



# Challenge, Risk, and Opportunity The Human Dimensions of a Changing Arctic

Maribeth S. Murray

University of Alaska Fairbanks, Fairbanks, Ak  
International Study of Arctic Change, Stockholm, SE

# Changing Perspectives on Research in the North



*Robert Peary Sledge Party,  
posing with flags at the North  
Pole, 04/07/1909*

[ARC Identifier: 542472](#)



*Members of the international *Siku-Inuit-Hila* (Sea  
Ice-People-Weather) project on the sea ice near  
Qaanaaq, Greenland. Photo credit: Andy Mahoney*

# Arctic Peoples and Environmental Change

ARTICLE

## Arctic Environmental Change of the Last Four Centuries

J. Overpeck,\* K. Hughen, D. Hardy, R. Bradley, R. Case, M. Douglas, B. Finney, K. Gajewski, G. Jacoby, A. Jennings, S. Lamoureux, A. Lasca, G. MacDonald, J. Moore, M. Retelle, S. Smith, A. Wolfe, G. Zielinski

A compilation of paleoclimate records from lake sediments, trees, glaciers, and marine sediments provides a view of circum-Arctic environmental variability over the last 400 years. From 1840 to the mid-20th century, the Arctic warmed to the highest temperatures in four centuries. This warming ended the Little Ice Age in the Arctic and has caused retreats of glaciers, melting of permafrost and sea ice, and alteration of terrestrial and lake ecosystems. Although warming, particularly after 1920, was likely caused by increases in atmospheric trace gases, the initiation of the warming in the mid-19th century suggests that increased solar irradiance, decreased volcanic activity, and feedbacks internal to the climate system played roles.

and other feedbacks (6, 7).

In this article, we use the paleoenvironmental record to assess the climate events of this century from the perspective of the last four centuries. We build on previous work (8–10) by compiling a variety of complementary paleoenvironmental indicators of climate from around the entire Arctic. This perspective permits the visualization of natural subdecadal to century-scale climate variability in the circum-Arctic region and



*A group of Copper Inuit in the central Arctic dressed in winter clothing. Photograph by J. J. O'Neill during the Canadian Arctic Expedition, 1913-1916. (CMC neg. no. 38466)*

*Ann. Rev. Anthropol.* 1981. 10:1-25  
Copyright © 1981 by Annual Reviews Inc. All rights reserved

## HUMAN ADAPTATION TO ARCTIC ZONES

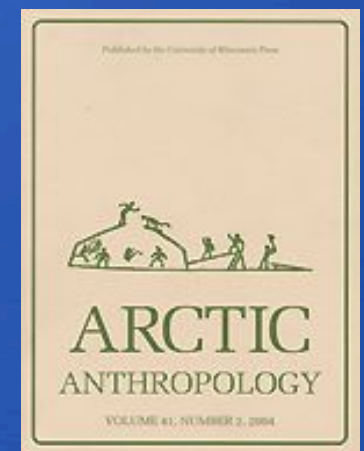
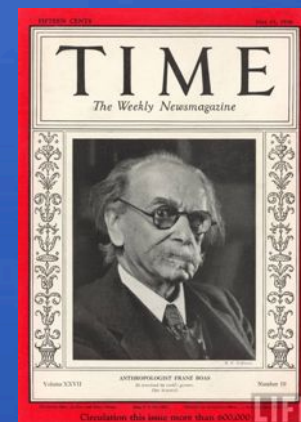
◆9669

*Emilio F. Moran*

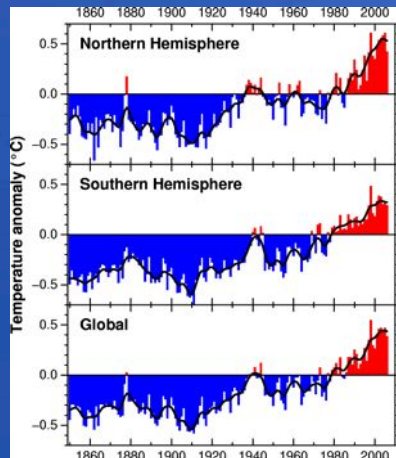
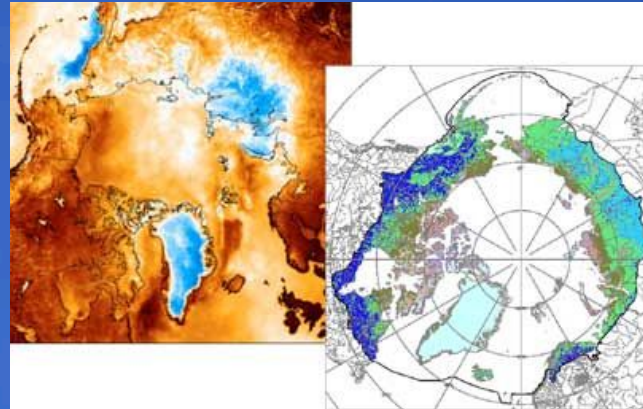
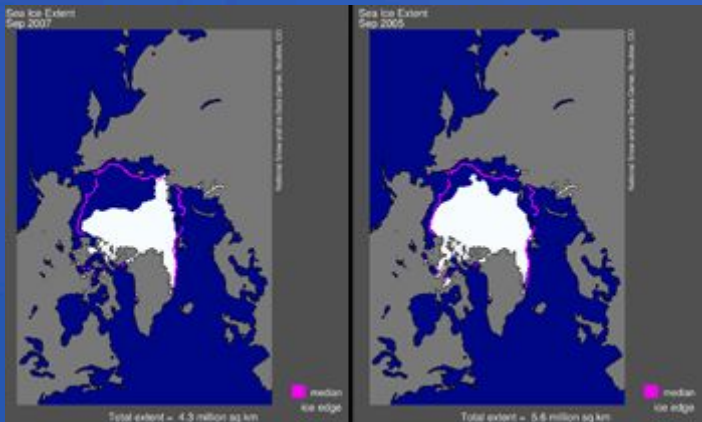
Department of Anthropology, Indiana University, Bloomington, Indiana 47401

