

**CAES-workshop "Reindeer 2000"
Tromsø, Norway, August 1999.**



RANGIFER

**Research, Management and Husbandry of Reindeer
and other Northern Ungulates**

Special Issue No. 13, 2002

Rangifer

Published by: Nordisk Organ for Reinforskning (NOR) Nordic Council for Reindeer Research
Pohjoismainen Porontutkimuselin

Editor: Rolf Egil Haugerud
Address: c/o NVH, Department of Arctic Veterinary Medicine
Stakkevollvn. 23 B
N-9292 Tromsø
Norway
e-mail: Nor.Rangifer@veths.no

Web address: www.rangifer.no

Telephone: +47 77 69 48 10 Telefax: +47 77 69 49 11 Mobile telephone: +47 414 16 833

Bank account: 4760 56 92776 Swift address: SNOWNO22

Subscription rates:

Ordinary subscription (2 issues/year), prices/year: 2003 Subscription runs until cancelled!

Payment and back-issues, see NOR's web address.

Nordic countries	.NOK 200,-
Europe, surface mail	.NOK 220,-
Europe, air mail	.NOK 240,-
Overseas, surface mail	.NOK 260,-
Overseas, air mail	.NOK 280,-
Student, surface	.NOK 150,-

Still available back issues - Rangifer Special Issues ISSN 0801-6399

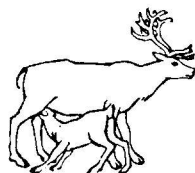
- Special Issue No. 3 (1990) - 5 Int. Reindeer/Caribou Symp., Arvidsjaur, Sweden, 1988 - 460pp
- Special Issue No. 7 (1991) - 5 N. Americ. Caribou Workshop, Yellowknife, Canada, 1991 - 170pp
- Special Issue No. 8 (1993) - Monograph: Porcupine Caribou Herd by D.E. Russell et al. - 168pp
- Special Issue No. 9 (1996) - 6 N. Americ. Caribou Worksh., Prince George, Canada, 1994 - 400pp
- Special Issue No.10 (1998) - 7 N. Americ. Caribou Workshop, Thunder Bay, Canada, 1996 - 264pp
- Special Issue No.11 (1999) - Thesis: Endectocide treatment of the reindeer by A.Oksanen - 112pp
- Special Issue No.12 (2000) - 8. N. Americ. Caribou Workshop, Whitehorse, Canada, 1998 - 216pp



Nordic Council for Reindeer Research (NOR) was founded in 1980 to promoting cooperation in research on reindeer and reindeer husbandry. From 1993 the organisation is under the auspices of the Nordic Council of Ministers (the Ministers of Agriculture). The work of NOR depends on funds from the member governments (Finland, Norway, Sweden and Greenland).

ISSN 0801-6399

Print: Lundblad Media AS, Tromsø



RANGIFER

Special Issue No. 13, 2002
CAES-workshop 'Reindeer 2000'

Issue editors: Päivi Soppela, Bruce Forbes
Editor of Rangifer: Rolf Egil Haugerud

Special Issue	2002	No. 13
Contents		Page
Workshop organizers and preface		3
Program		4
<i>Social science</i>		
Kendrick, A. Caribou co-management: Realizing conceptual differences		7
Sabev, D. Central planning, market and subsistence from a tundra perspective: Field experience with reindeer herders in the Kola Peninsula		15
Heikkilä, L. Reindeer herding and other traditional means of livelihood in modern context – planning a study in a Sami area in Finland		27
<i>Natural science</i>		
Finstad, G. L., Bader, H. R. & Prichard, A. K. Conflicts between reindeer herding and an expanding caribou herd in Alaska		33
Kuzmina, Y. & Leshko, Y. Hydrobiological effects of gathering reindeer at an arctic lake in Russia (<i>Brief communication</i>)		39
Kolesnikova, A. & Uzhakina, O. State of invertebrates on reindeer-grazed localities (<i>Extended abstract</i>) ..		41
Kuljugina, K. Plant cover of sandy deflation scars in reindeer-grazed tundra (<i>Extended abstract</i>)		43
Information		44
11th Arctic Ungulate Conference (AUC)		
NOR grants 2003		

Published by Nordic Council for Reindeer Research
Tromsø, Norway 2002

Example of referring to this issue:

Kendrick, A. 2002. Caribou co-management: Realizing conceptual differences. – Rangifer Special Issue No. 13: 7-13.

CAES¹-workshop 'Reindeer 2000'

CAES-workshop 'Reindeer 2000', 11 and 13 August 1999, Tromsø, Norway

CAES coordinators: Ekaterina Ruth & Päivi Soppela.

Organizing committee: Päivi Soppela, Ekaterina Ruth, Walter Ruth, Bruce Forbes, Ulla Heiskari, Harri Norberg & Tarja Porsanger.

Preface

A group of PhD students, post-doctoral scientists and senior scientists gathered together in Tromsø, August 1999 for the 1st CAES Workshop 'Reindeer 2000', in conjunction with the 10th Arctic Ungulate Conference (AUC). The purpose of the workshop was to stimulate the interdisciplinary approach and communication in studies relating to reindeer and reindeer husbandry.

The workshop got its idea in discussions of many scientists working in research related to reindeer husbandry. A holistic approach and dialogue between discipline borders was seen necessary to better understand the many challenges of today's reindeer husbandry. This workshop aimed to increase understanding and partnership particularly between young natural and social scientists, and to foster closer interaction across the borders, especially between the Nordic countries, North America and Russia.

During the workshop the invited key-note speakers presented how they envisioned an interdisciplinary approach to research being developed in their fields and disciplines. The students' presentations provided an overview of their proposed or ongoing studies. As a whole, the introductions of the key-note speakers and presentations of the students served a basis for the session where the theme 'interdisciplinary' was discussed and future activities were planned. The workshop turned out fruitful and stimulated lively discussions. The number of student presentations was 25 and that of keynote lecturers and organisers was 8. Total number of participants was 46, including participants from the AUC conference.

In specific, the workshop 'Reindeer 2000' was a successful step and get-together for the international course 'Reindeer as a keystone species in the north: Biological, cultural and socio-economic aspects' that was held in the northern Fennoscandia and Kola Peninsula in September 2000 (The Proceedings are published in the Arctic Centre Reports 38, 2002). During the workshop, important contacts were established and the course planning was started.

This issue of *Rangifer* contains four full-length refereed papers that are based on the student presentations in the workshop. The paper of Lydia Heikkilä features challenges of contemporary reindeer herding in a Sami area in Finland, Dessimslav Sabev in tundra camps in the Kola Peninsula, and Greg Finstad in the Seward Peninsula, Alaska. The papers will show differences as well as similarities in the preconditions of reindeer herding in these areas and their particular concerns. In the fourth paper, Anne Kendrick presents considerations of shared decision-making of natural resources between 'local resource users' and 'state resource managers' in caribou co-management – a topical issue also in Nordic reindeer husbandry today.

The present issue also includes the short communication of Yana Kuzmina and the extended abstracts of Alla Kolesnikova and Ekaterina Kuljugina. The other abstracts of the workshop presentations appeared in the Scientific and Social Programme - Abstracts of the 10th AUC, the section CAES Workshop, *Rangifer* Report No. 4, 1999: 103-114.

The workshop was organised by CAES, and supported by NorFA. Warmest thanks to all the participants of the workshop as well as authors and referees of this issue.

Päivi Soppela

¹ Circumpolar PhD Network in Arctic Environmental Studies.

Program CAES-workshop 'Reindeer 2000', Tromsø, Norway 1999

Wednesday, 11th August 18:00 - 22:00

Session 1 Chairs: W. Ruth & P. Soppela

Opening lectures:

"Introduction of the CAES Network". Ekaterina Ruth, Department of Environmental Planning and Design, Luleå University of Technology, Sweden.

"Introduction of the idea of the present Workshop 'Reindeer 2000'". Päivi Soppela, Arctic Centre, University of Lapland, Finland.

Key note lecture 1:

"Resolving complexity in reindeer and caribou grazing systems. The role of interdisciplinary research". David Klein, Institute of Arctic Biology, University of Alaska, Fairbanks, USA.

Students' presentations:

Sari Stark (Finland) - Reindeer grazing and soil carbon and nitrogen dynamics in northern-boreal and oroactic ecosystems.

Ekaterina Kuljugina (Russia) - Dynamics of aeolian sands vegetation cover of tundra zone.

Ulla Heiskari (Finland) - Digestive physiology and nutrition of reindeer with special interest in winter feeding.

Anna Nilsson (Sweden) - Physiological characteristics of reindeer in relation to nutritional status and transition from pasture to feeding.

Pål Storeheier (Norway) - Factors influencing the in vitro digestibility of lichens in reindeer.

Erik Ågren (Sweden) - Early reindeer calf mortality.

Session 2

Key note lecture 2:

"Socio-economic changes in Sami homeland - Renewing traditional knowledge systems". Jorunn Eikjok, University of Tromsø, Norway.

Students' presentations:

Otto Habeck (UK) - Reindeer herding as a survival strategy in the north of the Russian Federation.

Dessislav Sabev (Bulgaria) - Reindeer herding after the Sovhoz: a tundra-centred field-research in the Kola Peninsula.

Lydia Heikkilä (Finland) - The socio-economic significance of the price of reindeer meat - representation of money in the reindeer herding Sami society.

Tarja Porsanger (Finland) - Socio-economic development and reindeer herding in northern Finnish Lapland.

Nicholas Gunslay (Finland) - The effects of the changes within reindeer herding regarding Sami identity and unity.

Summary

Friday, 13th August 09:00 - 18:00

Session 3 Chair: W. Ruth

Key note lecture 3:

"The environmental and economical effects of contradiction between of reindeer-husbandry and industry development on the European North-East: The Experience of interdisciplinary research". Tatiana Evdokimova, Institute of Biology, Komi Science Centre, Syktyvkar, Russia.

Students' presentations:

- Nikolaj Polezhaev (Russia) - Using geographical information systems (GIS) for reindeer range mapping.
Yana Kuzmina (Russia) - Reindeer impact upon the hydrobiological regime of the northern water bodies.
Alla Kolesnikova (Russia) - The relations of reindeer with Coleoptera of Bolchezemelskaya tundra.
Sergej Mishenev (Russia) - Veterinary and ecological aspects of reindeer breeding in northern Russia.
Elena Romanova (Russia) - History and prospective use of reindeer genetics in the Russian North.
Lars Rønnegård (Sweden) - Selection strategies in reindeer management.
Harri Norberg (Finland) - Reindeer calf mortality as a key factor for population management and productivity in reindeer husbandry.
Tatiana Ermashova (Russia) - The effect of using non-traditional foods in the diet of agricultural animals.

Session 4

Key note lecture 4:

"Hunting/herding relationship to reindeer: some social and cultural implications". Yvon Csonka, Prehistory Dept., University of Neuchatel, Switzerland.

Students' presentations:

- Anne Kendrick (Canada) - Complementing links: the exchange between western science and traditional ecological knowledge in caribou co-management structures.
Greg Finstad (USA) - Impact of the range expansion of the Western Arctic Caribou Herd onto traditional reindeer ranges of the Seward Peninsula, Alaska.
Carita Bergman (Canada) - Caribou movement as a correlated random walk.
Amund Høyemork (Norway) - Antler development in reindeer in relation to age and sex.
Raphaella Stimmelmayer (USA) - Meal patterns in reindeer ecological implications.
Michael Ferguson (Canada) - Understanding data and information from different cultural knowledge systems.

Lecture:

"Introduction of the provisional programme of the Course 'Reindeer as a keystone species in the North: biological, cultural and socio-economic aspects' which due to be held in Northern Finnish Lapland, Finnmark and Kola Peninsula in 2000". Päivi Soppela, Arctic Centre, University of Lapland, Finland.

Key note lecture 5:

"Questions of interdisciplinarity in Arctic environmental studies". Walter Ruth, Luleå University of Technology.

Discussions and planning sessions in working groups chaired by lecturers. Organising chair: Walter Ruth, Luleå University of Technology, Sweden.

Results of the working groups. Chairs: P. Soppela, W. Ruth & B. Forbes.

Summary

Caribou co-management: Realizing conceptual differences

Anne Kendrick

70 Dysart Road, Natural Resources Institute, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada (umk-endri@cc.umanitoba.ca).

Abstract: The conditions allowing innovative collective learning of the unpredictable dynamics of caribou populations may be particularly apparent in co-management settings, especially those settings that foster diverse understandings of caribou ecology. This paper examines co-management, specifically caribou co-management in arctic and subarctic North America, for evidence of diverse conceptual constructs among co-management participants. It is suggested that the learning occurring in cross-cultural co-management settings may lead to the development of the humility necessary for the expression and adaptation of diverse understandings of caribou ecology.

Key words: epistemology, knowledge system, management.

Rangifer, Special Issue No. 13: 7-13

Introduction

While acknowledging the significance of the political power dynamics between 'state' and 'community' in caribou co-management, this discussion concentrates on learning and the accommodation of varied ways of knowing. The question of how humans learn to respect other ways of knowing is represented here as a question of humility, a respect for diverse realities. Humility is central to a needed dialectic or "new mode of conversation" allowing diverse and flexible human thought (Gregory Bateson in Mary Bateson, 1991: 306). This discussion sits within a larger global debate about learning that accepts the existence of uncertainty rather than the promotion of 'the myth of abstract certainty' or a belief that science can and will reveal all 'truths'.

Co-management is the sharing of natural resource management decision-making between 'local resource users' and 'state resource managers'. In this case, local resource users are traditional caribou-hunting communities who have had a high degree of cultural and/or economic dependence on caribou for many generations. The 'sharing' of decision-making authority is rarely, if ever, equal in co-management arrangements. Land claims processes have certainly

played a part in addressing this imbalance in decision-making authority in Canada (Campbell, 1996). However, recognition of the political power imbalance between aboriginal peoples and external state agencies is undeniably a part of understanding the learning that occurs in co-management scenarios. References to Aboriginal peoples in this paper include both First Nation/'Indian', Inuit and Métis peoples.

The often-mentioned 'user-manager' dichotomy has never represented a strict divide between aboriginal 'users' and state 'managers'. The seamlessness of resource use, observation, and interpretation of natural processes means that the management and harvest of resources is conceptually and practically inseparable in many northern communities (Usher, 1986: 2). Knowledge is derived from every aspect of caribou harvesting: from travelling, searching, hunting, skinning, butchering, and eating, and this knowledge modifies human-caribou relationships. Moreover, the 'user-manager' dichotomy is further blurred with the settlement of land claims; aboriginal 'users' may also be state 'managers' and policy-makers.

Co-management Tensions and Trust

While co-management broadens participation in resource management decision-making, it is not a panacea for the resolution of long-standing resource management conflicts, especially when there are considerable transaction costs endured by the indigenous societies who participate in these processes (Caulfield, 1997; Kofinas, 1998). These transaction costs are focused on the burden that lies with aboriginal peoples to 'prove land use or lose it' or to prove the legitimacy of their ecological knowledge (AFN and NAFA, 1995: 19). Aboriginal peoples may be 'information-rich, but data poor' and without the transformation of knowledge into shareable data, aboriginal rights and land use systems can be at risk because they are 'invisible,' although equally at risk when 'visible' and therefore easily co-opted (AFN and NAFA, 1995). However, the documentation of indigenous knowledge can be an expensive prospect. Perhaps fortuitously, aboriginal peoples' knowledge often represents knowledge that is prohibitively expensive to collect using conventional biological methods (AFN and NAFA, 1995: 8) and government and aboriginal peoples' needs and resources can be complemented in a kind of political tradeoff.

While not denying that power dynamics are central to co-management decision-making processes, this discussion is an attempt to expand upon the concept of "trust between actors," one of Berkes' (1997) posed conditions for successful co-management. Trust is at the centre of co-management processes, including: "Trust that the sensitivity of [aboriginal peoples] data will be respected. Trust, that the data won't be misused. Trust, that the data was collected in a credible way. And trust that the people or agencies interpreting the data have the skills, sensitivity and understanding to do so" (Olive & Carruthers, 1998: 132).

Trust is connected to *learning* and dependent on the mutual recognition of diverse belief systems or metaphors by the parties involved in co-management. It is suggested that co-management analyses have largely ignored the potential development of innovative learning processes within co-management institutions because of an almost complete focus on political power dynamics.

Of fundamental importance to this discussion is the finding, in a comparative study of Alaskan and Canadian caribou management systems, that neither the Canadian nor the Alaskan systems have found effective mechanisms for incorporating user and manager caribou observations (Kruse *et al.*, 1998). Managers comment that user observations are often difficult to interpret and a divergence in user and

manager views stifles efficient action. As a result, conventional management measures (*i.e.* limiting harvest rates) may be achieved only at the expense of significant short and long-term social costs and with minimal understanding of the natural processes regulating caribou numbers and the viability of caribou populations. A prime example of the social costs possible are early harvest data collection practices in northern Canada. These data were used to set quotas on community harvests, but allowed communities little input into the formulation of quotas (Usher & Wenzel, 1987). Widespread community mistrust of harvest data studies resulted, and negotiations to develop suitable protocols for harvest data collection were long and difficult.

Traditional Knowledge of Caribou

Traditional knowledge ... is encoded in story, song, and dance served to maintain the link between culture and land through all manner of adversity that accompanied colonisation (Duerden & Kuhn, 1998: 33).

The comparative study of Alaskan and Canadian caribou management systems revealed that not only do caribou users and managers have divergent perspectives on caribou ecology and management, but that they have difficulty interpreting each other's knowledge (Klein *et al.*, 1999: 495). It is worthwhile to take a closer look at the structure of traditional knowledge in order to appreciate the perceptual gap between caribou ecologists and traditional caribou hunters.

The notion that the act of harvesting caribou contributes to an understanding of the health and population dynamics of the animals underlies traditional caribou hunters' knowledge of these animals. Historically, hunting practices that allowed mass harvests of caribou occurred everywhere throughout the circumpolar north (Speiss, 1979). A discussion of mass harvests reveals the extent of local knowledge in both a temporal and spatial sense. Drift fences, impoundments and snares were employed (Kelsall, 1968: 213; Speiss, 1979: 105) to harvest large numbers of animals in the past and the use of these techniques was based on knowledge of the timing and location of high caribou population densities and migration paths.

