

Climate Change:

Linking Traditional and Scientific Knowledge



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Integrating Traditional and Scientific Knowledge: Management of Canada's National Parks

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Abstract

In this case study from Sirmilik Canada National Park, we present the context of a research project on Inuit Traditional Ecological Knowledge (TEK) pertaining to snow geese, arctic foxes and red foxes. We show how TEK shared by Elders and hunters from Mittimatalik (Pond Inlet, Nunavut) complements Western Science and can contribute to the management of the park. We argue that documenting TEK is essential for the development of ecosystem-based management strategies that are locally sensitive.

Introduction

Over the past 20 years, the idea of combining Traditional Ecological Knowledge (TEK) and Western Science for managing natural resources has gained a growing recognition (Berkes 1999, Berkes 2000, Manseau *et al.* 2005, Moller *et al.* 2004). In Canada, the increased appreciation of TEK, coupled with native political and cultural claims, has led to legislation and policies requiring that TEK be considered alongside Western Science in certain resource management decisions (Usher 2000). For example, a cornerstone of the Nunavut Land Claims Agreement was the creation of a council that would ensure Inuit involvement in decisions regarding the preservation and development of land covered in the agreement (Gouvernement du Canada 1993). Furthermore, following the creation of the territory in 1999, Inuit Traditional Knowledge (*Inuit Qaujimajatuqangit [IQ]*) has emerged as a guiding principle of the Government of Nunavut (Wenzel 2004).

Set out in the Nunavut Land Claims Agreement (Gouvernement du Canada 1993), and further defined in an Inuit Impact and Benefit Agreement (1999), it is also now a legislative requirement that Inuit knowledge be included in the management of Canada's National Parks in Nunavut (Nunavut Field Unit of Parks Canada 2004). The first step in fulfilling this requirement was the

creation of Joint Park Management Committees (JPMC) for each National Park in Nunavut. For Sirmilik National Park of Canada (Sirmilik NPC, Figure 1), a JPMC was created when the park was established in 2001. Since its creation, the JPMC has fulfilled its advisory role to Parks Canada, but members of the committee soon realized that true integration of Inuit knowledge wasn't being fully achieved. As a consequence, the JPMC for Sirmilik NPC set the collection and integration of Inuit TEK as the first priority for the park (Parks Canada 2002). During the 2001 Sirmilik NPC Resource Description workshop, it was also agreed by Elders, scientists and Parks Canada that collection and integration of TEK related to birds, hunting activities, history of people in the area, and wildlife behaviour would be a priority.

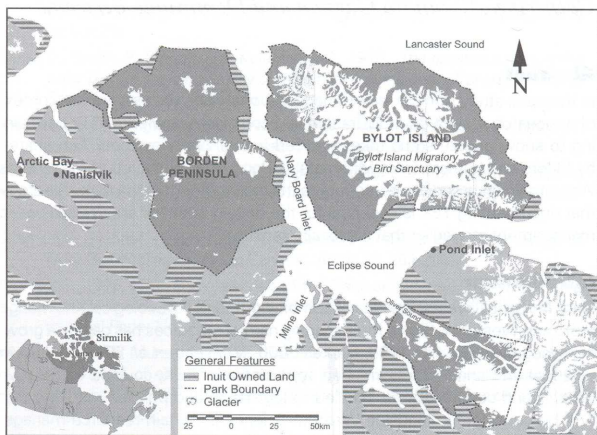


Figure 1. Sirmilik National Park of Canada and its surrounding areas, northern Baffin Island. Copyright 2004 by the Nunavut Field Unit of Parks Canada. Adapted with permission.

Recognizing that the integration of TEK in Nunavut National Parks was not being fully addressed (Nunavut Field Unit of Parks Canada 2004), the Nunavut Field Unit of Parks Canada launched a multi-year 'Inuit Knowledge Project' in 2004 precisely dedicated to the incorporation of TEK in the planning and management of Nunavut parks (Parks Canada 2005).

Here, we present an ongoing project in which interests of Mittimatalik (Pond Inlet) residents, Parks Canada staff, and academic scientists were combined

to investigate Inuit TEK pertaining to greater snow geese (*Chen caerulescens atlantica*), arctic foxes (*Alopex lagopus*) and red foxes (*Vulpes vulpes*). This project is a crucial step in integrating Inuit TEK into the management of Sirmilik NPC, first because it puts in place an approach to TEK collection, and second because it gathers abundant information on species central to the local ecosystem. At the time of writing, the project reaches its final stages and this paper presents the current views of the two academic scientists most deeply involved in the study.