### INTRODUCTION

The study of human adaptation to polar areas has engaged scholars in many fields since the late nineteenth century. The first two scientific monographs on the Eskimo were published in 1888 (16,55), and were soon followed by useful reports (2, 39, 99, 110). Since then much work has been undertaken, and efforts at a synthesis are now under way. Tundra ecosystems were recently a focus of research efforts by the International Biological Program (IBP), and students with interest in the human ecology of this region now have a rich and rapidly growing literature. The Swedish component of the IBP/Tundra Biome has published a useful collection of papers on the structure and function of tundra ecosystems (102).



# Recognizing the Breadth of Change

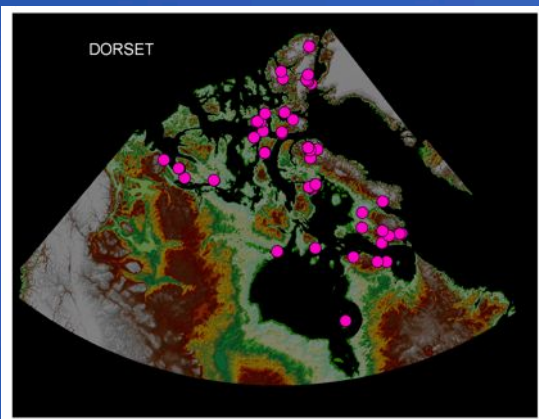


“The Arctic is the barometer of the globe’s environmental health. You can take the pulse of the world in the Arctic. Inuit, the people who live farther north than anyone else, are the canary in the global coal mine.”  
Aqqaluk Lyngø, leader of Greenland’s Inuit population and former president of the Inuit Circumpolar Council, extract from submission to the Stansted airport inquiry, The Independent 30 May 2007.

