

11th Annual Rising Voices Workshop

Understanding the Relationships: People, Place, Technology, the Environment, and Climate Change



Wednesday, May 31 – Friday, June 2, 2023
Hybrid: In-person Boulder, CO and Virtual

WORKSHOP REPORT

<https://risingvoices.ucar.edu/>



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And always, **to Heather Lazrus and Bob Gough**, Rising Voices co-founders, who continue to guide our hearts and actions every step of the way.

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**Please note that if material is cited from the sections shared by workshop presenters, credit needs to be given to that person(s); it is their knowledge and wisdom being shared.*

This report is an overview of the workshop sessions. It is not meant to be exhaustive of the breadth and richness of the conversations and discussions, but rather to provide a summary context of the convening. This report will help contribute to the goal outcome for the RV11 workshop, which is to create a Declaration on the Wise Application of Technology for Climate Actions. To watch the workshop story sessions and the Bob Gough Public Symposium, please visit the RV11 workshop webpage, <https://risingvoices.ucar.edu/events/workshops/2023>.

BACKGROUND

[The Rising Voices Center for Indigenous and Earth Sciences](#) (RV) facilitates intercultural, relational-based approaches for understanding and adapting to extreme weather and climate events, climate variability, and climate change. RV supports a growing network of Indigenous, tribal and community leaders, atmospheric, social, biological and ecological scientists, students, educators and experts from around the world. At its core, Rising Voices aims to advance science through [collaborations](#) that bring Indigenous and Earth sciences into partnership, create [opportunities](#) for Indigenous students and early career scientists through scientific and community mentoring, and [support](#) adaptive and resilient communities through sharing scientific capacity.

Rising Voices' mission is to center relationships to interweave Indigenous and institutional approaches to Earth Sciences. In this way, we cultivate more inclusive innovative responses to extreme weather, water, and climate change impacts. Our Vision is to see Indigenous and institutional collaborations that uplift a climate resilient and justice-forward world for all generations. This includes envisioning collaborative research that brings together Indigenous knowledges and science with Earth sciences in a respectful and inclusive manner to achieve culturally relevant and scientifically robust climate and weather solutions. In doing so, RV seeks to advance science, remove the boundaries between science and society, and create innovative partnerships among collaborators with diverse disciplinary and cultural backgrounds to support adaptive and resilient communities.

Rising Voices is co-administered by the University Corporation for Atmospheric Research/National Center for Atmospheric Research (UCAR|NCAR) and the Livelihoods Knowledge Exchange Network (LiKEN) in partnership with Haskell Indian Nations University, the Indigenous Peoples' Climate Change Working Group, and the National Oceanic and Atmospheric Administration's (NOAA) Office for Coastal Management.

The Rising Voices Center for Indigenous and Earth Sciences is entering an exciting, emerging new phase, with this year marking its 11th anniversary. At this significant juncture as Rising Voices transitions from its first decade to the next, it's important to reflect on where we've been, to set a path forward for where we will go. Thank you to all of you for being part of, and shaping, this journey.

About Rising Voices: [Website](#), [Introductory video](#), link to [previous workshops](#)
Contact: risingvoicescontact@ucar.edu

WORKSHOP OVERVIEW

The RV11 Workshop Theme

The theme of the workshop was *Understanding the Relationships: People, Place, Technology, the Environment, and Climate Change*. How do these relate to each other and to rebuilding and rediscovering relationships?

The dominant go-to response for climate solutions is a technological fix. What if we situate technology within the mindset of not about fixing things, but healing our relatives? What do the relationships between people, place, technology, and the environment mean for climate actions? What do these dynamics mean for issues around power, justice and data sovereignty, and around the differences and intersections of data, information, knowledge, and wisdom? How has the change in technology over time changed how we share our stories and communicate our science? What role does technology play in re-engaging and rebuilding relationships with the natural world and how might we strategize this re-engagement? We can look to past and contemporary examples to understand the future. The “work” part of the workshop was in rebuilding and rediscovering relationships: to the world, to place, to all relatives, to each other.

The workshop included 161 in-person and 190 registered virtual participants. Of the in-person participants, 41% self-identified as early career, 25% as students, and 45% as having an Indigenous or tribal affiliation.

Community agreements

There were several community agreements shared among the RV11 participants, including: (1) [Rising Voices Ethics Guidelines](#), (2) [UCAR/NCAR Participant Code of Conduct](#); (3) [Workshop Report and Outcomes](#)

Intended Workshop Outcomes

As with previous Rising Voices workshops, one key outcome of the workshop was fostering new and existing relationships to facilitate collaborations between Indigenous and Earth sciences in response to the climate crises. All the workshop activities yielded notes and transcripts, which were used to develop this summary workshop report. The report will be shared publicly on the Rising Voices website and with the Rising Voices listserv and all workshop participants.

The summary report and notes are being used to continue developing a collectively authored – with credit to all workshop participants as contributors – set of guidelines to consider for centering justice in convergence research, and to create a *Declaration on the Wise Application of Technology for Climate Actions*. These documents will be shared with all workshop participants and the Rising Voices network through the listserv, as well as publicly on the Rising Voices website.


The intention of the RV11 planning team is to work with the editors of a special issue of a peer-reviewed journal to publish these guidelines and *Declaration* in a format where they can reach a broader audience, extending the reach of the RV11 workshop into communities, classrooms, research sites, and board rooms. The goal is to create, collectively, something that’s actionable beyond the workshop for a justice-forward approach so that we have technologies and make choices that reconnect and rebuild human-nature relationships for future generations in a changing climate.

Pre-workshop events (Tuesday, May 30)

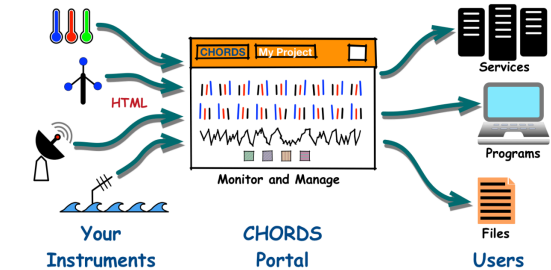
Open IoT (internet of things) Workshop

Agbeli Ameko and Keith Maull, with speakers Mike Daniels and Mike Dye and facilitators AJ Lauer, Virginia Do, Robbie Hood, and Ruben Alter, led an open IoT workshop focused on hands-on table top deployment. The workshop included an introduction to Open IoT and Community Science Observation, including data sovereignty and community sensing programs; co-designing potential IoT network that fits community needs and knowledge sharing; and demonstration of table top sensor deployment, including flash microcontroller and test receiving data (Temp, Pressure, Rel. humidity, VOCs).

What is Internet-of-Things (IoT)?



CHORDS: Free, open source software to ingest, display, and access time series data (1 of 3)



3) Start sending data and making it available on the net!

NCAR | Computational Information Systems Laboratory
UCAR | NCAR Library

NCAR | Computational Information Systems Laboratory
UCAR | NCAR Library

Mentoring Gathering

The mentoring event brought together undergraduate and graduate students with scientists and Tribal and community leaders with the intention of building relationships within the Rising Voices community. The participants worked in small groups and given a prompt to think of themselves as individual trees - starting from their roots, who is their family, and their peoples’ origin stories;

as they moved up through the trunk of the tree, they were asked to think about what represents their work today and who they are as a person; and lastly, through their branches, how do we connect with others?

Workshop Opening

The workshop opened with welcome and prayer by Steven LaPointe (Lakota), a Native American Culture and Education Specialist at Denver Public Schools. Steven set the tone for the gathering, in reminding everyone to do our work for our future generations and create a better world for our children's children.



Ava Hamilton (Arapaho), a Rising Voice Council member, welcomed everyone to Place. Coming from these lands for generations, Ava welcomed everyone “to our beautiful world here in Boulder. This is Arapaho homeland, and I'm Arapaho. This is where my ancestors, the Southern Arapahos, who were later massacred at Sand Creek, the Cheyennes and Arapahos were there. Those are all my relatives.” Ava shared that it's a “concerning time for humanity and for all living things, because I want us to exist in the future.” Those in the room were recognized as, “people who have dedicated themselves to education, to learning...We have love of life, and that we're all related...We are not separate from the circle of life, the cycle of life. We are part of it.”

Her concern for the future comes from what she knows from Indigenous knowledges and knowledge-holders across the country, about future existence, based on long-time “observing and learning from our relatives, all living things here, food, plants, animals, the air, weather, rain, water...They say we have not taken care enough, in that we can see the anger of our Mother Earth here because we haven't taken care and been responsible.” Awareness was raised in referencing the film, *Dark Waters*, about contaminated drinking water from a toxic chemical (PFOA) used in the production of Teflon, with 90% of humans having these chemicals in their bodies.

Ava reminded everyone that:

“Science should be involved with our quality of life for all of us, for all ages, throughout the ages, for the future. And Indigenous knowledge is very, very old. It's older than PhDs...And in this Rising Voices village, I get to meet both of those kinds of people. And it is a blessing. So I welcome everybody here to work together, to meet each other, and to really learn because we are an endangered species. We truly are. If you are a listener like me to Indigenous knowledges, I listen to you, to the scientists. They're not saying quite so drastic things, but they're close...Indigenous knowledges and Western sciences are saying almost the same right now. So let's learn from each other and let's have really good actions. And it's great to see so many knowledgeable, good people from our beautiful planet.”

and commitments, but could in the process create real transformative change. We are thrilled that you are here, in being part of this journey, together...One that would not be possible without our ancestors, those who came before us, who continue to guide our way. To Kris Marwitz, Jerry Fills Pipe, Dick Krajewski, Uncle Hank Fergerson, to RV co-founder Bob Gough, and now to RV co-founder, Heather Lazrus, and our ancestors who came before and will continue to come in the future generations, thank you. Thank you for continuing to light our way.”

Diamond Tachera (kanaka ‘ōiwi; NCAR) announced the offering of a *ho’okupu* and *makana*, or gift, for allowing us to be here. Our friends made a beautiful 200+ foot *lei lā‘ī*, which is made from ti leaf, weaving in Hilo-style, all the places, relationships, and communities that we come from and the people that we represent and the ancestors that have allowed us to be here today. We also offer *pa’akai*, which is salt; it's an agent for healing, protection, and preservation. It was used traditionally to preserve our food. This was offered “as a way to heal the communities that we work in to preserve our *‘ike kupuna*, the knowledge of our ancestors and to protect the places that feed us and love us and that we've come from.”

Gretchen Mullendore (NCAR), provided the welcome from NCAR. In doing so, she considered what her lab, the [Mesoscale & Microscale Meteorology Lab](#), NCAR, and the broader scientific community is doing to share space with Indigenous knowledges and Indigenous scientists:

“So much of what we do in the scientific community [is] so driven by Western science. Indigenous voices are still considered as extra or other, or not considered at all. I look ahead and we have a very long road ahead of us still, where we can achieve our goals of integrating science across many backgrounds. And giving value to all sources of wisdom...But then I thought, the road is very long but look how far we've come... this is the 11th Rising Voices Workshop [and] as we just saw, how many of you are new to this, more and more scientists are engaging in this space. And they're engaging in the cultural changes needed to include all wisdom. And early career scientists are feeling supported and empowered to be here and participate. And I am so excited to see where all of you early careers will take us next.”

Gretchen shared a heartening aspect about the

“[O]utpourings of admiration and love for Heather Lazrus, who is one of the co-founders. She was a member of my lab. She helped carve out the path that we're all walking today. She gave selflessly of her wisdom and patience to help others by tackling systemic racism and magnifying contributions of Indigenous scientists. Our shared experience as Earth and social scientists, or whatever your background is, is improved because of Heather. And that also gives me hope...all of you give me hope as well...I want to thank you for your work. I want to thank you for your expertise. I want to thank you for your commitment. And I want to thank you for showing up in this space as your authentic self.”

Following the welcome remarks, the [Introducing Rising Voices](#) video was shared, to provide the background and context about what Rising Voices is, what it has been, and how it has evolved over the years.

Providing the framing for the workshop theme, Daniel Wildcat (Yuchi member of the Muscogee Nation of Oklahoma; Haskell Indian Nations University) shared the opening statement that Henry David Thoreau gave at a Concord Lyceum in April 1851, in a presentation that, when published ten years later, was titled, *Walking*: “I wish to speak a word for nature, for absolute freedom and wildness, in contrast with freedom and culture, merely civil, to regard man as an inhabitant or part and parcel of nature rather than a member of society. I wish to make an extreme statement. If so, I may make an emphatic one, for there are enough champions of civilization. The minister, the school committee, and every one of you will take care of that.” Focusing on that first sentence – “I wish to speak a word for nature, to consider myself part and parcel of, and inhabitant of” – he was speaking to his neighbors, his relatives, and saying, “You know, all of you are all about championing civilization. I'm going to speak for nature.”

Dr. Wildcat proposed that first, we're going to leave behind the notion that:

“Indigenous science, thought, knowledge, wisdom, and science are implicitly and inherently at odds with each other. There are different ways of understanding the world. One has some advantages, another has some advantages. Our goal here in this convening of Rising Voices has always been to see where we find the convergences. The convergence is once we see where they converge, where we're complementary, then we can create something very new, and that will be emergent science.”

Dr. Wildcat reminded that part of the work here is to let people and institutions of science know that “if you're serious about diversity, equity, and inclusion, you better make a safe, welcoming place to people who think differently and understand the world very differently. That's what Rising Voices is about...*Mitákuye Oyás'íŋ*, We're all related. Isn't that what evolutionary theory teaches?...our ancestors understood this way before Darwin ever stepped onto the stage...And modern ecology, that's maybe a hundred years old...but our ancestors always knew that we were part of larger communities than just human communities...So, when we speak of community here, what I'd like to challenge you to do is to walk away from this invidious distinction between nature and culture.” Putting forward a request to everyone gathered:

“[W]ith all this crazy talk about artificial intelligence, I'd like to see us work on natural intelligence...This planet is wise. This mother that we have is wise and the knowledge sits in places. So, let's work on natural intelligence. Let's honor the fact that all of us know something someone else doesn't because we are all unique...let's work on sharing the most undervalued in this society's communication skill, and that's active listening. You need to be an active listener because as relatives, what we will do is...try to create a safe space, a brave space where we can share what we think we know...if we have this safe space, we can speak honestly...And that's where we can make something emerge, a new kind of knowledge and practices...there's a lot of talk about artificial intelligence. There's a lot of talk about how the technosphere is eclipsing the biosphere...while you're here, what I'd ask you to do is in this space, listen to your other human relatives. Try to

learn. Let's strengthen the relationships, this kinship that we can share in this place...the Earth, her outer garment is very beautiful and very different depending on where you reside in this beautiful blue-green biosphere. So, we're different. That's natural. Don't let anyone ever try to tell you that diversity, equity, inclusion is about political correctness...It's about the natural law. It's about the land, air, and the water, and the life that resides there. No trees are the same. No fish is the same. Why should humankind be different?..We take this opportunity to work together to come up with actionable intelligence. Things that we can use to take action for our families, for our communities, human, and ecosystem communities that we call home.”

