

EQUITY, VULNERABILITY AND RESILIENCE IN SOCIAL–ECOLOGICAL SYSTEMS: A CONTEMPORARY EXAMPLE FROM THE RUSSIAN ARCTIC

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ABSTRACT

Environmental and social problems are tightly linked in coupled social–ecological systems in the Arctic. This chapter will discuss the importance of equity as a factor in the adaptive capacity of a region undergoing relatively rapid climate change and simultaneous land-use change (petroleum development) in the northwest Russian Arctic. Relative to North America, attempts to implement some kind of economic or legal equity with regard to massive industrial development are token at best. Unfortunately, in the current situation, legal rights to land and resources are neither likely to materialize nor, even if they did, to facilitate adaptive capacity on the part of Nenets herders. As such, herders lack power over important decisions pertaining to the manner in which development proceeds on their traditional territories.

Equity and the Environment

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Russia's northern lands have been developed along starkly different lines than those of Europe and North America. Yet the limited literature of resilience in northern social–ecological systems is derived almost exclusively from North American experiences with co-management. Recent work on the Yamal Peninsula indicates that even with a sustained commitment to active engagement, only incremental change is expected. Western-style legislative campaigns and overnight blanket solutions are far less likely to bear fruit and may, in fact, be counterproductive. The prescriptive approaches from four different analyses of the Yamal situation are compared, with special attention devoted to their respective assessments of resilience. Fortunately, the retention of youth within the nomadic population of tundra Nenets appears to be high, providing a positive indicator of overall resilience in this particular social–ecological system.

BACKGROUND AND INTRODUCTION

By definition, environmental and social problems are strongly linked in so-called “social–ecological systems” or SESs (Folke et al., 2002; Folke, Berkes, & Colding, 2003). Some have argued that this is especially the case in northern high-latitude regions where, at the dawn of the 21st century, many indigenous and non-indigenous people are still dependent to a greater or lesser extent on marine and terrestrial wildlife for some combination of food, clothing, shelter and spiritual fulfillment, as they have been for millennia (Berkes, 1998; Berkes & Jolly, 2001; AHDR, 2004; Chapin et al., 2004, 2006a, 2006b). This is particularly the case in northern Russia, where certain populations of hunters, herders, fishers and gatherers continue to live their lives largely “on the land,” migrating almost constantly within and among the tundra and taiga, much as they have for at least 1,000 years. These resource relationships, generally but not exclusively with animals, are so strong as to serve, along with technological change, as markers for cultural differentiation in space and time (Helm, 1981; Damas, 1984; Krupnik, 1993). Passing knowledge of these cultures, coupled with images of spectacular landscapes and seascapes, have helped to create a popular vision of the Arctic as a bleak wilderness sparsely settled by primitive cultures. This view is misleading at best, patronizing and counterproductive to building resilience at worst (Forbes, 2005a). As active hunters, herders, fishers and gatherers, obligate rural groups around the Arctic are already facing special challenges from climate change and globalization processes that more urban and suburban segments of the population generally are not

likely to ever experience in the same manner (Smit & Pilifosova, 2001; Nuttall et al., 2005). Although northern communities keenly observe the waxing and waning of populations of both wild and domesticated animals and plants, it is only in the past few years that the Arctic has entered into the public consciousness as a bellwether of changes that may affect, or are already affecting, the rest of the globe (ACIA, 2005).

As in other parts of the world, attempts to “manage” and “conserve” the natural resources of the Arctic have met with decidedly mixed success (Forbes, 2005b). The Society for Conservation Biology has recently acknowledged that, nearly two decades after its founding, more species and ecosystems than ever are at risk globally, despite undeniable progress in our understanding of ecological patterns and processes at several scales. In 2002, the Society began a frank internal discussion over the reasons for this perceived failure and concluded that it is not because of bad science, although there is always plenty of that to go around. Rather, the disconnect between our ecological knowledge and conservation success has derived in large part from a general inability among natural scientists to accept that social factors are often the primary determinants of success or failure (Mascia et al., 2003). For natural scientists undertaking ostensibly policy-relevant research, it has been difficult over the past 2–3 decades to accept that no matter how many new regulations, migration corridors and protected areas are established – each one an ostensible “success story” in its own right – ecosystems continue to degrade globally and large numbers of species edge toward and on into extinction.

It is obvious to even the casual observer that the Arctic is not characterized by the levels of biodiversity found in more temperate and tropical regions (Olson & Dinerstein, 1998). The Arctic is, however, home to large and widespread populations of wildlife such as caribou/reindeer and marine mammals that, in turn, have supported humans for thousands of years (Krupnik, 1993; Forbes & Kofinas, 2000). The region is therefore extremely rich in cultural diversity (Damas, 1984; Vakhtin, 1992; AHDR, 2004). Nonetheless, as the general public and at least some politicians have come to recognize anthropogenic global change as an issue, popular attention has predictably focused on the potential loss of “keystone” species, e.g. polar bears, caribou and whales, rather than the cultures that have developed in intimate association with these animals over centuries and millennia. In the global hoopla surrounding the recent release of the Arctic Climate Impact Assessment (ACIA, 2005), it appeared at times like more attention was being paid to the rapidly disappearing tundra, glaciers and permafrost than to the equally serious threats to arctic indigenous cultures.

After the overwhelming and largely sympathetic attention afforded the concerns raised by ACIA, at least one U.S. congressman and the front page of *The Wall Street Journal* were compelled to question skeptically how truly variable had arctic climate been in the past (Regalado, 2005). Suddenly, the Arctic was everywhere in the news, for a few weeks or months anyway, and it seemed to be quite vulnerable. Images of open water at the North Pole in summer 2004 were followed by news of late freezing sea ice in November 2004 and then early melting sea ice in spring 2005. These, in turn, were followed by the indelible images of hurricane Katrina in August 2005. Rightly or wrongly, the media and a great many people began to try to connect the dots based on this short burst of occasionally misguided media attention to long-term, complex phenomena. The problems facing the polar bears, the Inuit and the permafrost were no longer limited to the “remote” Arctic. Global change, in particular climate change, was something that could threaten whole cities far from the Arctic. Suddenly, the entire planet seemed vulnerable.

In the wake of Katrina, experts of different stripes proclaimed that they had warned for years that the levees of the Mississippi River delta were highly susceptible to collapse in a severe storm. At the same time, politicians declared confidently that the destroyed urban areas of the Gulf of Mexico coast could and would rebuild, the people would return and that the entire region would recover. Without using the precise words, the concepts of “vulnerability” and “resilience” lay at the core of these arguments. The sad truth is that levels of vulnerability and resilience in cities like New Orleans were driven in large part by socio-economic and racial equity or, more precisely, the lack thereof. Despite the strenuous denials of politicians, the disparity in terms of storm impact and response across different neighborhoods was obvious to all.

