International Centre for Reindeer Husbandry
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Sven Skaltje

REINDEER HUSBANDRY AND BARENTS 2030

IMPACTS OF FUTURE PETROLEUM DEVELOPMENT ON REINDEER HUSBANDRY IN THE BARENTS REGION

A REPORT PREPARED FOR STATOILHYDRO BY THE INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY

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Disclaimer II
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INGUNN IMS VISTNES NORUT ALTA - ÁLTÁ
PHILIP BURGESS INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY
SVEIN DISCH MATHIESEN INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY
CHRISTIAN NELLEMANN UNEP/GRID-ARENDAL
ANDERS OSKAL INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY
JOHAN MATHIS TURI INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY

REINDEER HUSBANDRY AND BARENTS 2030

IMPACTS OF FUTURE PETROLEUM DEVELOPMENT ON REINDEER HUSBANDRY IN THE BARENTS REGION

Anna Degteva

SUMMARY

THE FUTURE FOR REINDEER HUSBANDRY IN THE BARENTS REGION IS HIGHLY DEPENDENT ON THE AVAILABILITY OF GRAZING LAND. EXTENSIVE OIL AND GAS DEVELOPMENT WILL LIKELY LEAD TO LOSS OF VITAL RANGES, IN PARTICULAR COASTAL SUMMER PASTURES AND CALVING GROUNDS. REINDEER HUSBANDRY AND BARENTS 2030 PRESENTS NEW POTENTIAL SCENARIOS FOR REINDEER HUSBANDRY, COMBINING THE GLOBIO METHODOLOGY FOR MAPPING LOSS OF BIODIVERSITY WITH THE EXTENSIVE OIL AND GAS DEVELOPMENT PICTURED IN THE BARLINDHAUG SCENARIOS.

New calculations confirm that continued piecemeal development will substantially reduce grazing grounds in coastal areas, also without additional petroleum development. When coupled with extensive petroleum development as projected in this report, however, an additional 21 000 km^2 will be deteriorated as grazing grounds in the Barents region. This is equivalent to the size of 2/3 of Finnmark's spring and summer ranges.

Continued loss of grazing land will constrain reindeer husbandry practices and make the livelihood less capable of handling other future challenges such as climate change. Herd production will likely decrease, while internal and external conflicts will become more common as the competition for resources increase. Unless a no-net loss of reindeer grazing ranges is implemented, continued piecemeal development, mainly as a result of associated non-petroleum activity, will seriously threaten the entire platform upon which reindeer herding is based. Identification of alternative ranges, restoration of current ranges, or the development of mitigation schemes to reduce impacts of current and new activity will be required in order to ensure long-term sustainability and the survival of reindeer husbandry.

RECOMMENDATIONS AND OPTIONS:

Short-term

1. Raise awareness and enhance capacity building by the further development of courses in industrial and indigenous adaptation and mitigation processes involving all parties. These courses should integrate traditional knowledge and up-to-date scientific knowledge on impacts on indigenous peoples and subsistence livelihoods.
2. Further develop courses in training of indigenous peoples in environmental and social impact assessments and in negotiations concerning industrial development projects
3. Increase outreach and information capacity of relevant publications through translations of documents into Russian and selected major indigenous languages for regions particularly exposed to development.

Mid-term recommendations and options

4. Support the development of Arctic ethical standards and guidelines applying to industry with regard to involvement of indigenous peoples in industrial development processes
5. Include and consider the impacts of industrial development projects on the ability of indigenous peoples to adapt to a changing climate
6. Adopt a no net loss policy with regard to availability of grazing ranges, so that losses of grazing land from new development is compensated with either restoration, support to adaptation and mitigation measures where effective, or increased access to ranges elsewhere.

Long-term recommendations and options

7. Develop an integrated management plan also for the Barents sea land region involving and balancing the land changes associated with industrial and infrastructure development, climate change and the long-term sustainability of reindeer husbandry.

Sven Skaltje

Figure 1. *Circumpolar distribution of reindeer husbandry and reindeer herding peoples*

INTRODUCTION

Reindeer husbandry is a traditional livelihood in Eurasia, carried out by more than 20 different ethnic indigenous Arctic peoples in Norway, Sweden, Finland, Russia, Mongolia and China, (e.g. the Sámi, Nenets, Komi, Khanti, Dolgan, Nganasan, Yukagir, Even, Evenk, Sakha (Yakut), Chukchi, Koryak, and Chuvan), involving up to 100,000 herders, 2.5 million semi-domesticated reindeer, and four million square kilometers (Figure 1). Reindeer pastoralism is a traditional livelihood that represents a model of sustainable exploitation and management of northern terrestrial ecosystems based upon generations of experience accumulated, conserved, developed and adapted to the climatic and political/economic systems of the north. Reindeer husbandry represents a complex coupled system of interchange between humans and animals in the Arctic. Therefore, any vision of sustainability that is related to the Arctic cannot but take account of the knowledge and lessons learned by those who practice reindeer husbandry and related subsistence activities in the region.

Reindeer Husbandry and Barents 2030 discusses potential consequences of oil and gas development in the Barents Region (northern Fennoscandia and north-east Russia), assuming potential future development of several LNG plants, crude oil terminals, and pipeline systems in the area. The basis for these assumptions is the Barlindhaug 2030 scenarios (Barlindhaug 2005) and how they add to existing scenarios of development in the region. Upgraded UNEP Globio maps for reindeer pastures in the Barents region are presented, including potential loss of grazing land towards 2030 if coupled with extensive petroleum development. Three scenarios are described, giving possible outcomes of varying levels of oil and gas development and how they will impact the region generally, and reindeer husbandry more specifically. The report concludes by recommending a number of specific actions and mitigation measures of significance for reindeer husbandry regionally.


Ellen Inga Turi


Philip Burgess


Svein Disch Matthiesen

THE BARENTS REGION AND ITS INDIGENOUS INHABITANTS

The Barents Region includes the grazing range for over 800,000 semi-domestic reindeer, the traditional livestock of the Sámi, Komi and Nenets people (Jernsletten and Klokov, 2002). Both natural and political conditions have formed this way of life. Natural conditions decide where grazing conditions are most favourable at any given time of the year with regards to snow, forage quality and quantity, predators, insects, and climate. Political conditions such as closing of national borders and regulation of pasture use have constrained reindeer in other ways, such as the closing of the Norwegian-Finnish border in 1852 which excluded all reindeer on the Finnish side from their traditional summer pastures in Norway and vice versa (Bull *et al*. 2001). As a result of these varying conditions, reindeer husbandry is conducted in different forms throughout the Barents Region. The Sámi people also consist of several more or less distinct groups with different livelihoods including fisheries and reindeer herding, as well as a wide variety of other occupations. The Sámi are divided into several different language groups (Figure 2).

It is important to note that this very same region represents the largest commercially unexploited continuous ranges in Europe, the greater part of which represents the home and traditional pastures of the indigenous peoples that live there (UNEP/EEA 2004).

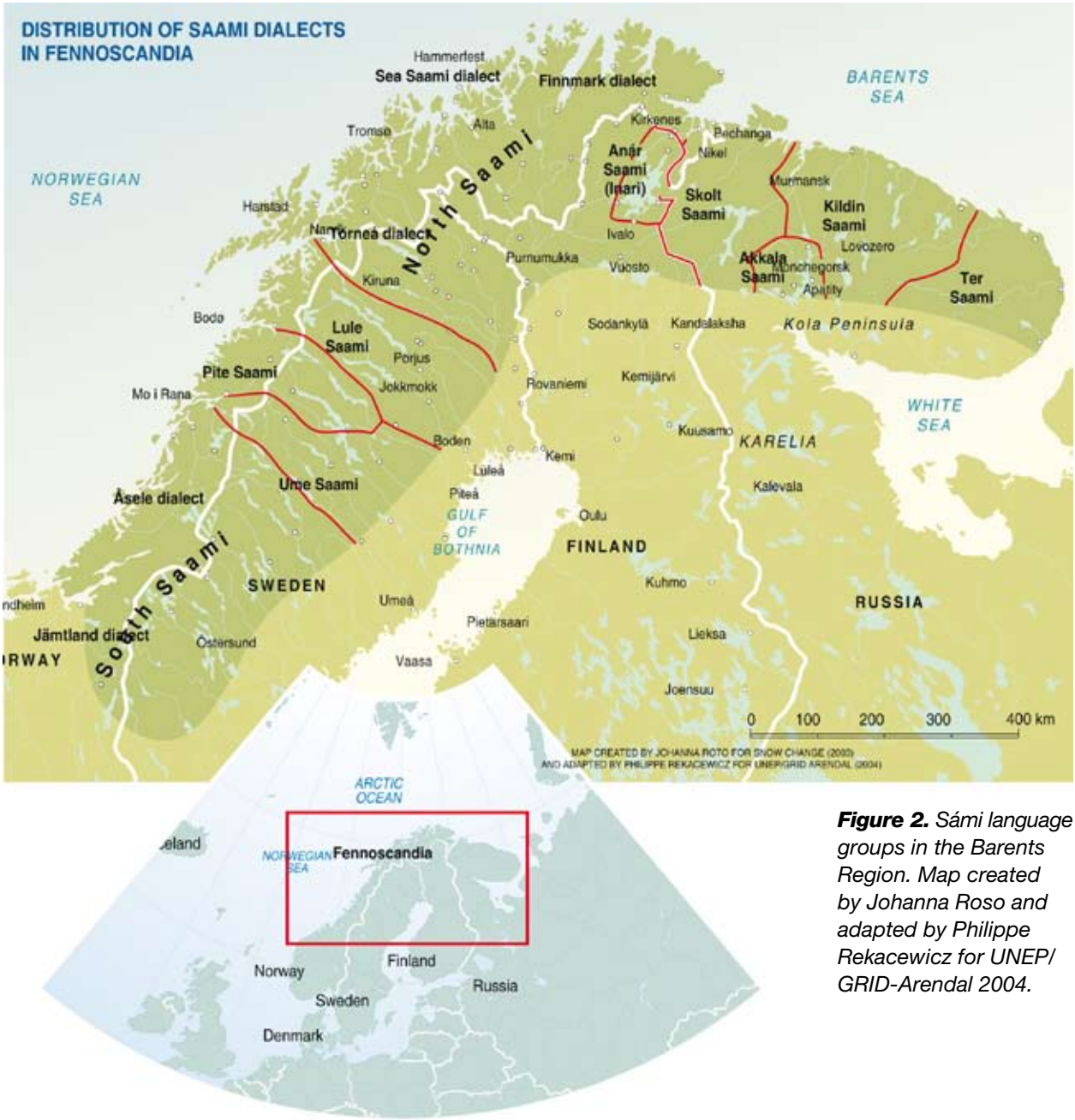

Figure 2. *Sámi language groups in the Barents Region. Map created by Johanna Roso and adapted by Philippe Rekacewicz for UNEP/ GRID-Arendal 2004.*


Philip Burgess

REINDEER HUSBANDRY IN FENNOSCANDIA

In Norway, some 240,000 semi-domestic reindeer are herded over an area of approximately 146,000 km^2, which is equivalent to 40% of the mainland area of the country (Reindeer Husbandry Administration 2008). Only Sámi people may herd reindeer in Norway, with the exception of a few concession areas in southern Norway. Approximately 2900 Sámi have reindeer husbandry as their primary or part time occupation. Reindeer husbandry is an exclusive Sámi livelihood also in Sweden, except in the concession area in the Kalix and Torne valleys in Norrbotten. As in Norway, around 3000 people are reindeer herders in Sweden, using 40% of the country's area and owning around 250,000 reindeer. Finland has around 200,000 semi-domestic reindeer and 4900 reindeer owners (Paliskuntain Yhdistys 2007), and reindeer husbandry is open to all members of the European Union. The borders between Finland, Norway and Russia are closed for reindeer migration. The border between Sweden and Norway is open, and reindeer herders in border regions may have regulated grazing grounds on the other side of the border during parts of the year. In Norway and Sweden, the livelihood is characterised by relatively long migrations between winter and summer pastures (Figure 3). In Finland, reindeer husbandry may be more stationary, and in the southern ranges reindeer husbandry is often combined with farming. Many Finnish herding cooperatives are closed by fencing. Supplementary winter feeding is common in all but the most northerly areas of reindeer husbandry in Finland.

