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

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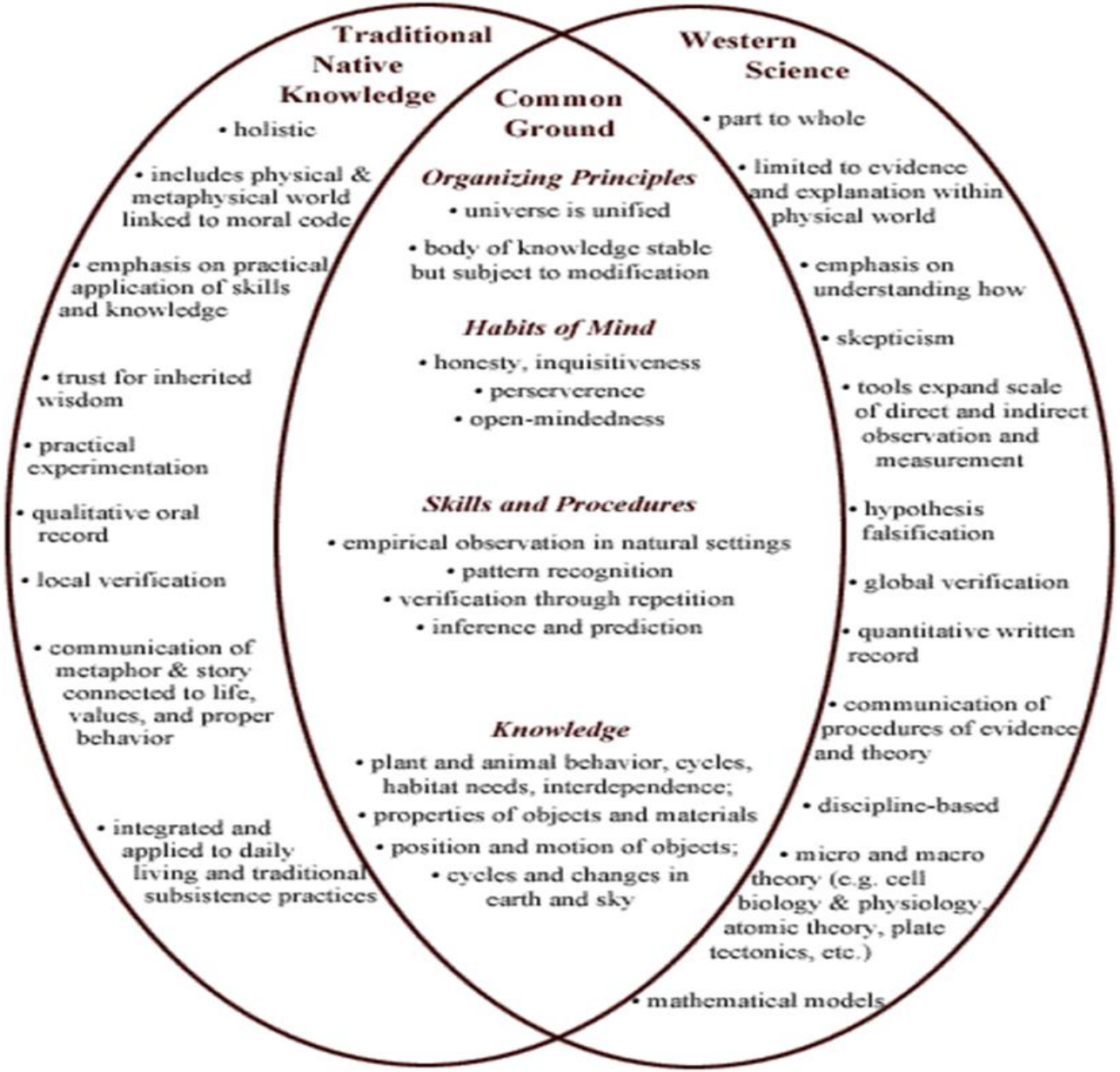
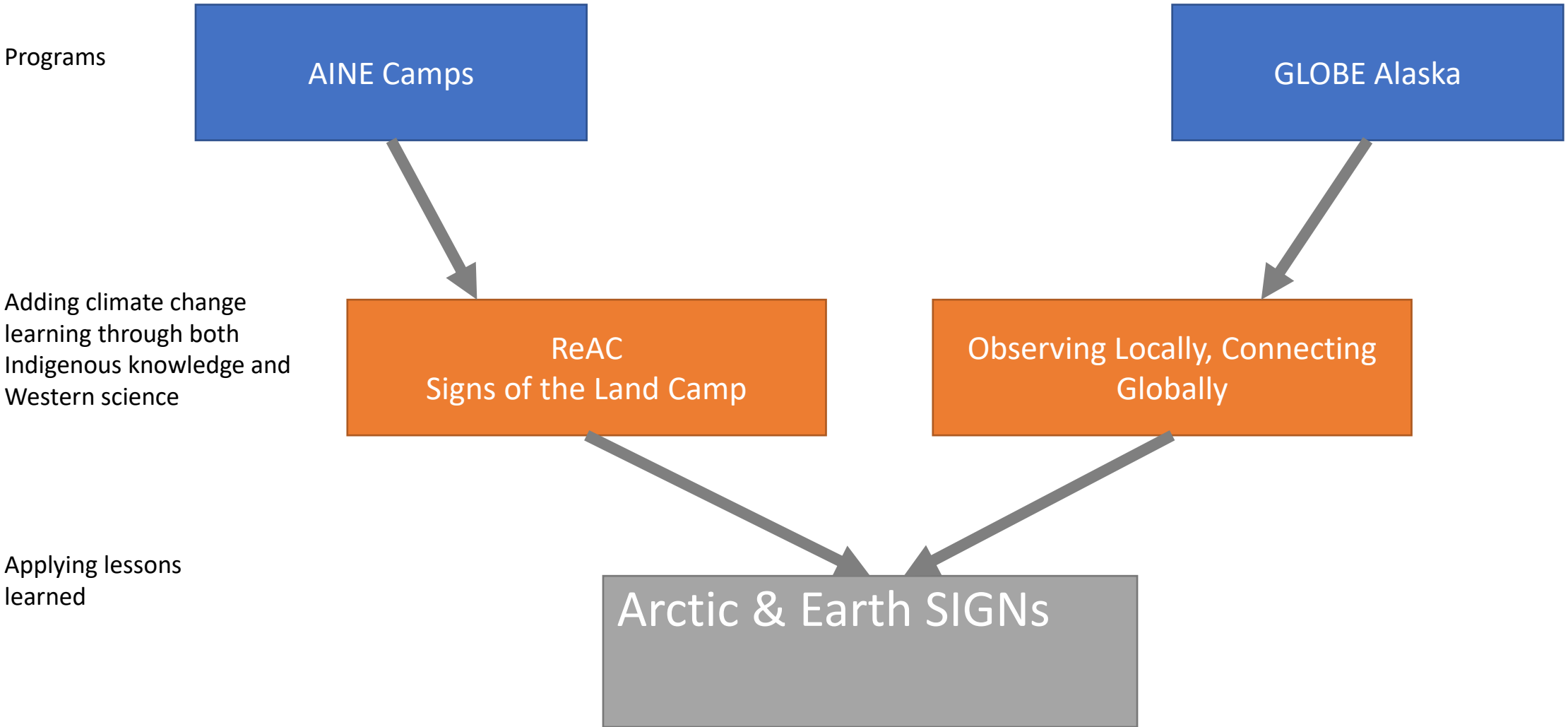


