Working Together for Climate Change Learning and Community Science in Indigenous Communities

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Building on Foundational Work

- AINE Camps
- GLOBE Alaska

Programs

Adding climate change learning through both Indigenous knowledge and Western science

Applying lessons learned

ReAC Signs of the Land Camp

Observing Locally, Connecting Globally

Arctic & Earth SIGNs
Association of Interior Native Educators

established (in 1995) to provide a voice for Alaska Native educators and advocacy for educational issues affecting Alaska Native people
Reaching Arctic Communities Facing Climate Change

- Facilitated in-depth dialogue about climate change in a camp setting

- Explored its impact through the cultural lens of Alaska Native communities.

- With significant Alaska Native Elder involvement, tested a model for representing Indigenous communities in climate change education efforts.
EXPLORE AND LEARN ABOUT THE EARTH SYSTEM

Atmosphere

Biosphere

Pedosphere

Hydrosphere

https://www.globe.gov/
**Exploring impacts & feedbacks of a warming Arctic,**

*Engaging learners in STEM using GLOBE & NASA Assets*

SciAct 2.0

Project Partners:
University of Alaska Fairbanks; Association of Interior Native Educators; GLOBE Implementation Office; NASA Langley Research Center Office of STEM Engagement; NASA Goddard Space Flight Center; 4-H Alaska; and Cooperative Extension; Iditarod School District and other school districts; Kenaitze Indian Tribe; Santa Ana Community College MESA; Goldstream Group; NASA Science Mission Directorate Science Education Project Collective, Fresh Ice on Ice, Alaska Arctic Observing Knowledge Hub, Rising Voices Network, Indigenous Sentinels Network

[www.arcticandearthsingns.org](http://www.arcticandearthsingns.org)

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The Arctic and Earth SIGNs inquiry model
Using GLOBE, NASA, and local knowledge to make STEM learning locally relevant and have an impact

SHARE
Learn from Elders, long-term residents, and scientists about signs and impacts of climate change.

EXPLAIN
Make sense of research by analyzing data and reviewing information from local experts, NASA data, and existing research.

APPLY
Design and implement stewardship project to help community address the climate change issue.

EXPLORE
Do culturally responsive activities to establish knowledge base on the topic
- Talk with a NASA/UAF scientist
- Select inquiry question

SHARE
Discover what youth and adults know
Identify key climate change issue for community
Brainstorm investigation and stewardship ideas

EXPLAIN
Soil Erosion in Kwethluk
Credit: Lindsey Parkinson
Collaborate with a scientist & community to develop and implement GLOBE investigation

Spellman, Sparrow, Chase, Larson & Kealy (2018)
Culturally Responsive Curriculum

**Learning from Kk’eeyh (Birch)**

**Green-Up**

**Athabascan Values**
- Respect for Elders and Others
- Respect for Knowledge & Wisdom from Life Experiences
- Respect for the Land and Nature

**Essential Questions**
- What changes have been observed by our Elders in the tradition... including the appropriate times for certain knowledge to be taught

**Alaska Cultural - Students**
- **A.4.** Practice their traditional responsibilities to the surrounding environment
- **B.1.** Acquire insights from other cultures without diminishing the integrity of their own
Climate Change and My Community Course

1. What is my personal connection with climate change?
2. How does climate change influence the Earth system?
3. How does climate change affect my community?
4. What can I do about a climate change issue in my community?
ENDURING UNDERSTANDING:
• Climate change influences our lives.

ESSENTIAL QUESTIONS:
• What changes have I observed in my own life that may be related to climate change?
• What are the patterns across our observations and which are associated with climate change?

NGSS themes addressed:
• Practices- Developing models, communicating information
• Cross-cutting concepts- Stability and change, Patterns, Cause and effect
• Disciplinary core ideas- LS2.A: Interdependent Relationships in Ecosystems; ESS2&3: Earth’s systems, Earth and Human Activity

Culturally-Responsive Curriculum Standards Addressed:
• A. Integrity of cultural knowledge that students brings with them
• E. Local knowledge and actions in a global context

REFLECTION:
What good teaching practices were modeled?

What challenges might some learners face with this activity in the classroom?

What adjustments or accommodations could be made to address these challenges?
Activity 2: Understanding impacts and feedbacks of climate change in the Arctic

ENDURING UNDERSTANDING:
• Climate change influences earth systems at multiple scales.

ESSENTIAL QUESTIONS:
• What are the impacts and feedbacks of a changing climate observed across the Arctic?
• How do they compare to our observations?

NGSS themes addressed:
• Practices- Developing models, communicating information, constructing explanations
• Cross-cutting concepts- Stability and change; Patterns; Cause and effect; Scale, proportion, and quantity
• Disciplinary core ideas- LS2: Ecosystems: Interactions, Energy, and Dynamics, ESS2&3: Earth’s systems, Earth and Human Activity

Culturally-Responsive Curriculum Standards Addressed:
• A. Integrity of cultural knowledge that students brings with them
• B. Cultural knowledge as part of a living and constantly adapting system
• C2. Recognizes the depth of knowledge that is associated with the long inhabitation of a place;
• D. Fosters a complementary relationship across knowledge derived from diverse knowledge systems.
• E. Local knowledge and actions in a global context
Boys and Girls Club of Metlakatla presented their project on salmon streams at the GLOBE Student Research Symposium & the GLOBE Annual Meeting.

Kwethluk High School students presented their study on Erosion along the Kwethluk river and a Yuraq at the GLOBE Learning Expedition in Ireland.
Tribal Administrator used NASA data to prove rising water levels

Native Village of Kongiganak

Credit: Association of Village Council Presidents

Edward David Elder

Cassius Brown Assistant Principal, Teacher

Joseph Mute Tribal Administrator
Lessons Learned and Applied

• **Equitable Partnership**
  - Invite & engage at outset
  - Recognize & honor diverse knowledge systems

• **Negotiated Space**
  - Braided approach
  - Equitable opportunity to access & present both knowledge systems
  - Cognizant of collective educational and historical trauma experience

• **Communication**
  - Two-way exchanges
  - Make climate science relevant