The level of knowledge involved in the coordination of these large harvests is notable given that large numbers of people (800–1000) assembled *expressly* for these hunts (Smith, 1978). For example, the Chipewyan, located in northern Saskatchewan, Manitoba and the Northwest Territories in Canada

(one of several Dene or Athapaskan language speaking groups) had a high dependency on caribou. The Chipewyan needed to have a reasonable expectation and knowledge of the availability of moderate or large bands of caribou (Speiss, 1979: 135). Drift fences mimicked knowledge that caribou movements are mediated by geomorphological features like landscape contours such as ridges and eskers. Assembling large numbers of people specifically for such communal caribou hunts says something about the scale of the knowledge and the formidable communication involved. Drift fences at least a mile (American mile) round have been noted (Kelsall, 1968: 214). The interconnected and socially cohesive Chipewyan bands arcing from just west of the Hudson Bay coast northwest to the Arctic Circle still engaged in communal hunts using chute and pound techniques in the 1920s and 1930s.

It is possible that the hesitancy of communities to accept the methods and technology of caribou population surveys is also related to the ways that such research affects local knowledge exchange systems. "The sharing network, in addition to its functioning as a mechanism for distributing resources through the community, also functions as an information network" (Collings, 1997: 25). 'Local' sharing networks were historically distributed in some northern areas across broad regional areas. For instance, Chipewyan people did not live in isolated, individual camps, but moved between interconnected and shifting aggregations of family groupings. Intercommunity trade networks essentially extended the scale of a 'local' community. The Chipewyan 'information network' rethinks community as 'cultural isolate'. There are other examples of such 'information networks' including the Inupiat peoples who hunt the Western Arctic caribou herd in Alaska. Historically, 20 Inupiat societies were associated with 'home districts,' but identified themselves as part of a single Inupiat Eskimo culture.

These communication networks did not disappear with the advent of permanent settlements. Nakashima (1991: 339) writes of the Québec Inuit and how "... the informed network of communication which is a dynamic part of contemporary community life provides a system by which wildlife conditions, numbers, distribution, etc. can be monitored with unequal efficiency". Temporally and spatially the scales of local indigenous knowledge can be quite large. Local oral histories relate information about isostatic rebound, flooding events and the structure of local ecosystems (Duerden & Kuhn, 1998: 35).

Divergences in Perceptions

The continued differences between 'caribou users' and 'government managers' perceptions of caribou population dynamics (see Kruse et al., 1998) represents a significant epistemological issue; the co-existence of different ways of thinking. Epistemologically-speaking, co-management may contain clues about how to overcome human beings' deficit of what we are able to know and think (Mary Bateson, 1991) and an increasing tendency to homogenize how we are able to know and think. Understanding the assumptions that lie behind the concepts currently employed in caribou ecology is a large part of appreciating the contribution of community-based knowledge (including both traditional ecological knowledge and day-to-day local observations) to an understanding of caribou in circumpolar environments. This discussion uses the term 'traditional ecological knowledge' in the sense of the cumulative knowledge of people connected to place over generations (Berkes, 1999).

While it is important to recognize that human-caribou relationships have an enduring history, the values and behaviour underlying these relationships have always been dynamic. The circumpolar north 'pulsates in space and time' (Krupnik, 1993: 158). The 'cycle' is the basic unit of northern ecology, affecting virtually everything (Pruitt, 1978) and as a consequence, the adaptations of people to circumpolar environments are, and always have been, flexible.

Biologists have recognized the need to examine the historical basis of the differences and resultant conflicts between the environmental perceptions of boreal ecologists and northern indigenous communities for many years (Drolet *et al.*, 1987). The current 'co-production' of knowledge (Kofinas & Braund, 1998) between caribou-harvesting communities and academic researchers includes both the conceptual and empirical knowledge of communities. There has always been interplay between the knowledge of the state and communities about wildlife populations (Feit, 1998). However, the application of local knowledge by wildlife resource professionals increasingly reflects the 'needs and well-being of local resource users' and not just the 'interests and conditions of state institutions' (Feit, 1998: 123). The power dynamics involved in the recognition and expression of local knowledge is expressed by Foucault who has said that the "history and place of science in the larger context of power is needed ..." (quoted in Peet, 1998: 2), and this is as true for the study of caribou ecology as any other aspect of science.

A growing appreciation of the uncertainty involved in understanding fluctuations in caribou

populations is also playing a role in increasing academic interest in the contributions of local knowledge to understandings of caribou ecology (Klein *et al.*, 1999). Caribou population fluctuations are far more variable than biologists imagined 50 years ago (Klein, 1991). Fundamental concepts of caribou ecology in particular are still under negotiation. Even the question of defining 'a herd' is a matter of contention if the perceptions of caribou-using communities and caribou biologists are compared. In the Canadian arctic and subarctic there is an incomplete knowledge of almost all managed species and limited time depth of scientific knowledge (Ferguson, 1997). If fluctuations in caribou population dynamics range from 35-100 years then the observations of state management institutions are limited in the extent to which these cycles can be understood (the first Canadian Wildlife Service studies of caribou began in 1948).

The problems of generalizing to broader spatial and temporal scales, especially in fluctuating environments like boreal ecosystems, are especially problematic (Ferguson *et al.*, 1998). While indigenous knowledge is recognized as a source of empirical knowledge and ecological hypotheses, it has only recently been recognized by scholars as a source of alternative interpretation (Cruikshank, 1998; Ferguson *et al.*, 1998; Wenzel, 1999). Local knowledge is particularly critical to understandings of caribou dynamics precisely because of the wide circum-polar distribution and diverse habitats that caribou occupy. Gaining an understanding of caribou population dynamics and potentially predicting the responses of caribou populations to global warming, for instance, limits the value of generalizations (Gunn & Skogland, 1997). Moreover, it is predicted that global warming will add further variability to the inherent fluctuations in caribou population size and this effect will vary regionally (Gunn & Skogland, 1997).

The Relationship between Human Purpose and Resource Management

The limitations of humankind's understanding of ecological processes is a systemic, epistemological problem (Gregory Bateson quoted in Mary Catherine Bateson, 1991). Mary Catherine Bateson (1991) summarizes this problem as:

... a destructive mismatch between human behavior and the characteristics of the biosphere within which human beings live and on which we depend [exist]. This is a mismatch rooted, not in the mistakes of particu-

lar chemists or the wastefulness of hunters or farmers, but in the human capacity to think about natural systems and act on that knowledge.

Co-management is potentially an arena where the human capacity to think about natural systems may be 'remembered' and expanded. This may be achieved not only by respecting the metaphors or beliefs of local communities which inform the technical aspects of traditional knowledge and practice, but learned in institutions displaying the ability to link thought about social and ecological systems. Fienup-Riordan's (1999) recent work with Yup'ik communities in Alaska confirms the importance of the social connections between state and community. Without the development of personal connections, collaborative work between communities and the state remains limited in scope. As expressed by one Yup'ik elder:

There are different kinds of biologists. Some stick with what they know, they don't try to expand their knowledge. There are the others who want to learn more and expand their knowledge to help us (Fienup-Riordan, 1999: 19).

Understandings of caribou population dynamics are limited by a lack of environmental history (Bergerud, 1996 in Anderson, 2000). Implicit in gaining a sense of this history is understanding the linked history of caribou and people. The seasonal shifts of micro/ macro-bands of Chipewyan and how these shifts matched the movements of caribou is an example of the communication exchange networks that marked human-caribou relationships in the past. However, understanding the collective actions and knowledge of today's settled caribou-hunting communities is equally important. In order to appreciate the contributions of community-based knowledge to current academic discussions of caribou health, population size and dynamics, the links between past and present knowledge are key.

Defining Caribou Population Dynamics: by whom and how

Terms such as herd 'health,' 'stability' and 'change' are descriptions bound in logic that may not be equivalent to indigenous concepts of cyclical processes like caribou population dynamics. Gunderson and his colleagues (1995) describe ecology's struggle to understand the 'soup' of processes represented by ecosystems often undermined by lin-

ear thinking (quoted in Kofinas & Braund, 1998). Community knowledge of population dynamics may shed light on this 'soup' if it is not masked by conventional understandings of ecological dynamics. Short-term swings in weather and plant biomass may explain longer-term (decades) fluctuations in caribou herd size. However, factors such as predation and human harvest may increase or decrease these swings and serve to dampen fluctuations.

If human harvests can play a role in dampening caribou fluctuations when population numbers are low, then the matter of how and who defines population 'crises' becomes all the more important. Disagreements between caribou users and managers about the existence of caribou population crises can be seen across the North American North, from Alaska to Québec (Meredith, 1983; Freeman, 1989; Collings, 1997; Kofinas, 1998; Anderson, 2000). It appears that the conclusion of caribou biologists that caribou populations were in a state of 'crisis' in the 1970s may have contradicted what communities knew about the sequencing and phenology of caribou movements and distributions.

We return again to the notion of defining 'a herd'. There are "major differences between the Inuit concept of caribou populations and that used commonly by caribou biologists" (Ferguson *et al.*, 1998: 216), and in the case of southern Baffin Island, "Inuit knowledge proved to be temporally and spatially more complete than the written record" (Ferguson *et al.*, 1998: 201). The herd discreteness issue can be looked at from behavioural and genetic points of view. The two are obviously related, but how do community perspectives of the behavioural aspects of herd dynamics advance understanding?

In parallel to Ferguson's work with Baffin Island Inuit, Soviet ethologists, adopting much of their thinking from local perspectives, describe *stado* (migratory aggregations) in relational and behavioural definitions of caribou groupings. 'Herdness' changes seasonally and by activity (Anderson, 2000), varying according to the microecological conditions of each season. "These relational models of migrations are supported by a rather less well known side of Soviet biology and ethology which stresses the voluntaristic and direct effects of people on natural phenomena" (Anderson, 2000). Inuit and Dene elders have also suggested that the relocation of people to certain regions (and away from others) dramatically impacted migratory behaviour (LIA, 1977; Smith, 1978; Bussidor & Bilgen-Reinart, 1997). The long-standing and mirrored relationship of people and caribou is well-recorded, but the effects of human movements and behaviour on caribou popu-

lations beyond speculation on the effects of harvesting levels is little understood.

The historical distribution of Chipewyan camps in the taiga-tundra ecotone directly mediated the migratory movements of the Qamanirjuaq, Beverly and Bathurst caribou herds. "The hunting groups may be viewed as strategically situated reconnaissance patrols for collecting information on caribou movements and intentions" (Smith, 1978: 83). The composition of regional and local bands and hunting ranges was extremely flexible to accommodate the variation of caribou movements (Smith, 1978: 84). The archaeological data of the spatial arrangement of bands along the forest-tundra transition zone has considerable time depth (Smith, 1978: 75), following the same annual cycles of movement from at least A.D. 1400-1900 and possibly much longer. This is particularly remarkable given that herd size fluctuated considerably during this period (Burch, 1991).

This knowledge of the historical links between Chipewyan and caribou has implications not only for the temporal and spatial depth of this knowledge, but for the understanding of the human-caribou interaction itself along caribou migratory routes. Although Chipewyan do not currently live in this spatial distribution, the experience and memory of living in a seasonal round in relationship to caribou movements still exists, and movements to re-create an information network that partially replicates such communication should not be discounted. The knowledge of the pattern or sequencing of movements may be linked to knowledge of changes in abundance or herd size.

Ferguson's work with the Inuit of south Baffin Island shows evidence of different patterns of thought about caribou dynamics. The processes of range expansion including range drift and shift in wintering areas (Ferguson *et al.*, 1998) are also observed by Gwich'in (like the Chipewyan the Gwich'in are Athapaskan language speakers) in the western Canadian Arctic (Kofinas & Braund, 1998). For example, during population decreases, winter range volatility is marked by frequent and unpredictable interannual range shifts. Inuit and Gwich'in observations describe changes in population dynamics useful in predicting future changes through knowledge of the sequence of changes in caribou movement and distribution.

Community harvesting practices essentially highlight the range not only of the local observations of caribou-hunting communities, but the geomorphological and phenological knowledge of traditional caribou hunting peoples. Archaeological data show the temporal depth of this knowledge; there is a cor-

relation between phytogeographic change, caribou behaviour and human adaptation (Speiss, 1979: 51).

Conclusions

Since the uncertainty of knowledge about caribou population fluctuations is high, science can't predict when significant changes in herd populations will occur (Kruse *et al.*, 1998). Caribou monitoring data is particularly subject to sampling and measurement errors. The traditional way of life of caribou hunting peoples such as the Chipewyan illustrates that it is possible to adapt to and live within the uncertainties of caribou population dynamics. Resource user knowledge can address the problem of persistent uncertainty with respect to the timing of changes in populations especially among people such as the Chipewyan who historically had a high dependency on caribou (Speiss, 1979).

Handling the uncertainty of current understandings of caribou population dynamics is critical to the manner caribou ecologists and caribou-hunting communities 'co-produce' knowledge to reflect the problem of uncertainty in a comprehensive manner (Kofinas, 1998). There is a possible resolution of the mixing of typologies of population structures to be found with reference to community-based knowledge of behavioural parameters (Anderson, 2000). However, formalized caribou management systems do not have a firm grasp of the flow of information between communities, native organizations, management agencies and industry (Kofinas & Braund, 1998).

A careful study of the environmental history of human-caribou relations, the manner in which landscape ecology affects herd discreteness, and how human behaviour affects caribou migratory behaviour, might expand models of caribou population dynamics. Current efforts to identify local propositions of caribou movements and distribution do exist. What this discussion hopes to have outlined, however, is that concepts like 'population health,' 'stability,' and 'crisis' are not neutral classifications. What is known and who is knowing are intimately connected. Community insights into herd discreteness, population shifts, and range expansions for instance, can shed light on the complexities of caribou ecology not commonly integrated into formal intellectual discourse. Real innovation in thought may be discovered in resource management approaches that concentrate on recognizing cultural differences in learning patterns.

Acknowledgements

Grateful thanks are due to the organizers of the CAES Ph.D. network, who have provided a wonderful opportunity to share ideas with students involved in work from all around the circumpolar North and gave me the opportunity to share and develop many of the ideas in this paper. The author (and hopefully this paper!) benefited enormously from the comments of two anonymous reviewers.

References

- Anderson, D. G. 2000. *Rangifer* and human interests. – *Rangifer* 20: 153-174
- Assembly of First Nations and National Aboriginal Forestry Association. 1995. *The Feasibility of Representing Traditional Indigenous Knowledge in Cartographic, Pictorial or Textual Forms*. Ottawa: Assembly of First Nations.
- Bateson, M. C. 1991. *Our Own Metaphor – A Personal Account of a Conference on the Effects of Conscious Purpose on Human Adaptation*. Washington: Smithsonian Institution Press.
- Berkes, F. 1999. *Sacred Ecology – Traditional Ecological Knowledge and Management Systems*. Philadelphia: Taylor and Francis.
- Burch, E. 1991. Herd Following Reconsidered. – *Current Anthropology* 32: 439-445
- Bussidor, I. & Bilgen-Reinart, U. 1997. *Night Spirits – The Relocation of the Sayisi Dene*. Winnipeg: University of Manitoba Press.
- Campbell, T. 1996. Co-management of Aboriginal Resources. – *Information North* 22 (1): 1-6.
- Caulfield, R. A. 1997. *Greenlanders, Whales and Whaling – Sustainability and Self-Determination in the Arctic*. Hanover: Dartmouth College, University Press of New England.
- Collings, P. 1997. The Cultural Context of Wildlife Management in the Canadian North. – In: Smith, E. A. & McCarter, J. (eds.). *Contested Arctic – Indigenous Peoples, Industrial States, and the Circumpolar Environment*. Seattle: University of Washington Press.
- Cruikshank, J. 1998. *The Social Life of Stories: Narrative and Knowledge in the Yukon Territory*. Lincoln and London: University of Nebraska Press.
- Drolet, C. A., Reed, A., Breton, M. & Berkes, F. 1987. Sharing Wildlife Management Responsibilities With Native Groups: Case Histories in Northern Quebec. – In: *Transactions of the 52nd North American Wildlife and Natural Resources Conference*, Washington: Wildlife Management Institute, pp. 389-398.
- Duerden, F. & Kuhn, R. G. 1998. Scale, context, and application of traditional knowledge of the Canadian north. – *Polar Record* 34 (188): 31-38.
- Feit, H. A. 1998. Reflections on local knowledge and institutionalized resource management: Differences,

- dominance and decentralization. – In: L.-J. Dorais, Nagy, M. & Müller-Wille, L. (eds.). 1998. *Aboriginal Environmental Knowledge in the North*. Québec: GÉTIC, Université Laval, pp. 123-148.
- Ferguson, M. A. D. 1997. Arctic Tundra Caribou and Climatic Change: Questions of Temporal and Spatial Scales. – *Geoscience Canada* 23: 245-252.
- Ferguson, M. A. D. & Messier, F. 1997. Collection and Analysis of Traditional Ecological Knowledge about a Population of Arctic Tundra Caribou. – *Arctic* 50: 17-28.
- Ferguson, M. A. D., Williamson, R. G. & Messier, F. 1998. Inuit Knowledge of Long-term Changes in a Population of Arctic Tundra Caribou. – *Arctic* 51: 201-219.
- Fienup-Riordan, A. 1999. *Yaquet Qaillun Pilartat* (What the Birds Do): Yup'ik Eskimo Understanding of Geese and Those Who Study Them. – *Arctic* 52: 1-22.
- Freeman, M. M. R. 1989. Graphs and Gaffs: A cautionary tale in the common property resource debate. – In: Berkes, F. (ed.). *Common Property Resources*, pp. 92-109.
- Gunderson, L. H., Holling, C. S. & Light, S. S. (eds.). 1995. *Barriers and Bridges to the Renewal of Ecosystems and Institutions*. New York: Columbia University Press.
- Gunn, A. & Skogland, T. 1997. Responses of Caribou and Reindeer to Global Warming. – In: Oechel, W. C., Callaghan, T., Gilmanov, T., Holten, J. I., Maxwell, B., Molau, U. & B. Sveinbjörnsson (eds.). *Global change and arctic terrestrial ecosystems*. New York: Springer, pp. 189-200.
- Kelsall, J. P. 1968. *The Migratory Barren-Ground Caribou of Canada*. Ottawa: Department of Indian and Northern Affairs.
- Klein, D. R., Moorehead, L., Kruse, J. & Braund, S. R. 1999. Contrasts in use and perceptions of biological data for caribou management. – *The Wildlife Society Bulletin* 27: 488-498.
- Kofinas, G. P. 1998. *The Costs of Power Sharing: Communities in Porcupine Caribou Herd Co-management*. Ph.D. Thesis. Vancouver: University of British Columbia.
- Kofinas, G. P. & Braund, S. R. 1998. *Local Caribou Availability: A Draft Report from Community Involvement Phase 2 of the National Science Foundation Community Sustainability Project*. Online at <<http://taiga.net>>
- Krupnik, I. 1993. *Arctic Adaptations: Native Whalers and Reindeer Herders of Northern Eurasia*. Hanover: Dartmouth Press of New England.
- Kruse, J., Klein, D., Braund, S., Moorehead, L. & Simeone, B. 1998. Co-Management of Natural Resources: A Comparison of Two Caribou Management Systems. – *Human Organization* 57: 447-458.
- Labrador Inuit Association. 1977. *Our Footprints Are Everywhere*. Labrador: Labrador Inuit Association.
- Meredith, T. C. 1983. Institutional arrangements for the management and exploitation of the George River Caribou Herd: Remote or local control? – *Etudes/Inuit Studies* 7: 95-112.
- Nakashima, D. J. 1991. *The Ecological Knowledge of Belcher Island Inuit: A traditional basis for contemporary wildlife co-management*. Ph.D. Thesis. Montreal: McGill University.
- National Film Board. 1982. *The Kaminuriak Herd Film/Videotape Project*. (film crew: Snowden, D., Kusagak, L. & Macleod, P.).
- Olive, C. & Carruthers, D. 1998. Putting TEK into Action: Mapping the Transition. – In: Trostler, R. L. (ed.). *Bridging Traditional Ecological Knowledge and Ecosystem Science*, Conference Proceedings, 13-15 August, 1998, School of Forestry, College of Ecosystem Science and Management, Northern Arizona University, Flagstaff, Arizona, pp. 128-133.
- Peet, R. 1998. Existentialism, Phenomenology, and Humanistic Geography. – In: *Modern Geographical Thought*. Oxford: Blackwell Publishers, pp. 34-66.
- Pruitt, W. O. 1978. *Boreal Ecology*. London: Edward Arnold.
- Smith, J. G. E. 1978. Economic Uncertainty in an "Original Affluent Society": Caribou and Caribou Eater Chipewyan Adaptive Strategies. – *Arctic Anthropology* 15: 68-88.
- Speiss, A. E. 1979. *Reindeer and Caribou Hunters - an archaeological study*. New York: Academic Press.
- Usher, P. J. 1986. *The Devolution of Wildlife Management and the Prospects for Wildlife Conservation in the Northwest Territories*. Ottawa: Canadian Arctic Resources Committee.
- Usher, P. J. & Wenzel, G. 1987. Native Harvest Surveys and Statistics: A Critique of Their Construction and Use. – *Arctic* 40: 145-160.
- Wenzel, G. W. 1999. Traditional Ecological Knowledge and Inuit: Reflections on TEK Research and Ethics. – *Arctic* 52: 113-124.

