

Igor Krupnik
Arctic Studies Center, Smithsonian Institution

Arctic residents have long been aware of, and had to cope with, extreme variability in arctic climate, environment, weather, and sea ice regimes. The intimate ecological knowledge they have built through generations is well known, and it has been praised repeatedly as a source of valuable information about former and current climate variations in the high-latitude regions. The real applicability of this hard-earned knowledge to scientific studies of modern climate change, to modeling shifts in ice and atmospheric circulation, or to evaluating the resilience of arctic systems is another matter. One key theme running through the current discussion about indigenous environmental knowledge is how to develop adequate methods for documenting the expertise of arctic peoples and how to present it in a form that is accessible to both the polar environmental sciences and arctic indigenous communities themselves.

Current scientific understanding of arctic environmental and climate change is based upon the many instrumental records that are often short-term, fragmentary in space and time, or both. Weather observation records and sea ice distribution data are now available for many areas, but they rarely extend before the twentieth century. Satellite monitoring of snow, ice, and other parameters covers most of the Arctic, but obviously only for a few recent decades. As scientists move towards broad, multidisciplinary attempts to characterize the arctic system, it becomes increasingly important to understand the nature of the accumulated local knowledge about climate variations and how this expertise by arctic indigenous people reflects the changes in the physical and biological realms documented via scientific records. Despite all the attention currently being given to studies of climate variability globally and in the Arctic, indigenous perspectives are all too frequently overlooked, and indigenous records of change are under used and called nonscientific.

This poster presentation introduces several research projects in the documentation of indigenous knowledge that were covered in a recent collection of papers, *The Earth Is Faster Now: Indigenous Observations of Arctic Environmental Change* (Igor Krupnik and Dyanna Jolly, eds.; Fig. 1). The volume, published in 2002 by the Arctic Research Consortium of the U.S. (ARCUS) in cooperation with the Arctic Studies Center, Smithsonian

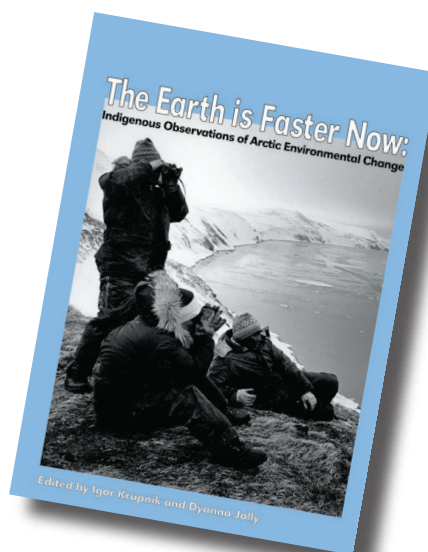


Fig. 1. Volume cover

Institution, addresses indigenous observations of arctic change and the implications of such change for science and the arctic people. *The Earth Is Faster Now* demonstrates that arctic residents have a great deal to say. The projects collected in the volume discuss various issues related to the documentation and understanding the nature of changes that are being seen by northern residents via their specific means of observation. This includes shifts in ice and weather patterns, increase in weather instability, variations in wind and temperature regimes, and various environmental phenomena that can be used as proxy indicators of change, such as change to the migration patterns of marine and terrestrial animals, new seasonality of subsistence activities, changing timing for major seasonal events, and many others.

If indeed the arctic environment is changing rapidly—as many arctic people argue from their first-hand observations—strategies in polar climate and ecosystem research may have to change, too. It is obvious that the increased climate variability in the North simply cannot be understood and addressed without incorporating the specific and detailed environmental knowledge of the arctic people. Records of local observations are created in dozens of indigenous communities across the circumpolar zone, by human inquisitiveness and people's interaction with each other and the environment. Such records are constantly reinforced and immediately tested in discussions with neighbors, fellow hunters, and experienced

* Corresponding author address: Igor Krupnik, Arctic Studies Center, Smithsonian Institution, 10th and Constitution Avenue NW, Washington, DC 20560; e-mail krupnik.igor@nmnh.si.edu

elders. This observation process is nonstop, daily, and intergenerational, without any granting agencies and science planning involved. This is indeed an exciting impetus for partnership and THE new research frontier, to guide the course of today's environmental change research and to draw public attention and debate.

