Rising Voices: Collaborative Science with Indigenous Knowledge for Climate Solutions

Rising Voices 5:
Pathways from Science to Action

Workshop Report

Thursday, April 13 – Saturday, April 15, 2017
National Center for Atmospheric Research
Boulder, CO

Background

Rising Voices: Collaborative Science with Indigenous Knowledge for Climate Solutions (Rising Voices) facilitates cross-cultural approaches for adaptation solutions to extreme weather and climate events, climate variability, and climate change. The program has evolved into a movement of engaged Indigenous and Western individuals, including tribal and community leaders, scientific professionals, environmental and communication experts, students, educators, and artists from across the United States, including Alaska, Hawai‘i, and the Pacific Islands, and around the world.

Rising Voices fosters collaborative partnerships between Indigenous and Western participants to work together in collaboration with community members to follow cultural protocols and understand community needs in conducting research projects within Indigenous communities. Rising Voices promotes the participation of Indigenous students and early career scientists. This program is an important step in rectifying the underrepresentation of Indigenous populations in the study of atmospheric sciences, decision-making, and policy efforts in the United States. Further, Rising Vocies helps Western-trained scientists expand their observational skills, research paradigms, and ultimately their science.

The Rising Voices program functions as a boundary organization among diverse individuals and knowledge systems, and fosters relationship building based upon mutual trust and respect. Rising Voices acknowledges the inherent value of Indigenous knowledge systems, including but not limited to traditional ecological knowledge, adaptive practices and processes, honoring them equally with Western science. In our efforts to build just climate pathways, we recognize and value the vast and varied ways of Indigenous knowledges. Rising Voices recognizes that Indigenous communities are frontline communities particularly vulnerable to the adverse effects of a warming climate and impacts of extreme weather events. Indigenous community members are in the best position to identify local changes and potential impacts upon their lands and culture. Climate scientists can assist these communities through providing information that identifies underlying larger-scale causes and predictions of future climate change to build resilience and assist in adaptation planning.

The overall goal of the Rising Voices program is to address the challenges of understanding and responding to a changing and variable climate, extreme weather events, and research and policy needs. To achieve this goal, Rising Voices focuses on the following objectives:

1. To recognize the role and contributions of Indigenous peoples to the global climate conversation over the decades;
2. To increase engagement among Native American communities in the US and Indigenous and Western scientists around the world by asking the question, “What are the elements of successful co-production of science and policy in the fields of extreme weather and climate change?”; and
3. To facilitate the full participation of Indigenous peoples in weather, water resources, and climate research in efforts to incorporate diverse perspectives to identify and achieve optimal solutions.

Aims and Objectives

Rising Voices aims to bring together Indigenous and Western social and physical scientists, community members, scholars, practitioners, students, and government representatives to:

- Support a growing network of collaborators with diverse intellectual and cultural backgrounds;
- Assess critical community needs in relation to the impact of climate and weather extremes;
- Encourage young Indigenous people to pursue a career in atmospheric sciences and at the science-Indigenous knowledge interface; and
- Pursue joint research aimed at developing culturally, socially, and economically optimal plans for community action towards sustainability.

Rising Voices envisions collaborative research that brings together Indigenous knowledges[1] and science with Western climate and weather sciences in a respectful and inclusive manner to achieve culturally relevant and scientifically robust climate and weather adaptation solutions.

Pursuant to these objectives, Rising Voices seeks to transcend boundaries – cultural, geographic, scientific, institutional – that often separate science and policy from society. Moving towards a new paradigm in climate science and community engagement, the Rising Voices program continues to explore how ethical and cultural protocols can be used to establish effective and appropriate collaborations. We achieve these objectives through bringing together diverse Indigenous and Western voices of individuals from different generations, cultures, professions, and levels of authority, serving to promote the translational role between knowledge systems and ways of understanding.

Process

Participation in Rising Voices occurs primarily through annual workshops, which have tripled in size since 2013, and an active listserv that members use to share updates, coordinate follow-up projects, and incorporate ideas from workshops. To date, the National Center for Atmospheric Research (NCAR) has hosted four Rising Voices workshops and the Pacific Risk Management ‘Ohana and Olohana Foundation hosted a workshop in 2016.

Across five Rising Voices workshops (2013-2017), the number of attendees increased three fold (from 45 to 134 people), with many more people applying to attend than could be accommodated in the venue (nearly 300 in 2017). Specifically, Rising Voices has drawn participation from 26 Tribal Nations *(note: more tribes have been represented, but some participate with other affiliations and are not representing their tribe),* 10 federal agencies and 2 state agencies, 37 universities and colleges, including tribal universities and colleges, 15 research centers, 40 non-profits and non-governmental organizations, and 13 countries.

[1] “Knowledges” is used in the plural form here, following the recommended use in the Guidelines for Considering Traditional Knowledges in Climate Change Initiatives, https://climatetkw.wordpress.com/guidelines/

The workshops aim to provide a supportive space for participants to convene and exchange scientific results, challenges, cross-cultural protocols, knowledges, and problem-solving strategies for long-term capacity building and increased resilience within a changing and variable climate. Each year, the workshops begin and end with traditional ceremonial protocol, and the agenda includes topical breakout groups, presentations by student and early career Indigenous scientists and others sharing relevant activities, discussion panels, informal evening gatherings, and unstructured conversations over shared meals.