Meat production is an important source of income for reindeer herding families. Meat production varies highly however, due to a number of factors such as variation in climate. Most reindeer herding families have several sources of income and varying levels of subsidies further complicate the picture. Income from handicrafts production has been estimated to account for 12% of the additional earnings in West Finnmark, but is negligible in other districts in the Barents Region (Jerns-

NEW NORWEGIAN REINDEER HERDING ACT IN 2007

The basic unit within reindeer husbandry in Norway has been the husbandry unit, the head of which is usually the concession holder, a model that dates back to 1978. The recently passed Reindeer Act seeks to reestablish the siida as an important management tool for reindeer husbandry. The siida is a community based working group within reindeer husbandry which forms the central basis of decisions made related to grazing grounds. The members are often related, and the composition of the siida may change from summer to winter. The new law has changed the term "husbandry unit" to "siida share" and also slightly changed the content of this term. By way of illustration, in West Finnmark (24,290 km^2), there are 26 pasture districts, 36 summer siidas, 53 winter siidas, 216 siida shares, 1322 reindeer owners, and 93,900 reindeer (2006–2007). This breaks down to 435 reindeer per siida share, 71 reindeer per owner, and 6 reindeer owners per siida share (Reindeer Husbandry Administration 2008).

letten and Klokov 2002). Compensation is another source of income for husbandry units – most of which is for loss of reindeer to predators. Compensation is also sometimes paid for loss of pastures, and this figure has been controversial in how is has been applied. While compensation is a source of income, it should be noted that e.g. in Norway, only around 20% of the annual claimed losses to predators are paid for by the government (Jernsletten and Klokov 2002). Over 50% of the expenses in reindeer husbandry are related to mechanical equipment (Reinert 2006). If transportation is included, the costs reach 80–90% of the total costs, clearly illustrating that mechanization of the industry has led to high expenditures. All in all, there is no doubt that most reindeer husbandry units in Norway have an income far below the average income in Norway (Reindeer Husbandry Administration 2007).

Reindeer and caribou populations can fluctuate substantially in numbers in response to forage availability,

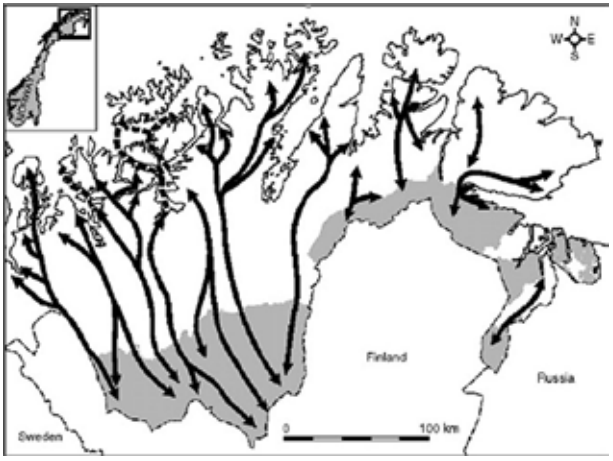

Figure 3. *The coastal areas of Finnmark include spring, calving and summer ranges, and are therefore of high value to reindeer herders. The above graphic represents annual migrations of reindeer between inland and coastal ranges in Norway (Vorren, 1962, Tyler et al., 2007).*

predation pressure etc. When herded, however, dramatic population fluctuations should be avoided in order to sustain a predictable income for herders and retain the production potential of the ranges. The debate on how many reindeer the tundra can support is an old one, as is the question on how much and in what way the authorities should participate in reindeer herding management and economic support during crisis years and peak production years. Reindeer numbers grew substantially in Norway, Sweden and Finland in the 1970s, reaching a peak around 1990. From 1990 to 2000 there was an overall reduction in the number of reindeer in Norway, Sweden and Finland, but numbers have increased again after 2000. Several factors have been identified that influence herd numbers, including mechanization of herding practices, supplemental feeding (especially in Finland), calf harvesting, anti-parasite treatments, market disruptions (such as the Chernobyl incident), and "the tragedy of the commons" theme, in which some researchers state that that open access grazing encourages overgrazing. Open access grazing does not actually exist in reindeer husbandry, but unclear and shifting winter pasture borders have in part lead to internal conflicts among reindeer herders. This may have encouraged keeping large herds in order to survive in the competition about limited grazing areas.

Paine (1992) and Berg (1997) denied the "tragedy" model, suggesting that the real culprit since the 1970s has been governmental reindeer policy, most especially the subsidy system begun in 1976. Their central concept is that with these policies, the state has taken over herder responsibility, leaving herders external to the central issues of their livelihoods. The engagement process between herders and institutions has also been questioned (Joks *et al*. 2006). These discussions are closely related with the Sámi Land rights question and the debate on what role the government should have in relation to reindeer husbandry.

REINDEER HUSBANDRY ON THE KOLA PENINSULA

The situation in Russia is quite different from Fennoscandia, complicated by the breakup of the Soviet Union and the following chaos, where the structures regarding land use, ownership and reindeer husbandry were altered and partly broke down. This is especially the case for reindeer husbandry on the Kola Peninsula. The process of collectivization was introduced to the Kola Peninsula in the 1930s, with the establishment of the *kolkhoz*, the *sovkhoz* and the "brigade" systems. This was overlaid upon the traditional family-based reindeer herding systems and ironically meant that continuity was retained in the system. That said, it is difficult to speak of "Sámi reindeer herding" on the Kola Peninsula, as the large immigration of Komi at the end of the 19th Century brought a restructuring of the livelihood toward larger herds, which fitted more easily into the coming Soviet reforms. Since the early 1990s, privatization reforms have occurred, but in reindeer husbandry, the *sovkhoz* (state farm) has persisted. The subsidies have not however, and the cost of living has risen dramatically. The state has also withdrawn from production, which has been a serious handicap in areas without easy access to markets. An emerging coping strategy has been "private" reindeer within the "collective" and this has become prevalent in reindeer herding on the Kola Peninsula in recent years. Post-Soviet herding has meant less control of territories and brigades and a composite mixing of herds. It is difficult to give an accurate picture of the future of reindeer husbandry on the Kola Peninsula using scenarios as the industry in still in a painful transition (Konstantinov and Vladimirova 2002).

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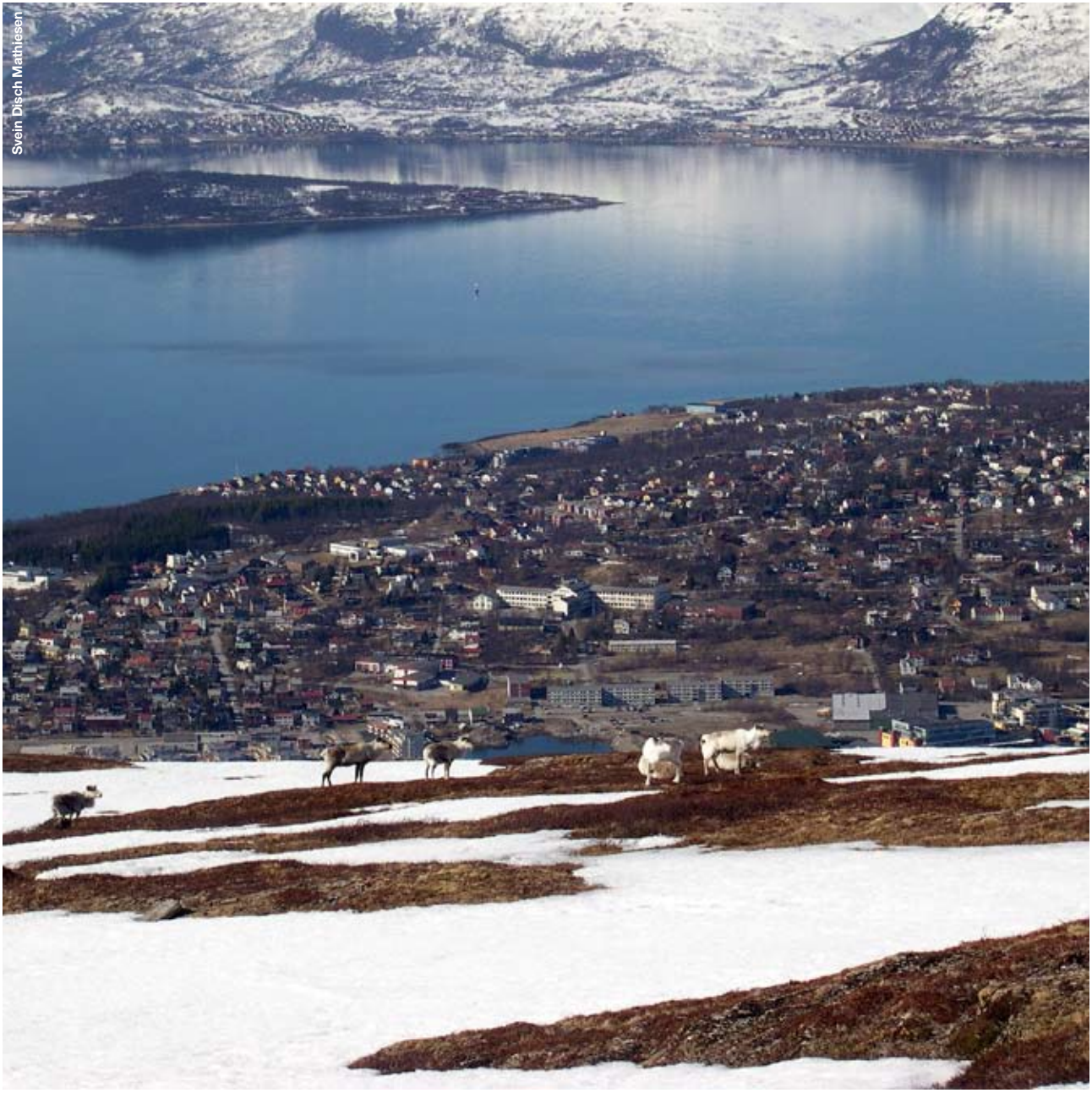
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IMPACTS OF DEVELOPMENT AND HUMAN ACTIVITY ON REINDEER

Reindeer herding represents a highly extensive form of land use. For herders the principle issue is generally the securing of pastures in which to graze their reindeer. Indeed, the progressive and effectively irreversible loss of the uncultivated lands which reindeer use as pasture is probably the single greatest threat to reindeer husbandry in the Barents Region today. Preservation of rangeland is, correspondingly, perhaps the single greatest priority for sustaining the resilience of reindeer herding confronted by changes in both the natural and the socio-economic environment (UNEP 2001).

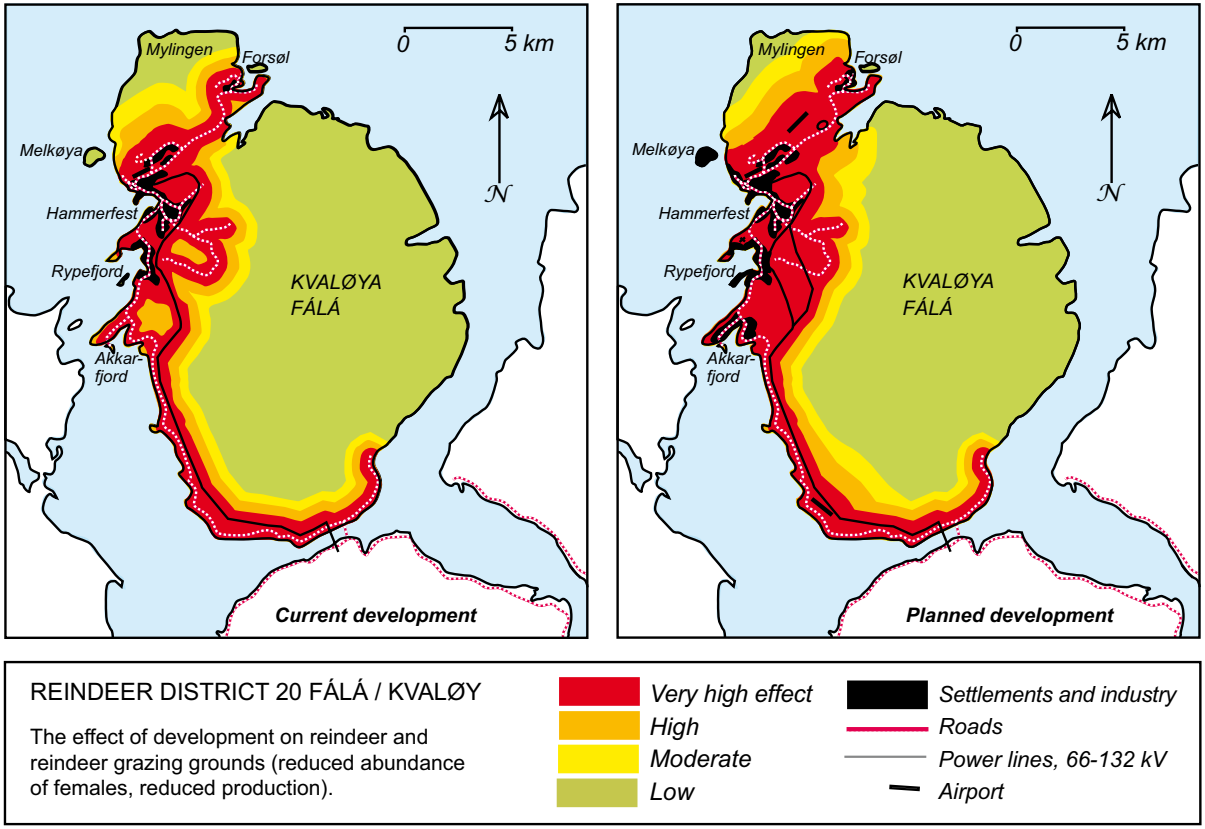
Loss of pastures occurs principally in two ways: (i) through physical destruction and (ii) through a reduction of use of the existing pastures. Reindeer pastures are physically lost through e.g. the construction of buildings, hydro-electricity facilities, pipelines, roads, and other infrastructure. Research shows, however, that only a few percent of the total available pastures are usually physically lost as a result of even large development projects (Maki 1992, Nellemann *et al*. 2003).

