

of Dallas Bugt and Cape Leiper Formations. The Lower Cambrian series may be an erosional remnant of the Arctic Platform.

The dark-colored walls on either side of the lowland provide a thermal oasis, which accounts for the vegetation and wildlife that are more lush than the latitude would suggest. The main climatic controls are the proximity to the Greenland high-pressure system and the arctic circumpolar vortex. This results in more heating and drying on the eastern coast of Ellesmere and a two- to three-month growing season at this lowland. A comparison of climatic data for Alexandra Fiord and Eureka indicates that mean annual temperatures are 5–6°C higher on this lowland. The growing season over a nine-year period averaged 376 degree-days at Alexandra Fiord and only 300 at Eureka. Two very important components of the climatology chapter are the year-round sets of data and the comparison of climate in the lowland oasis and the polar desert site at 500 m.

Here, as elsewhere, there is a close relationship between soils and plant communities. Regosolic static cryosol soils support plant communities of lichen–cushion plants–dwarf shrub (*Dryas*) along rock outcrops, outwash plains and beach slopes. Regosolic turbic cryosol soils also support a lichen–cushion plant–dwarf shrub community in sites with frost boils. The orthic static cryosols support dwarf shrub–cushion plant (*Cassiope*) communities at the base of beach ridges in snowbed sites. Gleysolic static cryosols with dwarf shrub–cushion plant communities occur at the southern part of the lowland on seepage and run-off slopes kept moist from meltwaters. Brunisolic static cryosols support deciduous dwarf shrub–graminoid communities along outwash plains near stream channels. Other gleysolic static cryosol soils supporting sedge–cushion plant–dwarf shrub communities occur on outwash plains kept wet from flowing surface water. All soil profiles exhibit weak horizon development due to the climate and frost action. These soils are all acidic because of the granitic parent material. This contrasts with many lands in the High Arctic, where soils are neutral to alkaline.

The vegetation of the lowland was ordered into six plant communities, with the coastal salt marsh the most distinct but of minor extent. Dominant species include *Stellaria humifusa* and *Puccinellia phryganodes*. The sedge–cushion plant–dwarf shrub community with *Eriophorum angustifolium*, *Carex stans*, *C. membranaceae* and the woody species *Dryas integrifolia*, *Salix arctica*, *Cassiope tetragona*, and *Vaccinium uliginosum* accounted for 28% of the vegetation. The lichen–cushion plant–dwarf shrub community (37%), and the dwarf shrub–cushion plant community (19%) were the other most important communities. The herb–dominated (*Epilobium latifolium*) community (5%) and the deciduous dwarf shrub–graminoid (4%) were minor components. These community types, in some modified form, have been reported from elsewhere in the High Arctic.

Additional sections cover standing crop and net production of these lowland communities, and there is a separate chapter on the communities of the upland polar desert (500–700+ m).

The section on autecology includes a chapter on resource allocation that shows the strategy of stress tolerator to be most important. The characteristics of this strategy are slow growth, small allocation below ground, a large allocation to attached litter, and internal cycling of nutrients. This strategy contrasts

with *Carex stans* and *Oxyria digyna* that have a high allocation below ground. *Cochlearia officinalis* has the strategy of a ruderal species, with most allocation to reproduction. Another chapter deals with allocation patterns in 10 species of *Saxifraga*, and another one with *Cassiope tetragona*. The ubiquitous *Dryas integrifolia* was studied in 10 habitats that showed leaf size and mass changed from xeric to hydric sites.

Two short but interesting chapters deal with the patterning of species around a large rock and the recovery of well-preserved plants with glacial retreat averaging 4.1 m·y⁻¹ over the last 22 years. *Dryas* and *Cassiope* plants appear as dormant individuals. This supports the theory that these glaciers are frozen to their base and that their forward movement results from internal deformation.