These examples are presented to make the following points. Public acceptance, if not understanding, of the Arctic, as a region critically important to the global climate system, is probably at an all-time high. Equally important, if not generally acknowledged, is the specter of degradation in combined social–ecological systems across significant portions of the Arctic, particularly where rapid climate and land-use change interact. The track record of ecosystem conservation across the globe is admittedly poor and getting worse, in large part because human actions are not properly taken into account when attempting to “manage” ecosystems. These concepts will be explored using the example of a nomadic pastoralist group in the Russian Arctic, the tundra Nenets of Yamal (Fig. 1). For them, inequality is manifest in the form of limited ability to leverage meaningful

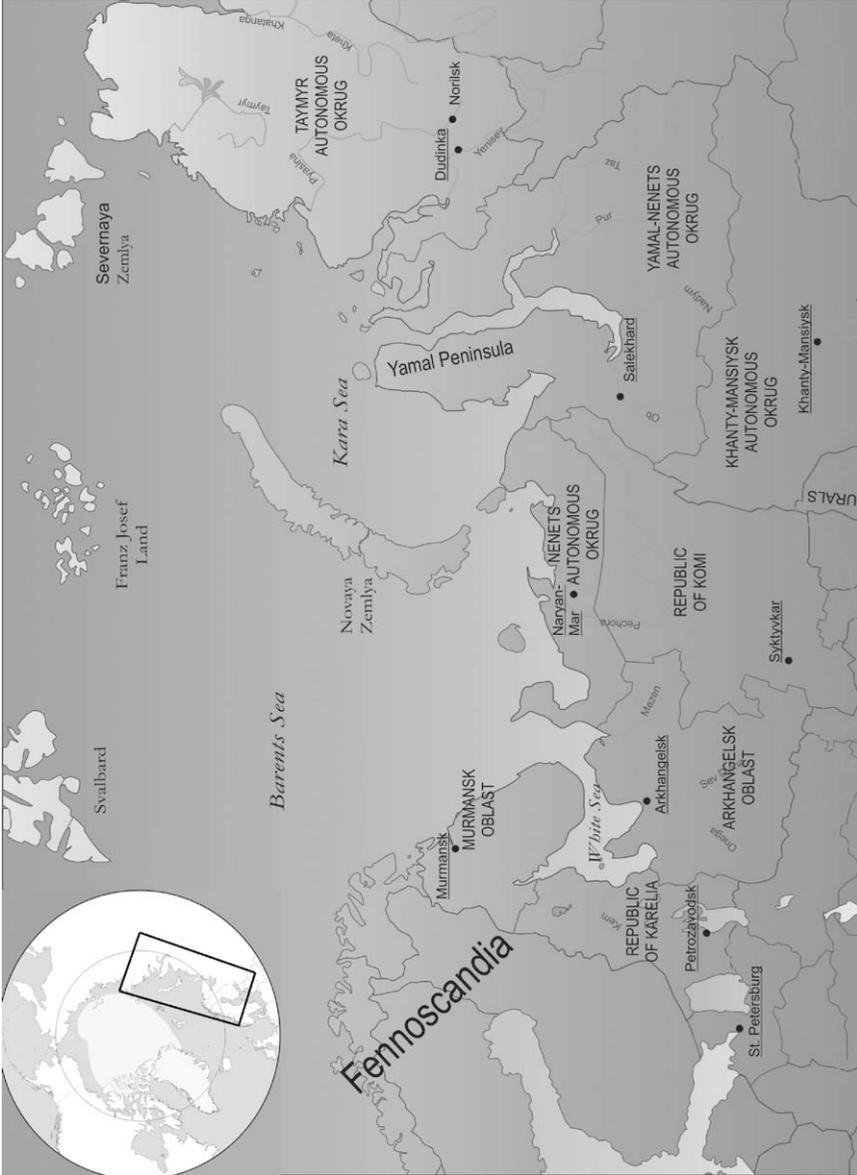


Fig. 1. Map of Northern Russia and Adjoining Northern Europe.

consultation and powers of decision-making that would mitigate the negative impacts of development on their traditional territories.

YAMAL NENETS REINDEER HERDERS OF NORTHWEST SIBERIA

All around the circumpolar Arctic, indigenous peoples tend to see themselves as integral ecosystem components in the areas where they reside (AHDR, 2004; Nuttall et al., 2005). In particular, nomadic reindeer herders of the Yamal-Nenets Autonomous Okrug¹ who live north of the arctic treeline immediately east and north from Russia's Ural Mountains, exemplify this spirit of being, quite literally, close to the land (Stammler, 2005). The Yamal Nenets are among the few remaining truly nomadic pastoralists. There is no need to romanticize this special relationship. The simple fact is that migratory herders spend most of their lives on the tundra and in close contact with their reindeer, apart from time spent as children in school and, for young men, engaged in compulsory military service. They also spend significant amounts of time fishing, hunting and gathering. This time on the land year after year allows for, or rather necessitates, the development and maintenance of highly complex social and ecological skills and forms of knowledge that cannot be learned in any classroom. Nor can such "ways of knowing" about the land be retained in perpetuity if and when younger generations migrate to towns and cities. A large literature has developed in recent decades around the concepts of "traditional," "local" or "practical" ecological knowledge, but this will not be reviewed here (see, however, Berkes, 1998, 1999; Usher, 2000; Kendrick, 2003a, 2003b, 2003c; Huntington, Callaghan, Fox, & Krupnik, 2004; Kitti, Gunslay, & Forbes, 2006). Suffice to say that the tundra Nenets' situation contrasts with that in arctic North America, where virtually all indigenous peoples were relocated into fixed settlements by the late 1950s and early 1960s for purposes of sovereignty, education, religious indoctrination, law enforcement and, not least, the fur trade.

On the one hand, arctic nomadism exemplifies resilience. The ongoing harvest of caribou/reindeer (*Rangifer tarandus*) and marine mammals has allowed different groups over millennia to occupy, extensively and persistently, a huge and climatically diverse and dynamic region that seems to most outsiders to be remote and forbidding (Krupnik, 1993; Forbes & Kofinas, 2000). On the other, certain arctic indigenous peoples are generally

considered to be extremely vulnerable to the newly synergistic forces of rapid climate and land-use change (AHDR, 2004; ACIA, 2005).

Entering the 21st century, the Yamal Nenets continue to migrate with the reindeer much as they have for countless generations, cued by – among other things – the cyclic greening and senescing of tundra vegetation, the melting and re-freezing of ancient rivers and the appearance and disappearance of biting insects (Stammler, 2005). Their homeland is effectively sandwiched between the latitudinal treeline to the south and the Arctic Ocean to the north. Fully cognizant of the modern world at their doorstep, they consciously choose to keep it at arm's length, taking what they need and, with increasing difficulty, attempting to keep out what they do not (Stammler, 2002). Their strong sense of independence and expert abilities as herders has served them well through successive Tsarist and Soviet regimes (Golovnev & Osherenko, 1999). Other factors include their nomadic lifestyle, requiring daily use of a fund of traditional knowledge, economic autonomy and a minimalist ethic. Further, Golovnev and Osherenko (1999) point out that these together “generate flexibility rather than rigidity,” and that this flexibility is reflected in the Nenets' pattern of leadership and in gender roles. In many ways, they have demonstrated marked adaptive capacity and resilience in the face of massive systemic shocks, such as the onslaught of collectivization and the subsequent collapse of the Soviet Union. In addition, their success is partly attributed to the fact that Soviet pressure for them to submit to a sedentary life was not as great as for peoples in other regions (Stammler, 2005). In any case, active adaptation is essential in the current highly dynamic situation (Klovov, 2000).