Of far greater concern is the reindeer's gradual abandonment of previously high-use areas surrounding development and human activity (UNEP 2001, 2004, Schaefer 2003, Vistnes and Nellemann 2008), possibly because areas close to humans are perceived as being high risk areas (Frid and Dill 2002). A range of studies have documented a 50–95% reduction in use of rangeland by reindeer and caribou within a 2.5 to 5 km wide zone surrounding cabins, dams, power lines, roads and other infrastructure (Cameron *et al*. 1992, 1995, Helle and Särkelä 1993, Nellemann and Cameron 1996, 1998, Vistnes and Nellemann 2001, Mahoney and Schaefer 2002, Nellemann *et al*. 2000, 2001, 2003, Vistnes *et al*. 2004, Joly *et al*. 2006, Schaefer and Mahoney 2007). When avoidance zones are several km wide, it usually means that a substantial portion of the range receives lower use, and that the animals will have to crowd into the remaining undisturbed pastures. Reindeer density is likely to increase in rangelands away from disturbance, often resulting in increased competition over forage with subsequent reduction in growth and production.

CASE STUDY 1

COASTAL DEVELOPMENT ASSOCIATED WITH INCREASED ECONOMIC ACTIVITY FROM GAS AND PETROLEUM DEVELOPMENT

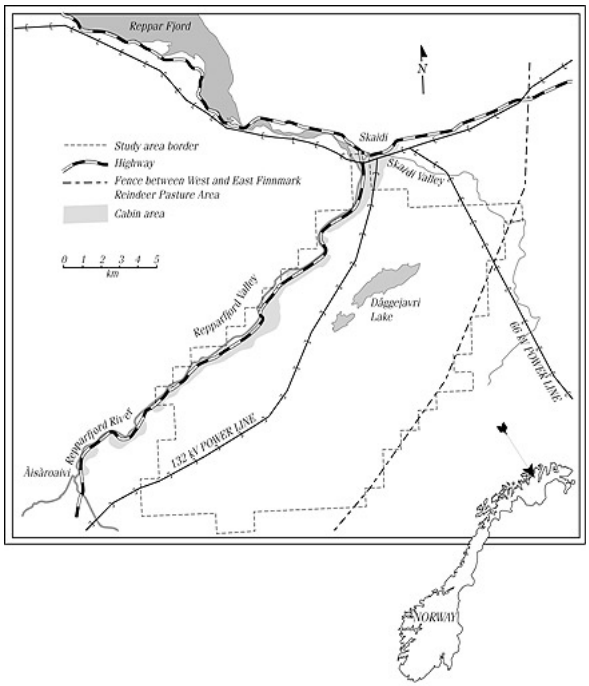
The opening of the Snøhvit liquid natural gas (LNG) field in the Barents Sea provides a textbook example of how a single industrial project results in a series of associated infrastructure development. In the Snøhvit case, proposed locations of new infrastructure and settlements will hinder access to important reindeer calving grounds on the Mylingen peninsula. This peninsula also holds historic sacred sites and offering stones, which are seldom mapped or taken into consideration in development projects. Alternative locations of new infrastructure could modify negative impacts on reindeer husbandry and keep the corridor to the Mylingen peninsula open (Nellemann *et al*. 2002).

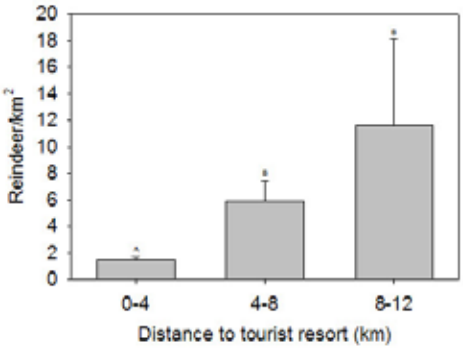


CASE STUDY 2

REPPARFJORD CABIN RESORT

Possible avoidance behavior of calving semi-domesticated reindeer was investigated near recreational cabins, roads, and power lines in Repparfjord Valley, Northern Norway (Vistnes and Nellemann, 2001). The distribution, sex, and general age composition of the reindeer was mapped during the 1998 and 1999 calving seasons (mapping 776 reindeer in 1998 and 678 reindeer in 1999) using systematic snowmobile and ski surveys. Mean reindeer density within preferred rugged terrain and altitudes was 78% lower in the area within 4 km from the tourist resort compared to the area more than 4 km from the resort. Mean reindeer density by the power line corridor without traffic was 73% lower in the area within 4 km from the power line compared to areas more than 4 km from the power line. Areas within 4 km from anthropogenic structures were avoided despite low levels of human traffic around the resort and a high proportion of preferred rugged terrain. Almost 74% of all available forage was located within the avoided 0–4-km zones from the resort or the separate power line. The results suggest that cabin resorts and power lines, even in periods with modest human traffic, may result in substantial reductions in the use of surrounding foraging areas. Possible increased competition for high-quality forage may affect lactation, body condition, and, hence, reproductive success in the long term.





Reindeer avoided the areas close to power lines and the recreational cabin resort during calving, in spite of absence of people during this season. This was also true for comparable habitat, terrain, snow and vegetation. Bulls and yearlings dominated close to the resort, whereas females with calves dominated in the 8–12 km zone. All reindeer groups, however, avoided the resort. Resort development is becoming increasingly popular along the coast, and the development will likely grow as a result of increased petroleum activity (Vistnes and Nellemann 2001).

Research on impacts of human activity and infrastructure development on reindeer and caribou (*Rangifer tarandus*) has periodically been reviewed (Wolfe *et al*. 2000, National Research Council 2003, Vistnes and Nellemann 2008). Before the 1980s, most disturbance studies were behavioral studies of individual animals at local scales, reporting few and short-term impacts within 0–2 km from human activity, including typically observations of reindeer or caribou bulls on roads and under buildings during insect harassment. Around the mid 1980s, focus shifted to regional-scale landscape studies, reporting that *Rangifer*, and particular females with calves accounting for over 80% of the herd of semi-domesticated reindeer, reduced the use of areas within 5 km from infrastructure and human activity by 50–95%, the extent varying with type of disturbance, sex, terrain, season, and sensitivity of herds. Of 85 studies reviewed, 84% of the regional studies concluded that the impacts of human activity were significant, while only 11% of the local studies did the same (Vistnes and Nellemann 2008).

Numerous studies across the Arctic have documented that the physical barriers and pasture fragmentation resulting from infrastructure development adversely affect the distribution and movements of reindeer and caribou (Bradshaw *et al*. 1997, Nellemann and Cameron 1998, Dyer *et al*. 2001, Johnson *et al*. 2001, Vistnes *et al*. 2001, Schaefer and Mahoney 2007), and from the 1990s and onwards, this has also been docu-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mented through a series of court trials, including from the Norwegian supreme court.

Additionally to direct loss of land, physical condition of individuals and hence reproduction and survival may also be affected through increased social and nutritional stress and direct disturbance from traffic, though such effects generally are less severe than the avoidance effects including reduced access and lowered carrying capacity (Calef *et al*. 1976; Whitten and Cameron 1983; Harrington and Veitch 1992; Bradshaw *et al*. 1997; 1998; Maier *et al*. 1998; Wolfe *et al*. 2000). As shown for a range of wildlife on numerous continents (UNEP 2001; Nellemann *et al*. 2003), reindeer and caribou may thus be observed occasionally close to infrastructure, but most regional studies find that the majority of *Rangifer* reduce their use of areas within 5 km of development by 50–95%. This means that mitigation measures must include regulation of human traffic and development, as well as ensuring the protection of large areas, in order for reindeer and caribou to continue to coexist with people. This is particularly important in a changing world where also climate change and other factors may influence their pastures. By reducing *Rangifer* pastures and migration opportunities, we limit their resilience and capability to cope with other natural and man-made changes (Post and Stenseth 1999; Thomas *et al*. 2004; Weladji and Holand 2006; Tyler *et al*. 2007).

DEVELOPMENT TODAY

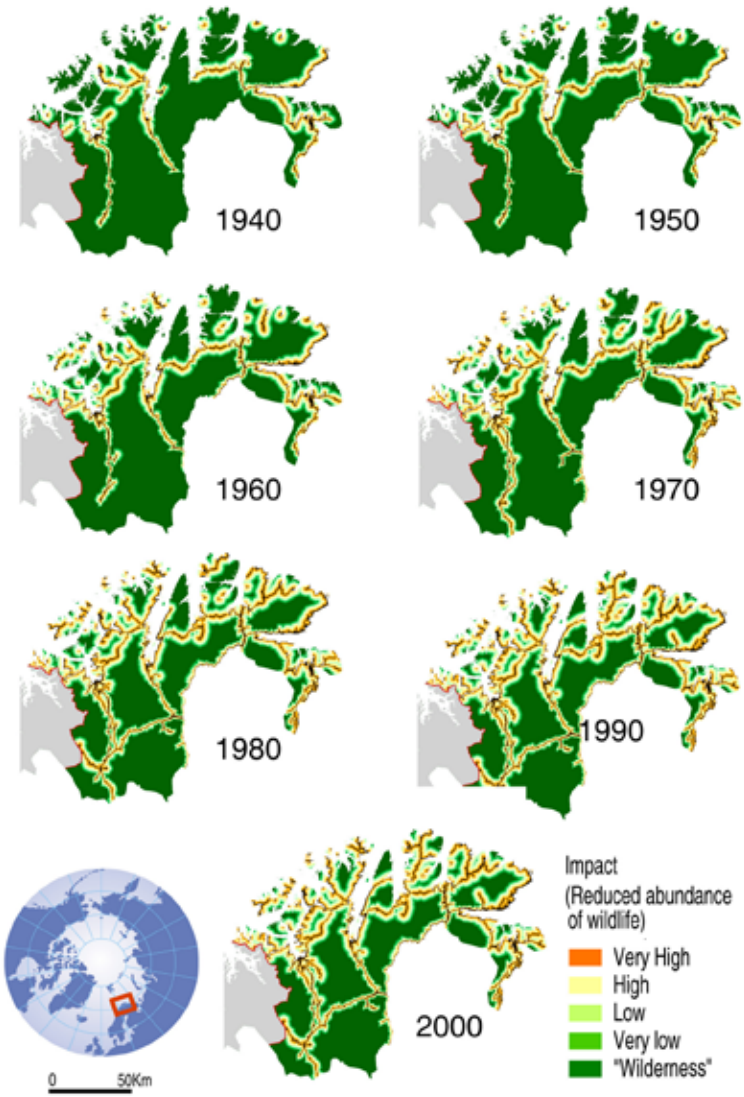
The Arctic has undergone major changes in development since 1900. The exploitation of natural resources and the associated infrastructure development has resulted in substantial fragmentation of Arctic habitats. Development rates have been particularly high in the Barents Region, which is now the region in the Arctic and sub-Arctic with the highest development pressure. Within the Barents Region, there are clear differences in extent of development. The development pressure has been particularly high in Southern Sámi regions and the coastal regions of Northern Norway and the Gulf of Bothnia. The coastal belt is virtually unprotected against development and the majority of national parks and other protected areas are located inland. The areas that have been protected are generally those of low economic importance.

