

# Rising Voices: Collaborative Science for Climate Solutions



## Third Rising Voices Workshop on Learning and Doing: Education and Adaptation through Diverse Ways of Knowing

### WORKSHOP REPORT



June 29-July 1, 2015  
National Center for Atmospheric Research  
Boulder, Colorado



DOI Climate Science Centers



Indigenous Peoples' Climate  
Change Working Group



## Isagǫuti –

**Denise Pollock** (presented at Rising Voices 3)

I began this journey  
As a little girl: hands cradling  
A sobbing, violent, yet silent head  
Heavy with the possibility of great loss  
"The island village of Shishmaref, Alaska will be  
Devoured by the ocean in ten years"  
Scientists and strangers speak strange truths  
Such a statement hit me while  
Unprotected and alone.

Slowly, I reached out to Eskimo relatives  
And learned the stories of erosion and flooding  
In Kotlik, Unalakleet, Kivalina, Golovin  
Newtok, Koyukuk—all Alaska Native villages  
The same brown faces  
Weathered by the wind and sun  
Rimmed with wolf fur  
Seal skinned mukluks  
Drawing on centuries of ancestral knowledge  
Reading the ice and ocean currents,  
Following the seals, walrus, caribou  
As the "real people", we know  
How to feed and protect ourselves  
And yet our access to culture, land, and relatives  
Is at stake.

And still as a child  
I began to ask questions  
Why is the Arctic warming faster?  
Why have we crossed the threshold of 400 PPM of  
CO2 in the atmosphere?  
Which agencies and individuals are blocking  
The structural and fiscal capacity of  
Federal, state, and local governments to assist our  
relocation?  
Who built the school, the post office, the church in  
Shishmaref?  
Who inspired these permanent settlements?  
Missionaries, militaries, miners, money hungry  
financiers and "educators"  
Will our community be stronger if we move to our  
summer camps?  
Will we become weaker if we disperse throughout  
urban cities or nearby villages?  
The real people have learned to overcome  
We are still here and we will find a way to  
persevere.

And just like the Trail of Tears and  
Forced urban relocation projects  
Enforced by our colonizers  
This child in me is angered

And awakened  
To the notion that our cultures and homelands  
Are slowly being stolen from us  
Who will pay for this collective trauma?  
Is there time left to grieve? To be silenced?  
Should we submit or stand? Should we resort to  
violence?

The people are organizing and taking stands, but  
Few authorities and agencies concede our  
demands  
The Native Village of Kivalina filed suit  
against twenty-four major fossil fuel industries in  
2008  
Those most responsible for anthropogenic  
greenhouse gases  
Which intensifies global warming, ice and glacier  
melting, sea level rise  
The Supreme Court ruled that these industries are  
off the hook  
But their dirty work, dirty minds, dirty words, and  
dirty spirits  
Will be held accountable  
Congress and the Executive Branch also  
Dodge their responsibilities  
And so Kivalina's fight becomes mine  
Her efforts become ours.

Today, the harsh reality faced by Alaska Native  
villages  
Is the future of all coastal cities of the world.

And the girl who once cried, transformed  
Pain into knowledge, ammunition  
Crafting carefully chosen words  
Inflicting bullets toward the perpetrators  
Through speeches, poems, reports  
Written to organize, mobilize, plant seeds in the  
minds and  
to turn the headlights to the crowns of industries:  
Tesoro, Chevron, ExxonMobil, and British  
Petroleum  
And enabling governments and economies  
Addicted to the fuels, products, profits made  
through their business plans.

And instead of keeping quiet, I rise  
Alongside Native brothers, sisters, and allies  
And each step on the streets is for teaching those  
Who will soon rebuild the world they've been  
destroying  
We rise, we rise, no more time to fear or hesitate.  
We lock arms, we bear arms to protect  
The only homelands, the living beings and the waters  
That can truly save ourselves

## **EXECUTIVE SUMMARY**

The mission of the Rising Voices: Collaborative Science for Climate Solutions program (Rising Voices) is to promote and facilitate more culturally diverse science and cross-cultural approaches for adaptation solutions to high impact weather and climate events, climate variability and climate change.

Annual workshops are held at the National Center for Atmospheric Research in Boulder, Colorado. The third workshop (Rising Voices 3) was held from June 29 to July 1, 2015. Almost 120 people came together for Rising Voices 3 from every region across the U.S. to focus on collaborative science for climate solutions, with the specific driving theme of Learning and Doing: Education and Adaptation through Diverse Ways of Knowing.

Rising Voices 3 explored four overarching and interrelated topics: (1) The role of Rising Voices as a boundary organization or hub for facilitating networking and catalyzing collaboration across diverse partners; (2) Student engagement and education curricula in support of youth and early-career leadership on climate issues; (3) Ways to appropriately evaluate the success of scientific-Indigenous collaborations; and (4) scientific-Indigenous insights for adaptation in response to climate variability and change, particularly regarding four key subject areas: (A) Relocation, (B) Water, (C) Phenology, and (D) Health and Livelihood Hazards.

### ***1. Transcending boundaries***

Workshop participants explored the idea of Rising Voices as a boundary organization that transcends barriers between ways of knowing, cultural context, generations, and science and policy. Transcending or lowering barriers is especially important in situations where collaborators may have little experience working together, high levels of distrust, and wield disproportionate degrees of power. Indigenous peoples have complex histories of exploitation at the hands of scientists and bureaucrats, leading to concern about how their knowledges are valued, credited, and respected in research relations. As a boundary organization, Rising Voices seeks to be a credible, salient, and legitimate collective across epistemological, research/practice, and generational communities.

### ***2. Students and education***

At Rising Voices 3, youth participants initiated the Rising Voices Youth Climate Initiative. The youth participants included high school students from Kansas, North Dakota, Colorado, and Hawai'i who participated throughout the Rising Voices 3 workshop, and shared their reflections with everyone gathered. The Rising Voices Youth Climate Initiative calls for the inclusion of all Indigenous and non-Indigenous youth who share a common goal: protecting the earth from the impacts of global climate change. We draw upon traditional and scientific knowledges to confront climate change and understand that it is we who must act now for our own future and the future of our posterity.

Educational curricula, especially K-12, needs to be expanded to include cultural frameworks and languages for describing the world that are based on Indigenous knowledge systems and that can be taught in tandem with scientific disciplines.

### ***3. Evaluation***

As the Rising Voices program has evolved in response to tribal communities' needs, funders, organizers, and participants have become interested in evaluation of its achievements and challenges. The evaluation of Rising Voices 3 was managed by an Indigenous organization, the Sustainable Development Institute (SDI) at the College of Menominee Nation. At Rising Voices 3, the SDI evaluation team interacted with many of the participants to see what relationships they felt

were important for capacity building and collaboration. An evaluation survey was fielded among Rising Voices 3 participants following the workshop, attaining a 67% response rate.

According to preliminary results, 78% of respondents felt that Rising Voices 3 supported relationships that develop collaborative scientific-Indigenous partnerships for adaptation in response to climate variability and change; 55% that Rising Voices 3 cultivated family-like relations, 87% that Rising Voices 3 supported professional relationships, and 45% that RV 3 facilitated mentorship relationships. The three activities that most supported the development collaborations were breakout sessions, break time and time between sessions, and unstructured lunchtime with outdoor/indoor seating options. The evaluation team will analyze the connections and re-survey participants in future Rising Voices gatherings to learn more about how relationships have evolved.

#### ***4. Scientific-Indigenous insights for adaptation***

Scientific-Indigenous collaborations may involve sharing traditional knowledges (TKs), an act that invokes responsibility, reciprocity and respect. To prevent exploitation of cultural information and promote equal standing among collaborators, partners should follow established guidelines, obtain formal permission from tribal leaders, and honestly assess all positive and negative outcomes of the collaboration. Four topics were explored as hot-button issues for technological scientific-Indigenous knowledge collaborations.

##### ***a) Relocation***

A Presidential Forum on the Human Rights of Safe, Viable Communities is needed that would manage a Task Force on Climate Migration, The Forum should focus on the first priority of adapting in-place, and help to determine the necessary interim measures in the process of communities' decisions for in-place adaptation and/or relocation, if the communities themselves determine adapting in place is no longer a viable option.

A Task Force on Climate Migration would ensure government-to-government relationships when talking about relocation and include tribal governments engaged in relocation issues and all the agencies that must be involved in relocation processes. The Task Force would help address the identified need to establish a legal mechanism, institutional framework, and financial support based on equity considerations to directly support marginalized communities (Indigenous and non-Indigenous) who are facing displacement due to climate change impacts and who desire to migrate safely and with dignity. It could create a space (physical/cyber) where nations can hear and learn from one another. This includes processes of dissemination of communities' best practices and lessons learned related to relocation. Such a space could support communities in determining necessary interim measures in the process of deciding in-place adaptation/relocation. Communities themselves would identify the essential assets that are culturally critical to maintain during relocation processes, those elements that are the tools for passing along culture and maintaining cultural integrity, as opposed to assimilation. Relocation must be managed within tribes who can rely on historical experience to learn from relocation stories in the past and could be tied to education curricula that would allow the youth to be the ones recording and sharing stories.

##### ***b) Water***

A shared commitment to addressing the challenge of long-term water quality, quantity, access and conservation is required. We have responsibilities for water resources, not just rights.

Tribal water rights and water standards and codes that build on the past and address current and future needs and circumstances need to be recognized and exercised. Even for Indigenous communities that are not *formally* recognized by the Federal Government, access to water remains a fundamental right – and responsibility – that should be continuously highlighted, nurtured and refined as conditions change utilizing both traditional knowledge and evolving western science in partnership.

Collaborative Indigenous Water Networks (or Network of Networks) based on examples such as the Yukon River Intertribal Watershed Council and the Indigenous Rivers Network are helpful to facilitate multi-government action across scales to manage water resources. This kind of collaborative framework facilitates shared learning and joint problem-solving and provides a vehicle for amplifying individual voices in regional, national and international deliberations while also strengthening the ability of all Indigenous communities to contribute to and benefit from discussions of water rights and management.

It is important to study and consider water in all of its forms – rainfall, stream/river flow, groundwater and, for coastal and island communities, the interactions of ocean water with sources of freshwater, and how climate change influences all of these.

Disaster management needs to meet the special challenges of slowly evolving, chronic conditions such as prolonged drought. Participants highlighted the value of the Stafford Act in enabling tribes to reach out directly to FEMA in emergency declarations.

### *c) Phenology*

We need community-to-community exchanges of knowledge and experiences about species behavior across all seasons as a means to help each other plan, for example a database of observations, experiences, and adaptations.

There is a need for inclusion of citizen scientists and a community voice in phenology, with place-based observations from local communities, as well as institutions and biologists' voices, forming partnerships through Rising Voices. This must be done with full adherence to appropriate cultural protocols and ethical considerations.

Ecological restoration is not a relevant or viable approach; instead, we need ecological renovation.

### *d) Health and livelihoods*

Indigenous people's concepts of health tend to be broader than physical health; the idea of "*one health*" encompasses human and community cultural, mental, spiritual, and physical health, as well as the health of the Earth, air, lands, waters, and wildlife. It is important to bring scientists and decision makers into communities so they can see how these ideas are engaged in daily lives, and so they can understand how climate change truly challenges health and livelihoods.

When communities adopt new technologies (solar, wind, straw bale, etc.) they need to be incorporated on the communities' own terms (i.e., using local materials) and in accord with community values in order to maintain health in this broad sense. Community members should be involved in implementing adaptations and monitoring community health. Knowledge and action must be linked; action must be culturally grounded, for example recognizing the importance of traditional foods to our identities, health, and livelihoods.

## **FULL WORKSHOP REPORT**

### **Mission of Rising Voices**

The mission of the Rising Voices: Collaborative Science for Climate Solutions program (Rising Voices) is to promote and facilitate more culturally diverse science and cross-cultural approaches for adaptation solutions to high impact weather and climate events, climate variability and climate change.