Manuscript accepted April, 2002

Central planning, market and subsistence from a tundra perspective: Field experience with reindeer herders in the Kola Peninsula

Dessislav Sabev

Centre d'Études sur les Lettres, Arts et Traditions, Université Laval, Québec G1K 7P4, Canada
(dessislav.sabev@fss.ulaval.ca).

Abstract: This paper is based on field experience in the tundra camp of a reindeer-herding brigade with mixed ethnic background (Komi, Sami, Nenets, Russians) belonging to the ex-Sovkhoz of Krasnoschelié. Its purpose is to situate the new critical issues facing the reindeer-herding collectives after the economic collapse in Russia in 1998. My main argument is that the increasing economic isolation of the tundra periphery forces the herders to redefine their relationship with both the centre(s) and the other tundra actors. Reindeer herding on the Kola Peninsula is analysed in relation to its heterogeneous economic system defined by the old Sovkhoz-like management and the new Western buyer of reindeer meat. Furthermore, the social environment in the herding territories has changed since the deterioration of the central planning economy, implying new renewable resources' users. After massive loss of jobs, militaries, miners and geologists came into the tundra for substantial hunting and fishing and so became actors in the local informal economy. Finally, tundra-located herders and hunters seem to be somewhere unified by a discourse against the town-based administrative power and economic actors such as mining industry. Therefore herders have to deal with both an old administrative system in the agrocentre and new realities in the tundra. Based on a case study of herding/hunting activities in a tundra camp, the paper analyses the social relationships between the different actors in the post-Soviet Kola tundra and express their quest for solutions.

Key words: bazi (tundra camps), brigades (crews, collectives), informal economy, participant observation, periphery, Sovkhoz, syncretism.

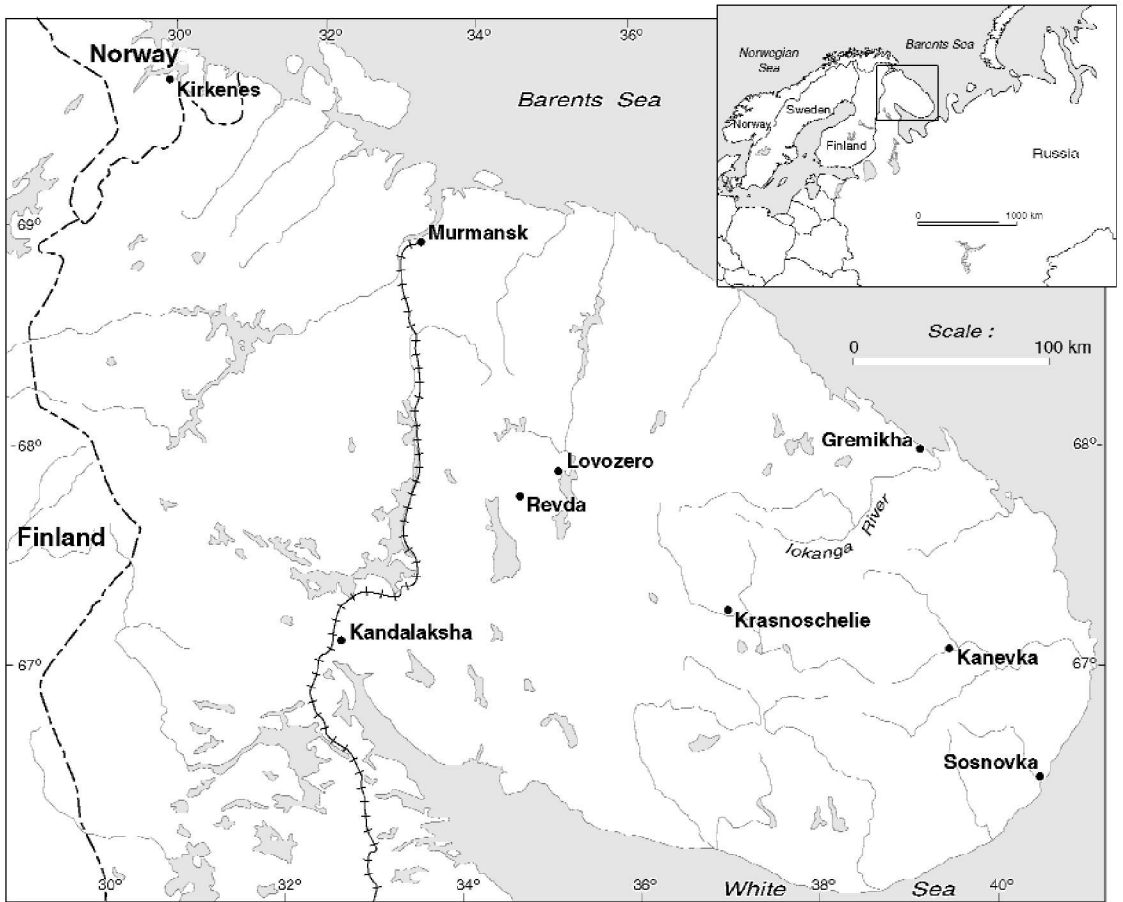
Rangifer, Special Issue No. 13: 15-26

Introduction

The sharp deterioration of the Russian economy in 1998 has strongly affected the northern periphery. The aim of my fieldwork was to share experience with tundra actors in the given economic crisis and to look, from a 'tundra perspective', after the current social dynamics in the post-Soviet North. More specifically my concern is how the economic relationships in the very periphery are redefined in response to centre's pressures. This paper follows a ten weeks fieldwork conducted during the spring 1999, mainly at the reindeer herding camp No. 1, belonging to the former state farm *Pamyat' Lenina* ('Memory of Lenin'). During Soviet rule, the tradi-

tional reindeer husbandry was reorganised into collective farms (*kolkhoz*) and later into state farms (*sovkhoz*). Created in 1921 in the village of Krasnoschelié, the Kolkhoz has progressively formed what will be later called 'agrocentre'. Classed as *perspektivnoe* ('with good prospects')¹ the village of Krasnoschelié became a local agrocentre after the fusion with two other *kolkhoz*' (Ponoy and Sosnovka) in 1962. Then the improved Kolkhoz was renamed *Pamyat' Lenina*. It was transformed into a state farm (*sovkhoz*) in 1971. In terms of reindeer husbandry, *Pamyat' Lenina* has been the second biggest state farm after the sovkhoz 'Tundra' in Lovozero. It consists of four operating brigades with 10 herders each

¹ See Palloit (1990: 665) about the methodology of classification.



Laboratoire de cartographie, Département de géographie, Université Laval

Fig. 1. Natural and social environment for the reindeer herding in the Kola Peninsula.

The two reindeer-herding farms are located in Lovozero ("Tundra", majority Sami) and in Krasnoschelie ("Olenevod", with units in Kanevka and Sosnovka, majority Komi). The South-North oriented railway through Kandalaksha to Murmansk has been the artery providing labor power from South for the 1930s industrialization. Nowadays it divides the peninsula into a heavy industrialized urban West and a low-populated pastoral East. Furthermore, the reindeer-herding camps, situated North from Krasnoschelie and North-East from Lovozero are surrounded by Northern Fleet military bases, towns and complex from the coastal North-East: Gremikha military town relies on Iokanga River² as does Krasnoschelie's tundra camp No. 1. Westward beyond the national border, Scandinavian investors create market expectations in the still centralized Farm Administrations.

one and nearly 20 000 reindeer (new data 2002). The 'Tundra' state farm was reported to include 25 000 reindeer in 2001 (Jernsletten & Klovov, 2002). Both state farms are situated in the eastern part of the peninsula, encompassing nearly the entire tundra region of Kola, administratively defined as Lovozero District.

The tundra camp of brigade No. 1 is located on the Iokanga river 350 km away from the municipal centre Lovozero. Its economic centre, though, is in

Krasnoschelie, which, despite of the status of 'agro-centre' is in fact a remote village not connected to the road system of the peninsula. The social environment of the reindeer herders has definitively changed after president Yeltsine and prime minister Chubais started reforms on privatisation (*Zakon "O privatizatsii gosudarstviennykh i munitsipial'nykh predpriyatii v RSFSR"*, 1991). In this paper I argue that the economic crisis during the transition in Russia is investing the geographical isolation of the tundra regions

² For more detailed maps on military bases, see Skorve, 1991: map 8; Ries & Skorve, 1987: 47.

Table 1. Economic and social relationships between the main actors in the agrocentre and the tundra. The paper focuses the periphery and emphasise the “tundra perspective”.

	AGROCENTRE		PERIPHERY
Location	Village administrative centre	(ex)State Farm economic centre	Tundra camps
Actors	<i>Lovozero</i> (District centre) ----- <i>Krasnoschelië</i>	<i>Sovkhoz Tundra</i> 8 brigades ----- <i>Pamyat' Lenina</i> 4 brigades	reindeer herders; military, geologists, hunters, poachers
Relationship	<u>Substantial</u> Family network	<u>Vertical relationship</u> Sovkhoz administration - Brigades	<u>Informal horizontal relationship</u> Brigades - other tundra actors

into a syncretic network of heterogeneous economic models which relates the reindeer herding brigade as a ‘convergence point’. Indeed, the tundra-camped brigade has to manage both its inherited Soviet-like relationship with the centre(s) and its informal deals with the new tundra actors. The main actors in the agrocentre and the tundra are depicted in Table 1.

As for the ethnic landscape, there is a great deal of ethnic variety in the brigades with no clear distinction, due to the many mixed marriages and the industrial migration from the south in Soviet times. However, one could say that the Sami represent the majority in "Tundra" sovkhos brigades, whereas the Komi are predominant in "*Pamyat' Lenina*" herding collectives. The Nenets, though, are represented in all the brigades, as well as Russians descendants of the 1930s labour migrants. Brigade No. 1 of Krasnoschelië consists of ten herders including six Komis, two Nenets, one Sami and one young Russian herder. The chief brigadier and his deputy are Komi brothers.

According to the Soviet organisation of the reindeer herding, the brigade consists of ten herders and two female *chum-rabotnitsi* (tent helpers), usually relatives (wives) to some of the brigade’s herders. A particularity of Krasnoschelië’s herding brigades is the lack of female tent workers after 1991. This is not the case in Lovozero’s tundra camps, nor to other herding brigades in the Russian north. Comparing to Lovozero, Krasnoschelië is a very remote settlement, cut from all communication system, with a poorer farm as unique economic actor. Its herding camps are too far from either the village and the slaughter house near Lovozero. May be the geographic isolation and the absence of cash for the tun-

dra workers are the main reasons why the herder’s wives don’t work in the tundra camps. This is the case in Brigade No. 1 where a former construction worker from the sovkhos has been working as a tent helper (*‘polar’*) since 1993 when the chief-brigadier asked him to join the brigade. At 53, he is the oldest in the brigade and uncle to one of the herders. His ethnic history could be representative of the current identity issues, although these are not the subject of this paper. He is the descendant of a great and famous Nenets family of reindeer herders from Yamal (Nenetskiy okrug, north-west Siberia). They came to the Kola peninsula during the great Komi-Nenets migration in late 19th century when a disastrous epidemic was killing the reindeer herds in north-west Siberia. His father was a herder and owner of 300 animals expropriated during the Soviet ‘collectivisation campaign’ in the north in the 1930s. His mother was tent helper and artist of traditional Nenets herder’s clothes represented at exhibitions in Moscow. He married a Komi girl from Krasnoschelië and they had four children. Despite his well-known Nenets family and his marriage with a Komi woman, his passport says that he is ... Sami. He has never explained this point to me but as described also by Konstantinov (1996: 54), ethnicity in the region is “to a large extent self-ascribed and arbitrary”.

Methods and approach

The anthropological participant observation (Spradley, 1980; Jorgensen, 1989) represents the main method of this fieldwork. It was carried out directly with the reindeer-herding crews (*brigadi*) at

the tundra-camps (*bazi*). My field experience started at the beginning of May 1999 in tundra camp No. 1 of the Krasnoscheliie farm. Apart from the nine herders and the tent helper, there were two Russian hunters in the base. In my daily tasks I mainly assisted the tent helper but participated also in the daily herding and fishing activities with the brigade as well as in several 48 hours hunts with the hunters. At the beginning of June the brigade left the tundra camp for the village³. Then I moved down the Iokanga River with the hunters. We stayed for hunting and fishing until the end of June in an area situated between the pasture of the mixed reindeer herd No. 4 and No. 5 and the closed to all but authorised personnel military town of Gremikha⁴.

As my fieldwork is exclusively centred on my meeting with these tundra actors, self-reflectivity takes a decisive part in my methods. Somehow, my location in the tundra has defined my researcher's perspective. All I could see from the reindeer-herding camp relates to two perception's dimensions: on the one hand the sovkhos which *transcends* the tundra, on the other hand these 'boys with guns' (hunters, poachers, military) who *are* in the tundra. Being at the same time with both the herders and the hunters in the tundra camp, I was also a 'point of convergence' of those heterogeneous realities. Sometimes with a gun, sometimes with a sleigh, I was continuously in both the sovkhos' discourse and the phenomenology of the tundra deals. Consequently, my 'research' is only centred on these relationships involving the tundra camp: the one between the brigade and the sovkhos, the other between herders and hunters.

This paper is thus based on field notes usually taken during our daily activities in the tundra camp (mostly feeding the transport animals, making and preparing the sledges, searching and stocking wood, hunting; fishing in June) or during group discussions⁵. No formal interviews were done during the field-work. Only informal talks and mostly oral history was taken into account; a few written texts were consulted.

Meeting the hunters was a chance for my fieldwork. Especially so, since there is quite few studies regarding the informal post-sovkhos relations between the tundra actors in the Russian north. The very stimulating "Hunters, herders, and heavy metals in arctic Siberia" (Anderson, 1995) analyses a

similar situation in what concerns the vertical relationships between the brigade and the agrocentre (Khantaiskii state farm in his case, Krasnoscheliie state farm in ours) as well as to the urbanised industrial centre (Norilsk metallurgical complex in his case, 'Lovozero ore mining and processing enterprise' in Revda in ours). As for the hunters, however, there is a radical difference between the two cases: hunters in Anderson's paper belong to the state farm and so have more "institutionalised" relationship to the herders. Hunters and fishermen nearby of the Iokanga river have nothing to do with the state farm. They come from the town and not from the village as do the herders, belong to urban social networks, and are *non-professional* hunters. In our case, one of the hunters used to be miner, the other has worked in the metallurgical plant in Revda, then as driver in the local milice (the police office). This said, in a context of either long-term unemployment or unwillingness to return to an underpaid job, which is the case of the former miner, the tendency is to become professional hunter. Because of these features, I was interested in following the hunters after the departure of the brigade No. 1 to the village.

Issues

The present situation in the tundra of Kola Peninsula is being determined by the intertwined interests of a few pairs of actors:

1. Reindeer herding brigades in relation to the sovkhos administration;
2. Herders in relation to hunters and other independent tundra actors;
3. All of the above, exploiting renewable resources, versus the town-based industries in the Kola, exploiting non-renewable resources (such as underground ores).

In my view all of these three relationships are interdependent and it is impossible for each one of them to be understood without understanding the influences of the others.

Memory of Sovkhos

In 1994, the sovkhos officially ended as a state eco-

³ Since the crisis in the central planning Sovkhos management, brigades progressively have abandoned the year-round herding. The herd is now left alone from mid-June to the slaughter campaign in October (*volny vypus*, in Russian). This type of herding is close to the traditional Sami herding.

⁴ Situated at the Iokanga's estuary on the Barents' coast, Gremikha is part of the large network of closed military towns on the Kola peninsula. See Honneland & Jorgensen (1999) for details and statistics.