Development in the Barents Region includes roads, power lines, dams, military and communication facilities, recreational cabins, pipelines, forestry and extensive logging roads. Since the early 1990s more than 800 recreational cabins have been constructed annually in Norwegian reindeer herding areas alone (Lie *et al*. 2006), resulting in extensive recreational traffic. In the majority of the cases the herders have little influence on the development (Lie *et al.* 2006). Indeed, windmill parks, power lines and roads are currently being developed without any common policy or plans to secure traditional grazing land for Sámi reindeer husbandry (UNEP 2001; CAFF, 2002; Jernsletten and Klokov 2002; UNEP and EEA 2004). This will be increasingly important to get in place as the petroleum reserves of the Barents Sea will accelerate coastal development along the Norwegian and Russian coast in coming decades.

CASE STUDY 3

LOSS OF PASTURES OVER TIME

Road development in Finnmark has taken place primarily during the past 50–60 years, and particularly along the coast (UNEP 2001). The Barents Region is currently the region in the circumpolar north with the highest development pressure.



The encroachment of road networks in Finnmark, Northern Norway, between 1940 and 2000.

VOICES OF HERDERS AND INDIGENOUS LEADERS


Philip Burgess

JOHAN MATHIS TURI

REINDEER HERDER AND SECRETARY GENERAL OF ASSOCIATION OF WORLD REINDEER HERDERS

"...Even though it can severely disrupt the livelihoods of reindeer herders, oil and gas development may not be the worst that can happen to reindeer husbandry: In contrast to other alternative sources for energy supply that affect our animals, such as windmills and smaller hydroelectric power plants, oil and gas development will often prove to be very profitable. This means that there is at least a financial foundation for positive development of also reindeer herding societies.

There is a saying that "the tide lifts all boats". The development of the Arctic as the new energy region of the north truly represents a "tidal wave" for the indigenous peoples of the north. I believe the tide will lift all boats, that is to say, all boats that float. When the wave is coming, it is important to also fix the small indigenous boats – not only so that they can ride safely on the flood, but also so that they can settle safely on the shore once the water ebbs away.

Reindeer husbandry represents a circumpolar model for management of the barren Arctic areas, areas which have only recently become interesting for other interests such as the oil and gas industry. The petroleum age is just a snapshot in the history of the North. Reindeer husbandry has been an important livelihood for people in these areas from time immemorial, and must continue to exist also after the oil and gas have been exploited. To this end, local capacity building in indigenous reindeer herding societies is essential."

ASLAK ANTE M. J. SARA

HEAD OF FÁLÁ REINDEER HERDING DISTRICT WHICH INCLUDES THE CITY OF HAMMERFEST

These quotes are partly based on an outreach activity of the ENSINOR project called Yamal-exchange bringing Russian oil and gas stakeholders to Finland and Norway, conducted together with International Centre for Reindeer Husbandry, and reproduced here with kind permission.


Ravdna Biret Marja Eira

"It was said that the new development (StatoilHydro's LNG plant in Hammerfest) in this area would have positive effects for the local community and... many people saw it as a positive development. We reindeer herders were concerned about how this development would affect our future livelihoods – we felt that the promise of positive effects for the local community put a strong pressure on us. It became difficult for us to show the impacts that this development would have on our reindeer herding, and when compared with the large oil and gas installations, our small industry would seem like a drop in the ocean. But if we were to look at this from another angle, the angle that the value of our husbandry is not measured in dollars but instead connected to the areas that we use... In this way we could show our strength, that our industry is based on the access and use of these areas. Because of this the situation for us reindeer herders grew very difficult in terms of showing the consequences for our industry. We were sort of forgotten in the whole process and our perspectives were not focussed on. Because the LNG-plant itself was not placed directly on reindeer pastures, we were not fully included in the total process of regulation. And with this start that we got, when we were not focussed on, we were continuously lagging behind in the process, not able to follow this up properly.

During the process that led up to the decision to initiate the entire development, there was not enough knowledge about the situation, knowledge that we have today. Due to the development we have seen an unexpected explosion in human activities. We have much more competition for our pastures now. There has been introduced a lot of other development projects that will impact our pastures. When you have this kind of major industrial development in Hammerfest, it makes the area around Hammerfest very attractive for other types of development. Also the society of Hammerfest is rapidly expanding because of the development. Now there is talk about several possible projects, and planning has begun. This includes petroleum development, new power lines, windmills, infrastructure development and roads. These are heavy investments driven by independent and influential economic sources, also in part independent of Statoil. We also see increasing human activities in our pasture areas in terms of outdoor leisure activities.

We had no idea about the scale of the industrial development when it started, and nor did people in the town either. It was impossible to make a picture of it before it began and we see it all just now, and only now we see what it has meant and what it can come to mean to us. We have to try to adapt to this, as long as we can. But to do this, also developers, local and national authorities and mainstream society must be willing to contribute. It cannot be right that one side gets the benefits of development, while the other only get the negatives. Anyway, it is absolutely clear that our pastures are being reduced. And therefore we need to get in very early as a participating partner in development projects, as early as possible, to try to have a reindeer herder's voice in the early planning process."

"Our main challenge is preserving pastures. The main threat in our area is the entry of mining companies, after the Finnmark Act came into force last summer...They say that they have found deposits, and that now the question is no longer "if extraction will take place". Extraction will take place and reindeer husbandry must make room for it. We see that the ore goes through all our pastures and migration routes. And we already have scarce pastures here; there is not enough room for everybody on the winter pastures. If the winter pastures and migration routes are lost, people will have to quit working with reindeer, as reindeer husbandry is not possible without winter pastures. Mining companies have said that they will buy people out, those who have to leave reindeer husbandry. But none of us who use the pastures are interested in selling land. We have said that our pastures are not for sale for any amount of gold-money. If they are going to use our pastures, which are already scarce, for 15 years it means that future generations will not be socialised in reindeer husbandry and will not learn the traditional knowledge. This does not only affect reindeer husbandry. It affects everybody in natural husbandries and also tourism; because there will no longer be any clean nature for people to come to see. It affects those who pick berries, fish salmon… because mines need large quantities of water in order to be able to extract minerals. It has been shown that this water will run back to the river, to Tana river and past Karasjok, polluting salmon rivers. All in all, the entire society here must change. It will change from being a prosperous society based on natural husbandries, to becoming a mining society. It is not true that there is not enough room for youth in reindeer husbandry. Youth are very interested in working with reindeer when they are given the opportunity. Concerning jobs, the focus should not be on the hundred new jobs, but on the threat to hundreds of jobs in the prosperous Sámi industries, such as reindeer husbandry and other nature-based industries. These traditional industries need virgin nature in order to survive."

MÁRET SÁRÁ
SPIERTANJÁRGA REINDEER HERDING DISTRICT, KARASJOK

A. KRASILNIKOV
CHAIR OF THE OLENEVOD REINDEER HERDING ENTERPRISE, LOVOZERO, KOLA PENINSULA

This text is taken from an open letter by the entire Olenevod reindeer herding enterprise to the Governor of the Murmansk region. Reported by NRK Sámi Radio October 25, 2007. Original letter available for download on the Reindeer Blog: www.reindeerblog.org/2007/10/26/reindeer* (accessed March 17, 2009).

"The former reindeer herd of MOOS, the reindeer herds No 5 and No 10 and the reindeer herd which earlier was bought for Kovdor, have all disappeared. Herd No 9 of our co-operative is disappearing now. Given that there 15 years ago were 80,000 reindeer on the Kola Peninsula, nowadays less than one half of this amount exists. This number continues to decrease. Our enterprise is so to speak still without any protection against this catastrophe. Reindeer are even shot from sea-going vessels engaged in illegal hunting, from helicopters, snow mobiles and cross-country vehicles. Groups of up to 14 foreign made snow mobiles come from the Tersky District, from Kirovsk and from Lovozero. They operate during the whole winter and spring period. They continue even with shooting reindeer in April, when female reindeer are preparing themselves to give birth to their calves. In most cases these activities are monitored by hunting inspectors who base their own private business on it. We have noticed that among these hunters are officials of the upper echelons of the local and regional arena. According to data from this year's hunting operations these illegal hunters shot about 1,200 domesticated reindeer belonging to our enterprise this year. The economic damage done to our co-operative amounts to 5 million roubles."


Svein Disch Mathiesen

SERGEI KHARUCHI

PRESIDENT OF RUSSIAN ASSOCIATION OF INDIGENOUS PEOPLES OF THE NORTH (RAIPON)

(pictured with Isak Mathis O. Eira)

This interview was conducted as part of the EALÁT-Information workshop held in Yar-Sale, Yamal-Nenets Autonomous Okrug.

"How is (oil and gas) going to influence the environment and traditional economic activities? Here we choose the golden middle road. It is very easy to declare each other to be enemies of the State. But there exists also another and more civilized way. This is the track of dialogue and co-operation and mutual problem solving by both the protagonists of traditional economy and the industrial sector. The first task is to minimize the impact on the natural environment as much as possible. The second task is that this or that development shall not make the situation for the other part worse. Last but not least everything depends on the concrete leadership of an enterprise and the indigenous peoples' communities. The key issue is to which extent they show wisdom. This will be decisive for relations between the workers in the industrial sector and in the primary sector. Co-operation, mutual understanding, complementary behaviour and consultation with each other is the only and the best way. The alternative is to declare war, but this has never brought any good to anyone."

LEONID KHUDI

PRESIDENT OF THE REINDEER HERDERS' UNION OF YAMAL

This interview was conducted as part of the EALÁT-Information workshop held in Yar-Sale, Yamal-Nenets Autonomous Okrug.


Svein Disch Mathiesen

"These types of activities (like oil and gas exploitation) are non-traditional and have had consequences, some of them negative ones. This due to the fact that reindeer herders' and local population's experiences were not taken into consideration. I hope that whatever will be done in the North and in the Arctic, the interests of indigenous peoples will be taken into consideration, and that there will be as little impact as possible on the reindeer pastures and the indigenous peoples' traditional ways of living. I would like that oil and gas exploitation would be to the benefit of the peoples in the North. Oil and gas exploitation will come sooner or later anyway. My hope is that Sámi reindeer herders will make full use of the experiences of Russia and the Russian reindeer herders there, the reindeer herders from Yamal included. I say this not by chance. These are bitter experiences, which we have got by huge efforts and the loss of many pastures and reindeer which it will not be possible to get back. That is why I would appreciate it very much if Sámi reindeer herders would take into consideration these experiences."


Agnar Berg

NILS HENRIK SARA

LEADER OF NORWEGIAN REINDEER HERDERS' ASSOCIATION

This interview is based on discussion between Nils Henrik Sara and Anders Oskal regarding the Barents 2030 Globio scenario maps.

"The entire region is a horror scenario. And this is so near in time, in 2030. There will be no time to adjust, some will have to leave reindeer herding, or perhaps reindeer herding will disappear? With this scenario, we cannot do traditional reindeer herding with the practices we use today. And we are totally dependent on those practices. […] When I travel across Norway and talk with young reindeer herders, I am often asked if there is a future in this livelihood. With all the threats that we face, can we possibly continue doing reindeer husbandry? There is no economic gain, you cannot expect high salaries. When there is an option to choose high salaries and a good education, it will be very tempting to quit reindeer herding, and I can understand that. But we also have those who believe strongly in this livelihood, and who still struggle immensely.

[On the development of the LNG plant in Hammerfest] *One thing is Statoil, but also other activity follows. That is what has happened in Hammerfest. For instance, several Alta-based businesses are now located also in Hammerfest. Statoil has their own plans that they want to realize. I'm not sure if we can reach Statoil with our message, because this is a company that has to earn money. But the message to the authorities who can instruct Statoil is to save these areas according to their promises. Facing the scenarios, the choice is: Do we want reindeer herding to survive or should Statoil earn more money? That is what these maps tell me.*

[On supplementary feeding] *Crisis feeding is ok, but not every year. Preventive feeding in case of crisis is something different. With supplementary feeding you lose the basis for this livelihood. The summer pastures form the basis. Reindeer lose weight in winter. Winter pasture is the bottleneck today. With increased development, this can change. This is a question of sustainability […]*

If you take the gas directly from the sea to the consumers in other parts of the world, it will of course not impact reindeer herding much. But looking at the map of possible sites to take the petroleum onshore, I see clearly that this will affect reindeer husbandry.