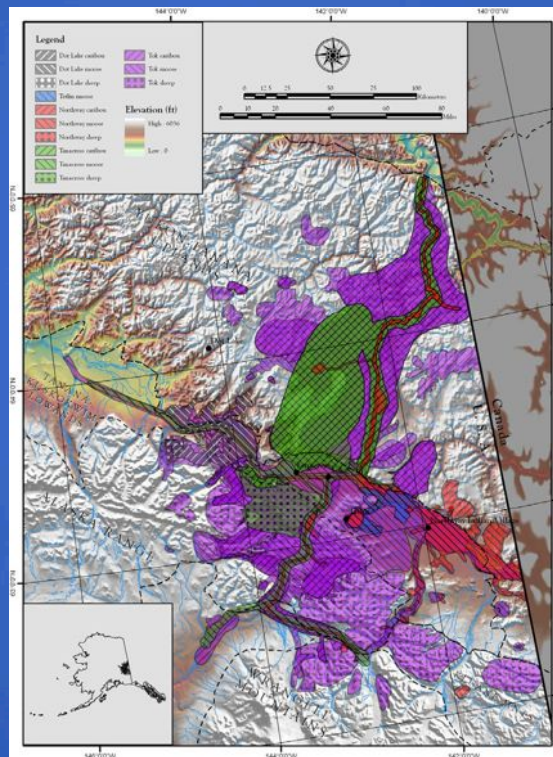
# Synthesis and Assessment



# Land Use Changes



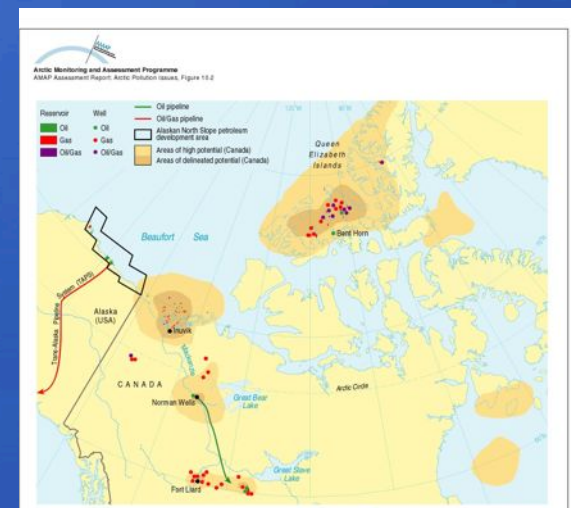
Settlements in arctic Canada ca. 2000 BP



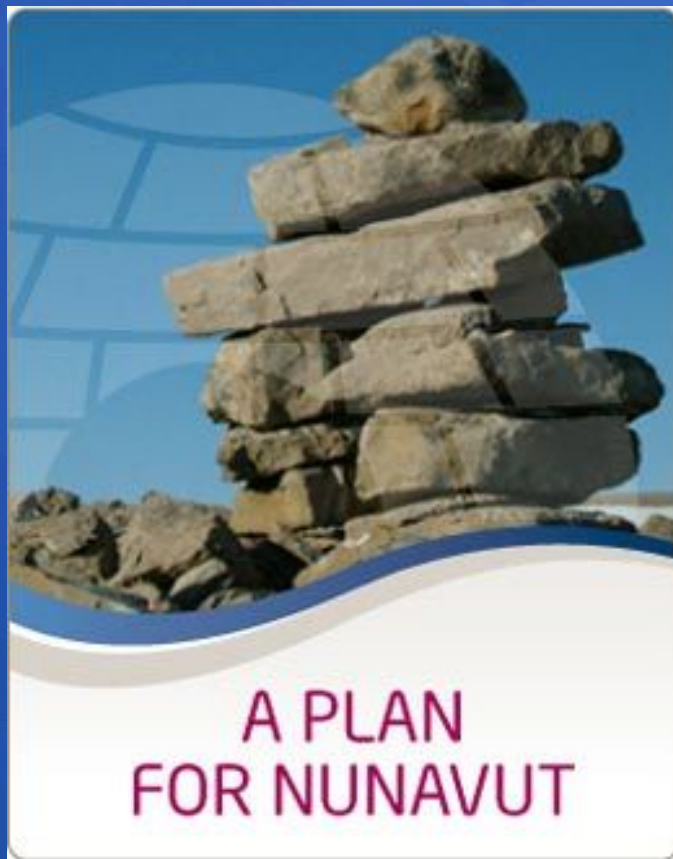
Hunting Territories in Interior Alaska ca. 1978 (Patterson 2010).



Ilulissat, Greenland, 2009



# Broadening the Landscape Concept



*Community Garden, Nenana, Alaska.*

# Northern Food Security

Potato farmer Ferdinand Egede: His grandfather was a hunter, his father a livestock farmer and his son now harvests crops.



*Kenneth Høegh, the chief consultant to Greenland's agricultural administration -- standing here next to a cold-resistant potato variety.*



**SPIEGEL ONLINE INTERNATIONAL**

NACHRICHTEN VIDEO THEMEN FORUM EINESTAGES ENGLISH DER SPIEGEL ABO SHOP

Front Page World Europe Germany Business Zeitgeist International Forum New letter

English Site > SPIEGEL Magazine

08/30/2006 Print | E-Mail | Feedback

Arctic Harvest

**Global Warming a Boon for Greenland's Farmers**

By Gerald Traufetter

Known for its massive ice sheets, Greenland is feeling the effects of global warming as rising temperatures have expanded the island's growing season and crops are flourishing. For the first time in hundreds of years, it has become possible to raise cattle and start dairy farms.