The project also has the potential to contribute to a broader understanding of Inuit values and activities associated with the above-mentioned wildlife species. Inuit from Mittimatalik have traditionally hunted greater snow geese and collected their eggs (Brody 1976, Mary-Rousselière 2002, Riewe 1992). Today, families from Mittimatalik hunt geese and gather their eggs while camping on the South plain of Bylot Island (personal observation, June, 2005), where is established the most important breeding colony of this species worldwide (Reed *et al.* 1998). As for arctic foxes (and to a lesser extent red foxes), Inuit from the area formerly trapped them extensively. From the 1920's, when the Hudson's Bay Company established a trading post in Mittimatalik, to the mid 1970's, fox fur represented the most important asset traded by Inuit to secure cash and/or other valuable goods (Sawtell 2005). Currently, only a few hunters still trap foxes around Mittimatalik, and trapping is no longer a major economic activity in the area. Nonetheless, foxes are highly visible and are frequently observed by local hunters traveling on the land (Panipakoocho 2005).

Greater snow geese, arctic foxes, and red foxes, are also intensively studied by scientists at Sirmilik NPC. In the late 1960s and early 1970s Canadian authorities conducted reconnaissance surveys of breeding greater snow geese on Bylot Island (J.D. Heyland, unpublished) and instituted a standard survey in 1983, which has been repeated every five years since (Reed *et al.* 2002). In 1988, a permanent study site was established on the South plain of Bylot Island as a joint collaboration between Université Laval and the Canadian Wildlife Service. Major themes investigated at this site include: a) goose demographics and population dynamics (Gauthier *et al.* 2004, Reed *et al.* 2002), b) impact of goose grazing on tundra vegetation (Gauthier *et al.* 1995) and more recently c) trophic interactions between plants, herbivores and predators (Bety *et al.* 2002; Gauthier *et al.* 2004). As part of this last theme, arctic and red foxes have been studied since 1993. However, research on arctic and red foxes expanded in 2002 to include a) a study of the northern range expansion of red fox that occurred during the twentieth century (MacPherson 1964), b) an investigation of the potential competition between arctic and red foxes (Sahanatien 2005), and c) a study on the potential effects of global climate change on the ecology of these two fox species.

Thus, the idea of developing an Inuit TEK project that would focus on geese and foxes emerged from the mutual interests of local community members seeking to promote the value and application of their knowledge, and academic and government scientists seeking to expand their sources of information. Furthermore, one of the management objectives of Parks Canada is also to protect the ecological integrity of its parks. In this context, collecting Inuit TEK about geese and foxes has the potential to contribute to the monitoring of the ecological integrity of Sirmilik NPC by providing information on two important changes operating in its terrestrial ecosystems, namely the increase in numbers of greater snow geese migrating to the area, and the appearance of a new species to the area (the red fox, a potential competitor to the arctic fox).

Further stimuli for the project included the perceived need by both scientists and the local community to build partnerships and stronger human relations between academics (who usually are busy summer visitors to the Arctic who "come and go with the birds") and year-round resident Inuit Elders, trappers, and hunters.

Methods - Study Area

Mittimatalik is a community of approximately 1200 inhabitants, of whom 94% are Inuit (Sawtell 2005). Historically, people from Mittimatalik lived in outpost camps throughout Lancaster Sound, Eclipse Sound and Navy Board Inlet (Brody 1976). The Hudson's Bay Company established a trading post in Mittimatalik during the 1920's, but it was not until the 1950's that permanent settlement started to occur, becoming prominent from 1955 to 1965 (Brody 1976).

Today, Mittimatalikmiut (the people from Mittimatalik) have a mixed economy divided between wage salaries and land-based subsistence activities such as hunting and fishing (Indian and Northern Affairs Canada 2004). Subsistence activities are associated with wildlife species such as ringed seal (*Phoca hispida*), bearded seal (*Erignathus barbatus*), harp seal (*Pagophilus groenlandicus*), narwhal (*Monodon monocerus*), caribou (*Rangifer tarandus*), polar bear (*Ursus maritimus*), arctic char (*Salvelinus alpinus*), greater snow goose (*Chen caerulescens atlantica*), and arctic fox (*Alopex lagopus*) (Riewe 1992, Statistics Canada 2004). Still today, Mittimatalikmiut perform subsistence activities on a wide territory spreading through Eclipse Sound, Northern Baffin and Bylot Island.