Widespread industrial development was not present in the Arctic prior to World War II. Possible exceptions include the mining of minerals on Kola Peninsula (Murmansk region) and the complex of coal mines and cement factories in and around Vorkuta (Komi Republic), both extensively developed with forced labor under Stalin beginning in the 1930s. Oil and gas development is therefore a regional newcomer that threatens Nenets in ways unlike earlier encroachments into their territory. In a typical contemporary Russian oil or gas field, the extent of ecosystem degradation is often an order of magnitude greater than in a comparable Canadian or Alaskan field. Yet such impact pales next to the upheaval that all Russians have experienced since the collapse of the Soviet Union. Equity is a key issue facing the Nenets as they ponder their own vulnerability in the face of extensive ecosystem reorganization and, most likely, degradation, over which they so far have little or no control (Chance & Andreeva, 1995).

Aspects of incremental climate change are intermittently evident, such as warmer winters and early springs in recent years and an overall warming of $\sim 3^{\circ}\text{C}$ since the 1970s (ACIA, 2005), but are necessarily pushed to the background as they confront the unrelenting challenges of weekly and monthly surprises associated with accelerating petroleum development.

The territory of the Yamal Nenets overlaps directly with some of the largest untapped natural gas and gas condensate deposits in the world. Supergiant gas fields on the Yamal Peninsula have been intensively explored since the late 1970s and are currently gearing up for full-scale production, primarily under the state-run enterprise Gazprom and its respective subsidiaries. Parallel efforts are underway to exploit huge oil deposits in the neighboring Nenets Autonomous Okrug (Stammler & Forbes, 2006). The Russian state has set itself ambitious goals for increasing oil and gas production and export within the next 5–10 years. Distribution of gas from Yamal to Russian, European and eventually North American markets is expected to take place via a combination of overland pipelines and tanker shipping through the northern sea route. The land and near-shore coast are underlain by frozen ground, or continuous permafrost, often some hundreds of meters deep. Much of the land is characterized by so-called ice-rich permafrost (ACIA, 2005). This and the extreme cold in winter seriously complicates numerous aspects of engineering and infrastructure development and may well impinge upon the timeline set for getting into full production mode (Talley, 2006). In the short term, however, development proceeds apace and the Nenets are working hard to engage the state, its various enterprises and proxy intermediaries head on in an attempt to preserve their way of life. For those unfamiliar with modern life in northern Russia, the strong contrast with western social–ecological systems and legal norms is perhaps informative.

RESILIENCE: EXAMPLES FROM CO-MANAGEMENT IN SOCIAL–ECOLOGICAL SYSTEMS

To assess the issues of resilience in a region of contemporary arctic Russia, we must first briefly review the relevant literature, as well as the history of interactions between northern peoples and southern institutions. The literature of resilience and vulnerability is vast and growing. In a recent review of nearly 3,000 papers published over a 38-year period, Janssen, Schoon, Ke, and Börner (2006) reported a rapid proliferation in

publications between 1995 and 2005. They observed that “the resilience knowledge domain has a background in ecology and mathematics with a focus on theoretical models, while the vulnerability and adaptation knowledge domains have a background in geography and natural hazards research with a focus on case studies and climate change research.” They also detected an increasing integration of the different knowledge domains, perhaps reflective of the rise in multidisciplinary approaches to research.

In accordance with the findings of Janssen et al. (2006), most of the empirical publications on resilience in the Arctic come from the general domain of ecology, in particular disturbance ecology and environmental change (e.g. Felix, Reynolds, Jorgenson, & DuBois, 1992; Reynolds & Tenhunen, 1996; Wookey & Robinson, 1997; Chapin et al., 2003). These works emphasize the absence of equilibrium or, rather, the ability of systems to switch between different states. As such they adhere to what Holling and Gunderson (2002) term “ecological resilience.” At any rate, while rich and undoubtedly relevant, the resilience and vulnerability literature is relatively shallow when it comes to examples from combined social–ecological systems in arctic or subarctic regions. Empirical studies are few, treating resilience rather than vulnerability, and most tend to be derived from North America (e.g. Berkes, 1998; Berkes & Jolly, 2001; Kendrick, 2003a). These examples overlap considerably geographically and socio-culturally with the literature on co-management (Kruse, Klein, Braund, Moorehead, & Simeon, 1998; Klein, Moorehead, Kruse, & Braund, 1999; Usher, 2000; Kendrick, 2002; Peters, 2003; Berkes, Bankes, Marschke, Armitage, & Clark, 2005). Co-management is defined as a shared decision-making process, formal or informal, between a government authority and a user group, for managing a species of fish and wildlife, or other resources (Caulfield, 2000). This shared process is a form of equity in decision-making that is normally held by the state. There are many different types of co-management, as reviewed by Berkes (in press).

Taken as a whole, there is a strong overlap between the literature on co-management, resilience and that of “local” or “traditional ecological knowledge” (i.e. TEK) (Treseder, 1999; Huntington, 2000; Berkes & Folke, 2002; Kendrick, 2002, 2003a, 2003c; Peters, 2003; Moller, Berkes, Lyver, & Kislalioglu, 2004). This is because a cornerstone of co-management is the integration of western science and traditional knowledge via the translation of indigenous life experiences into forms compatible with state wildlife management (Nadasdy, 2003). We must therefore accept a strong North American bias in these respective literature domains. While the cited examples of resilience in social–ecological systems are drawn from a diverse

set of conditions across arctic and subarctic North America (Berkes, 1998; Berkes & Jolly, 2001; Kendrick, 2003a), it seems that none of them are truly relevant to contemporary Europe and Russia. One published study does concern adaptive co-management in Europe (Olsson, Folke, & Berkes, 2004), but it is from southern Sweden and does not confront a suite of factors similar to those found in truly arctic social-ecological systems. Others concern North European fisheries and reindeer herding, but so far, only Norwegian fisheries approach something like co-management as it is practiced in North America (Jentoft, 1998).

There are several difficulties with transferring models of co-management and resilience across the Arctic. To begin with, while “virtually every co-management case study encountered in the literature is a success story,” co-management has its own problems (Nadasdy, 2003, *in press*). These stem from the political and other institutional obstacles to truly integrating indigenous knowledge into the dominant “scientific” paradigm of wildlife management embraced by modern states. Those studies that do treat with caution the lessons of co-management, and related research on traditional ecological knowledge, all emphasize that “trust” is the critical factor in finding any kind of common ground between indigenous “users” and scientists (Ferguson & Messier, 1997; Kendrick, 2003a, 2003b; Nadasdy, 2003; Olsson *et al.*, 2004). Without trust, there can be no real equity in shared decision making. The danger is that despite the rhetoric of local empowerment that generally accompanies such processes, they often actually serve to perpetuate colonial-style relations by concentrating power in administrative centers, rather than in the hands of local/aboriginal people (Nadasdy, 2007). Once a co-management regime is in place, defining “success” becomes an additional problem (Nadasdy, 2003).