Bringing together people from diverse backgrounds, the aim of the workshops is to shift from a conventional Western-style meeting format to a more engaged conversational format that includes traditional protocol and respects the cultural diversity of participants in several ways. The workshops are transforming communication processes and changing the definitions of diversity within Western scientific institutions.

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Cultural Protocol/Welcoming

Rising Voices 5 (Rising Voices 5) began, as all Rising Voices workshops do, with an opening ceremony. This year's welcoming ceremony was led by Jerry Fills Pipe, an elder belonging to the Oglala Lakota Tribe. As part of the ceremony, all visitors ceremonially requested permission from Mr. Fills Pipe to enter the large National Center for Atmospheric Research (NCAR) auditorium in which the convening took place – an offer of respect to local people and to NCAR as a host. Following permissions, every individual who attended the convening was smudged with sage, cleansing the energy of the space and the convening's participants.

Welcoming Remarks

Initial welcoming remarks and convening objectives were delivered by convening organizers Heather Lazrus (NCAR) and Julie Maldonado (Livelihoods Knowledge Exchange Network, LiKEN). For Rising Voices 5 the organizers partnered with Cultural Survival for the first time to bring a number of participants from around the globe. Attendees were reminded that directly following Rising Voices 5, a suite of recommendations would be presented at the 2017 United Nations Permanent Forum on Indigenous Issues, continuing the active presence and engagement of Rising Voices participants in national and international arenas.

Bob Gough addressing Rising Voices 5 participants.

Bob Gough (Intertribal Council on Utility Policy), Jim Hurrell (Director of NCAR), and Suzanne Benally (Executive Director of Cultural Survival) also provided welcome statements. Following welcoming speeches, Dan Wildcat (Haskell Indian Nations University) delivered the "charge" to Rising Voices 5: To prompt cultural change by exploring power and place; discover what it means to live in a world of relatives – humans, plants, animals, and generations yet to come; and expand our perception of "relationship" to include more than just anthropogenic interactions. Suzanne Benally delivered the charge for the second day: To move *from science to action*, including for the discussions in breakout groups work to develop concrete recommendations for policy makers.

A video compilation of *Rising Voices4: Storytelling for Solutions* was shown to the audience before presentation sessions began.

The 4th US National Climate Assessment and Tribal Liaisons at the Climate Science Centers

Shannon McNeely (North Central-Climate Science Center) provided updates on the 4th US National Climate Assessment (NCA4) and Tribal Liaisons at the Climate Science Centers. McNeely discussed the tribal issues integrated throughout NCA4, as well as the observations, projections, impacts, and adaptations included in the Assessment. Major topics to be discussed within the NCA4's Tribal and Indigenous Communities' Chapter include:

- Tribal livelihoods and economies at risk – subsistence, commercial and household, infrastructure;
- Tribal culture health and well-being are at risk – contaminants, nutrition, traditional foods and medicine, mental health; and
- Challenges and opportunities along the path to sustainable, culturally-appropriate tribal adaptation – low adaptive capacity, long history as observers of climate.

Further, McNeely provided attendees with advice on how to engage with Indigenous Peoples' issues in relation to the NCA. Suggestions for engagement included:

- Attend sessions at the National Adaptation Forum,
- Participate in the NCA4 Public Review and Comment Period,
- Respond to calls for public input in future processes,
- Sign up for NCA emails and tribal climate networks, and
- Assist tribal climate efforts at the local scale and submit work as case studies to the NCA

McNeely also announced that several of the regional Climate Science Centers had recently received funding to hire tribal climate liaisons. McNeely encouraged Indigenous Peoples at Rising Voices 5 to apply for these liaison positions.

Social Network Analysis

Carla Dhillon, a doctoral student at the University of Michigan, presented social network analysis research that she had initiated at Rising Voices 3. She has been collecting social network data to complement her graduate work and continued data collection with Rising Voices 5 workshop participants cohort to expand her research, and to continue to provide insights into the collaborative framework of Rising Voices. The survey distributed at Rising Voices 5 asked how long convening participants have known each other and about partnerships in climate adaptation that are taking place. The survey hopes to inform efforts to build community capacity in climate adaptation and to use multiple knowledge systems in climate change response.

Presentation Panels

Rising Voices 5 included three panels of presentations, each with a different theme: *Collaborative Research*, *Making the Links from Local Initiatives to International Mobilization,* and *Building Collaboration for Research and Action.*

Presentation Panel 1: *Collaborative Research*

The first Presentation Panel consisted of presentations from Karen Cozzetto (Institute for Tribal Environmental Professionals, ITEP), Katie Spellman (U. Alaska-Fairbanks), Andrea Carmen (International Indian Treaty Council, IITC) and Russanne Low (Institute for Global Environmental Strategies, IGES). Panelists highlighted ways in which Indigenous Peoples and Western scientists are working collaboratively to conduct research and solve pressing issues related to a changing climate.

Karen Cozzetto gave a presentation entitled, *Yurok Tribe Climate Change Adaptation Plan for Water and Aquatic Resources: A Collaborative Effort Informed by TEK & Western Science.* Following a massive fish kill due to high river water temperatures in their territory, the Yurok Tribe was eager to find solutions to the environmental destruction they faced. Cozzetto's presentation highlighted the Institute for Tribal Environmental Professionals' (ITEP) partnership with the Yurok Tribe Environmental Program (YTEP) to create a climate change adaptation plan that addressed the specific needs of the Yurok Tribe. Collaboratively, YTEP and ITEP utilized traditional ecological knowledge (TEK) and Western science to propose adaptation strategies to the issues presented to the Yurok Tribe. For example, strategies to address high river water temperatures include forest management practices such as cultural burns and the reintroduction of native tree species – all with permission, and in collaboration with, the Yurok Tribe. In addition, the Alaska Native Tribal Health Consortium has been working with the Tribe to assist in the development of the Local Environmental Observer (LEO) Yurok Hub.