Lifting up the 50th anniversary of Vine Deloria Jr.'s classic work, *God is Red: A Native View of Religion*, Dr. Wildcat closed with this quote, as it speaks to the challenge we take on together here, why we are here:

“Who will find peace with the lands? The future of humankind lies waiting for those who will come to understand their lives and take up their responsibilities to all living things. Who will listen to the trees, the animals, and the birds, the voices of the places of the land? As the long forgotten peoples of Indigenous continents rise and begin to reclaim their ancient heritage, they will discover the meaning of the lands of their ancestors. That is when the invaders of the North American continent will finally discover that for this land, God is red.’ We're all children of this beautiful blue, green, mother Earth. And I'm honored to be here. I'm honored to issue this challenge and look forward to having useful, meaningful, and learning conversations. And we have something in the Yuchi's we say, *Ôk'ajU TahA Ôk'âfâTA*. Together, we will make it happen. We will move it forward. Let's do it together.”

Continuing introductions, Diamond invited everyone sitting at their tables and virtually, to share with each other about their peoples, their places, their creation stories (if their peoples have that), and what brought them to Rising Voices this year.

Following introductions, Kumu Ramsay Taum (Kānaka Maoli; Pacific Island Leadership Institute) invited everyone to the next session, with the importance focused from the standpoint of talking to our ancestors. In doing so, Kumu Ramsay brought the focus back to the ancestral chair:

“To what was referred to as the ancestral chair. And it is that. But it is also more than that. As I think we'll find out about this entire gathering. It's a little more than we think it is. When we first started this 12 years ago, one of the first things we did was we introduced and acknowledged what we refer to as the empty chair. *Kanoho puni haka*. *Kanoho* to sit as a chair, *puni* to close or to cover, *haka* to represent. So essentially, it is a chair or proxy. It reminds us that the chair is never empty. That yes, our ancestors and everyone that brought us here, that contributed to who we are, good, bad and indifferent...That's who we are. They are in that chair. But on the other end of the spectrum, if it weren't for them, we wouldn't be here. And more importantly, our descendants wouldn't be here. And we heard it today. A big part of what we're doing isn't for today. But it is for our grandchildren's grandchildren. And so in that chair are our

great-grandchildren's great-grandchildren. In between all of that is also all those who could not be present. All relatives, human and otherwise. The wolves, the whales, the birds, the trees. Whomever it is that we individually or collectively have come to represent, to honor, to protect, to preserve, to serve. They are in this chair. We offer it up to each and every one of us to consider before we speak on behalf of someone else who's not present, that we always consider the empty chair. Consider who it is we are accountable to. Because we live in a world that operates off of accounting. And yet in the native natural intelligence, we operate from a world of accountability...those of us in Native communities know that there's only really two ways to engage Native communities. And that's by invitation or by invasion. And the invitation today is that we honor our ancestors of descendants and all that are not present. All those yet to come. And remember, we are accountable.”

Talk story: Learning from the Wisdom of our Elders

This panel session was organized to further set the foundation and center us, collectively, in our direction and intentionality. Our educators and guides in the session included Papali'i Dr. Failautusi “Tusi” Avegalio, Jr. (Samoan), Jannan Cornstalk (Little Traverse Bay Bands of Odawa Indians), Theresa Dardar (Pointe-au-Chien Indian Tribe); and moderator Tim Schneider (NCAR).

What has been your experience with technology changing over time? And how have these technological changes shaped how you share stories, communicate knowledge and understandings, and practice traditions?

Jannan Cornstalk started the conversation by sharing about female mentors she’s had, including Josephine Mandami, a water protector who raised awareness in walking around the shorelines of all five Great Lakes, and what it means to be an Elder, as someone who is held in high esteem and lives their life in a certain way with a humble demeanor. Jannan has followed the path as a water warrior, referencing back to what Ava shared in welcoming us to Place, and the very real and urgent dangers of our contaminated waterways. Jannan talked about water as our relative, “Just like somebody else was talking about our symbiotic relationship with all of our relatives, that water is our relative.”

This connects to the dangers of artificial intelligence. We have this technology available that we can use in a good way, like the way Jannan uses social media platforms to communicate about her [Water is Life Festival](#). She emphasized the importance of continuing to still use other means, like going to ceremonies, where you don’t bring electronics, and honoring our ancestors and the spirits:

“They understand when somebody's weaving a basket or pounding the wood to make baskets, they recognize that sound. But when it comes to technology, they don't. They don't understand that sound. So I try to use it in a good way and on behalf of *Nibi*, on behalf of my water relative.”

Jannan posed the question to everyone gathered: “How is it that we can use this artificial intelligence to do what we do, but to really do it in a very cautious and mindful way.”

She cautioned about the ways that artificial intelligence can replicate without actually talking to a wisdom keeper or being true to natural law, and the dangers of getting farther away from our connections to the Earth and each other and living according to natural law, the more that we depend on technology. Jannan reminded that we can be mindful in our everyday lives of things that we do and can all do, including stopping polluting the lands and waters. For example, when she is in a ceremony, she doesn’t take electronics. We’re not as connected with the Creator “when we don’t have our hands in dirt...or braiding sweetgrass or making baskets.”

Papali’i Dr. Failautusi “Tusi” Avegalio, Jr. shared that in being a warrior people:

“[O]ur greatest warrior was a woman. Name was *Nafanua*. And so when your greatest warrior was a woman, it conjures different types of images. Not only was she fierce, that she was courageous, but she also exemplifies the virtues of a great warrior. She was also compassionate. She was very humble, very respectful, and very loving. Some centuries later, a great descendant became a queen, the only queen in our history, only female, because there are four paramount, kingly titles held by men. And they're constantly fighting who would be able to hold all four titles and become the king of the region. So they all decided, okay, we're decimating our people. Let's give it to a young girl who they are all related to, who was pregnant. Give it to the child. When it was time for the birthing, everybody was already preparing for the new great warrior king to be born. It was a girl. Her name was *Salama Sinha*, radiance from the moon. She became the personification of what a great warrior means in my culture. She demonstrated through her actions what a great warrior is. In fact, she defined what a great warrior is, what a great leader is. So instead of improving on methods to kill each other, she focused on the healing arts, on the natural growths, on the weaving, on the voyaging, on the navigation, on reading the stars, and on healing. So much so that the definition of a great warrior in my culture and in my line said, good leaders lead, but great warriors heal...the emphasis on being great is on the healing. And so if you are an individual who wants to be truly great in our world, demonstrate healing. The four wisdoms that define a great leader in English is to engage with humility in all things, followed by embracing with respect, followed by sustaining with *aloha*, and last by healing with forgiveness. If the previous three are out of alignment, focus on the fourth wisdom, which is healing with forgiveness, until the others realign again and repeat the process. Continue repeating until all four are realigned and healing is starting to take place.”

Papali’i continued, looking at the issues of artificial intelligence:

“I think what is very important is that what are the values, what is being taught by those who actually create the artificial intelligence? Ask yourself that. If you have an educational system that places measurement as a priority over values, that places efficiency over conscience as a priority, that places information and data over ethics as a priority, that places accounting over accountability as a priority. Should you be surprised

that that mind that becomes a mature scientist and a mature adult will design something without the other?”

Reminding of the age of enlightenment and people like Renee Descartes and Isaac Newton that described the universe working like a great machine, Papali'i reflected, "In fact, the great machine is now gaining artificial intelligence. But I think what we need to understand is that without the values, without the conscience, without the ethics, without accountability, those who design the machines are designing something that can be extremely, extremely dangerous."

Considering how this nation was considered one of the most educated, sophisticated nations in the world, glorifying science and the mechanistic process. But there's danger in a society that focuses on these things without a heart, "Too many say we must change. But in the islands, when we teach someone...don't call change in the weather unless you know how to navigate the winds...The emphasis is on knowledge. The danger, knowledge is outrunning wisdom...But where does wisdom come from? It's not taught in the schools. It's in your homes." One of the positive consequences of the COVID-19 pandemic was that it forced families together and intergenerational experiences came again, with the opportunity of the Elders passing on natural law, "And so we acknowledge with profound respect even our elders who are not with us physically, but in spirit. Elders are our sacred pressure, which we must always keep in mind...*Mana* for us is spiritual energy. And you can feel this if you are guided by your elders to even recognize its feelings." Papali'i called upon us to be cognizant that "knowledge does not outrun wisdom under your roof, in your villages, in your communities, in your cities, and in our world." And remember our connections and balance,

"Learn how to weave traditional wisdom, spirituality, with modern science, knowledge, and technology. You need to weave it forward. The world has become more complex, so you must be better prepared. And this is why seeing these young people here is so inspiring...the quote that I heard that kept me holding on to my organic mother...my Earth mother, was a quote by one of the greatest minds in history, in human thought, in philosophy, and in science... 'The intuitive mind is a sacred gift, the rational mind a faithful servant.' We have created a society where we have forgotten the gift and honored the servant, Albert Einstein. So if you have a man with that level of intellect that can see that much deeper, that much higher, that much further, he's also cautioning us. Hold on to both hands. Weave it forward. And we are depending on you. *Mahalo*."

Theresa Dardar, from the Pointe-au-Chien Indian Tribe in Louisiana shared that she lives in a fishing community that fishes, shrimps, crabs, and oysters. Her community has lost a lot of their elders, who are the knowledge holders. Before they lost a lot of their elders, they used modern technology to record their elders and were able to, "document their stories so that we'll have them to pass on. And although we have our own stories, we still have to have the stories of our ancestors, because I feel that the future generation needs to know their past, where they come from, their roots."

Theresa shared how technology is used a lot by her generation and the younger generation, but the elders in their community don't use computers or laptops, and some don't use cell phones.

So while technology can be a good thing, “the problem with technology now is that we all have these in our hands, and it seems like it's more important than face to face conversations a lot of times, especially between our youth. And instead of going to see grandma, it's call grandma.”

So while technology can be helpful, it also reduces “the interaction that you should be having with your elders, the face to face...youth nowadays, they could be sitting side by side to each other, but instead of speaking to each other, they're texting.” Theresa's community is mostly an elderly community:

“[I]t's a lot of visiting still, but the younger generation is still not visiting. And I feel that it's increasing. The technology keeps increasing, and I think we're going to lose the connection with the youth. And we've just about lost it already, because we don't have the visiting. My mother-in-law has 15 children, but instead of them coming to visit, it's a phone call. She rarely sees her grandchildren. She doesn't know a lot of her great-grandchildren, because there's not a visit. It's not like it used to be like in olden days, whenever people did a lot of visiting and having a lot of Sunday meals at grandma or at moms. And they're too busy. Life has become too busy.”

Tim reflected on how the speakers shared ways that technology is weaving its way into our lives, with both good and bad sides to it. In considering what's central to all of our work here in Rising Voices and us all being agents of change:

How do we create this justice forward approach and rebuild our relationships with nature?

Jannan shared that justice “has to do with our connections in the community.” They used to do talking circles, trying to help people who had made mistakes:

“[C]ome back into the fold of the community, focusing on restorative justice and how you are accountable now to your community and how the community will help you come back...And that might be like going and helping an elder to cut wood, or going and being of service and going...to serve at a feast, or going and helping in the kitchen...there's lots and lots of tasks that can help to bring that justice back into alignment...In the Western thinking of justice, it is punitive. You do something, therefore you must be punished. And so for us, it's more justice is a balance...like the community having a responsibility towards that person...And then at the same time, holding that person accountable to the community, whether it's through providing them with a mentor, providing them tasks that they do, as a community, we always see the skills and things that people have, these special gifts that can help us...People really feel honored. People have a purpose, and they don't go off and divert into these things that might cause them trouble in their life. So to me, justice is the community being responsible to an individual, and then at the same time, that individual being responsible and accountable to their community. It's a reciprocal thing...And I have a responsibility towards my community, too, to other women, to a lot of these young students that have come here, to try to help them to get the skills and the knowledge that they need to navigate in this world...We get all different perspectives from all different kinds of angles, and that's where collective wisdom is, too, when we do it like that. To me, that is how we

can do justice in this community, in the world, and then in our own families, and then in our communities as well.”

Papali'i shared that “the most important thing that we as humans must facilitate...a voice of our kin, of our relatives. Unless that voice is heard in court, they're not represented. We've had some interesting movements in that direction. The people of Aotearoa, New Zealand, were very, very strong advocates for over a century, fighting for the right for their river. Their river is us. We are the Whanganui, the Whanganui is us. And in 2017, the Aotearoa, the New Zealand government, passed a law giving personhood to the river.¹ Now, through its stewards, the Whanganui Tribes, the river can take someone to court for polluting it, for doing harm to the river. The river, through its relatives, through its human relatives, can now speak for the river, can defend the river...It has the same rights.”

How can you give a river legal rights? It's the same way the Supreme Court gave corporations the rights of humans:²

“And if they can do that to a non-living entity, then think about it in your community. Is there something so sacred to you that you are willing to take it to court so that it is you when you are hit, and you and your legal representatives and legal teams can represent it? Otherwise, it's an uphill battle, very, very, very difficult. But to get to that stage, you need to know your profound relationship to your kin. If it's just a river to you, you have no reason to want to do what you need to do, as the Whanganui people did. Go into your stories. Go into your ancient wisdoms. Reconnect, and that'll give you the basis to make the kinds of decisions you need to make. When you talk about justice, diversity, equity, none of that means much unless you have the tenacity of spirit. Without resilience, those are just words...it has little meaning unless you reengage, restore, reconnect with the deepest sense of who you are. The deeper you go, the more intimately you will find that you are seamlessly connected to the entire, not only to the Earth, to the universe. And that is such an empowering sense of why you are you and why we are so inspired by the fact that you're all here.”

