Reindeer herding and petroleum development on Poluostrov Yamal: Sustainable development or mutually incompatiable uses

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CHAPTERS:

Background and introduction

In the Nenets' own language, "Yamal" means roughly "the end of the earth" or "land's end". It is an apt description for a peninsula that juts well out into the Kara Sea from the mouth of the Ob River, and which serves as the northern endpoint of an annual reindeer (Rangifer tarandus) migration route that, for most animals and modern herders, covers several hundred kilometers. For the reindeer, and the herders or their hunting predecessors, this migration has been taking place for at least a millennium, probably longer. Evidence comes from several places, including Yarte 6, a major archaeological site near the south shore of the Yuribei River on west central Yamal Peninsula (Golovnev and Zaitsev 1992). The latest archaeological material at Yarte 6 dates from the 11-12th century, but there is evidence for domesticated reindeer as early as 600 AD (Fedorova1998). However, at that time only a few reindeer were partly domesticated, perhaps only for riding or as hunting decoys. Even in the 12th century there were probably still relatively few semi-domesticated animals compared to wild ones. It is unlikely that intensive breeding began before the 16-1700's (W.W. Fitzhugh, pers. comm.,Director, Arctic Studies Center, Smithsonian Institution, Septmber 1996; see also Krupnik 1993). Post-Soviet reindeer ownership patterns are complex, as many formerly state-owned herds revert to private hands and the so-called 'brigade' system undergoes fundamental change (Golovnev and Osherenko 1999).

The Yamal-Nenets Autonomous District (Fig. 1), although home to one of the largest untapped sources of natural gas and gas condensates in the world, has only recently been introduced to the outside world via major coverage in the popular and business/finance media (TheNew York Times22 November 1994;The New York Times27 November 1994; Furman 1995; Klebnikov 1997; The Globe and Mail(Toronto) 15 March1997; Deutsch Morgan Grenfell 1998). The region has a long and troubled history, due in

large part to first Tsarist and later Soviet dreams of establishing state and religious authority over even the most remote human populations. Parallel ambitions for developing the so-called 'Northern Sea Route' have meant that traders have been active in the area for several centuries (Golovnev et al. 1998; Golovnev and Osherenko 1999). The town of Salekhard (formerly Obdorsk), at the base of Yamal Peninsula, celebrated its 400th anniversary in 1995. However, early interests in furs, fish and timber have shifted to gas, gas condensates and oil in recent decades.

Pressures for development were increasing rapidly even before the collapse of the Soviet Union, but took on new urgency, as the need for hard currency grew ever more acute after 1991. Just before the breakup of the union, former production amalgamations in the petroleum industry were transformed into "Soviet Union Concerns," and Gazprom took its dominant position in the gas industry. Gazprom was subsequently transformed from a state concern into a state-owned joint stock company, and the priorities of the state and Gazprom changed. Since then, Russia has been designated a 'Cooperation Partner' country within NATO and Western oil companies and the World Bank have been pledging billions in funding to develop the resources of the Yamal Region and export the the gas and oil via pipelines (The New York Times 24 April 1993; The New York Times27 November 1994; International Herald Tribune 18 November 1997). In fact, petroleum is one of the most stable and well-developed industries in the Siberian economy and the most important sector of the Russian economy overall. Russia has approximately 47 trillion cubic meters of gas reserves, about 80% of which are located in Western Siberia (Deutsch Morgan Grenfell 1998). The $40 billion Yamal project is the last of the 'Soviet'-style megaprojects (Deutsch Morgan Grenfell 1998), for which Gazprom has been actively exploring since the 1960's (Vitebsky 1990).

