**Sensing the Earth**

Boulder Conference, June 15, 16, 17, 2022

***Vision and Goals***

Cultivate a partnership ecosystem for coordinating information, data resources, training and research to support local Tribal climate resilience planning and implementation. Foster a climate adaptation innovation ecosystem that engages the entire climate adaptation stakeholder community.

Objectives: Inventory resources available provided by partners that support project goal, establish collaborative framework for sustained problem-solving, identify specific projects that can drive and test framework, institute communication processes that strengthen and expand collaborative framework.

Develop the collaborative initiative, Identify Tribal/TCU climate readiness, Create a narrative around future possibilities, Ensure all stakeholders view are represented

***Science Organizations and Programs***

UCAR/UCAR COMET International Development Program (ICD)

NCAR

NEON/Battelle

AIHEC

CU Boulder

Colorado State University

Earth Lab (CIRES/CU Boulder) Earth Data Science [www.earthdatascience.org](http://www.earthdatascience.org)

The Carpentries

National Science Foundation

US Department of Agriculture

Rising Voices Center for Indigenous and Earth Sciences (NCAR/UCAR)

BIA Branch of Tribal Climate Resilience (Pathways Program Native Youth Climate Adaptation Leadership Congress)

NOAA National Centers for Environmental Information (National Integrated Drought Information System, NIDIS)

Native FEWS (Food Energy Water on Tribal Lands) Alliance

Northcentral Climate Adaptation Science Center

Forest Service Rocky Mountain Research Station, Human Dimensions Program (BIO Char)

Indigenous Peoples Climate Change Working Group Rising Voices

Alaska Fisheries Science Center

Livelihoods Knowledge Exchange Network

University of Hawaii Manoa

Nasa Goddard Space Flight Center

University of Colorado North Central Climate Adaptation Science Center

UC Berkeley

***Tribes and Tribal Colleges***

Cankdeska Cikana Community College

Keweenaw Bay Ojibwa Community College

College of Muscogee Nation

Stone Child College

Nebraska Indian Community College

Southwest Indian Polytechnic Institute

Haskell Indian Nations University

Aaniiih Nakoda College

Navajo Technical University

Little Hoop

California Tribal College

Oglala Lakota College

Sicangu Rosebud Sioux Tribe

Quileute Tribe Menominee

Saginaw Chippewa Tribal College

Chippewa Tribal College

Upper Snake River Tribes Foundation

Quileute Natural Resources

College of Menominee Nation

Southeast Tribal College

**Partnerships Across Scientific and Cultural Boundaries**

 Relationships – Built at the speed of trust

 Diversity of Place

 Speak honestly –safe space

 Climate change is imminent best we can do is prepare

Honor plants and animals as persons Eco kinships Indigenous Right relationships

An hour does not a partnership make Enter partnerships respectfully

Be humble, listen well, and trust

Build systems of life enhancements

Questions

 ‘The world is fine all of us will be gone’

What is the role of leadership and how do we build?

 Emergent Embody change you want to see Engage, listen

What is your optimism for this meeting?

 Conversations about climate issues

 Give young people, children hope

 Encourage love

How to frame intergenerational trauma?

 Nothing wrong with feeling trauma

Traditional knowledge?

 Traditions are right now TEK antidote to destruction of planet

Lightning Talks: Science Organizations and Programs

Lightning Talks: TCUs and Other Institutions of Higher Education

Visioning/Toward a Collective Vision

**Data Sovereignty**

The Emerging Partnership Ecosystem

**BIG Data**

Sustainable Energy Joint Session

Foundational Themes

**Crafting a Partnership Charter**

Food Sovereignty

**Leaning Forward**

 Indigenous Climate Activation Community

Core group develop vision – spider web

Tape working group together with STE

Include USDA – regional hubs in place

How does education and training fit in structure?

Increase tribal liaison related to needs

Letter to support moving forward/grow the pie

Make case for needs –White House, TEK

Identify community based needs practical issues

Education comp9onent

Survey – who are you, what do you bring?

Longevity – sustainability

STE# Next meeting – foundations, private funds

 Build without ties to specific agency

 Diversify, demonstrate collaborative approach

Establish pilot/ demonstrable programs

Wednesday 4:30

Emerging Partnership Ecosystem

Right group for Data Access and resources

Takes leadership to make change

Planning for next 50 years

What is our responsibility, next step?

Centering and grounding as Indigenous people

Hard work ahead and there is hope.

Build our own table!!!

