher" and ancestral Land trustee, their work is at the forefront of Indigenous complexity systems theory with Western science to craft BioKulture-Designed nature-based solutions. Their research is informed by Indigenous R&D demystification and their lived experience within an Indigenous community directly affected by climate change uncertainty and social ecology dimensionality. Ňkwi collaborates with the Northeast SARE Working Group on Tribal and Indigenous agriculture, contributing to developing collective agency in agriculture. Their contributions challenge prevailing Eurocentric narratives in the emerging nature market stemming from Indigenous People's rights and Indigenous Data Sovereignty and as Indigenous (Runa) researchers, designers, negotiators, and catalysts committed to socio-environmental spatial justice, culture regenerability, the enfranchisement of Indigenous Peoples, and transdisciplinary research and policymaking, engaging with more-than-human and more-than-life relationality.

Amber Pairis is the Executive Director of the Climate Science Alliance and is an experienced Science Director with a demonstrated history of working with partners to elevate and support community led and implemented projects. Her current work focuses on building a science focused network of leaders, scientists, and managers focused on sharing ecosystem-based resiliency approaches to safeguard our communities and natural resources from climate change. Pairis completed her Ph.D. in Environmental Studies at Antioch University New England with an emphasis in Conservation Biology. She is a fellow of the Robert and Patricia Switzer Foundation.

Allison M. Scott is the Deputy Tribal Resilience Liaison with the College of Menominee Nation – Sustainable Development Institute and Midwest Climate Adaptation Science Center. She is of European ancestry and works with Indigenous communities throughout the Midwest to support climate adaptation and resilience for fish, wildlife, land, water, and people.

Cherry Y. E. W. Yamane *(they/them)* is a Kanaka Maoli from Waianae, Oahu. They are a PhD student in the Indigenous Health program at the University of North Dakota's School of Medicine and Health Sciences Department. Their doctoral work focuses on community-based and culturally-driven interventions centered on land-based healing with Indigenous communities.

Sara Smith is a citizen of the Oneida Nation and works as the Midwest Tribal Resilience Liaison at the College of Menominee Nation - Sustainable Development Institute (CMN-SDI), in association with the Midwest Climate Adaptation Science Center (MW CASC). As a liaison for the Midwest, she works on facilitating stronger relationships between Tribes, researchers, organizations, and academic institutions. In addition, she works with Tribes to build capacity and provides support by helping identify gaps and assisting with community resilience efforts.

Illeana Alexander currently serves as the Tribal Climate Adaptation Specialist for the Great Lakes Indian Fish and Wildlife Commission. They bring a diverse background of marine environmental policy, Tribal spill response, and early childhood education to their climate work.

Enrique Andrés del Castillo is a Peruvian engineer, activist, and environmental advocate. He is a member of the Global Youth Biodiversity Network. He has been standards officer at Fairtrade International, where he was in charge of the management and implementation of environmental regulations with 1,000 small producer organizations in Latin America. He has participated in various environmental events such as the 2022 UN Biodiversity Conference (COP15).

Julie Barber is a settler who has worked as a marine ecologist on shellfisheries in both the northeast and northwest corners of this continent. Currently, she is the senior shellfish biologist for the Swinomish Indian Tribal Community, where she leads a team working to research, restore, and sustainably manage shellfisheries for generations to come.

Andrew Kalani Carlson is a Kanaka ʻŌiwi (Native Hawaiian) environmental scientist. His research spans seaweed and marine biogeochemistry, Blue Carbon, climate coloniality, decolonial research standpoints and methodologies, and Kanaka ʻŌiwi environmental science and stewardship methods. He completed a PhD degree in Environmental Science from Hokkaido University, which is in the Indigenous homeland of the Ainu People.

Kathryn Champagne (she/her) is an Elder and Citizen of Muscogee (Creek) Nation with Choctaw heritage. Kathryn is also a retired teacher and has published manuscripts about Indigenous conservation, Traditional Ecological Knowledge, and Indigenous artwork.

Steph Courtney is a settler on Dakota lands and a Tribal Community Resilience Liaison with United South and Eastern Tribes (USET) in collaboration with the Bureau of Indian Affairs and the Climate Adaptation Science Centers. In this role, and beyond, she works to connect Knowledges to action and individuals to communities of care.

Marcy Delos (she/her) is a settler of Chinese and Italian descent. Through support from the BIA Branch of Tribal Community Resilience, she serves as climate resilience and sustainability coordinator for the Forest County Potawatomi Community. Her prior experiences include examining climate impacts on ecosystem services as well as incorporating racial equity, climate/environmental justice, and inclusive engagement into county infrastructure prioritization or climate planning.

Dr. Jamie Donatuto is a settler and community environmental health analyst for the Swinomish Indian Tribal Community (SITC), located in present-day Washington State, where she has worked for the past 24 years. She completed her doctoral work at the University of British Columbia, Canada, developing a set of Indigenous health indicators in collaboration with SITC.

Jonathan James Fisk is a Taíno Boricua born and raised on Tongva Land in Long Beach, California, and is a researcher for the Cooperative Institute for Marine and Atmospheric Research on Oʻahu focusing on Indigenous environmental relationalities, dynamics between natural resource management agencies and Indigenous communities, and food and material sovereignty. They are also on the board of directors and grantmaking committee for Hawaiʻi Peoples Fund, an Indigenous-led organization that supports, funds, and amplifies Hawaiʻi-based grassroots organizations challenging systems of oppression.

Heather Sauyaq Jean Gordon, PhD is Iñupiaq and a Tribal member of the Nome Eskimo Community. She is the owner/principal consultant at Sauyaq Solutions as well as an affiliated professor at the University of Alaska Fairbanks in the Center for Cross Cultural Studies. Heather is an Indigenous sustainability scientist, boundary spanner between knowledge systems, and a science diplomat communicating research to policy makers.

Chapter Author Positionality Statements Continued

Courtney Greiner is a settler and marine ecologist for the Swinomish Indian Tribal Community, where she has worked for the past 12 years. Her work focuses on researching climate change impacts on shellfish and implementing adaptation strategies like clam gardening.

Summer Huff is a Kanaka Maoli from Waianae, Oʻahu. She is a student and intercommunications electrician for the U.S. Navy. She serves on numerous councils advocating for resiliency, equity, and well-being and brings her lived experience into practice to supporting and uplifting members of her community.

Davidene Joaquin is a Kanaka Maoli from Waianae, Oʻahu. She is a respected Makua of their community who has dedicated their life to healing through community connectedness and relations for Native Hawaiʻians.

Amelia Marchand, MA is a Citizen of the Confederated Tribes of the Colville Reservation with paternal heritage from the Okanogan, Lakes (Sinixt), Moses-Columbia, Palus, Chief Joseph Band of Wal'wama Nimiipuu and maternal heritage from Irish, Scottish, French, German and Dutch immigrants/settlers to North America. Her personal experiences, family history, and professional expertise have increased her passion for Indigenous rights, environmental justice, and implementing socially equitable solutions for climate change adaptation and mitigation that not only honor values of community and reciprocity but also heal wounds from intergenerational trauma and institutional colonialism. She is founder of Indigenous-led conservation nonprofit L.I.G.H.T. Foundation, and her advocacy, research, and applied work remain at the intersection of Indigenous rights, cultural practices, food/water systems, sacred spaces, and climate change.

Karen Rittenhouse Mitchell is a descendant of Norwegian settlers and proud wife and parent of Swinomish Indian Tribal Community citizens. She has spent her career as a geologist in the public sector and the last 23 years at Swinomish serving as a geologist in the Land Management Department. Karen's research uses a process-based approach to geomorphologic and hydrogeologic studies to support sustainable use and stewardship of Tribal Lands.

Nadira Mitchell (she/her/asdzáán) is Diné (Navajo). She graduated May 2024 from the University of Arizona with a degree in Natural Resources-Wildlife Conservation and Management. She is currently Research Assistant Intern with the Wildlife Society-Native American Research Assistant Program working with Mescalero Apache and the US Department of Agriculture Forest Service to develop a Tribal Wildlife Plan. She is interested in the integration of Indigenous perspectives in wildlife, Tribal lands, and natural resources policy and aspires to advocate for environmental equity in Indigenous communities.

Todd Mitchell, swəlítub, is a citizen of the Swinomish Indian Tribal Community and director of their Department of Environmental Protection. His work centers on stewardship of traditional natural resources, the relationship between the community and those resources, and data sovereignty. Todd initiated the Tribe's ongoing "Between Two Worlds" Indigenous-science high-school class in the local school district in 2018, developing curriculum from a Tribally centered perspective interweaving science, natural resources, and culture to educate our Tribal Youth about the work in which DEP and the Tribe are engaged.

Megan Mucioki is an assistant professor of environmental science and Indigenous studies at Emory University on the homelands of the Muscogee (Creek) Nation. Megan is of Polish, German, and Russian ancestry and works as an ally with Indigenous communities in the Pacific West of the U.S., Canada, and Alaska on topics related to food sovereignty, cultural use plants, climate change, ecocultural restoration, and community-based research.

Robert Newman is a settler and professor in the biology department at the University of North Dakota. His work focuses on wildlife populations on human dominated landscapes, climate adaptation, and supporting Tribal sovereignty in environmental, wildlife, and Land stewardship. He is a board member of the Native Peoples' Wildlife Management Working Group in The Wildlife Society, works with the Traditional Ecological Knowledge section in the Ecological Society of America, and is a member of the Equity and Climate Justice working group for the National Adaptation Forum.

Hannah Panci is a scientist in the Climate Change Program at the Great Lakes Indian Fish & Wildlife Commission and currently lives on Anishinaabe Lands in the 1842 Ceded Territory. She is learning to integrate Traditional Ecological Knowledge and scientific ecological knowledge in her role studying climate change impacts on culturally important beings.

siwəlcʔʔ Alana Quintasket is a Swinomish Indian Tribal Community member who is deeply connected with her community. She was born and raised on the Swinomish Reservation. She currently serves at the Swinomish vice chair and the Community Environmental Health Program associate.

Cheyenne Reuben-Thomas is Onʌyoteˀa•ká• (enrolled member of the Oneida Nation of Wisconsin) and Onöndowa:gaːʼ (Tonawanda Seneca). She is a PhD student in ecology and evolutionary biology and entomology at Cornell University, located on the traditional Lands of the Gayogo̱hó:nǫʼ (Cayuga). Her doctoral work spans cultural fire, insect biodiversity, and Indigenous data sovereignty.

Raffaele Sindoni is a doctoral candidate at Yale University, where he focuses on Indigenous sovereignty, climate change, Rights of Nature, and environmental sociology. He is a research scientist for the National Indian Carbon Coalition and has served as an environmental justice summer fellow for the Yurok Tribe.

Chevaun Toulouse is Pike Clan from Sagamok Anishinabek First Nation. A passionate advocate for species at risk, Toulouse aims to blend her traditional Knowledge and formal training to ensure a healthier planet for generations to come. She has recently completed an undergraduate degree in biology and Indigenous environmental science at Trent University. Toulouse has worked in the environmental conservation field for many years as a species-at-risk technician for the Toronto Zoo, Magnetawan First Nation, Sagamok First Nation, and the Ministry of Northern Development, Mines, Natural Resources, and Forestry.

Squi-Qui (Joe Williams) is a lifelong fisherman and former Tribal senator for the Swinomish Indian Tribal Community, of which he is an enrolled member. Joe also works for the Swinomish Fisheries Department as the shellfish community liaison, where he builds connections between the community and Indigenous aquaculture projects such as reviving the ancient practice of clam gardening.

07 Indigenous-Led Conservation

Beaver Dam on the Diné Nation.
Photo Credit: Kelsey Jensen

Introduction

Indigenous-led conservation is a central aspect to consider in climate change discussions, particularly in the United States, where more than 700 communities and Tribal Nations of Indigenous Peoples face distinct and disproportionate challenges due to the complex consequences of climate change (Whyte et al., 2023). Given Indigenous Peoples' profound connections to and reliance on local ecosystems, they remain among the first to experience the immediate impacts of climate change (Hernandez et al., 2022; Whyte et al., 2023). Recognizing the critical and enduring roles of Indigenous Peoples as ecosystem and climate stewards, along with their cultural practices and resilience, is essential for effective climate change mitigation and adaptation. Indigenous Peoples' Knowledge-belief-practice systems, such as Traditional Ecological Knowledge (TEK), represent vital assets for Indigenous-led conservation initiatives and understanding and addressing the effects of climate change on local ecosystems.

This chapter spotlights Indigenous Peoples' expertise and dedication to their communities and the broader global community in preserving biodiversity, advancing climate mitigation and adaptation initiatives, and defending climate sustainability. These actions are firmly grounded in principles of justice, human rights, and cultural preservation, which fosters a more holistic and equitable approach to addressing the challenges presented by the changing climate.

Indigenous-Led Conservation and Climate Change Mitigation

In climate change discourse, the prevailing narrative of doom and despair often obscures the significant contributions of Indigenous communities to climate change mitigation (Hernandez et al., 2022; Whyte et al., 2023). While many governments worldwide are actively seeking ways to mitigate climate change, concerns exist about the effectiveness and consequences of their approaches. Therefore, it is imperative to consider the impacts of such strategies on Indigenous Peoples while exploring more holistic, sustainable, and Indigenous-led climate mitigation solutions from these communities. Despite facing historical injustice and ongoing marginalization, Indigenous Peoples persist as leaders in climate change mitigation (Findlay, 2021; Baker et al., 2023). Their efforts encompass a range of strategies, including the establishment of Indigenous Sentinels Networks (ISNs) and resistance against extractive energy projects (Hernandez et al., 2022). These initiatives are seeded in Indigenous Knowledge Systems and values, which play pivotal roles in accurately identifying and responding to subtle climate shifts (Prażmowska-Marcinowska, 2023). This section of the chapter presents climate mitigation case studies from across the Americas and around the globe, highlighting the successes of Indigenous-led conservation efforts, including ISNs and Tribal energy, food, and forestry mitigation strategies. These case studies underline the critical role of Indigenous Peoples in addressing the root causes of climate change and demonstrate the interconnectedness of climate mitigation and adaptation strategies.

Indigenous Sentinels Networks and Indigenous Resistance

Integrating Indigenous-led conservation efforts into climate change strategies is crucial for creating effective and holistic approaches to climate mitigation efforts (Hernandez et al., 2022). Indigenous sentinels networks (ISNs) offer solid examples of how Indigenous-led conservation contributes to climate change mitigation. Several case studies are listed below, which demonstrate how Indigenous Nations and communities are networking to share Knowledge and lessons in efforts to mitigate and respond to climate change.

- **Indigenous Sentinels Network:** The Aleut Community of St. Paul Island pioneered sentinel monitoring in the Bering Sea's Pribilof Islands for over two decades, which subsequently evolved into ISN. ISN empowers remote Indigenous communities by collecting TEK and local Western knowledge for climate mitigation and adaptation planning. It enhances climate monitoring and aids Indigenous-led conservation through projects such as invasive species tracking and smartphone apps for self-reporting observations (Darrell, 2023; Adapt Alaska, n.d.).

- **Great Plains Tribal Water Alliance** (GPTWA): Established in 2006, the GPTWA includes the Standing Rock Sioux Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe, and more. It serves as a public outreach, research, and education organization dedicated to protecting and preserving water resources within the Great Plains region, providing technical and policy recommendations for the next seven generations (Great Plains Tribal Water Alliance, n.d.).

- **Coastal First Nations Great Bear Initiative (CFN-GBI) Climate Action Peer Network**: Formed in 2019, CFN-GBI Climate Action Peer Network supports climate action coordinators within nine First Nations on British Columbia's North and Central Coast and Haida Gwaii. It addresses climate change impacts, focusing on community, food security, clean energy, and efficient infrastructure, while promoting traditional laws and Indigenous-led conservation (Changing Climate, n.d.).

- **Local Environmental Observer (LEO) Network**: The Alaska Native Tribal Health Consortium established the Center for Climate and Health in 2009 to outline connections between climate change, environmental impacts, and health effects, which subsequently led to the creation of the LEO Network tool that assists the Tribal health system and locals in sharing information about climate change (LEO, n.d.).

In addition to ISNs, Indigenous Peoples' resistance to extractive energy projects represents a proactive form of Indigenous-led conservation aimed at preventing ecological degradation, mitigating climate change, and preserving the integrity of natural ecosystems (Hernandez et al., 2022). The Standing Rock Sioux Tribe's opposition to the Dakota Access Pipeline, the Rosebud Sioux Tribe's resistance to the Keystone XL Pipeline, and the efforts of Indigenous commu-

nities in Brazil to combat Amazon deforestation are emblematic of these efforts (Hernandez et al., 2022; Ternes et al., 2020). Place-based resistance movements curb fossil-fuel and low-carbon energy projects and are successful in canceling, suspending, or delaying over a quarter of such projects (Temper et al., 2020). By halting projects that exacerbate climate change, Indigenous communities are actively conserving ecosystems that sequester carbon, preserve biodiversity, and maintain regional climatic stability.