### **Objectives of Rising Voices**

The Rising Voices program was initiated to increase engagement between Indigenous communities and Indigenous and non-Indigenous scientists to address the challenges of understanding and responding to a changing and variable climate, extreme weather events, and research and policy needs. Rising Voices is a community of engaged Indigenous leaders, Indigenous and non-Indigenous environmental experts, students, scientific professionals, and citizens across the United States, including representatives from tribal, local, state, and federal resource management agencies, academia, tribal colleges, and non-governmental, research, and community-based organizations. Rising Voices is a platform to amplify the voices of Indigenous peoples that need to be heard and recognized. The program brings together efforts for integrating diverse ways of knowing and helps to establish protocols for engaging culturally-varied and distinct communities. Rising Voices is now a primary initiative in the United States responding to recent national and international calls for meaningful engagement with Indigenous communities and knowledge systems.

Broad public participation in Rising Voices is welcomed through an annual workshop series. To date, the National Center for Atmospheric Research (NCAR) has hosted three Rising Voices workshops (1-2 July 2013, 30 June – 2 July 2014, 29 June – 1 July 2015), which have tripled in size with nearly 120 participants attending the third workshop in 2015.

### **Previous Workshops**

The first Rising Voices workshop was held in July 2013 at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado and convened over 45 experts, practitioners, and students from diverse institutions across the United States, including Alaska and the Pacific Islands, on cross-cultural scientific engagement. Some of the questions that drove the initial Rising Voices discussion included: *What are the elements of successful co-production of science and policy in the related fields of extreme weather and climate change? What lessons have been learned from over two decades of engaging Indigenous peoples in weather and climate science and policy? What are the best practices and successful pathways for enhancing engagement in the future?*<sup>1</sup>

Over seventy participants convened for a second time at NCAR at *Rising Voices 2* on June 30-July 2, 2014, to discuss what the science, information, support and research needs are of Indigenous communities to facilitate respectful and appropriate adaptation solutions to climate change and

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<sup>1</sup> Lazrus, H. and R. Gough (2013) “We’re all in the same canoe”: The rising voices of Indigenous peoples in weather and climate science and policy. Rising Voices I Workshop Report, National Center for Atmospheric Research, Boulder, Colorado, 1-3 July, 2013.

[https://risingvoices.ucar.edu/sites/default/files/rv1\\_report\\_final\\_0.pdf](https://risingvoices.ucar.edu/sites/default/files/rv1_report_final_0.pdf)

variability.<sup>2</sup> Thematic groups emerged to discuss adaptation needs for the key topics outlined in the third National Climate Assessment's Indigenous Peoples, Land, and Resources Chapter,<sup>3</sup> which was released a couple months prior to the Rising Voices 2 gathering, and represented a significant shift in the attention being paid at the national level to the inclusion of Indigenous voices and knowledges; this transformation was further highlighted in the release of the Fifth Intergovernmental Panel on Climate Change Report.<sup>4</sup>

### **Rising Voices 3: Third Rising Voices Workshop on Learning and Doing: Education and Adaptation through Diverse Ways of Knowing**

The Rising Voices community gathered together for a third time at NCAR in Boulder, CO on June 29-July 1, 2015. For Rising Voices 3 (Rising Voices 3), 119 people came together from every region across the U.S. to focus on collaborative science for climate solutions, with the specific driving theme of Learning and Doing: Education and Adaptation through Diverse Ways of Knowing.

Rising Voices 3 was a two and a half-day in-person workshop including presentations, panels, break-out sessions and group activities, facilitated conversations, informal networking, daily group debriefing, shared meals and collaborative development of workshop proceedings. Rising Voices 3 aimed to be a workshop that facilitated cross-cultural approaches for adaptation solutions to climate variability and change and to identify tracks of on-ground adaptation in topic areas.

Rising Voices 3 explored four overarching topics: (1) Collaborative scientific-Indigenous partnerships in support of adaptation in response to climate variability and change; (2) The question of how Rising Voices can and does function as a hub for facilitating networking and catalyzing collaboration across diverse partners (we call this role a boundary organization); (3) Education curricula and student engagement in support of youth and early-career leadership on climate issues; and (4) Ways to appropriately evaluate the success of scientific-Indigenous collaborations, including considerations of cultural knowledge and protocols. Key subject areas discussed in relation to these topics, and around which breakout groups formed, included (A) Relocation, (B) Water, (C) Phenology, and (D) Health and Livelihood Hazards.

### **Outcomes Rising Voices 3 Aspired to Achieve**

Rising Voices 3 aspired to build off the outcomes achieved by the first two Rising Voices gatherings, such as the letter of recommendations submitted to the President's State, Local, and Tribal Leaders Task Force On Climate Preparedness and Resilience,<sup>5</sup> becoming a member partner of the National

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<sup>2</sup> Rising Voices (2014) Adaptation to Climate Change and Variability: Bringing Together Science and Indigenous Ways of Knowing to Create Positive Solutions. Rising Voices II Workshop Report. National Center for Atmospheric Research, Boulder, Colorado, 30 June-2 July, 2014.  
[https://www.mmm.ucar.edu/sites/default/files/rv2\\_full\\_workshop\\_report\\_2014.pdf](https://www.mmm.ucar.edu/sites/default/files/rv2_full_workshop_report_2014.pdf)

<sup>3</sup> Bennett, T. M. B., N. G. Maynard, P. Cochran, R. Gough, K. Lynn, J. Maldonado, G. Voggesser, S. Wotkyns, and K. Cozzetto, 2014: Ch. 12: Indigenous Peoples, Lands, and Resources. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 297-317.

<sup>4</sup> IPCC [Intergovernmental Panel on Climate Change] (2014) Fifth Assessment Report: Impacts, adaptation, and vulnerability. <http://ipcc-wg2.gov/AR5/report/final-drafts/>

<sup>5</sup> Rising Voices (2014) Letter to the President's State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience.  
[https://www.mmm.ucar.edu/sites/default/files/letter\\_to\\_presidential\\_task\\_force\\_from\\_rising\\_voices.pdf](https://www.mmm.ucar.edu/sites/default/files/letter_to_presidential_task_force_from_rising_voices.pdf)

Climate Assessment's network-of-partner organizations, the transfer of knowledge about disaster preparedness between Pacific Islanders and Alaskans, and collaborations between scientists and community members concerned about relocation. Some of the goal outcomes Rising Voices 3 worked towards are: (1) New adaptation partnerships stemming from interactions at Rising Voices 3 and stronger adaptation partnerships initiated before Rising Voices 3; (2) Ideas for new/modified curricula and student/early-career involvement in climate science and adaptation planning; (3) Ideas for evaluating scientific/Indigenous partnerships/collaborations; (4) Jointly written products such as the Rising Voices proceedings reports and the 2014 Letter from Rising Voices; (5) Recommendations to and catalyzing action with priority tracks to policy audiences such as the UNFCCC Conference of Parties 21, The Intergovernmental Panel on Climate Change, U.S. Congressional committees, and the White House.

### **Crosscutting Themes**

The crosscutting overarching themes of Rising Voices 3 included evaluation, education, and boundary organization principles.

#### ***Principles of boundary organizations***

Boundary organizations function to actively manage the construction, bridging, and maintaining of boundaries. Boundaries can be, for example, between knowledges or ways of knowing, between science and policy, or organizational levels, and figure centrally in understanding the pathways between knowledge and action. Some principles of boundary organizations include, and effective boundary work involves:

1. Creating salient, credible, and legitimate information simultaneously for multiple audiences;
2. Linking knowledge and action
3. Bridges boundaries
4. Establishing participation from both sides of a boundary, engaging multiple actors across boundaries
5. Coordinating complementary expertise and conceptual frameworks
6. Negotiates between boundaries (e.g., science and policy, across nations, between different knowledges)
7. Establishing dual accountability across the boundary
8. Using "boundary objects", which are items that sit between two different social worlds, but can serve as a focal point for common understanding. Examples of "boundary objects": hydrologic, fisheries, climate models, assessment reports.
9. Actively mediating to establish win-win outcomes, reducing the potential tradeoffs and conflicts between increasing salience, credibility, or legitimacy.
10. Translating across boundaries<sup>6</sup>

Rising Voices as a boundary organization is operationalized through the structure of the annual gathering. Workshop participants explored the idea of Rising Voices as a boundary organization that transcends barriers between ways of knowing, cultural context, generations, and science and policy. Transcending or lowering barriers is especially important in situations where collaborators

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<sup>6</sup> Drawn from Cash, David, William Clark, Frank Alcock, Nancy Dickson, Noelle Eckley, and Jill Jäger (2002) Salience, Credibility, Legitimacy and Boundaries: Linking Research, Assessment and Decision Making. John F. Kennedy School of Government Harvard University Faculty Research Working Papers Series. Available at: [http://ssrn.com/abstract\\_id=372280](http://ssrn.com/abstract_id=372280)

may have little experience working together, high levels of distrust, and wield disproportionate degrees of power. Indigenous peoples have complex histories of exploitation at the hands of scientists and bureaucrats, leading to concern about how their knowledges are valued, credited, and respected in research relations. As a boundary organization, Rising Voices seeks to be a credible, salient, and legitimate collective across epistemological, research/practice, and generational communities.

### *Students and Education*

Rising Voices 3 included a particular focus on engaging students and early career individuals. Some of the key education-related questions that participants considered throughout their discussions over the course of Rising Voices 3 included: (1) What types of education (K-12, undergrad, grad) and/or community outreach efforts are already being conducted in your community or organization? (2) What needs do you see for education (K-12, undergrad, grad) and/or community outreach do you see in your community or organization? (3) What opportunities do you see in the Rising Voices Network to support education and/or community outreach efforts?

At Rising Voices 3, youth participants initiated the Rising Voices Youth Climate Initiative. The youth participants included high school students from Kansas, North Dakota, Colorado, and Hawai'i who participated throughout the Rising Voices 3 workshop, and shared their reflections with everyone gathered. The Rising Voices Youth Climate Initiative calls for the inclusion of all Indigenous and non-Indigenous youth who share a common goal: protecting the earth from the impacts of global climate change. We draw upon traditional and scientific knowledges to confront climate change and understand that it is we who must act now for our own future and the future of our posterity.

A major finding within this theme is that educational curricula, especially K-12, needs to be expanded to include cultural frameworks and languages for describing the world that are based on Indigenous knowledge systems and that can be taught in tandem with scientific disciplines.

### *Program Evaluation*

Using both time-tested knowledge and insights from more recent experiences, Indigenous peoples have dynamic methods for evaluating programs, institutions and events such as Rising Voices 3.<sup>7</sup> These methods focus attention on understanding how a program, institute, or event can foster relationship building, meaning the process of creating connections and mutual respect across participants (including nonhumans) that will make it possible to achieve the desired outcomes of a program, institute, or event.

One of the key tenets of Indigenous evaluation is that evaluation processes are part of the program, institution, or event being evaluated. That is, participants must be involved in the evaluation process instead of just being “subjects of evaluation.” To this end, participants of Rising Voices 3 engaged to support the development of an evaluation process that suits both the particular kind of event Rising Voices 3 is and the goals and outcomes of Rising Voices 3 stated above. One key aim of

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<sup>7</sup> Examples of Indigenous evaluation: American Indian Higher Education Consortium, Indigenous Evaluation Practice, <http://indigeval.aihec.org/Pages/Documents.aspx>  
Sustainable Development Institute of the College of Menominee Nation, <http://link.springer.com/article/10.1007%2Fs11625-015-0304-x>

the evaluation process was to help participants and organizers better understand the qualities of relationships fostered (or not) at Rising Voices 3 in support of the event's goals and outcomes. A group of Indigenous persons who were already active in and some of whom were new to the Rising Voices community helped facilitate the development of an evaluation process for Rising Voices. The evaluation team included Kyle Powys Whyte, Marie Schaefer, Chris Caldwell, and Jannan Cornstalk, all of whom work together on Tribal climate adaptation in the Great Lakes region through the Sustainable Development Institute (SDI) at the College of Menominee Nation.

At Rising Voices 3, the SDI evaluation team interacted with many of the participants to see what relationships they felt were important for capacity building and collaboration. An evaluation survey was fielded among Rising Voices 3 participants following the workshop, attaining a 67% response rate.