The processes by which this can be done, however, take considerable time and effort on the part of both researchers and arctic residents. Communicating ongoing change from the perspective of indigenous people and in the way(s) they observe and interpret it is, thus, a central theme to this volume. What emerges through nine project overviews organized as separate chapters is a sequence of local, place-based case studies that, taken together, reveal an extensive record of quite alarming events. While many northern physical scientists often talk to arctic people and query their observations of change to the environment, we believe the time has come to put such observations into circumpolar or, at least, in the North American continental perspective.

The projects presented in this collection were all undertaken during the last few years, mainly in 1999–2001. They report ground observations from some 20 indigenous communities (Fig. 2); altogether, they cover thousands of miles, almost the entire stretch of the North American polar zone, from the Bering Strait area to northern Alaska to the central Canadian Arctic to Baffin

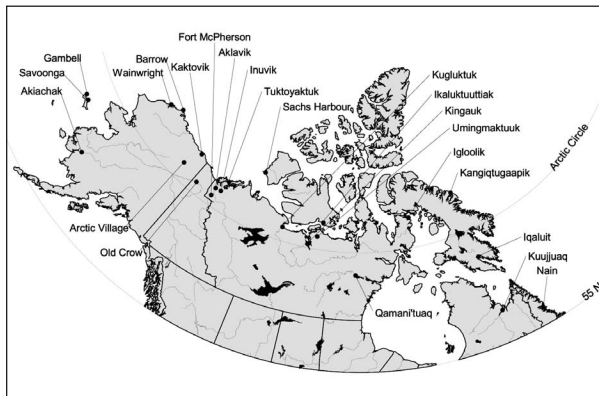


Fig. 2: Map of indigenous communities that participated in the arctic environmental change documentation projects discussed in *The Earth is Faster Now*.

Island and the eastern Labrador coast. Despite their differences in local geography, patterns of community involvement, and researchers' approach, all of the projects were structured around the observations, stories, and personal reflections of the northern residents, the people we work with and learn from. Despite all our daring efforts in scientific planning, writing, and analysis, there would never be a significant body of data in documenting indigenous knowledge of environmental change across arctic North America if not for cooperation and goodwill of so many northern communities and dozens of individual local collaborators. In this way, the project papers offer arctic Native people various venues to speak for themselves, using their own words and explanations.

The book in general is a tribute to the scholarly explorations and research expertise of arctic people. Such knowledge is their special intellectual treasure, the best of their scholarship, and a pinnacle of generations of inquiries and achievements in mastering their beloved though often unforgiving environment. Many projects were, in fact, generated by the Native communities rather than by academic curiosity and research agendas of individual scholars. In return, this contributed to the unique level of knowledge sharing among local experts and researchers, which, we believe, is the true mission and spirit of our common enterprise. Each project and its review paper offered its own perspective on finding ways to make this kind of collaboration possible.

The title of the book, *The Earth Is Faster Now*, also carries a common message. It comes from a comment of a local elder, first shared by Caleb Pungowiyi, then the president of the Eskimo Walrus Commission. While talking to elders in his native village of Savoonga on St. Lawrence Island, Alaska, he recorded the following statement from Mabel Toolie (Legraaghaq, born in 1912). This is how Pungowiyi explained this statement himself:^{*}

My aunt, Mabel Toolie, said [to me]: "The Earth is faster now." She was not meaning that the time is moving fast these days or that the events are going faster. But she was talking about how all this weather is changing. Back in the old days they could predict the weather by observing the stars, the sky, and other events. The old people think that back then they could predict the weather pattern for a few days in advance. Not anymore! And my aunt was saying that because the weather patterns are [changing] so fast now, those predictions can not be made anymore. The weather patterns are changing so quickly she could think the Earth is moving faster now.