> (Indigenous) actions are firmly grounded in principles of justice, human rights, and cultural preservation, which fosters a more holistic and equitable approach to addressing the challenges presented by the changing climate.

The Blackfeet Nation successfully protected the sacred Badger-Two Medicine area in so-called Montana from oil and gas development threats in 2023. This achievement resulted from years of advocacy and agreements with developers to voluntarily relinquish their oil and gas leases. This example highlights the critical role of Indigenous sovereignty in mitigating climate change for Indigenous lands, which encompass significant carbon-sequestering forests (Segnini, 2023; Menzies et al., 2022; Santos, 2021; Whyte et al., 2021). However, Indigenous resistance to extractive energy projects is often met with violence and repression, including the imprisonment and assassinations of activists (Temper et al., 2020). Nevertheless, Indigenous Peoples use resistance as a mitigation strategy, harnessing their long-standing traditions of being Land and water protectors and advocating for a sustainable future that eschews the destructive patterns of fossil fuel dependence (Hernandez et al., 2022).

The Complex Landscape of Renewable Energy Transition for Tribal Nations and Indigenous Communities

Tribal Nations and Indigenous communities encounter significant challenges in transitioning to renewable energy, mainly due to constraints in Indigenous self-determination (e.g., in infrastructure ownership, financing, and regulatory frameworks; Whyte et al., 2023). Such limitations impede access to affordable renewable energy, which impacts Tribal Nations' and Indigenous communities' abilities to enact self-determination in climate mitigation efforts. Although the U.S. Department of Energy (DOE) and the U.S. Bureau of Indian Affairs (BIA) have funded many Tribal climate and energy projects, recent trends in federal funding show dramatic decreases in funding Tribal projects that improve energy efficiency and renewable energy (Whyte et al., 2023). Nevertheless, Tribal Nations and Indigenous communities remain steadfast in paving the way toward renewable energy futures. The list below documents several Tribal energy efforts, as highlighted by the DOE, that work toward mitigating climate change (DOE, n.d.).

- **The Karuk Tribe:** Utilizing solar power to offset energy use by 92%.
- **The San Xavier District, Tohono O'odham Nation:** Powering two Tribal buildings with solar energy.
- **The Seminole Tribe:** Created a solar-plus-storage microgrid, saving about $3 million and providing energy during grid outages.
- **The Native Village of Igiugig and Huslia:** Transitioning from diesel to a hydrokinetic power system and a wood biomass system.
- **The Quinault Indian Nation:** Incorporating renewable energy solutions (e.g., creating a walkable community and energy efficient homes and buildings) in relocating villages threatened by climate change.
- **The Oneida Indian Nation:** Developed an energy efficiency project, saving nearly half a million dollars annually.
- **The Tolowa Dee-ni' Nation:** Developed a solar system that replaced 85% of electrical energy usage at a fish hatchery with renewable solar energy.

In addition to funding declines, several renewable energy challenges remain for Tribal Nations. For example, renewable energy–based concerns have been raised by the International Indigenous Peoples' Forum on Climate Change (IIPFCC) about strategies such as carbon markets, nature-based solutions, and net zero frameworks (IIPFCC, 2023). Pema Wangmo Lama Mugum, an Indigenous Youth activist who spoke for the IIPFCC, emphasized that renewable energy strategies could exacerbate existing forms of oppression and environmental degradation (IIPFCC, 2023). These strategies entail significant trade-offs that can include the commodification of environmental resources, displacement of Indigenous communities from their ancestral or current homelands, and the imposition of external control over Indigenous territories (and thus the loss of Indigenous sovereignty). Indigenous Peoples globally fear that such trade-offs will create negative impacts on Indigenous Peoples' Lands and their rights, arguing that such strategies may lead to continued colonization, militarization, Land dispossession, and Land loss (IIPFCC, 2023). Additionally, the emphasis on market-based solutions may prioritize profit over the protection of Indigenous People's rights and Lands and exacerbate existing inequalities and power imbalances.

Conversely, some Tribal Nations view these options as economic opportunities to enhance Land stewardship and assert sovereignty (National Indian Carbon Coalition, n.d.; First Nations Leadership Council, 2019). Thus, tension exists between Indigenous Peoples' concerns about the ramifications of such initiatives and Indigenous-led projects to achieve net-zero emissions by maximizing renewable sources (e.g., hydro, wind, solar, and nuclear power). However, some Indigenous-led mitigation solutions, such as the Frog Lake First Nations' involvement in building a large carbon capture and storage initiative, work against colonial and capitalistic structures by relying on Indigenous values to support ecosystem and climate health while remaining responsible to their community by creating economic benefits (Bakx, 2021; Connolly, 2022). Despite facing significant challenges, Tribal Nations and Indigenous communities actively contribute to climate change mitigation through diverse, innovative, and complex renewable energy strategies. Their efforts reinforce the significance of integrating community engagement, IK and values, resilience planning, sovereignty and self-determination, and holistic ecosystem and climate management practices in developing sustainable and resilient energy solutions.

Kayenta Solar Plant, the nation's first Tribally built, owned, and operated solar facility by the Navajo Tribal Utility Authority.
Photo credit: Brandon Bell for Getty Images

Strategizing Tribal Forestry for Climate Mitigation

Forests are vital for global carbon neutrality efforts, sequestering carbon and offsetting emissions (Findlay, 2021). Tribal forestry programs often merge TEK and Western timber approaches and promote sustainable practices such as selective tree harvesting (ensuring natural regeneration and sustainable harvests over longer intervals) and controlled burns, thus demonstrating how IKs are adaptable and able to meet current climate demands (Dockry et al., 2023; Grenz & Armstrong, 2023; Pearce, 2023; Baker et al., 2023). Additionally, Tribally managed forests support more biodiversity, sequester more carbon, and reduce climate-induced wildfire risks more effectively compared to Western forestry practices (Waller & Reo, 2018; Marks-Block et al., 2021; U.S. Climate Resilience Toolkit, 2023; Tripp, 2020). For example, the Menominee Tribe in so-called Wisconsin, with over a century of experience, harvests sustainably, maintains standing wood, and captures 30,000 tons of carbon annually, thereby driving economic development (Pearce, 2023; Buckley, 2023). However, the Tribe needs more equitable funding, machinery, and resources to maintain these processes.

Tribal Nations increasingly lead sustainable forestry initiatives and participate in cap-and-trade programs, which are influenced by their IK and value systems. These programs also create ethical dilemmas when concessions are made to state governments that create pathways for industrial pollution to continue, which poses risks to nearby communities (Manning & Reed, 2019; Kormaan, 2018). For example, the Yurok Tribe trades carbon credits in so-called California's cap-and-trade system, generating funds to buy ancestral lands managed with TEK and Indigenous values (Kormaan, 2018; Mucioki et al., 2021). Each metric ton of carbon in Yurok forests is traded for one offset credit that polluting industries can buy to comply with the state's greenhouse gas–emissions cap (Kormaan, 2018). The Yurok cap-and-trade program generated millions of dollars of discretionary funds that the Tribe used to purchase over 60,000 acres of their ancestral lands, which are now managed with Yurok Tribal values that support the ecological and cultural services of their ecosystems through climate adaptation and mitigation practices (Kormaan, 2018; Mucioki et al., 2021). However, the global credit market has been criticized for its ability to use habitats as sacrifice zones and perpetuate harmful impacts on communities (L.I.G.H.T., 2023). The Indigenous organization Leadership, Indigenous, Guardian, Honor, Teach (L.I.G.H.T.) Foundation recommends more equitable and just pathways for identifying credits, benefit-sharing of such credit mechanisms, creating safeguards for sustainable development benefits, and including TEK in biodiversity quantification to reduce harms (Marchand, 2023).

Re-Indigenizing Mitigation by Investing in Indigenous Ocean Food Systems

Indigenous communities worldwide are actively re-Indigenizing (i.e., reclaiming Indigenous ways of being and Knowing and ensuring they are central to the process) their Traditional food systems to reduce carbon emissions and their communities' reliance on imported foods. These acts of re-Indigenization are especially important in Hawai'i, which is among the most remote places on Earth and which grapples with a heavy dependence on imported food (Geslani et al., 2012), a direct consequence of settler colonialism, Land privatization, and the U.S. occupation of the sovereign Hawai'ian Kingdom (Sai, 2004; Beamer et al., 2021). This poses concerns for energy efficiency and the many endemic bioculturally important species in Hawai'i. For example, it is not an option to import the endemic limu (seaweed) manauea (*Gracilaria coronopifolia*) or the varieties of kalo (taro; *Colocasia esculenta*) that are specific to the 'āina (land; that which feeds) of Hawai'i (Abbott, 1984; Kagawa-Viviani et al., 2018). Before U.S. occupation, under Native Hawai'ian statecraft, sustainable resource management systems fed up to 1 million Native Hawai'ians (comparable to the modern total population of the Hawai'ian Islands; Winter et al., 2018). Yet, despite violent colonial disruptions, Native Hawai'ians resisted and perpetuated their practices (Silva, 2004).

One prime example of this is the restoration of 49 *loko i'a* (Hawai'ian fishponds), with approximately 35 community groups restoring nearly millennium-old rock walls, removing nonlocal beings (invasive species), and using Indigenous science to regulate water quality for a thriving environment (Morishige et al., 2018; Chang et al., 2019; Kua'āina Ulu 'Auamo, 2020). When *'ama'ama* (Hawai'ian mullet, *Mugil cephalus*) make their home in a restored loko i'a, they contribute to climate change mitigation thanks to Indigenous-led conservation. While the carbon in fish biomass does not directly contribute to carbon sequestration, the reduced greenhouse gas emissions enabled by local Indigenous food sovereignty are potentially tremendous (Mariani et al., 2020; Nyong et al., 2007). Loko i'a also provide habitat for many native fish species, limu, crabs, and seabirds while improving coral reef resilience and overall biodiversity from the mountain to the ocean (Keala et al., 2014; Winter et al., 2020). Through these cumulative improvements, they maintain a positive feedback loop that enhances productivity—thereby reciprocally contributing to a strict definition of climate change mitigation through emissions reductions. Beyond Hawai'i, there are parallel examples across many Indigenous Nations, which underscores how achieving food sovereignty through Indigenous Traditional aquaculture practices remains a key component of global climate change mitigation.

Indigenous-Led Conservation and Climate Change Adaptation

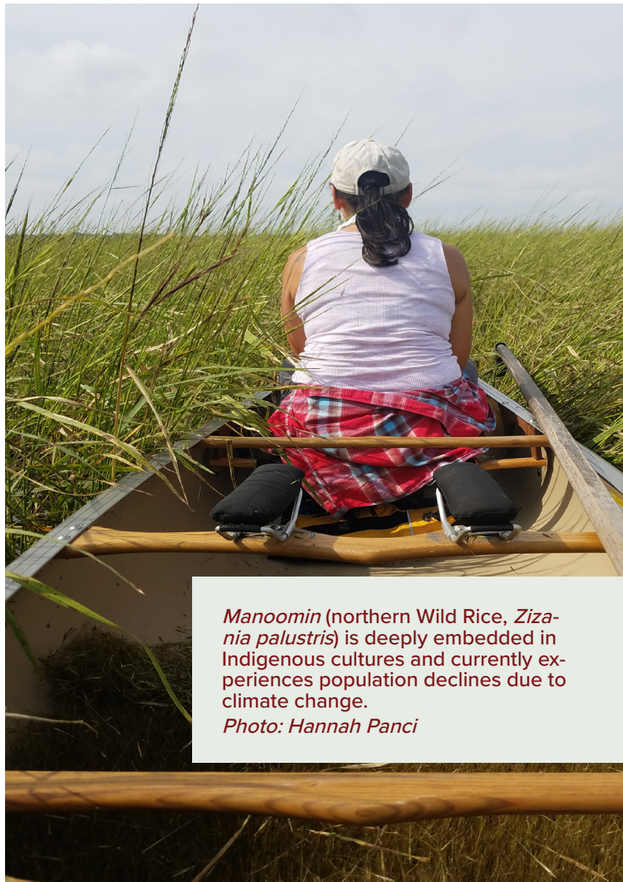
Climate adaptation involves preparation for and responses to current and anticipated climate change impacts (IPCC, 2023a). It emphasizes reducing vulnerability and enhancing resilience to climate change, which are vital aspects of successful environmental conservation given the ongoing and projected climate change effects (IPCC, 2023a; Marvel et al., 2023). Indigenous Nations and communities have assumed leadership roles in environmental conservation and contribute significantly to climate adaptation initiatives.

This section of the chapter spotlights the significant impact of Indigenous-led conservation efforts on climate adaptation by providing specific illustrative examples. Additional case studies from various U.S. regions can be found in previously published resources, such as the Bureau of Indian Affairs Branch of Tribal Community Resilience (BIA TCR) (BIA, 2023), the "Tribes and Indigenous Peoples Chapter" of the *Fifth National Climate Assessment* (Whyte et al., 2023), the Tribal Climate Change Guide of the University of Oregon (Pacific Northwest Tribal Climate Change Project, n.d.), and the Tribes and Climate Change Program of the Institute for Tribal Environmental Professionals (ITEP, n.d.).

Indigenous-Led Climate Adaptation Planning

Many Tribal Nations and Indigenous communities are conducting climate change vulnerability assessments and adaptation plans that incorporate TEK (Bethel et al., 2022; Meeker, 2017). For example, the Great Lakes Indian Fish & Wildlife Commission (GLIFWC), which represents 11 Ojibwe Tribes in parts of so-called Minnesota, Wisconsin, and Michigan, completed a vulnerability assessment of 68 culturally important beings by interviewing Elders, Knowledge Holders, and other community members about climate change (GLIFWC Climate Change Team, 2023). The assessment, *Aanji-bimaadiziimagak o'ow aki* (the world is changing), is grounded in Ojibwe Knowledge and language, which are used alongside western ecological knowledge to determine the vulnerability and potential impacts that different beings may face due to climate change. The assessment identified multiple vulnerable species, including manoomin (northern Wild Rice, *Zizania palustris*), a special gift from the Creator to the Ojibwe People.

The Ojibwe People interviewed for the assessment reported fearing a loss of identity as the cumulative effects of climate change cause them to lose their relationships with manoomin (GLIFWC Climate Change Team, 2023). Manoomin was once widespread across Ojibwe territory, but interviewees reported declines in populations and harvest opportunities and shared concerns about the health and abundance of manoomin. Manoomin is now vulnerable to climate change at every stage of its life cycle and faces a large variety of climate-related threats [e.g., changes in water level, warming temperatures, loss of ice cover, extreme storms, and increasing populations of nonlocal beings



Manoomin (northern Wild Rice, *Zizania palustris*) is deeply embedded in Indigenous cultures and currently experiences population declines due to climate change.
Photo: Hannah Panci

(i.e., the more-than-human relatives that western scientists generally refer to as "invasive species" and also what some Indigenous Peoples term as "competitive newcomers")]. GLIFWC member Tribes are active leaders in adaptation efforts focused on habitat protection and restoration, reseeding, and maintaining or improving access for harvesters. Additionally, many cross-cultural and cross-jurisdictional collaborations support manoomin in a good way, which helps ensure the resilience of this being (GLIFWC Climate Change Team, 2023).

When climate change causes disturbance to culturally important beings, Indigenous Peoples may be forced to adapt their lifestyles and cultures to these changes, although political boundaries may present additional barriers because Tribes may be unable to relocate to the areas in which their relatives are moving (GLIFWC Climate Change Team, 2023). Going forward, *Aanji-bimaadiziimagak o'ow aki* will form the basis of a regional climate change adaptation plan for GLIFWC's member Ojibwe Tribes. Grounding climate adaptation planning, when rooted in Indigenous ways of Knowing, remains critical to successful climate adaptation planning because western approaches are insufficient to address the complex cultural and ecological relationships that Indigenous Peoples have understood for millennia.

Habitat Connectivity for Animal Migrations

Climate change creates unique conservation challenges by interacting with other stressors (Staudt et al., 2013). For example, habitat fragmentation can reduce genetic diversity and limit movement, which can reduce adaptive capacity and inhibit range shifts for fish and wildlife responding to climate change (Rubenstein et al., 2023; Schlaepfer et al., 2018; Torda & Quigley, 2022; Tucker et al., 2018). However, Indigenous Peoples have always been, and continue to be, leaders in conserving fish and wildlife (Hoagland & Albert, 2023) and are leading the protection and restoration of habitat connectivity through the construction of wildlife corridors.

