Geoscience Canada

Looking to the Future: Nunavut Environments, Past and Present

Elliott Burden

Volume 23, Number 4, December 1996

URI: https://id.erudit.org/iderudit/geocan23_4ed01

See table of contents

Publisher(s)

The Geological Association of Canada

ISSN

0315-0941 (print)
1911-4850 (digital)

Explore this journal

Cite this document

Burden, E. (1996). Looking to the Future: Nunavut Environments, Past and Present. *Geoscience Canada*, *23*(4), 173–175.

Looking to the Future: Nunavut Environments, Past and Present[1,2]

Preamble to the following papers presented to the Inter Americas Institute Geological Association of Canada Nuna Meeting–Nunavut Environment Assessment Transect (NEAT) Pond Inlet, Northwest Territories, 14-18 June 1996[1]

INTRODUCTION

The Inter Americas Institute (IAI) is a multinational government agency committed to scientific and other liaisons concerning the science and economics of global change. The IAI was established in 1992 as an initiative from a 1990 meeting called by United States President George Bush, and titled "The White House Conference on Science and Economic Research Related to Global Change." Developed as a means to foster closer links with other national and international organizations, the IAI became active in 1994 when six signatory nations ratified the agreement for this organization and accepted the protocols for joint research. By May 1995, 16 North and South American nations had signed this agreement and the scientific program began.

Among the first initiatives of the IAI was development of a global change-based scientific agenda and grants program. The IAI scientific agenda consists of seven research themes:

1. Tropical ecosystems and biogeochemical cycles.
2. Impacts of climate change on biodiversity.
3. El Niño-Southern Oscillation and inter-annual climate variability.
4. Ocean-land-atmosphere interactions in Inter-Tropical Americas.
5. Comparative studies of oceanic, coastal and estuarine processes in temperate zones.
6. Comparative temperate terrestrial ecosystems.
7. High-latitude processes.

In addition, the following themes relating to education and interdisciplinary studies are considered significant: human dimensions of global change, networks, training and education, modelling, other cross-cutting themes (*i.e.,* agriculture)

Funding for the IAI comes from participating nations contributing to a central granting agency, the American National Science Foundation. Canada's contribution to the IAI is directed through the Foreign Affairs Department and its International Green Plan Initiative.

NUNAVUT ENVIRONMENT ASSESSMENT TRANSECT (NEAT)

In August 1995, an organizing committee sought funding to develop a research program focussed on high-latitude processes, IAI scientific agenda item number seven, and related themes. For funding, the IAI required careful consideration of the criteria outlined in their scientific agenda, including significant international exposure from new partnerships. Accordingly, efforts were made to contact a broad cross section of Canadian and American academics, identified for their diverse expertise in the physical and biological sciences of polar regions. Canadian scientists who agreed to participate represent Calgary, Carleton, Laval, Memorial, Queen's and Toronto universities. American scientists are from the universities of Massachusetts and Wisconsin. Local experts with the Government of the Northwest Territories and Parks Canada, and from nearby communities agreed to provide comparative data and observations on points of mutual interest (*e.g.,* caribou populations and snow cover).

The Nunavut Environment Assessment Transect (NEAT) program was developed as a means to bring together, through a common funding program, a variety of researchers involved in some of the many facets of global change, interested in

[1] Publication of papers from this Nuna meeting has been aided with financial support from The Memorial University of Newfoundland *via* a grant from the Inter Americas Institute project on high-latitude processes.

[2] **Editor's Note:** We are pleased to publish the following series of papers from the GAC Nuna Conference, Nunavut Environment Assessment Transect (NEAT), held at Pond Inlet, northern Baffin Island in June 1996. As Elliott Burden of Memorial University explains in this introduction, the conference looked at the large question of global climatic change as reflected in Canadian Arctic environments. In one of the following papers, Hardy and Bradley express the problem eloquently: " ...The spectre of global warming has led to predictions of relatively rapid sea-level rise, increased storminess, changes in precipitation patterns, and other consequences, all with profound ecological effects, and serious economic implications for human societies. High-latitude regions such as Nunavut, surrounded by sea ice and and snow covered much of the year, may be particularly sensitive to global climate change, due to amplification of even small changes by feedback processes...". Such is the background for this Nuna Conference. The challenge is to better understand the recent past and present, in order to make sensible predictions of future change in the Arctic. A recurring observation is that the record of arctic environmental measurements and monitoring is brief. Thus paleo-environmental indicators such as pollen, diatoms, laminated sediments, *etc.* from lake sediment cores are key components in deciphering the record of arctic climatic change since the last continental glaciation. The use of such proxy data offers a continuing role for the earth sciences. Global warming and related predictions provide a sense of urgency to climate-related studies in this unique region of Canada. R.W. Macqueen.

