

generalize information without excluding the most interesting details” (p. 13).

The Results section ends with a detailed description of the polar bear harvests reported by the survey participants. The interviewees reported a total of 588 different harvest events, involving 754 individual bears, between 1952 and 2005 (ca. 60% from 1991–2005, ca. 35% from 2001–05). An extensive summary of these harvests, including age/sex composition, geographic and seasonal distribution, and hunting methods (dogsleds versus skiffs), is presented in tables, charts, and maps.

The text concludes with a brief Discussion, which reiterates the study objectives and adds additional context to the results. The authors summarize available information on the status of the two hunted polar bear populations (Kane Basin and Baffin Bay) and caution, on the basis of reported catches, that both populations may be subjected to over-exploitation. They also discuss the value and advantages (and disadvantages) of collecting local knowledge, noting, for example, that the study provided qualitative data that could not be collected using other methods and that can supplement quantitative data collected during biological research. Born et al. conclude by recommending that local observations “be collected systematically through a long-term monitoring system established locally to provide supplementary information on trends in distribution and local density of polar bears” (p. 214).

Overall, this impressive volume is an important contribution to our knowledge of polar bear ecology and distribution. It is well-written and edited and free of jargon, and the printing and reproduction quality are excellent. I found no errors of fact or omissions of important material. The book is well documented, with 93 references (English, Danish, and Greenlandic) on a variety of relevant subjects, including polar bear ecology and status, use of local knowledge in research and management, Greenlandic culture and harvesting techniques, and climate change. There are a total of 119 tables and 37 figures (charts and maps) in addition to a number of high-quality colour photos of bears, hunting techniques, local landscapes and communities, prey items (e.g., pagophilic seals, walruses) and successful predation events.

Born et al. provide a detailed and informative account of the distribution, biology, and harvesting of polar bears and the effects of recent climate changes on the species and the subsistence hunt. I highly recommend this book for researchers and managers involved with polar bear conservation. The information contained here is also of value to many other interested parties and is not limited to those with an interest in polar bears or Inuit harvesting. For example, the reports on climate change observations are of general interest and valuable both to researchers in a wide range of disciplines and to laypersons.

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SIKU: KNOWING OUR ICE. DOCUMENTING INUIT SEA-ICE KNOWLEDGE AND USE. Edited by IGOR KRUPNIK, CLAUDIO APORTA, SHARI GEARHEARD, GITA J. LAIDLER, and LENE KIELSEN HOLM. Dordrecht, Germany: Springer, 2010. ISBN 978-90-481-8648-8. xxxi + 501 p., 38 contributors, maps, b&w illus., appendixes, colour plates, index. Softbound. US\$49.95.

This ambitious book comprises 20 contributed chapters. Its five co-editors enlisted 38 authors to examine comparative Inuit sea-ice knowledge. Credit the International Polar Year (IPY) 2007–2008 for stimulating these extensive efforts. Two geographical emphases emerge: central Beringia, featuring about 15 communities on Russian and North American sides of the Bering Strait; and eastern or Atlantic North America, featuring a like number of communities distributed between Canada and Greenland (Fig. 1.1, p. 6). Here we find abundant evidence for the caution that the Arctic defies generalizations. Instead of one-size-fits-all explanations, the Arctic is better viewed as awesomely varied sets of site-specific, dynamic, and complex relationships and processes. In that sense, Carl Benson’s observation that “ignorance of the Arctic is an infinite resource” rings true. Filling circumpolar spatial gaps in local knowledge of sea ice would likely take forever and require infinite resources.

However gratified we should be that indigenous knowledge of Arctic sea ice has attracted this significant assault on ignorance, my admiration for this emphasis is tinged with regret. Funding for dozens of research projects during IPY 2007–2008 was generated in reaction to perceived risks to communities and their locally based knowledge systems. Those risks were in turn linked to concerns over global climate change. The overview (Chapter 1) credits mounting alarm over anthropogenic causes for trends in baseline environmental conditions with funding for the collective Sea Ice Knowledge and Use (SIKU) Project. Sea ice, like the polar bear, has recently assumed bellwether status. Together, these two icons can be simplified in non-Arctic residents’ minds to symbolic shorthand for the health of the Arctic as a whole. “Ice” as a first-order heading with second-order subheadings fills nine columns in the book’s Index (p. 484–488), but “Climate Change” earns second place for index entries by occupying one and one-half columns of heavily page-referenced entries (p. 481). Must urbanized, Western societies deem ecological and cultural systems to be threatened with collapse before they merit support for trans-disciplinary studies? If so, the achievements in SIKU represent “salvage ethnography” to a regrettable degree (cf. Henshaw, Chapter 19, p. 440).