Exploration and development activities at the Bovanenkovo Gas Field alone had, by 1990, led to the loss of 127,000 ha (1270 km^2) of tundra comprising reindeer pasture land (Martens et al. 1996). This process, combined with massive outright land withdrawals by Gazprom and cumulative impacts, has pushed a relatively consistent (M.N. Okotetto, pers. comm., Nessei Reindeer Cooperative, Seyakha, Yamal, Janaury 1998) or increasing (Golovnev and Osherenko 1999) number of animals onto progressively smaller areas of tundra. By 1980, large portions of the Gydan and southern Yamal Peninsulas were showing signs of heavy grazing (Vilchek 1992). It is now estimated that the number of semi-domestic reindeer on Yamal (ca. 180,000) is already 1.5 to 2

times greater than the optimum for the region (Vilchek 1992; Vilchek and Bykova 1992; Martens et al. 1996).

The regional scale of habitat destruction in northwest Siberia, including the Yamal Peninsula, was recently summarized by Vilchek and Bykova (1992) and Vilchek (1997). These authors observed that plant cover is already completely destroyed over 450 km²within gas and oil fields and 1800 km²along the main pipelines. They estimate the total area of destroyed vegetation to be about 2500 km². Based on the Tyumen Oblast's present plans, they assert that the area of explored gas and oil fields will increase to 16200 km²and the portion with completely destroyed vegetation will increase to 5500 km². These figures can be misleading because they do not include the further degradation that is expected to occur due to overgrazing by reindeer, nor cumulative impacts such altered hydrology and blowing sand/dust from roads, quarries and abandoned drilling sites (e.g., Forbes 1995). The three most widespread types of disturbance are off-road vehicle traffic, exploratory drilling, and sand excavation (Vilchek and Bykova 1992; Khitun 1997). Assisted revegetation programs designed to control erosion on affected areas have met with limited success due to their immense expanse and the prevalence of nutrient poor, well-drained and highly erodable sands, in conjunction with the cold, dry climate (Martens 1995; Forbes and Jefferies 1999).

The dual impacts of intensive grazing and industrial development combine to create a scale of actual and potential surface disturbance not found anywhere else in the tundra ecoregion. The two starkly differing economies would appear to be mutually incompatible. Yet there are few quantitative baseline data available to predict how the tundra will respond to the range of anthropogenic disturbance regimes introduced or accelerated in recent years.

Viable wildlife populations

The relative biodiversity of Yamal on a global scale is insignificant, but does include some rare and ecologically vulnerable species. About 10 species of birds and small mammals (and seven species of vascular plants) are included in the Red Book (Chernov 1997), and it seems that none are listed due to being understudied. Substantial populations of terrestrial wildlife still exist (Dobrinskii 1997), although some fur-bearing species are subject to hunting and trapping, both licit and illicit. Pelt output can allow a very rough measure of population dynamics and harvest statistics from 1962 to 1988 are provided by Vilchek (1992) for wild (not farmed) arctic fox, fox, ermine, wolf, squirrel, otter, wolverine, sable, muskrat and

hare. Data for brown bear and moose (both very rare on the tundra), and reindeer are available for the period 1975-84. Polar bear and walrus may come ashore in places in late summer but are protected (Chernov 1997). Three types of ptarmigan or grouse (Lagopus spp.) occur, along with wild ducks and geese, and these are hunted for sport and game by non-Native and Native populations, respectively. Raptors comprise a variety of owls, eagles, hawks, all of which are common in the tundra zone except the peregrine falcon (Chernov 1997). In the years following microtine peaks, when raptors peak, Nenets typically kill a great many eagles in an attempt to control predation on reindeer calves (M.N. Okotetto, pers. comm.).

The pelt output trends for some mammals reveal steep declines. For example, the number of arctic fox pelts produced between 1962-64 ranged from 23324 to 32406. In 1988 the number was 4334. Others, such as wolverine, vary greatly - from a high of 148 in 1969 to a low of 7 as recently as 1983 - with no clear pattern (Vilchek 1992). The dangers of using such data to estimate actual wildlife populations are well-known (cf. Usher and Wenzel 1987). Nonetheless, I simply wish to demonstrate that the full suite of indigenous wild animals has survived in the context of reindeer herding for several centuries, despite increasingly intense hunting, trapping, fishing and industrial pressures from non-Nenets in the last several decades.