Stephens, S. (2000). Handbook for Culturally Responsive Science Curriculum. Alaska Rural Systemic Initiative, p.7

Building on Foundational Work

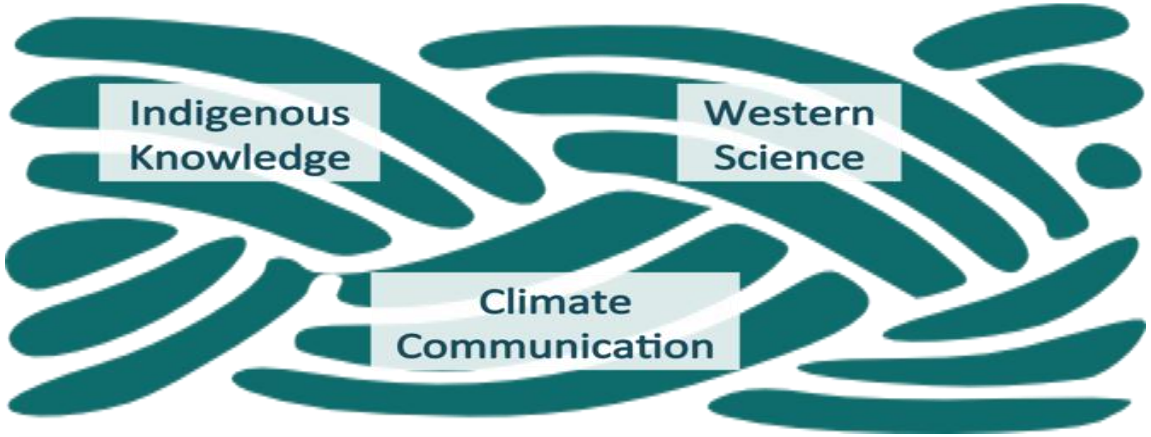


Association of Interior Native Educators

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.