⁵ In some way, these group discussions have been provoked by the process of taking notes itself. As usually happens with anthropologists living for a while in local communities (Stocking, 1983), I was myself object of interest for them, and especially while writing. This interest was very stimulating because it generated a real informal, and informative, exchange.

conomic unit and the "Memory of Lenin" became *Tovarishhestvo s Ogranichennoy Otvetstvennost'yu*, a kind of Ltd. company through the so-called "insider privatisation" by the "Workers'-and-managers' collectives". In this form of privatisation, managers and employees of the concerned state firm get the majority of the shares at a state-subsidised price (stressed also by Nikula, 1998: 155). "Memory of Lenin Ltd." is a representative product of that system. In late 1998, it was formally transformed into a 'cooperative' named 'Olenevod' ('Reindeer herder'). These name changes didn't imply structural ones in the economic relationship between the administrative centre situated in Krasnoschelië and the tundra collectives.

This chapter discuss how the social meaning of the former state farm has been perpetuated into the new "private" form. One real change that herders feel in their relationship to the farm's administration is their lack of money and social security. It is however significant that they continue to call the Farm 'The Sovkhoz', and so do I in this paper, emphasising an old model perpetuated in a new form. Hence, the brigade is still managed by a planning-economy relationship with the ex-Sovkhoz, and there are more than one planning: one for the kilograms of slaughtered meat, another for the number and the inner structure of the herd (percents of females, males, castrates, calves). All the reindeer meat is sold by the farm, which pay the herders mostly with products and services in the village (but not in the tundra camps): electricity, health care, children care, etc. Brigade workers are also supposed to receive salary, which happens less often during the last years. Here is a representative discussion with herders:

" - It was much better before, of course (collective approval).
 - What was better ? (I asked).
 - There were salaries, regularly paid ... and *advances* at the beginning of the month. We had paid vacancies, could go to the Sovkhoz' villas (recreational centres belonging to the Soviet 'professional unions'), you could travel, go to the Black Sea, to Bulgaria⁶! - Now, you can't go anywhere... You have no money... And they don't pay salaries anymore, you live just on the *advance* ... What a bloody misery!"

Economic and geographic isolation have rein-

forced each other since the deterioration of the Soviet economy and this created an anxious feeling of social insecurity among the tundra collectives. The periphery feels abandoned by the centre(s). This context of isolation is reinforced by the lack of female workers in the tundra camps in the last years, so herders feel isolated from both the decision-makers and the family. The response to this is a stronger and valuable relation to the ex-Sovkhoz, the only conceivable source of security. Even the relation with the family pass through the Sovkhoz, as many of the herder's wives work in there and children go to the Sovkhoz' school or kindergarten.

" - So when did the 'misery' begin ? I asked.
 - With this fucking *perestroïka*, you know...
 - With Gorbachev ?
 - No, later ... In 1990 ... (others:) - In 1991 (the beginning of the privatisation of the Russian state farms).
 - How this changed things here, in the brigade ?
 - In no way. As it has ever been, so it is (This is a Komi proverb and was said in Komi, while all the discussion(s) was done in Russian) ... The only difference is that there's no money now...".

The main structural change operates indeed beyond the herder-administration relationship, as it concerns the relation of the farm to the buyer. After the 'privatisation', the state ceased to provide subsidies and a market for the reindeer meat. Consequently, the farm administration is left to find a market for its production, as well as to negotiate the deal with the buyer. Thus, beyond the substantial economic relationship of the brigades to the ex-Sovkhoz, the private Buyer appears as a new economic actor in the tundra. The Swedish slaughterhouse "Norfrys-Polarica" serves as the unique buyer of reindeer meat in the whole Peninsula. Located near Lovozero, it deserves both Lovozero' and Krasnoschelië' ex-Sovkhoz's. Paradoxically, this new, western, and private enterprise has not changed the economic relations between the herders and the Sovkhoz (Fig. 2).

The herding collectives has no (economic) relation to the buyer. Preserving the crucial role of mediator, the Sovkhoz' administration continues to control the flow of goods between the Producer and the Buyer through a Soviet-like system of redistribution that

⁶ Because I am originally from Bulgaria, herders did this clin d'oeil on the former vacancies on the Bulgarian sea coast, which was part of the international recreational infrastructure inside the Socialist Bloc.

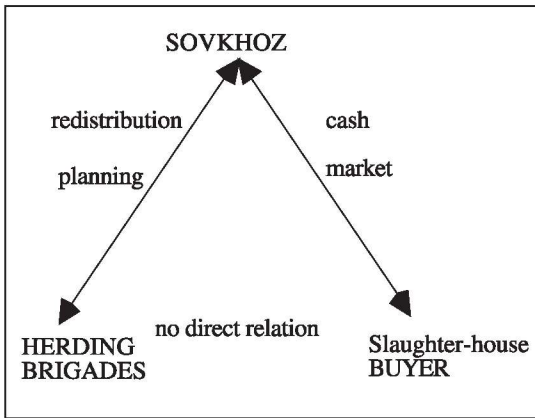


Fig. 2. The economic relationships between the producer, the farm administration and the buyer in the current reindeer husbandry in Krasnoschelië. Despite the "insider privatisation" in 1994, the ex-Sovkhoz has perpetuated its middleman's role between the reindeer herding brigades and the buyer of their production. Hence the brigades continue to relate to the farm in a "central-planning" fashion while the latter is in a market relationship with the Swedish buyer. The Sovkhoz redistributes goods, services and sometimes salaries to the brigades.

is practically cash-free. Even more, the Western private buyer took some of the roles played before by the former State. Being in a monopoly situation, it provides at the same time a non-market economic 'security' to the reindeer husbandry production, and through this, a precious social security to the tundra collectives.

The brigade workers legitimise this system by refusing to become independent economic actors outside the Sovkhoz. The brigade is still the basic social unit for the reindeer herders in the Kola peninsula. After 'the privatisation' of the Sovkhoz, one can notice the increased solidarity within the herding collectives as a response to perceived threats, or abandonment, from the outside. From herders perspective, the brigade remains even the only imaginable herding unit. As in some other regions of the Russian north (Fondahl, 1998), the anticipated initiatives for private reindeer herding after the adoption of the law for the privatisation of the Russian state-owned enterprises (*Zakon O privatizatsii gosudarstviennyh i munitzipial'nyh predpriiaty v RSFSR*, 1991) did not happen. Brigade workers are reluctant to the idea of private herds sold directly to the buyer. Even they consider this project as "impossible". Almost each herder has indeed some 'private' ani-

mals which are grazed together with the Sovkhoz' herd on the summer pasture. These 'private' reindeer are bred for subsistence only. They are very useful especially in the village, for both transport and meat. But there is no market-oriented private herding as well as there are no private owners. And this despite of the appearance of a private buyer and a kind of market. Herders don't look excited by the possibility to sell own production to the buyer. They feel certainly more secure being managed by a familiar middleman as the Sovkhoz and are not enthusiastic about any entrepreneurship. I looked strange with my 'fix-idea' of possible private herding, while initiating discussions again and again with the herders on this subject. I was making efforts to understand their point, so were they regarding my question. This makes me say that from the tundra perspective, the private herding is a hardly imaginable option in the region. The main reasons are social, indeed:

1. "The Sovkhoz would not accept this."

This statement express not just a power relation between the centre and the periphery. It also express a necessity of co-operation between the tundra camps and the village. The Sovkhoz is still the main and even the only economic actor in Krasnoschelië. According to the herders, "no Sovkhoz - no village".

The Soviet concept of 'agroculture' has been built on this concentration of all the rural economy in a big centre. Consequently, the Sovkhoz has been managing, controlling and securing all the activities in the village. Even after the significant "April decree" ("On the programme for the social development of the village", *Pravda*, 1989), the key-role of the state farm in the village was perpetuated, as reported by Palloit (1990: 663)

"Despite the enhanced role envisaged for regional and republic bodies in the development of collective and state farm villages, the April decree perpetuates the assumption made since the 1960s that these settlements are a farm's responsibility [...]"

In this way the farm encompasses the social universe of the village. Even habitants non employed by the farm "must rely on farm management for the provision of a whole range of services. [...] Reforms since 1960s have attempted to extend local authority power in rural areas but farms have continued to exercise the decisive role in village development." (Palloit, 1990: 663).

After the so-called "Chubais' privatisation" in 1991, state farms on the Kola peninsula continued to exercise, with less cash, this decisive role. They were

financially abandoned by the state but enjoy support from both the village and the tundra brigades. The latter are socially connected to the Sovkhoz by their family and social networks: their relatives, friends and neighbours work there. This network of mutual support is hardly thinkable out of the centralized social institution.

2. "You'd have big problems with the other herds."

The second reason for the unwillingness to begin private herding is the complicated structure of the reindeer herds in the area. Contrary to other parts in the Russian north, the herds in this Sovkhoz' area are situated relatively close to each other, especially in the winter pastures. This makes them mix quite often, which is a constant problem in the tundra camps. The extensive reindeer husbandry practised during the Sovkhoz was based on the Komi principle of a year-round herding. Since 1990 it has been replaced by the practice of *volny vypus*' (leaving the herd on its own from June to October), which is close to the Sami pre-revolution model of husbandry. Since the brigades don't herd year-round, they mark less often their reindeer with the brigade's mark (in spring 1999, for instance, there wasn't any marking coral for the herd No. 1). In this way the herds

increasingly fall out of the brigades' control and become mixed with neighbouring herds. Hence, when the reindeer populations get mixed, it is difficult to separate "ours" from "the others". Historically, there are two different traditional approaches to deal with this situation. Until the end of the 19th century, Sami herders, who were leaving the herd on its own in the summer, were regulating this frequent problem by a kind of ethical code. Each owner finding 'foreigners' in his herd had to catch them and give them back to their herder. But this code changed after the arrival of the Komi at the end of the century. Practising the year-round herding, they tried to control permanently the herd. In terms of ethics, this resulted in the responsibility of each owner to take care of his herd. 'Immigrants' were considered as part of the herd.

In some ways this conception is still acting nowadays. The difference is that there is no private ownership. Somehow "everybody is equal in the eyes of the Sovkhoz" so the migration of animals from one herd to another doesn't change the ownership. In this sense it is an administrative problem rather than a social one. Regarding the management of the herd, brigade workers deal with the village-based administration accountancy through more or less abstract

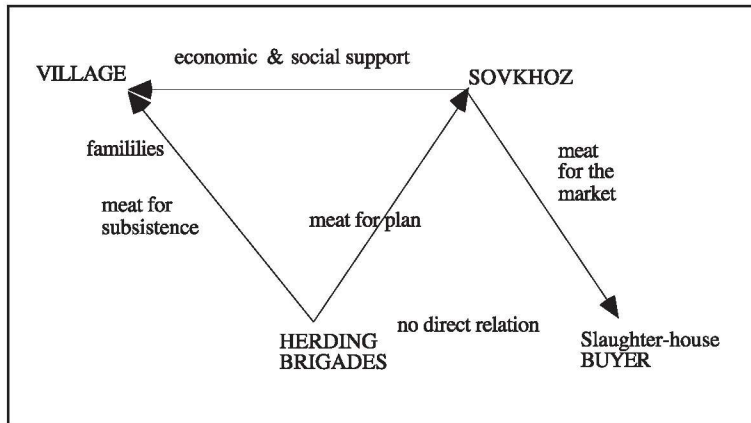


Fig. 3. "Security environment" as seemed to be perceived by the reindeer herders. It emphasises the substantial links between the tundra-located brigade, the village-based administration and the village social network (relatives, friends, neighbours). This triangle acts as a "redistributive system", the sovkhov supporting both the brigades and the village. The figure shows one of the main reasons for the brigades to continue herding the sovkhov' herds instead of starting private herding and selling the meat directly to the buyer. In their view, this scenario would deteriorate the social network in the village and would even threaten the existence of the latter.

⁷ There are contradictory rumors about loss, some of the herders said the animals were poached by military people.

between two actors with different status: Sovkhoz' workers and private owners. A situation like this could deteriorate the social network in the both tundra camps and village. Furthermore, it would threaten the social structure because one would get cash but not access to the services, while the other will continue to work underpaid but with access to the Sovkhoz' services, products and network. So this potential 'social differentiation', or rather social 'disintegration' is perceived as the worst scenario. The Sovkhoz, as a unique owner, is a warranty against such kind of social insecurity.

3. "You cannot cope yourself with this."

There is neither adequate infrastructure nor economic environment to develop private herding. A private herder could not rely on any help from the so-far existing institutions, neither formal (administration, brigades, municipality) nor informal (networks). Unlike the herders from Lovozero, brigades from Krasnoscheliie are situated too far from the Swedish slaughterhouse, so they have even less physical possibility to direct access to the buyer. All of this makes them highly dependant on the Sovkhoz as mediator. The case of Sosnovka, another remote village in the area of "Pamyat' Lenina" Sovkhoz, has been often reported as an example during our discussions in the camp. One brigade there tried to begin private herding. The next year "those guys returned with awful shame to the Sovkhoz, begging the administration to forgive them and to accept them again".

Nikula (1998: 157) stresses the specific non-market relationship between managers and workers in the Russian 'insider privatisation':

Managers are not interested in ownership as such, but they are interested in maintaining their power to control the distribution of profits and benefits. Workers are also not so much interested in ownership, but care more about economic gains and secure employment.

Based on the above, one may argue that the structure of the insider privatised 'Memory of Lenin' is significantly charged with the memory of the Soviet economic system⁸. Fig. 3 shows the "security environment" seen from the reindeer herders.

Survival after the Sovkhoz: Herders and hunters in the tundra

Against the formal vertical relationship with the vil-

lage-centred administration, herders raise informal types of horizontal relations with other tundra actors, such as hunters, militaries or geologists. The reindeer herding brigades hardly do any hunting. When a need arises, they kill a reindeer from the herd for meat. A majority of the hunters are poachers who come from the industrialised or military towns. Propelled in the tundra by the changing social context, these new actors have rapidly taken place and provoked a reinterpretation of the traditional social relationships. Arriving either on tracked vehicles or on snowmobile (usually in its Russian version, *Buran*), they are the guys who recreate post-Soviet tundra's connection with the town. Contrary to my expectations, I witnessed hunters and herders working together and helping each other after been "abandoned by the State" according to their expression. Their collaboration took the form of a series of informal negotiations and barter deals.

Herders sheltered hunters in the camp while hunters were helping herders with their tracked vehicle, especially precious for collecting wood. They also used it while returning to the village - because in a lack of vehicles, the Farm sent just one vehicle to assist the return of several brigades. The meeting point was the traditional winter camp (*pogozd*) of Semyostrovie, situated between the Iokanga camp and the village of Krasnoscheliie. Hence, the herding brigade No. 1 joined Semyostrovie with the vehicle offered by the hunters.

Following this implied agreement with the herders, and maybe because of a "researcher's" presence in "witness" position, the hunters never shut reindeer during my stay, even after we moved from the tundra camp in June. Before the thaw of the Iokanga river at the beginning of June, they were hunting mostly geese and ducks, and preparing for the fishing season, especially for the June's salmon fishing. During our stay near the area of the brigade No. 4 and No. 5 (called "brigade 45" by the herders), they managed also to kill one elk (moose, *Alces alces*), which was their only poaching apart of the salmon fishing (the legal season to hunt elks and fish salmon is from September 1 to November 15). Their dream "to meet the bear" failed unrealised.

Hunters bring meat back to the town for various subsistence purposes. Meat is used mostly to feed the hunter's families; then it is redistributed to the informal network of relatives, friends and neighbours. Finally, it is given to local key-employees against some services (such as having access to military vehicle, obtaining easier hunting permits, for the direction of the school their children go, etc.). In

⁸ The title of the article 'Memory of Lenin Ltd.' (Konstantinov, 1997) express in my view the same idea.

any case they don't sale the meat (there is no market) and so participate in the dominant cash-less economy of the tundra region.

During our daily discussions hunters have been expressing a strong desire to escape the industrialised town unable to provide them "a normal living". One of them had worked for 19 years as a coal miner in the town of Revda. "There, you are in the very 'system of Mendeleiev': *Cobalt, Radium, Uranium, heavy water...*". One year before reaching retirement age he had left the mine to devote himself to a hunting life in the tundra. The following discussion was done while we two were salting the first 60 kilograms of fish caught by our nets in the semi-thrown Iokanga river on May 27, 1999:

" - My brother is a great hunter. Look at this... I have this knife from him. He has made it himself. Look at this, the handle is made from birch, so your hand doesn't freeze in winter. Hey, try it (to clean the fish), give me your silly knife, yours is for herding, not for fishing... See the difference?...

- Do you have other brothers?

- I have three of them. But the two others don't hunt often. They work in the mine. I have also a sister, in Chelyabinsk, our mother left an apartment there for us but I have nothing to do in the town. There is no job, no food, no freedom. What can I do in the fucking town? To stay on the little balcony (*na balkonchike*) and admire it? Or maybe to angle those chemical fish at the little river? ... No, I can't imagine to live without the tundra. Tundra is everything for me, you know... Food, freedom ... There is nothing of this in the town, just radioactivity, the system of Mendeleiev (*sist'ema Mendel'eva*) ..."

The other hunter, 40, born in Byelorussia, is still working as driver in Revda but "can't food the family with one salary". His wife, daughter of a Komi reindeer herder who has been chief-brigadier of Krasnoschelie brigade No. 4, is unemployed. They have four children, three of them go to school, the youngest is one year old. "If I don't go hunt and fish in the tundra, we'd eat nothing but this (showing our dry 'soldier's bread'). In the tundra, I am depending of no one but myself".

This is the way town hunters live the wilderness paradigm which leads them to the tundra camp. After 1991, escaping to the wilderness quickly evolved and became a reality for the both town population and tundra reindeer husbandry. Military, geologists and miners from the town lost their jobs

and were forced to reorient themselves towards accessing the resources of the tundra in order to make a living (Honneland & Jorgensen, 1999). According to their own definition, they are following "the call of the wild" and for them this is a kind of survival strategy.

However, the situation is different regarding the military staff neighbouring the reindeer pastures. Although isolated from the centre and in lack of money since the post Cold War reforms in the Russian army, the military bases on the eastern Kola inherited good internal infrastructure and equipment. In the informal economy of the tundra, this enables them to provide services and goods for barter deals. In this context reindeer herders have often to deal with militaries. As mentioned above, the latter cause sometimes serious poaching problems, but the relationship with the herders in general is not an antagonistic one. Beyond the practical reasons for establishing good relations with the militaries, herders have in my view also a kind of 'sentimental' reasons for this. In the first chapter I mentioned the impact of the 'syndrome of isolation' on the herders' "quest for security". The idea of overcoming the geographic and social isolation has also been many times expressed through the herders' 'individual military story'. Each of the nine herders in the tundra camp No. 1 has done his military service for at least three years in the Soviet army, so everyone told me his military story. Since I also did my military service in an army of the Warsaw pact and I did not appreciate it too highly, I was surprised by the very positive way my brigade mates were talking about their military experience. The idea behind these stories was 'escaping the isolation', travel to the south and living with other people. Two of the brigade had been soldiers abroad, in the Soviet bases in East Germany, so they were the most nostalgic about the years spent in the army. The army, as the Sovkhoz, have been meant to provide both social security and social network, as well as one's feeling to "participate in the real world", which is "go to the centre" (Sabev, 2002: 35-36). Somehow the Memory of the army has joined the Memory of the Sovkhoz.