Theresa, building off what Papali'i shared about us all being connected to the Earth:

“That's the reason that our community has been working to save our sacred mounds³ and other sacred places like our cemeteries. And we don't have money, but we've been finding organizations to help us to try to save our land because our state won't help us. And people, after storms like Ida,⁴ people ask, why do you stay here? Where would you have us go that there's no natural disaster? And besides, this is where our roots are.

¹ For more information, see <https://natlib.govt.nz/he-tohu/learning/social-inquiry-resources/cultural-interaction/cultural-interaction-supporting-activities-and-resources/change-maker-whanganui-river>

² For more information, see <https://www.npr.org/2011/10/24/141663195/what-is-the-basis-for-corporate-personhood>

³ See for example, <https://southerlymag.org/2020/09/02/coastal-louisiana-tribes-team-up-with-biologist-to-protect-sacred-sites-from-rising-seas/>

⁴ Referring to Hurricane Ida, which Theresa's community took the direct hit, in August 2021. For more information, see <https://www.desmog.com/2021/09/09/coastal-tribes-louisiana-desperate-need-hurricane-ida/>

We're connected here. This is part of us. This land is part of us. I wasn't raised there, but I've been there more than half my life. My roots are there. And this is part of my being. I wouldn't be able to live anywhere else...Like Doc Tusi said, we're all part of this land. And like Dan said, that we're all part of the Earth, no matter who we are. We're part of the Earth. So it's up to us to save it. And that's what our community has been trying to do. We're trying to do justice for our next generation.”

Tim concluded the session by sharing of the awe in learning about how people for millennia navigated the Pacific using nothing but the currents, the winds, the stars, the animals, life. Like the navigational aids, the stars, we have three stars shining brightly to guide us, sharing their wisdom and knowledge and “giving us the responsibility to act on it and take it to heart.”

Group dialogues

Following the conversation, participants engaged in a “think-pair-share” activity at their circle-tables, focused on: *What do the relationships between people, place, technology, and the environment mean for climate actions? What if we situate technology within the mindset of not about fixing things, but healing our relatives? What do these dynamics mean for issues around power, justice and data sovereignty, and around the differences and intersections of data, information, knowledge, and wisdom? How has the change in technology over time changed how we share our stories and communicate our science? What role does technology play in re-engaging and rebuilding relationships with the natural world and how might we strategize this re-engagement?*

Talk story: Applying Technology for Climate Action

This panel session focused on an example project of applying technology for climate action. [Restoring Louisiana Marshes: Protecting Sacred Sites, Increasing Tribal Resilience, and Reducing Flood Risk](#), is a project that involves filling in the canals dredged in Louisiana’s wetlands in order to restore marsh ecosystems, reduce land loss and flood risk, and protect sacred sites. Leaders and organizers from the Atakapa-Ishak/Chawasha Tribe of Grand Bayou Indian Village, Grand Caillou/Dulac Band of Biloxi-Chitimacha-Choctaw Tribe, and Pointe-au-Chien Indian Tribe initiated this project, which integrates coastal resilience activities and cultural heritage. The speakers included Elder Theresa Dardar (Pointe-au-Chien Indian Tribe), Elder Rosina Philippe (Atakapa-Ishak/Chawasha Tribe, Grand Bayou Indian Village), Elder Chief Shirell Parfait-Dardar (Grand Caillou/Dulac Tribe), Kristina Peterson (Lowlander Center), and Alessandra Jerolleman (Lowlander Center), with Julie Maldonado (Livelihoods Knowledge Exchange Network, LiKEN) moderating.

The session started with a short [project video](#) providing background context and actions for restoring Louisiana marshes by filling in the dredged canals. Julie emphasized the focus of the project is on weaving together Indigenous and local knowledges and practices with modern technology; instead of creating divides and barriers, the idea is to use technology to bring us together in the context of climate adaptation and restoring communities and land.

Rosina Philippe shared that Grand Bayou is a coastal village and they are the first people of Plaquemines Parish, living on the peninsula. They have seen the land disappear over time but what they're living with now is an accelerated rate of loss due in large part to climate change but also, the demise of their delta has been accelerated by the saltwater inundating the inland marshes, which are being impacted by the saltwater coming in through the canals that were dug by oil and gas corporations, who were supposed to close up the access canals at the end of their operations. However, they were left open and now there's over 10,000 miles of canals that have been cut through the inland marsh lands of the coast:

“With sea level rise, we've seen more and more water each year and as the vegetation is negatively impacted, we lose that root system and when the root system is gone the sediment is gone. Land loss in Louisiana is not just real estate. We're losing our food and medicine plants, we're losing our nurseries and rookeries, because we are a subsistence people. When we shop for food we go to the environment around us. The Creator in his infinite wisdom put us in places where we can thrive and we've been there for thousands of years on the coast, living a holistic and peaceful life. The coast has always subsided and eroded because that's the nature of the coastal landscape. But when the river would flood, it would rebuild a deposit sediment so the delta could continue to grow. But since the river has been levied and denied to do what it was doing before to grow the delta and provide the much needed sediment to rebuild the land, with the canals cut it's been like a double whammy. No replenishment of the sediment and extreme loss of the sediment due to the canals and the saltwater intruding into these inland places.”

Rosina explained how Grand Bayou is outside the levee system, which was built excluding their communities from protection:

“We're at a critical stage in our inhabitation. We plan to continue to take a stand to advocate along with partners and anyone else who has a vision or shares our vision of protecting the lands...preserving what's still there because it's not just about our lives but it's about all the other lives, flora, fauna, all our other brothers and sisters that make our human lives possible. It's about their existence also. It's very important to do what we can because we have all these huge projects that are being proposed and coming online for coastal Louisiana⁵ but those projects are billions and billions of dollars and they don't do anywhere near what the simple project of closing canals can do and in the same timeline and footprint; closing those canals is vital to the preservation of lands that are still here. And it's vital that those canals begin to be closed ahead of those big projects being proposed by industry...A lot of our homelands and territories for other communities around there, and not only offering protection for ourselves and our own lives but we are the line of defense for all the other communities in the region. So why

⁵ For example, the Mid-Barataria Sediment Diversion Project; for more information, see for example <https://www.rollingstone.com/politics/politics-features/louisiana-indigenous-tribes-fighting-climate-change-protecting-coastal-lands-1234696553/>, and a massive LNG plant, <https://www.wwno.org/coastal-desk/2022-11-17/environmental-groups-sue-louisiana-over-permitting-of-13-2b-lng-plant-fear-of-flooding>

it's very important we use our Indigenous Knowledge and make possible what is possible, And closing the canals, that's a first line of defense for making other things happen, saving terra firma."

Theresa shared that "we have so many canals that need backfilling that brings in so much current whenever we have a storm because we have no more buffers." She described how they used to go to the beach at Timbalier Island during the summer, but that it's gotten so small and washed away that it's hard to find a place to even get there, and when a storm comes that beach no longer projects them:

"[W]e had Hurricane Carmen in 1974. We had water but it didn't reach our home and it receded quickly because we had so much land out there before that would slow that current down even though we had the canals. But since then, that land has washed away and the canals bring so much current and the water gushes through. Hurricane Ike [2008], it went all the way to the end of Pointe au Chien road, about 10-miles long...All these canals with all this current that it's pushing in is causing a lot of damage. And we're in the same situation as Rosina and them, from the river not overflowing like it used to and bringing in soil, and our land sinking and the canals being open has caused us more flooding. The oil companies, when they took the land, they made dividers, we call them trainasses, it's some cuts about 3-foot wide, which now Donald's boat is 38 feet and his boat won't touch either side of the canal...With canal backfilling it would stop all this current."

The project team, with partners from Pointe-au-Chien Indian Tribe, Atakapa-Ishak/Chawasha Tribe of Grand Bayou Indian Village, Grand Caillou/Dulac Band of Biloxi-Chitimacha-Choctaw Tribe, Lowlander Center, Louisiana State University, Livelihoods Knowledge Exchange Network (LiKEN), Drexel University, and more, have developed connections over the years and started having regular virtual meetings a few years ago for the project. As Theresa emphasized, "and that's where technology comes in because we all live all over, technology makes it easy for us to meet."

Julie raised up that the Mid-Barataria Sediment Diversion Project that Rosina and Theresa mentioned is now at a price tag of \$3 billion and growing, for something that is deeply controversial in terms of its impact, would take decades to see any positive effects, and is the result of technology happening in isolation from local knowledge and community wisdom. *How does a small constellation of people come together from different places and spaces to move this work forward and weave these technologies, knowledge, and wisdom together?*

Kristina reflected:

"It's called heart and passion. After Hurricane Andrew in 1992 when I was first introduced to Isle de Jean Charles and Pointe au Chien Tribes the issue was of rebuilding houses and...trying to find out why the houses became so precarious and started to see the land loss that was horrific, so in the '90s started looking at the tens of thousands of miles of canals that have been criss crossed across the delta of Louisiana. And then after [Tropical Storm] Isidore and [Hurricane] Lili [in 2002], one of the tribal

members at Grand Bayou said we need to partner to save our land and our culture. Overwhelming when you have a comment like that, how do we do that? And it's not just rebuilding the houses that were destroyed, home is for our more than human family and human family. We started looking at partners to be able to refill canals that had been devastated by the storm surges coming up and devastating the houses. Just repairing houses is a bandaid to what's going on when you have a coast disappearing before our eyes. Looked around for partners, started building coalitions across tribes, formed the [First Peoples Conservation Council](#) through NRCS [Natural Resources Conservation Service] and thinking about how we do this when refilling canals was not a priority for the state; the state wanted to build the largest river diversion. That's just upstream from the world's largest LNG plant⁶ that's going in... [Backfilling is] a simple solution that can rebuild land immediately.⁷ Kept looking for partners and with [Restore Act](#), where the money from BP Oil Spill that harmed the communities that are sitting here, oiled severely, that money was supposed to go into repairing the damage that it did but when we met with the Restore Act Council said no we can't help you because first you're not federally recognized tribes, second the money has to go through the state master plan and you're not in the state master plan with canals... So we started looking at other ways of bringing in money and bringing in resources. At a BTNEP [Barataria Terrebonne National Estuary Program] presentation Gene Turner who was at LSU, he gave a presentation about canals and how he had helped refill canals in the Jean Lafitte National Park. It worked and within a couple years, there were trees, flora, fauna, birds, everything flourishing. So we invited Gene to our team. We started collecting the people who had the heart, passion, knowledge, and then we started going after other partners that had money to be able to do this... This coalition of folks came together, totally volunteer, we put together different proposals. Pitched first proposal by calling it saving sacred places and communities, posing in that kind of way on the different coastal monies thought could squeeze through but were denied. But kept persevering. It's the collection of people that have heart and understanding they can participate with their specific techniques or expertise... A whole complexity of people but main core of that complexity is heart."

Alessandra shared that the complexity extends into the legal and regulatory landscape, considering the various kinds of permits:

"and all of that is rendered more difficult when you're working without state support. It's one thing for the local parish government and environmental offices to navigate these processes. To do that with this ragtag band of incredible people coming together around this but not always connected to all those channels where there is a strong preference in many cases for the diversions, has been challenging. It's not just the coastal master plan that's implicated, it's the hazard mitigation plans for the parishes, coastal zone management plans, a lot of different pieces where if the canals were officially listed as

⁶ See for example, <https://grist.org/energy/louisiana-liquified-natural-gas-terminal-lng-gulf-coast/>

⁷ Turner RE, McClenachan G (2018) Reversing wetland death from 35,000 cuts: Opportunities to restore Louisiana's dredged canals. PLoS ONE 13(12): e0207717. <https://doi.org/10.1371/journal.pone.0207717>.

part of the strategy it would've been a little easier...In Louisiana this question of responsibility for the canals is a big legal question that the Louisiana Supreme Court weighed in on a lawsuit and basically said yeah, lease holders are supposed to put things back the way they got them but we're not really going to enforce that in this case. So what's happening is that responsibility is being enforced by the communities. It's the tribes doing the work in spite of the government and regulatory processes and as that continues you start to see, well maybe the next state master plan will mention canals...In thinking about the roles and pieces that come in there's a big administrative role which has a legal component. How does a set of small nonprofits manage large grants and the regulatory hurdles that comes when you're piecing things together, it's a lot of timelines, a lot of reporting, it's a tremendous amount of burden to just do the work, and that takes its own body and set of expertise which is difficult to come by."

Kristina reminded that all these canals were built by oil and gas companies across land that was stolen from the tribes, and now we're having to get permission to go on to restore the land that they destroyed. Considering the administrative burden aspect, Julie reflected, includes challenges of how to get agencies and funders to see the holistic view. Everything is boxed in to be in linear phases, but yet in reality, can't wait for one phase to end and wait another year while land goes away as you try to get more funds together. The team has been working to find ways to take a holistic approach, while slicing it and then stitching it back together. It's been how to plant the seed to get the implementation to grow, how weaving back together the diversity of technologies, wisdom, knowledge, of how to apply this kind of technology for climate action and commitment moving forward.

Elder Chief Shirell emphasized that it's absolutely crucial that each of us in our communities utilizes our traditional ecological knowledge because:

"[T]hat's an intimate knowledge that's developed over time and it's proven, even though some sciences might not have caught up to that yet but it seems to be growing...When it comes to relying on connections, and government connections, another problem we have is during elections. If we get fortunate and have someone in a department who understands the situation and is passionate and is trying to work with us...we have them for 4, maybe 8 years at the most...Crucial we stay on the front end of those things as they change so people are educated and aware of the situation in the communities and why we do the things we do...If you're looking to heal and protect and preserve, causing more harm to a place that has already experienced astronomical amounts of extraction and harmful practices is not going to help carry us forward, which is why it's extremely crucial to listen to communities, listen to the wisdom, their TEK because they know what their community needs...The longer it takes for us to address these challenges for communities like ours facing relocation in the future, we're trying to do everything we possibly can to prevent that from happening. Why? Because we also have the understanding that we're not the only communities addressing drastic changes due to human practice and now the climate crisis. As I've always said, we are here to and for

each other. And that's not just human. That's every living being that is meant to thrive on a healthy planet.”