Any review of Krupnik et al.’s book is hard pressed to convey the full extent to which its many contributors have enriched the subject of sea ice knowledge and use (Table 1.1, p. 18–22 summarizes administrative origins, personnel, and funding sources contributing to this volume). To make sense of this enrichment, I suggest that readers new to Inuit uses of sea ice open the book first to the concise Epilogue (Bravo, Chapter 20, p. 445–452). Reading this last chapter first may

provide enough historical and social context to make the preceding 19 chapters easier to appreciate. Bravo contrasts the fundamentally positive social values assigned to sea ice by traditional coastal inhabitants of the Arctic with the negative values long ascribed to sea ice by Europeans' traditional lenses of commerce and marine navigation. Bravo's argument stresses that ice knowledge is crucial to assuring the functionality of Inuit communities. Predictive ice knowledge systems from Chukotka to Greenland are as essential to Inuit societies as knowledge systems for interpretation of cycles in climate and seasonal weather patterns became to agrarian societies after settlement of the Fertile Crescent and the Nile River Valley, once Pleistocene climatic variability had yielded to Holocene stability (cf. Hulme, 2009:12, 32).

Organizing this collection for publication challenged its editors. They might have arranged the core 18 chapters (2–19) in some geographic order, such as east-to-west. Instead, they chose to group chapters under four themes, as explained in the overview chapter (p. 17). Those themes became the book's four main parts: I – Recording of local observations of climate and ice change (Chapters 2–6); II – Documentation of current use of ice across the Arctic, particularly with modern technologies (Chapters 7–10); III – Learning and transmission of traditional knowledge to the younger generations (Chapters 11–14); and IV – SIKU and Siku: Opening new perspectives (Chapters 15–19). The editors' choice of thematic organization is important to note, since a time-pressed reader might miss the rationale for this order of chapters and end up bewildered by the sequence of contributions jumping unpredictably from one regional set of communities to another.

In paragraphs below, I highlight sample chapters from each of the book's four thematic parts.

In Chapter 6 (“Sila-Inuk: Study of the impacts of climate change in Greenland”) Lene Kielsen Holm focuses on 55 interviewees' observations of climate change over a wide range of communities that span about 13 degrees of latitude (60–73° N) in West Greenland. She contrasts the “poster child” nature of predominantly physical science studies of the Greenland ice sheet and its shrinkage since the 1990s with her own project's reliance on local expertise to collect numerous perspectives on environmental changes. Observed changes in seasonal phenomena are summarized in Table 6.2 (p. 152) for 14 of Greenland's southernmost communities. One of those observations might seem paradoxical to people lacking high-latitude experience. Because icebergs rounding southern Greenland from east Greenland melt faster than in the past, lenses of fresh water form atop seawater. These low-salinity lenses freeze at higher temperatures, “creating dangerous sea ice conditions for hunting.” Choosing local experts with whom to work from various communities (e.g., p. 150, 157) seems to follow the same pattern in Greenland as elsewhere in the Arctic. Hunters, fishers, herdsman, and farmers nearing the end of their active careers tend to be consensual and community-recognized experts in their specialty because they have the longest experiential memories to share.

Claudio Aporta (Chapter 7, “The sea, the land, the coast and the winds: Understanding sea ice use in context”) synthesizes collaborative observations made possible through the umbrella component of SIKU in Canada known as the Inuit Sea Ice Use and Occupancy Project (ISIUOP). In this contribution, Aporta examines the four principal determinants of sea-ice conditions recognized by the Inuit of the Igloolik region of Nunavut, Canada. As is appropriate for Part II, Aporta emphasizes not climatic change, but cultural change and the ongoing challenges to traditional knowledge systems and expertise. For highly mobile Inuit family groups, understanding the sea ice was an integral part of their orientation to all interactive features of their environment in the time before their transition to settlement-based living in the 1960s, and this understanding remains important today. Terminologies for directions, horizon features, and transitions from one condition to another reflect the dynamics of movement through space and time. Aporta illustrates how precisely one person can guide another to a specific location using the dynamics of spatial relationships. One example tells how one guides another to where a disabled sled has been left behind (p. 174). Another example is drawn from a traveler's experience of becoming separated from the trail he had been following over sea ice. Disoriented, he reached his uncle in Igloolik by shortwave radio. The uncle asked a series of questions to establish wind direction, appearance of the horizon downwind and then upwind. Once these spatial relationships were clear, the uncle identified for his nephew the features on the horizon marking where he could expect to rejoin the trail. As is often the case with visitors who gain a deep understanding of local expertise, Aporta admires its multidimensional interpretive power. Beyond envying this power, Aporta laments the limitations of Western sciences, including their “inevitable fragmentation of reality that comes with documentation” (p. 177). Early in the chapter (p. 164), he articulates the acute discomfort that some other investigators (including me) have endured in seeking research support:

A study of Inuit knowledge and use of sea ice implies, inevitably, a simplification of the learning experience as it happens in its original context. The very definition of the research topic (e.g., writing a proposal) involves severing one particular aspect of Inuit knowledge (in this case, the sea ice) from the rest of a multidimensional approach to life and the world....