Another factor is that North American co-management regimes have relied heavily on the institution of “elders” as holders of knowledge, who therefore tend to be chosen to represent community-level understanding and concerns as they pertain to wildlife and other issues (e.g. protected areas). In Russia, there is no council of indigenous elders, and Nenets who have visited North America found the practice amusing. In their eyes, elders would not know how to talk to state representatives or companies. Quite on the contrary, crucial partners to implement coexistence in Russia are either Soviet-educated indigenous intelligentsia (most of whom are not really elders), or, increasingly, young, dynamic emergent leaders. While this hints at significant inequalities within Nenets society, in fact herders seem reasonably satisfied with their chosen mode of representation by these two main groups. During Soviet times, the influence of pensioners was nominally

diminished as they were deprived of official decision-making power in administrative matters. Nonetheless, elders' knowledge retains its functional importance, since people still consult elders in relation to life on the tundra. [Stammler \(2005\)](#) argues that in many cases, Soviet rule abandoned kinship relations and a Nenets system of leadership in the tundra only superficially, while the role of respected leaders and the importance of kinship relations continued to be important throughout the Soviet period. However, respect in Nenets society was not acquired by mere age, but more by particular qualities of a character.

At its core, co-management is based on participatory approaches to policy-directed research that involves local users, indigenous or not. There is a long history of co-management in North America ([Treseder, 1999](#)). It is only in recent years that discussion of truly participatory approaches to northern resource management has taken place in the terrestrial ecosystems of subarctic Europe, in each case involving reindeer management ([Karlstad, 1998](#); [Sandström et al., 2003](#); [Forbes et al., 2006](#)). Experiments in participatory research have encountered varying degrees of resistance from European states (e.g. Sweden, Finland). This is in large part because natural resource management has historically been the exclusive domain of natural scientists, whose research is conducted at the behest of the relevant ministries (forestry, agriculture, environment) to advance their respective agendas, aspects of which are considered strongly paternalistic by Sámi reindeer herders ([Forbes, 2006](#); [Müller-Wille et al., 2006](#)). Russia, as [Stammler \(2005\)](#) points out, also has its own history in which the “outside world” has structured its interactions in a paternalistic manner with what he refers to as the “tundra sphere.” Given these differing histories, and the limitations of the existing literature, we need to be cautious in our assumptions about the applicability of earlier equity, vulnerability and resilience analyses to new situations. The purpose of introducing the case study of the Yamal Nenets here is to provide some geographic, cultural and historical contrast to the North American institutional interactions that prevail in the literature.

CONTEMPORARY REINDEER MANAGEMENT: EQUITY IN DECISION-MAKING

Rangifer tarandus L. *sensu lato* is the species of the deer family Cervidae that includes all wild and semi-domestic forms of caribou and reindeer in the world ([Harrington, 2005](#); [Forbes, 2005c](#)). Human–*Rangifer* systems are

circumpolar in the northern hemisphere and encompass a variety of coupled social–ecological systems (Forbes & Kofinas, 2000). The diversity of these systems is striking. They are dominated by hunting cultures in North America, whereas in Europe and Russia there exists a mix of herding and hunting cultures. Importantly, there have been identified continua within, and occasional transitions among, these general designations over time (Ingold, 1980; Krupnik, 1993; Baskin, 2000; Müller-Wille et al., 2006). Furthermore, within Russia, this categorization is institutionalized, in that hunting is mostly considered a less prestigious occupation than herding (Stammler, 2005). In either context, *Rangifer* is an extremely complex animal ecologically and behaviorally. Nonetheless, its circumpolar distribution and interaction with virtually all arctic and subarctic cultures makes it tempting to draw comparisons between modern day management regimes from different regions.

Evidence from a large research project in northern Fennoscandia² clearly illustrates the contrast between recent North American and European experiences with regard to participatory institutions for resource management (Forbes, 2006; Hukkinen et al., 2006). The project, RENMAN, was an experiment in participatory action research in northernmost Europe, where indigenous Sámi reindeer herders and their respective states (Norway, Sweden, Finland) have historically confronted similar dilemmas of resource equity for all citizens versus resource protectionism for indigenous minorities (Jernsletten & Beach, 2006). Compared to their counterparts under co-management regimes in North America, the Sámi have little equity concerning individual or collective decisions concerning short- and long-term management of their herds.

Along with other societies in northern Russia, the Yamal Nenets experienced major shocks in the last century, which affected their ability to maintain their traditional way of life. The most obvious is collectivization, which began in the late 1920s, when reindeer herding became a branch of agriculture. As happened with Sámi reindeer herding after World War II, the aim was to turn reindeer into a commodity suitable for the market and to provide state institutions with meat (Stammler, 2005; Hukkinen et al., 2006; Kitti et al., 2006). Both Russia and European states attempted to wrest control of the seasonal change of pastures and implemented a management model based on “carrying capacity,” although honest biologists admit how difficult it is to evaluate actual carrying capacity (Helle & Kojola, 2006; see also Mysterud, 2006, van der Wal, 2006). The difference was that Sámi were to be engaged in herding as an enterprise,

whereas in Russia, all property was confiscated and reindeer ownership transferred to the state.

While accepting that significant ruptures took place, Stammler argues that, in the end, things changed relatively little, using first the examples of reindeer pasture migration routes. Golovnev and Osherenko (1999) suggest that migration routes were radically altered. This observation derives from the conversion from kolkhozy to sovkhozy in the 1960s, which cut off southern migratory area from the northernmost Yamal sovkhoz. However, based on extensive fieldwork in the Yarsalinski sovkhoz, which comprises the largest and longest of the region's sovkhoz territories, Stammler (2005, p. 131) concludes "that the general pattern of migration did not change and that migration is actually one of the main examples of continuity from pre- to post-Soviet times." Other aspects of life that he notes remained unchanged include de facto private ownership of animals throughout the entire Soviet period, the use of the *chum* (a traditional form of tent or teepee) as mobile housing during migration, and the use of reindeer for transport rather than motor vehicles. He attributes this to the Nenets' ability to adapt the Soviet system as needed and use it to their advantage, as well as to the fact that pressures from Soviet authorities to submit to a sedentary life were apparently not as great for Nenets as for other indigenous peoples. Golovnev and Osherenko (1999) hold that Nenets indeed were pressured to give up land and resources, and responded by remarkable rebellions in the 1930s incorporating ritualistic practices.

Concerning animal ownership, the rate of private to sovkhoz (publicly owned) reindeer shifted from being 30 percent held as private stock in the Soviet period to 70 percent private in the post-Soviet 1990s. Retention of the sovkhoz system was a conscious decision on the part of Nenets who held positions of leadership in the Yarsalinsky sovkhoz. The leaders understood that without state subsidies through the sovkhoz, the herders would not have access to cash needed to buy and deliver basic supplies to tundra camps. The sovkhoz system allowed continuous payments to herders and "tent workers" without which the migratory herders would have had an increasingly hard existence. The success Nenets have had to date is in significant measure due to the insight of Nenets' leaders. In many or most other areas, people completely dismantled the state farm system (Golovnev & Osherenko, 1999).

Another example comes from the institutional restructuring of collective herds (meaning Soviet state farms or *sovkhozi*) that took place upon the collapse of the Soviet Union. Yamal herders refer to this time during the 1990s as "the decade of chaos" (Stammler, 2005). This period was

characterized by a confusing struggle between privatization and state ownership of agricultural enterprises in which some collective herds were nominally liquidated and others survived. Sovkhoz herds did decline in the 1990s but since 2000 have increased. In many respects, the sovkhoz structure was retained. *Stammler (2005)* cites the institutional change of the sovkhoz herds as evidence of continuity on Yamal, in spite of the undoubted transformations that took place in the post-Soviet restructuring.