PHOTO GALLERY

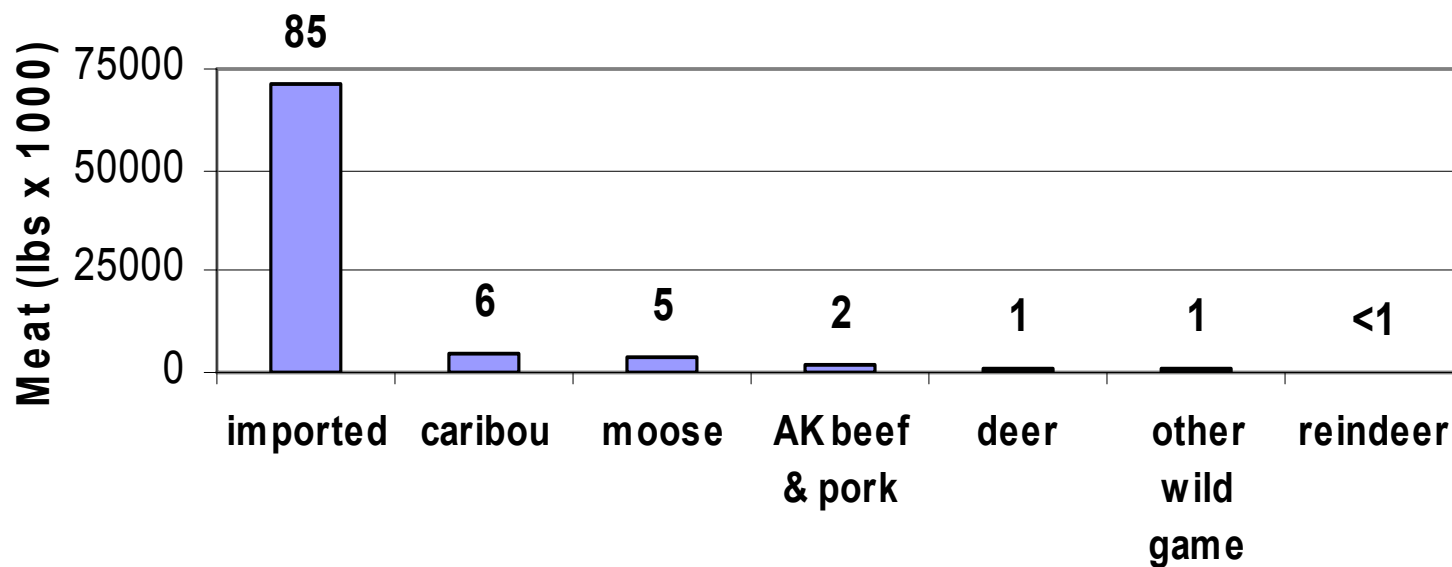
Photo Gallery: Greenland's Agricultural Boom



*Domestic fowl, small farm, Fairbanks, Alaska.*



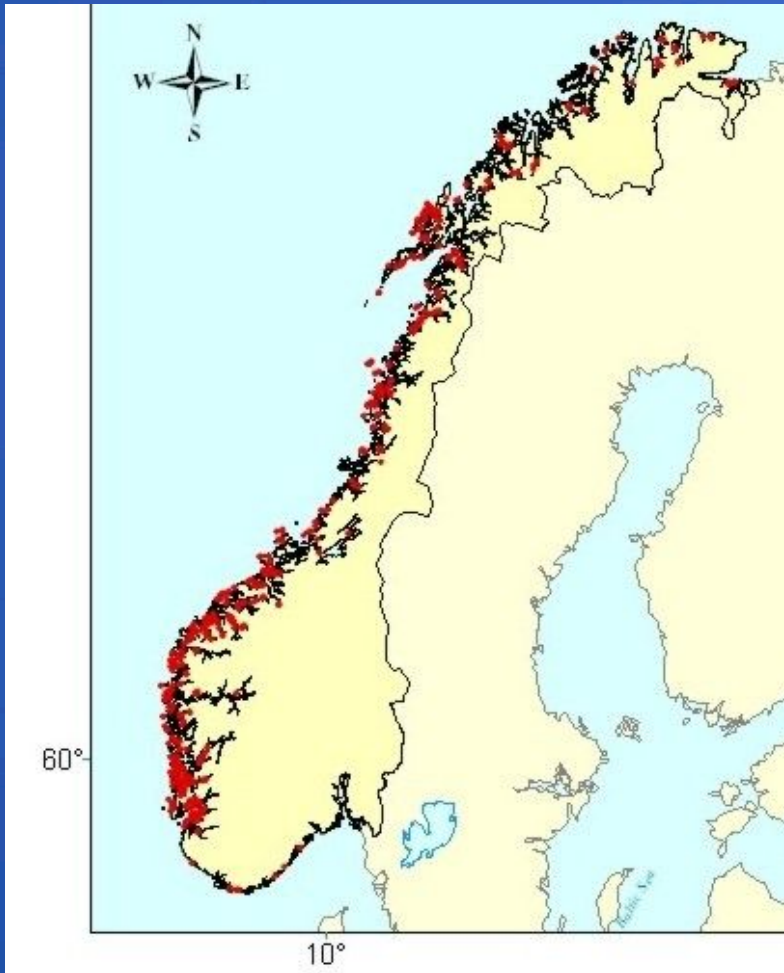
**Red meat production in Alaska  
(annual average 2001-05, % of total above bars)**