The projects described in this volume thus respond to a common urgent issue—the need to come to grips with what is happening in the North, as explained by the people who live there and who are experiencing changes firsthand. The reports in the volume focus on various ways to build a network of community engagement in the climate/environmental change documentation process, or, better, creating different models of community engagement. Whereas the changes to the environment are absolutely obvious to the people on the ground, several questions remain in documenting the actual scope of change. First, what is the best way to reveal it, so that local observations are regarded not as "village stories" but as valid and representative evidences for major environmental shifts that are taking place over substantial portions of the Arctic. Second, how to make individual observations by local hunters, elders,

^{*} Caleb Pungowiyi (from Kotzebue) speaking at the Girdwood Workshop on Sea Ice and Environmental Change, February 15, 2000 (quoted in Krupnik 2000: 26). We are very grateful to Caleb for his kind permission to use his story for the title of the book.

and experienced subsistence users—which are often visual and experience-based—compatible with those made by northern researchers, who rely upon different sets of indicators and methods in their research and whose observations are primarily instrumental. Last but not least, how can people from distant northern communities communicate their message to those agencies that make management and policy decisions? Several project reports in the volume offer various strategies and share experience in building such partnerships with local indigenous communities and regional institutions.

In the project described by Shari Fox, “These Are Things That Are Really Happening: Inuit Perspectives on the Evidence and Impact of Climate Change in Nunavut,” this task has been achieved by building a local climate change observational record via a combination of techniques: from meetings, presentations, and informal discussions to semidirected interviews, focus groups, mapping exercises, and videography in four Inuit communities in Nunavut, Arctic Canada—Iqaluit, Iglulik, Kangiqtugaapik (Clyde River), and Qamani’tuaq (Baker Lake) (Fig. 3). The project presented by Gary Kofinas and co-authors, “Community Contribution to Ecological Monitoring: Knowledge Co-production in the U.S.-Canadian Borderlands,” advances a different model. In this case, a whole system of community-based



Fig. 3: Dramatic fjords near Clyde River, northern Canada, in August 2000.

environmental monitoring was created across the U.S.-Canadian Arctic Borderlands (north-easternmost section of arctic Alaska and the adjacent areas of the Canadian Yukon Territory and the Northwest Territories) via a cooperative of five indigenous communities, government agencies, and university researchers. The main purpose here was to build a long-term database and process of communication, through which evidences of change could be traced and also shared along many parameters and at many different levels, both among participating communities and with researchers (Fig. 4). The project presented in the paper by Dyanna Jolly



Fig. 4: Allan Benjamin of Old Crow scans the autumn landscape from above his cabin on the Crow River. Hunters like Allan are aware of changes in their landscape, both through the stories of their elders and from spending a lifetime travelling community homelands.

and co-authors, “We Can’t Predict the Weather Like We Used to: Inuvialuit Observations of Climate Change, Sachs Harbour, Western Canadian Arctic,” introduces yet another model of formatting Native observations for sharing with and possible use by other constituencies. It describes how residents from the Inuvialuit (Canadian Inuit) community of Sachs Harbour on Banks Island in the Western Canadian Arctic decided to transform their observations of and ideas about the recent changes into a powerful media message—by making a 48-minute professional video, *Sila Alangotok*, in order to raise awareness in more southern regions and to make links with other communities (Fig. 5). The key factor in this crucial decision by the Inuit community to use such a nontraditional venue to convey the message was its great concern about the speed and the scope of environmental change that it observes with the growing anxiety and frustration.