The final section covers the fauna of the area. The breeding bird density for a three-year period was similar to other high arctic oases (13.2 pr·km⁻²). Ten species commonly nest on the lowland, and an additional 17 species occupy the area. Snow Bunting is the most common species, as it is in other oases. Collembola species are the most abundant arthropods here, as elsewhere, and they reach their greatest species richness in wet habitats. A second major study was conducted on the moth *Gynaephora groenlandica*, because of its amazingly long life history (14 years). There are at least seven insect species that parasitize *Gynaephora* species.

Although quite a few of these articles have been previously published, it is very convenient to have all of the studies combined in one book. The articles are well illustrated and there are few typographical errors. Those who seek information from a multidisciplinary study on a high arctic polar oasis will find this book most valuable. With limited research funding and a seemingly reduced interest in the Canadian Far North, similar studies will be difficult to repeat in the future.

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ARCTIC ADAPTATIONS: NATIVE WHALERS AND REINDEER HERDERS OF NORTHERN EURASIA. By IGOR KRUPNIK. Hanover, New Hampshire: University Press of New England. Originally published in Russian. Expanded English edition, translated and edited by MARCIA LEVENSON. 355 p., 14 maps, illus., bib., index. Hardbound. US\$54.00.

This book is an important work for those interested in indigenous arctic peoples. The recently released American edition is intended to provide Western researchers with “concrete information about Siberian subsistence systems and current patterns of transformation among them” (p. xvi). By combining Western theory about human ecology with the long tradition of Russian ethnography in Arctic Eurasia, Krupnik presents a stimulating and provocative hypothesis about the interconnectedness of successful human ecological adaptation in the North. Using case

studies of Asiatic Eskimo sea-mammal hunters and Nenets and Chukchi reindeer herders from the mid-1850s until the 1930s, he rejects the common view that indigenous Arctic societies achieved a state of equilibrium with their environments by controlling their population growth and by conserving natural resources.

In Chapter 2, Krupnik calculates subsistence balances (i.e., the annual consumption demands versus the annual economic production) for five Asiatic Eskimo communities on the Chukchi Peninsula. Together the five communities numbered approximately 1100 people, who made their living by periodically intercepting whale and walrus along the open coast and by hunting seal within defined territories, supplemented by fishing, hunting, and gathering. Annual harvest data indicate that these Eskimos produced up to twice the amount of their consumption needs through seemingly destructive activities, which included overhunting sea mammals and reducing their reproductive population by deliberately taking young calves and pregnant cows. Yet, these practices did not cause their economy to collapse, as it produced large surpluses for trade with the tundra pastoralists.

In Chapter 3, Krupnik calculates subsistence balances for tundra pastoralists by dividing members of one Nenets and three Chukchi communities into classes: small herders (<150 reindeer), mid-size herders (150–500 reindeer), and large herders (>500 reindeer). Looked at this way, nearly three-fourths of the population, mostly poorer herders, had a negative subsistence balance. Poorer herders owned more male harness reindeer to overcome the severe transport stress of the Siberian tundra, and did not produce enough meat to feed themselves. They made up the difference through traditional subsistence activities, like hunting and fishing, and by working for wealthy families. Wealthy herders owned more breeding does and slaughtered larger numbers of animals for food, raw materials, and trade. Some Chukchi communities became dependent upon coastal settlements, since a positive net subsistence balance was possible only when imported foods provided 30–35% of their diet. Although the relationship approached symbiosis, importing large amounts of high calorie sea-mammal protein and processed foods disrupted the herders' subsistence balances, as the expanding pastoralist population led to overgrazing.

In Chapter 4, Krupnik reconstructs the past thousand years of Eurasian Arctic climatic history from data on navigation and ice conditions, dendrograms, past fluctuations in the Arctic tree line, glaciation and glacial composition, and weather reports. He uses this reconstructed climate history in Chapter 5 to propose that reindeer pastoralism arose during ecologically favorable periods, characterized by "...moderate precipitation; damp, cool summers; and relatively cold winters free from drastic temperature fluctuations" (p. 167). The first such period occurred in the late 1500s and early 1600s, and saw the rise of reindeer pastoralism in Scandinavia, where there were supportive social conditions. At that time, Siberia had favorable ecological conditions, but unfavorable social conditions for indigenous pastoralism due to the Russian invasion. During the second period of favorable climatic conditions for herding in the Eurasian Arctic, from the early eighteenth century until the mid-nineteenth century, social conditions also supported reindeer pastoralism. The Russians encouraged private property ownership, which

ended economic cooperation among indigenous tundra communities, resulting in socioeconomic stratification. From around 1850 until Soviet modernization in the 1930s, wealthy herders dominated the pastoralist economy, and poorer families either worked for them or became part of the sedentary population.