When you in addition look at the planned 422 kV power line […] It is said that it should end in Hammerfest, but we know that people are looking into the option of stretching it further east. It will probably continue from Skaidi, and will then cross all the reindeer herding districts east of Skaidi. In the meetings with the first affected reindeer herding districts in the Balsfjord-area, the developers were very rigid regarding the choice of location; "the line will go


Svein Disch Mathiesen


Svein Disch Mathiesen

here, reindeer husbandry can say whatever they want". There has been no will to compromise. There was no will to move parts of the power line, at least not during the first meetings, even though the reindeer herders argued as best as they could about the negative effects which would be expected. At the same time, it was said from the beginning that (the power line company) would try to adjust the construction work according to reindeer herding interests. In the end, the attitude was completely different, and economy became a big issue – this alternative was least expensive, and there was no longer talk about other interests and to adjust the location of the power line according to other business interests. The power line interests were most important, and all other parties should adjust to them, the developers. If Statoil should run a similar line… it will be a hopeless situation if they have no adjustment margins in their plans. But consultations are not over yet, so there is still a chance that they will turn in the last minute. Perhaps that is their tactic – to be rigid in the first round, and to be more compromising in the end.

Wind power is also a problem. For instance, on Fosen, the developers have taken over the entire district with their power plants. This can happen also in Northern Troms, if the plans are not changed in the last minute. Perhaps reindeer can habituate to wind mills in the future – we don't know. Anyway, we will go through a period of transition which will be difficult. And the infrastructure that follows the wind power plants will remain. Wind power occupies areas that have not been attractive to development earlier, such as high-altitude areas, areas considered non-productive by most people, but being very important to reindeer husbandry during parts of the year. I saw this on Nordkyn, where particularly good spring and fall pastures were developed."

On March 17, 2009, NVE[1] announced an overview of the wind power and related development projects that are currently on the table and there are 260 projects in the Sámi area alone. Sara responded in the media:

"*I had never thought that there were so many power projects underway in areas within reindeer husbandry [...] For us, it only means one thing, namely, less pasture for reindeer. Loss of pastures is the biggest challenge reindeer husbandry is facing.*[2]"

1. Norwegian Water Resources and Energy Directorate (NVE) is subordinated to the Ministry of Petroleum and Energy and is responsible for administering Norway's water and energy resources.
2. *Reindrifta sjokkert over kraft-planer*, NRK Sámi Radio. www.nrk.no/kanal/nrk_sami_radio/1.6528336 (accessed March 17, 2009).

Svein Disch Mathiesen

HILL-MARTA SOLBERG

CHAIR OF THE STANDING COMMITTEE OF PARLIAMENTARIANS OF THE ARCTIC REGION

Excerpt of speech held at the Arctic Council Meeting in Salekhard 25–26 October 2006.

"We parliamentarians strongly believe the impact of climate change to be a matter of urgency. The climate change already has a strong impact on the living conditions of the Arctic indigenous peoples. And if the ice disappears for large parts of the year, we will see an explosion in human activities in the Arctic. We need to find ways to regulate this activity and keep ahead of the development. In recent years we have seen and experienced in many countries a strong and increasing interest in the Arctic region. This interest is due, not least, to the expected substantial quantity of energy resources and other natural resources in the Arctic. However, the climate change in the region and its projected wider impact has also contributed to this focus.

[…] We, as politicians and people of the North, have a responsibility to turn this increasing interest into something positive for the people living in the Arctic. Together we can send a strong Arctic message about the opportunities and challenges in the region. Together we must face our common challenges, and secure a sustainable basis for future generations of Arctic peoples to build on."

REINDEER HUSBANDRY SCENARIOS

IN THIS SECTION, WE PRESENT TWO EXISTING SCENARIO MODELS FOR THE BARENTS REGION, NAMELY THE BARLINDHAUG SCENARIOS AND THE GLOBIO METHODOLOGY, AND COMBINE THE TWO TO CREATE UPDATED SCENARIOS, WHICH WE ANALYZE FROM A REINDEER HUSBANDRY PERSPECTIVE. WE ALSO DISCUSS CLIMATE CHANGE SCENARIOS FOR THE REGION.

THE BARLINDHAUG SCENARIOS

The Barlindhaug report (Barlindhaug 2005) argues that the Barents Sea is about to become a new petroleum region both in Norway and globally, with petroleum exploration and production gradually expanding from the North Sea and the Norwegian Sea. A similar process will take place in Russian waters, beginning with the Shtokman gas field. The report draws on experience from the Snøhvit and Ormen Lange projects to calculate and predict total investment costs and employment effects. The future is divided into three periods; 2006–2012, 2012–2020 and after 2020. For each phase, major new activities and developments are indicated.

In the period 2006–2012, the report predicts that the Snøhvit LNG train 1 and 2 will be put into operation, the Goliat oil field and new oil fields in the Petchora Sea will be developed and exploration activity will increase. Development will start at Shtokman, and the Baltic Sea pipeline between Vyborg and Greifswald will be completed (Figure 4a).

In the period 2012–2020, Snøhvit LNG train 1 and 2 will be operated, maintained and modified, and train 3 will be planned. Shtokman LNG 1 and Goliat will also be in production. Plans are made for an extension of the Western Arctic Pipeline from Mid-Norway to Eastern Finnmark, Shtokman LNG 2 and construction of an eastern pipeline to the pipeline in the Baltic Sea. A number of gas processing plants will be built along the Norwegian coast from Eastern Finnmark to Vesterålen. Some of the plants will also have oil terminals and processing facilities (Figure 4b). After 2020, all planned projects will be in operation, including activity in the disputed area between Norway and Russia and the Eastern Barents Sea, and petroleum activity will expand into the northern part of the Barents Sea (Figure 4c).

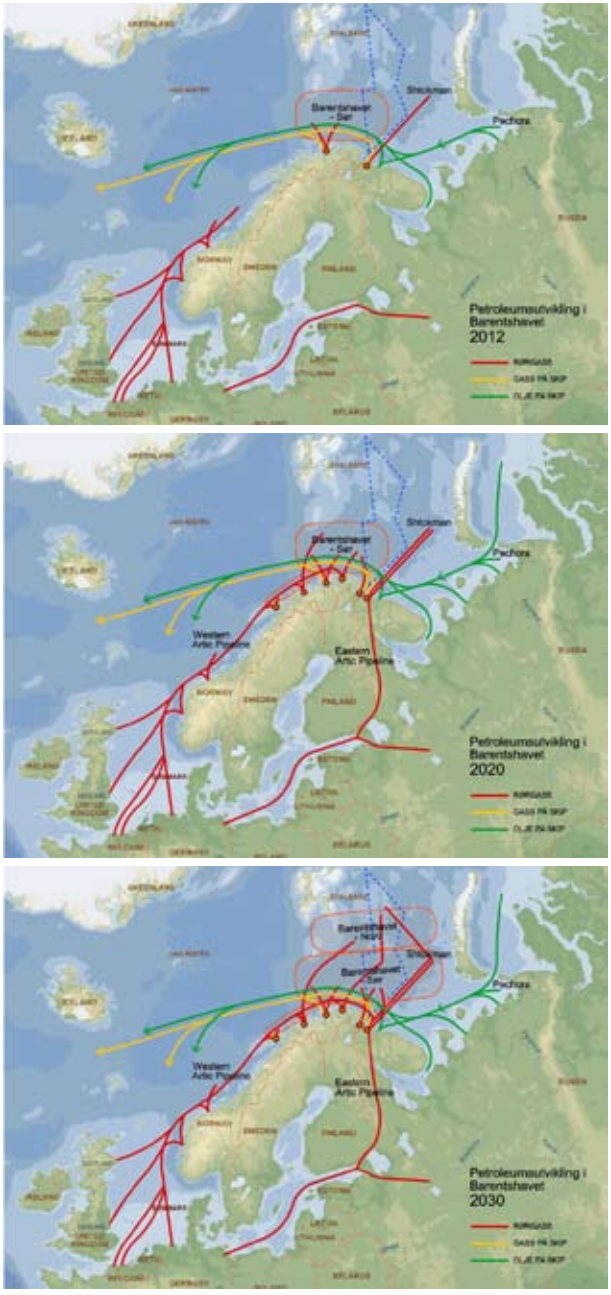


Figure 4a–c. *The Barlindhaug scenarios of increased petroleum development in Northern Scandinavia and the Barents Sea (Barlindhaug 2005).*

As pointed out by Arbo *et al*. (2007), the Barlindhaug report is clearly written from a Norwegian point of view. It takes for granted that large areas will be opened for exploration, that new recoverable fields will be discovered, that oil and gas prices will stay high enough to drill for petroleum under Arctic conditions, that Russian authorities will consider a Norwegian pipeline system as useable, and that the Barents Region will remain a politically stable area with close cooperation between Norway and Russia. Arbo *et al*. concludes that the report is a vision and a contribution to an ongoing debate, with both limitations and substance. Herein, we use the Barlindhaug scenarios in combination with UNEP's GLOBIO scenarios to illustrate several possible futures seen from the perspective of reindeer husbandry. Our scenarios cannot claim to be more scientific or neutral than the Barlindhaug scenarios, but unlike Barlindhaug we open up for several possible outcomes depending on varying future conditions (Arbo *et al*. 2007).

GLOBIO SCENARIOS

Scenario development involving changes in natural conditions, biodiversity and alternation of habitat has undergone a rapid development in the past 10 years, such as through UNEP and affiliated programs like the Millennium Ecosystem Assessment, GLOBIO and the IPCC (IPCC 2007, UNEP 2003, 2007). Global and regional programs now usually involve at least four different scenarios for each timeline (www.globio.info, UNEP 2003). Hence, we present a range of scenarios all linked to the Barlindhaug scenarios to provide a broader range of possible outcomes of the development schemes. This is particularly important as a number of variables, including government policies and municipality policies, may greatly mitigate or change the impacts on reindeer husbandry of the current projected development schemes. The geographical areas covered are the reindeer pastures from Nordland County, Norway, to Jugorskij Poluostrov and Novaya Zemlya in north-west Russia.

GLOBIO SCENARIO MODEL

The GLOBIO2-model is being developed for and together with UNEP (United Nations Environment Programme) to help assess and map the environmental impact of human development (UNEP 2007). The model has been used by a broad range of regional and global scenarios by several UN-programmes, including UNESCO, UNDP and UNEP. GLOBIO compiles scientific knowledge on global environmental change into a format that is compatible with the needs of policymaking. The model incorporates buffer zones of probability of reduced abundance of wildlife around infrastructure features, such as roads, human settlements, industrial development, etc. By using distance zones with varying degree of impacts caused by infrastructure, it is possible to predict the approximate area of impact zones in the future by simple regression analyses using different alternatives of growth. GLOBIO is thus primarily a tool for communicating and visualizing environmental changes in such a way that it can be used in sustainable development planning and international agreements on protection of biodiversity and natural habitats. For detailed methodology, please see appendix 3 and www.globio.info. The scenarios without additional petroleum development (assumption a) are based on the “policy first” scenarios in UNEP (2003).


Sven Skaltje

BARLINDHAUG AND GLOBIO SCENARIOS COMBINED

GLOBIO scenarios show that currently approximately 25% of the grazing land in Northern Norway is strongly disturbed by development, including 35% of the coastal area and the most productive calving grounds and summer ranges (UNEP/EEA 2004). This figure has been estimated to increase to as much as 78% by 2050 if no changes are made in national or regional policies.

Up to 1% of the summer grazing grounds used traditionally by Sámi reindeer herders along the coast of Northern Norway is lost every year, which is equivalent to the grazing land used by one nomadic family in summer (Jernsletten and Klokov 2002, UNEP 2004).

Development pressure has been considerably lower in Russia. Although northwest Russia suffers from high local-point pollution, development has been concentrated, leaving more habitat undisturbed (www.globio.info).

For this report, selected hotspots for oil and gas development were identified using the Barlindhaug scenarios and fed into the GLOBIO models. Alteration and reduced use of pastures could then be compared using two different assumptions;

a) Infrastructure development in the Barents region will continue at the current growth rate towards 2030, without additional or increased growth due to petroleum development

b) A range of oil and gas hotspots along the Norwegian and Russian coast, including LNG plants, processing plants and pipeline systems, will be developed by 2030 as assumed in the Barlindhaug report

Both scenarios predict that continued development will substantially reduce grazing grounds in coastal areas used for summer ranges and calving grounds. Looking at coastal areas in the entire Barents Region including areas with no or little development on northern Kola and Novaya Zemlya, around 15% of the area is heavily impacted by human development. This figure is estimated to increase to 25% in 2030 given the current growth rate (assumption a). Assuming increased petroleum development according to the Barlindhaug scenarios (assumption b), 30% of the coastal areas will be highly impacted by human development in 2030. More specifically, assumption b will lead to deterioration of an additional 21 000 km^2 of reindeer grazing grounds, compared to assumption a. This is equivalent to the size of 2/3 of Finnmark's summer ranges.