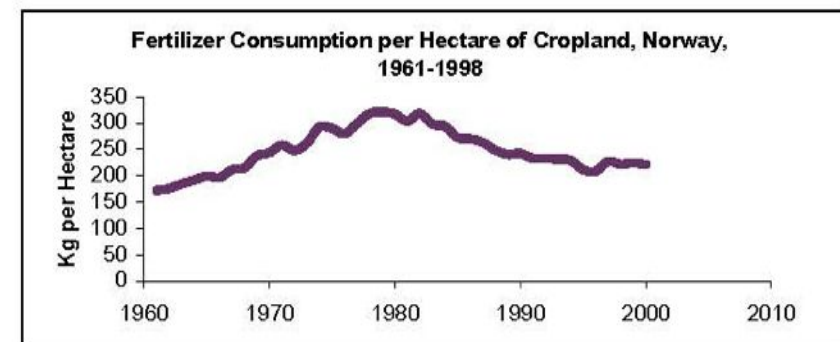
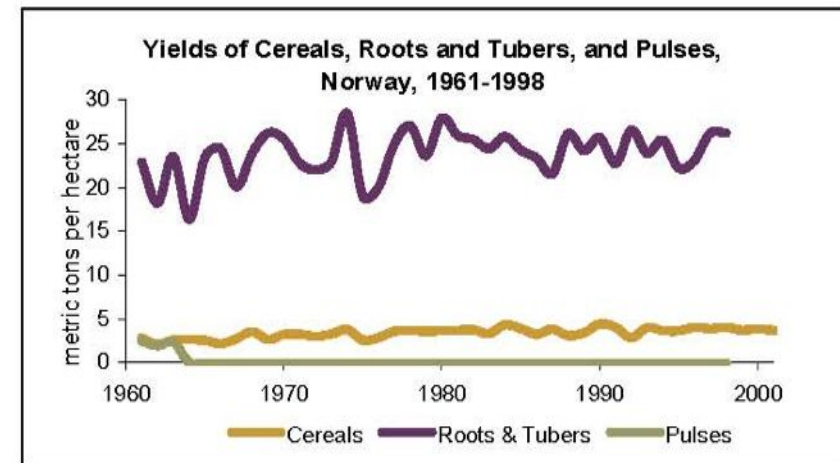
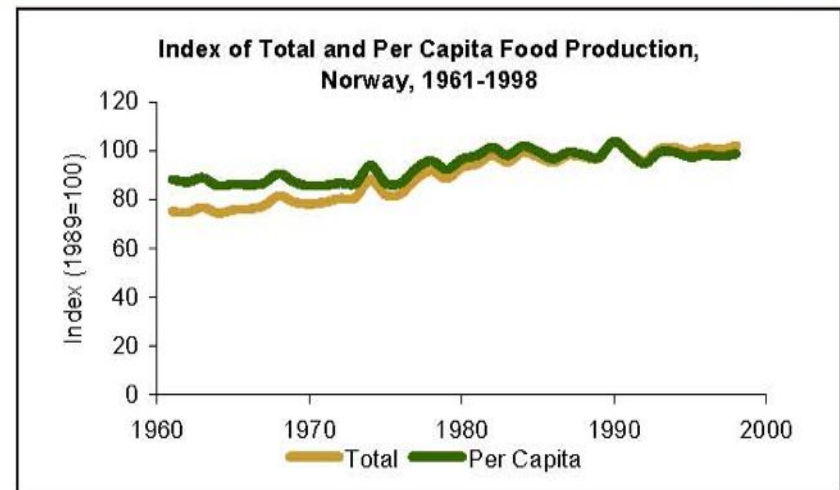
From Paragai et al. in press, Ak Farm Bureau Report