The second presentation, delivered by Katie Spellman, was entitled *AK citizen science - Making STEM learning locally relevant.* Spellman's presentation highlighted a pilot program based in Alaska: the *Arctic and Earth, STEM Integrating GLOBE and NASA* (*Arctic and Earth SIGNs*). *Arctic and Earth SIGNs* explores impacts and feedbacks of a warming Arctic, while engaging learners in Science, Technology, Engineering, and Math (STEM) using Global Learning and Observations to Benefit the Environment (GLOBE) and National Aeronautics and Space Administration (NASA) assets.

In this presentation, Spellman outlined the three objectives of Arctic and Earth SIGNs:

1. Develop a high quality climate change education program that includes NASA assets (resources and experts), citizen science, and mobile technology for formal and informal science education settings.
2. Engage educators and community members in learning experiences to model best practice for inquiry-based, culturally responsive climate change science teaching.
3. Engage youth, community members and educators in locally and globally important science where they produce and apply new information on the impacts of a changing global climate.

Arctic and Earth SIGNs' target audience is educators in rural and Indigenous communities and the youth they serve, and other underserved communities in STEM. Spellman highlighted the importance that collaborative needs assessments served in the creation of *Arctic and Earth SIGNs*. Her research into community-needs led to the creation of a program that involved youth, communities, and elders connected by way of the local practice of berry-picking. Topics in the

course included: uncertainty in harvest amount and timing influenced by climate change, phenology (the timing of natural events, in relation to climate and plant/animal lifecycles), seasons, atmosphere, preparing and storing foods, and other locally relevant topics. An enduring understanding for students of *Arctic and Earth SIGNs* is that anyone can use local and traditional knowledges and STEM to help communities adapt to climate change.

"We can make a difference on climate change issues by listening, inquiring, observing, and then acting." - Katie Spellman

The third speaker in the *Collaborative Research* panel was Andrea Carmen of the International Indian Treaty Council, who presented *Climate Change, Traditional Knowledge and Rights of Indigenous Peoples: Traditional Corn Altars, Tsalie Arizona and Oaxaca Mexico*. Carmen's work bridges TEK and Western science by working with Indigenous Peoples to create favorable international policies. Carmen cited international agreements such as the Universal Declaration of Human Rights and UN Declaration on the Rights of Indigenous Peoples that are not being upheld by international leaders, resulting in denial of land and water rights for Indigenous Peoples, environmental contamination resulting in poor health and biological mutation, imposed development on Indigenous Peoples' land, and loss of Indigenous culture and language. Furthermore, Carmen cited climate change as the "*single most important threat to food security in the future*."

As vital food plants and animals are threatened by extreme weather and climate change, Carmen proposed food-based adaptation and mitigation such as restoring original seeds to Indigenous Peoples' communities, the reintroduction of sacred buffalo species, declarations of genetically-modified organisms (GMOs), pesticides and extractives-free food sovereignty zones, and protection of sacred Tule marshes. Carmen also cited the submission of the International Indian Treaty Council (IITC) questionnaires to the UN as a means of voicing Indigenous perspectives prior to UN climate negotiations.

Carmen closed her presentation with a request:

> "…that the new Platform for Traditional Knowledge Exchange under the UN Framework Convention on Climate Change (UNFCCC) is developed with the full and equal participation of Indigenous Peoples from all regions and especially our knowledge holders and traditional food producers and in a manner that fully respects our rights, traditional Indigenous sciences and the richness of our ancestral knowledge."
>
> – Declaration of Tecpan, March 9, 2017

Russanne Low (IGES) was the fourth panelist, presenting on the *GLOBE Observer Mosquito Habitat Mapper*. The project is based around addressing the key problem that communities around the world lack access to tools and techniques needed to participate in decisions that directly affect them, especially in relation to environmental health hazards. The Mosquito Habitat Mapper is designed to empower communities by providing a tool that can be used to identify and assess public health risk from mosquito vector borne disease.

The GO Mosquito Habitat Mapper is a mobile app used by citizen scientists to map, count, and identify mosquito larvae found in breeding sites. It supports citizen scientists as they perform up to four functions: (1) identify breeding sites where mosquito larvae are found, (2) sample and count larvae, (3) examine a specimen to determine whether it is one of three genera (*Culex, Anopheles* or *Aedes)* that have species that can cause disease in humans, and (4) decommission or eliminate the breeding site, if a container habitat.

The app is designed for citizen scientists who are interested in learning more about the ecology of mosquitoes and/or understanding and reducing the health hazards that mosquito vectors pose to their community. The data is uploaded to an open database that enables map-based visualization of breeding site locations, which can be accessed by anyone, including citizen scientists, community members and public health officials. Importantly, the app focuses on the mosquito larva, the aquatic and immature stage of mosquito, which does not bite and cannot transmit disease. The next steps for the app include producing a Global Mosquito Alert and rolling out a UN Environmental Program-funded prototype.