If one accepts that the Yamal Nenets social–ecological system was subject to significant shocks (*Golovnev & Osherenko, 1999; Stammler, 2005*), then resilience is demonstrated by sustaining those attributes that are important to society in the face of change. According to *Chapin et al. (2006a)*, adaptation means developing new socio-ecological configurations that function effectively under new conditions. *Stammler (2005)* echoes this with regard to the Yamal Nenets. As described above, he analyzes their behavioral and historical adjustments to their changing natural, social and economic environment and concludes that their adaptive capacity or “flexibility” has proven to be high in many historical crisis situations. However, he also stresses that this capacity is not unlimited and is indeed threatened by ongoing oil and gas development, which “holds dangers for the future.” This is because although the pre-Soviet, Soviet and post-Soviet regimes all needed the cooperation of the Nenets to manage the region for its resources (furs, meat, fish), their partnership in oil and gas extraction is not needed. Indeed, their presence and their hopes for an equitable mutual coexistence have come to be seen by some as problematic. This is despite the fact that in Soviet industrialization ideology, such coexistence was implied and desired, albeit on unequal terms. The past paternal tendencies cited by *Stammler* are now manifest by state efforts, on the one hand, unilaterally to withdraw lands essential to maintaining traditional migrations, and on the other to facilitate depopulation of the tundra by subsidizing herders’ relocation into villages and towns.

CHALLENGES TO MAINTAINING ADAPTIVE CAPACITY

In my own experience in northwest Russia over the past 16 years, climate rarely comes up among Nenets as an important agent of change. According to Nenets themselves, petroleum development presents a more urgent and immediate threat (*Khorolya, 2002*). The existing and future threats must

therefore be placed in the context of the immediate situation, using historical developments as guide, while understanding that the current climate warming begun in the 1960s and 1970s may continue to accelerate and so pose new challenges (ACIA, 2005). As mentioned earlier, in this highly dynamic situation, active rather than passive adaptation is essential (Klokov, 2000).

The push for oil and gas development is a common thread connecting northern Alaska, northwest Canada, and the Russian North. Indigenous identity is tied in part to reliance on the land and sea, and knowledge of how to live there over many generations with or without large subsidies or interference from outside the region (Nelson, 1969; Berger, 1985; Wenzel, 1991). As in Russia, the proven and potential natural gas reserves of arctic Alaska and Canada occur mainly on lands inhabited by indigenous peoples referred to, respectively, as Alaska Natives and First Nations. The difference is that at the time oil was discovered by outsiders in the late 1960s and early 1970s, the political clout of the diverse indigenous groups and their supporters in Washington and Ottawa was already sufficient to instigate a spate of major land claims that were seen as both pioneering and generous as the time. In retrospect, such agreements were not without serious flaws (cf. Berger, 1985; Flanders, 1989). In the case of Alaska, development was allowed to proceed quickly via the Alaska Native Claims Settlement Act (ANCSA) of 1971, which transferred title to 18 million hectares of land and \$962.5 million to Alaska Natives. As for the Mackenzie Valley pipeline, its development was shelved in the 1970s until land claims could be negotiated. By the late 1990s, most of the First Nations groups that once opposed drilling on legal, environmental and cultural grounds had abandoned their protests and now strongly favor exploiting their region's energy resources. It is a measure of their hard-won political maturity that these North American groups have attained such a high level of legal and economic strength when it comes to development rights.

With regard to northern energy development, both the Alaskan and Canadian situations have been intimately tied to a degree of political and legal parity in negotiations more or less absent in Russia. To be sure, this is in part due to the timing of the settlements. No one should be under any illusions that if arctic oil fields in the West had been developed during or prior to World War II, the indigenous groups in North America would have received such equitable treatment. Yet the fact remains that at present Russia contrasts in almost every dimension of “human development” (social, cultural, economic, political, legal) with other circumpolar rim countries (AHDR, 2004). Perhaps most importantly for this discussion, the legal rights of arctic

indigenous peoples have developed along starkly different lines around the circumpolar North. These range from self-governance in Greenland and Nunavut, to the aforementioned land claims in western North America, to the more limited power held by indigenous northern Russians (Bankes, 2004). In Fennoscandia, the national Sámi parliaments that exist are able to suggest but not enact legislation. Nonetheless, certain hunting, fishing and herding rights are attached to legal definitions of “being Sámi” (Karppi & Eriksson, 2002; Müller-Wille et al., 2006).

Despite these rather sharp regional differences, broadly speaking there are some historical parallels in the perceptions of, and behavior toward, the Arctic. In general, governments have traditionally treated the North as a hinterland for supplying resources to southern populations (Armstrong, Rogers, & Rowley, 1978; Young & Osherenko, 1992). Many, but not all, countries have also promoted the view of the Arctic as a remote and fragile “wilderness” (Forbes, 2005a). The latter is a western concept at odds with Arctic indigenous peoples’ perceptions of their own environment. In truth, Nenets see themselves as integral components of the ecosystems they inhabit, which they consider to be bountiful. Conversely, companies and not a few politicians have tended to adopt a view of the Arctic as a barren wasteland. Alongside the concept of wilderness comes the view among many conservationists that the best way to “protect” the Arctic is to establish protected areas.

These perspectives represent various aspects of thinking by outsiders, displaying a rather circumscribed view of humans and nature, with each having its own elements of paternalism. Since the breakup of the Soviet Union, the concept of protected areas and the marketing of “wilderness” tourism have also gained currency in Russia (Forbes, Monz, & Tolvanen, 2004a; Forbes, Fresco, Shvidenko, Danell, & Chapin, 2004b; O’Carroll & Elliot, 2005). According to World Wide Fund for Nature (WWF), their quest to create a circumpolar network of protected areas is making the fastest progress at present in the Russian Arctic. In the last seven years, the territory designated as “protected” has more than doubled, bringing the total reserve land area to about 35 million hectares today – an area the size of Norway (WWF, 2006). However, it has been argued that the establishment of protected areas is often “in conflict with the interests of indigenous peoples and may sometimes adversely affect their prosperity and welfare” (Bolshakov & Klovov, 2000). As with petroleum development, the nascent legislative sphere concerning indigenous peoples’ rights in relation to arctic ecosystems presents both dangers and opportunities. Officially, the state does recognize that each sovkhos has “unlimited use rights” for

herding, which also encompasses rights for hunting, fishing and gathering. Yet even the presence of significant numbers of migratory Nenets in the tundra does not necessarily serve to limit the pace and extent of development (Stammler, 2005). It merely adds another step of complication in pushing development forward. This requires negotiating the transfer of “agricultural land” (e.g. pastures) of an authorized long-term user (e.g. sovkhos) into industrial land (e.g. for extraction) to be used by a new limited-term user (e.g. an oil company). This often involves much paperwork. But if the development project is important for somebody with power, these things can proceed surprisingly quickly (F. Stammler, personal communication).