The Southern Ute Indian Tribe collaborated with the Colorado Department of Transportation, Colorado Parks and Wildlife, and other partners to construct the US 160 Wildlife Crossing Project near Lake Capote, Colorado (a man-made land bridge over the highway). The crossing ensures the safety of people and wildlife by reducing animal–vehicle collisions and allows ungulates like elk (*Cervus canadensis*) and mule deer (*Odocoileus hemionus*) to move between on- and off-reservation habitats along their traditional migration paths (Shockley, 2023). This connectivity is especially important because annual ungulate migrations to the Southern Ute Reservation are vulnerable to climate change impacts such as drought and warming winters (Shockley, 2018). In the U.S., the proposed Tribal Wildlife Corridors Act aims to authorize federal funding to support the implementation and maintenance of wildlife corridors by Tribal Nations across the country (NAFWS, n.d.-a). Habitat fragmentation can drive biodiversity declines, and lack of funding poses significant challenges to Indigenous-led conservation; therefore, programs that dedicate funding for Indigenous-led restoration of habitat connectivity may play a major role in conservation and climate adaptation efforts (Garnett et al., 2018; Haddad et al., 2015; Schuster et al., 2019; Tran et al., 2020).

Reducing Vulnerability for Long-Lived Fish

Lake sturgeon (*Acipenser fulvescens*), known as *name* (Ojibwe), *nmè* (Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians), and *nama'o* (Menominee), holds profound cultural significance and provides food and other resources for many Indigenous cultures (GLIFWC Climate Change Team, 2023; Holzkamm & Waisberg, 2004; Stults et al., 2016). However, colonization-driven factors led to their decline, and despite Indigenous-led conservation that has resulted in recovery for some populations, name/nmè/nama'o remain beings of concern due to a variety of threats (Embke et al., 2023; GLIFWC Climate Change Team, 2023; Haines, 2016; Holzkamm & Waisberg, 2004; Stults et al., 2016). Climate change is a driver behind these concerns because it threatens their habitat suitability, spawning times, and survival (Embke et al., 2023; GLIFWC, 2023; Haines, 2016; Stults et al., 2016). Despite the need for additional research on climate drivers affecting name/nmè/nama'o populations (Embke et al., 2023), Indigenous Peoples remain at the forefront of conservation efforts to acquire Knowledge and facilitate adaptation initiatives (e.g., Holtgren et al., 2014; Runstrom et al., 2002). At the Bay Mills Indian Community, biologists actively study the species in the St. Mary's River, using tagging and monitoring to understand their movement patterns and habitat use, which informs conservation and adaptation strategies (F. Zomer, personal communication, August 1, 2023; Fig. 7.1). In response to Tribal concerns from the Midwest U.S. region, a collaborative research project involving Tribal and federal entities has been initiated to investigate climate change impacts and adaptation possibilities (Embke et al., 2022). The Red Lake Nation and White Earth Nation in so-called Minnesota, along with the Rainy River

Figure 7.1. Tagging and monitoring of Lake Sturgeon by Bay Mills Indian Community biologists on the St. Mary's River to understand movement patterns and habitat use to inform conservation strategies. Photo by Allison M. Scott.

First Nations in Ontario, partnered with government agencies to restore name/nmè/nama'o populations in the Red River Basin (Grand Forks Herald, 2023). Likewise, the Cree Nation and Fisheries and Oceans Canada established a collaborative framework for Cree-led stewardship of name/nmè/nama'o in the Southern Hudson Bay–James Bay (Quinn, 2023). Such Indigenous leadership and incorporation of IK in name/nmè/nama'o stewardship and adaptation remain indispensable for preserving these beings for future generations.

Using Indigenous Technology for Coastal Adaptation

For Northwest Coastal Indigenous Peoples such as the Swinomish Indian Tribal Community, coastal ecosystem foods (e.g., clams) hold immense cultural significance and have sustained Coast Salish physical, economic, and cultural lifeways since time immemorial (Augustine & Dearden, 2014; Donatuto et al., 2011; Garibaldi & Turner, 2004). These foods are crucial for food security and cultural transmission processes, but they now face climate change threats such as sea-level rise, warming oceans, storm surges, and ocean acidification (Augustine & Dearden, 2014; Deur et al., 2015; Poe et al., 2016; IPCC, 2023b). Recent research reported declines in *sx̌a?a?* (native littlenecks, *Leukoma staminea*) and *stxʷub* (butter clam, *Saxidomus gigantea*) populations, which are two culturally important native species (Barber et al., 2019).

To safeguard clams for future generations, SITC and other Coast Salish Tribes and First Nations collaborated in Swinomish territory to construct the first postcolonial clam garden built in the U.S. in August 2022 (Fig. 7.3). Clam gardens are intertidal terraces that enhance clam habitat and have been managed by Indigenous Peoples for over 3,500 years (Groesbeck et al., 2014; Holmes et al., 2022; Jackley et al., 2016). Clam gardens offer resilience to climate change by attenuating wave energy and adjusting to rising sea levels (Holmes et al., 2022). Additionally, the presence of shell hash (i.e., broken shell piec-

The First Co-owned and Co-managed Tribal-State Park in the U.S.: Swinomish Tribal Co-Management with Washington State Parks as Kukutali Preserve

Narrative by Todd Mitchell

Figure 7.2. Swinomish Indian Tribal Community staff conducting a geomorphology study at Kukutali Preserve for use in developing the Preserve's conservation and master management plans, June 2013. Photo by Todd Mitchell, 2013.

Kukutali Preserve, a peninsula and group of small islands and tidelands located within the Swinomish Reservation, was historically under private ownership, limiting Tribal Citizens' access to their traditional places and cultural resources. In 2010, the Swinomish Tribe and the Washington State Parks Commission entered a co-management agreement to jointly acquire and operate Kiket Island and an adjacent parcel on Fidalgo Island. The drive behind this effort was to provide public recreational access, restore Tribal access to traditional places and cultural resources, and work in partnership to develop, operate, and maintain a public park as a unit of Deception Pass State Park. The Swinomish Tribe and the State Parks Commission now co-own the 93-acre upland portion of Kukutali, with the Tribe retaining sole ownership of the adjacent approximately 38 acres of tidelands. The Swinomish Tribe and the State Parks Commission co-manage Kukutali using consensus decision-making via a board composed of three Tribal representatives and three Parks representatives (Mitchell & Mitchell, 2018).

Kukutali is managed with two main goals: protecting unique ecosystems and enhancing biodiversity while providing the public with educational opportunities to learn about the ecosystems and take part in the stewardship of these lands. Swinomish-led scientific work in Kukutali, including surveys on fish, clam populations, wildlife, and habitat conditions for a diverse array of species, supported the development of a conservation management and restoration plan that was adopted into the Kukutali Preserve Master Management Plan (Mitchell & Mitchell, 2018; SITC, n.d.; Fig. 7.2). The Swinomish Tribe's strong input in the development of the management plan ensures their Indigenous values and priorities guide the use and management of Kukutali. Due to Kukutali's vulnerability to sea-level rise from climate change, Swinomish restoration efforts prioritize habitat sustainability and address current anthropogenic impacts and potential climate change adaptations to preserve habitat and access to cultural resources for generations.◂◆

es) in clam gardens may mitigate the effects of ocean acidification and other climate change impacts on calcifying organisms, especially during their early life stages (Clements & Hunt, 2017; Green et al., 2009; Greiner et al., 2018). Furthermore, clam gardens contribute to the greater nearshore ecosystem by enhancing biodiversity and benefiting other Tribally important species groups such as *təǰabac* (sea cucumber species), *bəsqʷ* (crab species), and *čəlaʔəb* (seaweed species; Deur et al., 2015; Groesbeck et al., 2014; Lepofsky & Caldwell, 2013). Therefore, clam gardens exemplify Indigenous adaptive strategies to address climate change impacts on coastal ecosystems and culturally important sites. Swinomish community members and staff documented their efforts in a recently released video in which they work with several visiting Indigenous communities to build the Swinomish clam garden (NOAA, 2023).

Learning Adaptation Strategies from More-than-Human Relatives

On the Blackfeet Reservation in so-called Montana, weather-related climate change impacts are drastically affecting water flow on critical waterways. Changing weather patterns, including earlier snowmelt, rain-on-snow events, and heavy precipitation in short time frames, have contributed to decreased summer stream flows (Ksik Stakii Project Team, n.d.). Rising summer temperatures and more frequent extreme heatwave events exacerbate these reductions in stream flow. To combat these negative climate impacts, the Blackfeet Nation has looked to their relative, *Ksik Stakii* (American beaver, *Castor canadensis*), for guidance. The Ksik Stakii Project brought together the Blackfeet Water Resources Department and students from the Blackfeet Community College to build small dams in key points across Willow Creek, mimicking Ksik Stakii dam-building behaviors (Ksik Stakii Project Team, n.d.). These natural barriers slow the flow of water, allowing for increased water seepage into wetlands and reducing riverbed disturbance during high runoff events. In addition to building seven mimic dams, project leads and students also developed a robust curriculum of presentations, field trips, and other activities to share information about the Blackfeet Climate Adaptation Plan and Ksik Stakii Project with others interested in using the tool for climate adaptation. Learning to adapt from careful and respectful observation of more-than-human-relatives can provide important insights when responding to climate change impacts (Tribal Adaptation Menu Team, 2019).

Figure 7.3. SITC and other Coast Salish Tribes and First Nations collaborating in Swinomish territory to construct the first postcolonial clam garden built in the U.S. (August 2022).

Figure 7.4. *Pollinator Garden* by Rhode Grayson, 2023.

Protecting Plant Pollinators

Pollinators play a critical role in the functions of ecosystems and hold cultural significance for many Indigenous communities (Fig. 7.4) (Vasiliev & Greenwood, 2021). However, pollinator populations have declined due to climate change impacts (e.g., increased pathogens due to warming climate) and other colonial stressors (e.g., habitat fragmentation and disturbance and pesticide exposure; Vasiliev & Greenwood, 2021). Some pollinator species have shown resilience to phenological, behavioral, morphological, and physiological stressors manifested by climate change. For example, bumblebees have shifted the timing of their life-cycle events and the behavior of whole-colony activity, they have demonstrated changes in body hair, and they have developed genetic-level adaptation of increased heat tolerance (Maebe et al., 2021). Despite their significant roles in ecosystems, pollinators are often overlooked in climate adaptation planning (Downing et al., 2021). However, Indigenous Peoples are taking adaptative and resilience-based steps to protect pollinators and their habitats from climate change impacts, as highlighted by the examples below.

• **The Pawnee Nation** in so-called Oklahoma established pollinator gardens as a climate mitigation strategy and community educational programs to bring community members into deeper relations with their pollinator kin (Oklahoma State University, n.d.).

• **The Blackfeet Nation** in so-called Montana incorporated pollinator species into their climate adaptation planning and recommended that pollinator relatives should be supported through the enhancement of native pollinator habitat and the development of pollinator gardens (Blackfeet Nation, 2018).

• **The Karuk Nation** in so-called California incorporated pollinator considerations into their climate adaptation plans and is considering how to practice prescribed fire to produce favorable conditions for pollinator communities (Karuk Tribe, 2019; Loffland et al., 2017).

• **The Colville Confederated Tribes** in so-called Washington conducted a pollinator inventory to address a lack of information and emphasize the importance of pollinators in Indigenous culture and food sovereignty (Downing et al., 2021). Findings from the report were integrated into initiatives of the L.I.G.H.T. Foundation—an Indigenous-led native plant nonprofit.

• **The L.I.G.H.T. Foundation** is developing research partnerships to support native pollinator species threatened by climate change while also supporting Indigenous-led conservation practices, Tribal sovereignty, and Tribal rights (L.I.G.H.T., n.d.).

• **The College of Muscogee Nation and Euchee Butterfly Farm** collaborated to build suitable habitat along monarch butterfly annual migration pathways to increase pollinator populations, which influence the health of the Mvskoke Cultural Community Garden (Tyner, 2019).

These examples illustrate how Indigenous Nations and organizations are acting through Indigenous-led conservation, focusing on research, outreach, and education to protect pollinators from climate change impacts. Such efforts hold promise to protect pollinators while promoting holistic and culturally relevant conservation strategies that prioritize Indigenous leadership, Indigenous Knowledges, and Indigenous relations.

Reciprocal Care for Ihiya Unalii (Rivercane Our Friend)

Rivercane (*Arundinaria gigantea*), known as *ihiya* (Tslagi/Cherokee), *uski* (Chahta/Choctaw), and *kohv* (Mvskoke/Muscogee), plays vital roles in Indigenous Peoples' Traditions (e.g., basketry, housing construction material, weaponry, flutes, etc.) and ecosystems across Turtle Island. *Ihiya/uski/kohv* historically thrived in canebrake stands in the southeastern regions of Turtle Island, providing homes and forage to over 70 species; however, they have since greatly diminished to two to three percent of their

Continued on p. 218

Figure 7.5. A rare ihiya/uski/kohv flowering event observed during the 2023 Rivercane Gathering on Cherokee Nation Lands. Image by Steph Courtney, 2023.

The Importance of Hawai‘ian-Led Conservation

Narrative by Cherry Yamane

The health of Native Hawai‘ian People is intricately connected to our Land. We learned this from childhood through genealogical stories that bind Native Hawai‘ians to the Lands and oceans. The Land, our ancestor, cares for us through a reciprocal and responsibility-laden relationship rooted in profound love (Fig. 7.6). As *wahine* (women) of Moku o Waianae, we recognize that our small archipelago in the Pacific connects us to our cousins across the oceans. It is home to unique ecosystems and biodiversity, including honeycreepers, snails, and plants found nowhere else in the world. Our community once had a deep connection with traditional waterways, mountainous pili grass, and natural water flowing through our valleys. However, this sweet water has vanished due to colonization, which resulted in diverted waterways, ongoing cultural traumas, neoliberal food systems, industrialization, and the U.S. occupation of Hawai‘i.

Figure 7.6. *The Land Is Our Ancestor* by Rhode Grayson, 2023.

Settler colonialism disrupted Kanaka Maoli ways of Knowing and being in harmony with the land, which resulted in climate injustices rooted in the intricate history of land privatization through the Great Mahele. This history contributed to the loss of Land during the illegal overthrow of the Hawai‘ian Kingdom, accompanied by enduring losses of Land, life, and cultural practices. The U.S. military’s occupation of Hawai‘ian Lands and its leases for bombing and fuel storage have further exacerbated climate, environmental, and Kanaka health concerns, including the contamination of O‘ahu’s water sources. It is our responsibility to resist the U.S. occupation of the Hawai‘ian Kingdom, as we are not mere advocates but stewards and protectors who know what is best for these Lands and waters. Our ancestral Knowledges assist us in maintaining biodiversity, a thriving climate, and the connections between Lands and waters to our Peoples. Because of these responsibilities, we resist these leases to safeguard our People’s environmental and health interests, ensuring access to water for future generations. For example, Makua Valley is sacred to our community and has been significantly restricted since the U.S. military’s occupancy. We can visit it only once a month, which restricts our ability to conduct cultural protocols and preserve our connection to Makua. This challenge extends to other Lands occupied by the military and disrupts native species, Lands, and water resources. These Lands must be returned at the end of their 65-year lease in 2029. In doing so, Kanaka Maoli can reclaim our positions as Indigenous leaders in conservation efforts and help drive climate mitigation and adaptation efforts as we have done since time immemorial.◀◆

The narratives in this chapter underscore Indigenous Peoples’ vital contributions to climate justice through Land conservation and stewardship. These distinct stories provide unique insights into the challenges, solutions, and responsibilities associated with climate mitigation and adaptation across many areas of Turtle Island. From the Swinomish Tribe’s co-management of Kukutali Preserve to the resilience of Native Hawai‘ians in preserving their ancestral lands, these narratives illustrate the permanent commitment of Indigenous communities to protect their ecosystems, cultural heritage, and future generations while navigating complex challenges related to climate change, colonial legacies, and the ongoing pursuit of justice.

abundant precolonial populations (Barrett et al., 2021; Noss et al., 1995). *Ihiya/uski/kohv* population declines pose ecological consequences and contribute to the extinction of certain bird species (Barrett et al., 2021). However, Indigenous Nations and communities are re-Indigenizing their relations with *ihiya/uski/kohv,* fostering healing for Indigenous Peoples and their more-than-human relatives (Noss et al., 1995; Barrett et al., 2021; Tom et al., 2023).