Figure 5a–c. *Development scenarios for the Barents Region, assuming extensive petroleum development towards 2030. In 2000, 15% of the region was significantly disturbed as grazing land for reindeer. This figure will increase to 30% in 2030 with petroleum development including several LNG plants, processing plants, and pipeline systems in operation. Development pressures are highest on the coast and affect significantly larger areas in Fennoscandia than in Russia, where development is more concentrated.*

Figure 6a–b. *Development scenarios for the Barents Region, assuming varying levels of petroleum development towards 2030. In 2000, 15% of the region was significantly disturbed as grazing land for reindeer. With continued infrastructure development using current growth rates, this figure will increase to 25% by 2030 (figure 6a), or with 30% assuming increased petroleum development (figure 6b). Scenario b) means that an additional 21 000 km^2 will be significantly reduced in value as reindeer grazing grounds compared to scenario a).*

CLIMATE CHANGE SCENARIOS

Inner Finnmark comprises the part of Norway in which the local effects of climate change are likely to be most pronounced (ACIA 2004). Models predict that the mean temperature and precipitation in inner Finnmark may increase by as much as 0.7ºC or 10% per decade during the next 30–50 years. Most scenarios predict that temperatures will continue to rise both in summer and winter. In addition, more severe storms and winds are expected, as well as increased precipitation. For reindeer grazing conditions, this will lead to more unstable winters in continental areas, with a further increased frequency of freeze-thaw cycles and subsequent icing of pastures. Summer pastures may change from open to shrub-vegetated land. Growing seasons will become

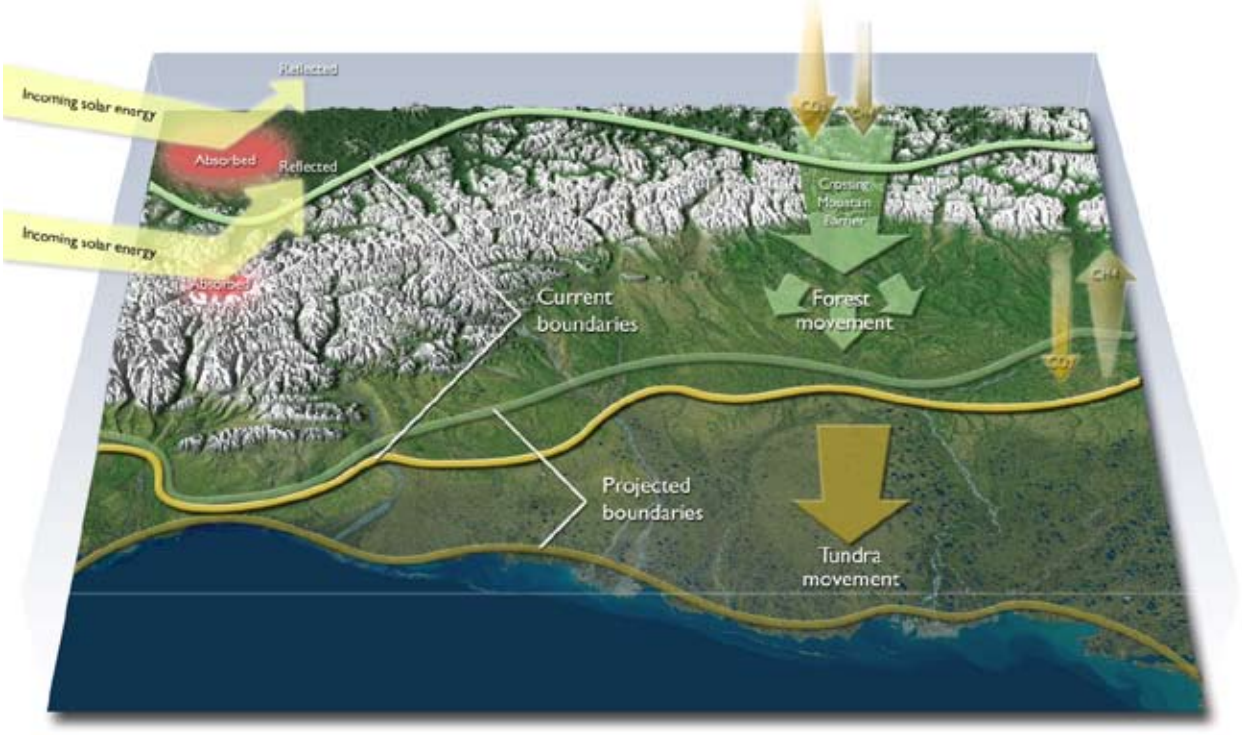


Figure 7. *Projected climate change will create changes in snow ablation patterns, vegetation patterns and freeze-thaw cycles, which in turn will strongly influence seasonal pastures by reindeer. Extreme weather conditions will, in turn, require herders to move animals more frequently, and the accessibility to undisturbed land will become even more essential in the coming decades. The coastal ranges, and particularly the lowland areas, are currently under the greatest threat from continued piecemeal development (ACIA 2004).*

longer and plant production increase. Temperatures will likely become more favorable for parasites and diseases (Post and Stenseth 1999, Cornelissen *et al*. 2001, Kumpula and Colpaert 2003, Gautestad *et al*. 2005, Cebrian *et al*. 2008, Helle and Kojola 2008, Moen 2008). Reindeer herders continuously adapt to new changes, ranging from socio-economic to climatic changes. Their resilience, vulnerability and ability to adapt is strongly influenced by the extent to which they can move reindeer freely across the landscape as conditions change. Encroachment of their ranges, such as by infrastructure development, is therefore a key factor in their ability to adapt (UNEP, 2001; UNEP/EEA, 2004; Tyler *et al*., 2006).

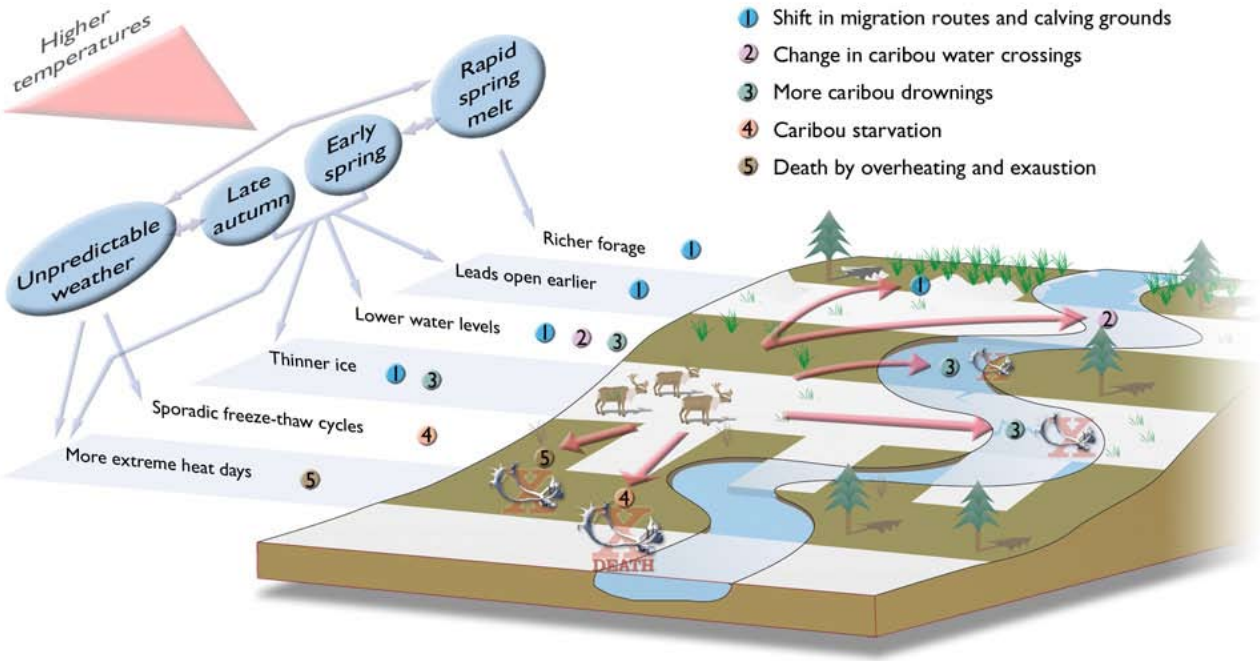


Figure 8. *Climate-induced changes to arctic tundra are projected to cause vegetation zones to shift significantly northward, reducing the area of tundra and the traditional forage for these herds. Freeze-thaw cycles and freezing rain are also projected to increase. These changes will have significant implications for the ability of reindeer populations to find suitable grazing conditions and accessibility to undeveloped areas will become critical for the ability of herders to adapt to a changing climate (ACIA, 2004; Tyler et al., 2006)*

THREE QUALITATIVE SCENARIOS FOR THE BARENTS REGION

IN THIS CHAPTER WE WILL PRESENT THREE SCENARIOS FOR REINDEER HUSBANDRY IN THE BARENTS REGION, BASED ON THE OUTCOME OF THE GLOBIO/BARLINDHAUG SCENARIOS ABOVE COMBINED WITH INTERVIEWS WITH REINDEER HERDERS AND INDIGENOUS LEADERS. IT IS IMPORTANT TO NOTE THAT SCENARIOS ARE NOT PREDICTIONS. INSTEAD, THEY ARE ILLUSTRATIONS OF POSSIBLE OUTCOMES IN A WORLD WHERE EVERYTHING IS OPEN AND UNCERTAIN, BUT WHERE SOME OUTCOMES ARE MORE DESIRABLE THAN OTHERS, AND WHERE OUTCOMES CAN AND MUST BE CONSTRUCTED OR CREATED IN SOME WAY. SCENARIOS CAN HELP US THINK MORE ACCURATELY ABOUT WHAT WILL COME NEXT, AND HELP PREPARE FOR IT (SCHWARTZ 1997, ARBO *ET AL*. 2007).

SCENARIO 1: CONTINUED PIECEMEAL DEVELOPMENT

Moderate oil prices and limited success in exploration means that the initial Klondike atmosphere in the aftermath of Snøhvit has evaporated. Gazprom focuses on Yamal, and Statoil focuses more on energy sources abroad. Exploration in Russia and Northern Norway continues at a moderate rate.

On the reindeer husbandry front, although the worst fears of heavy oil and gas development have not materialised, the continued piecemeal development of land has further eroded reindeer pastures. This has taken place especially in coastal calving and summer areas.

The promised gains of the new Reindeer Husbandry Act have not materialised as expected and herders have split over whether the new system is an improvement or not. The majority of herders state that tinkering with the system will not address the real underlying causes that are impacting the sustainability of reindeer husbandry, namely the lack of an integrated management regime that takes account of development in its entirety and how the total sum of development – roads, infrastructure, installations, military activities, leisure cabins, freight haulage etc impact on land use. Herders also complain that there are no revenue sharing agreements in place for the resources that are being exploited. There has been intense mining activity in Finnmark since 2010, and the weaknesses of the Finnmark Act have been sorely exposed, leading to disillusionment among reindeer herders and their families.

Predation continues to be a problem for reindeer husbandry, partly because of a failure by reindeer husbandry to effectively communicate this as a problem issue to the broader population. Ironically, with reduced pastures, predation actually increases as predators have easier access to herds.

Reindeer husbandry on the Kola Peninsula is in further disarray, as repeated efforts to restructure the livelihood fail, generally due to the as yet unresolved tensions between private reindeer ownership and collective structures. The industry continues to suffer from a lack of investment and is not seen as a priority by the regional administration in Murmansk. Small projects are initiated aimed at developing an export market, and supplying the large Murmansk market with reindeer meat, but these initiatives are under-capitalised and not clearly planned. Sámi are falling out of reindeer husbandry and young herders are not being recruited.

Industry plays a disengaged role, preferring to work through established governmental channels and avoiding the more difficult route of engaging with indigenous communities. As a result, capacity building in Sámi communities is stalled. Industry responds that it is not the role of the oil and gas industry to give handouts and that they do not wish to be wreaking “ethnic divisions” in the north. Reindeer Husbandry and Sámi politicians accuse oil and gas majors of abdicating their responsibilities and complain of a lack of leadership in regional and national politics. Management systems have not undergone any major revisions and the recognition of traditional knowledge systems are not taken seriously except in small academic circles.