According to preliminary results, 78% of respondents felt that Rising Voices 3 supported relationships that develop collaborative scientific-Indigenous partnerships for adaptation in response to climate variability and change; 55% that Rising Voices 3 cultivated family-like relations, 87% that Rising Voices 3 supported professional relationships, and 45% that RV 3 facilitated mentorship relationships. The three activities that most supported the development collaborations were breakout sessions, break time and time between sessions, and unstructured lunchtime with outdoor/indoor seating options. The evaluation team will analyze the connections and re-survey participants in future Rising Voices gatherings to learn more about how relationships have evolved.

### Presentations

Rising Voices 3 was called together with a Lakota prayer and thinking of all our relatives unable to attend the meeting in person. Everyone entered the room together as a family, leaving a pathway for tomorrow, aiming to embody this approach in our actions throughout the gathering. Protocol was established that in breakout group sessions elders shall speak first, followed by reflections from the younger generations.

*Dan Wildcat* (Haskell Indian Nations University) set the tone for the discussions that followed, charging participants to speak honestly with one another, like family, and respect each other through good, yet challenging conversations. He tied the conversations in the room to the significant momentum occurring around the globe, such as Pope Francis channeling Luther Standing Bear in his recent encyclical speech. Dr. Wildcat reminded all of us that climate change adaptation is not about managing resources, but rather about respecting relatives. He encouraged the need for more and more young people to engage in our gatherings, and evoked the words of his mentor, Vine Deloria Jr., when he pronounced, "Get good people together and good things will happen." He encouraged participants to have difficult discussions but to remember that we may be in uncharted waters and need to honor everyone's knowledge. As he concluded and the gathering commenced, "That's my charge relatives, so roll up your sleeves."

*Heather Lazrus* (NCAR), *Julie Maldonado* (Livelihoods Knowledge Exchange Network), and *Bob Gough* (Intertribal Council on Utility Policy), the co-organizers, encouraged participants to think of the gathering as an organic opportunity to have cross-cultural conversations, share ways of knowing for meaningful partnerships, and build upon Rising Voices 2 conversations, but also the need for fresh ideas and recommendations to continue this organic momentum into the future. One of the main objectives and most significant drivers for the gathering was to meet partners for new

engagements, as well as re-invigorate already formed partnerships, to come out of the gathering with positive connections and doing this as one family, collective unit.

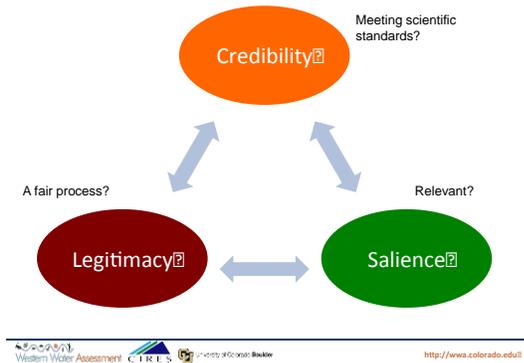
*Greg Holland* (Regional Climate Section, NCAR) welcomed everyone to NCAR and opportunities for increased collaborative research that incorporates traditional knowledge and youth-based programs. He encouraged the youth gathered to take advantage of their time at NCAR and at Rising Voices 3, to meet and talk with scientists; the youth are the ones that are going to take us into the future. One participant followed this sentiment during introductions around the room, “There is a great feeling that the future of our species is in for some wonderful positive changes.”

One of the crosscutting themes of Rising Voices 3 was considering if and how Rising Voices serves as a boundary organization and what that means in practice. *Lisa Dilling* (Western Water Assessment, Environmental Studies, Cooperative Institute for Research in Environmental Sciences’ Center for Science and Technology Policy Research at the University of Colorado-Boulder) engaged participants with a presentation on “Boundary Organizations: Navigating Between Worlds.” Boundary organizations navigate between worlds and can be an individual, a group, an organization that crosses one or multiple boundaries to bridge scientific knowledge, information and resources for decision-makers.

Some of the types of boundaries participants raised in discussions were physical, visible, historical, natural, political, language, international, disciplines, paradigms of thinking, religion, regulatory, legal, age, cultural, gender, income, profession, and tribal. Boundaries were seen as serving modes of protection, comfort or safety, efficiency, allocation of resources, power, control, identification of self, shared values, fear, exploitation, exclusion/inclusion, and sphere of sovereignty. Boundaries are crossed by helping those who are fearful of crossing boundaries; by building trust, mutual respect, empathy, curiosity, courage; encouraging questioning, shared experiences, contributing to education; and being aware of customs and traditions.

The boundary between science and society was seen as being deliberately maintained with ethical implications. Compartmentalizing knowledge and science excludes cultural sciences. Modern science places emphasis on quantitative measures and cultural aspects are not often measurable in this paradigm. Social sciences and traditional knowledges are not considered in the established hierarchy. Some of the ways boundaries between science and society or science and “non-science” are maintained are through the National Academies of Science, the National Research Council, and scholarly journals. Colonization has fractionalized the world, with names, definitions and descriptions; Indigenous science connects it back together. Boundaries have been forced within the science community through language, degrees, institutions, councils, committees, funding, and stakeholders.

One of the problems with science boundaries is there is a reservoir of knowledge that is not being effectively communicated to or reached by decision-makers. The result is that information is often not as useful as it could be, is often not what is most needed, there is a lack of regional specificity or scale mismatch, inaccessible presentation or poor communication, not presented with accompanying information, institutional constraints in decision-makers response, lack of trust in information, and uneven delivery to affected constituents.



The Cash et al. framework for Knowledge to Action explains that efforts to connect knowledge to action are effective only if they are sufficiently salient, credible, and legitimate with multiple audiences simultaneously.<sup>8</sup> The importance of each element will vary depending on the actor and his or her perspective. One example of a boundary organization managing the boundary between scientific knowledge and decision-makers is the Western Water Assessment RISA (Regional Integrated Science Assessment), which aims to help provide decision support information to assist decision-makers grappling with impacts of climate

variability and change. An effective boundary organization creates a space for legitimacy for all players by linking knowledge systems through actions.

The first panel session highlighted **Learning and doing by example**. *John Doyle, Mari Eggers, and Sara Young* (Little Big Horn College) presented their work on addressing fecal contamination of Chief Plenty Coups Spring in Pryor, Montana, on the Crow Reservation. They engaged the Pryor community through research and activities based on local environmental knowledge, working with the Pryor 107 Committee of Elders as well as the Crow Environmental Health Steering Committee. They tested water samples from Chief Plenty Coup Springs, a nearby well and two local creeks for coliform and *E. coli* as indicators of fecal contamination. LBHC staff member Ada Bends and student interns Amanda Not Afraid, Emery Three Irons and Jessica Eggers also gained research experience through helping with the sampling and analyses. Water samples were further analyzed by colleagues Stephanie Ewing, Julie Geddes and Sue Pellegrini at Montana State University Bozeman, who conducted isotopic analysis of water samples, and used DNA sequencing to compare bacterial communities. The goal is to understand whether the bacterial contamination is because of tourist traffic to Chief Plenty Coup Park creating an additional load on a failing septic system and/or whether bacterial contamination in Pryor Creek increases in the summer and some of that passes through groundwater to the springs. The key focus of the research is about restoring the health of a sacred spring as well as building research capacity for their tribal communities where elders are part of the community-directed team and the youth are involved in the project to understand contamination in a sacred spring. One important boundary issue in conducting the work is tribal vs. non-tribal land.



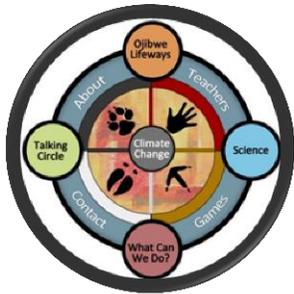
Sampling a spring at Chief Plenty Coup State Park for coliform and E coli contamination, other types of bacteria present and isotopes. Left to right: Sara Young (sitting), Stephanie Ewing, John Doyle, Julie Geddes, Mari Eggers. June 2015. Photo courtesy of Antonie Dvorakova

*Catherine Techtmann* (University of Wisconsin-Extension) presented the **Gikinoo’wizhiwe Onji Waaban (Guiding for Tomorrow) or “G-WOW”** Changing Climate, Changing Culture Initiative: A

<sup>8</sup> Cash, D, WC Clark, F Alcock, NM Dickson, N Eckley, and J Jäger. 2002. Salience, credibility, legitimacy and boundaries: Linking research, assessment and decision-making. KSG Working Papers Series RWP02-046.

New Model for Climate Change Literacy & Action ([www.g-wow.org](http://www.g-wow.org)).

In the heart of the Lake Superior Ojibwe Community, there is increasing evidence that climate change is affecting the sustainability of Lake Superior coastal resources, communities, and cultures. There is concern about climate change impact to Ojibwe treaty rights and traditional cultural practices within the Ceded Territory. “Traditional” climate literacy models were not resonating with audiences. Diverse project partners came together as the G-WOW Team to develop a new climate change educational outreach strategy (federal and local partners).



The Lake Superior Ojibwe people have relied on the sustainability of key plant and animal species for generations to support subsistence, cultural, and spiritual practices or “lifeways.” Their traditional ecological knowledge (TEK) of natural systems provides place-based indicators of climate change for people of all cultures. The G-WOW key principles include acknowledging that climate change is real; humans contribute to climate change; weather and climate are different; climate affects culture; and we can make a difference.

The G-WOW model is unique in that it is based on evaluating climate change impacts on the habitat conditions needed for the sustainability of plant or animal species that support a cultural practice through integration of place-based with scientific evidence. It creates a culturally relevant climate change perspective; links cultural, place-based evidence with scientific climate research; makes the model transferrable to other cultures; and promotes action through service learning.

An example of applying the G-WOW model is wild ricing; manoomin (wild rice) is a key species to the Ojibwe for subsistence, spiritual, and ceremonial purposes. The Ojibwe lifeway of wild rice harvesting depends on the sustainability of manoomin, which depends on habitats with shallow water, moderate water level fluctuations, and cool growing season temperatures. Place-based evidence of climate change impacts on manoomin include that from 2007-2012 there was unprecedented disruptions in tribal wild rice harvests and yields due to drought, fungal disease, and storms; western scientific evidence includes increased average temperature, increased frequency of 90-degree days, and change in frequency of more than two inches precipitation.

The G-WOW service learning curriculum is focused on talking circles where climate service learning projects and results are shared; place-based evidence of climate impacts on four-seasonal Ojibwe cultural practices and the key species supporting them; integration of climate science with place-based evidence to evaluate if culture and science agree; and taking action through climate service learning projects. Some G-WOW outreach tools include web curriculum; climate change discovery center; education training institutes; cultural connection; Ojibwe language, Traditional Environmental Knowledge (TEK), and cultural elements infused; integration of climate science; and taking action on climate change and sharing results. The target audiences for the curriculum include learners (middle school and above), teachers-educators, and the general public.

*Elena Sparrow* (University of Alaska-Fairbanks) and *Malinda Chase* (Association of Interior Native Educators) presented on the **Signs of the Land: Reaching Arctic Communities Facing Climate Change Camp by the Tanana River in Fairbanks, Alaska**. This is a partnership between the International Arctic Research Center at the University of Alaska Fairbanks, the Association of

Interior Native Educators and Columbia University, with participants that included traditional chief Trimble Gilbert from Arctic Village, Alaska, along with elders, linguists, teachers, scientists, community leaders, resources managers and students. The four-day camp wove together TEK, Native language, climate science, hands-on activities and observations through participation and storytelling. Participants discussed the importance of developing and using Arctic resources in a sustainable way, especially given the drastic rate of increase of northern temperature, sea ice change, and changing of the timing of seasons, along with more frequent fires. They mentioned the tremendous 2015 summer fire rampage through the interior region of Alaska (about 5.1 million acres burned). They shared the *Signs of the Land* video (<https://www.youtube.com/watch?v=NMVqF6nQOB4>), which documents the camp experience and can serve to inform other tribes and communities interested in hosting a similar climate learning experience. The camp goals were to increase awareness and knowledge of climate change and its impacts in the Arctic, provide tools for planning and decision-making and encourage participants to share with their community what they learned by creating dissemination plans. While at the camp, the Elders summarized that “climate change will bring us together,” and stressed the critical importance of informing young people of the changes ahead and including them in climate change education efforts. Evident during and following the camp is how significant philosophies and beliefs are embedded in indigenous language, and can be used to guide, teach and as a learning tool.