Presentation Panel 2: *Making the Links from Local Initiatives to International Mobilization*

The second Presentation Panel consisted of presentations from Tui Beth Shortland (International Indigenous Forum on Biodiversity), Jannie Staffansson (Saami Council), Hindou Oumarou Ibrahim (Association for Indigenous Women and Peoples of Chad), and Berenice Sanchez (Indigenous Network for Food Sovereignty in Mexico). This Presentation Panel highlighted initiatives that are working to make local Indigenous issues heard and addressed by international agencies.

The first speaker was Tui Beth Shortland, who presented on *Pacific Indigenous and Local Knowledge.* Shortland is a representative of the Te Kopu Pacific Indigenous and Local Knowledge Centre of Distinction, based in New Zealand. Te Kopu is a regional organization "committed to the cause of promoting and defending indigenous and local knowledge within communities and to inform international, regional, and national decisions."

Shortland spoke about local marine wildlife issues, and how local Indigenous initiatives ultimately changed national policies that had previously infringed upon Indigenous cultural practices and food security. More specifically, as a member of the Ngatiwai Tribe, Shortland watched as national regulation deemed her cultural practice of harvesting resources from deceased, beached whales, or *ikanui,* illegal. At the time, however, the Tribe had noticed differences in the health of the local whales. Continued cultural practice and necropsy (an autopsy of an animal to determine cause of death) revealed changes to stomach contents and organ health in marine mammals due to ship strike. These findings led to the national development of a Whale Kit for Indigenous Peoples who wished to continue their harvesting tradition and also contributed to scientific marine mammal knowledge.

In addition, Shortland spoke to the issue of food security. While eels, or Koroma, are a traditional food, commercial fishing and climate change have made annual harvests almost nonexistent. Te Kopu's publicity efforts around food security ultimately influenced international policy documents.

The second presenter, Jannie Staffansson, is a representative of the Saami Council, a voluntary Saami organization with Saami member organizations in Finland, Russia, Norway and Sweden. Staffansson explained that the Saami people, the northernmost Indigenous peoples of Europe, span across colonized borders, and the Saami Council serves as a uniting force. The Saami people traditionally herd reindeer and fish as a means of livelihood, although climate change is now threatening their traditional ways of life. The Saami Council gained international attention by starting provocative social media campaigns. Most notably, they documented a campaign, entitled, "Run for Your Life," in which a single stone was carried by runners who ran a relay from the Arctic to Paris prior to the 21st UN Framework Convention on Climate Change's Conference of the Parties (COP21). The stone now rests in the Pacific to symbolize the drowning of land.

Hindou Oumarou Ibrahim with the Association for Indigenous Women and Peoples of Chad gave a presentation in which she described the challenges faced by the M'bororo people - a group of nomadic and semi-nomadic herders that span Cameroon, the Central African Republic, Chad, Niger and Nigeria. Climate change is already creating seasonal changes, drought, desertification, loss of biodiversity, and reduced livestock throughout the countries listed above. Most notably, Lake Chad, a main source of livelihood for the nomadic M'bororo people, has lost 95% of its water since 1963, creating serious health, livelihood, and cultural concerns for those that previously relied upon the lake for traveling long distances.

Lea Kekuewa (Native Hawaiian youth), Hindou Oumarou Ibrahim (Association for Indigenous Women and Peoples of Chad (AFPAT)), and Papalii Dr. Tusi Avegalio (University of Hawaii)

In response to climatic challenges, the M'bororo people utilize traditional knowledge for forecasting rain, and have now partnered with scientists to use participatory 3D mapping and support trackers to better manage natural resources. Ibrahim noted the importance of Indigenous participation in upcoming international climate agreements.

"Where there is no water, there is no life." – Hindou Oumarou

Berenice Sanchez, an Indigenous representative from Mexico, gave a presentation in which she described Indigenous sovereignty issues pertaining to food and land management. The presentation, delivered in Spanish with simultaneous English translation, described a loss of native mushroom species due to mass logging and environmental toxicity in her homeland. The

Mexican government is charged with not asking for Indigenous Peoples' consent for implementing logging practices, residential development, or even "green" development. For example, a composting business was built on Indigenous Peoples' territory without consent, resulting in the presence of a bio-dump on their land.

Furthermore, the Indigenous communities in Mexico have traditional knowledge of their borders – knowing where their territory begins and ends – but not government-recognized deeds. This led to the violent exploitation of Indigenous territories by local and national governments. Due to the lack of protective initiatives by the local Mexican government, Sanchez and her community reached out to the UN Special Rapporteur for Indigenous People. The two entities are now working together and a land deed is being developed to protect Sanchez's village.

Presentation from the Capacity Center for Climate & Weather Extremes

On the second day of the convening, a presentation was given by Greg Holland, Director of NCAR's Capacity Center for Climate & Weather Extremes (C3WE). Holland described the three components of C3WE: Engineering for Climate Extremes Partnership (ECEP); Rising Voices, and Global Risk, Resilience, and Impacts Toolbox (GRRIT). The focus of Holland's presentation was on GRRIT. GRRIT's tools include temperature, rain and wind pattern forecasts, Cyclone Damage Potential forecasts, and predictions of hurricane rainfall impacts due to climate change. GRRIT tools aim to provide actionable science for community adaptation and planning. The following discussions highlighted potential uses for GRRIT among tribal agencies and decisions makers, and others, to help advance adaptation planning.