Group Dialogues

Following the conversation, participants engaged in small groups to consider: *What are examples of applying technologies for climate actions that reconnect and rebuild human-nature relationships?*

Working Groups

Day 1 and 2 of the workshop included a session for Working Groups by Topics; Day 2 also included a session for Working Groups by Regions. The working groups facilitated discussions focused on what the relationships between people, place, technology, and the environment mean for climate actions. The working groups focused on the following questions and considerations:

Questions:

1. When we talk about technology in the context of climate change and climate actions, what do we mean?
2. How has the change in technology over time changed how we share our stories and communicate our science?
3. What technological choices have been made related to climate actions, considering political, economic, and other influences? What technological choices have been positive and/or negative, and why? What led to those choices being made?
4. How do we create a more justice-forward reality so that we have technologies that reconnect and rebuild human-nature relationships for future generations in a changing climate?



In the context of discussing these questions, some considerations:

- What if we situate technology within the mindset of not about fixing things, but healing our relatives?
- What do these technological dynamics mean for issues around power, justice, and data sovereignty, and around the differences and intersections of data, information, knowledge, and wisdom?
- What role does technology play in re-engaging and rebuilding relationships with the natural world and how might we strategize this re-engagement?
- What has technology done to exacerbate and/or help the current climate and environmental problems? E.g., plastic pollution and new technologies to mitigate it.
- How is artificial intelligence (AI) going to affect our traditions, science interpretation, and influences on how we interact with each other and our environment?

Topics

Community relocation/site expansion

The community relocation/site expansion working group typically discusses issues around communities working on community-led relocation, resettlement, or expanding into a new or ancestral site when adapting in place no longer becomes an option. During the two days of working group conversations, conversations centered on topics of flooding, drought, fire, landslides, earthquakes, hurricanes and how technology can be a problem after these disasters.

Contact with insurance companies and government relies on electricity and internet accessibility, but these are not always restored in a timely manner or focus is not given to rural communities. In addition, the elderly often don't know how to or have these technologies. Regaining authority over lands as it relates to climate change is a critical step addressing the disconnect between policy, government, and the community. Preserving culture throughout relocation was also a topic of discussion. Land and money are tangible. Spirit of land and culture must be contained. So far culture has not been part of policy discussions but they are important.

There is a need to create our own platforms and change, and technology can be a big part of that. It's important to engage students as a way to get communities the support they need, and uplifting the importance of collaboration, with getting more people involved; some communities might be small and not have the local mass to get change done but if they have partners perhaps they could.

Education, Communication, Training, & Outreach

The discussion included in-person and online breakout groups on education, communication, training and outreach considerations, strategies, and opportunities as connected to climate, weather, and water. With regards to education, communication, training, and outreach, what is the intention behind technology? What are the power structures associated with it? How do we decolonize education? It is the story, not the data, that causes people to act, so we should not underestimate the role of the story teller. To be human is to be a storyteller, and the means of storytelling has evolved with technology. Education communication training can focus on how we share stories, and honor how the stories are intended to be shared. Technology has led to degraded quality of relationships in science, communication, and education. Timelines are compressed due to technology - we do everything faster, yet have less time because we are required to be more productive. Technology encourages unhealthy work-life balance. Funding is key - we need more funding directed to Indigenous, community-centered, place-based work.

One group discussed how technology could be used in education and community, with a focus on sharing resources, in times of climate change. Apps on your phone could identify plants, and help foster a sense of place and being able to document that place in regards to climate. There is so much information already in place about successful practices in dealing with climate change or climate extremes in the past; learn from that past knowledge in dealing with climate

extremes and convey that to our current communities facing similar challenges. We need to get the word out to a lot of people about what we're doing, ways to benefit from successes in one place from successes in another.

One of the virtual education groups talked a lot about the tensions between the fact that there are rarely exact right answers and rarely is there something that doesn't have at least some potential negative consequences. It's important to navigate those tensions and use technology and things like virtual reality, social media, and virtual platforms for communications that have benefits but challenges as well. Don't be afraid of those tensions but rather think broadly and engage with those complexities.

Energy systems

The discussions included considering a just transition away from fossil fuels to cleaner, renewable energy. Transforming to alternative energy, decarbonization, sustainability in a way that does not replicate harms of the fossil fuel industry, but rather replicating natural systems in a circular manner (renewable) and not linear (use & throw away). There is always a downside/negative impact for energy-related technology (ie batteries), and there is no single solution. Many times the resources needed to build technology comes from Indigenous lands (globally). So how do we re-think about these systems? We need to connect larger transmissions to rural communities or have tribal microgrids, prioritize co-creation of projects with communities, and have more transparency/communication and writing support for grants.

A key issue is around who does the technology benefit, who loses, and who makes the decisions. When talking about energy systems, it's important to involve the communities where these systems are happening because the impact could, for example, lead to gentrification because it's just green enough. How are these things financed and developed? Consider low cost or distributed low voltage DC systems, and that when things like the Solar Advisory Model (SAM) are used to calculate cost of energy development or project, how can that be community centered? Places like the National Renewable Energy Laboratory (NREL) are working on community solar type projects like the National Community Solar Partnership (NCSP); how can that be expanded to other models that are not focused on building multi, mega hundred watt-scale projects but rather on community-focused and community- scale projects with communities invested by being part of the entire process from the conception to financing. Looking at it on a smaller scale can also be modeled using some of the open source models in technologies like NREL has.

Food systems

The discussions included ideas around food security and food sovereignty, as connected to climate, weather, and water. Because of climate change and other anthropogenic impacts (i.e., pollution, genetically modified organisms-GMO, etc.) the native foods of native people are struggling to grow. And because of the inability to keep up with a fastly changing climate, and because of GMO introduction, there is also a loss of biodiversity. In our modern world, we prioritize the efficiency of food and not necessarily long-term benefits. But is efficiency related to

time? nutrition? What is the part that we value? “Wealth is not food anymore; the priority is the money over the food.”

What do more just and less just food systems look like? Less just food systems are very disconnected and commodify food, water, and culture. More just food systems are about how we can have sovereignty over our food, know where our food is coming from, know the people who are growing the food, and who is consuming it. Focus on local initiatives to push those types of things and availability and food nutrition, to ensure that we are producing good nutritional food for our communities and people, and that those who have been historically disenfranchised by larger organizations and governments have access to those types of foods.

Human health

The discussion included individual, community, and cultural health (physical, mental, social, emotional, spiritual) as these connect to climate, weather, and water.

As First Peoples, many of us come from communities that are in third world conditions. So much funding is directed towards diseases in other countries but many of our reservations are in poor conditions. There is lack of clean water, mold in mobile homes, no septic tanks or access to health care, high prevalence of cancer due to proximity to Superfund sites, and more. During COVID-19, we were the last to know about vaccines or have them available in our communities. With climate change, there are more climate-related hazards and there's a lack of early warning systems and when these storms come in, the waste from agriculture facilities and pathogens and contaminants from superfund sites come in and impact people's health. There is a deep, systemic racism in health care, in both access as well as doctors not treating Native People properly. We must recognize there is a difference between curing and healing. Approaching a community with a “solution” when you're working with people that have been impacted by trauma over many generations and you're not really going to fix anything, only brings up that grief once again.

We need to update early warning systems to take into account human health, and spread awareness that climate change not only affects nature but our health, too. How do we build greener hospitals? With continued heat waves and poor air quality, how much energy is required to power hospitals? Also is it possible to see climate impacts on online medical systems such as Mychart, and to connect health system information to prepare for extreme weather events and climate change? Lack of internet access is a big concern in health.

One idea that emerged was for an app for early warning systems for climate change events and connecting how health and climate change are related. As climate change is making storms more severe and common, there's a need for more dialysis clinics and dialysis treatment within storm shelters. When there is an emergency, having an app that lets people know who needs to go to dialysis or who hasn't been to dialysis for a couple days, and informs people about when a dialysis center is closed or when a road is closed. It would be helpful to have solar panels so when there are severe storms and power goes out, people can charge devices.

Phenology

The discussion focused on the timing of natural events, in relation to climate and plant/animal life cycles. The group talked about their individual experiences in witnessing the shift from an overreliance on technology to a space where technology is serving the communities in terms of data collection, observation collections, and communication. A number of examples were shared about how communities are using phenology observations to inform the timing and conditions for hunting and subsistence needs and for communicating risk. One example shared was about communities making observations on ice break up that happens during the spring to inform about flooding risk; that's not as easily modeled when directly observed and it's through these technological tools that are available that they're able to quickly communicate that risk and evacuate areas that are at risk. The group shared a lot of specific examples of tools that are available via apps, software that are being developed by Indigenous-led developers or community-led processes so the tools are in the hands of the community, not just the use of the tools but the development and ownership of these tools.

The [Indigenous Phenology Network](#), which emerged from Rising Voices, engages in monthly meetings together to share our observations, solutions, mitigation strategies, and continue having that connection through using the technology that is here to serve us and being able to have virtual meetings, talk to each other, and see certain patterns, but more from a relational space.

Water systems

The discussion focused on water quality and quantity issues, including freshwater ecosystems and marine ecosystems. The in-person water systems group especially focused on man-made systems that manipulate water. For example, there is poor water quality due to a heavy presence of arsenic and lead in Minnesota. Indigenous Peoples are disproportionately affected by the climate crises and issues, especially water pollution. There's a need for a supplemental presence by modern Western technology, science, and medicine when there's an unknown and especially when it's integral to environmental and Indigenous health. We need to build capacity and adopt data sovereignty as a permanent practice. For example local water testing on- and off-reservations to increase accessibility and awareness of water quality and health quality, which can lead to the creation of structural pathways and Institutional Review Boards (IRBs) or other protective entities to make it easier for people to know what they're consuming and the quality of it. The education system needs to be dismantled and reframed to have Indigenous Knowledges as the basis for scientific exploration rather than starting with Western science and then moving on. This is a community effort from different Indigenous cultures because these people are affected every day and it needs to be centered around that, and that can be empowered by Western scientists.

When the Earth is forced into a state such as now where the Earth can no longer self regulate as naturally did, we as stewards of the Earth must accept and use Indigenous and Western technology as a tool. To fight colonialism and capitalistic ventures opposed upon our lands and peoples and our non-human relatives, we have to use tools that are sometimes a byproduct of

colonialism to our advantage. In doing so we can amplify our effect in this and in being land and water protectors.

The virtual water systems group discussed how technology isn't meant to replace relationships, often pushing us towards things before we understand them. It's important to take a step back and take that cradle to grave review of things before we move with them. How do we get these conversations that are happening here out and shift into action? Some of those actions we can take as individuals or organizations going forward and valuing those soft voices. It's not just about being resilient, it's about being relentless! We can be the voice and the listener to shift and encourage, shifting from bringing everyone to the table to everyone in your canoe, because that's the person you rely on to survive, to get you through it, you're intrinsically linked to them, you're not just sitting across from them. Let's challenge that prevalent mind set.

There is a subtle difference between the Western side and Indigenous side of the definitions people have of climate change and we need to reconcile those notions to make meaningful change in our work moving forward. How do we make sure that RV12 can provide a safe space for Indigenous voices to talk with federal agencies? It's important that when we leave here we go and meet people where they're at, that place is so important. And to make the work, even if it's not on an institutional level, if it's on an individual level, to recruit Indigenous students and voices.

The mindset is not about fixing things but about healing our relatives. Technology is working with a living system, it's alive, it's moving, it's dynamic, and we exist within it. Our workshops need to have that core dynamic style within it; to have Indigenous voices and artists, if want it to be fluid and go somewhere. To build the leadership from within, we need to acknowledge the places where we are and that place matters so much and the voices matter; that's how we allow the sacred into the place and it's of equal value to the science being presented there. The hope that the healing paradigm gets present in the American public and public in general and we shift from this idea that the Western side of thinking gets thinking it's superior, that it's not sick, and the other side saying but no we are sick, so to balance that knowledge. Community first and foremost and how we as people here at Rising Voices can do more to bring Indigenous voices into federal structures.

Kainoa Azama, Kānaka Maoli; Olohana) shared a reflection that, as a current university student, "For me it's about making an alternative space for learning that's experiential, that models what it means to live in the changes that we're going to experience. Because we can have all this technology that prepares the kids that make all this efficiency, but look at Guamm Cat 5 hurricane wipes out Guam, no power, no water still today. Now what are we going to do? All the reading we did, all the chants we could've studied in Hawaiian studies and read about, the relationality to the people, to the place, that's what ultimately comes useful especially when we know the changes that are happening now. So what is the alternative space of learning that we're going to cultivate?...maybe it's not about reinventing the wheel, and instead about going back into the old ways by region,

by peoples, however we want to do it, but we need to start doing it. Because as our kupunas told us, in doing we learn.”

Regions

Atlantic Coastal

The Atlantic Coastal working group brought together communities from the Gulf Coast, Southeast, Caribbean Islands, and Northeast.

The group discussed hurricane prediction and prediction of location has improved but prediction of intensity is sometimes off. When it comes to natural hazards and hurricanes, sometimes that risk is unknown but it is known and it's not communicated to people. Early warnings are issued based on population size, which leaves out many rural areas. After Hurricane Maria, for example, only those who were close to the government or universities were privileged enough to know the truth about what happened, and a lot of scientists came in and that information was not distributed to people. In terms of FEMA, after some of these events happen, sometimes your agents change without notice. There needs to be timeliness and follow-up, that should be prioritized when talking about post-disaster issues.

There have been many choices and decisions made about infrastructure put on native lands and Native People were not consulted and often harmed in those processes; they need to be a part of the decision-making and not have something put on their land and forced to accommodate without having a say in those decisions. Often the decision-makers use the highest technology infrastructure in the neighborhoods and areas that are wealthy and white when often those are not the places that will receive the highest hazards, compared to historically marginalized and Native communities.

To look to a more justice-forward reality, there needs to be much better representation in the policymakers and in the policy. However, we aren't going to sit around and wait for those changes. There needs to be a serious effort to build trust between groups, especially given the massive amounts of harm that have been done and continue to be done. And working towards a world where natural hazards could occur without a human disaster. To get to that goal we need affordable, sustainable, and safe housing.