*Karletta Chief* (University of Arizona) and *Preston Hardison* (Tulalip Tribe) presented on the **Guidelines for Considering Traditional Knowledges in Climate Change Initiatives** (<http://climatetkw.wordpress.com/>). Traditional knowledges (TKs) are increasingly recognized as valuable for adaptation to climate change, bringing scientists and Indigenous people together to collaborate and exchange knowledge. There are benefits through mutual learning and mutual generation of knowledge, with a focus on social contexts of exchange; less recognized components are implications of multiple cultural, legal, risk-benefit and governance contexts. Despite keen awareness of climate change, Indigenous people have limited participation in technical climate change science; there is limited access, power imbalances, and differences in worldview. Western science emphasizes facts, whereas Indigenous views emphasize the relationships to spiritual and biophysical components and indicate important and distinct contributions that each knowledge system can make. Indigenous participation in climate change science and decision-making is needed to engage communities in designing climate change solutions; create an environment of mutual respect for multiple ways of knowing; directly assist communities in achieving their adaptation goals; promote partnerships that foster effective climate solutions from both western and Indigenous perspectives; and foster regional and international networking to share climate solutions.

The Guidelines for Considering Traditional Knowledges in Climate Change Initiatives are provisional guidelines composed by the Climate and Traditional Knowledges Working Group (CTKWG). Fifteen contributing authors from universities, non-governmental organizations, tribes, and state and federal agencies collaborated on the guidelines. Tribes, the North Pacific Landscape Conservation Cooperative, and the US Department of Agriculture provided funding. The purposes of the Guidelines include increase understanding of the role of and protections for TEKs in climate initiatives; provide provisional guidance to those engaging in efforts that encompass TEKs; and increase mutually beneficial and ethical interactions between tribes and non-tribal partners.

TEKs are understood as dynamic knowledge systems and lifeways referring to Indigenous ways of knowing resulting from a close relationship to the environment and developed over thousands of years. The holders of TEKs are not just knowledge holders, but also users of TEKs in accordance

with traditional government systems that govern how TEKs are shared and used. TEKs are relevant to climate change through land management practices (e.g., fire as a land management tool); adaptation; and addressing gaps in data and information to help establish baseline.

TK Principles of Engagement include:

- **“Cause no harm”**: meaning to identify and avoid risks that could lead to loss of or misappropriation of Traditional Knowledges,
- **Free, Prior, and Informed Consent**: Free means Indigenous control over decisions, Prior means Indigenous peoples should be involved from the beginning at the conceptualization phases of collaborative relationships; Informed means all relevant information must be made available and provided in language/forms understandable to Indigenous peoples; and Consent means first affirm the right of Indigenous peoples to decline to engage in mobilizing TKs for cooperative projects.

TK Guidelines include:

- **Guideline 1.** Understand key concepts and definitions related to TKs.
- **Guideline 2.** Recognize that Indigenous peoples and holders of TKs have a right NOT to participate in federal interactions around TKs.
- **Guideline 3.** Understand and communicate risks for Indigenous peoples and holders of TKs.
- **Guideline 4.** Establish an institutional interface between Indigenous peoples, TK holders, and government for clear, transparent and culturally appropriate terms-of-reference, particularly through the development of formal research agreements.
- **Guideline 5.** Provide training for federal agency staff working with Indigenous peoples on initiatives involving TKs.
- **Guideline 6.** Provide specific directions to all agency staff, researchers and non-Indigenous entities to ensure that protections for TKs requested by tribes and knowledge holders are upheld.
- **Guideline 7.** Recognize the role of multiple knowledge systems.
- **Guideline 8.** Develop guidelines for review of grant proposals that recognize the value of TKs, while ensuring protections for TKs, Indigenous peoples, and holders of TKs.

When Indigenous peoples share TK, there are values like reciprocity and goodness of mind/heart. Guidelines are necessary to prevent exploitation of TKs. Relationships ought to be in equal standing between all parties. Project funding should require a process of obtaining formal permission from tribal leaders with a completely informed proposal that includes all positive and negative outcome possibilities as a result of the information being sought.

Despite little research on climate change impacts on tribes, there is momentum of efforts by tribes, tribal researchers, and tribal partners in the last few years, including national advocacy for consideration of and partnership with tribes and protection of tribes and TKs. There has been increased federal funding for tribes, but not a significant level. Despite these progresses, there is more work to do, especially on education, partnerships, outreach, and planning.

*Dennis Ojima* (Colorado State University) brought attention to the **UN’s Sustainable Development Goals (SDGs)**, 17 goals that collectively provide a framework for sustainability within the political realm. Based on the principle of universality, the SDGs brings up questions to consider when your nation moves forward, such as recognizing what these 17 goals look like, targeting assistance to meet the goals, identifying how implementation is monitored and evaluated, and determining the usefulness of the interface.

*Fred Eningowuk* (Native Village of Shishmaref, Alaska) set the tone for the second day of the gathering when he addressed participants and spoke about his tribe, located 15 miles south of the Arctic Circle, as being ground zero for climate change. Climate change is impacting the modes they live off of – the land and ocean. Last winter the temperature did not reach -30°F as it used to (it might have dropped to -20°F for two days, but not more); in parallel, the community has noticed many environmental changes, such as earlier spring ice breakup; later ice build up (October/November is now December/January); changes in how slush used to build on the shores to form a natural wall for the community, melting permafrost; less snow each year; less berries because of changing snow patterns; and drying up snow and erosion because of lack of accumulated snow. The community is afraid of what is to come; especially considering that they might soon be classified as a desert. As a community, they decided to relocate in 2001, but have yet to relocate. They are conducting soil studies on a relocation site, where they believe they would be better situated. In the meantime, they are trying to adapt to climate change, such as harvesting spring mammals one month earlier than before.

“The ocean and land are our garden and supermarket and how we survived for thousands of years.”

– Fred Eningowuk,  
Native Village of Shishmaref, Alaska

*Kristin Wegner* (UCAR-GLOBE, Climate Voices) spoke about UCAR programs and opportunities for involvement. She outlined how education can include many types of learning: formal learning in training institutions, K-12 education, academia; non-formal learning through community-based settings or online; and informal learning through daily life, in communities, and through interests and activities. The Global Learning and Observations to Benefit the Environment (GLOBE) program is an international K-12 science and education program for students to learn about the Earth’s system and the natural environment. The GLOBE Teacher’s Guide has a formal curriculum of Protocols and Learning Activities, which is freely available on the GLOBE website ([www.globe.gov](http://www.globe.gov)). Students learn by observing, asking questions, designing and carrying out investigations, incorporating phenology protocols like green-up/green-down and arctic bird migration. Students (and soon to be citizen scientists) enter their data into the GLOBE visualization system and interact with the map-based dataset to conduct investigations.

Kristin also presented on Climate Voices, a climate science speakers network that reaches the public through informal/public outreach. Climate Voices includes nearly 400 speakers that engage in non-partisan conversations in communities or with organizations about climate change and solutions. Climate Voices partners with national networks, such as GreenFaith, to connect with communities. Climate Voices provides webinars around the country on subjects meant to inspire hope for the environment. Another NCAR program is SciEd, which offers resources for K-12 teachers and students (web content, classroom activities, online interactives) about weather and climate ([www.scied.ucar.edu](http://www.scied.ucar.edu)). The NCAR Climate Exhibit is a research lab and interactive museum open to the public. The Significant Opportunities in Atmospheric Research and Science (SOARS) is an undergraduate-to-graduate bridge program designed to broaden participation in the atmospheric and related sciences. The program is built around research, mentoring and community. SOARS invites students from many disciplines to apply their expertise to understanding the Earth’s Atmosphere. In particular, SOARS seeks to involve students from groups that are historically under-represented in the sciences, including Black or African-American, American Indian or Alaska Native, Hispanic or Latino, female, first-generation college students and students with disabilities.

To conclude this presentation, participants were invited to discuss how they are involved in climate change-related work and share something they learned; one person shared they learned how one person who has a desire to work from the local level up can make a difference by going into a federal agency with numerous resources to transform a traditional top-down educational system into a horizontal system.

One of the most important aspects of Rising Voices 3 was youth participation and sharing their perspectives and work. *Thomas Dire* (NASA Experiential Learning Opportunity intern) started the student panel session by discussing how he is learning about GIS and ways to apply this tool to better understand the suitability of potential relocation sites for coastal communities in response to sea level rise and storm surges.

*Sheila Northbird* (NASA Experiential Learning Opportunity intern) talked about the changes her tribe is seeing in Minnesota. She grew up in a family practicing traditional management practices; they aren't allowed to burn anymore, but the area is dependent on burning, and they're losing the pine forests because of this situation. Last year, Northbird worked on a project focused on the Jack pine and climate change in Chippewa National Forest. Her work engaged the processes detailed in a legend that says Jack pine and blueberries love each other - the Jack pine goes into the forest and blueberry follows its path. Her new project focuses on collecting data on the Hydrophyte Wild Ginger Root around Leech Lake Reservation, which is used for medicinal purposes and is currently impacted by drought and timber blowdown. She is working on incorporating ways of modern science and traditional knowledge.

*Paulette Blanchard* (Absentee Shawnee) spoke about her work, **Our Squirrels Will Have Elephant Ears: Indigenous Perspectives on Climate Change in the South Central United States** (inspired by an elder's observation of shifts in local phenology and timing of seasonal ceremonies). Through the South Central Climate Science Center, University of Oklahoma and Haskell Indian Nations University, this work brought together participants from 33 of 63 tribes in and around the south central United States to discuss experiences of local climate changes and impacts on tribes in the region. She chose this work because she noticed minimal data relating to tribes and climate change. Her qualitative approach created space for tribal participants to represent themselves and made the information accessible to the communities, and made sure they approved it before conducting research or releasing findings. She received approval from them before publishing and releasing results to respect community and sovereignty. She used Indigenous feminist methods, cultural etiquette, and cultural competency. Some of the stories shared with her included how animals and plants were moving in or out of the areas, some local chemical plants are causing cancer in their population, how climate change impacts people's health, ability to grow food, have clean water, and how some older wells were becoming brackish or needed to be deeper. Some of the results include: tribal Peoples in the region understood climate change and had clear perspectives on the changes they observed and experienced, they understand water and water rights are in crisis, there exists a lot of distrust of scientific assumptions and the capacity of scientists to hear, and it is necessary they represent themselves in discussions that affect them and their communities and homelands including have financial self-determination. The oil and gas industries in the region are integrated into these conversations of climate change, due to the long-standing connections in the region. The communities do not need a handout but rather a hand-up. They are not helpless but hamstrung financially and politically.

*Melissa Watkinson* (University of Washington) presented on her work, **Tribal Capacity for Climate Change Adaptation: Identifying the Impact of Fractionated Land for a Coastal Community**.

The study looked at the implications of climate change adaptation and land policies for the Quinault Indian Nation (QIN), located on the coast in the northwest corner of Washington. She considered the development of residential and commercial infrastructure further inland on the reservation as a potential tribal adaptation strategy to address the loss of land. One major problem however is limited relocation options on the reservation due to historical land policies. Her research focused on the question of how reacquiring fractionated land through the Land Buy Back program (LBB) could increase tribal governments' capacity to adapt to the impacts caused by climate change. QIN was selected because they have already begun planning to relocate to what they call the "upper village", which is just south of Taholah, where the majority of tribal community members live, at a higher elevation. They are restricted by reservation boundaries and land policies. They are facing issues of sea-level rise, coastal erosion, flooding, and tsunamis as immediate potential risk; nearly 68% of all land parcels are fractionated. To ensure that the study would address community needs and have the potential for a direct impact on decision-making, she partnered with the Quinault Department of Natural Resources (QDNR) and incorporated participatory research practices, which was also important in considering ethical research considerations.