Presentation Panel 3: *Building Collaboration for Research and Action*

The third Presentation Panel consisted of presentations from Carolyn Brinkworth (UCAR), Melissa Watkinson (U. Washington), Robert Borrero (International Indian Treaty Council), and M. Kalani Souza (Indigenous Phenology Network). This group of presentations highlighted programs that help facilitate collaborative working relationships between Western scientists and Indigenous Peoples.

The first presentation in this panel was provided by Carolyn Brinkworth, UCAR's Chief Diversity, Equity & Inclusion Officer. Brinkworth described the new direction that UCAR and NCAR are taking in terms of diversity, citing the new National-Science Foundation-funded INCLUDES program, which aims to build upon the UCAR/NCAR core value of producing "science in service to society." The INCLUDES program will produce research partnerships between climate researchers and Indigenous communities, striving to complement, and be in service to, Indigenous partners. The program will also bring in Indigenous students to provide training in Western science that can supplement their traditional ecological knowledge. NCAR scientists

will be trained to work in tandem with Indigenous communities, with the purpose of inciting purposeful and meaningful collaboration.

"In diversity work, the more you learn, the more you realize you *have* to learn." - Carolyn Brinkworth

The second presenter, Melissa Watkinson, described her experience as an Indigenous woman doing a Marine Policy Fellowship at The Nature Conservancy in Washington State. Watkinson noted that when she arrived at The Nature Conservancy, local tribes were excluded from conservation planning. Watkinson responded to this by building and facilitating training programs for her colleagues, and ultimately provided training about local tribes and treaties to the entire Washington chapter of The Nature Conservancy. The practice of building collaborations between local tribes and environmental non-governmental organizations (NGOs) was of utmost importance to Watkinson, as she noted that no one tribe or Indigenous person can represent all Indigenous Peoples' opinions or desires.

Roberto Borrero from the Indian Treaty Council spoke about the United Nations Agenda in terms of the Sustainable Development Goals (SDGs). SDGs are the post-2030 agenda which encompass 17 goals through 2130. Borrero described all of the SDGs, noting that "Indigenous Peoples" and "scientific and technological communities" represent two of the nine "Major Groups" defined within the SDGs. Borrero highlighted that the frameworks calls on Indigenous Peoples to engage actively in implementing SDGs, including in the follow-up and review on the national level to ensure that progress for Indigenous Peoples is reflected, particularly with regard to the goals of tracking Indigenous agricultural output and equal access to education for Indigenous children. Lastly, Borrero called for more per-Indigenous sustainability strategies, programs, and policies - meaning that the items should be made *for* and *by* Indigenous Peoples.

The final presentation was given by M. Kalani Souza, a Native Hawaiian, and representative of the Indigenous Phenology Network. Kalani's presentation was given in the form of storytelling, in which he described a story of "two Hawaiian guys" who had gone on a hunting trip in Alaska. The two men fought over who would be able to bring their trophy moose back to Hawai'i, ultimately deciding that they would both bring their moose back, as they did this every year. The pilot agreed, thinking it should be fine if they did it every year. The plane crashed, and the men said, "Where are we? I think we're about 500 yards from where we crashed last year." The point of this story is to say that we must change our ways if we wish to see a difference in outcomes. Kalani continued to describe how Indigenous Peoples often think about how actions will affect across seven generations, and that Western policies would benefit from that way of thinking.

"If you value life then the first law is compassion." – M. Kalani Souza

Public Event

As we do every year, Rising Voices held a public event during the convening. This year, the event was held at Naropa University. A distinguished panel of Indigenous activists and leaders shared their experiences and provided an opportunity for public dialogue on developing strategies for an actionable future in an era of uncertainty and climate change denial. Speakers included:

- Gary Morishima (Quinault Indian Nation) spoke on Indigenous Peoples and the future generations in an era of alternative facts, fake-news and climate change denial.
- Shiloh-Kay Bennett (Kiksapa Consulting) spoke on the implications for policy in the absence of communication and accurate information at Standing Rock.
- Cristina Coc (Q'eqchi Maya) spoke on land rights and climate change: the impact and implications of current US policies on Indigenous Peoples struggles.
- M. Kalani Souza (Olohana Foundation) spoke on extreme weather and natural disasters and the need to shift frameworks from climate change to adaptation.
- Bob Gough (Intertribal COUP) moderated the event.

Climate Change Themes and Discussion Topics

Continuing on the Rising Voices approach of organizing small group conversations by themes, we broke out into five thematic groups each day: 1) Water, 2) Phenology, 3) Relocation, 4) Health and Livelihoods, and 5) Energy. Each thematic group was presented with two sets of questions for discussion. The questions are included below, followed by key aspects of the discussion – as guided by these questions – in each group.

Building Collaborative Knowledge about Extreme Weather, Climate Change, and Disasters

1. How do you define extreme weather events, climate change, and disasters? How does Indigenous science inform your understanding? How does Western science inform your understanding?
2. How do you know if extremes are changing? What information do you use to understand the changes (e.g., eye-witness observations, oral history, technological instruments)?
3. When does an extreme event become a disaster? Are there impacts of extreme events that are particularly significant, at what points or in what contexts?
4. How can Indigenous and Western sciences collaboratively work to understand the changes, address the resulting impacts, and develop adaptive actions? Are there examples of best practices or lessons learned in such collaborative work?