Deciduous Forests

The Deciduous Forests working group brought together communities from the Midwest, Great Lakes, and Northeast.

Trees and forests are important in our communities. Forests provide us with Inner peace, food, medicine, teachings, creativity and brain stimulation, identity, our stories, we give CO₂ and receive O₂ from forests, balancing our metabolism, art, wisdom, tools and materials, medicine, gathering places, orientation, firewood and warmth, shelter and lodging, transportation and

canoes and other transportation, erosion prevention and land management, wind breaks, kids toys and games, ecosystem health, temperature regulation, music, and spirituality.

What we do as people for forests; imparting respect, tending to the forests, harvesting, stimulating growth and regeneration, we create boundaries that can be good and bad – as humans we determine where forestland is – fire, controlling management, species diversity balancing, helping animals and habitat grazing, clearing out old trees, helping with forest health, spending time in forests can help with forest health, advocating for forests and forest rights, designating safety, encouraging movement and seed migration.

To create a more justice-forward reality so that we have technologies that can reconnect and rebuild human-nature relationships for future generations in a changing climate, the biggest takeaway was finding balance. Utilizing technology and having it serve us for communication and helping us connect with nature to achieve environmental, social, and racial justice.

Grass/shrub/arid lands

The Grass/shrub/arid lands working group brought together communities from the Southwest, Plains/North Central, and South Central.

We need to focus on the relationship between things and not necessarily the identity of the things, and the nuances of local and non-local beings and the roles and responsibilities they're trying to fill. What we consider weeds in one context are really trying to tell us something. Looking at fire, for example, as a being with its own intention, its own intelligence ecologically and socially and trying to see what it's telling us. An example was shared about a fire in Colorado that uncovered an archaeological site that connected people from the Four Corners down to Mexico and revitalizing that. It's about combating the modern mind and what we lose when we focus on the promise that technology and economies of scale try to provide by freeing up time but what we lose when we gain that time.

The role and power of language as technology was emphasized, and that Indigenous languages evoke the spirit of the landscape and when that's translated to someone of the modern mind, they resonate with it. For example, in New Zealand the Māori people interfaced with the government to introduce them to language names of certain places including a large park-land owned by the government, which eventually led to the government recognizing the park-land as Māori land and giving it back to the Māori people.

Pacific Coastal

The Pacific Coastal working group brought together communities from the Pacific Islands, Alaska, and Northwest.

The conversations focused around identity politics; if you have strong Native identity it gives you the gusto to stand up for the rights you're trying to protect, or stand up for the issues you're representing in a much stronger way than you would having someone that doesn't have that kind of identity. There's something different about representing a group you're part of and know

and involved in, than being outside and collecting data and sharing other people's information. Intellectual property or ownership of stories that are now being created as culture and technology or culture and science start to merge. Some of the tribal or cultural stories get embedded into these things but then ownership of those stories, without being said or without understanding what's happening, are being shifted into ownership of universities or other organizations and the narrative gets lost and the tribe or group no longer has ownership of that story and it's free and out there to be used however the university or organization sees fit.

The importance of context and specificity when trying to create place-based solutions while concepts or ideas of how we mitigate some of these problems, those might flow across the board but implementing those strategies in place is very much a site-specific strategy and being able to connect with the people from that place and ask them for solutions instead of just coming from the top-down and offering what we think are solutions from the scientific realm. Healing through relationships is a technology we need to re-implement, and we're doing it at this workshop.

We need to redefine what technology is. Technological implications and pollutions in our local regions – importance of resurgence of natural and biological and native technologies and intelligence; biological systems such as our bodies, nature itself, and re-learning how to observe, be in communication and communion with nature, and how our ancestors could navigate the ocean and they didn't need other technologies, they could read the technologies of the sky. Ancestors could tell the time of the day by when the rain would come down because at a certain time the sun would come up and would create the clouds that would rain down. That was a technology. There was technology of *kilo*, an old Hawaiian practice. *Kilo*, intentional observation, as ancient technology. A cultural practitioner shared how the goal of *kilo* is to become the app, meaning being able to look upon a place, being able to look upon the water consistently so as to not rely on an app to tell me when high tide or low tide will happen. Go to that place, look upon the water, connect with that place to be able to make those predictions. Doing *kilo* or intentional observation of clouds, to be able to predict cycles and patterns, to look at a particular cloud and know in a few hours it will rain or the sky will clear.

What does justice mean in our different cultures? For example, the Island of Guam in Micronesia where the military owns one-third of the land and built a firing range over an aquifer and put lead in water and dredged up the coral reef. That reef is now gone, and the people are unable to access that beach or reef or fish there anymore because of what the military did. This highlights an interesting dynamic of justice, with Guam's unique positionality within the Pacific, within regional space as an island but also within the US as a territory with no voting rights but with a military base on the land. A lot of Indigenous forms of justice in all our communities are based on collective, restorative justice and if those forms of justice aren't in our governance, and if based on a Western idea of justice and benefits that are white- and western-centric, the idea of how society should function doesn't work for our communities. It's about decolonizing and reworking our forms of justice, restorative justice into those systems.

Declaration on Relationships and the Wise Use and Applications of Technologies for Climate Actions for Everyone: Working Groups' Reflections and Priorities

To open the final day of the gathering, Vesta Colombe (Lakota) offered a prayer and ceremonial song. In doing so, she reminded everyone gathered of the courage to be here and create shared and safe spaces to hold each other as relatives, to actively engage and actively listen together, that we all have something to give, learn, and share, as forever students. We've come together from many diverse backgrounds, histories, cultures, and perspectives, which is beautiful and also hard and challenging and real. And it's a start. As one of our mentors Bill Thomas often reminds us, we're setting the table for those coming next.

Julie invited everyone to get together in small groups, meet new relatives, and be present in the space together. A reminder that we've always had technologies, such as language is technology. There is a diverse range of technologies, it's not only emails flying and these devices we're stuck to; that's not where it ends, it's not where it started, and it's not where it has to only go. Considering a justice forward and justice-centered approach to the choices we want to see and manifest into technology for climate action and commitment, not only for us but all of our relatives to not just survive into the future but to thrive, what are those choices that we make today? How do we set the table for the next generations?

Participants shared what they discussed in their small groups about what's most important to consider for the wise application of technology for climate actions.

Patrick Freeland (Muscogee Creek Nation of Oklahoma) started the share-outs, in talking about AI (artificial intelligence) and the need to recognize where it's going and to explore the opportunities and challenges. It was recommended to no longer use the term AI in place of specific technologies such as large language models, generative transformers, and more. It's also important to recognize the stereotypes and biases that exist in large data sets, particularly for Indigenous Peoples. The next principles are: to be proactive, rather than reactive, to hype for technology; have a shared responsibility emphasis on individual, collective, and direct responsibility; move away from greenwashing terminology, particularly net zero, and instead focus on reducing energy use and reducing consumption and material. Further, technology should support harmony between peoples and the Earth. This means being against geoengineering, particularly aerosols and cloud seeding. They emphasized the revitalization of traditional knowledges, particularly living with the Earth as opposed to control, dominance, and extraction paradigms. It's time to sunset the term sustainability when it's used in the context for domination and control. We must emphasize Indigenous sovereignty and data sovereignty, and that the definition of metrics and baselines must be first defined by the community. Within this context, it's critical to implement the [United Nations Declaration on the Rights of Indigenous Peoples](#) as well as the [Rights of Mother Earth](#).

We must collectively recognize that technologies include applications for peacemaking, healing, and reconciliation. It's time to move away from resource commodification of the water, air, and more, and reframe pollution and hazards beyond acceptable limits. In this work, it's important to understand balance, recognize positions and roles, and that recognizing positionality can lead to co-created solutions. To foster an adopted distributism approach and increase accessibility and use to reach those who need it the most, technology software development should be open source and open access.

Itzel Flores Castillo Wang (Indigenous from Mexico; Promesa Boyle Heights) shared from being in conversation with relatives from Louisiana in the room, considering important topics for the *Declaration*, included changing the way that we use language, such as maybe shifting from using the word technology and thinking of it in other terms such as wisdom because technology is not just machines, "it's also natural technology. It's our knowledge that has been passed on from our elders." In terms of communication and relationship building, we should continue using the current machine technology as a tool, but at the same time, not lose sight of relationship building with our human relatives, and our plant, animal, and element relatives. Technology can never replace that connection and those relationships. Considering how we connect back with the youth who are really into technology and bringing them back to "listening to the history, the elders, the things that they're not necessarily going to learn through those [other] forms of technology." Children often learn through song, which is how knowledge was traditionally passed down. How do we connect that with the current technology that we have? Lived experiences can be shared by listening to each other. And uplifting that it's not just Western science that matters but all knowledge is valuable and important. This calls for dismantling and revolutionizing the current education system.

lokepa Frederick (Kānaka Maoli; Leeward Community College) shared that their group discussed the concept of "technology being like a kin to us." If we're going to be using some technologies such as drones, this tool that we can use for the betterment of everyone, we have to give it the responsibilities of what it's a kin to. Therefore, some of the responsibilities "would be like that of an eagle because the eagle sees over the environment, the topography...we're not greater than or less than the technology if we're going to make it a kin to us. And we have to see ourselves as equal...we should have Eagle Vision and not ego vision."

The group also discussed some of the intentional uses of technology; if we're going to develop technologies, they have to be solution-based. If we commodify food and water, those things that give us sustenance, give us life, "[it] allows humans to determine who dies and who gets hurt by it. And so we need to reframe our position and our perspective on... why do we commodify these essential things that all humans need to live?" Deadlines are a colonial thought; our ancestors didn't have deadlines but rather gathered food at a specific time and it was left to interpretation of what the day brought to them. Being more intentional about our work "can build towards a better world." Reflecting on being profit-motivated versus love-motivated, we need to shift the narrative and think about the things that we love and not just in monetary value. For example, dams are profit-motivated; one can cut this water off from people and it can generate

revenue for someone, “but where’s the love in that? Where [are] the animals going to go...what communities are going to be affected by the clogging of water?”

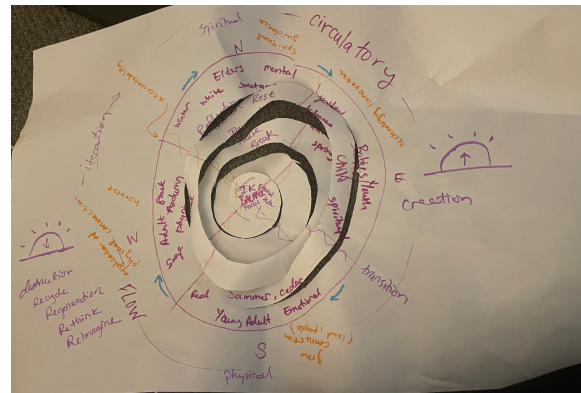
Reconnecting with our ancestral technology of language, it’s important to think of all of our relations when we act and when we move forward, and to do it with intention, that’s where the core of wisdom is. As we step into different spaces, “be humble where you walk, and to remember that you carry your land with you wherever you go, no matter how far away you might be from it, you’re rooted in that. And when we encounter diversity, to be curious because from this curiosity is where a lot of exchange of information and energy happens.”

The group also talked about how to humbly elevate Indigenous voices, and how to “acknowledge technology that may not have been heard in the past”, to have connection to both modern electronic technology and Indigenous knowledge. Artificial intelligence (AI) is knowledge without wisdom, and includes data and designer bias. And to remember that “knowledge is all this stuff that we kind of pick up as we go along. But wisdom is there from our ancestors...there is a really important role in recognizing and connecting and calling in our ancestors to these spaces and to walk with us as we move forward.”

AJ Lauer (NCAR) reported back that their group reflected a lot on the concept of: the intention behind the use of the technology, which doesn’t always match with the technology’s impact, especially when communities aren’t engaged in designing the technology where it’s implemented. Moving towards a shared vision and shared goal means no ownership of technology. Rather, it’s inclusive of many generations, communities, minds, and stories, for everyone’s benefit. It’s important to beware of technology goals that are monetary-focused rather than investment in our collective interests. Reflecting on the lessons learned from the COVID-19 pandemic, communities were both brought together through resource sharing but also divided when individualistic purchases trumped sharing; we witnessed the positive environmental impacts, but also the billionaires becoming richer off of so much suffering. What can we learn from what unfolded, are there ways to take the profit gained from new technologies and spread it among communities, who often already have the technology that is necessary for their well-being. We can share stories “to create shared stories and shared vision.”

Sofia (Red Cliff Band of Lake Superior Chippewa) shared that she and her brother ran the Native American student organization together in college, and working to shift it from a hierarchical framework, changed the structure into a medicine wheel style structure where everything is equal and circulating and all connects together, where Elders are as important as infants, who are as important as children, with everyone having a role in the community. Showing the structure that they worked with that is more circular and multi-dimensional, getting away from the hierarchical, several members from the group shared what they put together collectively:

“[W]e have the north, south, east, and west, and in this analogy, the east and west became that from infant to kupuna, transition that flow, that natural course. And so we took technology from the infant side, and needing to circle that around compassion, being the kind of moral compass of what we're talking about developing tech...we recognize that we're not a silo, we're not a monolith...when we think of the eastern direction, that's where the youth, the children are, and so thinking of the creation and growth of new technology, aligned with the rising of the sun, but coming from and informed by spirit. And then moving through the southern direction, the summer, the growth, thinking about how tech and technology can grow to build connection. And then in the autumn, in the western direction, thinking about what we're able to gain from this technology, the application of these physical connections. And then also moving into the northern direction, thinking about connecting with Elders, reflecting on is that technology actually serving and growing connection or is it hindering connection? Taking a pause and rest to think and reimagine what the tech needs to be and grow into new technology. So we see this model as a process of creating technology in line with the values of Indigenous Knowledge.”