Efforts to restore *ihiya/uski/kohv* are supported by organizations such as the Rivercane Restoration Alliance and the Rivercane Gathering, as well as individual Indigenous households, Tribal colleges, collaborations with researchers, and federally funded projects (Fig. 7.5; Batton, 2023; Fedoroff, 2021; NAFWS, n.d.-b; Tyner, 2019; U.S. Forest Service, 2022). Restoration projects aim to enhance access to ihiya/uski/kohv for community education, relationship building, and basketry artisans while providing additional benefits, including carbon storage, winter habitat for wildlife, and stabilization for riverbanks (Barrett et al., 2021; Tyner, 2019). *Ihiya/uski/kohv* have unique abilities to combat climate change impacts due to their riparian characteristics that reduce sediment loads and nitrate runoff, which contribute to water quality and support the resilience of Indigenous lifeways (Barrett et al., 2021; Blattel et al., 2009). Many Tribal Nations are working to support Indigenous Peoples' relationships with *ihiya/uski/kohv* through long-term growing projects and Indigenous Knowledge exchanges that benefit water, ecosystems, and Traditional lifeways (Fedoroff, 2021). These efforts underscore how Indigenous-led conservation promotes adaptation to climate change while contributing to the healing of Indigenous communities and local ecosystems (Fedoroff, 2021).

Climate Adaptation Through Indigenous-Led Conservation

Overall, Indigenous-led conservation and climate adaptation initiatives include various strategies such as creating climate adaptation plans, revitalizing clam gardens, restoring rivercane populations, constructing wildlife corridors, and protecting pollinators. In all these examples, Indigenous Nations and communities facilitate a proactive approach to climate adaptation that incorporates TEK to address climate change impacts. These efforts offer significant ecological and cultural implications by promoting resilience in ecosystems and supporting the well-being of Indigenous communities. However, many challenges remain, such as financial barriers and the need for increased research and partnerships. The examples illustrated throughout this chapter demonstrate how the combination of Indigenous-led conservation, Indigenous Knowledges, and Indigenous relations with the environment remain critical for addressing climate change and fostering reciprocal stewardship of the environment.

Organizations and Partnerships that Center Indigenous Conservation

Conservation organizations are at the forefront of climate adaptation planning and action processes yet have historically overlooked elements of Indigenous lifeways such as resilience, resistance, accommodation, and transformation. Until recently, many organizational responses to climate mitigation and adaptation have focused primarily on assessment and plans that prioritize short-term coping strategies and incremental actions that fail to consider the root causes of climate vulnerability across species. However, a promising shift toward community-centered approaches and integrating culture and local priorities is emerging. These approaches empower communities to drive change from within and foster community-led decision-making for transformative adaptation and mitigation strategies (Adger et al., 2009). This section of the chapter explores two case studies that showcase the convergence between conservation organizations and Indigenous-led conservation efforts.

Climate Science Alliance Model

The Climate Science Alliance (CSA) prioritizes Indigenous voices and sustained engagement by bridging Indigenous and western sciences, advocating for equal knowledge valuation, co-stewardship of Indigenous Peoples' ancestral lands, and Indigenous leadership in environmental justice movements. Through the CSA Tribal Working Group of over 20 Tribal Nations and Indigenous organizations, CSA supports Indigenous communities through initiatives for climate adaptation planning, Indigenous data sovereignty, intergenerational Knowledge exchanges, Indigenous fellowships, and the Southwestern Tribal Climate Change summit, which emphasizes decolonization, relationship building, and Knowledge sharing.

The Bureau of Indian Affairs Tribal Community Resilience Liaison Program

The BIA TCR administers an annual awards program providing competitive funding to federally recognized Tribal Nations and authorized Tribal organizations to bolster climate resilience (BTCR, n.d.). This funding is exclusive to federally recognized Tribes, thus creating financial barriers for state-recognized Tribes and unrecognized Indigenous communities engaged in climate adaptation. As of November 2023, the BIA TCR program allocated $18.1 million for the direct implementation of climate adaptation strategies across the U.S. These strategies have encompassed actions aimed at enhancing wildfire and flood resilience, improving the management of community rangeland water resources, conserving fish and wildlife populations, and executing community-level climate change adaptation plans (BTCR, 2023).

The BIA Tribal Community Resilience Liaison Program collaborates with BIA, Tribal entities, and regional Climate Adaptation Science Centers (CASC). Beginning in 2012 with one liaison, the program evolved to include liaisons within regional CASC boundaries across the U.S. Liaisons are funded by the BIA and hosted by Indigenous-led organizations to facilitate relationships between Tribal Nations, academic institutions, and CASC. Their activities include site visits, Tribal meetings, Tribal Climate Camp, Indigenous climate change networks, climate adaptation plan writing retreats, training, workshops, and climate summits. Each of these efforts ensures that Tribal priorities, values, and needs are addressed in climate change contexts while influencing CASC science priorities and building Tribal capacity (Pfaeffle, 2022). Current partnerships include:

- American Indian Higher Education Consortium in partnership with the Southwest CASC.
- United South and Eastern Tribes in partnership with the Northeast and Southeast CASCs.
- Affiliated Tribes of Northwest Indians in partnership with the Northwest CASC.
- Native American Fish and Wildlife Society in partnership with the Alaska CASC.
- College of the Menominee Nation Sustainable Development Institute in partnership with the Midwest CASC.
- Great Plains Tribal Water Alliance in partnership with the North Central CASC.
- The South Central CASC employs a full-time Tribal liaison through the Chickasaw Nation and a New Mexico Tribal liaison through the University of Oklahoma.

Climate change presents ongoing challenges, but collaboration with Indigenous communities offers a promising path for the future. Indigenous Knowledges, values, and community-led efforts are crucial in achieving global resilience. By fostering sustained and meaningful engagement, valuing diverse knowledges equally, and building partnerships, Indigenous Nations and communities can continue paving pathways toward more equitable futures. The examples in this section highlight the importance of community-driven initiatives and the need for respect, reciprocity, and deep collaborative learning to be woven into the process where conservation organizations work with Indigenous Nations and communities. Conservation organizations must prioritize partnerships and support Indigenous leadership to accelerate transformative actions for climate adaptation and mitigation.

Conclusion

Conservation led by Indigenous communities has positive results in ecosystem restoration and climate adaptation and mitigation. The application of Indigenous practices, Knowledges, and science contributes to the reduction of greenhouse gas emissions, the preservation of local biodiversity, and the strengthening of food sovereignty, among others. Indigenous climate leadership and conservation can be accompanied by the joint participation of governmental and academic entities and social actors that carry out actions aimed at research, information dissemination, education on environmental aspects (e.g., conservation practices), and measures to counteract climate change and its diverse impacts. Such collaborations should honor Indigenous Knowledges and Indigenous rights to self-determination by meaningfully addressing barriers to Indigenous leadership on climate mitigation and adaptation (e.g., sustainable funding, infrastructure, capacity building, policy/regulatory frameworks, etc.; see Chapter 6).

The holistic complexity of Indigenous narratives and Knowledges enables transformative climate mitigation and adaptation actions while challenging colonial and capitalist harms that might otherwise persist if climate-focused conservation excludes Indigenous leadership. For exam-

ple, Indigenous narratives can provide accountability and nuance on how co-management can equitably and effectively address the climate crisis. Similarly, diverse Indigenous-led conservation case studies and critiques may illuminate possibilities to advance Indigenous sovereignty through cap-and-trade programs, while ensuring such programs do not masquerade as solutions that actually perpetuate harms (e.g., increased greenhouse gas emissions, industrial pollution that sacrifices the health of nearby communities and habitats, dispossession of international Indigenous homelands). More broadly, a multitude of Indigenous-led conservation efforts have expanded global understanding of Indigenous resistance to colonialism as powerful models of climate mitigation. These models include Land/water protection against extractive energy projects as well as resistance to larger-scale U.S. occupation and its disruption of Indigenous local food/ecological/hydrological systems for communities such as Native Hawai'ians. Such acts of resistance can also represent important forms of climate adaptation, particularly since colonial legacies can have compounding interactions with climate hazards that contribute to the disproportionately negative climate impacts that Indigenous communities endure.

Indigenous-led conservation for climate mitigation and adaptation facilitates healing of Indigenous communities, more-than-human/ecological communities, and the planet. This collective healing is possible because Indigenous conservation strategies are rooted in deep, lasting relationships to and Knowledges of ecosystem elements as well as the resilience of Indigenous communities in persevering against ongoing colonialism and other oppression that perpetuate both climate change and unjust vulnerability to climate impacts. The relationships, Knowledges, and culturally relevant conservation practices of Indigenous Peoples highlight their importance as ecosystem/climate stewards who lead place-based and globally significant responses to the increasing intensity, complexity, and uncertainty of climate impacts (e.g., challenges such as nonlinear ecological responses and changes in critical thresholds, emergence of novel ecosystems without historic analogues, and complex interactions between climate and nonclimate stressors; Hewitt et al., 2016; Grimm et al., 2013; Malhi et al., 2020). ◂◆

Indigenous-Led Conservation Chapter References

Abbott, I. A. (1984). *Limu: An ethnobotanical study of some edible Hawaiian seaweeds.* National Tropical Botanical Garden.

Adapt Alaska (n.d.). *Indigenous Sentinels Network.* https://adaptalaska.org/resource/indigenous-sentinels-network/

Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., Naess, L. O., Wolf, J., & Wreford, A. (2009). Are there social limits to adaptation to climate change? *Climatic Change, 93*, 335–354. https://doi.org/10.1007/s10584-008-9520-z

Augustine, S., & Dearden, P. (2014). Changing paradigms in marine and coastal conservation: A case study of clam gardens in the Southern Gulf Islands, Canada. *Canadian Geographies, 58*(3), 305–314. https://doi.org/10.1111/cag.12084

Baker, K., Cockney, K., Jones, H., Landrie-Crossland, S., Low, M., Pictou, K., & Childs, A. (2023). *Indigenous Climate Monitoring Toolkit.* https://indigenousclimatemonitoring.ca/

Bakx, K. (2021, December 22). *Competition underway to develop carbon-capture centres in Alberta.* CBC News. https://www.cbc.ca/news/business/bakx-ccs-alberta-hubs-1.6288832

Barber, J. S., Ruff, C. P., McArdle, J. T., Hunter, L. L., Speck, C. A., Rogers, D. W., & Greiner, C. M. (2019). Intertidal clams exhibit population synchrony across spatial and temporal scales. *Limnology and Oceanography, 64*(S1), S284–S300. https://doi.org/10.1002/lno.11085

Barrett, R., Grabowski, J., & Williams, M. J. (2021). *Giant cane and other native bamboos: Establishment and use for conservation of natural resources in the Southeast* [Technical note]. Natural Resources Conservation Service, USDA. https://www.nrcs.usda.gov/sites/default/files/2022-10/flpmctn13727.pdf

Batton, G. (2023, February 6). Watonlak Hvshi season is a good time to save the river cane. *Choctaw Nation of Oklahoma Chief's Blog.* https://www.choctawnation.com/news/chiefs-blog/watonlak-hvshi-season-is-a-good-time-to-save-the-river-cane/

Beamer, K., Tuma, A., Thorenz, A., Boldoczki, S., Kotubetey, K., Kukea-Shultz, K., & Elkington, K. (2021). Reflections on sustainability concepts: Aloha 'āina and the circular economy. *Sustainability, 13*(5), 2984. https://doi.org/10.3390/su13052984

Bethel, M. B., Braud, D. H., Lambeth, T., Dardar, D. S., & Ferguson-Bohnee, P. (2022). Mapping risk factors to climate change impacts using Traditional Ecological Knowledge to support adaptation planning with a Native American Tribe in Louisiana. *Journal of Environmental Management, 301*, Article 113801. https://doi.org/10.1016/j.jenvman.2021.113801

Blackfeet Nation (2018). *Blackfeet climate change adaptation plan.* https://bcapwebsite.files.wordpress.com/2018/04/bcap_final_4-11.pdf

Blattel, C. R., Williard, K. W. J., Baer, S. G., Schoonover, J. E., & Zaczek, J. J. (2009). Ground water nitrogen dynamics in giant cane and forest riparian buffers. *Castanea, 74*(3), 259–270. http://www.jstor.org/stable/27742911

Buckley, C. (2023, April 22). The giving forest. *The New York Times.* https://www.nytimes.com/2023/04/22/climate/menominee-forest-sustainable-earth-day.html

Bureau of Indian Affairs (BIA) Branch of Tribal Community Resilience (2023). *TCR annual awards dashboard* [Interactive map]. U.S. Department of the Interior. https://experience.arcgis.com/experience/49f7458ad70c4bac949f421ddf5081c3/

Bureau of Indian Affairs (BIA) Branch of Tribal Community Resilience. (n.d.). *Tribal Community Resilience Annual Awards Program.* U.S. Department of the Interior. https://www.bia.gov/service/tcr-annual-awards-program

Chang, K. K. J., Young, C. K. H., Asuncion, B. F., Ito, W. K., Winter, K. B., & Tanaka, W. C. (2019). Kua'aaina ulu 'auamo: Grassroots growing through shared responsibility. In D. A. Mihesuah & E. Hoover (Eds.), *Indigenous food sovereignty in the United States: Restoring cultural Knowledge, protecting environments, and regaining health* (pp. 122–154). University of Oklahoma Press.

Changing Climate (n.d.). *Coastal First Nations*

Great Bear Initiative Climate Action Peer Network. https://changingclimate.ca/map/coastal-first-nations-great-bear-initiative-climate-action-peer-network/

Clements, J. C., & Hunt, H. L. (2017). Effects of CO_2-driven sediment acidification on infaunal marine bivalves: A synthesis. *Marine Pollution Bulletin, 117*(1–2), 6–16. https://doi.org/10.1016/j.marpolbul.2017.01.053

Connolly, M. (2022, February). *First Nations carbon: A BCAFN discussion paper.* British Columbia Assembly of First Nations. https://www.bcafn.ca/sites/default/files/docs/reports-presentations/BCAFN-Carbon%20Offset%20Discussion%20Paper_Feb%202022_%20Web_0.pdf

Darrell, J. (2023, July 26). *Indigenous Sentinels Network: Bringing traditional Knowledge to resource management in Bristol Bay* [Radio interview]. KDLG. https://www.kdlg.org/environment/2023-07-26/indigenous-sentinels-network-bringing-traditional-knowledge-to-resource-management-in-bristol-bay

Department of Energy (DOE) Office of Indian Energy Policy and Programs. (n.d.). *Tribal energy project successes.* https://www.energy.gov/indianenergy/tribal-energy-project-successes

Deur, D., Dick, A., Recalma-Clutesi, K., & Turner, N. J. (2015). Kwakwaka'wakw "clam gardens": Motive and agency in traditional northwest coast mariculture. *Human Ecology, 43*, 201–212. https://doi.org/10.1007/s10745-015-9743-3

Dockry, M. J., Hoagland, S. J., Leighton, A. D., Durglo, J. R., & Pradhananga, A. (2023). An assessment of American Indian forestry research, information needs, and priorities. *Journal of Forestry, 121*(1), 49–63. https://doi.org/10.1093/jofore/fvac030

Donatuto, J. L., Satterfield, T. A., & Gregory, R. (2011). Poisoning the body to nourish the soul: Prioritising health risks and impacts in a Native American community. *Health, Risk & Society, 13*(2), 103–127. https://doi.org/10.1080/13698575.2011.556186

Downing, J., Hart-Beck, L., Taylor-Manning, L., & Quenemoen, S. (2021). *Pollinators and climate change in the Colville Confederated Tribes traditional territories.* Environmental Trust Department, Colville Confederated Tribes. https://sustain.wwu.edu/files/2021-10/Pollinators_CCT_Report.pdf

Embke, H. S., Lyons, M. P., Smith, S., Shultz, A., Croll, R., & Panci, H. (2022). *Indigenous perspectives on lake sturgeon and the potential impact of climate change.* Climate Adaptation Science Centers Project Explorer. https://mwcasc.umn.edu/node/836

Embke, H. S., Nikiel, C. A., & Lyons, M. P. (2023). *Potential effects of climate change on Acipenser fulvescens (lake sturgeon).* U.S. Geological Survey. https://doi.org/10.3133/ofr20211104E

Fedoroff, M. (2021). *Indigenous approaches to rivercane restoration.* U.S. Army Corps of Engineers, Tribal Nations Technical Center of Expertise. https://www.spa.usace.army.mil/Portals/16/docs/TNTCX/Journal%20Articles/Feb_2022_RR%20Workshop%20Report_final_jh.pdf?ver=61JJovjkv4Zr-ifOdlis-w%3d%3d

Findlay, A. (2021). Climate mitigation through Indigenous forest management. *Nature Climate Change, 11,* 371–373. https://doi.org/10.1038/s41558-021-01042-5

First Nations Leadership Council. (2019). *BC First Nations Climate Strategy and Action Plan development.* British Columbia Assembly of First Nations. https://www.bcafn.ca/priority-areas/environment/climate-emergency/bc-first-nations-climate-strategy-action-plan/bc-first

Garibaldi, A., & Turner, N. (2004). Cultural keystone species: Implications for ecological conservation and restoration. *Ecology and Society, 9*(3), 1. http://www.ecologyandsociety.org/vol9/iss3/art1/