Some volume papers reveal documentation projects that were heavy in researchers’ and observers’ reflections about their partnership, though not framed directly by the arctic climate change paradigm. David Norton’s paper, “Coastal Sea Ice Watch: Private Confessions of a Convert to Indigenous Knowledge,” expresses his own reservations about the linear nature of arctic climate change scenario, a perspective that is shared by his Native collaborators, Iñupiaq whalers from the



Fig. 5: The permafrost on Banks Island is melting at a faster rate than before. The melting has resulted in the ground collapsing around inland lakes and has caused rapid erosion of seaside cliffs as in this photo. Here, John Keogak shows a film crew coastal slumping and permafrost thaw in August 1999.

communities of Barrow and Wainwright in northern Alaska. It was a growing concern for safety of hunters who every year spend several weeks on the sea ice during the spring bowhead whaling season that worked as a key factor encouraging local participation. What came out of this growing concern was a comparative documentation of a series of abnormal historical ice events, such as rapid ice breaks and high-speed ice overrides, that took place during the last few decades. For the first time, Inuit whalers and polar ice researchers brought together their records and shared their explanations of such abnormal ice events as equal partners, but using their specific knowledge perspectives (Fig. 6).

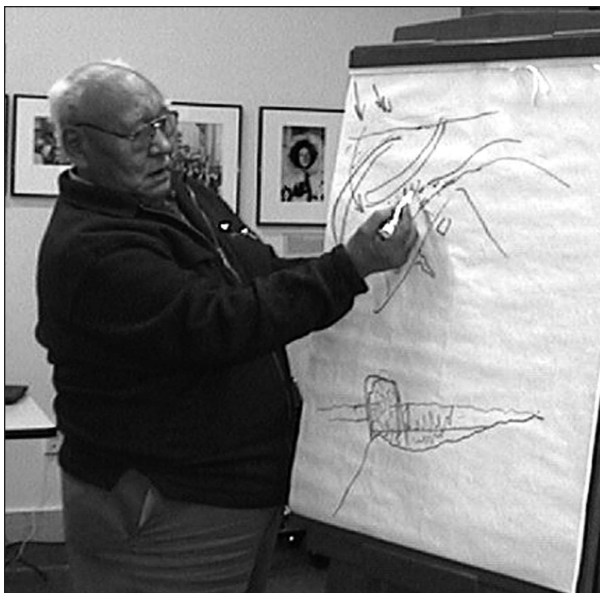


Fig. 6: Kenneth Toovak, Sr., reviews ice features observed by members of the audience during the helicopter overflight of sea ice on March 8, 2000. Photo by Allison Graves.

In the project described by Igor Krupnik, “Watching Ice and Weather Our Way: Some Lessons from Yupik Observations of Sea Ice and Weather on St. Lawrence Island, Alaska,” it was the desire to preserve ancestors’ knowledge on ice and weather monitoring practices that became the key factor for local one-year (2000–01) sea ice observation in the villages of Savoonga and Gambell. This effort was thus an attempt to put a record of Native ice and weather observations by local residents in writing—in both their Native Yupik language and in English—as well as to explore the ways hunters analyze several dozen local ice patterns and weather regimes in “their own Yupik way” (Fig. 7).



Fig. 7: Qenghuk, refrozen crashed ice—one of over 100 types of ice formation identified by the St. Lawrence Island Yupik people. Pencil drawing by Vadim Yenani (October 2001).

The project undertaken by Natasha Thorpe and her co-authors, “Nowadays It Is Not the Same: Inuit Qaujimagatuqangit, Climate and Caribou in the Kitikmeot Region of Nunavut, Canada,” presents a specific cross-section from a long-term collaborative effort in documentation of Native knowledge related to the biology, behavior, and changes in caribou population in Arctic Canada. Here again, the main message is of urgency, because the Quitirmuit in the Nunavut Territory are concerned that current changes in the weather, environment, and wildlife populations seem to be happening too rapidly for people and the environment to adapt.