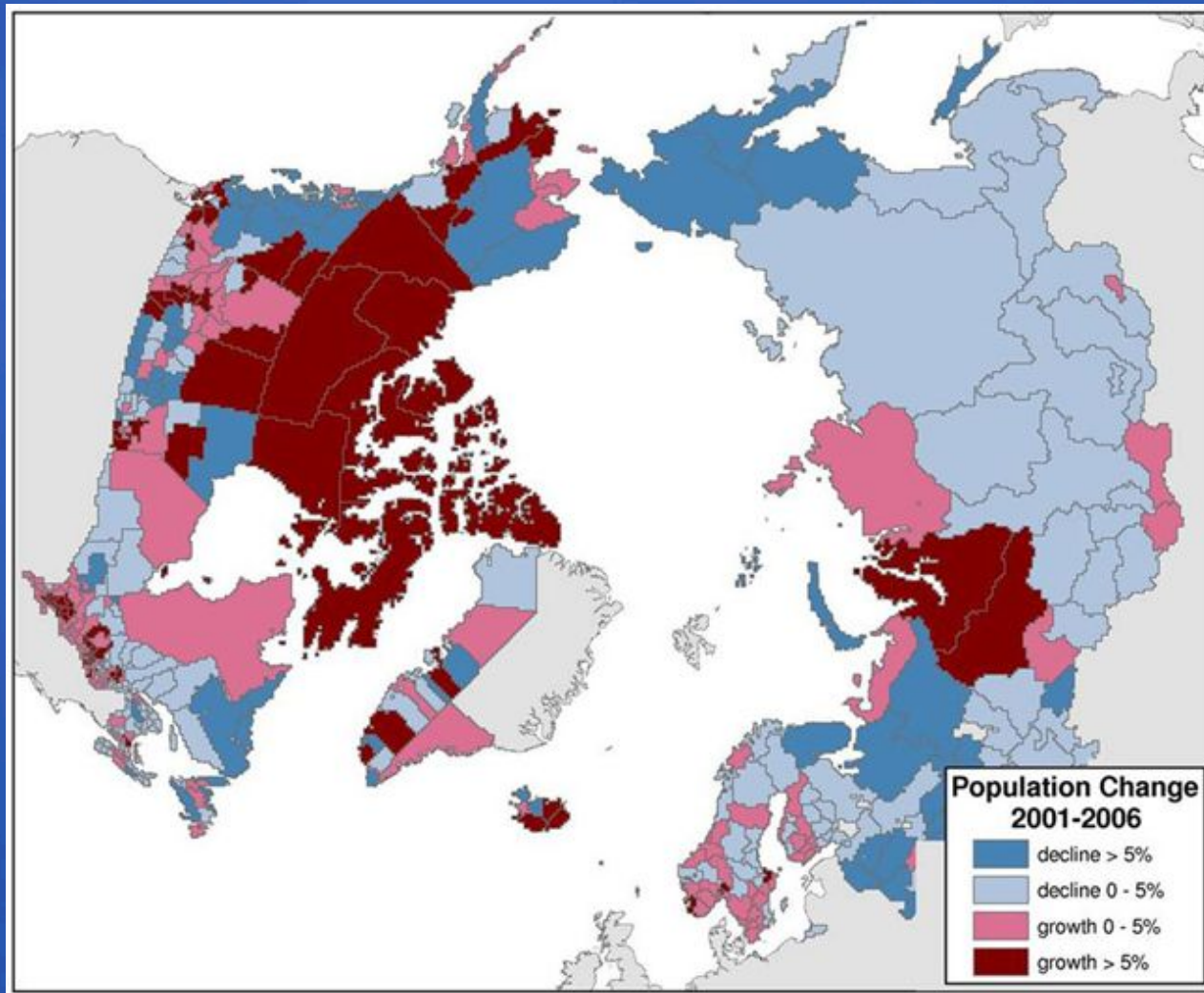
# Moving to the Pan-Arctic Scale



*Licenses for cod sea-cage farming in Norway (red circles), 2007. Data from Norw. Direct. of Fisheries. Interactions between escaped farmed and wild cod. Research supported by the Norwegian Research Council (2006-09, Projects 'Interactions' and 'Vertical').*