long-term monitoring of the environment, and in reporting change from an arctic perspective. Practically, this meant identifying the many environments of the north, determining the most appropriate measures for recording environment change, selecting multiple study sites from the northern tip of Ellesmere Island to the southern shore of Baffin Island, and obtaining approvals for continuous measurement of environment parameters. The National Parks and Park Reserves provide ready-made platforms for measuring changes to the natural environment, and selected communities can provide comparative data on the local impact of human occupation.

Start-up funds were granted for the NEAT program by the IAI in February, 1996. Soon after, the organizing committee at Memorial University approached the Geological Association of Canada (GAC) with a proposal to have this IAI meeting structured as a field conference jointly sponsored by GAC, and identified as a Nuna Conference. The name Nuna, loosely translated from Inuvialuit, and meaning "the land around us," was selected by the GAC for its distinctively Canadian flavour. GAC Nuna Conferences are meetings of specialists called together to discuss and debate one or another aspect of our geological heritage and environment. GAC Council approved in principle a NEAT Nuna conference in Nunavut, recognizing both the geological and environmental significance of the emerging territory Nunavut, and the importance to both the scientific and public communities at large of a field conference in what is one of the most northerly settlements in Canada.

MEETING REVIEW

The Nuna meeting, co-sponsored by the IAI and the GAC and held at Pond Inlet, NWT, 14-18 June 1996, was also supported by the Hamlet of Pond Inlet, the Nunavut Research Institute in Iqaluit, and the Centre for Earth Resources Research at Memorial University of Newfoundland. The Nuna program contained three parts:

1. A conference outlining the state of the environment of Nunavut today;
2. A field trip in and around Pond Inlet to explore sites which are of local to global significance; and
3. A planning session to outline a sharply focussed program for long-term monitoring of changes in this polar environment.

Papers presented during the first days of this meeting were arranged thematically according to our understanding of the physical environment and measurements of natural and anthropogenic change. Each day, time was set aside for questions, discussions and round table planning sessions.

Elliot Burden opened the conference with a presentation outlining the regional bedrock geology of Nunavut, highlighting selected areas where natural conditions of bedrock and topography affect ice, water and weather, and identifying localities where continued anthropogenic change might be expected. Brian Moorman and colleagues showed that although there is a 6 per mil variation in the ^{18}O content of precipitation in the Arctic at present, we will need to better understand the present-day effects of geographic and seasonal variation in isotopic compositions of precipitation before isotopic compositions of ice core material can be used effectively to track climatic changes. Because approximately 75% of Canada's modern glacier-covered terrain occurs in Nunavut, there is potential for glacier monitoring as a means of detecting climate change, as pointed out by Trevor Bell and John Jacobs.

Moving into surface systems, and the impact of short-term changes to the biosphere, Michel Allard showed that systematic variations in permafrost dynamics can be used as indicators of climatic change, but specific sites will need to be monitored. Using pollen data from lake sediment cores, Bill Mode looked at the larger picture of vegetation change over the last several millenia. He showed a pattern of changing vegetation communities during post-glacial times, which can be used as a background to assess predictions of future climatic changes. Raymond Bradley and Douglas Hardy reviewed instrumentally recorded climatic data in the Arctic, concluding that the record is too brief and the number and location of observation stations too limited to be of use in understanding climatic variations backward beyond the last few decades. They advocate extensive use of proxy data as a substitute for instrumental measurements, particularly the collection and study of laminated lake sediment cores. A similar approach is suggested by John Smol and Marianne Douglas, with the study of sensitive diatom assemblages to be used as proxy climatic indicators.

Warwick Vincent and Reinhard Pienitz, through analysis of lacustrine systems, and Moire Wadleigh, through rainfall, lichens and direct atmospheric measurements, identified anthropogenically induced changes to UV-light, and to gaseous and metallic pollutants entering the Arctic from southern sources, mostly of European origin. Bob Helleur, and Jun Abrajano *et al.* presented summaries showing organochlorine and polycyclic aromatic hydrocarbon pollution of high latitude systems from volatiles carried through the air or particles transported by water.