In Chapter 6, Krupnik suggests that unlike tundra pastoralists, Asiatic Eskimos did not have a linear development, but alternated between expansion and decline. Instead of a relatively stable and predictable resource like reindeer herds, coastal hunters utilized a resource base with slim margins of success. If the sea mammals failed to appear, or did not come in sufficient numbers, the hunters survived only by trading with herders, which was possible only if hunters overexploited resources to produce a surplus. This "Dual Subsistence Model" says tundra and coastal populations evolved systems "in which two or more resource use strategies developed in tandem [in a] *dual or paired economy*" (p. 211) as a defense against the Arctic environment, where ecological conditions favored different subsistence strategies at different times. Regions where a paired economy existed, such as northern Scandinavia, show evidence of long-term habitation and cultural progression. Regions like Greenland, that supported only one subsistence strategy or had one of the paired economies fail, became uninhabited for long periods, and cultural traditions were lost.

In Chapter 7, Krupnik states that minimum growth models improperly portray Arctic peoples as static, not dynamic entities. As Arctic populations grew during favorable ecological conditions, they expanded or migrated into new territories. During periods of unfavorable ecological conditions, however, people overexploited resources, which led them to abandon territory and to lose cultural traditions. Indigenous Arctic peoples survived by maintaining constant high growth rates, and some populations increased by a factor of four within a few generations. At times, survival required hunters to ignore rational game management, and they overexploited their resources.

In the final chapter, Krupnik applies his Eurasian Arctic subsistence model to the study of Paleolithic societies. Big-game hunters were "aggressive toward the environment" (p. 252), and as they increased their ability to obtain resources, they disrupted the environment–human equilibrium, leading to local ecological crises. Instead of creating innovative cultural forms, ecological crises destroyed peoples and cultures. The inherent instability of Paleolithic hunting societies caused them to expand and to flourish initially, but to regress and die out during periods of environmental stress. Paleolithic instability was overcome finally through economic diversity in the Mesolithic, when societies began to fish, gather, and eventually produce food as supplements to hunting.

There are three problems with the book's sources. Krupnik states that the Eskimo, Nenets, and Chukchi communities maintained traditional economies into the 1930s. Yet, Russian trading and military operations had influenced tundra herders and coastal hunters in Eurasia for hundreds of years. Indeed, as Krupnik points out, Asiatic Eskimos had traded with Euroamericans for over a century, obtaining new hunting technology like firearms. The Nenets began purchasing foods from Russians in the 1500s, and by the late 1700s annual per capita flour consumption was

over 80 kilograms (p. 93). It is difficult even to accept that the relatively isolated reindeer Chukchi, who were not collectivized until the mid-1930s, were a “traditional tundra reindeer economy” (p. 87). For nearly 50 years in the 1700s Russia attempted its version of ethnic cleansing on the Chukchi, killing many and forcing the remainder to form alliances with other ethnic groups and to inhabit new territories. In addition, beginning in the early 1920s, “Soviet administrative power was increasingly brought to bear on native society, with its own agenda and plans for the communist transformation of life among the indigenous [Arctic] population” (p. 34).

The data were gathered in the early 1920s and 1930s for the *Komitet Severa* (Northern Committee), to help the small peoples of the North make the leap from precapitalist to socialist societies without passing through the capitalist stage. Although collected before the onset of the Stalinist repression of indigenous peoples, the data were probably manipulated to suit the *Komitet Severa*. The introduction of the class struggle into research effectively divided the Arctic populations, legitimized Soviet power and facilitated suppression of indigenous economies. Large reindeer owners were classified as *kulaks* even before 1930; when Stalinist oppression began, they were exterminated as a class and, in reality, as human beings. It is hard to believe that records from the 1920s and 1930s did not have political implications, which makes their accuracy suspect.