Wolves (Canis lupus albus) are distributed everywhere, but population densities are somewhat higher on the so-called 'southern' tundra (central Yamal) compared to the 'northern' tundra (northernmost Yamal) and the forest-tundra. Adult animals are good sized, with males averaging 40 kg and females 36.6 kg. The only consistently larger ones belong to the North American subspecies C. l. occidentalis (Korytin et al. 1995). Hunting from helicopters peaked after WWII (413 animals taken 1948-58), but then eased up and populations had recovered by the 1970's. The total population for the Yamal-Nenets Region was recently estimated to be about 500 wolves, with densities ranging from about 0.7 individuals per 1000 km2in the forest-tundra to 1.5/10002km in the tundra (Korytin et al. 1995). The majority of animals depend on the reindeer for their sustenance and therefore follow the latter's annual migration to a great extent. But for many in the far north and along the coast ptarmigan are also important in their diet. Average pack size is 6.5-7.5 animals with dens not closer than 15 km to each other.

Although wolverines also range all over Yamal Peninsula, population densities are much lower than wolves, as is the case elsewhere in

the circumpolar North. They are slightly more numerous in the southern tundra and forest-tundra. The density for the region is estimated to be only 0.05 individuals per 1000 km²(Korytin et al. 1995). They sometimes prey on reindeer, taking only weakened/sick adults or calves, but are so rare that Nenets do not consider them a threat to the herds. More common is for them to feed on carcasses left by wolves, though they also prey on smaller mammals and birds and consume hoards of berries in season. When they are hunted or trapped, it is usually by non-Nenets seeking their extremely valuable pelts.

The arctic fox is considered to be particularly at risk. In the early phases of intensive gas field development, 13% of dens were substantially or totally destroyed during the construction of roads, facilities, and quarries, in addition to uncontrolled off-road traffic by tracked vehicles. Since then the pace of development has increased substantially, as has poaching by crew workers, and there is concern for the long-term viability of the central Yamal population (Dobrinskii and Sosin 1995). In addition to wild mammals, each year many Nenets-owned reindeer and tons of fish are taken illegally by non-Natives (Forbes pers. obs.; Golovnev and Osherenko 1999; L. Okotetto, pers. comm., Panaevsk Sovkhoz, Yamal Peninsula, March 1999).

Impacts of petroleum exploration and reindeer grazing on ecosystems

Many direct and indirect impacts (e.g., poaching, as described above) occur as a result of petroleum exploration. After more than 25 years of exploration, the tundra ecosystems of northwest Siberia are characterized by many of the same impacts found in arctic Alaska (cf. Reynolds and Tenhunen 1996; Walker 1997). On Yamal, these impacts are documented by Forbes (1995, 1997), Khitun (1997) and Vilchek (1997). Natural disturbances which regularly create large areas of bared mineral soils include thermokarst erosion, lake drainage, and so-called 'shallow-layer detachment slides', when large portions of slopes slump downhill and reveal bare mineral soils (Leibman and Egorov 1996; Pavlov 1997). The region is vast and the amount of overall industrial disturbance seems small when calculated as a percentage of the total land area (Vilchek 1997). Nonetheless, as Nenets are quick to point out, the developers always take the best lands - higher, drier ground - for creating infrastructure (Alexander 1994; Forbes pers. obs.) (Fig. 2). In an area as flat as Yamal, dominated by mires and lakes, this quickly puts additional, unsustainable pressure on the remaining relatively high ground, such as ancient sand dunes, which is

exploited by the reindeer for insect relief in summer (Helle and Aspi 1984).