Garnett, S. T., Burgess, N. D., Fa, J. E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C. J., Watson, J. E. M., Zander, K. K., Austin, B., Brondizio, E. S., Collier, N. F., Duncan, T., Ellis, E., Geyle, H., Jackson, M. V., Jonas, H., Malmer, P., McGowan, B., Sivonogxay, A., & Leiper, I. (2018). A spatial overview of the global importance of Indigenous lands for conservation. *Nature Sustainability, 1*, 369–374. https://doi.org/10.1038/s41893-018-0100-6

Great Lakes Indian Fish and Wildlife Commission (GLIFWC) Climate Change Team. (2023). *Aanji-bimaadiziimagak o'ow aki: Climate change vulnerability assessment Version 2.* Great Lakes Indian Fish & Wildlife Commission. http://data.glifwc.org/download/archive.bio/Aanji-bimaadiziimagak_o_ow_aki_digital_02212023.pdf

Geslani, C., Loke, M., Takenaka, B., & Leung, P. (2012). *Hawai'i's seafood consumption and its supply source* (Report No. 12-739). Joint Institute for Marine and Atmospheric Research. https://www.soest.hawaii.edu/pfrp/soest_jimar_rpts/leung_etal_hi_seafood_consumption.pdf

Grand Forks Herald. (2023, May 30). *Partners collect Rainy River sturgeon eggs for stocking efforts in Red River Basin.* https://www.grandforksherald.com/sports/northland-outdoors/partners-collect-rainy-river-sturgeon-eggs-for-stocking-efforts-in-red-river-basin?auth0Authentication=true

Great Plains Tribal Water Alliance (n.d.). *Home Page.* https://www.tribalwateralliance.org/

Green, M. A., Waldbusser, G. G., Reilly, S. L., Emerson, K., & O'Donnell, S. (2009). Death by dissolution: Sediment saturation state as a mortality factor for juvenile bivalves. *Limnology and Oceanography, 54*(4), 1037–1047. https://doi.org/10.4319/lo.2009.54.4.1037

Greiner, C. M., Klinger, T., Ruesink, J. L., Barber, J. S., & Horwith, M. (2018). Habitat effects of macrophytes and shell on carbonate chemistry and juvenile clam recruitment, survival, and growth. *Journal of Experimental Marine Biology and Ecology, 509*, 8–15. https://doi.org/10.1016/j.jembe.2018.08.006

Grenz, J., & Armstrong, C. G. (2023). Pop-up restoration in colonial contexts: Applying an Indigenous food systems lens to ecological restoration. *Frontiers in Sustainable Food Systems, 7,* Article 1244790. https://doi.org/10.3389/fsufs.2023.1244790

Grimm, N. B., Chapin III, F. S., Bierwagen, B., Gonzalez, P., Groffman, P. M., Luo, Y., Melton, F., Nadelhoffer, K., Pairis, A., Raymond, P. A., Schimel, J., & Williamson, C. E. (2013). The impacts of climate change on ecosystem structure and function. *Frontiers in Ecology and the Environment, 11*(9), 474–482. https://doi.org/10.1890/120282

Groesbeck, A. S., Rowell, K., Lepofsky, D., & Salomon, A. K. (2014). Ancient clam gardens increased shellfish production: Adaptive strategies from the past can inform food security today. *PLoS ONE, 9*(3), Article e91235. https://doi.org/10.1371/journal.pone.0091235

Haddad, N. M., Brudvig, L. A., Clobert, J., Davies, K. F., Gonzalez, A., Holt, R. D., Lovejoy, T. E., Sexton, J. O., Austin, M. P., Collins, C. D., Cook, W. M., Damschen, E. I., Ewers, R. M., Foster, B. L., Jenkins, C. N., King, A. J., Laurance, W. F., Levey, D. J., Margules, C. R., Melbourne, B. A., Nicholls, A. O., Orrock, J. L., Song, D.-X., & Townshend, J. R. (2015). Habitat fragmentation and its lasting impact on Earth's ecosystems. *Science Advances, 1*(2), Article e1500052. https://doi.org/10.1126/sciadv.1500052

Haines, R. (2016). *Use of traditional phenological knowledge indicators to predict lake sturgeon spawning timing on the Seine River.* International Joint Commission, Canada. https://coilink.org/20.500.12592/tndhfp

Hernandez, J., Meisner, J., Jacobs, L. A., & Rabinowitz, P. M. (2022). Re-centering Indigenous Knowledge in climate change discourse. *PLOS Climate, 1*(5), Article e0000032. https://doi.org/10.1371/journal.pclm.0000032

Hewitt, J. E., Ellis, J. I., & Thrush, S. F. (2016). Multiple stressors, nonlinear effects and the implications of climate change impacts on marine coastal ecosystems. *Global Change Biology, 22*(8), 2665–2675. https://www.doi.org/10.1111/gcb.13176

Hoagland, S. J., & Albert, S. (Eds.). (2023). *Wildlife stewardship on Tribal Lands: Our place is in our soul.* Johns Hopkins University Press. https://doi.org/10.56021/9781421446585

Holmes, K., Lepofsky, D., Smith, N. F., Crowell, T. D., & Salomon, A. K. (2022). Ancestral sea gardens supported human settlements for at least 3,800 years on the Northwest Coast of North America. *Frontiers in Earth Science, 10*, Article 988111. https://doi.org/10.3389/feart.2022.988111

Holtgren, M., Ogren, S., & Whyte, K. (2014). Renewing relatives: Nmè stewardship in a shared watershed. *Mellon Humanities for the Environment.* https://ssrn.com/abstract=2770100

Holzkamm, T. E., & Waisberg, L. G. (2004). Native American utilization of sturgeon. In G. T. O. LeBreton, F. W. H. Beamish, & R. S. McKinley (Eds.), *Sturgeons and paddlefish of North America* (pp. 22–39). Springer. https://doi.org/10.1007/1-4020-2833-4_2

Intergovernmental Panel on Climate Change (IPCC). (2023a). *Climate change 2022—Impacts, adaptation, and vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press. https://doi.org/10.1017/9781009325844

Intergovernmental Panel on Climate Change (IPCC). (2023b). Climate change 2023: *Synthesis report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Inter-*

governmental Panel on Climate Change H. Lee, and J. Romero (Eds.)] (pp. 35–115). IPCC. https://doi.org/10.59327/IPCC/AR6-9789291691647

International Indigenous Peoples' Forum on Climate Change (IIPFCC). (2023, December 1). *Opening statement by the IIPFCC at COP28*. http://www.iipfcc.org/blog/2023/12/1/opening-statement-by-the-iipfcc-at-cop28

Institute for Tribal Environmental Professionals (ITEP). (n.d.). *Tribes & Climate Change Program*. https://www7.nau.edu/itep/main/tcc

Jackley, J., Gardner, L., Djunaedi, A. F., & Salomon, A. K. (2016). Ancient clam gardens, traditional management portfolios, and the resilience of coupled human–ocean systems. *Ecology and Society, 21*(4), 20. https://doi.org/10.5751/ES-08747-210420

Kagawa-Viviani, A., Levin, P., Johnston, E., Ooka, J., Baker, J., Kantar, M., & Lincoln, N. K. (2018). I ke ēwe ʻāina o ke kupuna: Hawaiian ancestral crops in perspective. *Sustainability, 10*(12), Article 4607. https://doi.org/10.3390/su10124607

Karuk Tribe. (2019, March). *Karuk climate adaptation plan*. Karuk Tribe Department of Natural Resources. https://karuktribeclimatechangeprojects.files.wordpress.com/2019/10/reduced-size_final-karuk-climate-adaptation-plan.pdf

Keala, G., Hollyer, J. R., & Castro, L. (2014). *Loko iʻa: A manual on Hawaiian fishpond restoration and management.* College of Tropical Agriculture and Human Resources, University of Hawaiʻi at Mānoa.

Kormaan, C. (2018). How carbon trading became a way of life for California's Yurok Tribe. *The New Yorker*. https://www.newyorker.com/news/dispatch/how-carbon-trading-became-a-way-of-life-for-californias-yurok-tribe

Ksik Stakii Project Team. (n.d.). *Protecting beaver and restoring wetlands: The Ksik Stakii Project.* Blackfeet Country and Climate Change. https://blackfeetclimatechange.com/what-kind-of-future-do-we-want/the-blackfeet-nation-is-adapting/ksik-stakii/

Kuaʻāina Ulu ʻAuamo. (2020). *Loko iʻa needs assessment: Resilient loko iʻa.* University of Hawaiʻi Sea Grant College Program. https://kuahawaii.org/huimalamalokoia/resilientlokoia/

Lepofsky, D., & Caldwell, M. (2013). Indigenous marine resource management on the Northwest Coast of North America. *Ecological Processes, 2,* 12. https://doi.org/10.1186/2192-1709-2-12

L.I.G.H.T. Foundation (n.d.). *What we're about.* https://thepnwlf.org/

Local Environmental Observer (LEO) (n.d.). *About LEO Network*. https://www.leonetwork.org/en/docs/about/about

Loffland, H. L., Polasik, J. S., Tingley, M. W., Elsey, E. A., Loffland, C., Lebuhn, G., & Siegel, R. B. (2017). Bumble bee use of post-fire chaparral in the central Sierra Nevada. *The Journal of Wildlife Management, 81*(6), 1084–1097. https://doi.org/10.1002/jwmg.21280

Maebe, K., Hart, A. F., Marshall, L., Vandamme, P., Vereecken, N. J., Michez, D., & Smagghe, G. (2021). Bumblebee resilience to climate change, through plastic and adaptive responses. *Global Change Biology, 27*(18), 4223–4237. https://doi.org/10.1111/gcb.15751

Malhi, Y., Franklin, J., Seddon, N., Solan, M., Turner, M. G., Field, C. B., & Knowlton, N. (2020). Climate change and ecosystems: Threats, opportunities and solutions. *Philosophical Transactions of the Royal Society B, 375*(1794). https://doi.org/10.1098/rstb.2019.0104

Manning, B. R. M., & Reed, K. (2019). Returning the Yurok forest to the Yurok Tribe: California's first Tribal carbon credit project. *Stanford Environmental Law Journal, 39*(1), 71. https://law.stanford.edu/publications/returning-the-yurok-forest-to-the-yurok-tribe-californias-first-tribal-carbon-credit-project/

Marchand, J. (2023, November 19). *Public consultation for Indigenous Peoples and local communities comment letter to Verra for Sustainable Development Verified Impact Standard Nature Framework.* L.I.G.H.T. Foundation.

Mariani, G., Cheung, W. W. L., Lyet, A., Sala, E., Mayorga, J., Velez, L., Gaines, S. D., Dejean, T., Troussellier, M., & Mouillot, D. (2020). Let more big fish sink: Fisheries prevent blue carbon sequestration—half in unprofitable areas. *Science Advances, 6*(44), Article eabb4848. https://doi.org/10.1126/sciadv.abb4848

Marks-Block, T., Lake, F. K., Bliege Bird, R., & Curran, L. M. (2021). Revitalized Karuk and Yurok cultural burning to enhance California hazelnut for basketweaving in northwestern California, USA. *Fire Ecology, 17*, 6. https://doi.org/10.1186/s42408-021-00092-6

Marvel, K., Su, W., Delgado, R., Aarons, S., Chatterjee, A., Garcia, M. E., Hausfather, Z., Hayhoe, K., Hence, D. A., Jewett, E. B., Robel, A., Singh, D., Tripati, A., & Vose, R. S. (2023). Chapter 2: Climate trends. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023.CH2

Meeker, D. (2017). *A synthesis of climate adaptation planning needs in Alaska Native communities* [Master's capstone paper, University of California San Diego]. University of California eScholarship. https://escholarship.org/uc/item/7f58n91k

Menzies, A. K., Bowles, E., Gallant, M., Patterson, H., Kozmik, C., Chiblow, S., McGregor, D., Ford, A., & Popp, J. N. (2022). "I see my culture starting to disappear": Anishinaabe perspectives on the socioecological impacts of climate change and future research needs. *FACETS, 7,* 509–527. https://doi.org/10.1139/facets-2021-0066

Mitchell, K., & Mitchell, T. A. (2018). *Kukutali Preserve: Co-managing the first tribal-state park in Washington.* Salish Sea Ecosystem Conference. https://cedar.wwu.edu/ssec/2018ssec/allsessions/69

Morishige, K., Andrade, P., Pascua, P., Steward, K., Cadiz, E., Kapono, L., & Chong, U. (2018). Nā kilo ʻāina: Visions of biocultural restoration through Indigenous relationships between people and place. *Sustainability, 10*(10), 3368. https://doi.org/10.3390/su10103368

Mucioki, M., Sowerwine, J., Sarna-Wojcicki, D., Lake, F. K., & Bourque, S. (2021). Conceptualizing Indigenous cultural ecosystem services (ICES) and benefits under changing climate conditions in the Klamath River Basin and their implications for land management and governance. *Journal of Ethnobiology 41*(3), 313–330. https://doi.org/10.2993/0278-0771-41.3.313

National Indian Carbon Coalition. (n.d.). *Economic opportunity: Carbon, climate, and Indian country.* https://www.indiancarbon.org/

National Oceanic and Atmospheric Administration (NOAA). (2023). *Swinomish Indian Tribal Community clam garden.* https://www.fisheries.noaa.gov/video/swinomish-indian-tribal-community-clam-garden

Native American Fish and Wildlife Society (NAFWS). (n.d.a). *Habitat connectivity.* https://www.nafws.org/initiatives/tribal-wildlife-corridors/

Native American Fish and Wildlife Society (NAFWS). (n.d.b). *United Keetoowah Band of Cherokee Indians awarded funds to restore endangered river cane ecosystems.* https://nafws.org/news/united-keetoowah-band-of-cherokee-indians-awarded-funds-to-restore-endangered-river-cane-ecosystems/

Noss, R. F., LaRoe III, E. T., & Scott, J. M. (1995). *Endangered ecosystems of the United States: A preliminary assessment of loss and degradation.* U.S. National Biological Service, Department of the Interior. https://ecos.fws.gov/ServCat/DownloadFile/101448?Reference=6107

Nyong, A., Adesina, F., & Osman Elasha, B. (2007). The value of Indigenous Knowledge in climate change mitigation and adaptation strategies in the African Sahel. *Mitigation and Adaptation Strategies for Global Change, 12*, 787–797. https://doi.org/10.1007/s11027-007-9099-0

Oklahoma State University. (n.d.). *Pawnee Agriculture & Nutrition Initiative—Outreach* (Pani-O). USDA Research, Education & Economics Information System. https://portal.nifa.usda.gov/web/crisprojectpages/1013883-pawnee-agriculture-and-nutrition-initiative--outreach-pani-o.html

Pacific Northwest Tribal Climate Change Project. (n.d.). *Tribal Climate Change Guide - Adaptation plans.* https://tribalclimateguide.uoregon.edu/adaptation-plans

Pearce, F. (2023, July 24). Tree keepers: Where sustaining the forest is a Tribal tradition. *Yale Environment 360.* https://e360.yale.edu/features/menominee-forest-management-logging

Pfaeffle, T., O'Malley, R., Bamzai, A., & Tangen, S. (2022). *Training and capacity building activities of Climate Adaptation Science Centers for the benefit of Tribal and Indigenous communities, 2010–2019.* U.S. Geological Survey. https://doi.org/10.3133/gip217

Poe, M. R., Donatuto, J., & Satterfield, T. (2016). "Sense of place": Human wellbeing considerations for ecological restoration in Puget Sound. *Coastal Management, 44*(5), 409–426. https://doi.org/10.1080/08920753.2016.1208037

Prażmowska-Marcinowska, K. (2023). Climate change mitigation and adaptation: With or against Indigenous Peoples? *Studia Iuridica, 96*, 286–300. https://doi.org/10.31338/2544-3135.si.2023-96.14

Quinn, P. (2023, August 3). *Lake sturgeon conservation agreement blazes new path.* Nation.

http://nationnews.ca/news/lake-sturgeon-conservation-agreement-blazes-new-path/

Rubenstein, M. A., Weiskopf, S. R., Bertrand, R., Carter, S. L., Comte, L., Eaton, M. J., Johnson, C. G., Lenoir, J., Lynch, A. J., Miller, B. W., Morelli, T. L., Rodriguez, M. A., Terando, A., & Thompson, L. M. (2023). Climate change and the global redistribution of biodiversity: Substantial variation in empirical support for expected range shifts. *Environmental Evidence, 12*, 7. https://doi.org/10.1186/s13750-023-00296-0

Runstrom, A., Bruch, R. M., Reiter, D., & Cox, D. (2002). Lake sturgeon (*Acipenser fulvescens*) on the Menominee Indian Reservation: An effort toward co-management and population restoration. *Journal of Applied Ichthyology, 18*, 481–485. https://doi.org/10.1046/j.1439-0426.2002.00426.x

Sai, D. K. (2004). American occupation of the Hawaiian State: A century unchecked. *Hawaiian Journal of Law and Politics, 1*, 46. https://www.academia.edu/7895818/American_Occupation_of_the_Hawaiian_State_A_Century_Unchecked

Santos, D. (2021, May 7). *Climate debt: A model for Indigenous Latin American self-determination?* E-International Relations. https://www.e-ir.info/2021/05/07/climate-debt-a-model-for-indigenous-latin-american-self-determination/

Schlaepfer, D. R., Braschler, B., Rusterholz, H. P., & Baur, B. (2018). Genetic effects of anthropogenic habitat fragmentation on remnant animal and plant populations: A meta-analysis. *Ecosphere, 9*(10), Article e02488. https://doi.org/10.1002/ecs2.2488

Schuster, R., Germain, R. R., Bennett, J. R., Reo, N. J., & Arcese, P. (2019). Vertebrate biodiversity on Indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas. *Environmental Science & Policy, 101*, 1–6. https://doi.org/10.1016/j.envsci.2019.07.002

Segnini, N. (2023, November 22). *9 Indigenous-led conservation wins and other promising advancements from 2023.* The Wilderness Society. https://www.wilderness.org/articles/article/9-indigenous-led-conservation-wins-and-advancements-2023

Shockley, J. W. (2018, February 2). *Migration patterns shift with unseasonably warm weather, lack of snow.* The Southern Ute Drum. https://www.sudrum.com/news/2018/02/02/migration-patterns-shift-with-unseasonably-warm-weather-lack-of-snow/

Shockley, J. W. (2023, February 23). *US 160 wildlife crossing a boon for big game migrations.* The Southern Ute Drum. https://www.sudrum.com/top-stories/2023/02/23/us-160-wildlife-crossing-a-boon-for-big-game-migrations/

Silva, N. K. (2004). *Aloha betrayed: Native Hawaiian resistance to American colonialism.* Duke University Press.