PRESCRIPTIVE APPROACHES

Although they generally do not use the language of vulnerability and resilience, authors who have analyzed the Yamal Nenets’ particular situation have recommended different approaches to the dilemmas presented by ongoing oil and gas activities (Chance & Andreeva, 1995; Golovnev & Osherenko, 1999; Zen’ko, 2004; Stammler, 2005). Equity in some form or another is at least considered by Chance and Andreeva (1995) and (Zen’ko, 2004). Given the aforementioned variations in the development of contemporary legal and political regimes, sensitivity to the special Russian context is essential.

To begin with, Golovnev and Osherenko (1999) outline three models “for restoring rights and decision-making authority” to the Nenets, drawn from three broad categories: tribal governments, public governments where the indigenous population constitutes a majority (e.g. Home Rule in Greenland) and co-management. They readily admit that none of these three are perfect solutions and all of them “risk undermining indigenous leadership and destroying existing modes of decision-making.”

Using some different historical examples than Stammler (2005), Golovnev and Osherenko (1999) make the same basic point concerning the relatively strong adaptive capacity of Yamal tundra Nenets. In the final paragraph of their analysis they stress that, “Nenets nomads who travel lightly across the tundra have the internal quality of flexibility to adapt to new conditions.” They further suggest that “outsiders must allow them the space for adaptation and the opportunity to retain control over their lives.” To an uninformed westerner, the latter appears as a rather passive outlook, in which the assumption seems to be that the respective national, regional and

sub-regional governments, along with the thousands of newcomers arriving in the region each year, are capable of acting as essentially benign forces. Far from benign, the lead company active on Yamal Peninsula – Nadymgazprom – actively exploits weaknesses in the unresolved nature of enforcement, as well as the lack of monitoring by law enforcement agencies and federal regulatory services (Zen'ko, 2004). Typical western alternative responses might range from vocal environmental and legal activism to more quiet rebellion among significant numbers of concerned shareholders. The former almost certainly represent the wrong track and are instead likely to backfire. The latter is impossible given that Gazprom and its various daughter enterprises are functionally state held.

As was mentioned earlier, Russia's indigenous peoples do not have the same level of political clout as those in western countries. They reside in radically different systems, with their own histories and cultures. In many ways they are simply not comparable. As with the political systems, so go the legal and corporate structures and environmental responsibilities. To put this into perspective, non-Russians must appreciate that functionally state held entities like Gazprom are not beholden to international shareholders. Although there has been some improvement in recent years, these powerful monopolies to date have expressed little concern with regard to their environmental image. Multinational British Petroleum, on the other hand, has engaged in an extended, costly and strategic campaign to re-brand itself as an environmental champion "beyond petroleum" (Whiteman, Forbes, Niemelä, & Chapin, 2004). Thus its image was hit hard by the August 2006 shutdown of its Prudhoe Bay operations due to pipeline leakage (Hoyos, Bream, Harvey, & McNulty, 2006; Mufson, 2006).

Yet even western partnership does not necessarily ensure the implementation of best practices on the ground in Russia. For mutual coexistence, the real onus is on the local and regional actors of state and joint venture enterprises to accommodate indigenous peoples, who themselves possess little real power in the present system. It is very hard work on all sides and nomadic reindeer herders understand and accept that it is impossible for development to have no impact. The Alaska pipeline has shown clearly that even with stringent standards dutifully enforced, some direct and indirect or cumulative impacts are inevitable (NRC, 2003; Mufson, 2006). Yet people on Yamal know from their past experience with Amoco in the 1990s that it is possible to have meaningful consultations and to implement research that addresses local concerns, such as monitoring conditions of reindeer pastures, rehabilitation of disturbed areas and cultural heritage preservation

(Martens, 1995; Martens, Magomedova, & Morozova, 1996; Fedorova, 1998).

In separate publications, Osherenko (1995; 2001) has argued more forcefully for the implementation of title to land as a viable instrument for indigenous cultural survival. She states that “without restructuring property rights [the Nenets population] remains powerless to protect its interests against monopolistic and unreformed oil and gas enterprises” (Osherenko, 1995). At present the land is officially owned by the state but is mainly managed by the local authorities, which provide it for use to the sovkhos (Osherenko, 1995). However in Russia, even if it were granted, title to land is probably not a guarantee against future problems given the limited experience so far with implementation coupled with a weak overall juridical system. The recent trial of entitlements on Yamal during the 1990s was not encouraging. According to Stammler (2005), legal land titles were often granted “for a limited time, which sometimes was not worth the investment in obtaining it.” As was demonstrated with ANCSA in Alaska, merely giving people title to valuable land and shares in new enterprises does not ensure that they understand either how to exercise their own rights or to retain them for future generations (Young, 1992).

In the North American petroleum industry, the emphasis is on legal rights and profit sharing. Alaska Natives and Canadian First Nations faced a steep learning curve in the early years of massive development but are now generally able to hold their own in the media, the courts and the marketplace. In contrast, the Yamal Nenets, whose legal rights are being defined piecemeal as part of an ongoing process, realize they are not likely to profit directly in a monetary sense. There are certain inducements and subsidies for people who choose to leave the tundra and take up residence in town. Indeed, relatively minor subsidies to maintain herding in the tundra, such as health care, trade (including barter) and meat distribution are important, even if some are not considered absolutely essential. However, there are no large transfer payments or direct leases to indigenous entities with full or partial title to the land, as has been the norm in North America (Osherenko, 2001). In the Yamal-Nenets and Khanty-Mansisk Autonomous Okrugs, some herders do own shares obtained in the form of vouchers, but there is no equivalent system in the neighboring Nenets Autonomous Okrug (NAO) to the West. To date there are small-scale models under discussion for some form of profit sharing but nothing substantive (F. Stammler, 2006, personal communication).

In their much shorter analysis, Chance and Andreeva (1995) review the “serious problems” related to large-scale petroleum development in

northern Alaska and on the Yamal Peninsula. They provide a list of measures they believe would assist in achieving an “equitable” outcome. The series of six recommendations is wide-ranging and complex but can be summarized as follows:

- (1) Undertake comparative multidisciplinary and multicultural studies to encourage new modes of thinking about sustainable resource development.
- (2) Involve indigenous representatives in policy, planning, implementation and evaluation of every large-scale development in areas where they reside.
- (3) Pay more attention to resolving existing environmental crises by promoting social changes now rather than relying on hoped for technological changes in the future.
- (4) Internalize so-called “externalities” associated with natural resource development to better reflect the true costs of development.
- (5) Bridge the intellectual divide separating physical, biological and social scientists, perhaps via joint work on environmental impact assessments.
- (6) Analyze in depth those aspects of the political economy that contribute to the present harm.

Points 1, 5 and 6 are essentially recommendations for future policy-relevant research. The others amount to prescriptive policy bullets. From a Russian perspective, they perhaps reflect a western sense of, and faith in, the basic utility of policy recommendations in the first place. Of these, only portions of Point 2 lie within the realm of possibility in the foreseeable future, at least in the Yamal-Nenets region. Points 3 and 4 rub up directly against the potent mix of hubris and paternalism that continues to characterize not only Russian administration, but also Russian anthropology, as described with contemporary examples by [Stammler \(2005\)](#). The second point comes down to active participation by Nenets in regional planning and assessment, a recommendation that is agreed upon by other academics ([Golovnev & Osherenko, 1999](#); [Zen’ko, 2004](#); [Stammler, 2005](#)). By insisting on indigenous involvement in all phases of “every large-scale development where they reside,” the recommendation probably stands little chance of full implementation. This is unlikely to change even if western partners are eventually allowed to enter into joint ventures on Yamal, which they currently are not.