AINE

UAF UNIVERSITY OF ALASKA FAIRBANKS

International Arctic Research Center IARC University of Alaska Fairbanks

Columbia Climate Center
EARTH INSTITUTE | COLUMBIA UNIVERSITY

The GLOBE Program

https://www.globe.gov/

NASA Sci Act 2.0

www.arcticandearthsigns.org

Exploring impacts & feedbacks of a warming Arctic, Engaging learners in STEM using GLOBE & NASA Assets
SciAct 2.0

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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

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.

SHARE

Discover what youth and adults know

Identify key climate change issue for community

Brainstorm investigation and stewardship ideas

EXPLORE

Do culturally responsive activities to establish knowledge base on the topic

Talk with a NASA / UAF scientist

Select inquiry question

EXPERIMENT

Collaborate with a scientist & community to develop and implement GLOBE investigation

Soil Erosion in Kwethluk

Credit: Lindsey Parkinson

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

Spellman, Sparrow, Chase, Larson & Kealy (2018)

Culturally Responsive Curriculum

Parent-friendly

Learning from Kk'eeyh (Birch)

Green-Up

Spring Season • Standalone Format; Multi-Season Option

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

- Activity A: Listening to Elder Observations of the Timing of Spring
- Activity B: Viewing Green-Up from Space & Our Own Yards
- Activity C: Understanding Why Green-Up Matters for Me, My Community and for Alaska
- Activity D: Observing Birch Green-Up Using GLOBE

tradition... including the appropriate times for certain knowledge to be taught

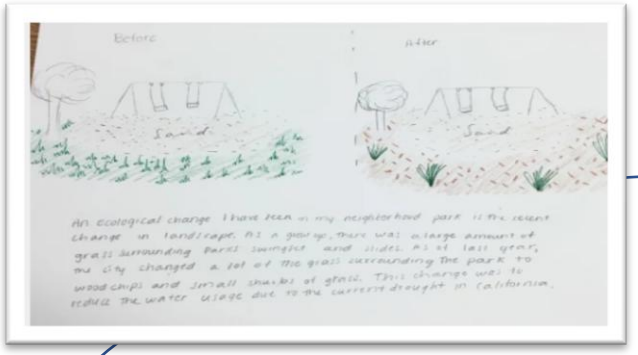
Alaska Cultural - Students

A.4. Practice their traditional responsibilities to the surrounding environment

B.1. Acquire insights from other cultures without diminishing the integrity of their own

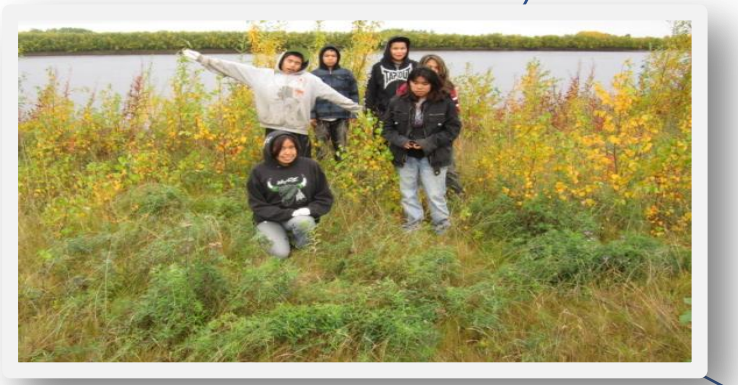
Climate Change and My Community Course

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?

Activity 1: Sharing personal observations of change

ENDURING UNDERSTANDING:

- Climate change influences our lives.

ESSENTIAL QUESTIONS:

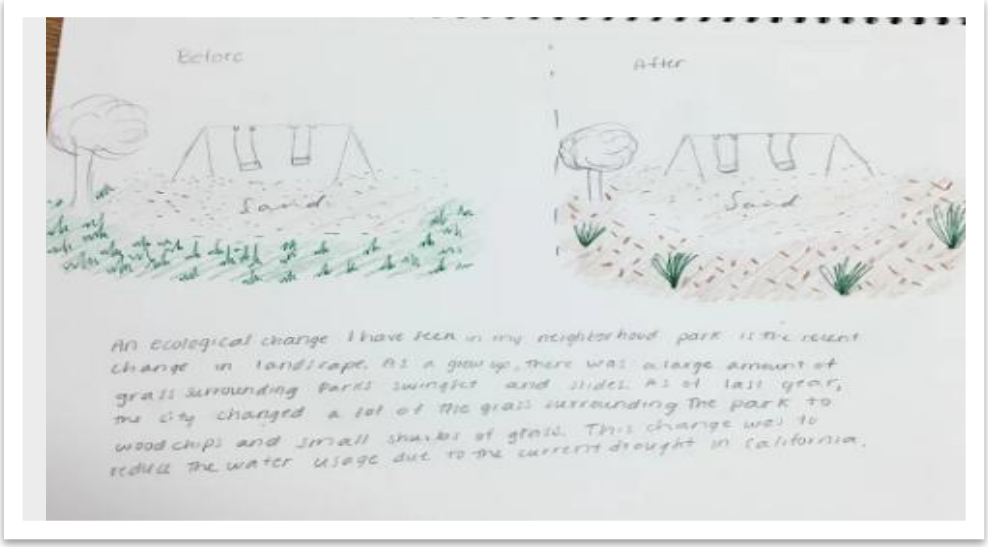
- What changes have I observed in my own life that may be related to climate change?
- What are the patterns across our observations and which are associated with climate change?