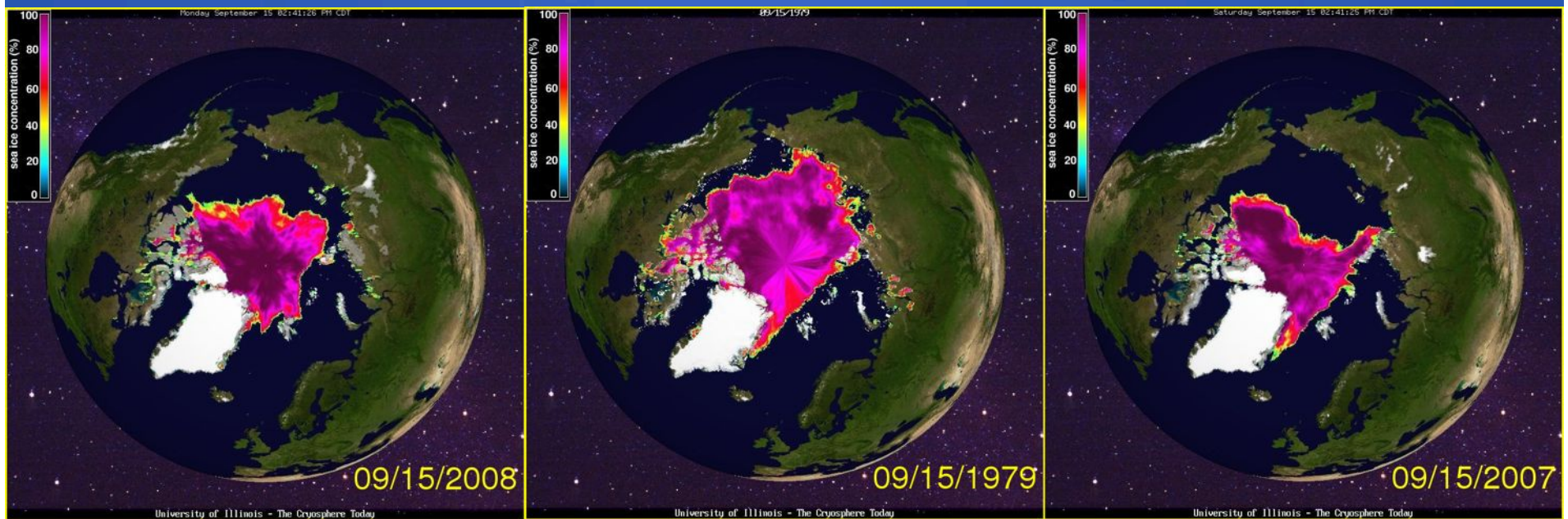


# Arctic Demographics



From Hamilton 2009, <http://carseyinstitute.unh.edu/alaska-indicators-northern.html>

# 2007 Summer Sea Ice Minimum



# Immediate and Cumulative Impacts

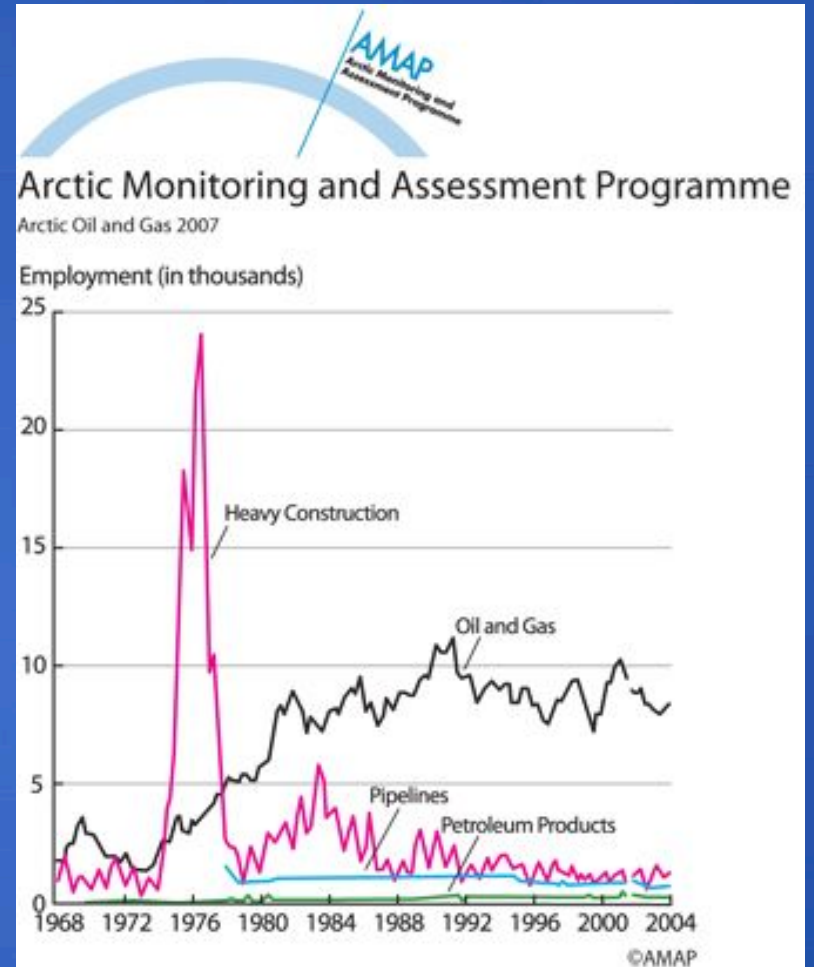
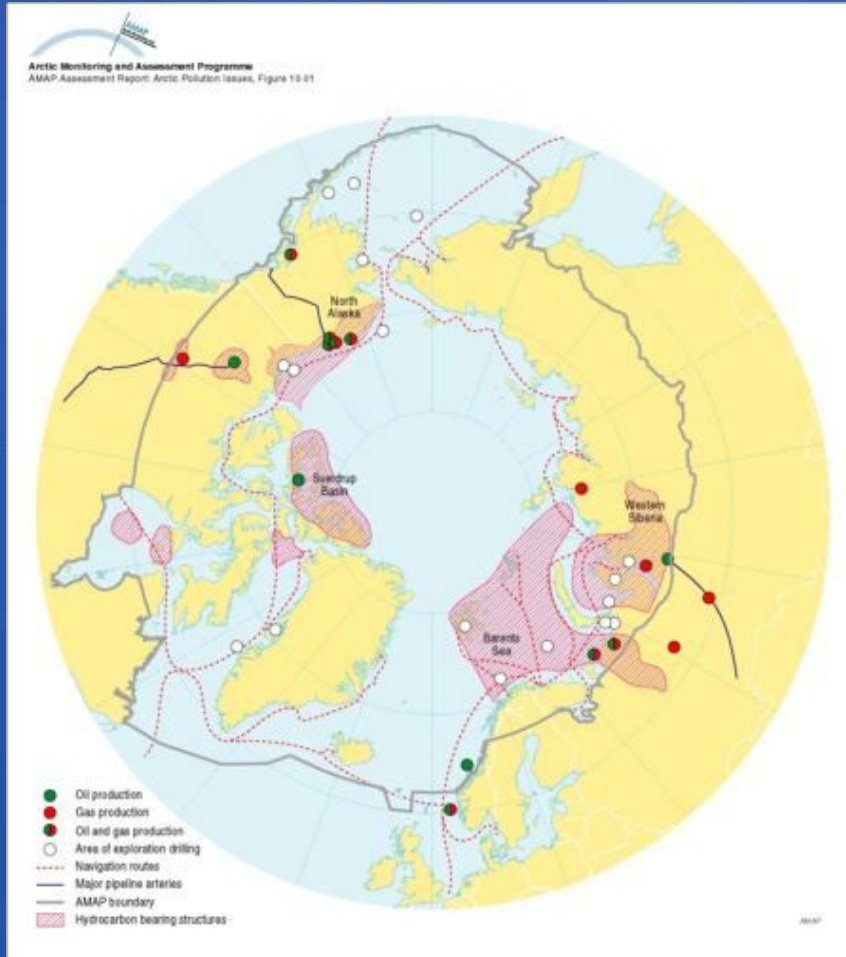