Reindeer grazing impacts are documented by Podkoritov (1995), Korytin et al. (1995), Martens et al. (1996) andMagomedova et al. (1997). Reindeer greatly affect community structure and productivity via their trampling and grazing. For example, cover of virtually all lichens, especially those fruticose species most preferred by reindeer (Podkoritov 1995), is minimal and ruderal or weedy species are prominent (Forbes 1995). There is evidence that vascular ruderals, which are normally restricted to disturbed habitats, have begun to spread into relatively 'intact' tundra, where the organic layer has been thinned often to the point of rupturing from trampling by the animals (Forbes and Jefferies 1999). The cover of grasses, in particular, is increasing in many areas - so-called 'grassification' - at the expense of dwarf shrubs and lichens (Martens et al. 1996). Grazing is increasingly conducive to the formation and expansion of denuded soil, particularly in zonal dwarf shrub-lichen tundras on sandy substrates, where denudation triggers deflation processes (Martens et al. 1995; Khitun 1997; Vilchek 1997). The cumulative impacts associated with grazing thus include: greatly accelerated deflation of exposed sands; thinning, warming and cratering of the vegetation mat; increased infiltration rates resulting in massive thermokarst and landslides; and altered hydrology and drying of soils in drained areas. It is estimated that 70% of the pastures currently belong to the low quality category (Korytin et al. 1995).

Reindeer herders of the state farm (or Sovkhoz) "Yarsalinskii", which manages those reindeer herds grazing in the vicinity of the Bovanenkovo Gas Field, have for many years been violating the Sovkhoz's borders by allowing their animals to graze extensively on pastures administered by the more northerly state farm "Yamalskii". Actions such as this are conducive to furthering the conflicts between reindeer herders working for the state farms and those acting as private owners/herders. These violations appear to start a chain reaction, leading to more violations (Okotetto and Forbes 1999). A parallel situation has been reported by Evdokimova (1999) slightly further west on the Bolshezemelskaya tundra, where pastures have been similarly degraded due to competition between Nenets and Komi herders for the same grazing land.

Development scenarios and conclusions

Plans regarding the development of the Yamal gas fields have been undergoing near constant revision during recent decades. There still remains indecision about the route of the potential pipeline(s)

(Deutsch Morgan Grenfell 1998), or even whether there should be any major pipeline(s) built at all. An alternative scenario under serious consideration is to ship the gas out by tanker via the Northern Sea Route (Golovnev et al. 1998). Regardless of the eventual outcome, a great deal of damage has already been sustained by the ecosystems of Yamal since the advent of extensive exploration and development (Forbes 1995, 1997; Khitun 1997; Vilchek 1997), including health and demographic problems among the indigenous population (Pika and Bogoyavlensky 1995). Among wildlife populations that have thrived for centuries in conjunction with reindeer herding, certain favoured species appear to be in decline and may soon become locally extinct due to an increase in hunting and poaching (Dobrinskii and Sosin 1995).

According to Gazprom's plans, the Yamal Project is to be developed in stages. The "last and most expensive" (i.e., damaging) stage, which they estimate at $18 billion, is not scheduled to begin until around 2005, and the actual reserves are not "needed" until beyond 2010, possibly later (Deutsch Morgan Grenfell 1998). Given the structure and power of the Russian state, its majority stake in Gazprom, and its increasingly desperate need for hard currency to pay its debts, it is almost a foregone conclusion that the final stage of the Yamal project will indeed go ahead sooner or later. However, the expected delay potentially affords some time for further baseline ecological and socio-economic studies to determine the most sensitive way to proceed. Although the American Oil Company (Amoco) was sponsoring archaeological, revegetation and reindeer pasture monitoring studies for several years, it withdrew from Yamal Peninsula in 1996. Amoco has since been merged with British Petroleum (BP) and other Western companies are planning to step in to fill the void, including Finland's Neste Oy. Gazprom, which has begun selling shares on the international stock market (Deutsch Morgan Grenfell 1998), has a poor record of environmental and cultural protection on Yamal (Forbes 1995, 1997; Khitun 1997; Vilchek 1997; Golovnev and Osherenko 1999). Therefore, long-term Western involvement is likely to be beneficial, so that international standards and protocols for mitigation are instituted and adhered to. If not, pressure can be brought to bear where it counts most, in the international media and the marketplace, should Gazprom continue, and its new cohorts begin, to ignore their responsibility to the Nenets and to the environment.

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