The modest steps taken in structural adjustments, the lack of engagement from the petroleum sector, and the lack of revenue sharing agreements all have a slow and imperceptible degradation of the ability of herders to adapt to the predicted climate fluctuation. Several hard winters have covered winter pastures in deep snow and hard ice layers. The inherent flexibility of reindeer husbandry has further been constrained by loss of pastures and by a rigid management structure and the resulting impacts on herd numbers are severe. Ironically this is interpreted by mainstream society as a proof that herders no longer have the tools or the knowledge to adapt to the challenges of climate change in the 21st century, and calls are made for even more intervention into the industry.

SCENARIO 2: FREE MARKET

By 2020, oil prices have reached a stable level of 160 dollars a barrel and a strong market has meant a heavy investment in the energy sector. Public opinion has swung away from mitigation in favour of maintaining low energy prices at home, and CO_2 reduction ambitions have dwindled. This was facilitated by the fact that the dire climatic warnings in 2007–10 failed to materialise with the speed that had been predicted. As a result, the regulatory environment has loosened up and development has accelerated.

Despite the best efforts of the Sámi Parliament and legal experts, no revenue sharing agreements have been made between the indigenous inhabitants and the energy sector. Many parts of the Barents region are declared incompatible with aboriginal land use and remaining herds are turned wild. As it happens, major pipeline development on the peninsula has severely disrupted traditional migrations and land use.

For Sámi reindeer herders in Finnmark, the dense pattern of industrial development surrounding LNG plants on the coast has meant a dramatic reduction in pastures. Installation "buffer zones" are created, and local officials finally succeeded in removing reindeer herds from the Hammerfest region, claiming that the reindeer and disputes were a public nuisance and restraining development.

A substantial increase in the population centres of the new LNG plants has pulled many people out of the Inner Finnmark region, as local opportunities in traditional livelihoods are reduced and the Sámi Parliament is no longer seen as an effective voice, leading to an intensification of community fractiousness in the Sámi area. The newcomers to the region, increasingly from all over the world, use their new found wealth


Svein Disch Mathiesen

to purchase holiday homes, ATV's and snowmobiles, and several new leisure complexes and skiing resorts are developed in the high mountains on the coast of Troms and central Kola, further reducing summer pastures. Newcomers have little or no idea that they are playing a part in the destruction of aboriginal land usage and livelihoods, and there are no attempts by government or business to educate employees about the history or culture of the region they now inhabit.

Municipal officials in several municipalities actively seek to construct cabins and leisure facilities on migration routes. Despite several high profile court cases that are won by reindeer husbandry units, the installations remain and the disturbance has been considerable. Municipal and regional officials stress the importance of maintaining a business friendly environment and that a few hundred reindeer herders cannot hold up progress. Some municipalities compete with each other for oil and gas installations to ensure that they get a share of the tax revenues that go along with the new developments. In return, promises are made and county and regional development plans are adjusted to make them more development friendly.

After some initial false starts, and a series of negative articles in the national and local media regarding the number of reindeer in West Finnmark, the Reindeer Herding Law was rescinded and control of reindeer husbandry reverted to a new section of the Ministry of Agriculture, further eroding reindeer herders' autonomy. The Norwegian Food and Drug Administration welcomed the move, stating that it was essential for market confidence that meat production be controlled in a vertical and integrated system in order to maintain consumer confidence. The Ministry prefaced the move by calling for a balanced approach in the competing visions of knowledge that seemed to exist in reindeer husbandry, and that "rational decision making based on science" was essential. In the wake of a tainted meat scandal from a reindeer carcass that passed through the monopoly system, large one time payments were offered to herders to quit the livelihood, an offer that was accepted by many herders. The Ministry has invested in reindeer research institutions in southern Norway at the cost of similar institutions in the North, and the division between the research community and Sámi communities is growing. As pastures and migration routes are further eroded, a closer examination of the Finnish herding system is proposed and taxes on supplemental feeds are eliminated in an effort to make the industry more sedentary.

With a falling student population The Sámi University College is renamed the College for Sámi Language and focuses on producing teachers of the Sámi language. It also conducts some sporadic teaching of Sámi as a 2nd language for newcomers as part of a grant received from a charitable foundation in Germany.

The predicted increase in demand for reindeer products fails to materialise. The reasons are complex, but the monopoly held by the meat market in Norway appears to be a factor, and this is worsened by the effect of several small scale accidents on the coast at LNG plants and teething problems with a new pipeline technology that exposes herds to carcinogenic POP's and heavy metals. Articles in several major newspapers entitled "Santa's Dirty Secret" result in a collapse in the market in Europe and scare Norwegian consumers, tarnishing the reputation of reindeer meat. As a result, meats prices stay low, earnings for herders are depressed and inflation diminishes real income, while transportation costs continue to rise.

Relations between mainstream society and Sámi reindeer husbandry deteriorate further. The internal robustness of Sámi societies is further weakened as the division between reindeer herding and non-reindeer herding societies is intensified. Reindeer husbandry has for the first time in its history a problem with recruitment into the industry as younger family members see no future in the livelihood.

SCENARIO 3: A COMMON SUSTAINABLE FUTURE

When it is clear that there will be intense petroleum activity in the Barents Region, a series of annual multi-stakeholder workshops and community meetings are held to inform residents and indigenous peoples about the possible impacts that this activity will bring and to discuss future strategies for community engagement. There is broad political and local support for this approach when it becomes clear that the impacts – both negative and positive – are far above any previous megaproject in the North.

A key stone of the new strategy created by industry is a revenue sharing agreement developed in cooperation with the Sámi Parliament in Norway, which, thanks to a stable source of funding in place, emerges as a real political powerhouse in the North. The Parliament also expands to include delegates from Finland, Sweden and Russia and a permanent working group on reindeer husbandry emerges as a key platform for reindeer herders.

The Parliament is not the only recipient of oil and gas largesse, as the Sámi University emerges as a world class indigenous institution with specific expertise in environmental impact assessment and indigenous peoples. Indigenous students, many of whom are from reindeer husbandry communities in Russia, attend the University's cutting edge courses developed from within the indigenous academy. One of the more innovative positions developed at the University, partly funded by the energy sector, is a PhD programme in *Boazolihkku* (Reindeer Luck).

The reinvigorated college plays a key role in developing expertise within Sámi societies and reindeer husbandry, as scores of reindeer herders attend specially designed courses in GIS, herd management techniques, traditional knowledge workshops specifically designed with the nomadic structure of reindeer husbandry in mind, engaging a wide range of Sámi elders as teachers, along with newly skilled Sámi teachers.

An integrated network of protected areas is developed in tandem with reindeer husbandry. Critical migration routes and calving grounds are declared off limits for development – this process is facilitated by the integrated land use management regime that has been developed as an outgrowth of the Finnmark Act. This is also a recognition of Norway's responsibilities under ILO 169 and the spirit of the UN Declaration on the Rights of Indigenous Peoples. In fact, under Kyoto 2, this very protection of reindeer husbandry areas generates significant carbon credits for the Norwegian state whose payments under Kyoto 2 are substantial.

Sustainable reindeer husbandry founded on traditional knowledge and science forms part of the backbone of a new optimism in the North. New models of co-productions of knowledge are developed and reindeer herders are no longer seen as standing in the way of progress, but rather as partners in the process of building a sustainable industry and as caretakers of the region's cultural and biophysical diversity. Interesting changes to herd structure occur in some of the larger districts, encouraged in part by sympathetic changes in reindeer husbandry legislation and the subsidy system. This was not universally popular, but a healthy debate about herd structure and sustainability has become a regular part of the internal debates within reindeer husbandry.

The meat market monopoly is loosened up and some business savvy herders are forging ahead with innovative products, independent supply chains and a brand that plays on the "organic" nature of reindeer meat as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consumers fear surrounding GMO's and mass production food methods increase in Europe. Reindeer meat is seen and marketed as a healthy and clean protein alternative. Prices are high and there is a strong emphasis on quality, value added products and the development of speciality markets.

Still, there are still many challenges – a consumer-led demand for green energy has resulted in a wind mills construction boom on the coast of Troms, Finnmark and the Kola Peninsula, severely impacting calving grounds. Significant sections of mainstream society are unhappy with the new power and influence of Sámi society in general and reindeer husbandry in particular, and several political parties pander to these insecurities. However, conflict resolution techniques and widespread education projects partly funded by revenue sharing arrangements have helped mitigate the more extreme forms of misinformation from all partners. Training in negotiations, EIA work, and particularly investments in research and innovative ways of restoring pastures disturbed by development has helped secure land suitable for reindeer herding.

CONCLUSIONS AND RECOMMENDATIONS

IMPACTS OF DEVELOPMENT ON REINDEER HUSBANDRY

Petroleum development scenarios for the Barents Region assume a higher development pressure in the region than what earlier scenarios have projected (UNEP/EEA, 2004). Extensive petroleum activity in addition to continued piecemeal development will likely seriously impact the ability of reindeer herding to adapt to climate change and will further limit the access to spring, calving and summer ranges (Vistnes *et al*. 2008a). As these ranges are vital to reindeer herding, a lack of policy to protect these ranges may have serious consequences for the ability of herding to persist at the extent and in the form known today. While protected areas mainly are located in inland areas, the coastal zone, which is the area under the highest historic and projected development rate, remains generally unprotected. The piecemeal development will:

1) Reduce the amount of available grazing land
2) Reduce herd production (e.g. slaughter weights, calf production), thereby reducing the income and possibility for herders to continue with reindeer husbandry
3) Increase internal competition among herders and external competition with mainstream society
4) Reduce the quality of life for herders, their families and indigenous societies as a whole as the impacts of uneven development impact on community resilience and gender roles in a negative manner
5) Decrease the ability of reindeer to cope with extreme winter conditions due to loss of summer ranges and thus less growth and weight gain in summer

These worst-case scenarios represent mainly the result of projected climate change, projected development, and beyond all, a continuation of the current lack of policies on securing the traditional grazing ranges (UNEP/EEA, 2004). More sustainable alternatives may be developed identifying opportunities of mitigation, conflict resolution and regional policies. However, such pathways would have to be developed as part of an integrated program involving both herders, their communities, the indigenous scientific community, resource managers, policymakers and industry.

Considerable effort needs to be directed towards reducing the vulnerability of reindeer husbandry to the effects of climate change. Only in this way can reindeer husbandry continue to develop confidently as an ecologically and economically robust form of land use. Research needs to be directed towards enhancing the ability of the reindeer husbandry to adapt to the challenges ahead. These challenges include not only the putative effects of climate change but also loss of pastures (both physically and as a result of reduced use), the effects of predation and the management of product development and marketing.

The limits of the adaptive capacity of reindeer husbandry must be defined, documented and explored together with the potential role of herders' traditional

understanding of, and techniques for, reducing their vulnerability towards the effects of climate change. To date, the official reindeer husbandry management's principal tool has been regulating the number of reindeer and reindeer herders. A continuous loss of reindeer pastures has and will lead to a situation in which there will always be "too many" reindeer and herders in an area. Movement beyond this negative focus requires lifting the general level of competence locally and within central management through research and training. This will also involve a paradigm shift in terms of the perception of and importance attached to reindeer herders' traditional knowledge, a knowledge with embedded key adaptive strategies that will enable reindeer husbandry participate more effectively in support for strong, healthy indigenous communities in the study region. Reindeer herders have experience with adapting to sudden changes in climate or political conditions, and understanding this ability to adapt is important for a future sustainable development of the circumpolar regions. Furthermore, it will be vital to communicate this adaptability to oil and gas developers, the mainstream societies and national authorities.

It will therefore become important to document the elders' knowledge, in this case particularly in relation to climate, local weather, pasture loss and the responses of herders and herders' institutions to variation in these parameters (Ferguson *et al*. 1998, Usher 2000, Kendrick *et al*. 2005). As the older generation decreases, the sum of non-written knowledge stored in peoples' memories and, thus, remaining in the Sámi society, is also declining. This knowledge is effectively irreplaceable. We believe that valuing both traditional and scientific knowledge and, hence, integrating herders' experience and competence within the scientific method, will enable us to contribute towards reducing the vulnerability of reindeer husbandry to the effects of coming changes (Kitti *et al*. 2006). Local effects of warming of the global climate during the next 30 to 50 years are likely to be pronounced over reindeer pastures in the north. We should use the best methods and practices available to meet these challenges.