Sirmilik means "the place of glaciers" in Inuktitut. In 2001, Sirmilik NPC was created in the area adjacent to the communities of Ikpiarjuq (Arctic Bay) and Mittimatalik (Pond Inlet). Covering an area of over 22 000 km², the park encompasses most of Bylot Island and most of the northern tip of Baffin Island (Figure 1). It includes territories travelled, hunted and fished for thousands of years by local Inuit and their ancestors (Brody 1976, Mary-Rousselière 2002).

Preliminary Consultations

Prior to the implementation of the project, we conducted general community consultations during two meetings held in Mittimatalik in February-March 2005. These meetings served to introduce the project and to invite advice and feedback. Approximately 20 local Elders, representatives from the Inuit Qikiqtani Association, and members of the JPMC attended the meetings. Consultations allowed us to evaluate concerns and the level of community support of the project. During both meetings, representatives from the community expressed their support for the project. In July 2005, a Mittimatalik Inuit Knowledge Working Group (IKWG) was created as part of the Parks Canada Inuit Knowledge Project. This working group, which overlooks the project, is composed of three Elders (two individuals elected from the Elders Committee and one individual selected by the Hunters and Trappers Organization), and a youth member. We maintain frequent contacts with the IKWG to ensure that local benefits are promoted through every step of the project.

Approach to TEK Collection

Following consultations, one of us (C.-A. Gagnon) resided in Mittimatalik from May-September 2005 and conducted the first phase of knowledge gathering upon which this project is based. Over this period, 21 local experts (6 women, 15 men; 9 Elders not-actively hunting; 5 Elders actively hunting; 7 hunters) were interviewed using the informal semi-directive interview method (Grenier 1998). Semi-directed interviews are open and flexible, and are not as rigid as questionnaires. General themes are established in advance by the interviewer, but questions remain open-ended and leave room for new subjects to emerge (Grenier 1998). In general, the two following themes were brought up during interviews: a) geese: cultural use and importance, hunting areas, changes in abundance and distribution, migration routes, and timing of moult; b) foxes: cultural use and importance, location of trap-lines, changes in abundance and distribution, winter feeding habits, moult, and arrival of red fox in the area. We selected local experts to be interviewed based on recommendations from Elders, members of the Mittimatalik Hunters and Trappers Organization, people from the Hamlet Office, and community members working for Parks Canada and the Nunavut Wildlife Management Board. With the consent of informants, a local student assistant audio and video recorded all interviews. Interviews were simultaneously translated into English and Inuktitut by a local translator. All audio, video and written materials produced through the interviews will be archived by Parks Canada and made accessible to the community (Nunavut Field Unit of Parks Canada 2004).

During interviews, maps stimulated conversation and were used as a recording aid. TEK pertaining to factual data about the environment is geographically specific, so maps convey tremendous value (Usher 2000). Maps allowed informants to draw attention to places that are important for foxes and geese, or

were personally valued for other reasons. As much as possible, we conducted interviews in places where informants felt comfortable, which included personal homes, the local visitor centre, the Parks Canada office, and traditional camping and hunting sites. Interviews conducted on the land were particularly effective in stimulating conversation, bringing back memories of hunting and camping stories. They generally made the informant feel more at ease. However, due to logistical and economic constraints, we could not conduct all interviews on the land.

An important step in performing TEK studies is data validation, a technique that involves a detailed check of data accuracy, interpretation of data, and conclusions drawn from data. Data validation is performed by the informants who are given the opportunity to judge the accuracy of the accounts and the correctness of the interpretations reported by the interviewers (Creswell 1998).

At the time of writing this paper, only a small portion of the collected information and subsequent interpretation was validated by informants. We here only present this validated fraction of the project results, and use that merely to demonstrate the type of outcomes that will emerge from the study. Research will be completed in late 2006, after complementary information will have been collected from informants and they will have validated all interpretations.