Corinne Arrington Salter (Indigenous Marshallese; Louisiana State University) reflected on the conversations about “language as a technology. And it's really reminded me to be present and to listen to your elders whenever they speak to you. And whenever you're surrounded with community, listen to the language that they're using. Use that language as a technology to understand each other better, and have a richer understanding of what it means, what our culture means. And what it means to be a good relative. In Marshallese language we say *lōkwe*, to say both hello and goodbye. And it literally translates to you are a rainbow. If we start by seeing a rainbow in somebody, then we can be more present. And we can see that rainbow in them. And we can understand the rainbow that brought us all here today and the rainbow that keeps us fighting for our elders, for our ancestors, and for our community.”

Vesta shared with the group that in the Lakota language, *thechihila*, the word for love, for example, does not translate back to that word, but rather translates to “I would suffer for you...Because if you are not willing to suffer for somebody, you cannot say that you love them. So, that's why the English language is so weak. Because there are a million things you can say in other languages, where you can't say in English.” Acknowledging that there are many amazing things we can do with technology every day, the question remains:

“what's going to happen when our technology runs into a brick wall. Are we going to go run into a brick wall too?...Or are we going to go back to our old technology?...We are the teachings from our ancestors...thousands of years ago from the beginning of our time...that is the knowledge that we need to hear and listen to, to survive...we're going

to have to rely on each other. We have to love one another. We have to suffer for one another.”

Robbie Hood (Cherokee Nation of Oklahoma; Blue Thunderbird LLC) shared about connecting with a new friend, Giovanna Ahuatzin Flores, at the workshop, who is living in the U.S. but was raised in Mexico. Her parents are science and history teachers, and when Giovanna learns about new technology, she tells her parents about it. Then, her parents inform their students in their own language and cultural references. If you think about technology as a tree, “that’s a new root anytime you can take this technology back and explain it and have your young people learn about it. That’s another root in the tree. Your ancestors learned how to work with trees and now you have that relationship. I think you can do the same thing with technology. Just treat it as something that’s going to have a purpose for you. And, now you’ve got young people that are learning about technology and they’ve got your back.”

Olivia Pearman (US Geological Survey) shared some of the themes that emerged from their group, including having a broad, more expansive definition of technology. In terms of applying technologies, the importance of being place-based and to implement at appropriate scales and to support the Indigenous Peoples of that place. When applying technologies, ensuring that all impacts are considered, including both the positive and the negative and potentially unforeseen and unintended consequences. Through the process, bring together Indigenous Knowledges along with Western scientific knowledge and science, and working with Indigenous communities, through respect, reciprocity, and curiosity in those relationships. This also includes working towards consensus building with decision making processes related to technologies. Considering access to technologies, ensuring the transparency in development and use, and the impacts where these technologies come from, also means incorporating restorative justice in all decision making, including the facilitation of returning stolen lands, with technologies implemented by and for the original inhabitants of that land.

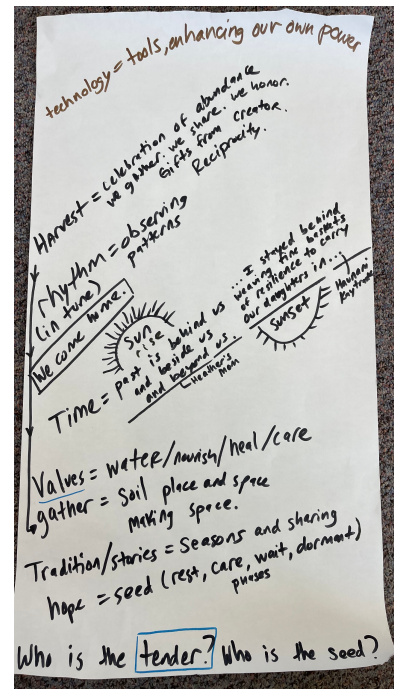
When designing technologies, are we going in with the intention of healing or fixing, and considering the inputs and the outputs that these technologies are producing. Related back to what Dr. Wildcat shared, of the three “C’s” – community, culture, and communication – over Environment, which should equal Technology.

Recognizing that Western technologies are often extractive, as we develop technologies in this time of needing to balance our natural systems and Western technologies, we need to recognize the limits that we have. We’re so used to operating on unlimited potential, but in looking at all the damage that we’ve caused, it’s clear that we’re not as unlimited as we think we are. Recognizing the importance of communication as a form of technology, our discussion has been in the framework of a colonial language, English. How do we decolonize that when forced into shared frameworks?

Martina Mapatis (UC-Berkeley) shared from their group a word cloud exercise, writing down words and thoughts about the wise use and application of technology and how you can apply that to a climate setting. One person wrote the foundation of coming together as our roots. The

group articulated value systems that included nurturing, care, healing, family support, emotion, and the foundation of coming together as the roots. That grew into a larger metaphor, that if those were the roots, then our values would be like the water; to continuously keep it alive, you have to keep putting that into your work. And then this gathering of people became like the soil; making space for people to speak freely and be vulnerable and open themselves to finding their inner wisdom that's always with them. Tradition and stories would be like seasons and sharing; not everything is linear. There are times when it's okay for things to happen and information to be exchanged, and there's times when you just need to rest, when the soil has reached its point where you need to let it self-regulate, and nutrients need to get back into that soil so more things can grow. Hope would be seeds, which can be rest, care, wait, and dormant because seeds are very delicate but they're also very strong, they can wait years until being planted again. And it can rekindle those ideas and movements forward.

Aaliyah Thomas (University of Hawai'i) shared about examining our process for resilience and for collective restorative justice and resilience. Time is a nonlinear concept for Native communities. As Suzanne MacAulay (Heather Lazrus' mom) shared at a gathering the evening before, the past is behind us and beside us and beyond us. We are thinking about the sun too and what the sun does for growth and for our healing, the sunrise as well as the sunset, and remembering the poem, *Sons*, by Haunani-Kay Trask, and the weaving of "fine baskets of resistance to carry our daughters." As we think about genealogy and our ancestors and how time is something that we've created, what does that mean in our cultures, in our communities? It means rhythm, it means observing those patterns, being cognizant of being spatially aware. Being aware of the time that it takes but also the space that we take, the actions we take across time and space that we're aware of, to love each other, to be intimate, and to grow. And harvesting those seeds, that can mean children, that can mean application. The celebration of abundance – in Native communities, it's hard to not be aware of the sparse, the times that we're not seen and not recognized and not heard. Every day is survival, every day we're fighting for space and to be seen. The harvest is where we gather. We practice taking care of one another, making good for each other. We practice love, which brings us back to the beginning of the cycle. Of those values, we share, we honor, we value reciprocity. And we recognize the gifts from the Creator.



An important question is who is the tender and who is the seed and how does that relate to each other? All of us here are the seeds. And we are the tenders. The tenders are our ancestors, but also us at the same time. This relates back to what Suzanne MacAulay said, that like the past, our ancestors are with us at all times, but also moving into the future, we ourselves become the past. It's a whole, nonlinear cycle. Many of us have trauma, transgenerational trauma. If those negative aspects that have been imposed upon us can be carried with us

through generations, then those positive aspects of our life can also do that. That's what Indigenous knowledge is; it is that positive side, the yin to the yang, it's that transgenerational trauma that pushes us forward to better ourselves and better our people, but also better work with the world around us; the Earth doesn't need to improve but it can be in a better space and that relationship can be rekindled and revitalized.

Tyler Moore (Haskell Indian Nations University) shared that having this platform for Indigenous voices to speak and have an open dialogue with our friends at NCAR and every other scientific organization is strongly needed. Demonstrating the importance of Indigenous voices: 80% of the world's biodiversity is within or around Indigenous Peoples, despite Indigenous Peoples only making up 5% of the world's population. Indigenous Peoples and our non-human relatives are at stake of losing the most so we must be the loudest voices. Learning from each other is the greatest strength of a convergent program such as this. Indigenous Peoples from the Pacific Islands, to the Great Plains, and everyone in between and beyond, coming together to talk with our fellow scientists. Using Indigenous knowledges, not just Indigenous knowledge, there's more than one. It's diverse, it's expansive. Our greatest strength is our unique identity from all of our backgrounds, all of our peoples.

One group came up with four technology applications. One was new water acquisition methods. Water Scarcity is a big issue across the globe and there's more technology being created; we need to be conscious of those who are creating it and their intent but we also need to acknowledge the greatness that can come from it, and also the patience it takes to get to the right spot in the end and implement the right technology. The second application is environmental impact statements for technology; creating and uplifting these metrics of environmental impacts of developing technologies. The third application emphasizes the delivery method of technology and considering how people's accessibility varies. The fourth application relates to the biggest issue with climate change, and the reason it continues to snowball is mindset of the people in power. Many youth have witnessed the generational trauma of our parents, experienced the trauma of what it was like in our childhoods, and watching it deteriorate. Witnessing our parents generational trauma and experiencing our own trauma lights that fire under us to make action. Education is the strongest technology to combat all the negative impacts climate change has done. The power of education has been used to destroy some of our cultures; shows its strength. Imagine if we flip that?

Highlighted during the Disaster Justice Network world café session, disasters can open up communities for land resource theft, justify disinvestment, and create social vulnerability. Census data is used to create a national risk index, yet many communities aren't counted in the census, leading some communities to be neglected. The Social Vulnerability Index uses census data and social science methods to determine the factors that can contribute to vulnerability or resilience. However, it is more effective on macro-scales (county, state) but less accurate on individual levels, as it excludes many factors the census doesn't measure, such as resilience through food sovereignty or independence from the market economy. The Environmental Justice Screening Tool is produced through the federal government and has similar limitations.

Such tools erode community agency and power, promote removal, and diminish and demean community leadership.

One of the key shifts for addressing this is changing our societal understanding and ethics. For example, the Haskell Wetlands in Lawrence, Kansas was originally framed as a health hazard (promoting disease), which justified draining the majority of the wetlands and led to the actions of highway construction. Similarly, Waikiki Beach in Oahu, Hawai'i was the breadbasket for the community, but the beach was destroyed in 1920 in the name of "protecting community health." This pattern will continue to be repeated if not recognized. How do we show the value of stewardship in protecting ecosystems and social systems, especially when many decision makers are motivated by money (and avoiding spending money) regardless of real ecological and social costs. For example, the Hawaiian governor passed an emergency order which stripped away protections for sacred lands under the guise of creating housing for unhoused Native Hawaiians (who couldn't afford the created housing). This divided the community around housing & sacred lands, which ultimately fast-tracked the housing. The emergency order overrode all protections for sacred places and was extended to benefit corporations. The question is how do we reverse the script to empower communities and use existing political tools such as eminent domain for communal benefit? How can we rewrite this "cost/benefit" paradigm that determines who is invested in and who experiences vulnerability in disasters? A starting point is considering the community values that we're holding onto, such as Respect, Knowing where we come from, and Culture.

Duncan Campbell (Living Dialogues - KGNU Community Radio) shared gratitude for the energy and joy being brought back to Boulder in this gathering. As the psychoanalyst Eric Erikson said in 1963, that any society in order to survive, much less thrive has to have an ongoing, mutually respectful, co-creative dialogue. This should be with elders and youth, an intergenerational dialogue. This is the mindset that will take us into the future. And beyond all of the challenges of climate change and other polarizing issues in our current big picture. This is a shining light that's going to grow and grow. Everyone that has spoken has been a beacon for all of us for the future.

The Bob Gough Public Symposium, "Climate Change is Inevitable, Adaptation is Optional"

This year's Symposium featured the opening at NCAR's Mesa Lab of the [*Preserving Our Place: Our Knowledge is Power Exhibit*](#), featuring the importance of culture and lifeways and the consequences of the climate crisis. It celebrates the work of two Indigenous photographers: Chantel Comardelle, Tribal Executive Secretary of the Jean Charles Choctaw Nation, Louisiana and Dennis Davis, community artist of the Native Inupiat Village, Shishmaref, Alaska. Additional photography was taken by and/or is provided courtesy of Pete Mueller, Nathan Jessee, and Thomas Reuters.

The collaborative exhibition illustrates the devastating effects of climate change on their native, coastal homes – of sea level rise encroaching upon Isle de Jean Charles and of global warming

melting ice breaks and permafrost in Shishmaref, which is causing roads to crumble and homes to fall into the sea. The exhibition includes 52 archival print 11x17” contemporary and historical photographs. It features the Indigenous artists’ lived experiences of being from communities in the US most affected by climate change now– and not in some distant future. As Comardelle said, “I am so excited to share the voice of our tribal community in this exhibit. The fight frontline communities are facing every day is real. Our hope is to share this story with everyone.”

The *Preserving Our Place* project was initiated as a means to preserve the culture – the traditions, history, and knowledge – of people and place, and elevating the voices of the tribal members to tell their own story. *Preserving Our Place* emphasizes the knowledge of land and place-based identities and values. Its goal is to demonstrate to the greater public the importance of preserving places most threatened by the climate crisis and centering the voices of those living through those impacts, today, and their fight to protect their culture, lands, and ways of life.⁸

RV11 participants visited the exhibit and then came together for the Bob Gough Public Symposium. Lisa Colombe (Rosebud Sioux), Bob’s daughter, opened the symposium and shared the [Bob Gough Tribute video](#), to Rising Voices’ co-founder. Bill Thomas (Native Hawaiian; NOAA) moderated a conversation with Chantel and Dennis about their work, experiences, and hopes and purpose for the exhibit.

A special thanks to the co-presenting partners, [EcoArts Connections](#), the [Livelihoods Knowledge Exchange Network](#) (LiKEN), the [National Center for Atmospheric Research](#) (NCAR), the [University Corporation for Atmospheric Research](#) (UCAR), [Open Studios](#), The Rising Voices Center for Indigenous and Earth Sciences ([Rising Voices](#)), and the [UCAR Center for Science Education](#).

Celebration: Honoring Dr. Heather Lazrus

RV12 included an evening celebration to honor Dr. Heather Lazrus (NCAR), Rising Voices co-founder, who transitioned from this world to the next earlier in the year.⁹ Prior to her transition, Heather had been nominated to receive the Bob Gough Award for Climate Justice in Action. Dr. Paulette Blanchard (Absentee Shawnee Citizen and Kickapoo descendant) presented the award to Heather, posthumously. Relatives, including colleagues, and ‘ohana shared reflections and words about Heather’s life, legacy, and inspiration, and shared stories about her community work, including Papali’i sharing about the connections with the legendary *Kaumaile* spear of Nanumea Island of Tuvalu. The group came together to hold a kava ceremony in her honor. Our gratitude to those who facilitated the gathering, Papali’i Dr. Tusi Avegalio, Ramsay Taum, Bill Thomas, Kalani Souza, Maraya Ben-Joseph, Kainoa Azama, Zethan Barros, and Keahi Tajon, Suzanne MacAulay, Paulette Blanchard, Diamond Tachera, and Julie Maldonado.