This perception has certainly impacted on the herder-military relationships in the tundra. Today, the main poaching problems come from the military. Herders are directly concerned by the loss of animals and someone even reported that the reason for the sharply decreased number of animals in herds No. 4 and No. 5 in fall 1998 was due to military poaching. This loss was so important that the Sovkhoz was forced to fusion the two herds in order to obtain the planned number of animals for one herd. This automatically implied a fusion of the two brigades,

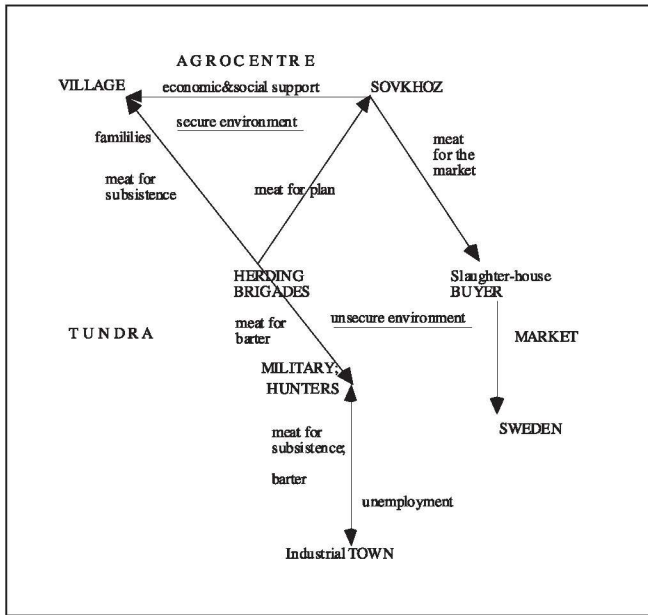


Fig. 4. The ambiguous position of the reindeer herders between an old and "secure" central-planning system and new actors in the tundra. The arrows follow the way of the reindeer meat which go through various economic relationships. The meat comes from one and same source in the tundra but changes its social meaning and economic "raison d'être" depending of the actors dealing with it. Hence it express respectively central-planning system, market relationships and subsistence economy in the Kola peninsula.

reducing the number of the tundra workers. Nevertheless, herders are in rather good relationship with the neighbouring military communities (Honneland & Jorgensen, 1999). Perceived as abandoned by the state in the same way that herders are abandoned by the regional centre, military still enjoy a good infrastructure: helicopters, tracked vehicles, fuel, and often help herders with transport. In absence of the Sovkhoz, the military complex could provide a kind of security to the tundra collectives.

In this way surviving strategies and informal network interact with the Soviet type of reindeer-herding management, and so produce a social syncretism in the tundra. This ambiguous position of the reindeer-herding brigade between a formal and an informal economy, between old and new actors is represented by Fig. 4.

At the same time both hunters and herders feel threatened by the invasion of several large industrial enterprises, which are destroying the living resources in the tundra. The area is rich with underground ores. Almost all towns on the Kola peninsula were created during the "industrial colonisation" in the 1930s. The town of Revda for example was created and survived thanks to the rare metals. It developed itself around the geological survey base *Alluaivstroy*, transformed into the metallurgical plant *Lovozero ore mining and processing enterprise*. Since the 1930s, it has been progressively filled with labour migrants from the south working in the mining industry. Even its ethnography museum emphasises more the local ores than the traditional reindeer herding. In the early 1990s, while the subsidised industry failed, new

joint-stock mining companies began to enter the tundra and became major players in the fight for resources. This threat is perceived as constant in the tundra collectives and so increase the feeling of "insecurity". Finally, the ideological discourse of both herders and hunters in the tundra, directed mostly against some centres of power located in the town (as Lovozero, Revda, *Voronya Minerals Ltd.*, Murmansk, even Moscow), often contributes to unify, this time at a political level, otherwise antagonistic tundra actors.

Looking for solutions

As the previous two chapters have shown, the complicated situation with the reindeer husbandry in the Kola peninsula results from several interconnected issues involving different types of social and economic actors.

1. There is an urgent need of investments in order to (re)create the market for reindeer products: meat, antlers, skins. Because of the specific political and legislative climate in Russia nowadays, western investors are confronted to a "non-favourable" environment: rather reluctant to foreign investors (World Bank report, 1996), Russian legislation has emphasised the "insider privatisation" by the "Workers'-and-managers' collectives". By helping the continuity of social relations and maintaining collective economic actors this privatisation scheme avoids painful social imbalance in remote communities. Therefore, for such a collective economic activity as the reindeer husbandry it might appear as a "good" strategy for many social points of view, except for the most important one: the market. Indeed, the reindeer husbandry is condemned without markets for its production. Today, there is no internal market for reindeer products. Reindeer meat

is practically absent from the formal market in the Kola peninsula out of the tundra. After surviving exclusively on reindeer meat in the tundra camps, I have never seen reindeer meat sold in Revda, Kirovsk, Apatity, or Murmansk. Lovozero is maybe the only settlement connected to the communication system where reindeer meat could be found, because of the Sovkhoz "Tundra" and the Swedish slaughterhouse there. The reasons for this situation are economic (people have no cash for the expensive reindeer meat) and cultural (the great majority of the population on the Kola peninsula are labour migrants from the south, so they have not habitudes to eat reindeer). The situation with other reindeer products (antlers, skins) seems to be even worse.

On the other hand, potential western investors are confronted by the recently increasing "anti-western" public discourse, especially after NATO's attack on Yugoslavia⁹. Despite all these problems, the *Norfryst-Polarica* case shows that foreign investments are possible and could work in this complicated system.

As for relying on local resources for recreating a market, this implies a kind of local initiative and entrepreneurship of which I have not seen (m)any signs so far. Therefore it would not be realistic to rely on a private initiative in the short term, but rather on more autonomic self-managed collectives based on a kinship-like structure and using the infrastructure of the former Sovkhoz. I think this is a tendency bound to increase when favourable socio-economic circumstances will eventually appear. However, that higher level of autonomy could not be expected before the resolution of the following two points:

2. Regulation of the **indigenous rights** of the tundra-located people. In my view, there is an urgent need of more appropriate regulation of the rights on the traditional reindeer-herding territory, actually threatened and maltreated by some powerful industrial enterprises, military and other smaller poachers. Even if there is a (blurred) legislation on this matter, it doesn't actually work because of the informal character of the economic relationships based exclusively on barter deals. Corruption in the centres of power complicates the situation. According to the rumours in the tundra, "the inspectors of hunting and fishing are the greatest poachers". Hunting permits are readily obtained especially for those occupying key-position in administrative centres. As for the industrial actors, they usually apply strong lobbying on the political powers at regional or central level. In these cases, the powerless herding collectives are not able to maintain the fight for tundra resources and are

threatened with the loss of traditional territories for reindeer herding.

Based on the above, I believe that these small and remote communities need extensive external assistance to give them both an effective infrastructure and more political power. Only then could one expect to see them become real economic actors. In that sense, the aboriginal property-rights experience from Scandinavian and North American Arctic could be useful for the economic development of the reindeer husbandry in the region.

3. Finally, the economic stabilisation of the **urban centres** is of a great importance for the solution of the problems in the tundra. As I mentioned in the second chapter, the massive loss of jobs after 1991 in the military complex and in the mining industry is the major cause of the poaching problem. It involved new actors in the tundra, some of them able to threaten whole herd(s) (according to the herders). For many of these actors poaching is a survival strategy. Therefore it is not expected they could change strategies in the present socio-economic context. Far from favouring the emergency of a market, this process only redefines the informal social relationships based on barter deals. The paradox is that the only imaginable economic growth in the Kola peninsula by now is related to the mining industry. So the question is: Would an adequate industrial revival in the region be able to help the reindeer herders in the tundra?

Acknowledgements

This field experience was made possible thanks to the support of the Bulgarian society for regional cultural studies and the Institute for anthropological field-research/New Bulgarian University. I have to thank especially Yulian Konstantinov and Petia Mankova who invited me to join their expedition, offered me their whole infrastructure in the Kola as well as some empirical data from their previous expeditions. My acknowledgements go also to the reindeer herders from brigade No. 1 of Krasnoshcheliie as well as to my informants from Revda for their precious collaboration. Thanks to Serge Duscheneau (Laboratoire de cartographie) and to Guy Mercier (director for CELAT), both from the Geography Department of the Laval University, for their help in producing the map.

References

Anderson, D. G. 1995. Hunters, Herders, and Heavy

⁹ The expedition on which this paper is based was held during the War in Yugoslavia (Spring 1999). Therefore I was witness to both herders' and Russian hunters' anxiety, based on the news of "Radio Russia" from the only transistor in the tundra camp. Despite their isolation, the increasing anti-western discourse of my informants corresponded exactly to what I had been heard in Moscow.

- Metals in Arctic Siberia. – *Cambridge Anthropology* 18 (2): 35-46.
- Antonova, A.** 1988. Letter to the authorities of the RSFSR. December, 1988. – In: Pika, A., Dahl, J. & Larsen, I. (eds.). *Anxious North*. Copenhagen. IWGIA Document No. 8: 171-185.
- Fondahl, G.** 1998. *Gaining Ground? Evenkis, Land and Reform in SouthEast Siberia*. Boston. Allyn and Bacon.
- Honneland, G. & Jorgensen, A.-K.** 1999. *Integration vs. Autonomy: Civil - Military Relations on the Kola Peninsula*. Vermont. Ashgate Publishing Ltd.
- Jernsletten, J.-L. L. & Klokov, K.** 2002. Ch. Reindeer Husbandry in Russia, pp. 23-72. – In: *Sustainable Reindeer Husbandry. Arctic Council 2000-2002*. Centre for Sami Studies, University of Tromsø. 157 pp.
- Jorgensen, D.** 1989. *Participant observation: a methodology for human studies*. Beverly Hills. Sage Publications.
- Konstantinov, Y.** 1996. Field Research of Reindeer-herding in the Kola Peninsula: Problems and Challenges. – *Acta Borealia*. (2): 53-66.
- Konstantinov, Y.** 1997. Memory of Lenin Ltd. – *Anthropology Today* 13 (3): 14-19.
- Nikula, J.** 1998. Entrepreneurship in Post-Socialism. – In: Granberg, L. (ed.). *The Snowbelt*. Helsinki. Aleksanteri Instituutti and Kikumora Publications, pp. 153-169.
- Palloit, J.** 1990. Rural Depopulation and the Restoration of the Russian Village under Gorbachev. – *Soviet Studies* 42 (4): 655-674.
- Pravda.** 1989. *Zakon O programme sotsial'nogo razvitiia sela* (On the programme for the social development of the village). Pravda (newspaper), April 13, 1989, p. 2.
- Ries, T. & Skorve, Skorve.** 1987. *Investigating Kola: a study of military bases using satellite photography*. Basseys Defence Publishers, London.
- Sabev, D.** 1998. L'appropriation du passé dans l'imaginaire postcommuniste. – Turgeon, L. *Les entre-lieux de la culture*. Paris and Québec. L'Harmattan and Presses de l'Université Laval, pp. 241-257.
- Sabev, D.** 2002. " 'Consommer la mobilité' en Bulgarie postsocialiste (1990-2000): sujets et objets". – *Material History Review* 55 (spring 2002): 29-41.
- Skorve, J.** 1991. *The Kola satellite image atlas: perspectives on arms control and environmental protection*. Norwegian Atlantic Committee, Oslo.
- Spradley, J.** 1980. *Participant Observation*. Holt, Rinehart and Winston, New York.
- Stocking, G.W. Jr. (ed.)**. 1983. *Observers observed: essays on ethnographic fieldwork*. Madison. University of Wisconsin Press.
- World Bank Report.** 1996. PREM, Washington.
- Zakon O privatizatsii gosudarstvennyh i munitsipial'nyh predpriiatii v RSFSR.* 1991 (Federal Law on Privatization).

*Manuscript (revision) accepted November, 2001
final version October, 2002*

Reindeer herding and other traditional means of livelihood in modern context – planning a study in a Sami area in Finland

Lydia Heikkilä

University of Lapland, Dept. of Social Studies, P.O.Box 122, FIN-96101, Rovaniemi, Finland
(lydia.heikkila@kolumbus.fi).

Abstract: Reindeer herding and other traditional means of livelihoods are challenged in numerous ways by modernization and globalization processes today. In my sociological study, I am aiming at uncovering and analyzing the manifold socio-economic changes and their contextual social and historical links, that influence the present conditions of practicing reindeer herding as a traditional means of livelihood in Finnish Lapland. In addition to focus on land use, my study will give some new understanding of the local environmental management. This article puts the subject in the current socio-economic developments and social scientific discourses around globalization, environmentalism and traditional knowledge. Moreover I will reflect upon methodology and impact for research results.

Key words: environmentalism, globalization, land use conflicts, modernization, reindeer herding, traditional ecological knowledge (TEK).

Contextual factors of current socioeconomic change and related social scientific perspectives

Accompanying the current interest in cultural minorities, traditional marginal means of living and local economies are receiving more public and scientific attention. A specific characteristic of the emerging research work is the *interdisciplinary* approach (e.g. Riseth, 2000). This trend is mainly influenced by: 1) feminist studies and 2) studies by members of ethnic groups themselves. The contribution of feminism is in recognizing also people's everyday spheres of life as research subjects (Lehtonen, 1995). On the other hand, the activity of indigenous peoples since the 1970s, e.g. as manifested by the Sami movement, has increased the self-respect of indigenous peoples with a need to reflect upon ethnic collective identity, selfhood and peoplehood (Eidheim, 1997). Accordingly, there has been a demand for new social scientific scopes and renewal interpretation of social facts leading to certain refocusing of research subjects, to new approaches, and to the emergence of

Rangifer, Special Issue No. 13: 27-32

new theoretical perceptions and methodological practices in social sciences. The growing interest in minority cultures and marginal economies is one outcome of this tendency.

Globalization and the environmental concern

An important factor that relates to the mentioned trend in social sciences is globalization. Today *globalization* is a major source of change for the local conditions of living. With globalization I refer to the changes in the economic, political and cultural spheres towards world-wide markets, cross-national companies and multinational media. Globalization is a process towards a common, world-wide community (Albrow, 1997; Alasuutari & Ruuska, 1999).

In the wake of globalization we also witness the resurgence of local histories, ethnic identities and a growing interest in traditional knowledge. To some extent this interest can be seen as a prescribed consequence of the process of unification itself. National interests have notably lost their significance in formulating peoples' identities with the extending

cross-national and universal tendencies in economy and culture. Therefore locality has in recent years gained more importance in constituting people's identity (Hobsbawn, 1994; Lehtonen, 1995; Hall, 1996; Alasuutari & Ruuska, 1999).

Another contributive factor is the intensified universal concern for the *environment*. The urban populations share a joint interest in the protection of nature, be it animals in captivity used for producing luxury commodities or for scientific testing, concern for rain forests, protection of wilderness areas, or impact of climate changes. Sustainable ecological, economic and social development has become the key concern of our time (Haila & Levins, 1992; Haila & Jokinen, 2001).

Environment management and protection of areas are expressions of this concern. In the planning processes common *human interests* are receiving more consideration. A method called *participatory planning/approach* has emerged in this process. Through participatory methods, individual citizens and different interest groups are given a chance to collaborate with planners and join in problem solving (Loikkanen *et al.*, 1999). An interesting detail is the rising interest in *traditional ecological knowledge* (TEK). Serious efforts are being directed to collecting this information and to gaining acceptance for TEK in western science (e.g. Ferguson & Messier, 1997).

Changing social circumstances

Transformations in the lives of everyone living in the Nordic countries (Denmark, Finland, Norway and Sweden) owe much to the social democratic concept of *welfare-state*. The term usually refers to the national system of social security. The measures deriving from welfare-state politics have been principally those of social, health and labor policy. The "Nordic model" of the welfare-state consists of a large body of socio-political measures contributing to the even distribution of income and services. Such measures connected to employment, housing standards and means of livelihood in both urban and rural regions of the Nordic area have been in the key interests of the welfare-state (Laatu, 1997).

The social circumstances of the northern local societies, both Sami and that of the majority population, was thoroughly transformed when the welfare-state was introduced after the Second World War. The structure of local labor markets and networks of social security were altered as new services were established in administrative, educational, health service, social security and national defense sectors with state support. With welfare-state measures the modern state extended to previously remote north-

ern areas to secure national integrity. The Province of Lapland in Finland, for example was incorporated into the national scheme of post-war rebuilding and the process of industrialization (Massa, 1994).

As the introduction of the welfare-state into the remote areas changed the local living conditions dramatically, nearly as intensive and pervasive has been the change caused by the withdrawal of the welfare-state services in the 1990s. In the past decade, Finland – along with other western societies – went through a major social change due to an economic recession. As a result, rigorous balancing measures were executed with the aim to cut public expenditure. Social security was reduced at every level, subsidies for transportation were suspended, etc. The transition process of the national economy was accompanied with the new regulations associated with Finland's membership in the European Union in 1994 and the process of globalization in general.

How, in particular, have these above mentioned factors influenced the local living conditions of the people living by traditional means of livelihood in Finnish Lapland? How has the context of practicing the traditional means of livelihood changed? How do these factors reflect into land use conflicts in the local society? How is the land use conflict articulated by different interest groups with the particular focus on Sami reindeer herders?

These are the questions I am intending to pursue in my research work "*Life is Different Beyond the Mountains – Sami Reindeer Herding in the Middle of Modern Land Use Discourses*". The study is part of a Canadian project "Sustainable Development of the Arctic – Conditions for Food Security" coordinated by the Université Laval (Québec) and McGill University (Montreal). The research is also involved in and are partly overlapping with the Natural Resource Planning project of the Finnish Forest and Park Service in the northernmost area of the country where most of the Sami in Finland are living (Heikkilä, 2000, Sandström *et al.*, 2000).