TCUs pool resources together to move forward

Questions/comments: now resources are available invite agencies

**TCU needs session:** Tribal College Table

NICC Capacity pro-bono adjuncts

Data Security useable format storage and sharing

Partnerships with TCUs

SIPI Plan expanded meetings continued conversations

 Capacity – opportunities

 Exposure to possibilities with other agency opportunities

NTU Annual meeting (AIHEC?)

 Collaboration with other TCUs, create workforce

MCC Understand need for interconnection

Let go of bad ideas

Stone Child Help with growing our faculty – adjuncts

 IRB education

 Strengthen TCU Relations

ANC Faculty needs/housing

Sharing Curriculum

Haskell Visiting subject matter experts

 Underwrite release time

 Commit to visit campuses

What tools so you have to share right now

??? Develop [research opportunities for TCU sites

 Child care services for students

 Comparable pay for interns, $12-$20/hour

KBOCC Accommodating interns

 Capacity/release time

OLC OST Hub venture

 Left out of data revolution

 Access data on tribal lands

Managing data – infrastructure

Analytics/ interpretation

Continuation of projects/partnerships

White bus/ red bus

Tribal hackathons

Customized training

OLC Drone programs; they will share

Increased partnerships with TCUs/R1s

Include more advanced training

TCU Tribal hubs

Protection of tribal data that is freely available

NHSC housing, childcare

Support for transfer students, funds

Science organizations, NGOs, Resources

Earth Lab (Nate) Earthdatascience.org

Workshops addressing specific needs

Partner/culturally relevant stories

In-state tuition

Berkley (Patrick) Resource enhancement for better application/ inclusion for students

CU (Heather) Research proposals (USGS funding)

 Internships

NEON (Bennie) Outreach @ each domain

 Assignable assets

Connections to professional societies

Coordinate solution science

Environmental stewardship of traditional lands UC Denver

Certificate on campus or in place

 Stem disciplines $$

 Internships/place based

 Offer students for internships @ your TCU

Carpentries (Alicia) Network of trained instructors

 Workshops for students

Trainings for instructors: 2 full days or 4 half days

Open curricula

\*Look at foundations for food, childcare funding\*

ASU resources for cyber infrastructure

 Connector for ASU researchers

Industry collaborations facilitations

CU Boulder (Shelly) Research computing

Cyber infrastructure – free with training, support

Support researchers and students

NCAR (Dave) Research IT support

Internships CU or Remote

You Visit or UCAR visits your campus

USFS (Jeff) new funds

Guest speakers for classes

Connections

USA Jobs student profiles

NOAA (Bob) Data Connections/ referrals

 Localized data, stream flow

Short- term high-impact weather data

NASA (Bonnie, Caroline) unique engagement in stem

Connect with opportunities

Support needs

Internships/student engagement

Modeling holistic internships for native students

UCAR (Catherine) 3-D printing weather stations

 WS training

 Control own data

**Visions and Scenarios**

Introduction to tools and how to use them – training through Carpentries

NEON data: skills to use these data

ACCESS modules, computational (HPC) resources

Workshops/training: time commitment: considerations: short/one day, short time commitment is best

Data management training

Tools training

Finding data to merge with larger datasets/ remote sensing, e.g. NEON data

Connecting ground data with remote sensing: ground truthing

Decision Deck – website select TCU/community and select soils/climate data for area

Apps doing this; each has gaps

(LDAS – L1S) land model system running different components

Earth Sciences division/NASA

Deliverable: aggregate data and training; create repository of best practices

User friendly, accessible to everyone --general public -- education tool -- simple, minimalist

Introducing Berkeley research – tribal lens

Faculty exchange: student exposure to new topics/teaching approaches

 Impacts to both immersion program

Support faculty

Open access curriculum

Levels Training relevant to big data; groups with data create TCU dashboard housed at AIHEC

 Dedicate USDA Extension money to this

 Exchange programs for those who can afford

Alternative programs providing similar benefits as exchange programs -- combine with cultural awareness

Session at AIHEC to build these relationships; USDA FALCON Meeting; Rising Voices

Who manages data collected on tribal lands –what protections are needed?

Not every TCU needs to build its own site—consortium site with this data addressing protections

CORDS platform could potentially be used for this—infrastructure already exists (speak to Mike Daniels)

 Can it ingest NEON data that needs to maintain public access?