⁸ For more information about the exhibit online, visit <https://www.preservingourplace.com/knowledge-is-power-exhibit>

⁹ <https://www.longmontleader.com/obituaries/heather-m-lazrus-6669313>;
<https://www.appliedanthro.org/publications/news/may-2023/dr-heather-lazrus>

Closing Ceremony

Steven LaPointe shared that he's been working with colleagues in Denver Public Schools to pilot a program this year to support their students that's really worked and they're now being asked to go to the School Board. It serves as a reminder that our work is being watched by our younger ones; they're listening. What we're doing is ensuring our Mother Earth is going to be here for our future generations. We are being good ancestors at the moment. He shared that the program is focused on our youth being able to live up to their full potential and push themselves and live in both worlds and be in balance. One of it is basic, traditional knowledge that comes from elders that have amalgamated into a curriculum. We have to represent where we've come from. We have been the center of a lot of these protests because they've taken our constitutional rights away many times. They've been doing art projects and using the museums as host for their art, from the Denver Art Museum to the Longmont Museum, and places in between. Our awareness message is creating a new generation of people who are trying to protect and spread that awareness of our people's plight.

Play space, project-based learning is so important to our people because we learned by doing. When our young ones are able to have microphone time, with state legislators with no fear, because they spoke from their hearts. We acknowledged them to use that power and they were able to articulate and be that vessel from their ancestors. And we could potentially change the face of urban Indian education nationwide. Steven LaPointe shared a closing prayer, reminding of the kinship created here, to create a better place for our future.

Jannan followed by sharing a story from the Quechua people in Peru as elevated through the UN World Water Day "[Be the Change](#)" campaign:

One day in the forest a fire broke out, all the animals ran for their lives. They stood at the end of the edge of the blaze. Looking at the flames and terror and sadness above their heads, a hummingbird was flying back and forth to the fire over and over again. The bigger animals asked the hummingbird what she was doing. I am flying to the lake to get water to help put out the fire. The animals laughed at her and said, You can't put out this fire. The hummingbird replied, I'm doing what I can.¹⁰

That represents all of us. Sometimes with climate change or the things that are going on in the world right now, we're that hummingbird going back and forth to the lake to go and get the water to try to put the fire out or that feels like we're pushing a rock up the hill. But we're doing what we can.

Phillip Chavez played us out with the flute, reminding that as Indigenous People, we walk in two worlds. We try to balance our lives between the Western world and our traditional ways; we learn to harmonize those ways, and places like this where we can learn to bridge it. The double flute represents that intertwining.

¹⁰ <https://www.unwater.org/bethechange/>

Appendix 1: RV11 Workshop Agenda

Pre-workshop: Tuesday, May 30, 1:00PM—6:30PM Mountain Time

1:00: Workshop on Open IoT (internet of things) – led by Agbeli Ameko with Keith Maull
5:00: Mentoring gathering (*in-person only*)

Day 1: Wednesday, May 31, 9:00AM--4:30PM Mountain Time

9:00: Opening Ceremony – Steven LaPointe
9:20: Welcome to Place – Ava Hamilton
9:40: Welcome to the 11th Annual Rising Voices Workshop and Workshop Overview
9:55: Welcome to NCAR – Gretchen Mullendore
10:05: Rising Voices Introduction Video
10:15: Charge to RV11 – Daniel Wildcat
10:25: Introductions
10:45: *Break*
11:00: Talk story: Learning from the wisdom of our elders
Papalii Dr. Tusi Avegalio, Jannan Cornstalk, Theresa Dardar; Moderator: Tim Schneider
12:10: Group dialogues
12:30: *Lunch*
1:20: World café meet & greet
Participants will engage in conversations with representatives from various organizations, programs, and networks to learn about their programming.
2:10: *Transition to Working Groups - Topics*
2:15: Working Groups – Topics
Participants will select one topic to join: Community relocation/site expansion; Education, Communication, Training, & Outreach; Energy Systems; Food Systems; Health; Phenology; Water Systems.
3:30: *Break*
3:45: Share-out: Reflections from working groups (topics)
4:30: Wrap-up Day 1; What's coming up next

Evening: Wednesday, May 31, 5:00--7:30PM Mountain Time

The Bob Gough Public Symposium, “Climate Change is Inevitable, Adaptation is Optional”

5:00: *Dinner*
Preserving Our Place: Our Knowledge is Power Exhibit
In-person at the Mesa Lab
Online, <https://www.preservingourplace.com/knowledge-is-power-exhibit>
6:15: Symposium Dialogue - Preserving Our Place: Our Knowledge is Power Exhibit
Opening: Lisa Colombe
Bob Gough Tribute Video
Speakers: Chantel Comardelle and Dennis Davis; Moderator: Bill Thomas

Day 2: Thursday, June 1, 9:00AM--4:30PM Mountain Time

9:00: Welcome to the Day

9:10: Recap of Day 1/Process Day 2

9:15: Talk story: Applying technology for climate action

Elder Theresa Dardar, Elder Rosina Philippe, Elder Chief Shirell Parfait-Dardar, Kristina Peterson, and Alessandra Jerolleman; Moderator Julie Maldonado

9:55: Group dialogues

10:15 *Break*

10:30 Working Groups – Topic

Participants will stay in their same topic group from the prior day: Community relocation/site expansion; Education, Communication, Training, & Outreach; Energy Systems; Food Systems; Health; Phenology; Water Systems

11:45: Share-out: Reflections from Topic groups

12:20: Group photo

12:30: *Lunch*

1:20: Poster “walk”

Participants will engage in conversations with poster author(s) to learn about their work.

2:10 *Transition to working groups - regions*

2:15: Working Groups by Region

Participants will select one region to join: Atlantic Coastal (Gulf Coast, Southeast, Caribbean Islands, Northeast); Deciduous Forests (Midwest/Great lakes, Northeast); Grass/shrub/arid lands (Southwest, Plains/North Central, South Central); Pacific Coastal (Pacific Islands, Alaska, Northwest)

3:45: *Break*

4:00: Share-out: Reflections from Regions’ Working Groups

4:30: Wrap-up Day 2; What’s coming up next

Evening: Thursday, June 1, 5:00--7:30PM Mountain Time

Celebration: Honoring Dr. Heather Lazrus

5:00: *Dinner*

Preserving Our Place: Our Knowledge is Power Exhibit

In-person at the Mesa Lab

Online, <https://www.preservingourplace.com/knowledge-is-power-exhibit>

6:15: Evening Celebration: Honoring Dr. Heather Lazrus, Rising Voices co-founder

Bob Gough Award

Remembrance video

Conversation - Kaumaile

With Papali’i Dr. Tusi Avegalio, Ramsay Taum, Bill Thomas, Kalani Souza, Suzanne

MacAulay, Paulette Blanchard, Diamond Tachera, and Julie Maldonado

Day 3: Friday, June 2, 9:00AM--12:00PM Mountain Time

9:00: Welcome to the Day

9:10: Recap of Day 2/Process Day 3

9:15: Focused goal of today

9:20: Declaration on the wise application of technology for climate actions
Reflections & Priorities from Working Groups

10:10: *Break*

10:20: Declaration on the wise application of technology for climate actions
Reflections & Priorities from Working Groups

11:10: Closing Reflections: Students/Youth

Appendix 2: World café meet & greet

Participants engaged in conversations with representatives from various organizations, programs, and networks to learn about their programming. The world café included both in-person and virtual hosted dialogues:

Climate Literacy and Energy Awareness Network (CLEAN) is a climate education project that supports educators of all types to bring climate and energy topics into their teaching. In addition to supporting educators, we work to connect with partners to continue to improve both the breadth and scope of our work and to amplify the voices of those working in climate and energy education. We do this through a yearly update to our educational resource collection and teaching guidance pages and by hosting an active network that includes a listserv, weekly calls, professional development opportunities, and workshops. Partners and educators are welcome to suggest resources, co-present through the network, and promote recent work. **Hosts:** Patrick Chandler, Kathryn Boyd, Gina Fiorile, Anne Gold, Alicia Christensen, Naomi Ochwat, Casey Marsh, Daniela Pennycook, and Ami Nacu-Schmidt (CIRES), Frank Niepold (NOAA), and Monica Bruckner and Sean Fox (SERC)

Weaving Relations - Racial Equity in STEM education project aims to re-imagine the structure and outcomes of STEM research at the graduate level, by providing Immersive, Interdisciplinary, Identity-based Team Science Experiences (IIITSEs) to solve challenges that have emerged as human activity has led to significant impacts on the planet's climate and ecosystems. IIITSEs are collaborative, culturally affirming, and solutions-oriented research projects that center diverse knowledge systems to respond to community needs, support cohorts of racially diverse faculty and students, and promote a just, equitable, diverse, and inclusive campus and community within and beyond the STEM disciplines. There are funded opportunities for graduate students or potential to discuss involvement in Weaving Relations (with faculty or community organizations). **Host:** Michele Clark (Earth Systems Science for the Anthropocene)

American Meteorological Society Committee on Spirituality, Multifaith Outreach, and Science (COSMOS), COSMOS is a subcommunity of AMS and non-AMS members committed to incorporating perspectives based on faith, religion, or spirituality. COSMOS favors no single spirituality or faith tradition, consistent with the AMS Code of Conduct. COSMOS is committed to dialog as a means towards mutual understanding about environmentalism and related fields. These dialogues are facilitated among AMS, scientific and professional societies, academic, government, public and private sectors, non-profits, and spiritual/faith-based organizations and ministries through webinars, AMS sessions, partnerships, and other initiatives. A mission of COSMOS is to increase Indigenous Voices in the Weather, Water, and Climate Community. We partner with Rising Voices on AMS Annual Meeting Sessions and other activities, as well as webinars that bring in Indigenous voices and topics. We welcome anyone

who is interested in working on the spiritual and environmental interface. **Hosts:** Carlos Martinez and John Ristvey (National Center for Atmospheric Research)

Thriving Earth Exchange links communities focused on issues like sustainability, pollution, climate change, and natural disasters, with pro bono community science project managers and experts to reach a measurable outcome, bringing communities a step closer towards achieving overarching goals. There are three ways in which one might participate in Thriving Earth Exchange: (1) as a community lead, representing your local community priorities to advance a certain outcome, (2) as a community science project manager, who we train to support a community lead in defining project goals and to find support and resources for projects, and or (3) as a scientist or expert, lending your knowledge to achieve community priorities. **Host:** Amanda Shores (Thriving Earth Exchange, American Geophysical Union, & Colorado State University)

Clean Energy to Communities (C2C) Expert Match – No-cost Technical Assistance Program at the National Renewable Energy Laboratory (NREL). Through the U.S. Department of Energy's Clean Energy to Communities (C2C) program, NREL, other national laboratory experts, and select organizations provide Expert Match—free, short-term technical assistance to address near-term clean energy challenges and questions. C2C Expert Match accepts applications on a rolling basis. This program is most suitable for communities that could benefit from assistance to inform time-sensitive decisions and identify and understand the range of options for achieving clean energy goals. The Expert Match technical assistance timeframe is 40–60 hours over 3-5 months. You can apply through our online application (~10 minutes to complete) here: <https://www.nrel.gov/state-local-tribal/c2c-expert-match.html>. **Host:** Alexandra Kramer (Clean Energy to Community (C2C) Expert Match program, National Renewable Energy Laboratory)

The Disaster Justice Network is a volunteer network lending support to share critical information that is not easily accessed for Hurricane recovery processes in Louisiana. The network includes community leaders, faith leaders, advocates, activists, practitioners, researchers, and students weaving together environmental justice and disaster expertise to develop strategies that address the inequitable access to disaster response and recovery efforts and to advocate for a justice-driven recovery process. The focus for the world cafe is on what's the alternative to a "Social Vulnerability" index (SVI)? Given the harm SVI has inflicted on communities, what is an Indigenuity-driven alternative that we can create? What elements can go into an alternative and how do we have it used as an alternative by agencies and others? **Host:** Kristina Peterson (Lowlander Center)

UCAR|SOARS®, a UCAR Community Program, housed in the Education and Training Center, Center for Science Education Significant Opportunities in Atmospheric Research and Science (SOARS) is an undergraduate-to-graduate bridge program designed to broaden participation of historically underrepresented communities in the atmospheric and related sciences. Applications for undergraduates are open in the late fall and close 1 February of the following year. Multiple mentors are always needed for Protégés as well: research, writing, computation,

and community coaches. Website: <https://soars.ucar.edu>. **Hosts:** Kadidia Thiero and Marissa Vara (UCAR|SOARS®)

Americas for Conservation + the Arts is a Latina-founded and led organization that initially hosted the Americas Latino Eco Festival, bringing leaders and advocates from North, Central and South America together to share struggles, best practices and accomplishments. The program Promotores Verdes (Nature Health workers) unites families from different cultural backgrounds to be in service to Mother Earth, acting on Climate Change. This intergenerational program connects families to public lands and green spaces, educates about the health benefits of nature, advancing the understanding of our ecological selves and inspiring people to grow their authentic leadership as well as their conservation skills. AFC+A is seeking AmeriCorps VISTA volunteers, and seeks collaborators, partners and volunteers for Tree Planting; Tree / Eco System Restoration; Building Forest, Garden and Mother Patches; Promotores Verdes Academy; Youth centered programming; Americas Latino Eco Festival (October 12-15); Workforce Development/ Training; and Developing a Circular Economy while Regenerating Ecosystems. **Hosts:** James Wieser, Bryce Linn (City of Louisville), Jonathan Rodriguez (Sunnyside Farms), Zuza Bohley (Americas for Conservation + the Arts)

Appendix 3: Poster “Walk”

The workshop included a Poster “walk”, both in-person and virtually, during which participants visited with poster author(s) to learn about their work and experiences. The posters included:

Title: Cross-cultural Climate Change Learning and Research. **Author(s):** Elena B. Sparrow (University of Alaska Fairbanks International Arctic Research Center/UAF-IARC), Katie V. Spellman (UAF-IARC), Malinda Chase (Association of Interior Native Educators, Alaska Climate Adaptation Science Center), Christina Buffington (UAF-IARC), Bonnie Murray (NASA Langley Research Center), Gilberto Fochesatto (University of Alaska Fairbanks College of Natural Science and Mathematics). **Abstract:** Relationship building, respect and reciprocity are crucial in conducting research in Indigenous communities, Current efforts to partner scientists with indigenous communities are increasing for cross-cultural scientific investigations. Scientists bring technical resources such as remotely sensed data, visualization technology and monitoring tools that can contribute to community action. Indigenous communities bring their long-term, often intergenerational, intimate knowledge and observations of local land and ecosystems, and questions that often become priority research foci. We explore the benefits of a cross-cultural collaboration called Arctic and Earth SIGNs which braids Indigenous knowledge, NASA data, and GLOBE standardized measurements for climate change learning and problem solving in engaging youth in STEM Learning. We highlight the program delivery methods, program evaluation methods and results that contribute to successful collaborations in working with pre-service teachers, formal and informal educators and community members, scientists and youth to increase our collective capacity to address climate change.