Methodological considerations

The immediate context in which I observe matters is a local reindeer herding Sami society in Enontekiö, in the northwestern part of Finland bordering Norway. I use the understanding that I have acquired after been living in the local indigenous society for over 14 years. I will use anthropological methods; the research material consists of written and oral first hand sources as well as literature. I use participatory observation as one of the main methods. I listen to conversations in various contexts and keep records in the form of a research diary.

Additionally I have at my disposal the archives of the Finnish Forest and Park Service concerning wilderness planning, natural resource planning, and public responses to the planning. Past and current literature is also available in this subject area.

In interviewing it is my preference to utilize structurally designed methods as little as possible. Structured and controlled interviews are incongruous with the lifestyles of indigenous people. There are certain good results of collecting the TEK of Inuit people by using a structured, but a very flexible, interviewing protocol (Ferguson & Messier, 1997; Thorpe & Eyegetok, 1999). However, Ferguson & Messier themselves reflect seriously upon the interviewing methods. They conclude that the insight of some Inuit advisors proved critical to the collection and interpretation of Inuit ecological knowledge. The Inuit have a particular manner of relaying information through factual stories that are told, instead of generalizations from several observations. The content and connections of these stories plus the significance of details needed to be interpreted to the researchers by some Inuit advisors. Ferguson & Messier stress that a thorough experience and cooperation is required from the researchers to gain trust and insights between the researchers and the indigenous people. Above all the researchers need a sound understanding of the cultural basis of indigenous knowledge. For Ferguson & Messier it took 12 years to develop the interviewing method suitable for that particular region and community.

By observing my living surroundings and reading Paine (1994), Beach (1981) and Ingold (1980) I have got the understanding that the herding and husbandry knowledge, as well as the traditional environmental knowledge in general, are intrinsically linked with the practice. It is essential to be present and participate in the working processes in the field. Beach (op.cit) recognizes this as the only way to gain knowledge.

Besides the pragmatic and particular nature of TEK one has to understand the significance of the detailed stories, called *muitalusat* and *máinnasat* in the Sami language. These, often fictitious stories, frequently supplement the pragmatic knowledge obtained in the fields. The content and connection of these stories may not, however, be obvious for non-members of the community. Another significant consideration is the role of *tacit knowledge*, which plays a very important part in the cognition processes and expressing patterns of indigenous people. There seems to be a considerable conceptual discrepancy when trying to incorporate indigenous knowledge into western scientific conceptual systems. How do we interpret the silence, the absence of cer-

tain discourses? Ferguson & Messier (1997) also underline the *research ethics* of studying indigenous knowledge. Indigenous reindeer herding knowledge is being studied today successfully, in subtle methods, by members of native societies themselves (Eira, 1994; Oskal, 1995; Sara, 1996; Kalstad, 1999). We should be conscious of the risk of assimilation or reproduction of colonial relations if indigenous knowledge is made to serve western environmental management.

We must consider several factors when using traditional knowledge. First, on whose conditions indigenous knowledge or TEK is collected and how it is utilized. Second, TEK seems to be more a way of thinking or a way of living including cultural values, rather than a certain set of information about nature as an isolated topic. It seems to include particular type of observing and decision making processes different from those regularly included in western thinking (Ferguson & Messier, 1997). TEK should be considered in light of this complex context and not only as separate disconnected pieces of information. Finally, in connection with the studies on indigenous people and ethnic minorities, it seems that the issue of researcher's positioning of oneself and its bearings to the research work must be evaluated anew. We as researchers are part of the de-/recolonizing processes in the world.

The intersecting land use discourses: theory and practice

I intend to apply current social scientific theories and approaches that are used in cultural studies. Accordingly, the social reality and social conducts are regarded as *social constructions*. In brief terms the content is: we can only acquire information, attain comprehension and convey our ideas of the material world through concepts that are socially constructed (Berger & Luckmann, 1988). I share the approaches of Fornäs (1995), Grossberg (1995), Lehtonen (1995) and Hall (1997) placing the emphasis on *cultural practices*. Culture is about "shared meanings", where language is the privileged medium in which we "make sense" of things, in which meaning is produced and exchanged (Hall, 1997). Social conducts have to be examined in the complex network of their effects, relations and material contexts (Grossberg, 1995).

According to Hall (1999) the events, their relationship and structures are conditioned by the material world, but they are construed meaningfully (signified) within *discourses*. The term discourse is referred to here as a set of statements, which provide a language for speaking of a certain subjects.

Discourse equals a mode of speaking or thinking, a way of representing an object. A discourse produces significant contextual knowledge and this knowledge has implications to social conducts and has substantial consequences. An important aspect of discourses is their function in relation to power. Power is understood here in a cultural and symbolic sense. More important than whether a certain statement is true or false, is its practical influences. Some discourses are stronger than others. One discourse may prevail in a society to the extent that it suppresses other discourses.

The discourse approach is frequently accompanied with *the theory of articulation*, in cultural studies. The concept of articulation – in the sense of clutching something into something – offers a useful point of departure for understanding the compelling relations of social conducts and their effects, including investigations on different, often unpredictable effects of certain conduct. Articulation provides a theory related to the contexts. "Articulation is used to engage this conduct to that effect, this text to that signification, this signification to that reality, this experience to that politics. These connections again are articulated to parts of larger structures etc." (Grossberg, 1995). To analyze a certain event implies the reconstruction of the network of relations part of which is being articulated, as well as options for other types of articulation (Grossberg, 1995).

The discourse approach and the practice of articulation have certain advantages, compared to the somewhat more static approaches of structural theories and system-theories (e.g. Ingold, 1980). This approach allows one to deal better with the various dimensions and multiplex relations of the phenomena and their contexts. Derived from this idea, I shall approach my research problem in terms of various interrelated discourses on local land use patterns. I have sketched five discourses along which land use conflicts are argued. The intersecting discourses articulating land use interests are: 1) environmentalism 2) recreation as a part of modern urban lifestyle 3) the changing role of the Finnish Forest and Park Service as the biggest land manager in the region 4) local (non-Sami) people living on traditional means of livelihood and 5) Sami reindeer herders. I am investigating how these discourses are articulated in different contexts of globalization, transformation of the welfare-state, and the rise of the market economy. As a result, a comprehensive analysis of the socio-economic transition process and its influences will be outlined.

Land use and ownership issues are articulated probably most seriously in the confrontations between the traditional means of livelihood and the

modern society today. There are certain historical features to be discovered behind these issues, for instance customary Sami rights in what is now Finnish area (Korpijaakko, 1989; Korpijaakko-Labba, 1999). Land has become a scarce resource after Finnish immigration to Sapmi (the land of the Sami) was encouraged by the government from the late 1600s onwards. Since nature in the northern subarctic areas is relatively barren and the climatic conditions are severe, agriculture is successfully practiced only with great difficulty in this area. With the northward expansion of peasant farmer's culture, more people became dependent on similar means of livelihood. Competition over scarce natural resources ensued. Along with modernization, people have adopted higher living standards, meaning modern accommodations and motor vehicles. This has resulted in a steadily growing demand for economical profit from natural resources. However, the reproductive capacity of nature is restricted. There is a clear limit to growth.

Land use conflict has assumed a multidimensional character nowadays. There are local, national and global factors acting simultaneously. Local conflicts appear in divergent interests of reindeer herding and other traditional means of livelihood. This conflict is made more pronounced since the underlying ethnic dispute between Finns and Sami has been reactivated lately. A key issue articulated in land use conflicts, according to my first hand observations, is the right to move in the landscape, particularly on motorized vehicles. Any extra disturbance in the landscape is regarded as harmful by the reindeer herders, in the sense that herds disperse easily. Off-road traffic seems to be the main source of conflict between reindeer herding and other traditional means of livelihood, as well as between reindeer herding and tourism. A second key issue is the land encroachments upon reindeer herding areas with conflicts e.g. to forestry, mining industry and an expanding network of roads. To sum up the many-sided argument: for reindeer herding it is a question of pastures getting scarce and the reindeer' habitats being disturbed. Reindeer herding cannot be carried out under these circumstances using the Sami traditional methods.

There are also the new perspectives to the land use confrontation raised by the expanding national and global demands for nature protection (environmentalism) and recreational needs. Both have claims on local land use and environmental conditions. In accordance with national and international agreements, and the practice of participatory approach, these arguments have to be considered in local environment planning.

Conclusions

The socio-economic transition process of the local society relying on traditional means of livelihood in a modern society is discernibly reflected in local land use conflicts today. Modern ways of life challenge the local land use patterns and place the earlier conflicts into new contexts. Modern environment management, as well as the local society, are forced to adapt to newly emerging global and national claims on local land use. Also the local inter-ethnic relations are rearranged in this process. There are simultaneously several ongoing discourses, within a framework where these interests are articulated. The arguments used in these discourses intersect in an interesting way. Behind the arguments are often quite substantial moral dilemmas which imply principal cultural values. I intend to bring forth certain new angles of the Sami reindeer herders' position today at the center of these discourses.

Acknowledgments

My doctoral research has been funded by the Social Sciences and Humanities Research Council of Council (Ottawa) granted through its Major Collaborative Research Initiative program to Groupe d'Etudes Inuit et Circumpolaires, Université Laval, Québec (Gerard Duhaime) and to the Department of Geography, McGill University, Montréal (Ludger Müller-Wille) for 1998-2003. I am thankful to two anonymous reviewers of Rangifer, to prof. Ludger Müller-Wille and to Ph.D. candidate Joan Kluwe from the University of Idaho for constructive comments and linguistic editing.

References

- Alasuutari, P. & Ruuska, P. 1999. *Post patria? Globalisaation kulttuuri Suomessa*. Vastapaino, Jyväskylä.
- Albrow, M. 1997. Foreword in Albrow & King (eds.). *Globalization, Knowledge and Society*. London. Sage.
- Beach, H. 1981. *Reindeer-Herd Management in Transition. The case of Tourpon Sameby in Northern Sweden*. Uppsala Studies in Cultural Anthropology 3. Liber Tryck, Stockholm.
- Berger, P. L. & Luckmann, T. 1988. *Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Irvington.
- Eidheim, H. 1997. Ethno-Political Development among the Sami after World War II: The Invention of Selfhood. – In: Gaski, H. (ed.). *Sami Culture in a New Era*. Davvi Girji OS. Ykkös-Offset Oy, Vaasa, pp.32–56.
- Eira, N. I. 1994. *Bobčuid lubtte. Gulaballat ja ollášubttit siidadoalu*. DAT Guovdageaidnu. Tangen Grafiske, Drammen.
- Ferguson, M. & Messier, F. 1997. Collection and Analysis of Traditional Ecological Knowledge About a Population of Arctic Tundra Caribou. – *Arctic* 50:17-28.
- Fornäs, J. 1995. *Cultural Theory and Late Modernity*. Sage Publications. London, Thousand Oaks and New Delhi.
- Grossberg, L. 1995. *Mielihyvän kytkennät*. Vastapaino. Tampere.
- Haila, Y. & Jokinen, P. 2001. *Mikä ympäristö, kenen politiikka*. Vastapaino. Tampere.
- Haila, Y. & Levins, R. 1992. *Humanity and Nature. Ecology, Science and Society*. Pluto Press. London.
- Hall, S. 1997. Introduction. – In: Hall (ed.). *Representation. Cultural Representation and Signifying Practices*. Sage. London.
- Hall, S. 1999. *Identiteetti*. Vastapaino. Tampere
- Heikkilä, L. 2000. *Luontaiselinkeinot ja Metsähallituksen toiminta Ylä-Lapissa*. Metsähallitus. Ylä-Lapin luonnonvarasuunnitelmaan liittyvä tutkimus. Moniste.
- Hobsbawn, E. 1994. *The Age of Extremes. The Short Twentieth Century, 1914-1991*. London: Michael Joseph.
- Ingold, T. 1980. *Hunters, pastoralists and ranchers*. Cambridge Studies in Social Anthropology. Cambridge University Press. Cambridge.
- Kalstad, J. L. H. 1999. Reindriftspolitikk og Samisk Kultur – en Uløselig konflikt? – *Dieđut* 2.
- Korpijaakko, K. 1989. *Saamelaiisten oikeusasemasta Ruotsi-Suomessa*. Lakimiesliiton kustannus. Helsinki.
- Korpijaakko-Labba, K. 1999. Saamelaiisten oikeusasemasta Suomessa – kehityksen pääpiirteet Ruotsin vallan lopulta itsenäisyyden ajan alkuun. – *Dieđut* 1/99. Sami Instituutta. Pohjolan painotuote Oy. Rovaniemi.
- Laatu, M. 1997. *Saamelaiset ja sosiaalinen turva*. Kansaneläkelaitos. Sosiaali- ja terveystutkimuksia 17. Helsinki.
- Lehtonen, M. 1995. *Merkitysten maailma*. Vastapaino. Tampere.
- Loikkanen, T. & Simojoki, T. & Wallenius, P. 1999. *Participatory Approach to Natural Resource Management. A Guide Book*. Forest and Park Service. Vantaa.
- Massa, I. 1994. *Pohjoisen luonnonvalloitus. Suunnistus ympäristöhistoriaan Suomessa*. Gaudeamus. Tammerpaino, Tampere.
- Oskal, N. 1995. *Det rette, det gode og reimykken*. Universitetet i Tromsø, Institutt for samfunnsvitenskap, Filosofiseksjonen.
- Paine, R. 1994. *Herd of the Tundra. A Portrait of Saami Reindeer Pastoralism*. Smithsonian Institution Press. Washington and London.
- Riseth, J. Å. 2000. *Sami Reindeer Management Under Technological Change 1960-1990: Implications For Common-Pool Resource Use Under Various Natural And Institutional Conditions - A Comparative Analysis of Regional Development Paths in West Finnmark, North Trøndelag, and South Trøndelag/Hedmark, Norway*. Dr. Scient-thesis. Department of Economics and Social Sciences. Agricultural University of Norway. Ås.

- Sandström, O., Vaara, I., Heikkuri, P., Jokinen, M., Kokkonen, T., Liimatainen, J., Loikkanen, T., Mela, M., Osmonen, O., Salmi, J., Seppänen, M., Siekkinen, A., Sihvo, J., Tolonen, J., Tuohisaari, O., Tynys, T., Vaara, M. & Veijola, P. 2000. *Ylä-Lapin luonnonvarasuunnitelma*. Metsähallituksen metsätalouden julkaisuja 38. Oy Edita Ab. Helsinki.
- Sara, M. N. 1996. *Boazu lea bieggá buorri. Studie av rein-driftens tilpasningsformer i østre del av Kautokeino reinsogn på 1950-tallet*. Hovedoppgave i samfunnsvitenskap. Universitet i Tromsø.
- Thorpe, N. L. & Eyegetok, S. P. 1999. Inuit Ecological Knowledge of Climatic Influences on Caribou and Calving Areas in the Kitikmeot Region of Nunavut, Canada. – *Rangifer* Report No. 4: 56.

Manuscript (revision) accepted October, 2002

Conflicts between reindeer herding and an expanding caribou herd in Alaska¹

Greg L. Finstad^{1*}, Harry R. Bader², & Alexander K. Prichard¹

¹ Reindeer Research Program, Agricultural and Forestry Experiment Station, P.O. Box 757200, University of Alaska Fairbanks, Fairbanks, AK 99775-7200, USA.

² Resources Management Department, School of Agriculture and Land Resources Management, University of Alaska Fairbanks, Fairbanks, AK 99775-7200, USA.

* corresponding author (fnglf@uaf.edu).

Abstract: The reindeer industry has existed in Alaska since 1892. This industry has largely been concentrated on the Seward Peninsula, Alaska because suitable habitat has been available and caribou have been absent here for over 100 years. Until recently, reindeer meat and velvet antler production consistently generated millions of dollars in revenue critical to the economies of rural Alaskan communities. From 1976 to 1996 the Western Arctic Caribou Herd (WACH) increased from about 75 000 to 463 000 animals. Concurrently, seasonal range use of the WACH shifted westward onto traditional reindeer ranges of the Seward Peninsula. Reindeer herders lost 75-100% of their herds through commingling and out-migration with wild caribou. This loss of over 12 000 reindeer represents a potential economic value of 13 million dollars. Sustainable meat and velvet antler production and the economies of western Alaskan are likely to be affected by these changes.

Key words: economic loss, out-migration, *Rangifer tarandus*, reindeer herders, WACH.

Rangifer, Special Issue No. 13: 33-37

Introduction

Historically, it has not been possible for domestic reindeer and wild reindeer (referred to as caribou in this paper) to coexist free of conflict when using the same ranges. Throughout much of the Soviet Union, Canada, and Greenland, domestic reindeer have been lost to commingling and emigration with caribou (Klein, 1980). Currently, a conflict between domestic reindeer and caribou is severely impacting the reindeer industry on the Seward Peninsula, Alaska. The Western Arctic Caribou Herd (WACH) has increased from about 75 000 animals in 1976 to approximately 463 000 animals in 1996 (Dau *et al.*, 2000). During this time, winter range of the WACH shifted west onto traditional reindeer ranges of the Seward Peninsula. Thousands of reindeer have commingled with migratory caribou groups and left the

Seward Peninsula in the last 15 years. This has significantly impacted the production and viability of the Alaskan reindeer industry.

The reindeer industry has existed on the Seward Peninsula since 1892. The reindeer population there has fluctuated over time but has never dropped below 15-20 000 animals (Stern *et al.*, 1980). By the late 1980s, 20-25 000 reindeer occurred in 14 herds on or neighbouring the Seward Peninsula (Blodgett *et al.*, 1993).

Today, most herders practice an extensive management style of loose herding. Snow machines enable herders to travel great distances in a short time so herding is based out of villages rather than out-camps. This type of management is characterized by sporadic herder contact that often results in the herd being unsupervised for extended periods when over-

¹ Oral presentation at 10th Arctic Ungulate Conference, University of Tromsø, 9-13 August, 1999.

