



What are the elements of successful co-production of science and policy in the fields of extreme weather and climate change?

The challenges of understanding and responding to a changing climate and extreme weather necessitate broad engagement with diverse communities. The National Center for Atmospheric Research (NCAR) hosted a workshop on the growing engagement of Native American, Alaska Native, and Pacific Island communities in climate and weather science, research, policy, and community response conversations.

- Workshop motivation: Assess over two decades of engagement to identify lessons learned for, or barriers to, achieving successful co-production of science and policy by appraising the first-hand experiences of those involved in cross-cultural efforts to integrate indigenous knowledge and diverse understandings in climate and weather modeling and assessments.
- Poster motivation: Present workshop insights to help guide future endeavors that bring together diverse "ways of knowing" about weather and climate.
- Broader context: The recently released report Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation states:
  - A crucial challenge is to ensure that indigenous peoples are involved as key partners in the development of climate change research and adaptation plans; and
  - Collaboration between indigenous knowledge holders and mainstream scientific research is generating new co-produced knowledge relevant for effective adaptation action on the ground.





#### Acknowledgements

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\*Adapted from Barnhardt, R., & Kawagley, A. O. (2005). Indigenous Knowledge Systems and Alaska Native Ways of Knowing. Anthropology and Education Quarterly, 36(1), pp. 8-23.

# Rising Voices of Indigenous Peoples in Weather and Climate Science and Policy

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- Traditional environmental knowledge (TEK) is informed by cultural values and cosmological understandings. These contexts must be included when considering TEK in scientific applications: "Remember how small we are and how big we need to think."
- Climate science discourse is often about absolutes, but scientists recognize the uncertainties, contexts and limitations of climate science. This is a similarity between climate science and TEK.
- Co-production of knowledge or policies must include the broader epistemological and ontological context of both TEK and climate science; integration of ways of knowing, not of data.
- Communication across ways of knowing should be based on an ethical foundation as well as a scientific one.

### Common Ground: Qualities Associated with Traditional Knowledge and Western Science\*

#### Traditional Knowledge

- Holistic - Physical and metaphysical basis of evidence and explanation - Emphasis on practical application - Trust and respect for inherited wisdom - Practical experimentation - Qualitative oral record - Local verification - Integrated and applies to daily living and traditional subsistence practices

## Common

Ground - Universe is unified - Knowledge stable but subject to modification - Inquisitiveness, honesty - Empirical observation - Pattern recognition - Verification through repetition - Inference and prediction - Properties, position, motion Cycles and change

#### Western Science - Considers parts to

understand whole - Physical basis of evidence and explanation - Emphasis on understanding how - Skepticism - Direct and indirect observation and measurement - Hypothesis falsification - Global verification

- Quantitative written record

- Discipline-based - Theory-driven



- reimbursement for involvement.

- hands in the canoe."
- mechanism.
- food security.
- Existing networks include:



Co-production requires a common point of reference but does not require reconciliation between approaches – their differences are what is meaningful.

Reframe integration so that the core of each way of knowing retains its value.

Climate and weather research can be adapted to local methodologies and cultural protocols for treating knowledge and practices.

Collaborations should involve local participants as active partners with appropriate

All knowledge holders and practitioners must retain rights and responsibility for the knowledge, and be held accountable for it.



• Many current co-production efforts are uncoordinated and unconnected; a Network of Knowledge Networks would help connect and coordinate similar efforts: "Need all

• Participants suggested a Native Science Foundation as a coordination and funding

Knowledge and capacity should be oriented towards shared issues in indigenous communities including building the resilience of communities, renewable energy and

• Observing and studying phenology is another growing priority on tribal and non-tribal lands and lends itself to connecting various efforts.

 Collaborations between tribes and Pacific Islands include partnerships with University of Hawaii Schidler College of Business, the Olohana Foundation, and Haskell Indian Nations University

• The Indigenous Peoples Climate Change Working Group is also positioned to coordinate efforts in the United States (http://www.haskell.edu/climate/).

• The authors of the tribal chapter in the National Climate Assessment.

• Participants posed the question: How can growing a US-based Network of Knowledge Networks contribute to more involvement at international level, i.e., the Intergovernmental Panel on Climate Change?