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



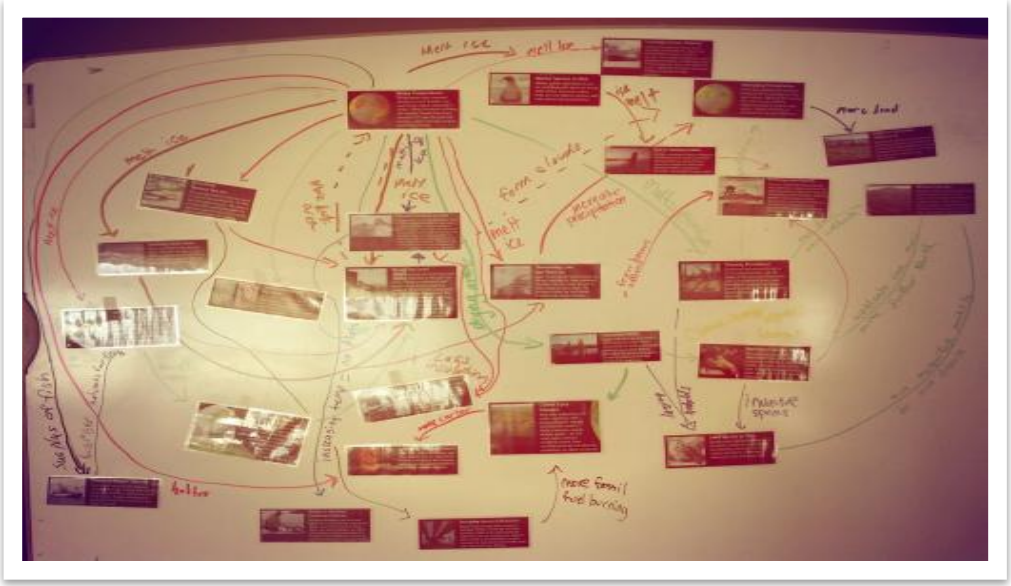
REFLECTION:

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

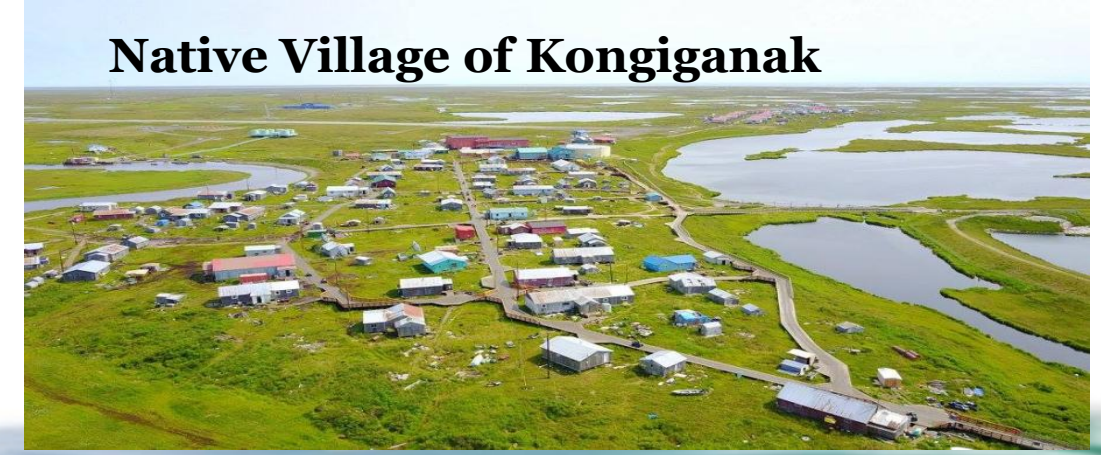
Culturally-Responsive Curriculum Standards Addressed:

- 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



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