Developing Pathways from Knowledge to Collaborative Actions

1. What are organizations, agencies, and communities doing by themselves or in partnership to support or implement mitigation, adaptation, and sustainability strategies? What types of collaborative partnerships are needed to support these strategies? Who should be involved?

2. What are some lessons learned from these strategies? What are some best practices for developing and/or implementing these strategies?
3. What are some alternative or new pathways that organizations, agencies, and communities could pursue? What resources or information are needed to pursue these pathways?
4. What is needed to strengthen collaborations or partnerships and move together from science to action?
5. How can connections with international organizations and the UN agencies support community mitigation, adaptation, and sustainability

Water

Participants in the water breakout group agreed that climate change affects quality, quantity, and availability of water to all peoples. Drought, flood, and fire were cited as the most common water-related extreme weather events caused by climate change, with other extremes including sea level rise, increased water temperature, ocean acidification, algal blooms, poor water quality, and loss of wetlands and aquatic habitats. Local understanding, oral history, eye-witness observations and traditional environemntal knowledge (TEK) of natural systems were cited as the main ways of noticing changes in extremes, while technological instruments were said to be least used (although helpful) for noticing changes. Indicators like changes in the appearance or frequency of native land and aquatic species were said to be key in noticing changing weather extremes.

Water-related disasters experienced by participants in the group included loss of livestock, crops, medicine, subsistence, and other forms of livelihood due to extreme weather events. Changes in water quality have affected the productivity of traditional resources, such as aquatic species and wild rice. Capacity for dealing with weather extremes was said to be crucial in determining when an extreme event becomes a disaster. It was noted that disasters are not just determined by the amount of money needed for reparations after an extreme event, but by the lasting effects that an event has on an Indigenous community and its culture.

Current collaborations between Indigenous and Western scientists that help monitor extreme events include rainfall monitoring, controlled burns, other forms of forest management, and water temperature tracking. Resilience and adaptation programs were also cited as helpful resources for tribes, when executed with care. Agencies participating in collaborative research, mitigation, and adaptation strategies include the US Department of Agriculture (USDA), US Geological Society (USGS), Desert Research Institute, National Oceanic and Atmospheric Administration (NOAA), the US Forest Service (USFS), research universities, and many more. The most successful partnerships include youth education, guidance from elder councils, and cultural respect. The creation of the National Estuary Reserve in Hawai‘i, partly funded by NOAA, was cited as an example of a successful project collaborating with local Indigenous partners.

According to the water group, transparency and collaboration are key to successful climate programs. It was noted that Western scientists should work closely with tribes to identify specific needs in terms of water - some areas may be facing high water temperature, while others could

be facing drought or water contamination, and it is important to identify needs before allocating funds for adaptation or mitigation strategies.

Connections with international organizations and United Nations agencies could make water issues known globally. International organizations are particularly useful when dealing with tribes that span across multiple countries; by standardizing water rights, tribes are less divided and able to collaborate.

> **"Water is part of who we are, and if we don't take care of it, it will never come back to us." - Elizabeth Azzuz, Indigenous Peoples Burning Network**

Phenology

The phenology breakout group focused on the value of TEKs for understanding how climate change is causing changes in the phenology of plants and animals, and seasonal shifts. Indigenous peoples depend upon their local, place-based knowledge for survival, and understanding the timing of seasons and natural events is a critical component of successful hunting, fishing, gathering wild places, and cultivating plants in situ in the wild or in farming practices.

Traditional predictive systems, eye-witness observations, oral history, and technological instruments were all said to be crucial when monitoring changes in extremes, according to the phenology group. The group discussed that Indigenous peoples are often highly connected to the land in which they reside, so intuitively noticing changes in seasonal cycles and other forms of phenology is often the first sign for Indigenous peoples that extremes are changing. The ancestral record of local, place-based knowledge and cultural practices that were passed down through spiritual and cultural practices provides a long baseline for many Indigenous peoples, the value of which is practically unknown by Western science.

Many are reluctant to share this knowledge due to negative experiences in the past. The Indigenous Phenology Network (IPN) is among the most prominent organizations that are currently promoting Indigenous knowledge and rights in terms of phenology. IPN emerged from previous phenology discussions at earlier Rising Voices workshops. IPN is building data encryption services for native communities in order to control when, how, and the amount of information tribes wish to share with Western scientists and even with other tribes. This organization puts Indigenous peoples' initiatives and privacy first, and serves as an example for future programs. Lessons learned from the IPN are that privacy and respect are crucial for running successful programs involving Indigenous peoples. By providing encryption services, Indigenous peoples do not feel as though their information could be stolen or used against them in some way. Putting Indigenous peoples in control of their own information is a surprisingly new concept in the Western science world and needs to be carefully respected and understood.

The phenology group also noted that, often, extreme events and disasters arise from seemingly non-extreme weather events. Subtle changes in phenology can have dramatic impacts on the ability of Indigenous people who forage and farm the wild to survive. In addition, extreme weather events can have secondary effects that increase impacts on Indigenous people. For

example, in California, many tribes experienced severe drought during the past few years. The lack of water created a domino effect, exacerbating fires, erosion, surface water runoff, landslides, and disruptions in ecosystems.

The phenology group highlighted the importance of integrative K-12 education as a means of promoting climate change education, mitigation, and adaptation. By teaching about phenology at a young age (see Katie Spellman's presentation overview above), children feel a deeper connection to the land and know how to notice when extremes are changing. The phenology group also proposed establishing learning environments at home by way of planting gardens. Personal gardens teach about food security, biodiversity, and human-land relationship.

