

ARCTIC PEOPLE, CHANGING PLANET

Citizens and Partners at the Top of the World

*Igor Krupnik, Smithsonian Institution
"The State and Fate of the Arctic"
Wilson Center, March 19, 2014*

*Inupiat hunters on ice floe off Wales, Alaska.
Photo: Winton Weyapuk, Sr., April 2007*

1990s: The First Call

<http://globalwarming.markey.house.gov/impactzones/alaska.html>



Photo by Bryan and Cherry Alexander
<http://forces.si.edu/arctic/index.html>



The Potential Consequences of Climate Variability and Change

ALASKA

A Report of the Alaska Regional Assessment Group
 For the U.S. Global Change Research Program

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 Arctic System Research
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 Fairbanks, Alaska 99775-7740

December 1999

PREPARING FOR A CHANGING CLIMATE

Assessing the Consequences of Climate Change for Alaska and the Bering Sea Region



Proceedings of
a Workshop

University of
Alaska Fairbanks
29-30 October 1998



An Activity of the U.S. National Assessment of the Consequences of Global Change
 and the International Arctic Science Committee

THE IMPACTS OF GLOBAL CLIMATE CHANGE IN THE BERING SEA REGION

AN ASSESSMENT CONDUCTED BY THE
 INTERNATIONAL ARCTIC SCIENCE COMMITTEE UNDER ITS
 BERING SEA IMPACTS STUDY (BESIS)

RESULTS OF A WORKSHOP

Arctic Science Conference
 American Association for the Advancement of Science

Girdwood, Alaska 18-21 September 1996

BESIS Project Office
 University of Alaska Fairbanks

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We would like to acknowledge the
 contributions to this workshop of
 International Arctic Science Comm
 University of Alaska Fairbanks, U
 IASC Global Change Programme C
 Rovaniemi, Finland

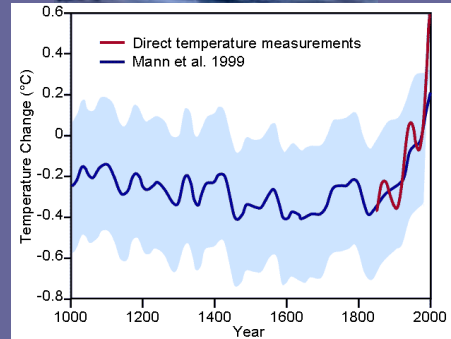
Photos: Regions and activities that could be affected by climate change:
 a) Subsistence lifestyles, as shown by a whaling camp at the ice edge. (Photo by Don Schell)
 b) Coastal processes of erosion and sea level rise on barrier islands. (Photo by Gunter Weller)
 c) Boreal forest ecosystems when permafrost thaws. (Photo by Tom Osterkamp)
 d) Village life (Kaktovik Village on the Beaufort Sea coast). (Photo by Gunter Weller)

Climate Change Impacts on Northern Communities:

- Coastal erosion
- Thawing permafrost
- Warming weather
- Advance in shrub vegetation
- Increase in tundra and forest fires
- Change in species distribution
- Reduced access to subsistence resources

Young ice is being formed off Shaktoolik, in Norton Sound, Alaska, a small community that is threatened by storm flooding triggered by climate change *Photo: Igor Krupnik, 2008*

Canary in the Coalmine?



By 2000, the Arctic was viewed as the 'Canary' of the Global Change processes. These images from the Arctic became the familiar symbols of our warming planet, as were also the famous 'hockey-stick' graph and polar bears on shrinking ice

The Tipping Point:

Arctic Amplification or It's Cold but Not Cold Enough

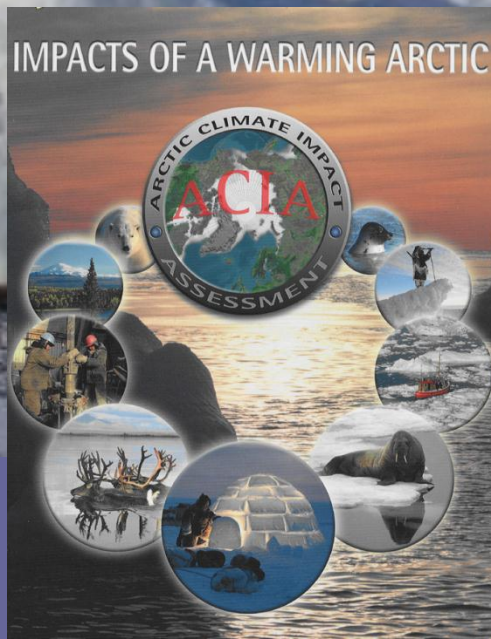
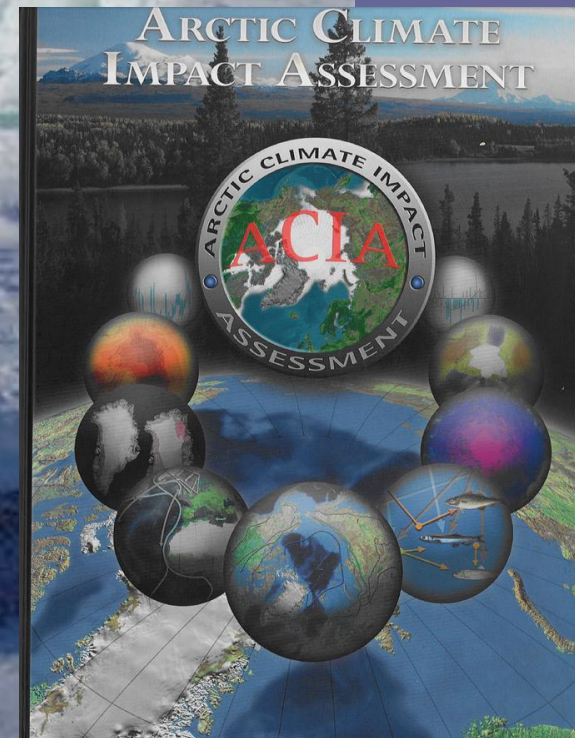


Photo: Igor Krupnik



The role of the Arctic as the harbinger of climate change and new threats to its residents were amply documented in the *Arctic Climate Impact Assessment* report (2004-2005)

Partners in Knowledge

*Traditional Ecological Knowledge
of Inuit and Cree
in the Hudson Bay Bioregion*

Voices from the Bay

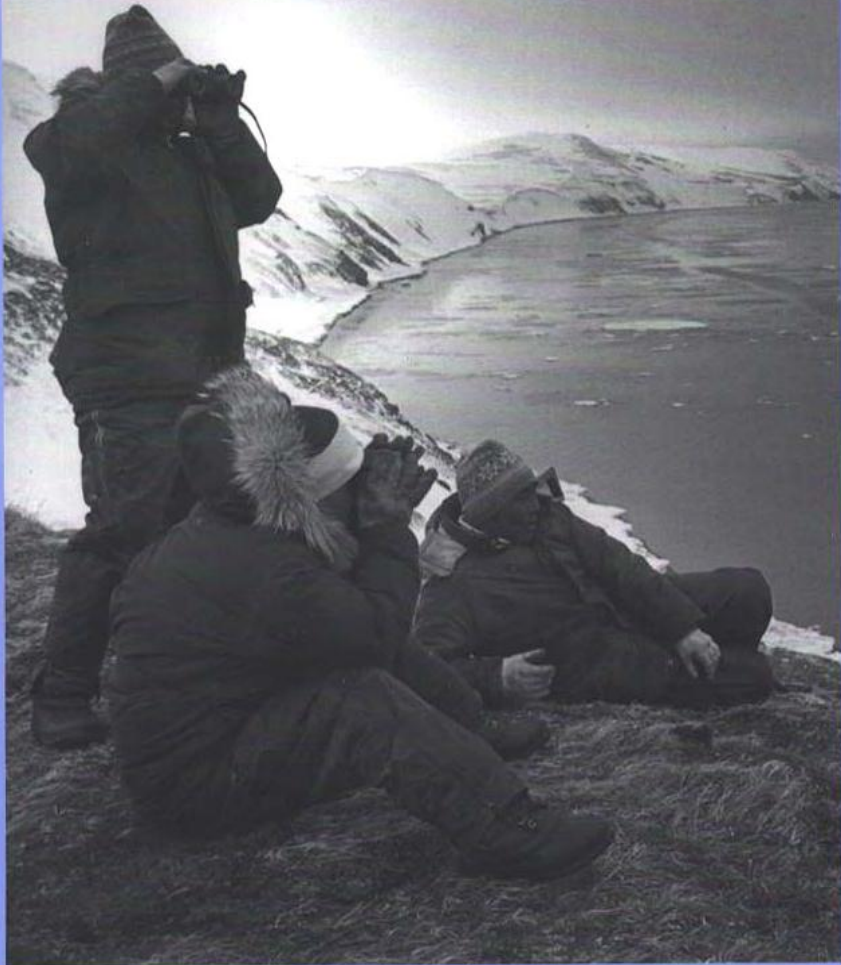
Compiled by
Miriam McDonald
Lucassie Arragutainaq
Zack Novalinga