Changes to terrestrial wildlife, as examined by Michael Ferguson, and Gilles Gauthier *et al.*, respond to both long- and short-term changes to the environment, and are exacerbated by cyclical fluctuations in populations and complex migratory patterns. Scientific studies are only now coming to grips with this important part of the physical life and culture of the region. Joanne Zamparo indicated that much can be learned from exchanges of scientific and Inuit traditional knowledge, proposing mechanisms for successfully exchanging information. Most of the presentations may be found in the 12 papers that follow.

Ensuing discussions, which carried on well into the evenings, focussed on our understanding of whether climate is in fact warming or cooling in this region. Related issues in environment change focussed on the sensitivity of Nunavut to pollutants and the impact of global change on Inuit lifestyles.

The field trip involved travel by snowmobile and komatik (Inuit sled), providing three days of traditional exploration practice, not that different from generations past when dog teams were the common mode of travel. Picking their way along the coast and through pressure ridges and open leads, Burden, Allard and Gauthier, the field trip leaders, made frequent stops onshore to identify for the other delegates and Inuit guides, significant geological and biological phenomena which make this area unique for scientist and tourist alike. Included on the trip were visits to nesting snow geese flocks to examine the effects of overgrazing, exploration of pingos and other glacial and periglacial phenomena which shape the tundra in this region, and examination of older Cretaceous and Tertiary strata containing dinosaurs and tropical and sub-tropical vegetation. At the end of each day and following a hearty meal of traditional fare liberally sprinkled with tall tales, the night was spent warmly tucked away under canvas.

It was agreed that the region around Pond Inlet contains many of the necessary requirements for developing a long-term monitoring facility equidistant between proposed research sites located in Auyuittuq National Park in the south and Ellesmere Island National Park in the north. Pond Inlet is relatively close to the Lancaster Sound polynia, a region of prolific biologic productivity, and the entrance to the Northwest Passage, a shipping and migratory route. The Hamlet of the Pond Inlet includes: 1) a relatively well-equipped research station (The Arctic Research Establishment); 2) a community that is familiar with science programs; 3) a community that is prepared to work with scientists in many ways, including sharing traditional knowledge, and; 4) a community with the desire and ability to host ongoing science studies in geology and biology.

A wide variety of globally unique environments exists in this region. From an international perspective significant steps should be taken to understand the global impact of deglaciation, pollution and vegetation change in this high-latitude region. Issues include cycling of CO_2 in the north as permafrost melts and vegetation changes, effect of sea-level rise on biodiversity of migrating species, ultra violet light on oligotrophic and acidified lakes, and understanding migration and sustainable harvesting practices on marine and terrestrial wildlife. To contribute to this understanding, the field trip gave priority to some areas as possible sites for additional glacial, lacustrine, biologic, oceanographic and atmospheric studies. Pond Inlet is logically one of the key areas in Nunavut for monitoring both local and global change.

ACKNOWLEDGEMENTS

Many people have come forward to offer encouragement and assistance with the tasks required in mounting a field conference in one of the most northerly communities in Canada. Nat Maktar provided community liaison with the Hamlet of Pond Inlet and the Arctic Research Establishment, offering many helpful ideas for blending northern and southern interests. Josh Idlout and Philip Paneak of the Toonoonik Sahoonik Co-op Ltd. were our conference ambassadors, ensuring that the facilities for the meeting and field trip were in order. Elizabeth Kyak of the Pond Inlet Co-Op acted as our on-site Inuktituk translator for oral presentations, questions and discussions. Bruce Rigby and Sharon Troke of the Nunavut Research Institute in Iqaluit facilitated written Inuktituk translations of the conference guide book by Tommy Patterk, and kept our priorities focussed on the critical northern issues of science, culture, education and employment. In addition, Bruce did double service with Doug Clark of Parks Canada in Pangnirtung by facilitating discussions on monitoring northern environments. Steve Johnston, representing the Geological Association of Canada, provided counsel on implementing this as a GAC Nuna Meeting on environmental science. Paul Filmer of the Inter-Americas Institute in Washington and Philip Enros of Environment Canada in Ottawa are our liaison officers for this international project. Finally, I would like to thank Roger Macqueen of *Geoscience Canada* for his editorial expertise, our authors and reviewers of papers in this volume, and our Memorial University organizing committee consisting of Louise Green, Jun Abrajano, Trevor Bell, Bob Helleur, Moire Wadleigh, and JoAnne Zamparo for keeping this project moving in a timely fashion.

Elliott Burden
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, Newfoundland A1B 3X5