The third problem relates to the incompleteness of the climatic data, a cornerstone of the author’s environmental focus. Historical evidence about navigation and ice conditions is anecdotal and sporadic. Dendrograms provide good information about annual summer weather, as do past fluctuations in the Arctic tree line, which are difficult to date except by C¹⁴. Instrument observations are the only reliable source Krupnik uses, but they do not go very far back in time and are reported from only a few stations. An understanding of local climatic conditions that affected the study communities is almost impossible to attain with these sources. While scholars must use the climatic data available, it is difficult to achieve the fine-grained results necessary to correlate with ethnohistorical records.

Arctic Adaptations consists of a complex model built on difficult data and complicated calculations. It is not for the layperson, nor for undergraduates, and should be read by graduate students in a course or under the supervision of an advisor who can help them understand the book. Nevertheless, it is required reading for scholars interested in understanding the past, and the future, of indigenous Arctic peoples. The book’s finest quality is that the Dual Subsistence Model represents an innovative and testable hypothesis on the nature of indigenous Arctic economies and their long-term adaptability.

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TAMMARNIIT (MISTAKES): INUIT RELOCATION IN THE EASTERN ARCTIC, 1939–63. By FRANK J. TESTER and PETER KULCHYSKI. Vancouver: University of British Columbia Press, 1994. 421 p., maps, illus. Softbound. Cdn\$24.95.

Pity the poor Canadian bureaucrat, especially if he or she is engaged on the front line of social engineering, and particularly if this engineering involves Canada’s First Nations. To the public, this bureaucrat seems powerful, with the ability to determine the destiny of entire peoples. And, as this book points out, the Canadian bureaucracy certainly brought dramatic changes in the lives of the people who dwell in the most northerly inhabited part of this country.

But in another sense, these bureaucrats—or at least their reputations—are highly vulnerable. Charged with the responsibility of formulating and carrying out public policy with respect to First Nations people, they may exert power in the short run, but in the long run they cannot win, for the public’s attitude towards First Nations changes over the decades, and what seems enlightened and progressive policy in one generation is likely to seem repressive and stupid in the next. To use a business metaphor, over time the bureaucracy is always behind the curve.

Nowhere is this more true than in the formulation of Canadian public policy towards the Inuit. In the past century, this policy has come full circle. It began at the end of the last century with an attitude of benign neglect, stemming from a belief that the Inuit were content and self-sufficient, and that there was nothing that “civilization” could do for them but harm them. This was followed by a gradual process of extending Canadian sovereignty and law over the Inuit, discouraging practices such as infanticide, while still leaving them to fend for themselves economically. At the end of World War II, the Inuit were brought into the Canadian social welfare system and by the 1960s they were virtually totally dependent wards of the Canadian state. In the past twenty years the circle has closed: the Inuit have become more and more self-governing, as Ottawa has turned over an increasing measure of control to local and regional authorities.

The bureaucrats suffer because they support all these shifts in policy, yet with each turn of the wheel, the discarded policy and its authors are roundly condemned: benign neglect becomes cruel indifference, attempts to help are seen as unconscionable interference. The title of this excellent book is an example of this change in attitude. What once seemed reasonable and humanitarian policies are now seen as “*tammarniit*,” mistakes.

The core of *Tammarniit* is a discussion of the relocation of certain Inuit groups to the high Arctic in the mid 1950s, an episode which has received considerable publicity in the past few years, much of it embarrassing to the veterans of the government of the day. The public controversy has centered on the relocation of 1953, in which a number of Inuit were moved from the Quebec shore of Hudson Bay and Pond Inlet to new communities at Resolute and Craig Harbour, many hundreds of kilometres to the north. The question which received the most publicity was whether this was done for humanitarian reasons or to strengthen Canadian sovereignty in the high Arctic, which had shaky foundations. The authors sensibly conclude that the two