Canadian Arctic Resources Committee
Environmental Committee of Municipality of Sanikiluaq

The first study of Arctic change using local indigenous people's knowledge was the Canadian 'Traditional Ecological Knowledge and Management Systems' (TEKMS) of 1992–1994 and its publication, *Voices from the Bay* (McDonald et al. 1997)

Reading Early Signal

The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change

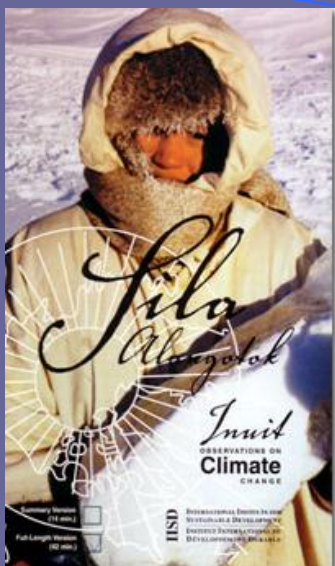


Edited by Igor Krupnik and Dyanna Jolly



Already by the year 2000, polar residents were reporting a sustained and consistent warming trend in their home environments, while many climate scientists were still 'sitting on the fence'

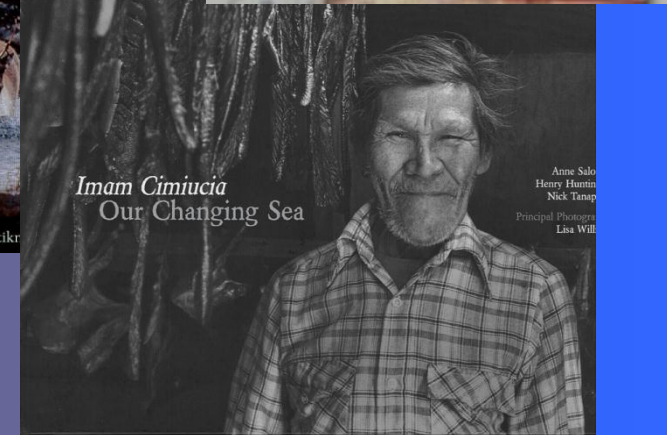
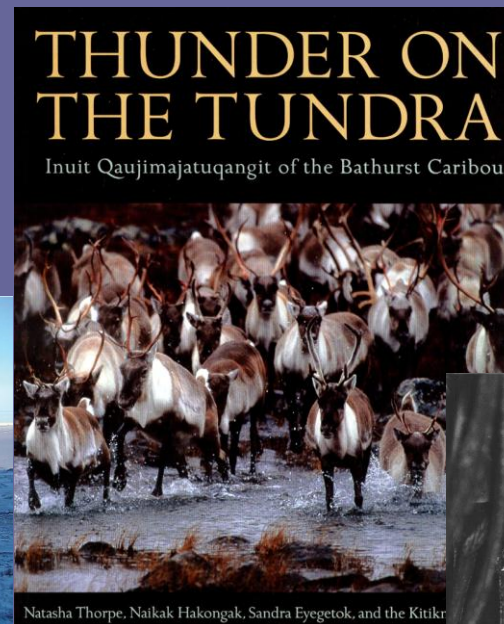
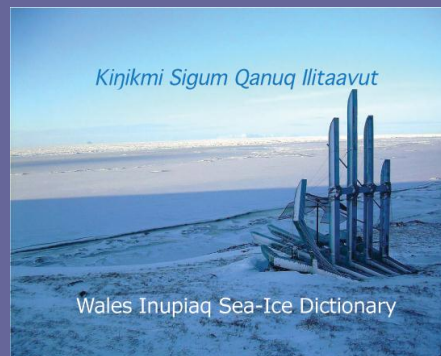
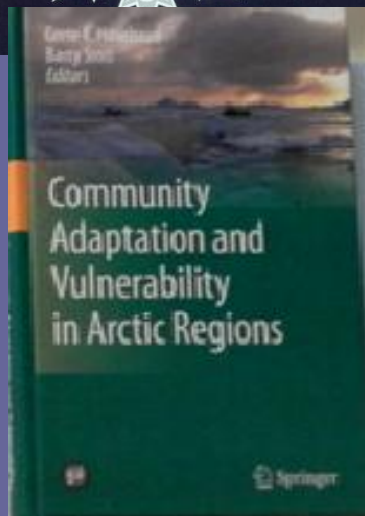
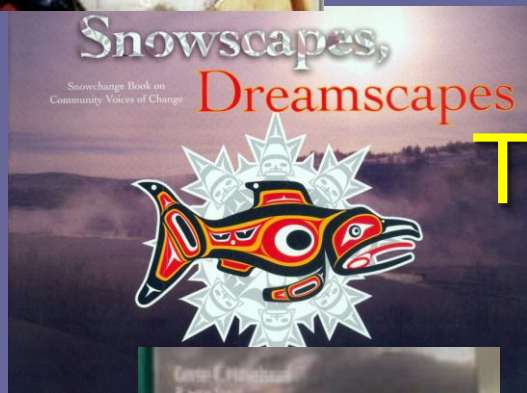
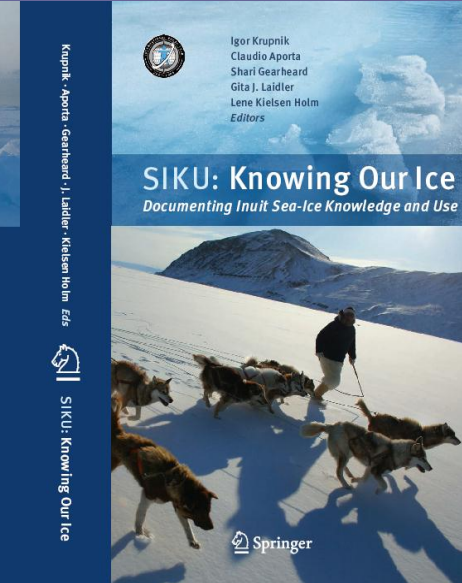
Photo: G. Carleton Ray