Staudt, A., Leidner, A. K., Howard, J., Brauman, K. A., Dukes, J. S., Hansen, L. J., Paukert, C., Sabo, J., & Solórzano, L. A. (2013). The added complications of climate change: Understanding and managing biodiversity and ecosystems. *Frontiers in Ecology and the Environment, 11*(9), 494–501. https://doi.org/10.1890/120275

Stults, M., Petersen, S., Bell, J., Baule, W., Nasser, E., Gibbons, E., & Fougerat, M. (2016). *Climate change vulnerability assessment and adaptation plan–1854 Ceded Territory including the Bois Forte, Fond du Lac, and Grand Portage Reservations.* 1854 Treaty Authority. https://www.1854treatyauthority.org/images/ClimateAdaptationPlan_Final-July_2016-optimized(1).pdf

Swinomish Indian Tribal Community (SITC). (n.d.). *Kukutali history.* https://www.swinomish-nsn.gov/natural-resources/page/kukutali-history

Temper, L., Avila, S., Del Bene, D., Gobby, J., Kosoy, N., Le Billon, P., Martinez-Alier, J., Perkins, P., Roy, B., Scheidel, A., & Walter, M. (2020). Movements shaping climate futures: A systematic mapping of protests against fossil fuel and low-carbon energy projects. *Environmental Research Letters, 15*(12), 123004. https://doi.org/10.1088/1748-9326/abc197

Ternes, B., Ordner, J., & Cooper, D. H. (2020). Grassroots resistance to energy project encroachment: Analyzing environmental mobilization against the Keystone XL Pipeline. *Journal of Civil Society, 16*(1), 44–60. https://doi.org/10.1080/17448689.2020.1717151

Tom, E., Adams, M. M., & Goode, R. W. (2023). Solastalgia to soliphilia: Cultural fire, climate change, and Indigenous healing. *Ecopsychology, 15*(4), 322–330. https://doi.org/10.1089/eco.2022.0085

Torda, G., & Quigley, K. M. (2022). Drivers of adaptive capacity in wild populations: Implications for genetic interventions. *Frontiers in Marine Science, 9*, Article 947989. https://doi.org/10.3389/fmars.2022.947989

Tran, T. C., Ban, N. C., & Bhattacharyya, J. (2020). A review of successes, challenges, and lessons from Indigenous protected and conserved areas. *Biological Conservation, 241*, Article 108271. https://doi.org/10.1016/j.biocon.2019.108271

Tribal Adaptation Menu Team. (2019). *Dibaginjigaadeg Anishinaabe ezhitwaad: A Tribal climate adaptation menu.* Great Lakes Indian Fish & Wildlife Commission. http://glifwc.org/ClimateChange/TribalAdaptationMenuV1.pdf

Tripp, B. (2020, September 16). Our Land was taken. But we still hold the Knowledge of how to stop mega-fires. *The Guardian.* https://www.theguardian.com/commentisfree/2020/sep/16/california-wildfires-cultural-burns-indigenous-people

Tucker, M. A., Böhning-Gaese, K., Fagan, W. F., Fryxell, J. M., Van Moorter, B., Alberts, S. C., Ali, A. H., Allen, A. M., Attias, N., Avgar, T., Bartlam-Brooks, H., Bayarbaatar, B., Belant, J. L., Bertassoni, A., Beyer, D., Bidner, L., van Beest, F. M., Blake, S., Blaum, N. ... Mueller, T. (2018). Moving in the Anthropocene: Global reductions in terrestrial mammalian movements. *Science, 359*(6374), 466–469. https://doi.org/10.1126/science.aam9712

Tyner, M. (2019, February 17). Este Mvskokvlke Em Vye Cvpofuce: The Mvskoke Cultural Community Garden. *Tribal College Journal of American Indian Higher Education.* https://tribalcollegejournal.org/este-mvskokvlke-em-vye-cupofuce-the-mvskoke-cultural-community-garden/

University of Alaska Fairbanks. *Tribal Governance. Unit 3: Alaska Native Claims Settlement Act (ANCSA) 1971.* https://www.uaf.edu/tribal/academics/112/unit-3/alaskanativeclaimssettlementactancsa1971.php

U.S. Climate Resilience Toolkit (2023). NOAA. https://toolkit.climate.gov/

U.S. Forest Service. (2022, October 11). *Revitalizing rivercane in Kisatchie National Forest.* USDA. https://www.fs.usda.gov/inside-fs/delivering-mission/deliver/revitalizing-rivercane-kisatchie-national-forest

Vasiliev, D., & Greenwood, S. (2021). The role of climate change in pollinator decline across the Northern Hemisphere is underestimated. *Science of the Total Environment, 775*, 145788. https://doi.org/10.1016/j.scitotenv.2021.145788

Waller, D. M., & Reo, N. J. (2018). First stewards: Ecological outcomes of forest and wildlife stewardship by Indigenous Peoples of Wisconsin, USA. *Ecology & Society, 23*(1), 45. https://doi.org/10.5751/ES-09865-230145

Whyte, K., Avery, C., Azzuz, E., Breckinridge, J., Cooley, C., Cozzetto, K., Croll, R., Cruz, M., Ezcurra, P., Hardison, P., Jones, C., Lake, F., Magee, C., Marks-Marino, D., McCrea, D., Mullen, H., Nelson, C., Pairis, A., Panci, H., ... Warneke, A. (2021). Ecosystems & biodiversity. In D. Marks-Marino (Ed.)., *Status of Tribes and climate change report* (pp. 56–80). Institute for Tribal Environmental Professionals. https://www7.nau.edu/itep/main/docs/publications/ITEP.STACC.Report_2021.pdf

Whyte, K., Novak, R., Laramie, M. B., Bruscato, N. G., David-Chavez, D. M., Dockry, M. J., Johnson, M. K., Jones Jr., C. E., & Leonard, K. (2023). Tribes and Indigenous Peoples. In A. R. Crimmins, C. W. Avery, D. R. Easterling, K. E. Kunkel, B. C. Stewart, & T. K. Maycock (Eds.), *Fifth national climate assessment.* U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023.CH16

Winter, K. B., Beamer, K., Vaughan, M. B., Friedlander, A. M., Kido, M. H., Whitehead, A. N., Akutagawa, M. K., Kurashima, N., Lucas, M. P., & Nyberg, B. (2018). The moku system: Managing biocultural resources for abundance within social-ecological regions in Hawai'i. *Sustainability, 10*(10), 3554. https://doi.org/10.3390/su10103554

Winter, K. B., Lincoln, N. K., Berkes, F., Alegado, R. A., Kurashima, N., Frank, K. L., Pascua, P., Rii, Y. M., Reppun, F., Knapp, I. S., McClatchey, W. C., Ticktin, T., Smith, C., Franklin, E. C., Oleson, K., Price, M. R., McManus, M. A., Donahue, M. J., Rodgers, K. S., ... Toonen, R. J. (2020). Ecomimicry in Indigenous resource management: Optimizing ecosystem services to achieve resource abundance, with examples from Hawai'i. *Ecology and Society, 25*(2), 26. https://doi.org/10.5751/ES-11539-250226 ◀◆

Indigenous Ways of Not Knowing

CHAPTER LEAD

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KEY MESSAGES

This chapter captures the essence of Indigenous Knowledges and their ingrained values of humility, gratitude, and trust. It invites readers to move beyond Indigenous ways of knowing to include Indigenous ways of not knowing, which emphasize the importance of embracing the state of not knowing.

CHAPTER RECOMMENDATIONS

Employing Indigenous ways of not knowing in climate action asks us to embrace humility and not knowing, deeply listen to Indigenous Knowledge Holders, and take more time for reflection and observation before acting. Our current climate actions are often rushed, with heightened feelings of urgency. This drives dominant society to prioritize Western science, as that is what is most familiar. We are calling readers to sit with the not knowing and follow Indigenous Peoples' leadership to reimplement traditional land management practices. This will enable all to return to a more sustainable and harmonious relationship with the environment for future generations.

Chapter Author Positionality Statements

Bazile Minogiizhigaabo Panek is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. He serves as an Indigenous consultant for the Institute for Tribal Environmental Professionals and is the founder and CEO of Good Sky Guidance, a consulting firm specializing in the use of Indigenous Knowledges in environmental initiatives.

Kaylen James is a PhD candidate in American Studies at the University of Minnesota Twin Cities, where she is also a member of the Critical Indigenous Studies Cohort. She is Itazipco Lakota and Mdewakantunwan Dakota, and an enrolled member of the Santee Sioux Nation of Nebraska. Prior to starting her PhD, Kaylen worked in Tribal education in a variety of capacities. She is currently the Charles Eastman Dissertation Fellow at Dartmouth College.

Nisogaabokwe Melonee Montano is a Tribal member of the Red Cliff Band of Lake Superior Ojibwe. She is a graduate student at the University of Minnesota-Twin Cities in the Natural Resources Science and Management Program of the Forestry Department, where her research is focused on the use of fire as a traditional land management tool by the Indigenous people of the Great Lakes region.

Joe Graveen is the Wild Rice Program Manager and a former Tribal council member for the Lac du Flambeau Band of Lake Superior Chippewa. Joe has been a hunter–gatherer throughout his life and has been passing his teaching onto his children and grandchildren.

Dr. Maddy Nyblade is a settler and an assistant professor of Environmental Studies at the State University of New York College of Environmental Science and Forestry (SUNY ESF). She is also one of the Faculty Co-Directors for the Center for Native People and the Environment, within SUNY ESF. She completed her doctoral work on the interconnected impacts of climate and land cover change on Wild Rice in collaboration with several tribes and inter-Tribal organizations across the Great Lakes.

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08 Indigenous Ways of Not Knowing

“These woods don’t separate us from the world is what I’m trying to convey here, nor do these stories I share with you. They are a place where things come together, but not always in ways that others would recognize as harmonious. Sometimes it’s terrible to be a squirrel, a bullhead, or a ghost at the other end of a dog, an eagle, or a bottle, but there is a terrible beauty in the world as well as a loving beauty, you’d best remember that. Both are beautiful because that is how they are—and how we are. How our story is. They’re harmonious but not in the way most people think of harmony.

We are like the woods, noozis—harmonious in this other way. We are mixed up, a place where things we don’t always understand come together—sometimes terribly and sometimes lovingly…”

—Carter Meland (Anishinaabe), Stories for a Lost Child (Meland, 2017)

We composed this chapter in respect to Indigenous oral literary traditions and knowledge creation. Throughout the creation of this chapter, we gathered in-person and online to have open-ended conversations about our ways of knowing and not knowing with respect to climate change. Transcripts of our conversations were initially used to fill the pages and were then collectively reworked into the current format. Given our approach, we included direct quotes from both ourselves and others to honor Knowledge shared by specific individuals. By incorporating oral literary methods, not only do we honor Indigenous Knowledge creation, we respect the fluidity inherent within such methods—methods that simultaneously disrupt the exactitude of Western knowledge production and provide space for interpretation, nuance, and mystery (James & James, 2023).

In line with the traditions of Lakota and Ojibwe protocol, we respectfully acknowledge our many teachers who have gifted us with generations of Knowledge that we now humbly and imperfectly share. Our teachers include both human and more-than-human relatives, as well as spirit and the unknown.

Introduction

To be uncertain and to be afraid is a terrible and loving beauty. To not know and not have control is a terrible and loving beauty. To come together in this way—as researchers and writers trying to know climate change—is both a terrible and loving beauty. This is what this Indigenous environmental research generates: ripples of grief and hope, of uncertainty and opportunity, of not knowing and knowing—all of which are indeed harmonious, but again, not in the way people often think.

Harmonious is not a term one would associate with any discourse around climate change in the dominant society today. With its dramatic increases in weather fluctuations, devastating storms, and unprecedented and unpredictable climactic events as discussed throughout this report, the climate crisis has been brutal for many of our human and more-than-human relations. The unpredictability of such extreme events and changes in the seasons has bred uncertainty and fear. Words like chaos, catastrophe, and apocalypse dominate the narratives surrounding climate change—narratives that are often repeated in pop culture and the media. So how can we be anything but afraid of such a future? How could we not feel despair? Climate change is a present and looming monster. We are running out of time, or maybe we have already run out. We are doomed, paralyzed with fear, so why try? Such thoughts and feelings of hopelessness run rampant.

However, as Indigenous scholars and allies, in this uncertainty, we see a humble opportunity—a chance to return to harmony through humility. Nature is neither cruel nor malicious; however, it can be brutal, and it can bring humanity to its knees in a manner that is both humbling and awe inspiring. While nature does not have a voice that is clear to human ears, it does speak. To hear nature, we must practice the utmost humility and respect.

Humility is one of the foundational values of many Indigenous communities. It is also the basis for understanding how many Indigenous Peoples relate to this world—humility asks us to “not stand out as apart, but…to stand within the circle, with a generous heart and mind for the People and all our relations” (Holmes & González, 2017, p. 214). As such, it is humility that informs our sense of interconnectedness with all Creation. To elaborate on humility, we can look at the Lakota and Dakota concept of *Wakan Tanka*, loosely translated as the great mystery or incomprehensibility. At the center of Lakota thought and spirituality is the profound understanding that there are not just truths beyond our comprehension, but there are even truths we are not supposed to know or understand. Our people understood that messiness, mystery, wonder, awe, and uncertainty were essential to feeling the full weight of our humanity—for it is this limitation in human knowledge and not knowing that both grounds and connects us to all Creation (James & James, 2023; James, 2023).

Bee pollinating saguaro cactus flowers during the spring season.
Photo Credit: Colleen Cooley.

From an Ojibwe perspective, the Creator of our world has many names. One name, *Gichi-Manidoo*, translates to the Great Spirit. Another, *Nigaanizid*, refers to the "big toe" of the Creator, because this being is so far beyond human perception that we can only visualize them by their big toe (L. O. Staples, St. Croix Chippewa Indians of Wisconsin, lives in Hinckley, Minnesota, personal communication, 2019). These names acknowledge and respect the human being's inability to fully understand. This principle of humility informs our interactions with the entire Earth community, supporting sustainable livelihoods.

Yet this respect for uncertainty and not knowing has often run counter to mainstream (Western) science and colonial knowledge production (James, 2023). The prominent American philosopher John Dewey once argued that the acclimation and adaptation to the natural world was the reflection of a "savage" relationship to nature, but the progressive and civilized society's relationship to nature was one characterized by its mastery and control (Deneen, 2018). One of the primary ways a civilized society could accomplish such mastery was through its technological innovations—innovations that attempted to manage and control land and nature. Streams were straightened into canals for transportation, wetlands were drained with ditches and then tile drains to create more cropland, dams were built to control the flow of waters, hot temperatures were cooled with air conditioners, and so on. In other words, mainstream science and technology's way of approaching nature has been characterized by their attempts to master and control that which is fundamentally uncontrollable and, at times, even unknowable (James, 2023). This includes our mainstream approach to climate science and adaptation such as modeling to predict future climate and impacts and engineering solutions such as mechanized carbon sequestration, solar panels, wind turbines, and erosion control structures. Yet, in the hopelessness and chaos of this climate crisis, we see a potential return to harmony but through a different path. This path begins by foregrounding intellectual and scientific humility—an acceptance and respect for not knowing—as understood within many Indigenous Knowledge Systems.