Chapter 11 (H.P. Huntington, S. Gearheard, L.K. Holm: “The power of multiple perspectives: Behind the scenes of the Siku-Inuit-Hila Project”) documents the evolution of this multi-site project from an earlier NSF-supported comparative study. In the course of a round robin of visits (see Table 11.1, p. 261), several surprises arose. Local experts from Barrow, Alaska, from Clyde River, Nunavut, and from Qaanaaq, Greenland, both hosted at home and became visiting researchers during travels out from the other two participating communities in 2007 and 2008. These visits to

Qaanaaq, Barrow, and Clyde River also included outside researchers—observers academically trained in representative social or natural sciences, but who were nevertheless visitors being hosted by a local team of sea ice experts (p. 262). It was instructive for all participants to see the role-reversals when ice-expert hosts in one community became visitors or visiting researchers in another. “None of the visitors felt comfortable traveling on sea ice alone in the new locations. Instead, they relied (as did all of us) on local expertise and guidance” (p. 264). This description concludes by extolling the virtues of humility, the lack of which could have fatal consequences. Another surprise was to discover that local experts and academically trained researchers could be equally stumped by challenges to understanding qualities of sea ice. One such insight from this project was recognition of ignorance, common to both knowledge systems, about how to account for certain observed currents under sea ice (p. 265, 268). In due course, this Siku-Inuit-Hila Project may emerge as a major story in itself. The participants intend to publish a book of their own.

Unqualified either to distill significant new linguistic insights from any of three chapters (16–18) on Inuit sea ice terminology, or to summarize Anne Henshaw’s chapter (19) on policy-building through partnerships and Inuit empowerment, I focus on Hajo Eicken’s principal contribution to this volume (Chapter 15: “Indigenous knowledge and sea ice science: What can we learn from Indigenous ice users?”). Eicken addresses the question in his title by pointing out that local and indigenous knowledge (LIK) helps science grasp a finer scale of interpretative resolution than can be achieved by satellite imagery and most other forms of remote sensing (p. 358, 362). Eicken’s analysis of the currently increasing collaborations between Western science and local expertise (aka LIK; aka TEK—traditional ecological knowledge) illustrates a significant recovery of balance. I recall an interlude of physical scientists’ and science administrators’ infatuation with remote sensing, in the late 1970s, when the technology of satellite imagery was just attaining full Arctic spatial coverage. About then, Arctic environmental sciences may have hit a historic low point in their reliance on local expertise. Observers at Earth’s surface, including indigenous “informants,” were considered arguably useful for a short stint of fine-tuning by “ground-truthing” the information from remote sensing platforms. A generation or so later, Western scholarship has effectively returned to a more balanced approach to Arctic knowledge. Today, the notion that two-dimensional imagery of sea ice could have captured sufficient knowledge of third- and fourth-dimension (change over various time scales) ice dynamics seems indefensible. In Chapter 1, Krupnik, Aporta, and Laidler remind us that partnerships in polar knowledge systems had become the long-term norm by at least the first IPY in 1882–83 (p. 1). Huntington, Gearheard, and Holm extend recognized partnerships further backward and forward in time to include scholarly contributions by Rochefort Maguire, Roald Amundsen, and Laurence Irving (p. 257–258). Michael Bravo (Chapter 20)

adds Franz Boas, Knud Rasmussen, Richard Nelson, and Milton Freeman (p. 445) to this pantheon of partnership. Thus, Eicken’s contribution is an altogether fitting recitation of many updated dimensions that LIK can contribute to scientists’ understanding of sea ice. He cites eight specific forms and examples of insights achieved only through collaborative work. Eicken concludes with a prognosis that “communities of practice” will become instruments for managing adaptations during an approaching difficult period of global change (p. 373).

Igor Krupnik and his many collaborators deserve congratulations for their efforts. Perhaps few readers will manage to read this book from cover to cover. Months of diligence got me close to that goal, but during that time, I wished that the book contained a master table of decoded acronyms. Page-turner readability, however, is not the same as a book’s long-term significance.

The significance of SIKU’s contribution to understanding the Arctic may be assessed by posing a question: Might the pendulum swing too far? Could collective enthusiasm for Inuit sea-ice knowledge represented in this book overbalance, or overcompensate for, recent decades when Western natural sciences paid too little attention to this knowledge? Let’s hope not, and it seems unimaginable that our Inuit colleagues would want partnerships with scientists to lapse. Isaac Asimov noted with amusement that forms of remote sensing allowed scientists to gain insights into processes on other planets before they had even observed analogous ones on planet Earth. With a telescope, Christian Huygens detected and described the south polar ice cap on Mars in 1672. That was 100 to 200 years before explorers and scientists described the two polar ice caps on Earth in rudimentary terms (Asimov, 1975:212–213). As if continuing in Asimov’s impious style, David Sandwell proposed more recently that the long and difficult birth pains preceding acceptance of the theory of plate tectonics stemmed from earthbound geologists’ having to study Earth’s architecture backwards. He asks us to suppose that humankind and sciences evolved on Mars, and to imagine a 21st century NASA-style series of missions to planet Earth. By exploring Earth at successively finer scales—from planet-wide measurement to detections of minute subsea plate movements—he proposes that five missions would suffice to provide sufficient data to support the theory of plate tectonics (Sandwell, 2003:334–340). Ultimately, however, robust theories grow from holistic thinking and synthesizing multiple perspectives, such as those brought together in this book.

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