When the Weather is Uggianaqtuq
Inuit observations of environmental change

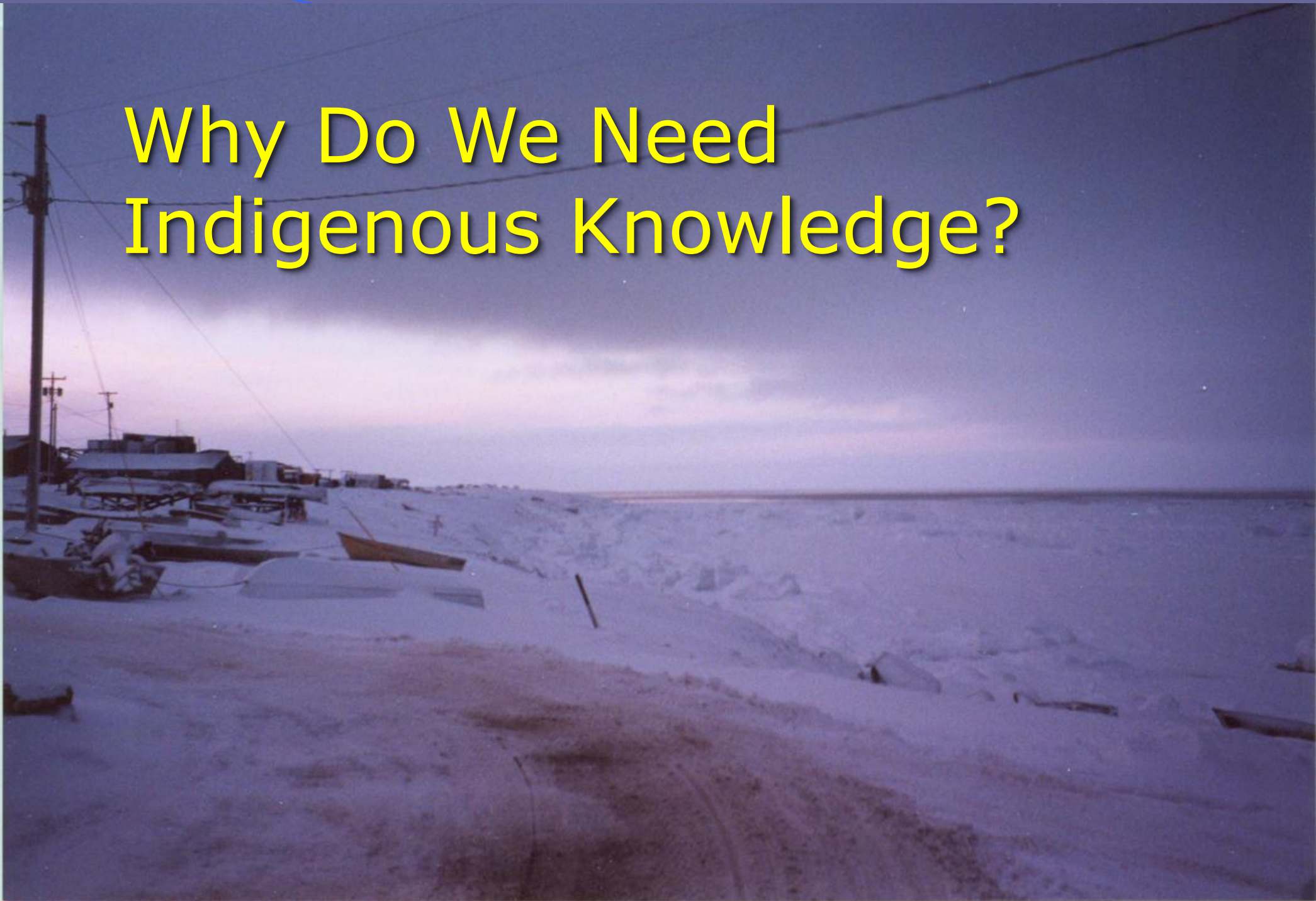


Conrad Oozeva, Chester Noongwook, George Noongwook, Christina Alouxa, and Igor Krupnik
Watching Ice and Weather Our Way
Sikumengllu Eslamengllu Esgbapalleghput
Akulki, Tapghaghmi, Mangtaaquli, Sanqaanga, Igor Krupnik



Some recent publications on indigenous peoples' knowledge and monitoring of Arctic climate change

Why Do We Need Indigenous Knowledge?



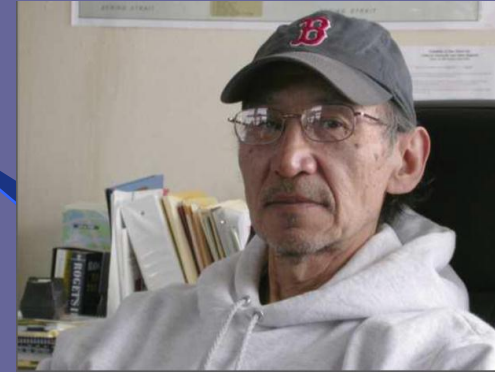
Many Eyes, Experienced Monitors



A small northern community can easily beat a good university by the number of experienced people it puts on weather, ice and wildlife watch 24/7, year after year.

SIKU – Sea Ice Knowledge and Use

Documenting Arctic Environmental and Social Change



SIKU Project village monitors (clockwise):
Clara-Mae Sagoonick, Arthur Apalu, Winton
Weyapuk, Jr., Alexander Borovik, Roman
Armaergen, Leonard Apangalook, Paul
Apangalook, Joe Leavitt



High Resolution at Local Scale



The use of many indigenous terms and indicators allows hunters document ice conditions with the high level of precision

Photo and captions by Winton Weyapuk, Jr.(to the right)