In a third analysis, [Zen’ko \(2004\)](#) also identifies problems confronting nomadic Nenets on the Yamal Peninsula. She fears that “the traditional economy is losing even the possibility of existence on a par with its industrial

neighbors.” According to her, feasibility studies and environmental impact statements do not fully take into account all likely sources of environmental damage. Forbes (1995) pointed out that in addition to the direct impacts of roads and road building on Yamal, there are important indirect or cumulative impacts such as blowing sand and dust from the roads themselves, as well the quarries used to provide construction. Some of these problems were plainly foreseen by the Nenets themselves, such as the introduction of feral dogs to the region as they escape from or are abandoned by oil field workers. Nonetheless, these concerns were not acted upon (Zen’ko, 2004). Another ongoing issue is the apparent unwillingness to actively reclaim or even to clean up used and abandoned sites. High concentrations of garbage and petrochemicals in and around old drill rigs, quarries and along transport corridors present persistent dangers for herders whose migration routes intersect with areas of prior or ongoing activity (Fig. 2).

Zen’ko (2004) recommends creation of an “integrated development program” specifically for the Yamal Peninsula. Such a program would account for its “geographic, historical, demographic and other features” and would “enable development of local law making, to create local legal statutes for the Yamal-Nenets Autonomous District.” To western ears, such a prescription may sound so vague as to be meaningless. Yet as she reports, and my colleagues and I have similarly observed during recent fieldwork on Yamal (2004–2007), the actual “demands” of Nenets are so moderate, focused and reasonable that they are agreed to in principle by some of the directors responsible for developing the Yamal Peninsula. These include: (1) complete and timely reclamation of the lands used during the technical work that are not industrial and have no facilities on them; (2) establishing and protecting corridors for movement between camps by people and reindeer herds (Zen’ko, 2004).

The first of these can and should be implemented automatically and unilaterally by the companies responsible for the lease at the time of the development. Unfortunately, as companies have come and gone over the years, overlapping layers of damage, ownership and clean-up responsibilities have become a complicated mess. This was one of the reasons behind the withdrawal of Amoco from Yamal in 1996. The tangled legal web is especially problematic in sectors where development began early and proceeded either continuously or in phases over the last few decades. As some western companies participating in joint ventures have found, even when they are willing to clean up areas damaged by earlier enterprises, there may be legal obstacles delaying or preventing them from doing so.



Fig. 2. Nenets Women Corraling Reindeer in the Vicinity of an Abandoned Drill Rig During Summer Migrations on Yamal Peninsula, July 2005. Herders try to avoid letting animals get too close to such sites because of the rusty metal, broken glass and petro-chemicals that can remain on the ground. when an animal injures a hoof during migration it runs a high risk of becoming infected. If this happens, adult animals tend to be slaughtered since they can no longer keep up with the herd. Herders usually try to treat young calves with leg or hoof wounds and it is not uncommon to see them being transported and fed on special sledges until they can walk properly again. Photo: B. C. Forbes.

The second demand is more difficult because it requires active and sustained bi- or multilateral engagement with herders and indigenous political representatives. Real or meaningful consultation is not easy in practice. There are many obstacles – legal, logistical and attitudinal. Certainly the urgency attached to developing the gas and oil deposits is an important issue, since it drives all other concerns, for better or worse. Yet it is completely unrealistic to expect rapid progress on the issues presented here. As a goal, equity must be seen as a long-term process. Zen'ko (2004) does not call for participatory management by name, but the protection of corridors for movement between camps by people and reindeer herds certainly requires it.

Finally, in a monograph-length analysis of the Yamal Nenets, [Stammler \(2005\)](#) covers virtually all aspects of nomadic reindeer herders' engagement

with their own world as well as the “outside” world. His treatment encompasses, but is far from restricted to, their multifaceted responses to the encroachments associated with recent oil and gas activities. He includes a broad historical treatment of their repeated adaptation to major systemic shocks and in doing so effectively documents their resilience, as do [Golovnev and Osherenko \(1999\)](#) in a more circumscribed manner. In his final analysis, [Stammler \(2005\)](#) believes that the nomadic Yamal Nenets will continue to respond flexibly to the changes newcomers continue to usher into their homeland. He adds that the peoples’ “competitive spirit will only be a useful force if those who currently hold power agree to continue a fruitful dialogue with the nomads, and genuinely respect the region’s current and future identity as one intimately connected with reindeer herding.” He also offers the caveat that their “adaptation strategy will depend on whether all actors participating in the development will build on the positive experience of the last century and respect each others’ conditions for maintaining flexibility.”

SUMMARY AND CONCLUSION

Returning to the broader global context, climate change represents a classic multiscale problem in that it is characterized by infinitely diverse actors, multiple stressors and multiple timescales ([Adger, 2006](#)). It has been suggested that climate change impacts will burden most those populations that are already vulnerable to climate extremes, and so bear the brunt of projected (and increasingly observed) changes that are attributable to global climate change ([Berkes & Jolly, 2001](#); [Krupnik & Jolly, 2002](#); [ACIA, 2005](#); [Adger, 2006](#)). Yet a key challenge pointed out by prior research on social–ecological systems is the need to match the scale of problems and the social and governance mechanisms devised to cope with them ([Folke, 2006](#); [Young et al., 2006](#)). Similar challenges have been exposed in ecology and conservation biology, where the importance of scale and the human dimension has been regularly underestimated in the past ([Noss, 1992](#); [Mascia et al., 2003](#)).

Nomadic pastoralists who have endured for centuries, the Yamal Nenets in some ways exemplify resilience. They have successfully adapted to the sequential forms of paternalism from Tsarist through post-Soviet times. As first-hand witnesses to capricious decision-making, they recognize better than all but the most dedicated and open-minded scientists that bridges from the local level to actual policy makers are inadequate or entirely

absent. Petroleum development is currently going ahead at full speed, with or without meaningful consultation. To secure a future for reindeer nomadism, mutual coexistence with oil and gas activities is not only possible but also essential, and therefore head-on engagement is the only way forward. In a western context, with recourse to legal action, the situation would be considered ripe for submission to the courts for formal attempts at conflict resolution. Just as there is no current legal recourse, there is no place at all for militant activist or environmentalist tactics, which would conflict with Nenets culture and their historic ability to cooperate with authorities during Soviet times. There is little choice but to work within the current system, albeit one that is characterized by a high degree of dynamism on the one hand and extreme conservatism on the other.