An Indigenous Worldview: In the Time of Harmony

Control and fear are just two of many ways humans can approach the natural world and its changes. Grounded in a sense of belonging and humility, Indigenous Peoples hold different approaches.

Ojibwe teachings also speak of a time when all beings, both human and more than human, lived in harmony with one another, communicating through a common language. Humans deeply belonged in this world, so much so that animals and other more-than-human relatives took pity on us and offered their gifts to help us survive. Humans, in our humble states, were never too

> *"In the old days it was said that the shining fish would come up from the water just to partake of our faces as we washed. The wind played a song in the reeds just to draw us near. The whole world loved the human people. Now it all pulls away from us and hides.*
>
> *In the old days when we were beautiful and agile, we asked the animals to lay down their lives for us and in turn we offered our kinship, our respect, our words in the next world over from here, our kind treatment. In the old days it was said that we were humans. What people believe, falsely, is that all this can no longer be so."*
>
> —**Linda Hogan,** Chickasaw (Hogan, 1999)

cold or warm, hunts and harvests were in balance, and our people prospered. This generous act of caretaking by our animal and more-than-human relatives maintained both balance and harmony. As relatives, people did not seek to control or own other beings, but rather cared for the balance of relationships. This reciprocal caretaking was our obligation as humans, and this balance allowed for all beings to co-exist harmoniously in the world.

Harmony was achieved through this humility, an acceptance of humans not knowing all things. People utilized silence—patient observation of other relatives and change—for Knowledge about caretaking the balance of relationships.

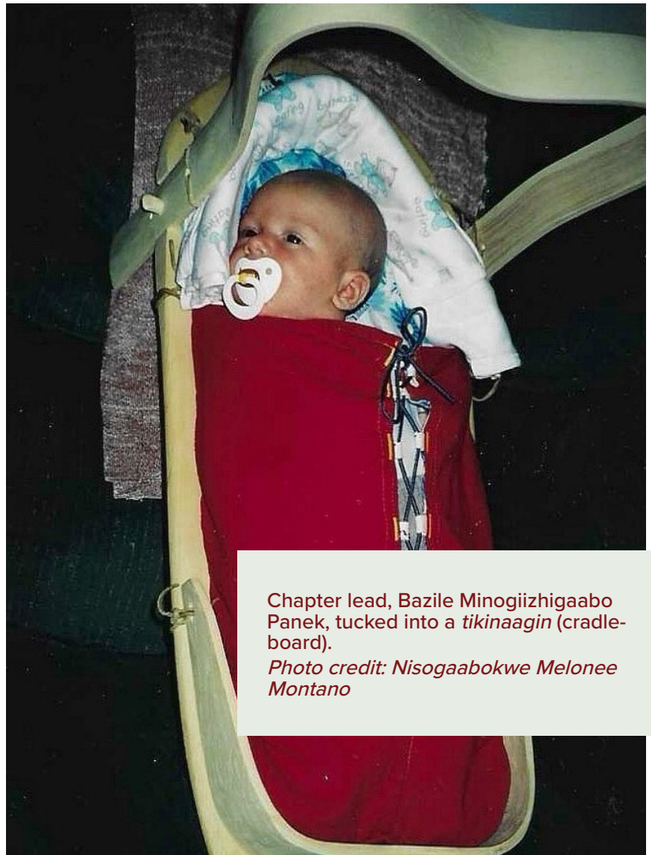
Silence and observation are the first form of education we receive as humans brought into this world (Gross, 2014). When only days old, many Ojibwe children are tucked into a *tikinaagin*, a cradleboard, commonly made from ash wood, moss as padding, and buckskin to hug and protect the child (Kohl, 1985). Cradleboards were carried by adults as backpacks so young ones could join their families in the bush during harvesting to listen, observe, and learn from their relatives and the spirits. But the infants themselves tucked in the cradleboards also hold knowledge not known by adults.

Ojibwe, Lakota, and other Indigenous Peoples grew to understand harmony was not static perfection, as balance and harmony involve both growth and decay, a terrible and loving beauty. This knowledge of cyclical creation and death became central to our ways of life. Ceremonies hold people within the joys and grief of this change, reminding us of our part in these flows—

> *"When I think about silence, I think of sitting in my fish shack jigging my hand carved fish decoy watching it go around in the water; then without notice a musky appears, gliding through the water…you cannot hear them…silence as I put my spear into the water…silence as the musky moves its fins…silence as the musky moves slowly towards the decoy…silence broken when I thrust the spear like a horse kick into the spine of the musky just behind its head. Solitude is used in many ways in my development, and solitude is something I know well. Solitude is my kingdom, for there I find answers to some of life's problems. Solitude for me is when my thoughts, body, and soul are in tune to my surroundings. When I can sit by a stream and just sit there and listen, listen to the stream speak. For it is here that my mind is cleansed. It is here that I acquire songs. It is here that I can hear other beings speak. Solitude is where life is. It is where a lot of my values come from, teachings that I pass on to my children. Respect it! If our world stopped like this regularly, I think society would be a better place to live. And I think that we would be heading in the right direction in finding balance between us humans and other beings such as plants, winged, four-legged, tree, stone, etc."*
>
> —**Joe Graveen**, Ojibwe

our agency to engage in this world and our inherent inability to control it. And with change, people's humility and respect for the natural world changed too. Humans began to take this world for granted and desired control in order to allow for the hoarding of food, materials, and power, forsaking the norms of social and cultural sharing. Fortunately for us, the spirits and our more-than-human teachers have ways to guide us back into balance by cultivating our humility:

> *"In the Ojibwe worldview, young people are closest to death and closest to spirits. It is believed that we, as humans, come from the stars and choose our parents before coming. When we first arrive, we hold a great wealth of knowledge and during infancy, we are able to communicate with the spirit world around us. We are then given the responsibility to learn all we can about the physical world here on Earth, through observation, which predominantly occurs while in a cradle-board (a traditional baby carrier used by many Indigenous people). It is said that during this time, we also receive teachings from the spirits around us. This same understanding exists when life comes full circle and it is time for death, which is when we return to the stars. ...*
>
> *... The ability for one to communicate with the spirit world around us can be observed when an individual is moments and sometimes days away from passing away, which is when the cycle from birth to death comes full circle."*
>
> —**Nisogaabokwe Melonee Montano**, Ojibwe



Chapter lead, Bazile Minogiizhigaabo Panek, tucked into a *tikinaagin* (cradle-board).
Photo credit: Nisogaabokwe Melonee Montano

When humans did not respect the sugar maple trees, the spirits took the gift of easy access away. We had repaid the generosity of the sugar maple with ingratitude. Along with the trees, the animals were tired of serving us and making humans' lives easy, and they expressed their desire to deny their labors to humans. Having pity on us, they did not take away all of their gifts to humans, just the common language. Humans could no longer ask for things from the animals but had to listen through silence and observation to develop hunting and gathering practices. In this way, humans were reminded of all we do not know and all we do not have control over, reminding us to have humility in order to live in harmony.

While these stories can be understood as from long ago, they are showing themselves again. We are in a time where gifts are being taken away with a changing climate, but the possibilities for their return remain. Our maple sap is becoming more challenging to harvest with more unpredictable and early flows with the shifting seasons and our animal relatives are disappearing, but we can heal our relationships from a place of humility, silence, listening, and respect for not knowing.

> *"Mewinzha (a long time ago) the Ojibwe people had all they needed to survive in the environment around and all lifeway activities were carried out with ease, requiring very little work to obtain, including the gathering of maple syrup. It was so easy that pure maple syrup flowed directly out of sugar maple trees, and all the Ojibwe people needed to do was lay under the taps and let it pour into their mouths. Nanaboozhoo saw that the Ojibwe people were taking the creators' gifts for granted and had become lazy. This made Nanaboozhoo worried that eventually the maple syrup would become worthless, so he decided to dilute it, making the Ojibwe go through a long and labor-intensive process in order to obtain pure maple syrup. To this day, it takes a great deal of effort and commitment for all human relatives to obtain maple syrup each year."*
>
> —***Nisogaabokwe Melonee Montano***, Ojibwe

A Colonial Worldview: Fear of Climate Change

Fear of the unknown and the uncontrollable, along with shame for human-driven destruction, dominates the colonial worldview's approach to climate change. Our inclination to look to science and technology to solve the climate crisis—to save us from the effects of extractive and industrial capitalism—is still very much an attempt to master and control a nature that we see ourselves as separate from and detrimental to. And this climate catastrophe fear can even intensify the dominant society's need for control.

In the dominant worldview, we must disrupt this march toward an unknown yet certain apocalypse, loss, and death, so we urgently pursue climate science in order to understand the unknown climate and predict its change. We monitor and measure as surveillance of the ongoing change in order to preserve a record of what once was. We rush to invent technology to control this change or adapt our resource use to attempt to preserve life as we know it. We must

know, so we can control, so we can prevent our own loss and death and possibly save others in the process. We humans will be our own saviors and those of defenseless nature through science, technology, and rationality.

While mainstream sciences' motivations are full of more complexities than expanded upon in the preceding characterization, this message nonetheless has become the dominant, outward-facing idea: we must control the climate, just as we seek to control nature. And if we dig further, we can connect our desire to control nature to our desire to be "civilized," as articulated by Dewey. So from the settler, colonized worldview, climate change is bad. We need to know so we can control the climate to our advantage.

So, what if change isn't the problem and control isn't the solution? What if people are not inherently bad for our climate and we actually belong on this planet? This is not to say that the rapidly changing climate in response to widespread human-driven fossil fuel consumption has not and will not bring forth much change, loss, decay, and death to the entire Earth community. But this loss of "the world as we know it" is a world of settler dominance and White supremacy, of transactional consumption rather than reciprocal relationships. What could climate narratives, climate sciences, and climate adaptation look like if not driven by shame and fear and not seeking to know, to control, or to save but rather to (re)build respectful, balanced relationships accountable to our own actions with acceptance of uncontrollable and unknown change, acceptance of our not knowing? Maybe we would slow down and sit in silence to listen and feel, rather than only measure and survey and control.

Chaos and Apocalypse: Where Colonial and Decolonial Meet

The chaos of not knowing exists in both a colonial and decolonial worldview, but with differences. In the colonial or mainstream scientific world, fear of the chaos tends to drive an urgency to obtain answers rapidly, often through immediate poking and prodding of our research subjects. Research timelines are rushed, and relationships, such as Tribal consultation and involvement, are overlooked (Fisher & Ball, 2003). This sense of urgency prevents us from being able to slow down to build relationships, learn from each other and more-than-human beings, and collaborate deeply because climate chaos is so pressing we must solve it immediately.

Decolonial chaos, on the other hand, is a light show of fireflies. Beauty is apparent in the seemingly random nature of their flight. Perhaps there is a pattern, but one is left to admire the mystery. We, as people, dance among them, as it should be. Decolonial chaos is the acceptance of the unknown and the act of not knowing, where one is at peace with not having answers for everything. This can also be an opportunity for joy, beauty, even celebration. There is so much to learn, and we can be grateful for that. Within the colonial view, chaos is jarring, and we feel lost and afraid. Within the decolonial view, we feel humility, gratitude, and trust. We also feel a responsibility to tend and take care of the gifts that have been given (Kimmerer, 2015).

> *"Humbly, I want to share a dream that I had. I dreamt that I was at Northern Michigan University where I went to school, in the Center for Native American Studies Office. One of the professors and my great mentor, April Lindala, was in the office too. I was busy writing a paper and I think it actually was for this report, the* Status of Tribes and Climate Change. *I had some ideas down on paper. My mentor, April, came in and began to review what I had written down. She relayed some of her thoughts. In the top left corner of my paper she wrote down, "Colonial chaos vs. decolonial chaos…" From this dream, I received this message. I learned that colonial chaos is the messiness, and it is seen as scary to not know everything. There is also an aspect of chaos in a decolonial worldview. …*

> *… When viewing chaos through a decolonial worldview, however, it's okay to have chaos and messiness. I'm visualizing that through a bunch of fireflies flying around. And that being a beautiful chaos. There is almost a rhythm to that chaos. Being okay with that through a decolonial worldview."*
>
> —**Bazile M. Panek**, Ojibwe

The apocalypse of climate change can also be understood from colonial and decolonial perspectives. From the colonial perspective, the apocalypse is a dark storm cloud on the horizon. The time between lightning flashes and thunderclaps is shrinking. The tornado sirens have just gone off. From the decolonial perspective, this apocalypse began 500+ years ago with the onset of Euro-American colonization of Turtle Island, with disease, wars, treaty violations, land theft, reservations, boarding schools, racism, environmental transformation, and more in the genocide that birthed this settler nation (Whyte, 2017). Throughout the centuries, the settlers transformed complete landscapes—old growth forests cleared, prairies tilled, wetlands drained, floodplains inundated—over a matter of years to decades in every corner of this nation. To elevate their ways of life, the settlers carried out the apocalypse against the lifeways of Indigenous Peoples. Settlers were the invading, apocalyptic zombies, yet with the awareness and intention to commit genocide. This ecological transformation ushered in the dominance of our settler nation's lifeways (Whyte, 2018). And yet Indigenous People and their cultures are still here today, they survived, but at great cost and with great loss. And climate change now threatens settler lifeways at a similar rapid pace.

If we see the apocalypse as a 500+ year event rather than an unparalleled, imminent danger from the chaotic unknown of climate disaster, we have time for a deep breath at this moment. We have survived for this long, so we trust that we can continue to do so with thoughtful ac-

Looking towards Aialik Glacier. Kenai Fjords - Aialik Bay, Alaska.
Photo Credit, Ashley Gries

tions and healing moving forward. In fact, if we don't take this time to breathe, to slow down, to connect, to listen with humility, we risk plowing ahead full speed down the same path of destruction of Indigenous lifeways in support of settler ones. In this pause, we can turn our focus inward to explore, to research, to reflect on our own thoughts and actions. If we lose our access to sugar maple trees, for example, perhaps rather than rushing to genetically engineering a new tree, we reflect. Are we being respectful to our sugar maple relatives? Are we feasting them like we should be? Are we taking too much from them? Are we caring for the Lands and air on which they depend? If we are not fulfilling our obligations to these relatives and the Creator by taking care of them, they can be taken away from us (Simpson, 2013).

Layer by layer we can peel away until we are sitting with curiosity in our shame and fear. Why are we afraid of the chaos of not knowing? What causes our shame and why? Where do these feelings come from? Bit by bit we can settle into acceptance of our not knowing and lack of control. Slowly this acceptance grows into humility and even awe. This path may reveal opportunities for collective healing and a sense of belonging.

Indigenous Ways of Not Knowing

Indigenous ways of not knowing emphasizes the humility and respect for the mysteries and unknown aspects of the natural world. This is the wisdom to recognize that we are not all-knowing beings, and some things are not meant to be known and not able to be controlled. Indigenous ways of not knowing instead remind us of humility, slowing down, respecting the mysteries, silence, observation, and being grateful for our opportunities for learning and growth. Indigenous ways of not knowing are not a deficiency. It is a respectful view of the unknown and the mysteries that exist within the world. This perspective values the mystery and sacredness inherent in nature and life, recognizing that some aspects of existence are beyond human comprehension and control.

"To me, seed keeping is a window into different cultural wisdoms regarding caretaking of future generations. The Western way of seed keeping involves storing all of the planet's seeds in a storage facility in the Arctic with the intent of preservation for future food security. This method holds the tremendous genetic knowledge of seeds from around the world in a way that can outlast the ongoing and rapid biocultural devastation of local environments.

But it turns out not all seeds when frozen last forever, and not all frozen lands last forever either. With a warming climate and natural decay, complete preservation becomes impossible. Indigenous seed keeping practices center active relationships—each year, seeds are planted, grown, harvested, and once again saved for the following season. The seeds continue to nurture people and people continue to nurture seeds through relationships practiced annually and passed down along with seeds. Seeds evolve with the selective pressures, adapting with resilience to changing climate, environments, and people. And knowledge remains rooted in place. But the exact, original information within the seed's genes is not preserved, and the continuation of these seeds depends on the continuation of their interconnected biocultural community."