She asked how, "Can re-acquiring these lands help them deal with climate change?" QDNR gave feedback that they would benefit from the identification of an emergency evacuation route. There is no route that leads them East to safety quickly; there is only a North/South route. She used qualitative and spatial data and analyses to identify where the route should be, and where it was okay to place a new route that wouldn't endanger important native lands. In her analysis of land suitability for future development, she found that where the land is more suitable, it is also more fractionated.

Some of the policy recommendations that emerged from the research include: QIN leaders should prioritize purchasing fractionated lands through the LBB program that fall within the range of suitable lands, and select those areas that fit local needs and desires as identified through discussions about community development plans with tribal members; the QIN should select the least-cost adjusted evacuation route for development and purchasing of fractionated land prioritization; the federal government should continue to fund programs and provide resources for tribal climate change adaptation, and should do so in a way that allows tribal nations to practice their sovereignty rights, particularly where they can plan for the next seven generations into the future.; the LBB program and similar land consolidation programs should be further funded to transfer land back to tribes as a strategy to increase the capacity for tribes to adapt to climate change; future land consolidation programs must incorporate the opportunity for tribes to practice their traditional ways of doing and implement their traditional ways of knowing into their strategies for climate change adaptation or land consolidation. Melissa suggested the need for future research to consider analyzing the implicit and explicit impact of the relationship between fractionated land and climate change on Indigenous knowledges through a critical lens such as de-colonial theories and methodologies.

*Linda Kruger* (US Forest Service) presented on work, led by *Katherine Norton-Smith* (graduate student, University of Oregon) and *Kathy Lynn* (University of Oregon): **Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences**. The synthesis defines and describes the key frameworks informing Indigenous understandings of climate change impacts and pathways for adaptation and mitigation: tribal sovereignty and self-determination, culture and cultural identity, and Indigenous community health indicators. Based on the examination of diverse and current sources of information (emphasizing literature from 2013 – present), the synthesis identifies knowledge gap concerns for future research. The goals of the synthesis are to contribute

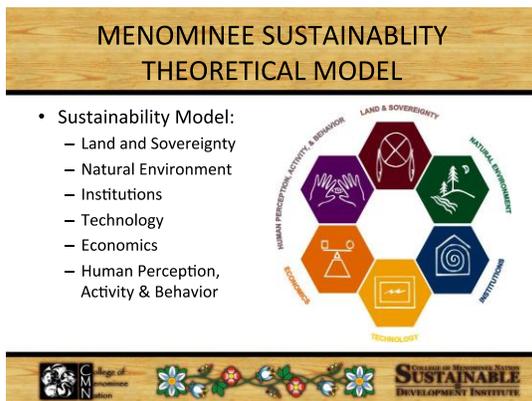
to efforts of tribal leaders, scholars and others working to strengthen Indigenous self-determination; and to bring together new scholarship and provide a comprehensive synthesis of climate knowledge, science and strategies that Indigenous communities are exploring.

The Synthesis explores the current climate impacts affecting Indigenous communities in the U.S., focusing on issues of public health, mental health, food security and traditional foods, water resources, tribal economies, natural resources, community infrastructure, energy, and climate-related disasters. With Indigenous communities leading efforts in profound ways to engage in climate change adaptation and mitigation at regional, national, and international levels, the synthesis explores regional tribal approaches; federal adaptation policies and governance; traditional knowledges and adaptation; tribal adaptation plans; and mitigation. The synthesis also includes a discussion of barriers and limitations to tribal adaptation, including minimal tribal involvement on federal climate change committees, working groups, and initiatives; report reliance on peer-reviewed literature; access to financial, technical, and other resource needed; and lack of national framework to deal with the relocation of tribal communities; and includes best practices and solutions, such as increasing Indigenous participation in climate change initiatives; increase Indigenous resilience to climate change is to increase federal support for tribal communities as they prepare for climate change; use of *Guidelines for considering Traditional Knowledge in Climate Change Initiatives* to ensure that future research is tribally-led or conducted with direct tribal engagement and the free, prior, and informed consent of tribes (CTKW 2014); and identifies areas for further research. For more information, Pacific Northwest Tribal Climate Change Project: <http://tribalclimate.uoregon.edu/>

*Denise Pollock* (Lewis Brisbois Bisgaard & Smith LLP) concluded the student/young professionals . Denise's family is from the Native Village of Shishmaref, and she grew up in Barrow, Alaska helping to harvest traditional foods, watching people hunt whales on the beaches and share the meat. Her mother was a teacher and she was raised respecting the language and the elders. This shaped her experiences, along with years of living in Boston, Washington DC, and traveling, receiving education and learning from multiple worldviews. She uses poetry as her creative outlet for activism and shared a poem with everyone on climate change threats to her homeland (see opening of report). She took college as an opportunity to travel, and minored in American Indian studies. It was the first time she learned about Eskimos from a political and historical level, and realized they were not teaching that in Alaska public schools. She learned the importance of volunteering in communities before making decisions and implementing policies. While in college she lived in Nome for a summer, working with a child advocacy center, and travelled to many small villages in the Bering Straits region, talking to them about difficult things like child physical and sexual abuse. After graduation she moved in with her grandmother to get back to the language, and encouraged children to give back to the communities. She currently works at a law firm as a research assistant doing research for tribes in legislation, finding value in her time in DC learning the federal relationship and how it does and does not work and the importance of also taking some time out of one's community to grow in different ways. Frustrated by how slow policy and legislation moves, she began participating in the DC Guerilla Poetry Insurgency: poetry slams of political, insurgent, radical, activist poetry. Denise expressed how there always needs to be an element of organizing and community building when making decisions. She wrote a poem, "The current reality of our city [Shishmaref, Alaska] is the future reality of all coastal cities. Instead of being silent I rise alongside native brothers and sisters... we will protect the homelands, the waters...putting forth armor to save the only lands that will save ourselves."

The panel concluded with one participant saluting youth victories, such as five students filing an appeal in Washington State that the state needs to look at climate change data. *Bob Gough* encouraged the youth, “You have to make a difference, because it’s not a planet for old men.”

*Marie Schaeffer* (Sustainable Development Institute, College of Menominee Nation) provided participants with some points on considering evaluation, one of the crosscutting focuses of Rising



Voices 3, about the relationships that are being built and maintained through Rising Voices. She provided examples from the Menominee Sustainability Theoretical Model, which represents the different dimensions identified as part of the Menominee sustainable forestry experience. This theoretical model for understanding Menominee sustainability examined the human/ environment relationship, and viewed these dimensions as separate, yet interactive dimensions, with the model being situated on Menominee autochthony, or of the land itself. This model has been used to identify research topics based on whether the

environmental issue crosses over different dimensions, such as climate change.

American Indian Higher Education Consortium (AIHEC) Evaluation Framework is similar to the Menominee Nation Model but developed for evaluation of education projects; the AIHEC framework is premised on: evaluation is part of and within the activity itself; place-based; community-based; individual responsibility-based; and respective of the entire Tribe as a people.

Some observations of Rising Voices 3 related to evaluation over the course of the first day of the gathering included reaching across boundaries and allowing networking that would not otherwise have been possible; learning a common language to use between Traditional Ecological Knowledges and Scientific Knowledge; making regional connections with parties who had never met before but live in the same area and work in the same field on similar projects, which leads to an exchange of information and inclusion in a larger network to collaborate; students looking for mentors who have advice on careers.

*Papalii Dr. Tusi Avegalio* (aka Doc Tusi, Pacific Business Center Program, University of Hawai‘i) gave a presentation updating Rising Voices 3 on the **Pacific Region Breadfruit Initiative** presented at Rising Voices 2 (see Rising Voices 2 workshop report, [https://www.mmm.ucar.edu/sites/default/files/rv2\\_full\\_workshop\\_report\\_2014.pdf](https://www.mmm.ucar.edu/sites/default/files/rv2_full_workshop_report_2014.pdf)). He spoke about manmade disasters and the impact on marine food resources and environment; seeking traditional wisdom to meet modern challenges; how modern science reaffirms ancient knowledge of the breadfruit; and implications for self-reliance, health, environment, community/village-based economic development and sustainability. He noted in particular how no one island jurisdiction can meet the minimum supply assurance of global supply of 300,000 tons of breadfruit flour a week, so the island jurisdictions must work together through the Pacific regional supply chain strategy.

He conveyed larger lessons in the presentation: “The spirits and ancestors of this place are as one.” If people don’t observe and learn, they will not find balance. The very solutions to global problems like food sovereignty and security that are needed are right in front of our faces, but we can’t see

them because we are caught up in the disasters. If communities reach back to traditional wisdom they will find the foundation of adaptive knowledge to deal with contemporary threats like sea level rise and radiation spreading from the Fukushima meltdown in Japan. People need to combine the traditional knowledge with science, for example to bring back the breadfruit (ulu). Without both approaches, there is an unnecessary divide between community-oriented practices and scientific-oriented practices.

Doc Tusi said that one word he hadn't yet hear din workshop discussion was "humility". Describing Pacific Islanders, he noted that we are a warrior people, but the greatest virtue of a warrior is humility. When people approach with humility they are showing honor and respect – this is a practice that all, including scientists, can employ in our work.

Speaking specifically of breadfruit, Doc Tusi notes that breadfruit is gluten free, and when talking to food experts his research team found it could be used to make gluten free flour. It has two flowers, one becomes the fruit and the other one dries and falls. The dried flower used to be used by the ancestors to repel insects baring diseases. Researchers have found the chemicals in this flower are 3 times more powerful than DEET. Breadfruit sap is 100% latex, and serves as a binder for making biodegradable plastic. Marine worms do not eat the wood, nor do termites. The research team has learned how to propagate thousands of trees per month, and they may be able to start doing this in four months. C.H. Robinson Worldwide Inc. is working with them to market the product, and will be going to organic food stores. They're using this to pull together the region. No one island can meet the projected demand of 300,000 tons of flour per week; they will have to work together.

*Craig Elevitch* (Agroforestry Net/Olohana) presented on **Reconnecting to Pacific Island Breadfruit Agroforestry Landscapes**. Lana'i Island's highly degraded cultural, environmental, and economic systems are extreme examples of the changes that have occurred throughout the Pacific Islands as a result of plantation agriculture and uncontrolled grazing. Currently a tourist destination for some of the richest people in the world, Lana'i also demonstrates how disconnected we can be from each other and the natural world. In the post-contact period (since the late 1700's), native Hawaiians' access to the land and ocean has been greatly reduced. The values that formed a foundation for their relationship to the natural world fostered highly productive agricultural and aquaculture systems that sustained Hawaiians for centuries. Much of their land-based agriculture was based on very productive perennial crops (e.g., breadfruit, banana, coconut, etc.). These durable systems are described today as agroforestry. These biodiverse and self-sustaining systems were replaced by plantation monocultures beginning in the 1800's, leading to progressive terrestrial and marine ecosystem degradation. Revitalization of traditional as well as modern

agroforestry systems—based on an indigenous relationship to the natural world—is the basis for the work that Olohana and Agroforestry Net are doing. Multistory agroforestry has the potential to regenerate degraded ecosystems while maintaining deep cultural values and generating a sustaining income.

While Indigenous farmers excel at anticipating yields from very complex agroforestry plantings, climate change presents additional challenges to predicting



yields. There are many predictive yield models for monocultures, but few for multi-crop systems. Elevitch is working on a predictive yield model that accounts for climate change impacts on agroforestry. Such models can be used to complement the generations-old knowledge of Indigenous farmers as we develop resilient cropping systems based upon time-tested techniques. The Hawaiian saying *I ke alo no ka 'ulu a hala* means, "The breadfruit was just in front and it was missed." In other words, the solutions we seek may be within reach if we know to look.