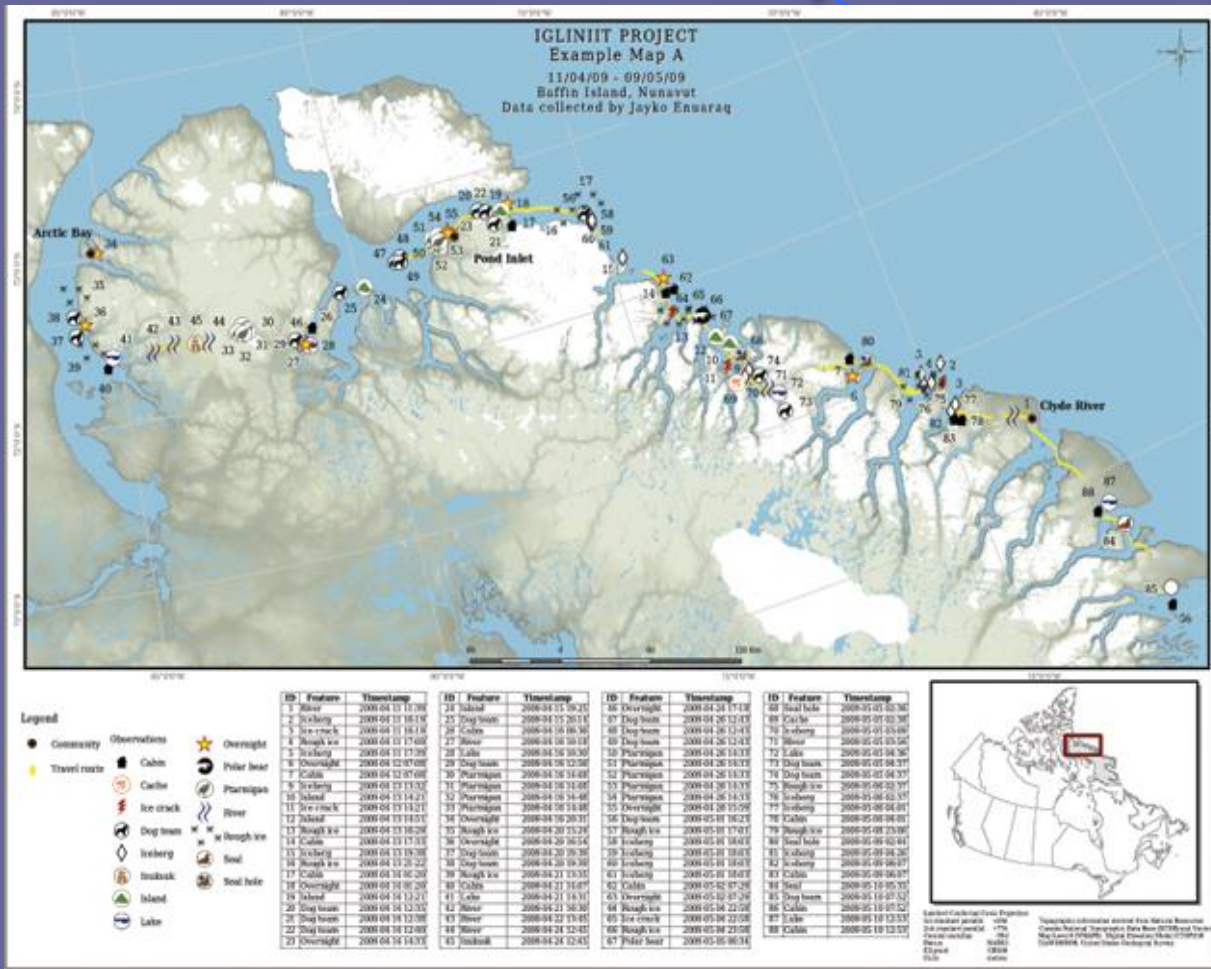
Team Work and Data Sharing



Indigenous monitors in their daily observations share data and routinely perform what scientists practice only while working in teams.

Photo: G. Carleton Ray

Citizen Science, Modern Technologies



Sample map documenting GPS-based observations by one indigenous monitor, April-May 2009

http://sikuatlas.ca/clyde_river_igliniit.html

Top right: David Iqaqrialu from Clyde River, Nunavut logs ice and snow information with his portable GPS-based system

<http://ittaq.ca/projects/research-projects/research-current-projects/igliniit-trails-project>

Bottom right: Eric Joamie and Gita Laidler work with Pangnirtung elders and hunters , 2005 (Pulsifer et al. 2010)

Melting Arctic: Fellow Citizens at Risk



<http://ux.brookdalecc.edu>

Barrow, Alaska, the U.S. northernmost community of 4500, faces the wrath of the warming ocean and increased threat of storm-triggered floods and coastal erosion

The 'Double-dip' of Climate Warming



Over the past 50 years many Arctic rural communities have been transformed into modern towns. The costs of new construction, local services, and infrastructure maintenance have increased exponentially. More Arctic residents are now at risk and at a higher cost...

*Left: Alaskan Inupiat village of Kivalina in 1964 (Photo by Ernest S. Burch);
modern town of Kivalina, 2007 (Photo by James Magdanz, ADFG)*

178 Alaskan Communities at Risk

Erosion can occur at the interface of land and water.

Alaska has:

- 10,000 named and thousands more unnamed rivers, creeks, and streams
- About 44,000 miles of tidal shoreline
- More than 3 million lakes

Of the 392 communities in Alaska, 178 report erosion issues.