Tag data with access permissions

Write justification for requesting access how do you maintain access with staff transitions important to connect to TCU consortium

Indigenous Values, Knowledges, Landscapes

Power and Place

 Homes (Healthy) Use materials that are sustainable, regeneratable, (hempcrete) local materials recycle materials

Build on relationships

Use Wind

Sustainable Energy

Governments (tribal politics)

Lack of trust and follow-through with outside help and sometimes governments

Lack of tribal incubators

**What are cultural assets/strengths**

 Science is young science –Indigenous knowledge is generations and in some cases ten/ hundreds of thousands of years old

Relationships/philosophy world view creates unique perspective and understanding of the world

Nature is relative not resource

Do I feel “relatives” pain or joy? Ethics of care.

Responsibility and accountability

Recognition and respect of gendered knowledge

Place as mentor – learning/watching from place

Respect and recognition of the plurality of knowledge(s) and cultures

‘Place’ assets contribute to Science/Data Assets—solar, wind, geothermal

Understanding and attention to energy production, consumption, *disposal*

Not enough research or attention paid to cleanup and disposal—possible opportunities for development

Dis and misinformation

Tribal buy in, political will

TCU Offer long-term thinking that’s good for all over generations

Problem –not planning for long-term problems or the solutions

Using knowledge to support community to strengthen sovereignty

Indigenous ‘Seven Generations”-- every decision should be thought of in the context of how it impacts next “Seven Generations”

 Connection to earth is innate and spiritual

Concept of being a god relative to all living things

All (each) TCUs, tribes, reservations are unique -- land or management based on modern indigenous knowledge

Issues of why do we care? Do the trees and water have rights? Special degree in indigenous sustainability

Sacred traditional foods respect for history

Understanding relationships amongst living things

Challenges in managing bison herds—water management and neighbor issues.

Future water rights issues climate change and drought

Government alignment

Challenges/changes of tribal leadership

Housing --$$$ issues mostly

Sharing leadership and data

Equal pay and authorship on publications Recognition

DATA Management

 Tools: existing ones; develop new ones; data sovereignty

 Who will manage the data?

 Who will use it? How to connect? Communications (benefits to community, Purpose, education)

 Networks of early adapters

Who will conduct research with the data? Citation issues?

Train folks and Build capacity

Data---Decision making

NEEDS

Connectivity

Traditional cultural integration into housing/ architecture

Appreciation for cultural traditions in building

Self-reliance

Displace tribes’ ability to apply/practice TEK –adaptation—sharing between tribes

$$expensive to make these changes---survival priority

Leveraging funds division of energy; department of energy

Community planners at TCUs not at Haskell, others?

Roads access for construction crews (casino providing funds/services in some communities)

Medical services for elderly in some communities

Need plan of action BIA funding climate adaption plans funds go directly to communities hiring consultants in many cases TCUs should be involved in this process—implementation can TCUs support consultation role?

DOE funding energy-related projects

Micro-grids in rural communities –self reliance

Senior projects –serve as consultants for grade

Mitigation needs to be considered in climate adaption planning

Training for tribal staff to understand technical documentation provided by external consultants –TCU role?

Critical infrastructure should be priority for buy-in

The following entries are comments from the break-out sessions. Unfortunately, they do not have any headings or way to identify which breakout session they belong to. Hopefully you will be able to recall better than I can!

Page 1 Cultural strength-stay local, preserve identity

 Tribal lands are great, urban spaces too fragile to host sust. Energy projects

 Partnerships with National Labs- Grand challenge opportunity exists

 Ask the tribes FIRST—how can we meet your unique needs, and cultural considerations and values?

 If they say no, give agency to our tribal students. Use as Liaisons

Page 2 Cultural strengths to create sustainable energy programs?

 Reintroduce cultural significance of natural world “Fire as important role in Earth system”

 How to create sustainable tribal architecture

Look at biochar, biomas, and batteries. Teach people to make small demonstration projects. Create educational programs

Existing partnership opportunities? How do we do this? Enhance our spaces for NA students? Access and opportunity to highlight cultural indigenous views.

Berkley/FEWS Alliance/TCU partnerships (in the quest for healing and reparations)

TCU STEM programs expensive—Berkley, MIT, Harvard etc. need to respect the TCU “Table”

DATA Listen to the voice of the environment

 So much date…but need to augment, create, etc.

 Expertise

Analysis tools

Relevance, how to tell the story

Storage and access

Distribution and networks

Inventory communication across institutions

VISION organized (by theme)

 Equitable accessibility

Appropriate in scale

Use friendly analysis tools

Shared experts and expertise

What type of organization can realize this?

Distributed

Curriculum exchange

Match-making of experts: access and processing

Forming affinity groups training faculty/students

Create network of experts