—**Maddy Nyblade** *(settler)*

A *miigwan* (eagle feather, Ojibwe) lies on the shore of Lake Superior before an elder offered asemaa (tobacco, Ojibwe) in return for being able to take the miigwan and use it for ceremonial purposes.
Photo Credit: Nisogaabokwe Melonee Montano

The current narratives surrounding climate change heighten feelings of urgency and drive the rush toward immediate solutions. And in this rush, mainstream science is prioritized over all other forms of knowledge (Cochran et al., 2013). In a steamroller approach to transition from fossil fuels to so-called green energy in early 2023, the Biden administration leased out large parcels of both the Pacific and Atlantic coastlines to offshore wind farms without consultation with nearby Indigenous Nations and without protections put in place to safeguard the cultural practices that are tied to the land and ocean (Lynders, 2023). In response, the National Congress of American Indians called for a halt to wind projects until procedures are developed to incorporate Indigenous Knowledges and Peoples in the management, permitting, and development processes of wind projects (Dlouhy, 2023). This pattern continues elsewhere, such as the construction of a green hydrogen facility on the wetlands bordering the Tonawanda Seneca Nation's Big Woods, one of the most important hunting and gathering lands for the Haudenosaunee, without consent from the Nation (Kimmerer, 2023). A transition from fossil fuels is necessary, but it can't happen appropriately without honoring the Indigenous Peoples who have been stewarding this land since mewinzha, a long time ago. Indigenous ways of not knowing gently remind us to slow down and listen. They urge us to engage in research and action that is well thought-out and respects all forms of knowledge.

The rush toward immediate solutions is driven by discomfort with the unknown and the seemingly chaotic nature of our world. By accepting our lack of control and employing a decolonial view on chaos, we can point our focus toward harmony and balance, moving away from a mindset of domination. Ojibwe People have long observed ebbs and flows of Wild Rice's population cycles that occur every four or so years (Nyblade et al., 2023; David et al., 2019). From a

perspective of short-term thinking, the highs and lows of the Wild Rice population may feel like a rollercoaster, but the Ojibwe have always recognized this as the being's natural cycle. During periods of low population, Ojibwe People know the rice and the lake are resting and intentionally nourish their communities through a diversity of other food sources as well as trade with neighbors whose lakes are at a different point in this cycle (Z. Nooding, White Earth Nation, personal communication, 2020). This approach encourages humility and patience. With an open mind toward chaos and inconsistencies, we can learn to be comfortable with new patterns and surprises (Gross, 2014).

We can even express gratitude for the incongruities and the fact that our understanding of the world is limited. How joyous it is to know that there is so much out there to learn. Oral storytelling is a key form of teaching for the Ojibwe. Often humorous, like the story about maple syrup that was presented earlier in the chapter, these stories require listeners to use their imagination and knowledge to draw out teachings and meanings (Johnston, 1976). In the face of climate change, we can use our imagination to dream new societies into reality: societies that navigate climate change through honoring Indigenous Knowledges and all that humans do not know while respecting and being responsive to Western science. Lawrence Gross (White Earth Band of Ojibwe) sees dreaming new societies into reality as a joyous opportunity: "It is not very often in human history that a people have a chance to build a new world" (Gross, 2014).

When we fully respect our not knowing, slow down, accept our lack of control, and experience joy about our limited understanding of the world, we can then work to heal ourselves, our communities, and our impacts on the world. When we implement Indigenous ways of not knowing in our work, we recognize that Earth and its processes are far more complex than our current understandings can encapsulate. Approaches with a more reflective pace allow for deeper observation and learning, fostering a deeper connection with the natural world and with each other. ◀◆

Indigenous Ways of Not Knowing Chapter References

Cochran, P., Huntington, O. H., Pungowiyi, C., Tom, S., Chapin III, F. S., Huntington, H. P., Maynard, N. G., & Trainor, S. F. (2013). Indigenous frameworks for observing and responding to climate change in Alaska. *Climatic Change*, *120*, 557–567. https://doi.org/10.1007/s10584-013-0735-2

David, P., David, L., Stark, H. K., Stark, K. J., Fahrlander, S. N.-A., & Schlender, J. M. (2019). *Manoomin, Version 1.0*. Great Lakes Indian Fish & Wildlife Commission. https://www.1854treatyauthority.org/images/ManoominChapter.Appendices.2019.final.pdf

Deneen, P. J. (2018). *Why liberalism failed.* Yale University Press.

Dlouhy, J. A. (2023, February 27). Offshore wind halt urged by Native Americans seeking sway. *Phys.Org*. https://phys.org/news/2023-02-offshore-halt-urged-native-americans.html

Fisher, P. A., & Ball, T. J. (2003). Tribal participatory research: Mechanisms of a collaborative model. *American Journal of Community Psychology, 32*(3–4), 207–216. https://doi.org/10.1023/B:AJCP.0000004742.39858.C5

Gross, L. W. (2014). *Anishinaabe ways of knowing and being*. Routledge.

Hogan, L. (1999). *Power: A novel*. Norton.

Holmes, A., & González, N. (2017). Finding sustenance: An Indigenous relational pedagogy. In D. Paris & H. S. Alim (Eds.), *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world*. (pp. 208–215). Teachers College Press.

James, K. (2023, May 11–13). *The lifespan and afterlives of Indigenous data: Decay, forgetting, and not knowing* [Conference presentation]. Native American and Indigenous Studies Association 2023 Conference, Toronto, Ontario, Canada. https://indigenous.utoronto.ca/event/naisa-2023-tkaronto-conference/

James, K., & James. K (2023). Putting research into the heart: Relationality in Lakota-based research. In E. Sumida-Huaman & N. Martin (Eds.), *Indigenous research design: Transnational Perspectives in Practice* (pp. 243–261). Canadian Scholars Press.

Johnston, B. (1976). *Ojibway heritage.* Bison Books.

Kimmerer., R. W. (2023, November 1). Stand for Indigenous Land justice: Stop STAMP. *Yes! Magazine.* https://www.yesmagazine.org/opinion/2023/11/01/ny-native-stamp-seneca

Kohl, J. G. (1985). *Kitchi-Gami: Life among the Lake Superior Ojibway* (L. Wraxall, Trans.). University of Minnesota Press.

Lynders, M. (2023, May 18). *Shinnecock Nation wants to center Indigenous perspective to offshore wind farm debate.* WSHU. https://www.wshu.org/long-island-news/2023-05-18/shinnecock-nation-wants-to-center-indigenous-perspective-to-offshore-wind-farm-debate

Meland, C. (2017). *Stories for a lost child*. Michigan State University Press.

Nyblade, M., Larkin, D., Vogt, D., Croll, R., Panci, H., Byrne, B., Panek, B. M., Ng, C., Graveen, J., & Hanson, K. (2023). Climate change contributes to loss of wild rice (manoomin/psiŋ), threatening Indigenous lifeways. In *First we must consider manoomin/psiŋ: Impacts of climate and land cover change on wild rice* [Dissertation, University of Minnesota]. University of Minnesota Digital Conservancy. https://hdl.handle.net/11299/260660

Simpson, L. B. (2013). *The gift is in the making: Anishinaabeg stories*. HighWater Press.

Whyte, K. P. (2017). Our Ancestors' dystopia now: Indigenous conservation and the Anthropocene. In U. Heise, J. Christensen, & M. Niemann (Eds.), *Routledge Companion to the Environmental Humanities*. Routledge. https://doi.org/10.4324/9781315766355

Whyte, K. P. (2018). Settler colonialism, ecology, and environmental injustice. *Environment and Society: Advances in Research, 9*(1). https://doi.org/10.3167/ares.2018.090109 ◀◆

Conclusion, Key Messages, and Recommendations

Status of Tribes and Climate Change, Volume 2 seeks to uplift and honor the voices of Indigenous Peoples across the U.S. to increase understanding of Tribal lifeways, cultures, and worldviews; the climate change impacts Tribes are experiencing; the solutions they are implementing; and ways that all of us can support Tribes in adapting to our changing world. By following the lead of Indigenous Peoples both within the United States and worldwide, we can reach a more sustainable future.

As demonstrated by this report, the increasing amounts of literature, and the TEK shared by Indigenous Peoples, Tribes are incredibly connected to the land, waters, plants, and animals. Many Tribes view these beings as relatives and not resources, emphasizing the interconnectedness that we have with the world around us. Various groups of Indigenous Peoples consistently remind us of our reciprocal obligations to care for the beings that care for us. These acts of care require the intricate knowledge of the environment that Indigenous Peoples have gathered since time immemorial. The current narratives surrounding climate change lack the care, understandings of interconnectedness, and social and spiritual dimensions that Indigenous Peoples recognize as necessary in responses to climate change.

Unfortunately, settler colonialism and the extractive nature of Western society have left the burden on Indigenous Peoples, who face the effects of climate change more than other groups. Extractive practices such as pipelines, mining, and logging have occurred only after turning a blind eye to Tribal treaties that were intended to protect the lands for generations into the future. Now comes the time for Western society, Western science, policymakers, and individuals to involve Indigenous Peoples and Tribes at all stages of climate change responses and actions. From the initial stages to development, implementation, monitoring, review, and evaluation of next steps, Tribes must be allowed to have a voice that is listened to, and their Indigenous Knowledge Systems must be respected as much as other knowledge systems.

01 Chapter 1: Historical, Political, Social, and Cultural Contexts

KEY MESSAGES

(1) Indigenous Peoples' Knowledge systems and self-governance should be recognized as solutions to mitigating the causes and negative impacts of human-induced climate change.

(2) Historic trauma is a major aspect of how Indigenous Peoples are harmed by climate change.

(3) Respect for ethical relationships and procedures helps to reduce threats that Indigenous Peoples face when they share their Knowledge.

02 Chapter 2: Cultural Preservation and Revitalization in the Face of Climate Change

KEY MESSAGES

Indigenous Knowledge systems offer a profound perspective on sustainability and ethics that are rooted in deep, relational understanding with lands and communities. These philosophies challenge the dominant ways of thinking by presenting holistic approaches to climate resilience that emphasize reciprocity, respect, and interconnectedness. Indigenous Knowledges provide pivotal roots to create sustainable and equitable paths moving forward.

RECOMMENDATIONS

Incorporating Indigenous Knowledges and wisdom into climate action is necessary. Honoring the land is central to moral and ethical considerations, so we must ensure Indigenous voices, cultures, and ways of knowing guide climate resilience. Policymakers and environmental stakeholders should establish partnerships with Indigenous communities and ensure their leadership and Indigenous Knowledges are prioritized in climate initiatives. These partnerships should honor consent, respect, Indigenous sovereignty, and reciprocity with peoples and lands.

03

Chapter 3: Water Justice

KEY MESSAGES

Indigenous Peoples are affirming inherent relationships for Water protection through Water declarations, law, and policy. New advancements for #WATERBACK stem from innate Water teachings advocating for restoring connection to Water, ecosystems, and Water-dependent nonhuman relatives. Protecting Water protects future generations and cultural continuity for species of cultural importance such as wampum, manoomin, salmon, and more. Water is Life.

RECOMMENDATIONS

Transboundary Water governance must be led by Indigenous Peoples and Indigenous Water institutions. Indigenous Water law, diplomacy, and treatymaking are key to restoring Indigenous Water rights and responsibilities. Indigenous Water scientists are actively leading Water data collection, and access initiatives should be supported through fiscal resources and capacity building for Tribal governments.

04

Chapter 4: Good Fire and Climate Change: The Return of Indigenous Fire Stewardship

KEY MESSAGES

Good Fire stewardship led by Indigenous Peoples has been practiced over millennia and is proven to be sustainable and healthy for landscapes. Cultural fire stewardship, often different from agency and prescribed fire approaches, is unique to each Tribe/Indigenous group in terms of goals and technique. The acknowledgement of Traditional Good Fire implementation presents culturally grounded solutions to the escalating threats of wildfires, biodiversity loss, and climate change.

RECOMMENDATIONS

Legal frameworks and policy must adapt to incorporate and prioritize Indigenous-led Good Fire practices. Acknowledging the legitimacy of these practices through supportive legislation will enhance ecosystem health and resilience in numerous locations across the United States. Policymakers should ensure that Indigenous voices are central in the dialogue, decision-making, and codification of these Indigenous-led, place-specific fire management processes.

05

Chapter 5: Seventh Generation: Youth Leaders in Climate Action

KEY MESSAGES

Indigenous Youth have especially been otherized because of the historical systematic disenfranchisement of Indigenous Peoples (Akopai, 2020) and sit at the intersection of systemic racial disenfranchisement and infantilization despite being disproportionately affected by the consequences of climate change. Indigenous Youth also hold the power to make positive change in climate action and resilience by recognizing climate harms and working toward paths to healing, engaging in local to international climate activism, and utilizing traditional teachings to Indigenize Western academia and collaborative approaches to climate adaptation.

RECOMMENDATIONS

Indigenous Youth can look to their identity and experiences as a source of power in rising to leadership roles at the local, regional, national, or even international level for climate resilience. Current leadership must create intentional space, provide resources, and empower Indigenous Youth on their journey to becoming responsible future Ancestors and stewards of Mother Earth.

06

Chapter 6: Political Challenges and Opportunities for Indigenous-Led Conservation

KEY MESSAGES & RECOMMENDATIONS

Challenges and opportunities in various contexts: diverse challenges and opportunities exist for Tribal Nations and Indigenous communities in managing Indian forests and island ecosystems and implementing wildlife management at different scales. Indigenous leadership, equitable funding, data sovereignty, and cultural preservation are crucial elements for addressing climate change and promoting Indigenous-led conservation.

Importance of Indigenous Knowledges and values: Indigenous Knowledges, such as Traditional Ecological Knowledges (as defined in Chapter 1), are vital to Indigenous-led conservation efforts and should be prioritized over colonial management norms, especially in management contexts surrounding Indigenous Peoples' more-than-human kin and climate.

Transforming governance and management approaches: an urgent need exists for paradigmatic shifts (e.g., reform of policy and practices) in how the more-than-human kin of Indigenous Peoples are managed, especially shifts that rectify the harms of conventional Tribal consultation models and colonial power dominance of Land, water, animal, plant, and climate management.

06

Chapter 6: Political Challenges and Opportunities for Indigenous-Led Conservation *(continued)*

#LANDBACK and co-equity management paradigms: co-equity management and #LANDBACK initiatives provide crucial mechanisms for Indigenous-led conservation of all ecosystem elements, including climate. These paradigms support the reclamation of rights, governance, and stewardship of territories by Indigenous Peoples.

Funding for Indigenous-led conservation: federal, state, and Indigenous funding and philanthropic institutions offer support for Indigenous-led conservation efforts, but challenges exist for long-term, sustainable funding opportunities that respect, uphold, and benefit Indigenous values, sovereignty, and self-determination.

07

Chapter 7: Indigenous-Led Conservation

KEY MESSAGES & RECOMMENDATIONS

Indigenous-led conservation and climate change mitigation: Indigenous practices and Knowledge Systems are essential for effective climate change mitigation. Indigenous traditional stewardship methods demonstrate proven track records in sustaining and preserving ecosystems, which is crucial for reducing global carbon emissions and enhancing biodiversity.

Indigenous-led conservation and climate change adaptation: Indigenous Knowledges are deeply intertwined with local ecosystems and offer invaluable insights and practices that are being used by Tribal Nations and Indigenous communities for adapting to climate change. Indigenous climate adaptation practices offer models for broader societal adaptation strategies. Western approaches are insufficient to address the complex cultural and ecological relationships that Indigenous Peoples have understood for millennia.

Organizations and partnerships that center Indigenous conservation: A crucial need exists to form respectful, equitable partnerships between Tribal Nations and Indigenous communities, conservation organizations, and governments. Successful collaborations should involve Indigenous Peoples and actively center and prioritize their Knowledges, rights, and leadership to achieve effective and ethical conservation outcomes.

Lessons learned from Indigenous perspectives: Indigenous narratives have broad applicability and value for conservation policy and practice. Indigenous approaches contain holistic views of ecosystems and sustainability and offer valuable lessons and methods that can be integrated into global strategies to address climate change in policy and practice.

08

Chapter 8: Indigenous Ways of Not Knowing

KEY MESSAGES

This chapter captures the essence of Indigenous Knowledges and their ingrained values of humility, gratitude, and trust. It invites readers to move beyond Indigenous ways of knowing to include Indigenous ways of not knowing, which emphasize the importance of embracing the state of not knowing.

RECOMMENDATIONS

Employing Indigenous ways of not knowing in climate action asks us to embrace humility and not knowing, deeply listen to Indigenous Knowledge Holders, and take more time for reflection and observation before acting. Our current climate actions are often rushed, with heightened feelings of urgency. This drives dominant society to prioritize Western science, as that is what is most familiar. We are calling readers to sit with the not knowing and follow Indigenous Peoples' leadership to reimplement traditional land management practices. This will enable all to return to a more sustainable and harmonious relationship with the environment for future generations.

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