To strengthen collaborations or partnerships between Indigenous peoples and Western scientists, the phenology group suggested: building confidence in Indigenous peoples that sharing of information is a positive tool, increasing capacity for Indigenous peoples to control their own scientific and cultural information, giving Indigenous peoples the power to determine research priorities and co-produce that research, and also providing Indigenous people with data that would be helpful in responding to weather extremes and disasters.

Connections with international organizations can help Indigenous peoples facing changes in phenology find partnerships and work together to solve issues pertaining to data collection, privacy, legal and financial capacities, and more. For those in the phenology group, building connections between Indigenous peoples is just as important as building relationships between Indigenous peoples and Western scientists.

Relocation

The relocation breakout group said that extremes should be defined by the people they impact. For example, some may argue that a small increase in sea level is not an extreme event, but those affected by that small shift may say otherwise after experiencing relocation and other effects of sea level rise. The relocation group also noted that weather extremes are now regular. As such, we must be wary of our language as to not make it seem like "extreme events" are out of the ordinary. Climate change should be looked at as both a short-term and long-term issue - and both should be viewed with equal importance. Winds, rains, economic changes, heat waves, landslides, and rising sea levels were all cited as indications of changing extremes that would impact relocation.

According to the group, a disaster, like an extreme event, should be subjectively defined by those experiencing extreme events. This is different than the US state or federally defined disasters, as those are defined by a minimum monetary loss. This group mentioned that disasters often happen slowly (as with the case of sea level rise), and definitions of disasters should be broadened to accommodate for those that manifest slowly.

This group also noted the political undertones that face climate and Indigenous peoples' agreements. If Indigenous ways of knowing are accepted politically, then there will be a better chance of positive collaboration. Currently, a lot is happening to address climate change and relocation on the community-level. This group believes that community groups need to reach

out, outside of their communities, in order to be validated and heard by politicians and Western scientists. Western scientists and politicians, on the other hand, should note that Indigenous peoples call for more actionable items pertaining to sea level rise and relocation, as opposed to more scientific studies. If more scientific studies are conducted, however, Indigenous peoples ask that those studies be summarized in layman's terms as to be able to inform the larger community and disseminate important information.

New or alternative pathways to address relocation disasters include preventative funding, localized climate modeling, and youth education (for Western and Indigenous children) with environmental values at the core. Further, collaborations could be stronger if Indigenous peoples were included in every step of the disaster-prevention and relocation process. With this in mind, the relocation group called for an increase in US institutional flexibility to work with tribal government timescales and systems.

> **Indigenous and Western sciences will be able to better work together when Western scientists change their perspective from "the land belongs to us" to "we belong to the land." – Relocation group**

Health and Livelihoods

Extreme weather events due to climate change are negatively impacting the health and livelihoods of Indigenous peoples around the world. While Western scientists see weather extremes as solely weather-related events, Indigenous peoples can view extremes as spiritual experiences. For example, Hawaiian creation stories involve many extreme weather events, so changes in extremes can have impacts that affect culture and ecology. TEKs, eye-witness observations, and oral history are crucial to realizing changes in extremes for health and livelihoods. Changes in growing seasons are one of the most prominent eye-witness observations related to climate change, although increases in diseases such as asthma and cancer are also indicators of changing environments.

As noted by the health and livelihoods group, for tribal communities that are consistently under-funded, any event can become a disaster. Events that affect staple crops, seasonal cycles, or land and water temperatures can be particularly devastating for food security and livelihoods. Events that cause extreme heat can also hurt Indigenous peoples' health.

Cultural food forests and community gardens were suggested as community-building initiatives that tackle food security and health issues. Another potential community-building program involves formation of an Indigenous Earth Ambassador Corps. This organization would train young people in disaster relief and TEK, so that Indigenous communities could have the help they need after disastrous events.

This breakout group hopes that connections with international organizations can improve Indigenous Peoples' sovereignty throughout the world. Standards for personal rights, disaster management, health, and food production are just a few ways in which international law could help Indigenous health and livelihoods throughout the world.

Energy

The energy breakout group highlighted earthquakes, floods, and droughts as major extreme weather events of concern. As far as noticing changes in extremes, this group believed changes are evident to any community that interacts with their natural environment, as animal patterns change, weather feels different, and more extreme weather events occur. Changes in biodiversity, rain patterns, yearly temperatures, fishing patterns, rainfall, presence of invasive species, and fruit cycles are also examples of observations that contribute to Indigenous understanding of changing weather extremes. According to the energy group, extreme events become disasters when many lives are negatively affected in terms of health, livelihood, or shelter following an event. Some examples of disasters include: sea level rise, entire communities being moved or shifted, forced inability to grow staple crops, or health hazards due to prevalent toxicity from natural resource extraction.

The energy group noted that Indigenous communities are largely not involved with renewable energy projects at this point in time, but are rather victimized by large coal, oil, and gas companies. However, there are also examples across Indian Country of tribes leading innovative renewable energy projects. Collaborative partnerships are needed between renewable energy companies and tribal leaders in order to facilitate transitions to clean energy. To improve communication between various entities, this breakout group suggested that Indigenous peoples and Western scientists could work more collaboratively if Indigenous languages were learned by peers in the sciences, or if Indigenous eeoples could provide translators for Western scientists. Relationship building programs that involve individuals from multiple disciplines (not just scientists, but also musicians, academics, community members, and government members) could also help foster relationships needed to promote positive climate action.