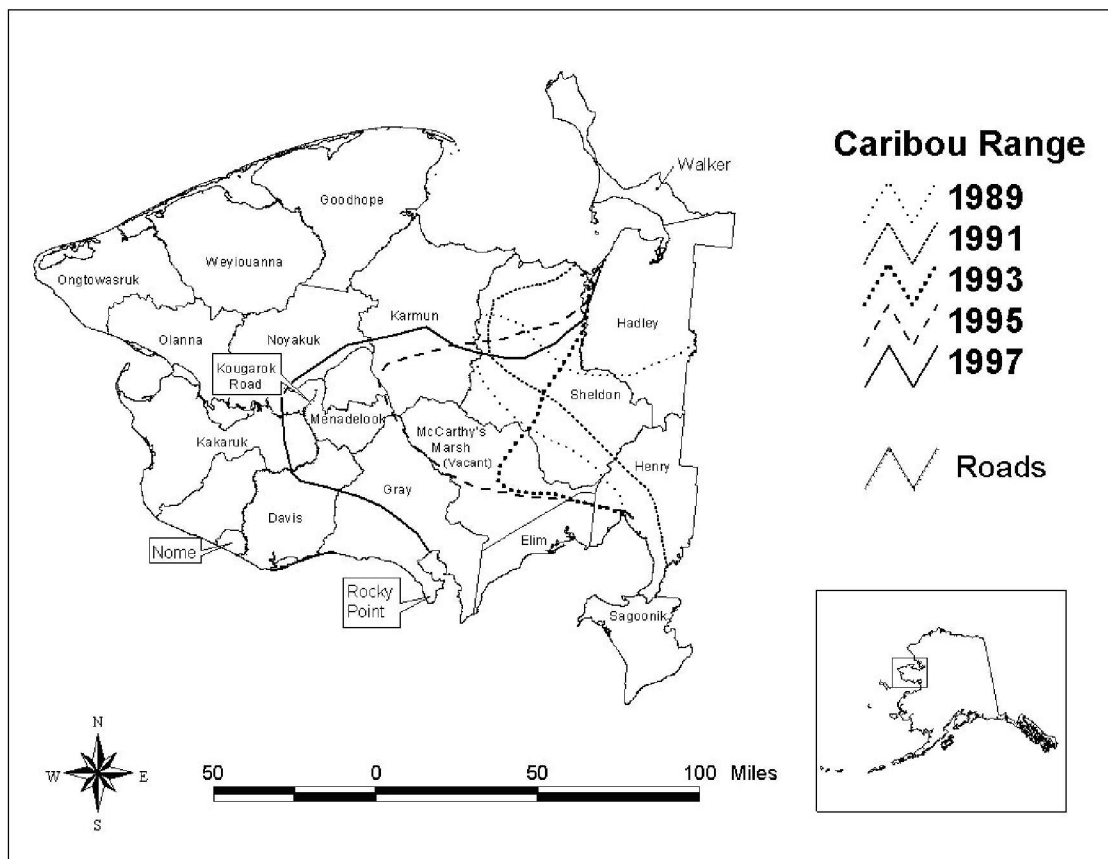


Fig. 1. Map of reindeer ranges and observed western extent of Western Arctic Caribou on the Seward Peninsula, Alaska.

land travel is difficult, or during mechanical breakdown of all-terrain vehicles. Unsupervised reindeer commingle with migrating caribou and emigrate from the Seward Peninsula. Reindeer have been observed with caribou 400 miles from their home ranges (Rose Fosdick, Director, Reindeer Herders Association, pers. comm.). Occasionally, some out-migrating reindeer will return to their traditional range but many do not return and probably succumb to predation, harvest by caribou hunters, and other factors (Klein, 1980). In addition, the presence of a small number of caribou in a reindeer herd will cause otherwise docile reindeer to become easily excited and difficult to herd (Nathan Hadley, reindeer herder Buckland AK, pers. comm.).

The herder not only incurs the present-day loss of reindeer and revenue due to caribou intrusion, but also lost yield of the herd for the future. Sustainable yield of reindeer on the Seward Peninsula is likely since they appear to have a good plane of nutrition and correspondingly high growth and reproductive rates. In some years as many as 40% of calves become

pregnant indicating the availability of excellent range resources (Prichard *et al.*, 1999).

This paper presents data on the direct and potential loss of Seward Peninsula reindeer to commingling and out-migration with the WACH.

Methods

The Seward Peninsula reindeer industry is comprised of 14 ranges managed by local herders extending north to south from Cape Espenberg ($66^{\circ}34'N$) to Egavik ($64^{\circ}03'N$), and east to west from Wales ($168^{\circ}03'W$) to the Inglutilik River drainage ($159^{\circ}05'W$) (Fig. 1). Reindeer are brought into corral systems biannually where they receive veterinary care, velvet antlers are harvested, and demographic and nutritional status information is gathered and recorded into a central record keeping system. Total number of reindeer corralled annually is determined for each herd. The annual totals likely underestimate true herd numbers because animals are missed during the

gathering and moving of scattered groups across remote and rugged terrain to handling facilities.

The extent of caribou presence on the Seward Peninsula since 1991 was determined using reports of reindeer/caribou surveillance flights conducted by the Reindeer Herders Association (RHA), radio-tracking and reindeer surveillance flights conducted by the University of Alaska Reindeer Research Program (UAF-RRP), and observations by reindeer herders. In June and July 1999 a low altitude aerial survey was conducted to further assess the status of the reindeer herds and the presence of caribou on the Seward Peninsula.

Results

From 1991 to 1995, major concentrations of wintering caribou shifted west from the eastern edge of the Seward Peninsula to extensively use the Hadley, Henry, Sheldon, and Karmun reindeer ranges, and the McCarthy's Marsh area (Fig. 1). By 1995, Hadley, Henry, and Sheldon had lost their entire herds to emigration with caribou.

In autumn of 1996 an estimated 90-100 000 caribou migrated through the central Seward Peninsula to the eastern edge of the Noyakuk range and were found as far west as the Kougarok road where hunters harvested caribou for the first time in over 100 years (P. Bente, unpubl. – 1997. Alaska Department of Fish & Game Caribou report: Reindeer Herders Association Annual Meeting, Nome, Alaska) (Fig. 1). Open water in rivers and lack of snow in October limited herder mobility in segregating their herds from the WACH. Sagoonick, Menadelook, Karmun, and Gray lost 50-75% of their herds to caribou (Table 1).

Caribou returned to the central Seward Peninsula during the winters of 1997 and 1998, and by summer of 1999 Menadelook, Karmun, and Sagoonick lost additional reindeer and could no longer economically justify corralling the few remaining reindeer on their ranges (reindeer herders Teller, Deering and Shaktoolik AK, pers. comm.). Gray retained a portion of his herd by segregating his animals on the peninsula extending to Rocky Point and using Golovin Bay as a caribou buffer zone.

The aerial surveys conducted during May, June, and July 1999 supported the corralling records and herder reports of missing animals. Few to no reindeer were located on the Henry, Hadley, Sheldon, Karmun, Sagoonick, and Menadelook ranges. Six

hundred reindeer from the Gray herd were found on Rocky Point.

Reindeer herders in areas used by caribou during winter have lost over 12 000 animals from 1987 to 1999 (Table 1) while adjacent herds on ranges with no caribou have experienced good herd growth (Prichard & Finstad, 1999). If the economic value of a reindeer is assumed to be \$550 U.S. (Renecker & Chetkiewicz, 1993), then the reindeer industry has

Table 1. Peak numbers and estimated losses of reindeer on the Seward Peninsula, Alaska.

Herds affected	Peak herd size	Year of peak herd size	Estimated herd size 1999	Losses - peak to current
Gray	2418	1993	600	1818
Hadley	2310	1987	0	2310
Henry	1397	1987	0	1397
Karmun	2155	1995	0	2155
Menadelook	1473	1995	0	1473
Sagoonick	1815	1992	0	1815
Sheldon	1582	1991	0	1582
Total	13150		600	12 550

suffered an economic loss of nearly 13 million dollars.

Discussion

The intrusion of large numbers of caribou onto traditional reindeer ranges on the Seward Peninsula will have many consequences for the Seward Peninsula grazing system.

Reindeer are semi-domesticated animals tended for purposes of economic profit to communities that controls their numbers, social organization and grazing patterns. During much of the last 100 years the forage produced by ranges on the Seward Peninsula is converted into reindeer meat or velvet antler generating income for the reindeer industry. Long term sustainable yield of reindeer meat and velvet antler and a reliable source of income are likely if herds are managed properly with no degradation to rangeland (Karter & Dieterich, 1989). As caribou displace reindeer the grazing system converts from a stable food production process managed by local people to an unpredictable subsistence food source subject to the whims of migratory caribou and managed by agencies. As more Seward Peninsula forage is converted to caribou biomass the animal products do not generate income, a larger proportion of harvest and consumption occurs outside the region, and

potential human food is lost to predation and attrition. Local reindeer herders cannot protect or maintain their herds when large numbers of caribou are present on their ranges, thus reindeer will be eliminated from local rangeland. An established food production system in Alaska will disappear.

Range management plans are developed for all reindeer herds on permitted ranges on the Seward Peninsula. The Natural Resources Conservation Service, USDA and other land managers conduct utilization checks in each reindeer district to ensure that stocking densities of reindeer do not exceed carrying capacity. Plant communities of local rangeland, especially lichen stands, are monitored to prevent overgrazing. Now, lichen communities will be affected by uncontrolled grazing of large numbers of caribou. Depletion of the lichen reserves will decrease carrying capacity of the ranges for any future reintroduction of reindeer.

In Alaska, the influx of domestic reindeer into caribou herds may have altered the gene pool of caribou (Bailey & Hendee, 1926; Murie, 1944). Local people also believe that interbreeding of reindeer and WAC causes a genetic predisposition in caribou to return and colonize the reindeer ranges of the Seward Peninsula. In most cases it seems unlikely that there would be much genetic transfer. First, reindeer males are smaller than caribou males and are unlikely to compete successfully for breeding with caribou females during the rut (Klein, 1970; Mukhachev, 1975). Secondly, reindeer cannot travel long distances as efficiently as caribou so they fall behind and become separated from the main aggregation of breeding adults (Klein, 1980). Further, the calving season of reindeer precedes the calving season of caribou by 3-5 weeks; thus, reindeer will be dropping calves at the height of spring migration when the majority of female caribou are enroute to the calving grounds on the North Slope (Klein, 1980). Reindeer/caribou hybrid females drop calves 2-3 weeks prior to calving caribou females (Bill Hauer, Station Manager Large Animal Research Station UAF, pers. comm.). Early calves will be very conspicuous, vulnerable to predation and thus removed from the gene pool. In a study to investigate genetic similarities specific allele frequencies differ considerably between reindeer on the Seward Peninsula and WAC, which suggests gene flow has been limited between the two populations (Cronin *et al.*, 1995).

Reindeer owners with viable herds must adopt an intensive management plan if the WACH continues to winter on the Seward Peninsula. Herders must collaborate with state and federal agencies to track caribou movements and maintain tight control of their animals. Reindeer must be moved from areas

heavily used by caribou to secluded refuges. Identification of satisfactory reindeer refugia to provide segregation from caribou and adequate grazing resources will be critical. RHA and the UAF-RRP have initiated a radio-collaring and surveillance program to assist herders in tracking reindeer movements. The UAF-RRP is currently mapping seasonally critical habitats used by reindeer on the Seward Peninsula not used by caribou (G. Finstad, unpubl. – 1999. University of Alaska Reindeer Research Program Progress Report: Reindeer Herders Annual Meeting, Nome, Alaska). Traditional herding methods and information provided from these projects can be integrated using a Geographical Information System (GIS) to provide a tool for the reindeer herders to improve management of their herds to avoid losses to caribou.

Acknowledgments

This is contribution no. J-99-2 from the Alaska Agricultural and Forestry Experiment Station. This study was partially funded by a grant from the Bureau of Indian Affairs, Kawerak Inc., contract 10-26-98. We thank the Reindeer Herders Association and the reindeer herders of the Seward Peninsula for their support. M. Berger, R. Wadeson and three anonymous reviewers provided helpful comments on the manuscript.

References

- Bailey, A. M. & Hendee, R. W. 1926. Notes on the mammals of northwestern Alaska. – *Journal of Mammalogy* 7: 9-28.
- Blodgett, D., Clarke, A. W., Renecker, L., Dieterich, R. A. & Thompson, W. N. 1993. Computer based data management system for commercial reindeer and game farm production. – *Rangifer* 13: 5-13.
- Brown, D. 1998. *Alaska Agricultural Statistics*. Alaska Agricultural Statistics Service. U.S.D.A. 30pp.
- Cronin, M. A., Renecker, L., Pierson, B. J. & Patton, J. C. 1995. Genetic variation in domestic reindeer and wild caribou in Alaska. – *Anim. Genet.* 26: 427-434.
- Dau, J., Coady, J., Machida, S. & Ayres, L. A. 2000. The Western Arctic caribou herd: current status and management issues. – *Rangifer* Special Issue No. 12: 65.
- Karter, A. & Dieterich, R. 1989. *Population Dynamics: An Introduction for Alaskan Reindeer Herders*. AFES, School of Agriculture and Land Resources Management, University of Alaska. Bulletin 81. 14pp.
- Klein, D. R. 1970. Nutritive quality of Alaskan range forage and associated growth and welfare of reindeer and caribou. Unpublished reports to U. S. Bureau of Land Management, Alaska Cooperative Wildlife Research Unit, Fairbanks. 29pp.

- Klein, D. R. 1980. Conflicts between domestic reindeer and their wild counterparts: A Review of Eurasian and North American Experience. – *Arctic* 33: 739-756.
- Murie, A. 1944. *The wolves of Mount McKinley*. Fauna of the National Parks of the U.S. Fauna Series No. 5. 238pp.
- Mukhachev, A. D. 1975. Some questions of the comparative morphobiological characteristics of domesticated and wild reindeer. – In: Syroechkovsky, E. E. (ed.). *Wild Northern Reindeer in the USSR*. Central Research Laboratory on Wildlife Management and Nature Preserves. Moscow, pp. 89-98.
- Prichard, A. K. & Finstad, G. L. 1999. *Model to evaluate potential production and income responses of reindeer herds under different management strategies*. Circular 116. Agricultural and Experimental Forestry Station University of Alaska Fairbanks.
- Prichard, A., Finstad G. & Shain, D. 1999. Lactation in yearling Alaskan reindeer: Implications for growth, reproduction, and survival. – *Rangifer* 19: 77-84
- Renecker, L. & Chetkiewiez, C. 1993. Record-keeping, management decisions and productivity of extensive reindeer herding on the Seward Peninsula. – *Rangifer* 13: 5-13.
- Stern, R. O., Arobio, E. L., Naylor, L. L. & Thomas, W. C. 1980. *Eskimos, Reindeer and Land*. AFES, School of Agriculture and Land Resources Management, University of Alaska. Bulletin 59. 205pp.

Manuscript accepted December, 2000

Brief communication

Hydrobiological effects of gathering reindeer at an arctic lake in Russia

Yana Kuzmina* & Yulia Leshko

Institute of Biology, Komi Science Center, Russian Academy of Science, Kommunisticheskaja 28, 167610, Syktyvkar, Komi, Russia (kuzmina@ib.komisc.ru).

Abstract: For the separation of reindeer, animals are collected on the shore of lake Laya-to (67°60'N, 56°E) about one month in every summer. Feces and urine produced by the herd are washed directly into the lake, which results in changes in the water quality and lake biota. When for instance in 1991 the herd numbered about 1000 animals, ammonium concentrations and zoobenthic biomass increased markedly after the period of separation.

Key words: eutrophication, pollution, species composition, zoobenthos.

Rangifer, Special Issue No. 13: 39-40

Study and discussion

Tundra water bodies contain water biocenoses with communities of hydrobionts which may be easily disrupted or destroyed and recover only with difficulty. Hydrobionts play an important role in self-purifying processes of the waters (Shcherbina, 1993; Marchenko *et al.*, 1997).

We have investigated lake Laya-to (67°60'N, 56°E) which is a natural water body situated in the Bolshezemelskaya Tundra (Fig. 1) for effects of eutrophication and compared with an unaffected lake.

The water vegetation of Laya-to, is dominated by *Arctofila fulva*, *Potamogeton* sp., *Ceratophyllum demersum*, *Nostok* sp. and water mosses. The mean temperature of the water in July is 9.05 °C, pH = 6.6-6.7, O₂ = 13.0 mg/l, CO₂ = 3.0 mg/l. The lake was studied in 1991 and 1992.

Reindeer herders often organize their resting and working places near large lakes. On the northeast bank of Laya-to, the animals were corralled for a month in June/July. During this time new antlers were cut before the herd was driven back to the grasslands. In June 1991 reindeer herders gathered about one thousand reindeer in the corral. Urine and dung flowed down into the lake and the shoreline

was damaged. In 1992, there were only a few reindeer there during our investigation and no drainages to the lake.

Chemical parameters in both years were similar and indicated eutrophication. Increased level of ammonium nitrogen (NH₄-N) was registered in both years. During the first year (1991) when concentrated reindeer urine and dung entered the lake, the level of ammonium nitrogen measured up to 112.5 mg/l. However, this local situation was temporary, and was typical to the presence of the reindeer herd. In 1992, the content of NH₄-N was 140 times less than in 1991 since ammonium nitrogen oxidates to nitrites (NO₂) and nitrates (NO₃) which are subsequently consumed by water plants and phytoplankton.

During the study period 12 species of plankton organisms and 18 groups of bottom invertebrates were found in the lake. The total number of bottom invertebrates in 1991 was 2.5 times higher and biomass 1.5 times higher than in 1992 testifying that wastewater enhances development of organic matter leading to an increase of bottom fauna, especially Oligochaeta, Mollusca, Nematoda and Chironomidae. Thirtyfour species of Chironomidae larvae

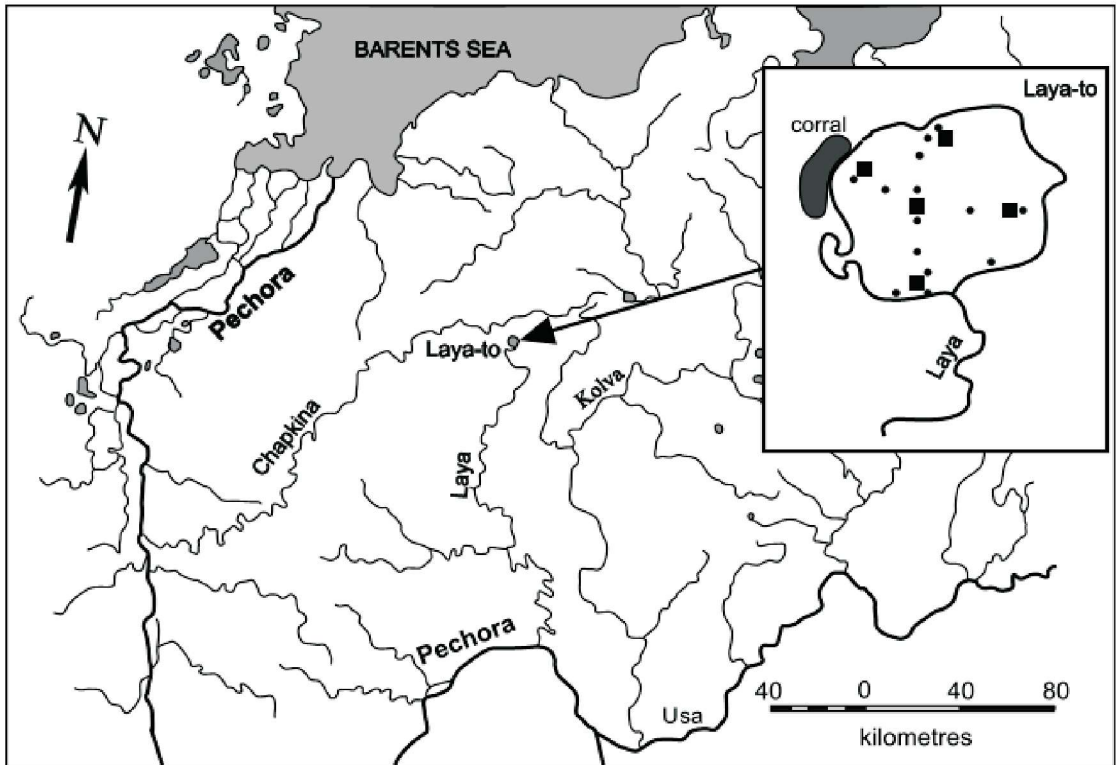


Fig.1. Map of study area lake Laya-to and localization of sampling stations

- hydrochemical stations
- hydrobiological stations

were observed in the lake. A vast number of larvae of *Procladius ferrugineus* (K.), *Polypedilum* sp., *Chironomus* sp. indicated eutrophication (Zinchenko, 1997).