One of the most powerful moments of Rising Voices 3 was during the time youth shared their reflections:

- *Luca Sanchez* – I am here taking notes, listening to elders, saying to myself “we are the next generation and we can create change”. We are very honored to speak in front of you today.
- *Anna Roszell* – I came not knowing what to expect, but learned a lot: how drastic and broad climate change effects are; the drought; relocation and impacts at coast; most importantly I learned that we, the youth, are really what is needed to cause change, problem solve, and bring a better future.
- *Leah Kekuewa* - My knowledge of climate change is small, and of solutions is even smaller. We've never gone into depth on climate change in my school. We've learned a few things, but it's nowhere near that simple. I don't think my generation grasps what is happening – we are all too preoccupied. This is why the five of us are here listening and learning; we are the ones who will need to act. Future generations need to possess the skills and knowledge to respond and adapt to the ever-changing worlds.
- *Stefan Petrovic* - Dan Wildcat said not to avoid challenging each other. We as youth understand dealing with climate change must be done in a cultural and sensitive way; proactively include youth. There are only five of us up here this year. Next year we need more. Invite more middle school and high school students next time. We would like to engage in solution-orientated collaborations through a youth caucus. Include youth voices in these conversations and create opportunities for mentoring. Let youth use social media to get the word out during the event.
- *Shiloh-Kimberly Bennett* - I interviewed a lot of you and now I give my voice to Rising Voices. I've heard about Rising Voices in my home many times. I didn't probe much into what it was. I walked in and found people talking about a common problem that transcends us. We are a mixing pot- we need more of a mixing pot. We need more youth voices, involved in the solution based collaborations. What I heard: I heard about mitigation, my opinion is we are beyond mitigation. From what's happening, we need adaptation. My Uncle Kalani said “this is the first time Mother Earth will be passed in worse condition to new generations”. We want to say that we are ready, we will not fail you. We want to thank Kalani and Dr. Wildcat, and others.

### Panel on updates on recent activities

*Bull Bennett* (Kiksapa) and *Julie Maldonado* (Livelihoods Knowledge Exchange Network) provided updates on the **the U.S. National Climate Assessment (NCA)**. Bull provided an overview of the status of the NCA. The NCA's Development Advisory Committee for the Third NCA (released in 2014) was surprised at the vast number of inputs from Indigenous communities. The challenge was taking over 200 inputs and pulling together a chapter that preserved the richness of the content. The technical inputs became part of the public record during the assessment process and can now be accessed during the sustained assessment for supplemental reports. It was a lesson in working with many agencies; attempts to cover the diversity of Indian Country, connect with many people and resources, and then synthesize an immense amount of information for the chapter. In some ways, the process for the Third NCA was a learning curve for what to and not to do in the

future. Bull discussed the need to sustain engagement and continue the outreach process, especially as NCA4 gets underway.

*Bill Thomas*, Chair of Pacific Risk Management 'Ohana, spoke about PRiMO. He described the roots of the word 'Ohana – family, working together for a common cause, you can break the roots and it still grows. The relationships we build feed and sustain us. PRiMO's motto is “the power of partnerships” and is about multi-agency collaboration as a way to improve services. Bill described some of the working groups, in particular the Indigenous Knowledge of the Environment (IKE), which also means deep understanding of the environment and context, including knowing who we are, what we do, and whom we serve. The PRiMO gathering has had several dynamic speakers over the past few years, many of whom are at Rising Voices 3. They are looking to reach out even more and keep looking at issues that affect the underserved and the underrepresented, which are largely Indigenous peoples.

Recently, the IKE hui (working groups) of PRiMO wanted to change its focus toward crafting recommendations. Examples of such recommendations include: exploring the establishment of a collaborative, multi-partner institute to integrate Indigenous knowledge and look at the range of activities that can be done to bring focus to Indigenous knowledge; coproduction of science plans, policy, and development plans; equal standing of Indigenous knowledge with “science-based” knowledge, the need to bridge silos into a joint institute; create a publication to focus on Indigenous issues, knowledge, science to be published before next year's PRiMO.

PRiMO 2015 was the latest example of the power of indigenous perspective. The Head of State of the Independent State of Samoa, Tuiatua Tamasese Efi, a well-known scholar and advocate for Samoan traditions and cultures, was invited to give his thoughts on the importance of indigenous approaches to resilience. However, at the last moment, he was unable to attend. In his stead, he sent his wife, Masiofo Filifilia Tamasese, also a dynamic leader. Bill shared some of her message: ceremonies demanded daily conversations with nature, God, taking time to understand the place of people and the Earth. In the disaster risk reduction debate, Pacific Islanders have looked to science, religion and western philosophy – perhaps Islanders need to look under their noses to their own Indigenous traditions. The migration among the islands was based on conversations with the environment. Islanders need to find ways to have these conversations again and look towards themselves, their families, and their Indigenous traditions for guidance and direction.

Next year's PRiMO will be March 14-17, 2016 at the Hawai'i Convention Center. The theme is “The Voyage to Resilience: Creating Value Through Partnerships,” of which all are welcome.

*Bob Gough* (Intertribal Council on Utility Policy) presented on the recent **National Adaptation Forum** (NAF) held in St. Louis, MO. The purpose of this forum is to bring people together bi-annually to inform about and discuss climate adaptation. He shared a video of *Kalani Souza* (PRiMO), who could not be present, discussing some of their work with FEMA and the National Disaster Preparedness Training Center, along with Haskell Indian Nations University and numerous tribal councils. Secondly, in their work with the Pacific Regional Breadfruit Initiative (PRBI), they have been addressing food security issues and agricultural adaptation in the Pacific. They have been working alongside students and professors from Cornell University to increase productivity of breadfruit, a gluten-free staple source of food that includes biodiversity as part of the agricultural experience. An important part of this on-going work is that it is conducted *with* Indigenous communities. They are using Indigenous, Native knowledge to address contextual, regional food security issues. This is a very special kind of expertise.

The Partnership for Adaptive America (PAA) is a partnership model that began in Hawai'i with NOAA. In this work, they have looked at coastlines and coastal areas for habitat restoration. In addition to protecting environmental services, they have expanded a concept model for K-12 education. With the education model, they are engaging community elders and community members on tribal science and knowledge to integrate those two different knowledge streams. This education initiative serves to preserve the traditional expression of intergenerational transfer of the knowledge base, how we can create those capacities within our communities and institutions. It is an innovative way to build solutions to climate change—a promising way to adapt environmentally, socially, and culturally. Then we are educating children on community associations, NPS, community groups, nonprofits, and support from NOAA, USGS—a lot of different partners. Their most exciting partnership is with the Veterans Administration to employ returning veterans in habitat restoration model.

Bob Gough organized an evening of presentations on 30 June at the University of Colorado Law School for Rising Voices 3 participants and open to the general public. During this time, people from across generations – from youth to elders – shared stories about what climate change means to them and reflected on how they were energized to engage in and dedicate themselves – both personally and professionally – to issues related to climate change.

### Breakout Group Summary Reports

Scientific-Indigenous insights for adaptation in response to climate variability and change, particularly regarding four key subject areas: Relocation, Water, Phenology, and Health and Livelihood Hazards.

#### Relocation

Lack of support for relocation, institutional framework, and funding mechanism has been a collective failure. It has to be framed based on the *Universal Declaration of Human Rights*. It is time to get away from prevailing concepts in guidelines and protocols (e.g., Stafford Act) that focus on relocation of individuals, and frame for *communities*. A Presidential Forum on the Human Rights of Safe, Viable Communities is needed that would manage a Task Force on Climate Migration, The Forum should focus on the first priority of adapting in-place, and help to determine the necessary interim measures in the process of communities' decisions for in-place adaptation and/or relocation, if the communities themselves determine adapting in place is no longer a viable option.

"I'm glad we are ending on a good note by recognizing that there are opportunities. Realize we've survived relocation before. It is possible. It may not be pretty, but possible."  
– Chief Albert Naquin, Traditional Chief, Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw

A Task Force on Climate Migration would ensure government-to-government relationships when talking about relocation and include tribal governments engaged in relocation issues and all the agencies that must be involved in relocation processes. The Task Force would help address the identified need to establish a legal mechanism, institutional framework, and financial support based on equity considerations to directly support marginalized communities (Indigenous and non-Indigenous) who are facing displacement due to climate change impacts and who desire to migrate safely and with dignity. It could create a space (physical/cyber) where nations can hear and learn from one another. This includes processes of dissemination of communities' best practices and

lessons learned related to relocation. Such a space could support communities in determining necessary interim measures in the process of deciding in-place adaptation/relocation. Communities themselves would identify the essential assets that are culturally critical to maintain during relocation processes, those elements that are the tools for passing along culture and maintaining cultural integrity, as opposed to assimilation. Relocation must be managed within tribes who can rely on historical experience to learn from relocation stories in the past and could be tied to education curricula that would allow the youth to be the ones recording and sharing stories.

Key funding concerns/opportunities for relocation include: **How do we handle cost sharing programs?** How can we be innovative, including new funding sources such as crowd sourcing? Can we partner regionally to accomplish more? Can we partner rural areas with urban areas? Consideration could be given to accessing or petitioning for funds that allow tribes themselves to record changes in ecosystems and past processes of relocation.

The group's **viewpoint of cultural or spiritual impacts to the community.** Things to consider include determining necessary interim measures and the deteriorating infrastructure in the process of deciding adaptation/relocation (stating the need for "relocation" causes a decline in state/federal funding). There is an opportunity to view examples of relocation cases in <http://toolkit.climate.gov/>. The proposal was raised about renaming the group from "Relocation" to "Native American Human Rights of a Safe and Viable Community in the Face of Climate Change" or maybe just "Self-Determined Community Working Group."

Residents of the Native Village of Shishmaref, Alaska (*Fred and Frieda*) spoke about melting permafrost and the need for studies on relocation sites. They also pointed to the direct need for a nationwide plan because it is going to affect all coasts in time, so there needs to be considerations for short-term and long-term impacts. *Chief Albert* of Isle de Jean Charles, Louisiana and other local residents spoke about erosion and subsidence in coastal Louisiana, as well as the issue of cultural integrity for tribes as opposed to assimilation. *Kris Peterson, Shirley Laska, and Alessandra Jerolleman* with the Lowlander Center in Louisiana focused on **considering between "now" and "then" as communities work to stay in place and also as the relocation process unfolds for some communities most at risk.** Hawai'ians (*Leslie Iaukea*) discussed working with communities in the Pacific working on how to perpetuate culture within diaspora, policymakers looking ahead and buying land, but locals are moving to places where another language is spoken, losing aspects of culture. One concern raised regarding communities needing to consider relocation is traditional lifeways in terms of subsistence passed down for generations; if people move and go to retraining programs, then are they being retrained into colonized system? It becomes a question of how to engage in cultural triage and what to save to be cohesive and successful.

Culture is not static, so what are the pieces that are intrinsic to identity and maintain those pieces through the relocation process? Are there ways to understand the past to inform the future? But there are also new problems that cannot be solved with old systems. Instead of the way relocations were forced in the past, now **Indigenous peoples themselves should be in charge to guide their own efforts and record historical transitions of change.**

Adaptation will never be concrete and absolute; it is a continuous change that we go through as we move through time. Communities must discuss openly and honestly about what cultural aspects are of greatest importance to the survival of one's identity and are relevant.

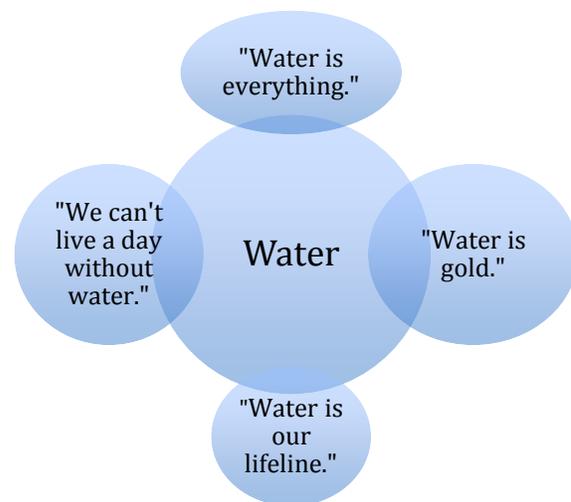
One of the main lingering issues that remained from the dialogue was how to **operationalize the relocation recommendation** that came out of Rising Voices 2 – **Convene a Federal Task Force on Climate Migration** to address the identified need to establish a legal mechanism, institutional framework, and financial support to directly support marginalized communities (Indigenous and non-Indigenous) who are facing displacement due to climate change impacts and who desire to migrate safely and with dignity. Another key issue is acknowledging challenges faced by Native communities that differ from non-Native communities. Besides tribal representatives and federal agencies, other consideration for who to involve include the White House Council on Native American Affairs, Arctic Council, Bolt law students to identify legal issues, and the Tribal Law and Policy Institute. One possible opportunity is that the U.S. is leading the Arctic Council and Secretary John Kerry is the director.

