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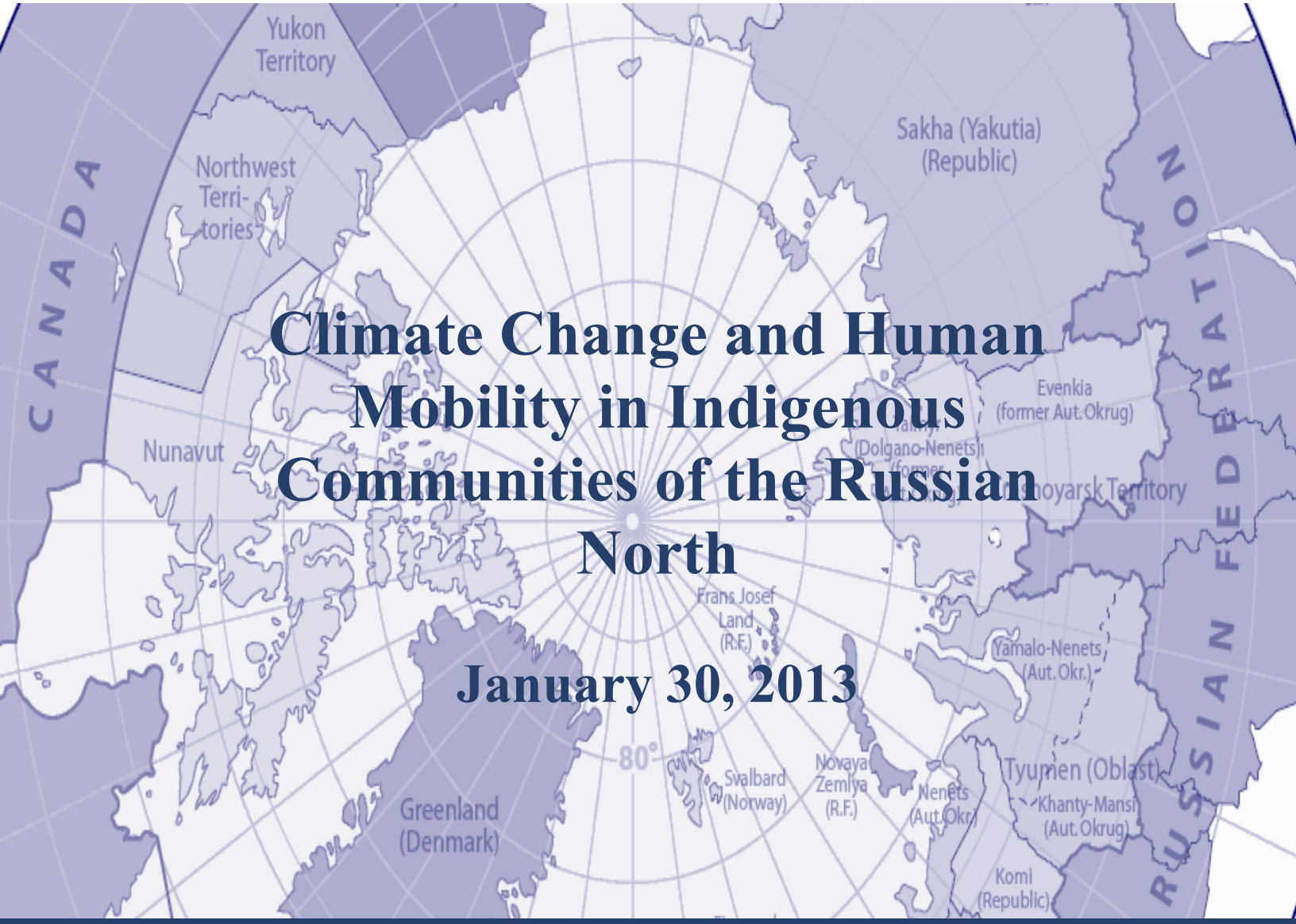

Climate Change and Human Mobility in Indigenous Communities of the Russian North

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Susan A. Crate
George Mason University

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EXECUTIVE SUMMARY

This paper explores the effects of climate change on human mobility (displacement, migration, and planned relocations) in the Russian part of northern Eurasia,[1] with a particular emphasis on indigenous communities. The paper is based on almost twenty years of longitudinal research with Viliui Sakha, one indigenous group of northeastern Siberia with a specific focus on local perceptions and responses to the effects of global climate change. In-depth examination of the effects of climate change on the Viliui Sakha, followed by a survey of responses to climate change and relocation within the Sakha Republic, is supplemented by three 'mini-case studies' of other indigenous groups in the Russian North: the Nenets, the Dolgan and Nganasan of the Taimyr Peninsula and the Chukotka- Chukchi and Siberian Yupik. The study then turns to the response of indigenous peoples and the Russian government to these changes and concludes with recommendations for indigenous groups, the government and other groups.

The historical context

Prior to mid-seventeenth century Russian colonization, mobility was key to the livelihoods for the diverse reindeer-herding, hunting/gathering, and pastoralist peoples inhabiting northern Eurasia. Russian colonization of these areas began to change that essential adaptive strategy. But the historical period that had by far the most dramatic affect on northern Russia's indigenous peoples' mobility and livelihoods and that introduced massive migrations and relocations was the Soviet period. With the 1917 October Revolution, and the 1922 establishment of the U.S.S.R., the feudal Russian system was transformed into a distinctive socialist one. The process was long, marked by five-year plans for collectivization and industrialization of both rural and urban life (Forsyth 1992: 283). Forced collectivization policies entailed relocations and resettlements into increasingly compact agro-industrial production centers. This meant the gradual transformation of the economy from decentralized production, involving subsistence activities that necessitated movement across the land, to centralized production based on concentrating breeding and growing operations in place. In accord with the resettlement and relocation for collectivization, non-Slavic peoples were categorized to designate them areas for inhabitance and production. In the 1920s the government divided the indigenous groups of the Russian North into two categories based on the size of their populations: 1) minority or 'small numbered' peoples, for those groups with less than 50,000 persons, and 2) 'big-numbered' or titular nations, for all non-Slavic peoples above that number.