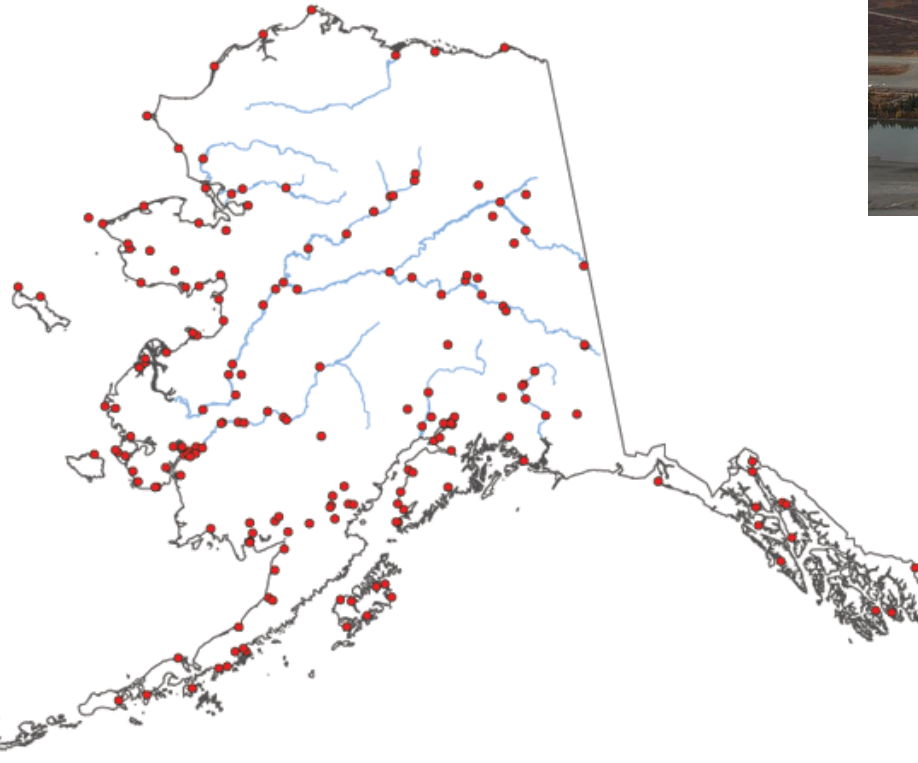


Photo: James Magdanz

2009 Army Corps of Engineers' Study reports that 178 rural Alaskan communities are facing erosion problems, due to heavy storms, permafrost thawing, and seasonal floods



Alaska District
Corps of Engineers
Civil Works Branch

Alaska Baseline Erosion

Date Prepared: March 24, 2009

Figure 3-1

Communities with
Erosion Concerns



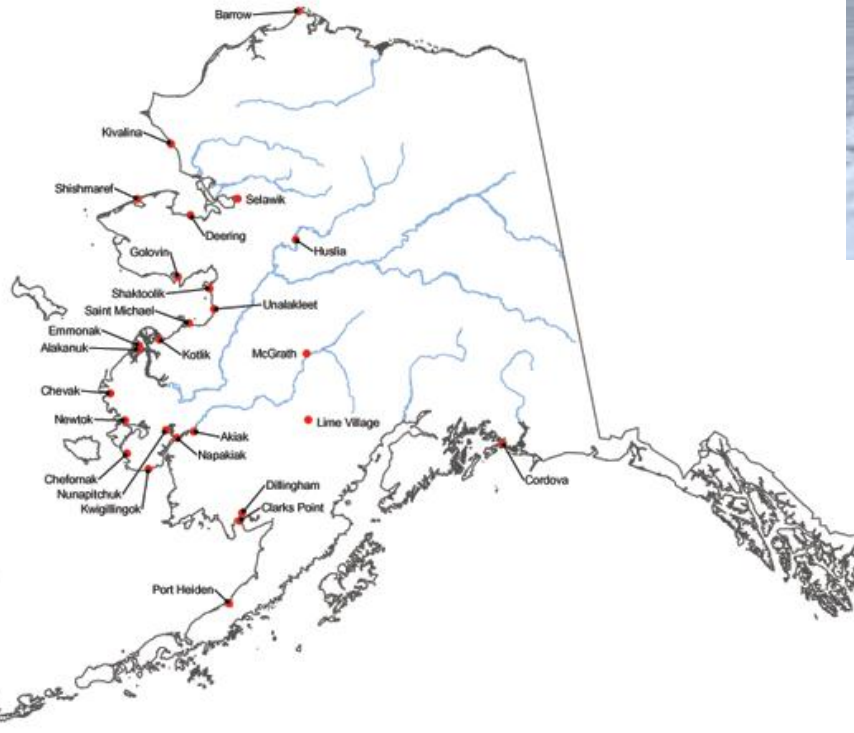
Photo: www.3rnet.org



Photo: Lars Krutak

Sand-bagged and Storm-bound

A Priority Action Community has reported erosion threatening the viability of the community and/or significant resources are being expended to minimize threats to the community's viability. The erosion issue likely warrants immediate and substantial Federal, State, or other intervention. Priority Action Communities should be considered for immediate action in either initiating an investigation or continuing with ongoing efforts to manage erosion issues.