The project by Claudette Bradley and her colleagues at the University of Alaska Fairbanks, “Travelling With Fred George: The Changing Ways of Yup’ik Star Navigation in Akiachak, Western Alaska,” illustrates how the sharing of knowledge always comes to the issue of change, even when the topic is the sky, the stars, and land orientation techniques. What originally looked (at least for an outside researcher) like a pure knowledge documentation effort to build a classroom curriculum in a Yup’ik community in western Alaska eventually emerged as a discussion of environmental change, as elders observed their old techniques of navigation and traveling in



Fig. 8: The grass is frozen in the same direction as the snow waves. Fred George says the grass is always available to find his direction. Photo by Claudette Bradley.

winter being altered by the new environmental realities of more stormy, unpredictable weather conditions (Fig. 8).

Some recent ventures in the documentation of indigenous knowledge focus primarily on the people side of the human-environment equation, by describing the impacts of current changes upon local people. In the project launched by Chris Furgal and his co-authors at the Public Health Research Unit, Université Laval, "Climate Change and Health in Nunavik and Labrador: Lessons from Inuit Knowledge," the link between human health and ongoing arctic environmental change is critical. These links are seen, for example, in the effects of environmental changes on the new health hazards (such as increased radiation, water supply, sanitation,



Fig. 9: The snowhouse, an icon of the North, may be a thing of the past in some regions because of changes in snow composition. Photo by C. Furgal.

etc.), on the abundance or availability of country food, or the ability of Inuit to access these resources (Fig. 9). In fact, there are many other human aspects to arctic environmental change, as revealed in the project by Scot Nickels and his co-authors, "Putting the Human Face on Climate Change Through Community Workshops: Inuit Knowledge, Partnerships, and Research." This project addressed the role for Native institutions such as Inuit

Tapiriit Kanatami (ITK) in partnering with researchers as well as with local, regional, and national organizations to bring indigenous voices into climate change science and policy debates through a series of community workshops.

Nine project reports are accompanied by a more general perspective on the role of indigenous observations in the current research on arctic environmental change. Fikret Berkes' "Making Sense of Arctic Environmental Change?" looks at the ongoing rapid shifts in arctic envi-



Fig. 10: Spring goose hunting camp at Middle Lake, Banks Island, Nunavut, Canada, in May 2000. After a string of unusually warm springs that saw families travelling to the camp on four wheelers rather than snowmobiles, this spring was unexpectedly cold with more snow than people had seen in years. There was no open water and the geese were three weeks late.

ronment through the framework of an ecosystem sustainability science (Fig. 10). Traditional knowledge, and civil science in general, are essential ingredients of sustainability science because conventional scientific approaches are limited in their ability to deal with complex systems problems such as climate change. Berkes' thoughts offer a challenging test to current stereotypes on how indigenous knowledge can be matched with, checked by, and recorded along the practices of modern science.

In his volume Introduction, Henry Huntington, the lead author for the "Indigenous Perspectives" chapter in the forthcoming Arctic Climate Impact Assessment (ACIA) document, shares his remarks on understanding the Arctic environment system through the richness of knowledge of Arctic people. Beyond the obvious value of such an approach, he also writes of the many challenges that lie on paths that seem so smooth and straightforward from the outside.

The last component of the volume is a short report of a European project team project established in Tampere, Finland. Their project, Snowchange, is a multiyear education-oriented effort to document indigenous observations of climate change in northern regions, particularly across the Nordic countries, Arctic Russia and Siberia.

By putting together the first volume focused specifically on Native observation of arctic change, we bring under a common cover a network of research efforts

by several institutions and individual scholars as well as by the northern communities who are supporting them. The ability of individual voices and projects to raise awareness about what is currently happening in the North is thus multiplied by sharing the stories from Alaska to the central Arctic to Nunavut to Labrador and finally to the Eurasian Arctic. As these individual stories report, as (and if) the climate and landscape continue to change rapidly, many arctic residents wonder "what then?" Neither arctic residents nor scientists have a definite answer, but both parties represented in this volume see it as extremely urgent to start the discussion. This new book provides a good start in that direction.

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