## Water

Participants in Rising Voices 3 Water discussions throughout the three-day gathering highlighted the central importance of water to our lives, our cultures, our health and well-being, our places, our broad natural family, our economies and our future in the face of changing climate. This shared belief underpinned the Rising Voices 3 breakout groups and plenary discussions and shaped the key findings and recommendations that emerged from these discussions. A shared commitment to addressing the challenge of long-term water quality, quantity, access and conservation is required.

Discussions at Rising Voices 3 were far ranging – in time, in space and in specific issues and topics raised. Perhaps the most fundamental and overarching recommendation **involved recognizing and exercising tribal water rights and water standards and codes** that build on the past and address current and future needs and circumstances. Even for Indigenous communities that are not formally recognized by the Federal Government, access to water remains a fundamental right – and responsibility – that should be continuously highlighted, nurtured and refined as conditions change utilizing both traditional knowledge and evolving western science in partnership.

This recommendation recognizes and builds on Rising Voices 2 call to Establish an institutional framework to ensure support for tribes to define and utilize their water rights and Establish basin-level regional processes for federal, state, local and tribal governments to develop and implement cohesive strategies to address the impacts of climate change. Specifically, we are calling for **establishing a collaborative Indigenous Water Network (or Network of Networks)** based on examples such as the Yukon River Intertribal Watershed Council and the Indigenous Rivers Network. This kind of collaborative framework would facilitate shared learning and joint problem-solving and could provide a vehicle for amplifying individual voices in regional, national and international deliberations. Such a collaborative network would also strengthen the ability of all Indigenous communities including, for example, island communities to contribute to and benefit from discussions of water rights and management.



To support these recommendations, we are calling for **development of a map or guide to Indigenous water network resources**. Such a guide would provide information on water in all of its forms – rainfall, stream/river flow, groundwater and, for coastal and island communities, the interactions of ocean water with sources of freshwater.

Another common thread that wove through our water discussions was the value of **engaging other formal organizations and civic groups also wrestling with the related issues of water and land use** such as the American Planning Association, the Western Governors Association Water Council and numerous water research centers as well as local and regional civic organizations. In addition to providing an opportunity to highlight Indigenous water issues and rights, such partnerships could strengthen a call for action by communities around the Nation and the world.

One specific aspect that emerged of ensuring access to water now and in the future was **meeting the special challenges of slowly evolving, chronic conditions such as prolonged drought in the context of disaster management**. Participants highlighted the value of the Stafford Act in enabling tribes to reach out directly to FEMA in emergency declarations and several participating individuals and organizations volunteered to raise awareness of this component of disaster risk management, especially in the context of changing climate.

Another significant theme that we highlighted was the central importance of **facilitating the engagement of youth** through formal education and training as well as through engagement in collaborative networks like Rising Voices. In the case of water resources, for example, there was a specific call for enhancing the number of Indigenous hydrologists. We all have an opportunity and a responsibility – as individuals, organizations and a shared community to strengthen the voices of youth in our discussions of *their* future. We highlighted a number of specific suggestions regarding securing support for scholarships, internships and other educational and training opportunities.

In addition to these broad recommendations, participants in the Rising Voices 3 Water sessions also committed to pursuing some specific, near-term opportunities that emerged during our discussions including:

- Working with staff at the climate.gov website and the Rising Voices family to facilitate the inclusion of Indigenous stories of climate and water challenges, adaptation and education to that Federally-sponsored resource; and
- Facilitating the development of an Oceans and Climate component to National Climate Impact Assessment current materials and future products.

### Phenology

Phenology affirms climate change through observations of changes in timing of biological phenomena as affected by seasons and climate, such as the beginning and end of the plant growing season, migration of birds, insects and animals like caribou. People are observing climate change-related mismatches and timing issues (e.g., mismatches in harvest times both in water and land are being experienced. For example, in the Pacific Northwest, salmon are off their cycle by 2-3 months due to an early spring, rapid run-off impacts their spawning runs and changing bio-chemistry impacts species health. Some options include high altitude release of water, the timing of water releases downstream, pull out sand and gravel to put in wetlands. But the existing issues are power-orientated with legal hoops and federal-tribal law dynamics. Other barriers and challenges include geographic border issues, such as the Ojibwe cannot go north into Canada with species' migration; tribal rights are geographical, but species are migrating to different places (e.g., White Earth Reservation as example of an area impacted by migrating species and boundaries). There is a

distinct need to understand timing through applied and adaptation methods, for example, to protect corridor areas for species' migration routes.

There is a need for **inclusion of citizen scientists and a community voice in phenology with place-based observations from local communities as well as institutions and biologists' voices, forming partnerships through Rising Voices as a network-of-networks**. Local Environmental Observer (LEO) Network and Tribal colleges are producing data and could be a place to develop more data, show current community issues, a regional look, and bio-regional alignment and partnerships. An intimate connection with the land enables awareness of what's happening; for example interior Alaska has a distinct feedback loop (with warmer temperatures and less precipitation, there are more fires which release and contribute to more carbon dioxide in the air which result in higher temperatures). In Arctic waters, with warmer air temperatures and shrinking sea ice there is less reflectivity and more heat is absorbed by water leading to new species have been noticed in these cold waters. The environmental changes give invasive species an advantage over native species. Water management is a major concern in terms of phenology. We need **community-to-community exchanges of knowledge and experiences, as a means to help each other plan, like a database of observations, experiences, and adaptations**.

Examples of the visionary work that is needed include: **landscape phenology needed at various levels and at larger scales; identify similar issues for partnership development; considerations for a Tribal Phenology Network- sharing observational knowledge and empowering ourselves to move beyond conversations, such as Haskell Indian Nations University Projects and database development**.

In Nature's Notebook, databases do not have a tribal focus in terms of phenology, so we would like to consider the possibility for Nature's Notebook to allow sorting by tribal entries, create an Indigenous page, share web platforms with local communities and horizontal sharing. One concern is over the need to protect data and adhering to the ethics of working with communities and using appropriate protocols. The objective is to explore an infrastructure for integrating stories, data, and communities for a more complete understanding of changes that are being observed. It will be a place to tell stories that show barriers, issues, mismatches, relocation/dislocation, adaptation options, and mitigation as well as a for multigenerational exchanges on climate change (e.g., using social media to reach youth). Guiding principles include focusing on and starting with Indigenous stories; use stories to contextualize relevant data, databases, and networks; build an understanding of data through stories; respect TEK (using guidelines); respect the language component; and utilize existing databases and resources to the extent possible. Example stories include heat and inundation are changing timing and location of juvenile species in nursery habitat in coastal Louisiana; boreal Forests, where fire and heat are giving invasive species an advantage and a mismatch between birds, insects, and rearing foods. Next steps include developing a core working team, write a white paper on concept, inventory phenology-related networks, propose a preliminary web infrastructure, develop content, maintain a website, and enable community; these milestones could be considered at Rising Voices 4. The intention is to leverage off of Rising Voices gatherings to take advantage of understanding what works, good examples, information resources, and funding leverage or resources, to be done through a database of participants enhanced with bios, interests, pictures, actions, and responsibilities. While the idea is to share observations and knowledge between regions, Rising Voices can serve as a network-of-networks for phenology-related issues; examples of existing phenology networks include LEO Network in Alaska and soon to start in California, USA National Phenology Network (NPN) Nature's Notebook, Project Budburst, National Environmental Education Council's work with Audubon on Bird Phenology, eBird through

Cornell Lab for Ornithology, NEON, GLOBE and local phenology observations. The white paper concept will include what phenology is, phenology mismatches or issues, phenology networks, and youth initiatives and/or student/youth contributions. The white paper will combine stories and data and be constructed in such a way that a one-page executive summary could be extracted from it for a particular tribe or region.

### Health and Livelihoods

An Indigenous concept of health must be at the center of the climate change discussion. Climate-induced health issues are immediate and severe in Indigenous communities. Our group is focused on bringing everyone to the table, but also on moving the table to center the place-based knowledge of tribal members. We must bring policymakers out on the land to hear Indigenous concerns, within Indigenous cultural frameworks. In our own Indigenous communities, we need to foster hope, optimism and empowerment, and conduct strategic, decolonizing planning based on questions such as “How did we get to this situation, Where are we now, and Where can we go?”

“It’s easier for us to learn scientific jargon than it is for a scientist to learn how to smell when the shrimp are ready.”  
– RV3 Participant from coastal Louisiana

In addition to defining the many impacts wrought by climate change on health and livelihoods, we need to articulate what a healthy community, a healthy person, and a healthy livelihood look like. Some aspects we identified are: access to potable water and healthy food, a feeling of hope, recognition of interdependence, access to education, disaster-preparedness, resilience, being “at the table **and** part of the decision-making,” access to sustainable economic opportunities, cultural awareness, maintaining language/ song/ and dance in the community, celebrating community s/heroes, having a sense of place, awareness of where and how to get information, access to both the built and the natural environment, sustainable environmental planning, access to sustainable transportation, identity/pride, access to quality traditional and western healthcare, opportunities for fitness, and a safe environment. We know that some of the aspects of an unhealthy community that we have identified, such as lack of safety, are symptoms of larger problems. If we shift the model of how we understand and cultivate “health,” the symptoms will eventually go away. Our concept of health is broader than physical health; we are talking about **“one health,” which encompasses human and community cultural, mental, spiritual, and physical health, as well as the health of the Earth, air, lands, waters, and wildlife**

How do we achieve this Indigenous concept of health in a context of climate change, in which some of our most important plants and animals are disappearing? Our communities are developing adaptive mechanisms, such as seed saving, cultivating plants that used to grow wild before the environmental changes, and holding multigenerational educational events to teach young people how to use traditional foods and medicines to take care of themselves. We have to fight the forces that have separated us and silo-d our programs, and find ways to re-connect our programs and our community members, as well as to develop connections with likely and unlikely allies outside of our communities.

When we work to educate others about the climate-induced health and livelihood impacts in Indigenous communities, we become “border crossers.” We know that we may be perceived as “border raiders” if we don’t have the established credentials. When entering the Western-science dominated discussion about climate change and introducing ideas of an inclusive concept of health, **we need to prepare ourselves and support one another.** Trainings such as the **Guided**

**Language Acquisition Design (GLAD)** program can help with navigating scientific jargon, analyzing scientific reports, and speaking to policy priorities. We must also bring the scientists and decision-makers to us, to our communities, so they can hear our experiences on the lands and waters where the impacts are occurring. The scientists also need training to understand our languages and epistemologies.

From the Gulf of Mexico to the Arctic Circle, and beyond, Indigenous health and livelihoods are incontrovertibly interconnected. In addition to impacting health, climate change impacts livelihoods, as we can no longer depend on our traditional animals, fish, and plants for subsistence. Besides the health impacts of diabetes and other diseases that accompany the loss of traditional foods for both subsistence and sale, we also see an increase in anxiety as it becomes more difficult or dangerous to procure these foods. We have always had stress and anxiety in our lives, but we had traditional ways of addressing stress that we may need to re-learn.

Climate change impacts on resources also lead to only the most experienced hunters and fishers going out, which hampers knowledge transmission to less experienced, younger community members. It also becomes more difficult to afford engagement in traditional livelihood activities, as climate changes may require additional or more specialized gear, such as larger boats to deal with more significant storms. We are tied to the land for our livelihoods, and those ties also knit us together as communities. **As we lose our lands and our livelihoods due to climate change, how do we maintain or re-structure our community ties, including our modes of knowledge transmission?**

We recognize that tribes have the most control over the development and stewardship of their own lands. We must therefore consider what we can do to live more sustainably on our own lands. When we adopt new technologies (solar, wind, straw bale, etc.) we need to incorporate them on our own terms (i.e., using local materials) and in keeping with our own core values. We must train community members in their development, production, and installation within the community. Livelihood opportunities increase when individuals learn healthy, sustainable methods (i.e., how to build sustainable housing or grow food sustainably).