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Figure 4-1

Priority Action Communities



<http://www.nytimes.com/2010/01/27>

26 Native Alaskan communities are declared as 'high-risk'; some are literally sand-bagged year-round



ACIA - <http://www.eoearth.org>

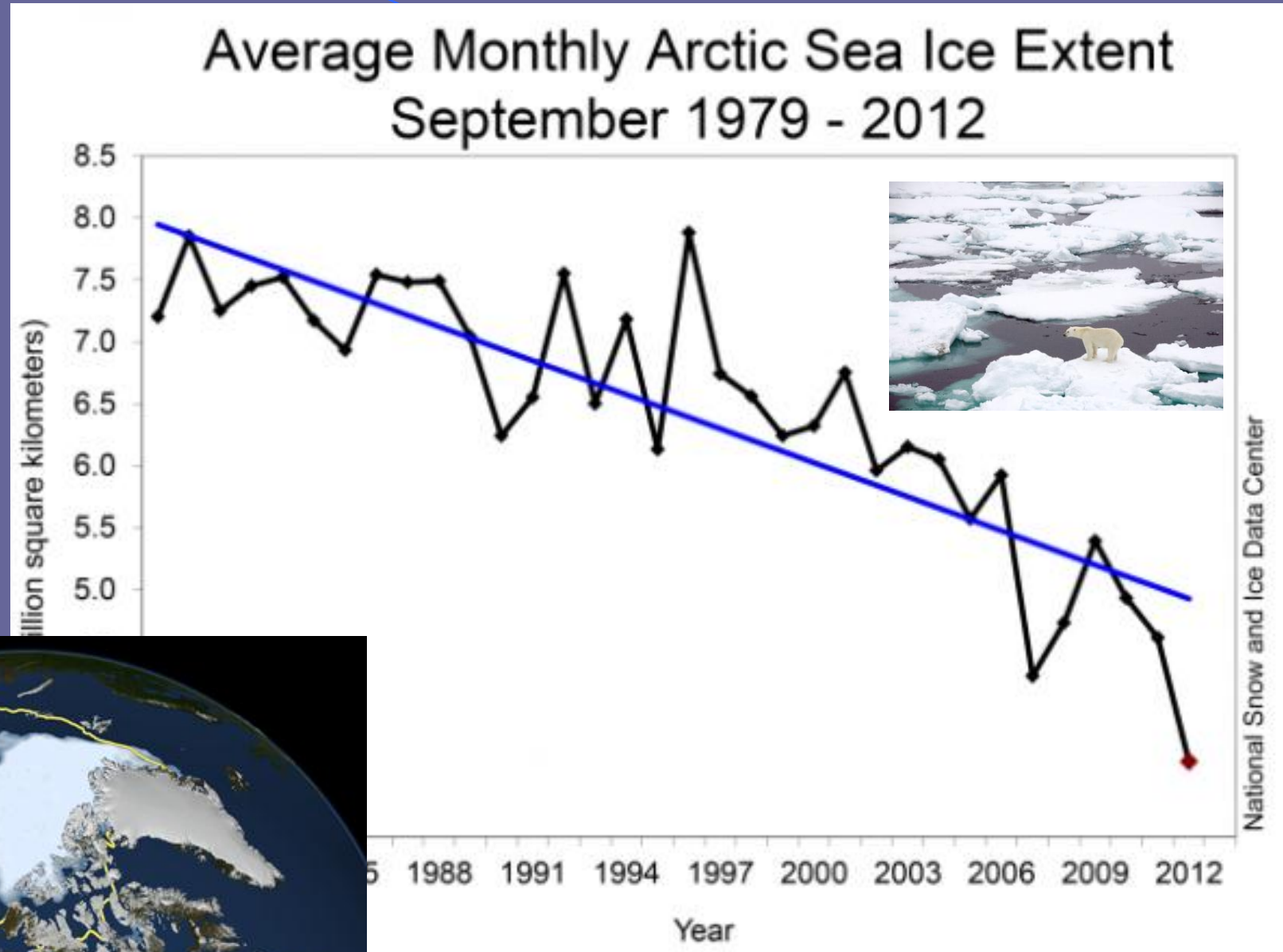


<http://www.theatlantic.com/magazine/>

12 communities have already decided to relocate to higher ground at enormous estimated cost: \$95-125M for Kivalina (population 374), \$80-130M for Newtok (population 354), \$100-200M for Shishmaref (population 563), about \$2M per household

http://tribalclimate.uoregon.edu/files/2010/11/AlaskaRelocation_04-13-11.pdf

Arctic Warming: It's Everybody's Bell !



September 16, 2012

2012 sea ice minimum

<http://svs.gsfc.nasa.gov/vis/a000000/a003900/a003998/index.html>

A scenic landscape photograph featuring a bright sun partially obscured by a layer of white, fluffy clouds. The sun is positioned in the upper center of the frame. In the foreground, a dark, rocky shoreline leads to a body of water. On the left, a steep, light-colored rocky cliff rises from the shore. In the distance, two small, dark structures are visible on the water's edge. The overall scene is serene and atmospheric.

Thank you!