*Butchering seals on the ice at Shishmaref, Alaska. Photo: K. Stenek*

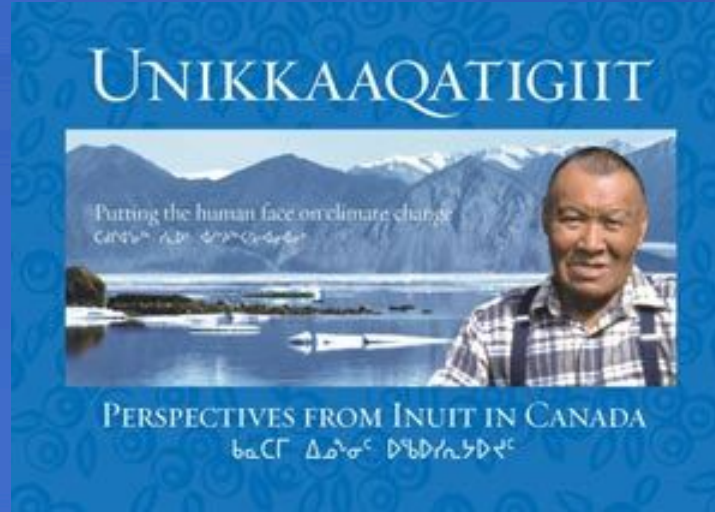
Feedbacks from changing environmental conditions and global processes

- Distance traveled
- Cost of fuel
- Success of harvest
- Cost of purchased goods
- Needs for wage labour
- Out migration
- Impacts on health

# Links to Development



# Major Achievements



# Science for Society in the Pan-Arctic

ARCTIC RAIN-ON-SNOW AN INCREASING  
CHALLENGE TO WILDLIFE, FORECASTERS  
[Bulletin of the American Meteorological Society,  
Oct 2008 by Rennert, Kevin J, Roe, G, Putkonen, J,  
Bitz, C M](#)



The carcasses are hung and inspected by the Agriculture Canada inspection team before being broken down into primals, individually bagged and ready for shipment.

34 NEWS/NORTH MNT, Monday, March 6, 2006

Selismic vibrations Page 36

**Business & Labour**

BUSINESS HOTLINE • DAVID RYAN  
Phone: (867) 873-4031 • E-mail: business@nml.com • Fax: (867) 873-8507

www.blox.com

## Muskox harvest returns

300 tags for commercial hunt mean 30 to 35 jobs

by David Ryan  
Northern Times Services  
Inuktitutuk/ Cambridge Bay

After a five-year break, the commercial muskox hunt here is back on and it's creating jobs for hunters and trappers.

"There's 3000 jobs created from this harvest," said Dale Smith, general manager of Kikimoot Foods.

The plant, which generally processes about 50,000 pounds of Arctic char annually, has been converted into a makeshift slaughterhouse and tags have been issued allowing for the harvest of up to 300 animals.

"We want to get the harvest going on a yearly basis," said Smith.

Reaction to the hunt has been positive around Cambridge Bay, said community elder and outfitter Allen Kitigon.

"People have been working very hard during the harvest and it looks as if its creating jobs," said Kitigon.

About 20 to 25 workers

Photo see 10a, page 36



# The Future