The water fauna of Laya-to included mostly widespread eurybiontic species. The high eutrophication is most probably due to anthropogenic factors; of them reindeer wastes are supposed to be the main factor. The relation between a lake and pollution depends on many hydrological and hydrochemical factors like water supply, distance from the source of pollution, and the presence of macrophyte belt in the littoral. Normally the lake will overcome pollution well when the water-exchange is good. Water plants also contribute to the self-purification processes. In comparison with Laya-to no eutrophication was observed in 1991 in the lake Bolshoe Shapkino which is similar to Laya-to in origin and hydrological indices but was not directly affected by reindeer (Kuzmina, 1993).

References

Kuzmina, Y. S. 1993. Gigrobiologicheskaya characteris-

tika oz. Bolshoe Shapkino. - *Materialy II Molodezhnoy nautbnoy konferentsii "Ratsionalnoe ispolzovanie i vosproizvodstvo prirodnih resursov"*. Syktyvkar, pp. 27-28.

Marchenko, N. A., Zinchenko, T. D. & Shitikov, V. K. 1997. Znachenie zoobentosa v samoochishchenii r.Chapaevka. - *Ekologicheskoe sostoyanie basseyna r. Chapaevka v usloviyakh antropogenogo vozdeystviya (biologicheskaya indikatsia). Ecologicheskaya bezopastnost' i ustoychivie razvitie Samarskoy oblasti. Vipusk 3. Tol'yatti*, pp.146-152.

Shcherbina, G. Ch. 1993. Rol' *Dreissena polymorfa* Pallas v donnykh soobshchestvakh oz. Bishtynetskogo. - *Zootsenozy vodoemov basseyna Verkhney Volgy v usloviyakh antropogenogo vozdeystviya. Tr.Instituta biologii vnutrennih vod. 69 (72): 145-159.*

Zinchenko, T. D.1997. Ekologicheskaya karakteristika chironomid. - *Ekologicheskoe sostoyanie basseyna r. Chapaevka v usloviyakh antropogenogo vozdeystviya (biologicheskaya indikatsia). Ecologicheskaya bezopastnost' i ustoychivie razvitie Samarskoy oblasti. Vipusk 3. Tol'yatti*, pp. 183-198.

Revised manuscript accepted November, 2001

Extended abstract

State of invertebrates on reindeer-grazed localities

Alla Kolesnikova & Olga Uzhakina

Institute of Biology, Komi Science Center, Ural Division of Russian Academy of Sciences, Syktyvkar, Russia
(dolgin@komisc.ru).

Rangifer, Special Issue No. 13: 41-42

Introduction

Reindeer grazing is practised in the territory of the Malozemelskaya Tundra. In 1998, a study of soil invertebrates was carried out in the following grazing lands of the collective farm Vyucheiskii with 9000 reindeer (Lavrinenko & Kuljugina, 2002): the Timan coast, the northern extremity of the Nenets Ridge, and the basin of the river Indiga. Winter pastures of reindeer are located on the Timan coast; they are dominated by sedge-grass-moss tundra communities. Summer grazing lands are situated in the Nenets Ridge and the Indiga river district dominated by dwarf shrub-lichen and willow tundra communities and forb-grass meadows. The Nenets Ridge is the highest area. In summer it attracts reindeer herds escaping from insects on the windy hills.

We studied 30 plant communities including 15 control plots and 15 experimental plots. The latter were located in places of reindeer trampling and grazing. We collected soil invertebrates by the hand sorting of the soil and litter samples of 25 cm x 25 cm. We also used soil traps (pit fall traps). In all, 30 hand samples were collected and 10 traps were placed in each plant community.

The data of authors Barbashova (1983), Matveeva (1970) and Sharova & Matveeva (1974) showed that the structure of soil biota is essentially changed in the reindeer pasture areas. The feed types of beetles changed along with a general reduction of species number. The number of zoophytes decreased and the number of saprophytes increased. It was also noticed, that species inhabiting the soil surface predominated (Antoshenkov, 1983).

Results and discussion

Vegetation and soil conditions in the research locations were presumably changed because of the constant use of grazing lands. Soil invertebrates, especially forms inhabiting the litter, reacted to the occurring changes. Soil invertebrates dominated the animal populations of tundra communities and included about 70% of general zoomass. About one half of the litter forms belongs to beetles, mostly to the families Carabidae and Staphylinidae. They are the most successful in the tundra landscapes and are important for tundra communities due to their wide feeding spectrum and big populations. These two families showed a considerable species diversity and a broad adaptive radiation. Twentyfive Carabidae species and 14 Staphylinidae species were observed in the research.

The winter pastures

Species diversity of soil invertebrates in the winter pastures was lower than on the area of summer grazing lands. In the control plots the most abundant beetle species were *Pterostichus haemotopus*, *Olophrum fuscum*, *O. rotundicolle* and *O. boreale*. On experimental plots, the beetle species *Pelophila borealis*, *Pt. kokeili*, *Pt. vermiculosus* and *O. boreale* common in tundra ecosystems, were registered. But any differences in qualitative composition of soil invertebrates in the experimental and control plots were not observed. So adjustable reindeer grazing on winter pastures may not influence on the soil biota structure.

The summer pastures

Species composition of beetles in the experimental plots of summer grazing areas was poorer than in the control plots. The species *Amara brunnea*, *Pt. kokeili*, *Omalium rivulare* were found in the experimental and control plots. The beetles *Curtonotus alpinus*, *C. torridus*, *Leistus terminatus*, and *Boreaphyllus benningianus* were only observed in the experimental plots. One of the factors affecting the soil biota on the summer pastures seemingly was trampling. The group of soil invertebrates forms completely disappeared owing to constant trampling. Also a decrease of litter forms was observed. The surface-soil forms living in more rare vegetation are saved.

Conclusion

Not only the species composition of soil invertebrates, but also their life forms was changed under grazing. The number of zoophytic species (feeding on animal food) increased in the tundra ecosystems, Thirtytwo beetle species belonging to this group were found in the control spots while only 8 saprophytic species.

Our data show, that reindeer grazing in summer pastures may have effects on the soil invertebrates through changes of soil biota structure and a decrease of species number. Species tolerating changing environmental conditions are the the most usual species in tundra communities. At high grazing

intensities, absence of beetles on plots has been observed. In the winter pastures (covered with snow) trampling and grazing seemingly have no discernable effect on the soil biota.

References

- Antoshenkov, V. F. 1983. Influence of regulated grazing on soil mezofauna of grazelands. – In: *Fauna and ecology of soil invertebrates of the Moscow region*, pp. 201-220. Moscow, 1983.
- Barbashova, L. G. 1983. Soil invertebrates fauna of grass-cereals birch forest and its changes under the influence of grazing. – In: *Fauna and ecology of soil invertebrates of the Moscow region*, pp. 186-200. Moscow, 1983.
- Lavrinenko, O. & Kuljugina, E. 2002. Use of State Natural Reserve in the Nenets District as reindeer pastures: Inventory of lichens. – In: P. Soppela, W. Ruth, B. Åhman & J.-Å. Riseth (eds.). Proceedings of the 1st CAES Course 'Reindeer as a Keystone Species in the North – Biological, Cultural and Socio-economic Aspects'. – *Arctic Centre Report Series Reports* 38, in press.
- Sharova, I. Kh. & Matveeva, V. G. 1974. Carabidae complexes of floodplain meadows in the European part of USSR. – In: *Fauna and ecology of animals*, pp. 3-17. Moscow, 1974.

Last version October, 2002

Extended abstract

Plant cover of sandy deflation scars in reindeer-grazed tundra

Katja Kuljugina

Institute of Biology, Komi Science Centre, Ural Division of Russian Academy of Science, Kommunisticheskaya 28, Syktyvkar, 167982, Russia (kulugina@ib.komisc.ru).

Rangifer, Special Issue No. 13: 43-44

Study area and method

The upper parts of the sandy hills in the East of the Malozemelskaya Tundra are characterized by sandy deflation scars (areas 200 - 3000 m²; depths 0 - 1.5 m) in lichen-dwarf shrub tundra. The kettles are most common close to reindeer herders' camps and settlements. The vegetation cover in sandy areas of the tundra zone has been studied by Andreev and Sambuk in the 1930s and by Pristiyazhnyuk & Telyatnikov (1995); Khitun & Rebristaya (1997) and Magomedova & Morozova (1997). The purpose of my study was to ascertain the state of vegetation cover of such ecotopes and their response to the effect of anthropogenic factors, one of which is reindeer grazing. As part of the study we have tried to find out if there exist connections between reindeer grazing and the occurrence of kettles.

In the field season of 1998, we made 58 descriptions of plant cover of sandy deflations on sampling plots of 5 m x 5 m (Kucherov & Payanskaya-Gvozdeva, 1995) that allowed us to describe a relatively homogenous plant cover. The following parameters were used: species composition, cover percentage, abundance of cryptogamic and vascular plants, plant height, and features of soil.

Results and discussion

The plant cover of the sandy deflation scars was heterogeneous. Four types of plant communities were found in these ecotopes. *Type 1* - communities were dominated by *Empetrum hermaphroditum* + *Arctous alpina* and situated on hillocks, at the periphery and

sometimes in the center of sandy deflation kettles, which presented fragments of destructed tundra. The species composition and diversity of life forms in these communities is similar to those of the bordering moss - lichen - dwarf shrub tundra. *Type 2* - communities of *Racomitrium canescens* - *Empetrum hermaphroditum* occurred on gently sloping hillocks situated closer to the centre of the soil-blowing kettles. The communities of *type 3* (*Stereocaulon rivulorum* - *Polytrichum piliferum*) occurred on the less steep surfaces of the deflation scars, in which spore plants predominated. Primitive plant aggregations in the communities of *type 4* (cryptogamic crusts - *Polytrichum piliferum*) were at the central part of deflation scars, where pebbles and stones predominated. Species composition was variable in such groups. This type belonged to a last stage of degradation of native plant cover and becomes the starting stage for further colonization and overgrowth of sands.

The comparative analysis of these communities of sandy scars revealed the following: species diversity decreased from the first to the fourth type; total plant cover decreased from *type 1* (86%) to *type 4* (3%), consequently the proportion of open substrate increased. There was an accompanying change in covering of different plant groups. The frequency of plant species also decreased from *type 1* to *type 4*. The cover of mosses and lichens increased, while cover of dwarf shrubs and shrubs decreased. The origin of such changes in plant cover of scars may be owing to reduced competition by vascular plants. Increased number of xerophytic species of vascular

plants, mosses and lichens of community *type 4* confirms deterioration of growing conditions in this type of communities. Variability of species composition was the highest in open communities, owing to increased instability of plant growing conditions.

The described changes in plant cover of sandy hills are most probably caused by anthropogenic impact. Reindeer numbered 2340 in the investigated area (Zolotoy, 1999) and grazing in the lichen and dwarf shrub-lichen tundra on sands may be the most important factor in stopping natural development of vegetation cover and causing changes or even total destruction of it. This situation is connected with the deterioration of plant life conditions caused by increased wind erosion. The latter disturbs the moisture regime of the soil. Pebbles on the soil surface also hinder regrowth of plants. Such open areas can persist over the long term, a conclusion proved by registered mapping in 1969 and air photographs in 1984.

Acknowledgement

Professor Olga Sumina, University of St.Petersburg has helped with improving the manuscript.

References

- Khitun, O. V. & Rebristaya, O. V.** 1997. The specific of the compound of species colonizing disturbed habitats in central Yamal. – *In: Reports of III international conference "The development of the North and problems of recultivation"* (St. Petersburg, Russia 27-31 May, 1996), pp. 132-135. Syktyvkar.
- Kucherov, I. B. & Payanskaya-Gvozdyeva, I. I.** 1995. Methods of the description of a condition of vegetation. – *In: Yurcev, B. A. (ed.). Anthropogeneous dynamics of plant cover of Arctic Region: principles and methods of study*, pp. 51-63.
- Magomedova, M. A. & Morozova, L. M.** 1997. Plant cover. – *In: Dobrinsky, L. N. (ed.). Monitoring of the biota of the Yamal peninsula in relation to the development of facilities for gas extraction and transportation*, pp. 11-99.
- Pristyazhnyuk, S. A. & Telyatnikov, M. Yu.** 1995. Natural restoration of a vegetative cover of Yamal tundra after anthropogeneous disturbances. – *Siberian ecological magazine* 6: 540-548.
- Zolotoy, S. Æ.** 1999. Present and perspective especially protected natural territories of the Nenets Autonomous District. – *In: Ecological situation in the Nenets Autonomous District in 1998*. Nar'yan Mar, pp. 37-57.

Last version October, 2002

11th Arctic Ungulate Conference (AUC)
Saariselkä, Finland, 24-28 August, 2003

Registration and information

See web pages www.rangifer.no or www.rktl.fi/english/index.html

Call for abstracts

Please find guidelines at www.rangifer.no/eng/news.html

Deadline for submitting abstracts is 3 March, 2003

Grants from NOR 2003

Information about NOR-grants at the above web site

Deadline for applying is 1 February, 2003



INFORMATION FOR CONTRIBUTORS TO **Rangifer**

Copy rights, language and quality

- Authors transfer copy rights automatically to NOR when the article is printed in Rangifer.
- English only. It is the authors' responsibility to submit manuscripts in as complete and perfect condition as possible. State your linguistic consultant(s).

Typing

- Use body text in 12 points size and double spacing with 4 cm margins on both left and right sides. Do not hyphenate at the right margin.
- State name and complete address, fax number, telephone number and e-mail address of the person who is to receive editorial correspondence.
- Submit 3 good copies. When accepted, the manuscript with tables and figures should also be submitted in e-mail attachment and/or on a 3,5" diskette containing no other files (use ordinary programs and versions).

Main text, summary and key words

- The manuscripts usually consist of the following main chapters; introduction, material and methods, results, discussion and references.
- Give comprehensive abstract and relevant key words, placed before the main chapters. A list of key words in alphabetical order should not include any words that occur in the title of the paper.
- Nordic authors should also prepare an abstract in their own language.

Tables, graphs and other illustrations

- These shall be numbered with Arabic numbers (1, 2, 3 etc.) and provided with a short text, such that they can be understood independently of the article text. Indicate in the margin of the manuscript where tables and illustrations shall be placed in the text. Figures and tables can be put directly in the manuscript. Long tables shall be avoided.
- Illustrations must be ready for printing (repro quality). Figure legends must be typed on separate page, each text clearly marked with the number of illustration. Mark the back of each illustration with the name of the senior author, figure number and <<TOP>>. Most photos are accepted, including slides. Authors have to pay extra for printing photos in colour.
- If using electronic programmes, save figures as ai-file (Adobe Illustrator) or eps-files (Encapsulated PostScript).
- Graphs and tables should be made in Microsoft Excel.

References

- Sources given in the text shall be written: Smith (1994), (Smith, 1994), (Smith & Jones, 1994) or (Smith *et al.*, 1994). Use semicolon between references: (Smith, 1994; Smith & Jones, 1995; Smith *et al.*, 1996) and put references in chronological order.
- The list of references shall be placed at the end of the manuscript and listed alphabetically according to the author: Holleman, D. F., Luick, J. R. & White, R. G. 1979. Lichen estimates for reindeer and caribou during winter. – *J. Wildl. Manage.* 43 (1): 192-201. (43 volume number, (1) number in volume series (can be omitted) and: 192-201 page numbers). You can also give full journal names.

Measurements and units

- Use metric units. Follow the accepted nomenclature of the International Symbol of Units. Numbers shall be given as: 739 847.34. Use the CBE Manual for Authors, Editors and Publishers.

Italics

- Italics shall be typed. Taxonomic names in Latin (genus and species; *Rangifer tarandus tarandus*), book titles and journal names shall be written in italics.

Proofs and offprints

- First correction of proofs is the responsibility of the author. Authors are fully responsible for checking all material for accuracy.
- Offprints must be ordered when page proofs are returned after correction. 60 offprints are provided free of charge (authors of special issue must order at cost). Additional reprints may be ordered at cost.

Referees

- The journal covers many different scientific research fields. The author is expected to submit suggestions on actual referees in their special field (name, address, e-mail).

Rangifer

Rangifer is the international Journal of the Nordic Council for Reindeer Research. It was first published in 1981. Since then the Journal has appeared in two to four ordinary issues per year with occasional Special Issues, including Proceedings, Monographs and Theses. The Journal is published biannually from 2002.

Rangifer is the world's only scientific Journal dealing exclusively with husbandry, management and biology of arctic and northern ungulates and publishes original, unpublished papers, review articles and brief communications.

Rangifer publishes quality papers on basic and applied research and is open for papers in both natural and social sciences on all themes relating to reindeer and reindeer husbandry (*e.g.* anthropology, biology, law, history of and modern practice in husbandry and management). The manuscripts are evaluated by at least two independent referees. The Journal offers the author 60 reprints of articles in ordinary issues, free of charge.

Rangifer is registered in international databases for scientific papers, including Biosis, Biological Abstracts, CAB, and Agris.