Philip Burgess

INDIGENOUS INFLUENCE ON DEVELOPMENT

In spite of the ILO-convention 169 on the rights of indigenous peoples and the UN Declaration on the Rights of Indigenous Peoples, the indigenous peoples of the Barents Region have had little influence on land rights and piecemeal development. One of the main problems is the sectored management of grazing land, where one ministry is in charge of infrastructure, another of hydropower development, a third of forestry, etc. This management regime has left no room for an overall policy to secure at least a minimum of grazing land for reindeer herding. Development plans are often supported by economic powerful interests, which are difficult to withstand for small, family-based occupancies like reindeer herding.

On the county level, a recent investigation by the Office of the Auditor General of Norway found that reindeer herders some possibilities to influence or modify general municipality plans (Riksrevisjonen 2004), although most plans end up as a compromise between developers and other interests. In the case of recreational cabins, only 12% of the municipality plans restricted new construction of cabins after protests from reindeer husbandry interests (Lie *et al*. 2006). However, the largest challenge for reindeer husbandry is the vast number of separate development cases that are raised in addition to the general county plans, which are time and resource demanding and leave little room to concentrate on the overall grazing land situation. Reindeer herders have fewer possibilities to influence the outcome of such separate cases than the general county plan process. Illustrating this, 400 new cabins are allowed built in Norwegian reindeer grazing areas each year as separate development cases, in addition to general municipality plans. Only 7% of these are stopped as a result of protests from reindeer husbandry interests (Lie *et al*. 2006). Also, in 86% of the separate cases of development on their lands, they are not informed by the county of the final decision in the cases, making it difficult to raise a final legal objection. Hence, in real life, the herders have only a marginal influence on the development of their own traditional lands.

WHAT CAN BE DONE?

The solution to the future of the Sámi people does not appear to lie within a single stakeholder, but must likely include a range of actions. Government agencies seem to have little coordination of development activities as no overall goal on preservation of range lands and reindeer pastures exists, while Sámi herders seem to have had limited success in collaborating both within countries and across borders to present a common policy and plan of action against the development. First of all, definition of crucial ranges should be critical, given of course, that such step will not simply accelerate development elsewhere without providing the necessary legal protection of the critical ranges.

The most important action superseding any other is the definition of an actual percentage of ranges and grazing land to be protected within a given timeframe. Secondly that effective monitoring and reporting to the various parties is presented annually. Shell-Canada has introduced an interesting and ambitious policy of no net increase in roads. Hopefully such policy could be adapted by most of the countries in the Barents Region for the remaining range areas.

EIA's generally have fairly high standards in northern Europe, but are widely limited to the individual development projects, a key problem in piecemeal development. While room for improvement certainly exists, it is the lack of policy on extent of land available to indigenous reindeer herders and wilderness to protect that is the primary problem in the region, not established systems and procedures for EIA's of the individual development projects. Hopefully this challenge will be met by both Sámi herders and the governments in the region.

Reindeer herders' traditional knowledge, including traditional use of grazing land, needs to be documented before much of their understanding is lost owing to the societal and cultural transformations associated with globalisation. Reindeer has a major cultural and economic significance for indigenous peoples of the North. Human-ecological systems in the North, like reindeer pastoralism, are sensitive to change, perhaps more than in virtually any other region of the globe, due in part to the variability of the Arctic climate and the characteristic ways of life of indigenous Arctic peoples. High sensitivity notwithstanding, little is known about the vulnerability and adaptability of such systems to change. Understanding and measuring resilience requires assessment of systems' ability to adapt to impact and the extent to which freedom to adapt is constrained.

RECOMMENDATIONS AND OPTIONS:

Short-term

1. Raise awareness and enhance capacity building by the further development of courses in industrial and indigenous adaptation and mitigation processes involving all parties. These courses should integrate traditional knowledge and up-to-date scientific knowledge on impacts on indigenous peoples and subsistence livelihoods.
2. Further develop courses in training of indigenous peoples in environmental and social impact assessments and in negotiations concerning industrial development projects
3. Increase outreach and information capacity of relevant publications through translations of documents into Russian and selected major indigenous languages for regions particularly exposed to development.

Mid-term recommendations and options

4. Support the development of Arctic ethical standards and guidelines applying to industry with regard to involvement of indigenous peoples in industrial development processes
5. Include and consider the impacts of industrial development projects on the ability of indigenous peoples to adapt to a changing climate
6. Adopt a no net loss policy with regard to availability of grazing ranges, so that losses of grazing land from new development is compensated with either restoration, support to adaptation and mitigation measures where effective, or increased access to ranges elsewhere.

Long-term recommendations and options

7. Develop an integrated management plan also for the Barents sea land region involving and balancing the land changes associated with industrial and infrastructure development, climate change and the long-term sustainability of reindeer husbandry.

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AUTHOR'S CONTACT INFORMATION

Ingunn Ims Vistnes
Norut Alta – Áltá, 9506 Alta, Norway

Philip Burgess
International Centre for Reindeer Husbandry, 9520 Kautokeino, Norway

Svein Disch Mathiesen
International Centre for Reindeer Husbandry, 9520 Kautokeino, Norway
Sámi University College, Hannoluohkka 45, 9520 Kautokeino, Norway
Norwegian School of Veterinary Science, Sjøgt 39 9000 Tromsø, Norway

Christian Nellemann
UNEP/GRID-Arendal, 4836 Arendal, Norway

Anders Oskal
International Centre for Reindeer Husbandry, 9520 Kautokeino, Norway

Johan Mathis Turi
Association of World Reindeer Herders, 9520 Kautokeino, Norway

APPENDIX

APPENDIX 1. PRESENTATION OF THE INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY, KAUTOKEINO, NORWAY, AND THE ASSOCIATION OF WORLD REINDEER HERDERS

APPENDIX 2. GLOBIO METHODOLOGY

APPENDIX 1. PRESENTATION OF THE INTERNATIONAL CENTRE FOR REINDEER HUSBANDRY, KAUTOKEINO, NORWAY

The establishment of an International Centre for Reindeer Husbandry in Kautokeino represents one measure to secure the future of this unique cooperation in the North. The Centre enjoys wide professional and political support, both nationally and internationally, and is recommended by, among others, the Arctic Council in the report "Sustainable Reindeer Husbandry" (2002), and by the 3rd World Reindeer Herders' Congress in the "Yakutsk Declaration" of March 2005. It is also recommended by the Government appointed committee of exports in the report published as NOU 2003:32 (Official Norwegian Report) entitled "Look North! Challenges and Opportunities in the Northern Areas". The former Norwegian Minister of Foreign Affairs, Mr. Jan Petersen, announced in the 4th Arctic Council Ministerial meeting in Iceland, November 2004: *"..Norway has decided to establish an international centre for reindeer herders in the Arctic, in Kautokeino, in close co-operation with the World Reindeer Herders. This will be a resource centre for exchange of information between herders in different countries and promoting co-operation between them"*. This was followed up by the government in its report nr. 30:2005 to the Norwegian Parliament entitled "Opportunities and Challenges in the North", which recommends establishment of an international information centre in close cooperation with WRH. The Norwegian Parliament supported the recommendation by adopting the "Proposition to Parliament" no. 264 (2005), which announces that the centre *"…is important to strengthen the cooperation between northern indigenous communities and other industries"*.

The Norwegian Government has followed up this proposal and the Centre is now organized under the Norwegian Ministry of Labour and Social Inclusion. The Centre is an independent professional unit, with its own board and budget. Its activity is funded by the Norwegian Government through annual grants from the budgets of the Ministry of Labour and Social Inclusion, the Ministry of Agriculture and the Ministry of Foreign Affairs. The Centre is to be a knowledge base for providing and exchanging information and documentation between different reindeer peoples, national authorities and research- and academic communities at the national and international levels. The Centre will thus contribute to adding value, to improving information and to enhancing understanding for world reindeer husbandry and reindeer peoples, their traditional knowledge and their future development

ASSOCIATION OF WORLD REINDEER HERDERS

The fall of the "iron curtain" and the Brundtland commission's report to the UN, "Our Common Future", enabled Norwegian Sámi reindeer herders to established formal cooperation with the Soviet Academy of Science and with reindeer herders in the Soviet Union. As early as 1990 a delegation with representatives from Sámi Reindeer Herders' Association of Norway (NRL), the Norwegian Ministry of Agriculture, the Norwegian Reindeer Administration and the University of Tromsø visited Even reindeer herders in Topolinij in the Republic of Sakha (Yakutia) in Eastern-Siberia. Most significantly, this visit was funded by the Norwegian Ministry of Foreign Affairs.

In September 1993, NRL organized an international Reindeer Peoples' Festival in Tromsø, in cooperation with the Russian Government and reindeer herders in Russia. Approximately 360 representatives from reindeer pastoralism in Norway, Sweden, Finland, the Russian Federation and Alaska participated in the Festival. This was the first time in history that such a diverse collection of reindeer peoples were able to meet with each other. This event marked the beginning of unique cross-border cooperation between the circumpolar reindeer peoples which resulted in the establishment of the Association of World Reindeer Herders.

The 1st World Reindeer Herders' Congress took place in the city of Nadym, in the Yamal region of Russia in 1997, and was hosted and funded by the Russian government together with the regional authorities in Yamal. Participants included representatives from the reindeer husbandry in the Nordic countries and in Russia. The Congress resulted in the establishment of the Association of World Reindeer Herders (WRH). The aim of the association is to promote professional, cultural, social and economic relations between world reindeer peoples, as well as to disseminate information about the reindeer pastoralism.

The establishment of WRH provided reindeer herders with a forum for contact and cooperation which contributed to bringing reindeer pastoralism on to the international agenda. Already in 1999 the Norwegian Minister of Foreign Affairs, Mr. Knut Vollebæk, took the initiative to add reindeer husbandry on the agenda of the international Arctic cooperation. As a direct consequence of this, in 2000 WRH was granted observer status in the Arctic Council.

The 2nd World Reindeer Herders' Congress in Anar (Inari), Finland in 2001 was funded by the Finnish Government. The Congress adopted the "Anar-Declaration", which is the first common statement developed by reindeer herders. The declaration presents guidelines for the development of a sustainable reindeer husbandry for the future.

The 3rd World Reindeer Herders' Congress took place in the city of Yakutsk, in the Russian Republic of Sakha (Yakutia) in March 2005. The Congress adopted the "Yakutsk-Declaration", which emphasizes reindeer husbandry's participation in the international cooperation in the Arctic. The Congress was hosted and funded by the Government of the Republic of Sakha (Yakutia) and was part of a campaign for promoting the reindeer pastoralism and the indigenous peoples of the Republic.

A great deal has been invested in international cooperation between world reindeer herders over the last 15 years. The Sámi reindeer husbandry, the Norwegian government, Russian reindeer herders, central and regional authorities in Russia, as well as reindeer herders and authorities in Finland have been especially active in promoting this cooperation. Initiatives designed to secure the resulting benefits within reindeer pastoralism are now needed.

APPENDIX 2. METHODOLOGY FOR THE GLOBIO SCENARIOS

For the development of future scenarios, the following assumptions were made:

1. Infrastructure primarily expands away from existing infrastructure and through further aggregation
2. Infrastructural development will continue according to current rates of increase
3. Areas with relatively high current population density will experience relatively high rates of growth in infrastructure
4. Areas with known timber, oil, gas or mineral resources will experience relatively high rates of growth in infrastructure
5. Areas close to coasts will experience relatively high rates of growth in infrastructure (historic pattern)

The rate of growth in infrastructure is estimated from historic changes in land use and road development based on data and projections obtained for different continents, for the period 1850–2000. Detailed descriptions of methodology are given at www.globio.info.

For estimates on the area available to reindeer herding and subsequent alternative scenarios of development, we used the Barlindhaug scenarios (Barlindhaug 2005). In addition, the GEO3 scenarios were applied to provide a broader range of possible outcomes of different policies. The Barlindhaug scenarios are comparable to the Market forces scenario of GEO3 with enhanced development surrounding key petroleum or gas centres along the coast. The scenarios depict different rates of development dependent upon economic growth and different management regimes. The scenarios serve to illustrate the variability and range of uncertainties that are involved in scenario generation. For details on this methodology, please consult UNEP (2003a, b).

Philip Burgess

International Centre for Reindeer Husbandry
P.O. Box 109
N-9521 Kautokeino
Norway

Phone: +47 7860 7670
Fax: +47 7860 7671
office@reindeercentre.org

www.reindeerportal.org

International Centre for Reindeer Husbandry
Международный Центр Оленеводства
Riikkaidgaskasaš Boazodoalloguovddáš