According to several authors in the preceding section, equity and “flexibility” or resilience seem to lie in shared decision making with regard to, among other things, secure access for migrations and maintaining a viable environment. Gray areas encompass matters such as poaching. Illicit hunting and fishing are predictable byproducts of improved mobility to and within remote areas that function as home to economically and/or nutritionally valuable species (Thomassen et al., 1999), but illegal or excessive harvesting by anyone – either indigenous or non-indigenous – must be controlled if the ecosystems are to remain functional. It is easy to forget that even without poaching, certain species of fish and other wildlife can and do undergo significant population fluctuations. This basic tenet of arctic biology has been recognized for decades by scientists (Vibe, 1967), and certainly for much longer by arctic indigenous peoples. Even if the underlying mechanisms are not yet fully understood, in some cases because the cycles occur over long timescales in remote areas well beyond the reach of the “scientific” record, these patterns clearly exist within the indigenous oral record (Ferguson, Williamson, & Messier, 1998; Schneider, Kielland, & Finstad, 2005). For this reason, indigenous observations should be given careful consideration as we move into a new and uncertain phase of rapid change in the Arctic (Huntington et al., 2004). The whole concept of resilience is based on a tacit acceptance of periodic systemic shocks, even if these may not be predictable.

Most authors suggest that Nenets’ adaptive capacity is high, but all agree that there must be some accommodation on the part of the government and oil and gas enterprises, a precondition that is described at length by Stammer and Wilson (2006) as “the enabling environment” for dialogue between indigenous peoples, companies and the states. As long as policies are designed and implemented in a strictly top-down manner, we can expect

problems to continue. As it is, policy is rarely flexible enough to encompass the level of heterogeneity found in northern social–ecological systems (Bolshakov & Klovov, 2000; Zen'ko, 2004). In the Yamal, as well as in the NAO, some brigades face immediate threats to their future, such as major withdrawals of critical pasturelands, while their neighbors function relatively normally and foresee few serious challenges to their survival. The Nenets themselves are guardedly optimistic (Stammler & Forbes, 2006) and this is an important prerequisite for securing their future on the tundra, but not enough to sustain them.

The heterogeneity of Nenets social–ecological systems means that even neighboring brigades can experience radically different projected and actual trajectories of development and associated impacts. Blanket rules are useful for mitigation strategies, such as enforcing reclamation, poaching and restricting off-road vehicle use, but for consultation, one size does not fit all (Stammler & Wilson, 2006). The balance of power is far from equal, and the more powerful players see little advantage in engaging with the less powerful ones. Reindeer herders do not expect to dictate where and on what schedule development goes ahead, but really do need to be accommodated if pipelines, quarries, railways and roads continue to encroach upon and increasingly fragment their ancestral territories. The rebellions of the 1930s illustrate that flexible adaptation is not the only strategy Nenets have deployed in the past (Golovnev & Osherenko, 1999). Since their leaders, both men and women, are holding positions in the regional Duma and in Russia's Association of Indigenous Peoples of the North (RAIPON), they may well find ways to deal with Gazprom.

With a situation like that in modern Russia, an analysis such as this is the easy part. Coming after 16 years of working there, enabling responsible social and environmental policy is far more challenging. We must accept without question the errors made in Soviet times and learn from them. Only then is it possible to encourage adaptive capacity for the future. Demography is key (Pika & Bogoyavlensky, 1995). Young people must want to live and remain in a place ... period. Even in highly developed countries like Norway, huge subsidies are currently unable to sustain marginal communities, such as fishing villages along the northern coast of the Barents Sea, where young people continue to leave for education and employment opportunities in places like Tromsø, Oslo and beyond. While state subsidies can and do assist rural populations with a strong desire to live as such, a sense of place cannot be legislated, just as a way of knowing about the land cannot be learned in a classroom. Unless young people see a future in it, the Yamal tundra, not unlike any other place, is doomed to be

gradually depopulated. The importance of youth retention is something that transcends boundaries in the Arctic. As Zen'ko (2004) puts it, "education emphasizing tundra survival skills is seen as a hedge or life preserver in a whirlpool of socioeconomic injustice." While I do not have any official statistics to support them, my own observations on Yamal in the post-Soviet era indicate that there is a rough balance of gender and age in the migratory population and that young people continue to choose to return to the tundra upon completion of their school and military service obligations. This in and of itself is highly likely to be a strong indicator of resilience. At the same time, the ongoing presence of a sizable nomadic Nenets population may serve as an incentive for the state to maintain a viable social and ecological system. This is because those in power in Yamal have understood that intact nomadic reindeer herding as a regional identity marker increases the status of the Okrug (Stammler, 2005).

The lack of meaningful consultation is hardly unique to Russia. We saw that for reindeer management in northernmost Fennoscandia, power relations are similarly skewed in relation to forestry, hydropower, mining and tourism (Forbes et al., 2004a, 2006). Even among older and ostensibly enlightened western democracies of northernmost Europe, the analysis of modern reindeer management has exposed significant disparities in power relations between the respective states and indigenous interests (Müller-Wille et al., 2006; Hukkinen et al., 2006). In North America, several observers have identified a lack of trust in co-management boards, even when community "users" serve as board members or are otherwise party to scientific "predictions" concerning wildlife monitoring and management (Kruse et al., 1998; Nadasdy, 2003, *in press*; Moller et al., 2004). Yet the literature of resilience as it pertains to high-latitude social-ecological systems is dominated by cases of marine mammal and caribou co-management from North America (Berkes, 1998; Berkes & Jolly, 2001; Kendrick, 2003a).

The point is not to disparage the North American-based literature and examples of northern resource management regimes, but to point out their limitations in terms of applicability to the rest of the Arctic. Co-management, for one, has been hailed widely as a success in North America (Nadasdy, 2003, *in press*). Certainly there have been some positive outcomes in Canada and Alaska, but there are still problems in transferring these models overseas. Robards and Alessa (2004) rightly point out that "the significant challenge of maintaining equity and resilience of remote communities, within and outside the Arctic, will necessitate incorporating localized cultural values and decision-making processes that fostered prior

community existence with (data from) western interdisciplinary research.” However, in Europe and Russia, the institutional barriers to participatory modes of decision-making in resource management mean that North American standards of equity are not viable models for the time being. A North American-style legal system of title to land is also neither likely to be implemented, nor a caveat to solve the panoply of problems surrounding contemporary nomadic reindeer herding as practiced by the Yamal Nenets. On the other hand, secure access to traditional lands for herding, hunting, fishing is an essential component of maintaining a viable human population within the region. Self-determination is also likely to play an important role in leveraging some form of property rights, but to what extent will depend in part on what course the current and future Nenets leaders choose to navigate.

Given the closely guarded manner in which the Russian state holds the reins of development, via its functional control of Gazprom, multinationals are not likely to be invited to participate in the development of Yamal in the foreseeable future. As a result, there is actually little that sympathetic westerners can do to actively support the Nenets’ struggle for mutual coexistence. If such joint ventures eventually do come about, they can and should be carefully monitored to ensure responsible behavior. What are important in the meantime is that the Russian state itself works to make mutual coexistence feasible and that the migratory tundra Nenets provide a potent example of long-term resilience in a social–ecological system that bears little resemblance to those featured in the western literature to date.

NOTES

1. Yamal-Nenets Autonomous Okrug (YNAO) belongs to the West Siberian economic region and Ural Federal district. YNAO is an independent unit of the Tyumen Oblast and lies in the extreme north of the West Siberian lowland.

2. Fennoscandia is a geographic term based on linguistics that encompasses the Scandinavian-speaking countries (Norway, Sweden, Denmark, Faroe Islands, Iceland) and Finland. The Finnish language derives from the Finno-Ugric group.

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