Success for us involves a response to climate change that addresses health and livelihoods and allows others to understand climate change as a health and livelihood issue, with Indigenous, sustainable adaptation mechanisms. Communities need support to develop a strategic plan to adapt to the changes, moving towards the future while maintaining the elements of the culture, using a cross- or intercultural approach. **A framework is needed for people and communities to identify their climate-induced health and livelihood impacts**, their needs, their strengths, and then their strategies to move forward. **Policy is needed to address the impacts of climate change, including recognizing the importance of traditional foods to our identities, health, and livelihoods.** One example is working with school systems and the US Department of Agriculture to allow locally raised buffalo meat into the school lunch menu. We must cultivate optimism in youth, seek like-minded collaborators, not just be at the table but make sure that the table is in the right place, and ensure that we are part of all aspects of policymaking, including the problem definition, the discussion of responses, and the decision-making.

In summary, **we must link knowledge and action**; identifying health and livelihood impacts as well as culturally grounded actions to address those impacts. This group is working on a preamble stating our position on the integration of health and livelihood in understanding climate change impacts. We are working internally on education/ training and externally on accessing information

and funding. We identified many potential partners, including the Global Indigenous Forum, the Indigenous Wellness Research Institute, the National Institute for Minority Health and Health Disparities, the National Indian Health Board, the Bloomberg School of Public Health at Johns Hopkins, and the National Institute of Health, and we developed a series of committees: Communications (including organizing a youth video contest on 'Climate Change and Health in Your Community,' and compiling a clearinghouse of information on climate change and health), Funding and Impacts (i.e., using documentation of impacts to affect the funding stream), Collaboration (partnerships and leveraging resources), and Indigenous Concepts/definitions (i.e., articulating and forwarding the "one health" concept), with a commitment to include youth in all committees. You can monitor our group at <https://drive.google.com/open?id=1RCe-N9NYN4IFmqkPnvC7o4QjQFQ-mXU6NRBFqHA8E>

### Rising Voices 3 final session on workshop outcomes and overarching reflections

The final session of the workshop was devoted to summarizing outcomes and offering overarching reflections on the workshop process and topics.

Two comments were made about Rising Voices' role as a boundary organization. First, Rising Voices serves to recognize, value, and support the wealth of information, knowledge, wisdom, and lived experience that Indigenous communities have of their environment, including all of the human and nonhuman inhabitants. Second, Rising Voices supports Indigenous efforts to mitigate and adapt to climate change, as Indigenous communities are at the front lines in "proof of concept" mitigation and adaptation, therefore identifying what works and what doesn't work, and how these lessons can be of help in the 21st century for all people.

Additional comments from the closing section are listed in Appendix 1.

Following the workshop, participants compiled a letter that was distributed to attendees of the United Nations Framework Convention on Climate Change 21st Conference of the Parties in Paris, France in December, 2016. The text of the letter is included in Appendix 2.

**RISING VOICES WEBSITE: [www.risingvoices.ucar.edu](http://www.risingvoices.ucar.edu)**

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or Bob Gough ([gough.bob@gmail.com](mailto:gough.bob@gmail.com))

## Appendix 1

Overarching comments as they were typed and projected on a screen during the final session of the Rising Voices 3 workshop:

- Sovereignty in planning and decision making
- Recognize value and support wealth of knowledge, wisdom and lived experience of Indigenous relationships with environment
- Demonstrate positive, solutions
- Boundary crossing (Lal water crossing) – a political metaphor; “diplomats” - what boundaries want to cross? And what is required to cross?
- Decolonization workshops with ecological base and new framework/language to provide alternative valid form to understand world we live
  - Use existing findings from this conference as part of teaching methodology
  - Disseminate these workshops as widely as possible preferably K-12, so kids start with new language and practice
  - Institutionalization of these new language/practice can have impact across scales, even reaching international impact to bring climate change into realms of civil lives
- Consider sending youth to international climate meetings
- Start an Indigenous Youth Rising in eco regions across continent/islands. Meet in bio-regions annually, gather all together every 3 years to share experiences.
- Working Group Task Force to take on youth involvement in everything
- Send Internet links and resources for website
- Youth and future: teacher preparation – include science based education which is currently at bottom of list – science (art and language) is suffering because of metrics for other disciplines; need to have a recommendation for teaching to integrate science with other disciplines; need to build the enthusiasm
- Youth/elder conference in AK that come together to discuss issues: Denakkanagga Inc.
- Youth: everyone bring someone with them to RV4; building framework for youth to move within and move forward -- Indigenuity
- Word ‘science’ can be argumentative – all other knowledge just as valuable. A definition for science is important – two definitions with equal footing; one from knowledge of land passed down through time and other is from modern understandings of science – multiple epistemologies
- Letter to Paris: Let’s look back to RV1, 2, 3 to capture *fundamental principles* as front material to more specific recommendations
- Data collection and organization. “Data democracy”(term recognized by audience in Paris): access to data and capacity to be able to use it with focus on underserved communities, international focus. Have an obligation to make sure communities know about and can use these resources.

- I.e. difficulty collecting information on fires in AK, ultimately found Facebook/social media useful. Sometimes the problem is that there is so much data, how do people find the data they need and distil it to use well.
- Data ownership: how is it collected, shared, used.
- Guiding principles for how data is shared, collected etc. – a sub-group to draft? (ALSO the TEK Guidelines). Maybe we create an RV “doorway” to the existing work/resources on this.
- Keep in mind that TK guidelines and other resources are general and communities need to make own policies.
- Toolkit.climate.gov: This is a pocket guide for tribal nations to make emergency declarations and get assistance
- EPA and NIEHS (contact Symma Finn) increasingly interested in TK
- Outcomes from RV2, collaboration with several communities in AK
- Youth charge from Day 2
- What does our canoe look like? Metaphor of canoe; need to really understand this. From Polynesian perspective – know what your island looks like, know you got there, did you pass it – these are vision statements. Tendency for us to get into the ingredients if you follow the recipe without knowing what making. What does our goal look like? We are bringing more people to canoe and having more destinations we are hoping to get to. What is THIS canoe? Come up with preamble/statement to say what RV canoe is, what it’s destination is, when it has arrived. Not just being heard, being listened to and something has happened. Without knowing our island, we head to any island, and become one-offs, not a collective once we arrive at the destination. What does island look like, what metric, accountability. We’re no longer just talking about relationships; we need to talk about what producing.
  - NCAR’s role is facilitator. Need to have the little projects, and also need the big picture. Make RV a model, building bigger canoe and society at large benefits from that. Maintain level of funding regardless of where meeting is held to keep gatherings going.
- Cahokiastatement.net can be endorsed as individual or as organization. See presentations from NAF, may steal language for other purposes

## Appendix 2

### **Rising Voices: Collaborative Science for Climate Solutions**



#### **RECOMMENDATIONS TO THE UNFCCC 21<sup>st</sup> COP**

“We include, we understand, we act.”

– *Rising Voices Youth Climate Initiative* Mission Statement

This document presents a series of recommendations for managing the impacts of our planet’s changing climate on Indigenous communities.

The recommendations are distilled from discussions among over 150 engaged Indigenous leaders, Indigenous and non-Indigenous environmental experts, students, scientific professionals, and citizens from across the United States who are part of the Rising Voices community. The *Rising Voices: Collaborative Science for Climate Solutions Program*, housed at the National Center for Atmospheric Research in Boulder, Colorado, promotes and facilitates more culturally diverse science and approaches for adaptation solutions to high-impact weather and climate events, climate variability, and climate change.

Rising Voices is a U.S. initiative responding to recent national and international calls for meaningful engagement with Indigenous communities and knowledge systems. Indigenous peoples are particularly adversely affected by climate change’s impacts to their environments and traditional, cultural, and spiritual livelihoods, practices, and beliefs. Thus, climate change challenges Indigenous self-determination and ways of life that are respected by the provisions of the *UN Declaration on the Rights of Indigenous Peoples* and International Labour Organization Convention No. 169.

On behalf of the Rising Voices community, we are providing a list of recommendations to those gathered at the UNFCCC 21<sup>st</sup> Conference of Parties and for dissemination around the world for communities, organizations, agencies, and governments to consider as focused examples of governmental actions as they pursue and implement urgent climate adaptation.

#### **Rising Voices Recommendations**

- ***Human Rights of Safe, Viable Communities:*** In the spirit of the *Universal Declaration of Human Rights*, **create a Forum on the “Human Rights of Safe, Viable Communities.”** The Forum will work to bring about and manage the Climate Migration Task Force and other Rising Voices recommendations. The Forum will focus on the first priority of adapting in-place, and help to determine the necessary interim measures in the process of communities’ decisions for in-place adaptation and/or relocation, if the communities themselves determine adapting in place is no longer a viable option. Given the urgency of issues faced by Indigenous communities, we strongly recommend that this be considered as a ***near-term action***.
- ***Migration: Convene a Climate Migration Task Force.*** An international Task Force on Climate Migration will address the identified need to establish a legal mechanism, institutional framework, and financial support to directly support marginalized communities (Indigenous

and non-Indigenous) who are facing displacement due to climate change impacts and who desire to migrate safely and with dignity. The Task Force will guide government-to-government relationships and frame relocation based on the *Universal Declaration of Human Rights*, and for *communities*, not just individuals. It will also consider the rights and potential consequences for host communities. Because many Indigenous communities are urgently threatened with displacement, we strongly recommend that this be considered as a ***near-term action***.

- ***Indigenous Perspectives and Knowledges: Support inclusion of Indigenous perspectives, insights, and knowledges in agency-led and nationally and internationally appointed assemblies concerned with natural resources, environmental management, and policy.*** The free, prior, and informed consent (FPIC) of Indigenous peoples should be respected when these assemblies are formed and engagement with Indigenous peoples is included, as per the *United Nations Declaration on the Rights of Indigenous Peoples*. Recognize, value, and support the wealth of knowledge, wisdom, and lived experience of Indigenous relationships with the environment. Indigenous peoples have a rich knowledge of their environment that is important for filling in lack of data and for developing adaptation and sustainable strategies. Because this underlies all cross-cultural work with Indigenous communities and because several efforts already address this, we recommend this goal in the ***near-term***.
- ***Youth: Create a Climate Change Service Corps to enhance capacity building of youth leaders.*** The capacity of our youth – who will be the ones to carry on in the face of climate change – needs to be enhanced through mentorships, scholarships, and internships with local federal agency affiliations in multiple countries. The Climate Change Service Corps will strengthen resilience amongst Indigenous and non-Indigenous communities around the world for the ***near- and long-term***.
- ***Indigenous Water Network:*** Water has a spiritual relationship for diverse Indigenous peoples around the world. ***Establish a collaborative, international Indigenous Water Network*** based on examples such as the Yukon River Intertribal Watershed Council and the Indigenous Rivers Network in the United States that will facilitate multi-government action across scales to manage water resources. Because this will entail significant intergovernmental negotiations, we recommend it be a goal in the ***medium-term***.
- ***Health: Create a “One Health” Initiative.*** Indigenous peoples’ concept of health is broader than physical health. The term “*one health*” encompasses human and community cultural, mental, spiritual, and physical health, as well as the health of the Earth, air, lands, waters, and wildlife. A “one health” initiative will recognize these links and provide a framework for Indigenous and non-Indigenous scientists and decision-makers to take health considerations into account in all management decisions. Because this will entail significant intergovernmental negotiations, we recommend it be a goal in the ***medium-term***.
- ***Ecological renovation: Community-to-community exchanges.*** Ecological restoration is not a relevant/viable approach; instead, we need ecological renovation, which includes populations coming together in the same “canoe” – a metaphor for our common voyage into an uncertain future. A need exists for inclusion of citizen scientists and a community voice in phenology, with place-based observations from local communities, as well as institutions and biologists’ voices. There is a need for community-to-community exchanges of knowledge and experiences, as a means to help each other plan, like a database of observations, experiences, and adaptations. Because this will entail significant relationship building, we recommend it be a goal in the ***medium- to long-term***.