Elders and other local representatives have expressed, since the beginning of the project, their desire that their knowledge be shared with youth from the community. Considering this, we will organize an Elder-youth camp in the summer of 2006, during which the knowledge shared by the Elders and hunters will be discussed, put into practice, and communicated to the younger generation. The camp, held within Sirmilik NPC boundaries, will not only allow for meaningful educational experiences for the youth. It will also provide an opportunity for Elders, youth, scientists, and Parks Canada staff to exchange, while on the land, about common interests (e.g. wildlife, ecological relationships, conservation of resources) usually approached from different conceptual angles, and with various techniques, objectives, and cultural background. All of these human groups play a role in the current or future understanding and management of the local environment.

Results and Discussion

We have recorded nearly 40 hours of interviews. While the project is still ongoing, the information shared and validated by local experts already reveals the richness of local Inuit TEK pertaining to geese and foxes.

Greater Snow Geese

Interviews provide insights on cultural importance (traditional and current) of geese to local people, on hunting techniques, and on goose ecology. Below

we illustrate the information that was shared, first through an example about the past and present importance of geese to people, and then through an example related to the fall goose migration.

Goose meat and eggs have always been alternative food items for local people, both historically and in contemporary times. However, the importance of geese to informants seemed to depend on the location where they camped and hunted when they were young. Informants who had lived closer to the goose colony were more likely to consider goose as a delicacy.

Usually it (the importance of geese) depends on the kind of food people usually eat. People who eat quite a bit of geese, their younger generation will tend to eat the same type of food that their Elders are eating. So the geese are very important for the younger generation, to be passed on to, like food wise and to learn how to hunt... So food wise and hunting wise, I believe it's very important to give to the younger generation. (Akomalik 2005)

Traditionally, geese were used as food for immediate consumption or, when hunted in surplus, were dried or cached for later use. Goose body parts were also transformed into domestic objects such as brooms (wings), mattresses (skins with feather), down-filled garments, flutes (trachea) and small bags (skins from legs and feet). Today, geese and their eggs are considered as a delicacy, and they are eaten shortly after being hunted or collected. Down-filled garments and brooms made of goose wings are still used in some households (personal observation, June, 2005).

Like the wings, I always collect them, I put them in bags, and all during the winter, I use them for broom ... just like my late in-laws were using them in the same way ... When I was young, we used to take the wind pipe of the goose and we would clean it thoroughly and when it's clean we'd dry it and then, we'd used it. We'd use it for whistles, like for children. (Katsak 2005)

To local Elders and hunters, geese also have an intrinsic value.

It's good to hear them ... it seems to make everything more peaceful and more beautiful because of the sound of the geese and other birds that are migrating up. ... when they're coming back up and you can hear them ... you know that spring is here. (Peterloosie 2005)

Fall goose migration has never been scientifically investigated in the area because of the huge costs involved in tracking birds over the vast expanses of the Arctic (one exception is a pilot study using satellite telemetry in 1995-96 (Blouin *et al.* 1999). The knowledge of local experts, on that matter, has

expanded the temporal scale of scientific knowledge by providing information on migration routes, timing of fall migration and behaviour during migration. For example, goose biologists were interested in knowing whether geese gather in one large area before starting their fall migration. From a wildlife management point of view, knowing about the existence and location of areas where geese congregate would clearly have implications on future land management. On that point, the consensus among informants was that geese do not gather in a large group in any local area before the fall migration. Instead, geese leave in small groups.

They don't gather, but whichever geese are able to fly then they start leaving, they leave one after the other in groups, but they don't gather or anything like that. They just start leaving as soon as they are able.
(Koonark 2005)

The geese that are going through there (during migration) they don't congregate all at once. ... There's up there always groups of geese like one after the other. They don't seem to congregate in one group.
(Panipakoocho 2005)

This example shows how TEK can offer information of high interest to scientists.

Arctic and Red Foxes

Interviews provided a wealth of information related to important trapping sites, traditional ways of trapping, uses of foxes (other than for trading), and ecology of foxes. To illustrate the potential for TEK to complement Western Science in relation to foxes, two examples are developed: one pertaining to the arctic fox winter feeding ecology, and the other about the recent invasion of red foxes in the area.