Title: Wave Characteristics and Inundation Risk at Pu’uhonua o Hōnaunau National Historical Park, HI. **Author(s):** Ashley Hi’ilani Sanchez (Department of Oceanography, University of

Hawai'i at Mānoa). **Abstract:** Pu'uhonua o Hōnaunau National Historical Park is an important Kanaka Maoli (Native Hawaiian) cultural and religious site located on the western coast of Hawai'i Island. Anecdotal evidence from park staff describes inundation events on park grounds in areas that have not previously flooded. The main goal of this study is to provide the park staff and community members with an understanding of the impacts of high sea level events to the park, namely flooding, so that they may better prepare for the impacts of sea level rise. Results from modeling work are jointly analyzed with in situ observations to establish a parameterized relationship between offshore wave conditions, still water level, and shoreline water level. We demonstrate the skill of the parameterized relationship and discuss applications for assessing future impacts and supporting effective resource management in the park.

Title: Building relationships for the future: How to develop partnerships for long term ecological research. **Author(s):** Charles "Sashi" White and Sofia Ledeneva (University of Minnesota, Department of Forest Resources). **Abstract:** The Minneapolis- St.Paul Long Term Ecological Research (MSP-LTER) project is a collaborative science initiative grappling with unique obstacles and opportunities for interdisciplinary and community-engaged research in the ecological, biophysical, social dimensions of the urban environment. Research driven by the questions and concerns of community members bridges the gap between research and practice by collaborating with local leaders for more informed, impactful research. When the goals of research are tied to community goals, collective leadership can transform the social, political, and ecological realities for communities. To understand the transformative effect of long-term community-engaged research, the MSP-LTER has restructured relationships from transactional connections to substantial, relational partnerships. Through the deepening of our relationships and building trust we have developed these guiding principles: acknowledging past harms, going slow, disrupting power dynamics, and being vulnerable together. These principles were demonstrated in a "Repair Cafe" centered on healing the ecological, emotional, and social harms caused by the systemic removal of ash trees in North Minneapolis in anticipation of Emerald Ash Borer. Conversations at the repair cafe demonstrated a meaningful impact on the relationships between community members, policymakers and enforcers, and their natural environment in surveys, interviews, and collective art. As our community partners' needs change, our approaches to serving the communities' needs will adapt through an iterative process of relationship building, open communication, and mutual support based on our guiding principles.

Title: We are Water: Connecting Communities. **Author(s):** Brigitta Rongstad Strong, Anne Gold, Annamarie Schaecher, Megan Littrell, Christine Okochi, Katie Boyd, Ami Nacu-Schmidt, Daniela Pennycook, Casey Marsh, Ethan Knight, and Benét Duncan (Cooperative Institute for Research in Environmental Sciences/CIRES). **Abstract:** We are Water partners with libraries to bring STEAM programs and an exhibition to rural, Latinx and Indigenous communities in the Four Corners Region of the U.S. We are Water springs from an exciting collaboration between scientists, Indigenous science educators, learning researchers, informal educators, evaluators, and library staff. The project engages community members in conversations about their personal and community connections to local water topics. Stories and community voices are highlighted and woven throughout the We are Water project, for example through exhibit

components and hands-on activities. Through experiences with We are Water, communities explore their shared watershed and local ecosystems, and connect with neighbors through their common and unique experiences with water in the region. We hope individuals, families, and communities will share their memories and stories about water, and come together to imagine a future they want for their communities.

Title: An agent-based model for exploring the hurricane evacuation dynamics. **Author(s):** Austin Harris (NCAR and University of Wisconsin-Milwaukee), Paul Roebber (University of Wisconsin-Milwaukee), and Rebecca Morss (NCAR). **Abstract:** In this work, we develop an agent-based modeling framework to study hurricane evacuations. Called FLEE (Forecasting Laboratory for Exploring the Evacuation-system), this model integrates high-level representations of the natural hazard (hurricane), the human system (information flow, evacuation decisions), the built environment (road infrastructure), and connections between elements (forecasts and warning information, traffic). After describing the model, we validate its simulated evacuations with real-world empirical data. Then, we investigate the simulated effects of changing the number of cars on the road network, implementing contraflow, shifting evacuation order timing, and projecting the population forward to 2030 and 2040. Lastly, we explore how forecast errors impact evacuations, by changing the size of the cone of uncertainty to sizes representative of today (2022) and in the past (2007), along with rapidly intensifying / onset cases, and evaluate their impact on evacuations. Through the experiments, we demonstrate the power of these frameworks for exploring hurricane evacuations across many scenarios.

Title: Climate Literacy and Energy Awareness Network (CLEAN): Building a foundation of support for climate and energy educators. **Author(s):** Kathryn Boyd, Gina Fiorile, Anne Gold, Alicia Christensen, Naomi Ochwat, Patrick Chandler, Casey Marsh, Daniela Pennycook, and Ami Nacu-Schmidt (Cooperative Institute for Research in Environmental Sciences/CIRES), Frank Niepold (NOAA/Climate Program Office), and Monica Bruckner and Sean Fox (Science Education Resource Center, Carleton College/SERC). **Abstract:** CLEAN is a climate education project that supports educators of all types to bring climate and energy topics into their teaching. CLEAN stewards a collection of over 800 educational resources including videos, visualizations, and activities that are reviewed by scientists and educators for quality and tagged to be easily searchable. CLEAN also hosts support pages and professional development activities for educators, including informational webpages on climate and energy topics, webinars, and newsletters. We translate many of our pages into Spanish and partner with Living Landscapes to include culturally relevant versions of climate and energy background information. The CLEAN Network is a professionally diverse community of over 850 climate and energy educators who engage and collaborate through an active email list, weekly video calls, and other events.

Title: Returning Ancestral Lands to Communities and Communities to Land: Kīpuka Kuleana’s “Landback” Efforts on Kaua‘i, HI. **Author(s):** Sarah H. Barger, Mehana B. Vaughan, Jennifer Luck, Christina Aiu, Elif C. Beall. **Abstract:** Established in 2018, Kīpuka Kuleana is a Native-led nonprofit organization and community land trust that perpetuates kuleana, ahupua‘a-based

natural resource management and connection to place through protection of cultural landscapes and family lands on Kaua'i. Long-time 'ohana (families) face rising land values, taxes and displacement from their homes as lands on Kaua'i become some of the most coveted and expensive on the planet. Historical and ongoing land dispossession disrupts connection between people and place, ecological balance, intergenerational caretaking of 'āina (lands and waters), and adaptation to climate change effects. Kīpuka Kuleana restores and creates new connections between communities and 'āina, provides tools to 'ohana working to keep their ancestral lands, and develops creative strategies for community stewardship of 'āina based on indigenous models and values. Our work aligns with global "Landback" efforts of returning indigenous lands to indigenous lands, a movement in Hawai'i that is still in its infancy.

Title: Centering Indigenous Ethics in Environmental Science Research to Support Present and Future Generations of Indigenous Data Stewards. **Author(s):** Brianne Lauro (presenting), Dr. Dominique David-Chavez, and Serena Natonabah (Indigenous Land and Data Stewards Lab, Fort Collins, Colorado; Collaboratory for Indigenous Data Governance, Tucson, Arizona); Dr. Stephanie Russo Carroll (Collaboratory for Indigenous Data Governance, Tucson, Arizona).

Abstract: In the U.S., Indigenous communities recognize an ongoing need for research that is guided by the concerns, priorities, and values of their communities rather than externally-driven agendas. Despite significant recent movement in federal policy in regard to tribal consultation and engaging Indigenous Knowledges (IK), we currently lack a national standard of ethics for environmental science research that engages Indigenous knowledge systems, lands, peoples, and communities. This has led us to conduct a systematic content analysis of 32 Indigenous research and data ethics frameworks from across the world. Based on these findings, we have developed an analytical framework for assessing federal guidelines and identifying critical gaps and support mechanisms for Indigenous research and data governance in environmental science research. Through sharing these study findings, we aim to enhance ethical standards in Indigenous research and to support present and future generations of Indigenous data stewards.

Title: Showing up "in a Good Way": Addressing Power Inequalities Between White and Indigenous Activists in the Movement to Stop Line 3. **Author(s):** Brigid Mark (University of Colorado). **Abstract:** During the construction of the Line 3 tar sands pipeline in northern Minnesota, thousands of Indigenous and white activists joined together to resist the pipeline. How did these Indigenous and white activists work together across difference, sustaining an alliance over time? To answer this question, I draw on 24 interviews and a year of participant observation of frontline activism. My analysis suggests that the movement instructed white activists to "follow Indigenous leadership." This encouraged white activists to come to the frontlines, discouraged white domination of discussions and decision-making, increased white awareness of Indigenous perspectives, and created lasting relationships. However, activists were aware of some complexities, questions, and problems that remained – overly deferential behavior from white activists, tokenization, appropriation, and white saviorism – and were working to add nuance and meaning to the instruction. The movement was thus a world-building space trying out new norms creating more just relationships across Indigenous-settler lines.

Title: The impact of wildfire recovery on atmospheric composition. **Author(s):** Shima Shams (NCAR, RAL). **Abstract:** Climate change has increased the occurrence of wildfires by intensifying warm and dry conditions. Wildfires disrupt land cover, which in turn affects the source and sinks mechanism of various atmospheric gases. The recovery of forested areas after a wildfire typically takes several years and is influenced by a range of factors including background conditions, meteorology, and land management practices. Investigation on the diurnal pattern of CO₂ and NO_x flux during the recovery years compared to before the wildfire could provide insights into the full impact of wildfires on atmospheric composition. This poster presents a project idea aimed at providing further understanding of the mechanisms and variables involved in post-wildfire recovery and their associated impacts on the environment and atmospheric composition.

Title: Adaptive Silviculture for Restoring Yurok Forests. **Author(s):** Frank K. Lake and Jonathan W. Long (USDA Forest Service Pacific SW Research Station). **Abstract:** The Yurok Tribe is working to restore forests and woodlands to be more resilient to wildfires, drought, pests and diseases. Our collaborative research is designing and evaluating effects of forest treatments including fuels reduction, tree harvesting, and intentional burning based upon Indigenous knowledge and associated traditional stewardship practices. Central to these evaluations are the potential availability and quality of traditional cultural resources used for food, basketry, medicine, ceremony, tools, and building materials, as well as habitat quality for plants and animals that are an integral part of the Yurok homeland. The conceptual framework is being developed through consultation with cultural practitioners to assess the cultural use quality in a stands across different vegetative communities and conditions. Our efforts to combine Tribal values and traditional knowledge with quantitative field measurements and modeling can inform restoration approaches, advance Indigenous stewardship, and support active adaptive management in the face of climate change.

Title: Huliāmahi: Overflowing of JEDI Efforts in the Earth Sciences at University of Hawai'i at Mānoa. **Author(s):** Helen Janiszewski, Caroline Caplan, Marley Chertok, Sloan Coats, Tristan McKenzie, Brytne Okuhata, Aaron Pietruszka, Eleni Ravanis, Thomas Shea, Diamond Tachera and Frances Zhu (University of Hawai'i at Mānoa, Department of Earth Sciences and Hawaii Institute of Geophysics and Planetology). **Abstract:** In August 2020, a group of graduate students began a grassroots effort to create a safe space for discussions on topics related to justice, equity, diversity, and inclusion (JEDI) between faculty and students. The graduate students, along with student-selected faculty members, held weekly virtual meetings. During the spring semester, we focused our efforts by participating in the URGE curriculum. In subsequent years, we have implemented JEDI-focused seminars in our department's weekly colloquium, successfully advocated for gender-neutral restrooms throughout our building, and organized a JEDI and URGE focused seminar for our summer REU program. In recognition of these efforts, the department has created and populated a faculty service committee focused on JEDI as of August 2021. We view this as a critical development, as much of the work that remains will require long-term institutional policy and culture changes.

Title: Interconnected Stewardship: Weaving Indigenous Arts & Sciences for Environmental Outreach. **Author(s):** Melanie Kirby, MSc. (Tortugas Pueblo), Teresa K. Quintana (Kiowa), Paul Quintana (Cochiti Pueblo), Laurie Logan-Brayshaw, MSc. **Abstract:** The Institute of American Indian Arts (IAIA) is a unique and distinct tribal college that promotes the spirit and vision of Native American and Alaska Native people. Founded in 1962, IAIA offers academic excellence to both Native and non-Native populations. Our goal is empowerment through education, economic self-sufficiency, and expression and enhancement of artistic and cultural traditions. IAIA is designated as a USDA 1994 Land-Grant institution that provides agriculture education to Native American and surrounding communities, IAIA students, faculty, and staff through culturally relevant outreach education programs. The Land-Grant Program integrates both the arts and the sciences to nurture people, revere places, and promote purpose. Current programs include Indigenous Youth Agriculture, traditional and contemporary agriculture, land stewardship, and food sovereignty promotion, beekeeping and habitat biodiversity regeneration. As an art college, IAIA Land-Grant encourages interdisciplinary approaches and mixed media for activism- the use of art to raise environmental awareness.