The energy group also outlined best strategies for transitioning to clean energy. The first suggestion was to provide incentives to big coal, oil, and gas companies *and* Indigenous peoples. Currently, Indigenous peoples are left out of incentive programs, and as the energy group stated, no one will want to change their forms of profit if they are not promised equal or higher returns. Another suggestion was to create community protocols for research projects that ensure that Indigenous communities are properly integrated into scientific processes and that the projects benefit Indigenous communities. It was also asked that tribal renewable energies be put on the grid.

Elizabeth Marino (Oregon State University-Cascades), Lesley Iaukea (University of Hawaii-Manoa), Jean Tanimoto (NOAA Office for Coastal Management), and Kristina Kekuewa (NOAA Office for Coastal Management) re-connecting over years of Rising Voices gatherings.

It was this group's hope that international climate agreements will prompt the transition to clean, renewable energy. They concluded that without international agreements, individual countries may fear competition in the energy sector and revert back to fossil fuels.

Common themes and Calls for Action

The following themes and calls for action emerged from Rising Voices 5 plenary and group discussions:

1. Call for a new classification of, and metric for monitoring, extreme events and disasters, which shall include financial, ecological, spiritual, and cultural disasters in response to climate-related issues.
2. Request for a reduction in the minimum amount of damages required to file for Federal Emergency Management Agency (FEMA) funds.
3. Create holistic science monitoring systems and models, which will help communicate TEK to Western scientists and communities
4. Create more Indigenous-based research, models, and papers, to include Indigenous Peoples in the study of their lands and ecosystems.
5. Increase collaboration within and between Indigenous Peoples, government agencies (local, state, and federal), and Western scientists, which is key to successful adaptation and mitigation.
6. Create training programs for government agencies and Western scientists in order to improve communication and empathy skills with regard to Indigenous Peoples.
7. Create climate change mitigation credits for Indigenous communities (for subsistence living and wetlands).
8. Develop an accessible network of Western scientists with an expertise in how their field relates to Indigenous Peoples. This network will be a resource for Indigenous Peoples facing extreme events and disasters.
9. Call for the co-development of youth training programs in disaster relief, TEKs, and Western science.
10. Create protocols for whether or not Indigenous peoples share information with Western scientists; such protocols must be viewed as commonplace and acceptable.
11. Call for long-term experiential science and information developed over generations of Indigenous Peoples to be recognized and respected as true science.
12. Require that Western scientists, organizations, and companies use the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) as the guideline for engagement with Indigenous Peoples and ensure the application of Free, Prior and Informed Consent (FPIC) for all projects.
13. Call for scientific documents to be published in Indigenous languages.
14. Call for the creation of a tribal peer review process for initiating research with tribes and tribal entities that could be adopted widely by any tribe seeking to institute a review process.

Reflection and Inspiration

The third and final day of Rising Voices 5 included a panel focused on reflecting over the previous days' conversations and providing inspiration to leave with together. Rising Voices 5 participants heard voices from across the generations, from Rising Voices youth participants to elders, providing guidance to everyone in attendance.

Lea Kekuewa, a Native Hawaiian youth raised the key point that youth engagement is vital to every step of the collaborative process in working together to address climate change. Action needs to start in the schools, where Youth Climate Initiative groups could meet twice per week and communicate across school groups, sharing their knowledge and experiences. Social media can be used as a key tool to make this a global initiative, one that focuses on the collective 'we'.

Lea Kekuewa (Native Hawaiian youth), providing inspiration to Rising Voices5 participants.

Shiloh-Kay Bennett, who has been a leading inspiration in the Rising Voices Youth Initiative, pointed out that the recurring theme across Rising Voices gatherings has been 'collaboration'. She brought to everyone's attention that one of the key ways to recognize that the problem of climate change affects all of us is through language and effective communication. Shiloh also focused on the collective 'we', acknowledging that we are all in this together. She asked everyone to keep in mind that "we are all bridge people" and it is our responsibility to connect and communicate the issues of climate change to others in ways that they will understand and be inspired to act.

M. Kalani Souza (Olohana Foundation), who has provided inspiration, guidance, wisdom, and leadership to many across the globe, encouraged everyone to keep on, that we will continue to come together for as many conferences as it takes to be heard. By focusing on the power of relationships and the power of "we" over "me", we can move from talk to action, respectfully and together.

Doc Tusi (University of Hawaii), who has also been a leader and mentor to many from around the world, reminded us that like fish, we need to travel in schools and work together. The best way to use information is to follow our intuition and remember the use of language, of metaphor and allegory, the linguistic tools that resonate with all peoples. We must center ourselves around the unifying principles of balance in all things, harmony, and restorative giving, or reciprocity. We must engage in all things with humility and respect and sustain the wisdom of 'aloha'.

"If you do anything, do it with all of the aloha in your heart, so that you will not want to do anything any other way." – Doc Tusi, University of Hawaii

Additional Resources

Rising Voices website: https://risingvoices.ucar.edu/
Link to Rising Voices 5 presentations: https://risingvoices.ucar.edu/presentations
Cultural Survival website: https://www.culturalsurvival.org/
Link to Cultural Survival Quarterly article on Rising Voices5 including interviews with participants: https://issuu.com/culturalsurvival/docs/csq-41_2_web

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RISING VOICES WEBSITE: www.risingvoices.ucar.edu

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