No scientific study has been done about arctic fox winter feeding in the North Baffin area. However, local trappers, who followed foxes during the winter, had considerable knowledge to share on the subject. According to them, two types of foxes, differing in their winter feeding behaviour, can be distinguished in the area. One type feeds on sea mammal carcasses in winter. This type has a thinner fur and its neck is stained by the sea mammal fat it feeds from. The other type is mainly terrestrial and has a thick and bright white fur. Local experts also mentioned that foxes, whether terrestrial or marine, move to the sea ice between late March and early April to hunt the new-born ringed seal pups.

There's also a difference between foxes who live on the mainland and foxes who live on the sea ice... they're all white but the difference is the...foxes that live mainly on the sea ice, their fur is thinner

and the foxes that live on the mainland, their fur is thicker. (Peterloosie 2005)

And there's a difference too in foxes. Foxes that usually remain on the mainland have thicker fur, and the ones that are on the sea ice tend to have thinner fur. (Nutarariaq 2005)

And also in spring...like at the last week of March, you find them (arctic foxes) on the sea ice, hunting for seal pups. (Mucktar 2005)

From the middle of April, when seals start having their pups... you see a lot of tracks from the land going down to the ice ... starting in April. ... We use to see, when we'd go out seal pup hunting, we would see fox holes diggings into seal dens. ... And one time, while I was seal pups hunting, I opened a seal den and inside was a fox. (Kilukishak 2005)

Interestingly, the existence of two feeding strategies in arctic foxes, one terrestrial and one marine, has been scientifically documented in Iceland, Svalbard and Greenland (Angerbjorn *et al.* 1994, Eide *et al.* 2005). But these were summer studies documenting summer behaviour. For the winter, Roth (2002) has suggested that two winter foraging options (marine and terrestrial) might be adopted by different segments of arctic fox populations. Yet, his results found no evidence of a bimodal use of resources for populations living near Cape Churchill, Manitoba. Instead, his stable isotopes analysis showed that the winter diet of the studied populations consisted of both marine and terrestrial components (Roth 2002). The existence of two distinct winter feeding strategies was apparently not documented. The existence of variations in fur thickness, related to winter feeding behaviour, is also new information to scientists. Information provided by local experts expanded the spatial scale of knowledge on fox feeding behaviour to outside the south plain of Bylot Island, and is now the source of a new direction for scientific questioning for one of us (D. Berteaux).

An aspect of fox ecology of some concern in the Arctic is the northern expansion of red foxes (Chirkova 1968, MacPherson 1964), and the negative competitive effect they may have on arctic fox populations (Tannerfeldt *et al.* 2002). In the North Baffin area, the only historical information on the red fox invasion comes from the pelt records of the Hudson's Bay Company trading post in Mittimatalik. According to these records, the arrival of the red fox is estimated to have occurred approximately in 1947 (MacPherson 1964). In order to complement this information, the arrival of the red fox was discussed with Elders and older hunters from the area. Many of them remembered the year a red fox was first caught in one of their traps, which coincided with the Hudson's Bay Company records. Not only did the informants reinforce

historical evidence on the invasion, but existing memories of this event open the way to further collection of information about the interactions between the two species when they first entered in contact and the reactions of people to the arrival of this new species.

It was probably in the ... early 50's, when we had a camp at Nunatsiaq. Somebody caught a red fox and it was very unusual to see a fox like that. We were quite amazed to see the red fox. It was something different and it was a big thing for us. We had a camp at Nunatsiaq and the hunters in Nadluat used to set their traps along this shore here (pointing on the map). It was one of the hunters who lived in Nadluat that caught a red fox and on his way back he stopped at our camp. (Sangoya 2005)

Conclusion

Preliminary results from the interviews conducted on Inuit TEK have clearly revealed insights on the uses and importance of geese and foxes to Mittimatalikmiut. Results also brought important ecological information complementary to western scientific data. This shows how Inuit TEK can be integrated into the management of the ecological integrity of Sirmilik NPC by a) contributing to the acquisition of baseline data on components of the terrestrial ecosystems and changes observed within the systems and b) providing a greater understanding of the relationship between Inuit and their environment. At a time when the Arctic is experiencing deep social and ecological changes, efforts to integrate Inuit TEK and Western Science are essential if we hope to develop locally sensitive ecosystem-based management strategies.

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