As a result, the sparse pre-Soviet settlement pattern of the Russian North changed immensely. Settlement policies forced nomadic and semi-nomadic subsistence peoples to stay in one place in order to school their children and have their production accounted for. Collectivization policies led to the concentration of populations into larger and larger food production units. Additionally, the relocation of 'specialists' from western Russia to serve as technological experts in the Soviet modernization plan altered the demographics of communities in the Russian North.

The coercive Soviet resettlement of indigenous peoples from small settlements into larger villages had a profound effect on indigenous communities, destroying the foundational ecological and social relationships that underpinned subsistence livelihoods. Furthermore,

[1] The term 'Russian North' is used for most of the paper except when discussing pre-Russian history of the area.

resettlement often meant that families were divided as children were sent to state boarding schools. Inhabitants were separated from their birth lands to work in mass production in centralized locations, leaving them little time, if any, to engage in historically-based subsistence practices.

It was during the Soviet era that the government designated 16 regions as parts of the 'Far North' (Kraynyy Sever) (Rosstat 2006). Of the 16 regions, 11 were homelands of non-Russian ethnic groups, most of whom were in residence long before seventeenth century Russian colonization. Reflecting the ecological sparseness of the extreme northern ecosystems, human population densities in the Far North are typically low. For example, although the Russian North makes up 53 percent of the country's territory, in the post-Soviet era it is home to a mere 5.6 percent of the Russian Federation's population (Heleniak 2009b:33). Even so, in comparison with other circumpolar regions, the region's population is relatively dense. If compared to the 2001 population of northern Canada in 2001, northern Russia at the time had 46 people per square kilometer in comparison with 3.

Up until the collapse of the Soviet Union in 1991, many inhabitants of northern Russia were 'temporary,' lured to the north mostly from western areas of the Soviet Union by a combination of Soviet planned economic incentives and state-regulated migration. Since then, many of the temporary population, (mostly Russians, Ukrainians and Belorussians) have left the region to return to their homelands. By 2009 one of every six people (17 percent of the population) had migrated out of the Russian North (Heleniak 2009a:129). In the post-Soviet context, the indigenous peoples of northern Russia number approximately 250,000 individuals belonging to forty-one different peoples, comprising less than 0.2 percent of the entire northern Russian population (Nuttall 2005).

Physical science

Russia is the largest country on earth, embracing 11 time zones, and home to a wide diversity of ecosystems stretching from the Arctic tundra to the pre-Caspian deserts. It claims most of the continuous Arctic shoreline. With the fall of the Soviet Union and reorganization of the former 15 republics into independent countries, Russia was rendered a majority northern country, based on latitude.

For reasons of both ecology and history, Russia is more vulnerable to the effects of global climate change than most other world areas. The effects of global warming in the Russian North include permafrost degradation, increasing ambient air temperatures, precipitation, and frequency of extreme events, and an overall softening of the extreme climate, all triggering changed seasonal timings (phenology) and ranges of animals and plants (ACIA 2005; IPCC 2007; Roshydromet 2008; Perelet et al. 2008). As one example of the impacts of climate change, northern Russia, home to 50 percent of the world's boreal forest, is losing that forest as temperatures warm and deciduous forests move north. Global climate models predict that Russia could lose up to 50 percent of its vast boreal forest reserves in the near future (Krankina et al. 1997).

Like most of its circumpolar neighbors, much of its land area consists of permafrost, but unlike its neighbors, Russia is home to the most southerly permafrost areas on earth

> Russia – the world's biggest country by geographical area - is already warming at one and a half times the rate of other parts of the world. If global temperatures do go up by the 4°C many scientists fear, the impact on Russia would be disastrous. Much of Russia's northern region would be turned into impenetrable swamp. Houses in several Arctic towns are already badly subsiding (Harding 2009).

Not only are Russia's vast permafrost areas predicted to turn into swamp but northern Russia's, and particularly Siberia's vast permafrost area sits on top of large methane deposits that will further exacerbate global climate change if and when they are released due to permafrost degradation.

In addition to being ecologically more susceptible to climate change, Russia is also more vulnerable to its effects due to its history. The Soviet period held back Russia and its 14 neighboring former Republics in comparison to other developed countries in leaving three major areas underdeveloped: 1) the physical infrastructure and civil awareness necessary for environmental protection; 2) a stable economy that was competitive in the world market; and 3) a democratic political system capable of delegating responsibility and power across a vast landscape.

Close-up case study: Illustrating the changes affecting livelihoods and teasing out climate effects

Local peoples and ecosystems are affected and respond in different ways to climate change. Not only is the Russian North warming more than other parts of the world, within Russia, the greatest warming is occurring in the Sakha area. In-country scientists report an unprecedented increase in this region in both average annual precipitation rates and air temperature in the last decade (Fedorov and Svinoboev, 2000; Skachkov, 2005). Both are attributed to global climate change (Roshydromet, 2008).

Taking a close-up view of Sakha to understand mobility, resettlement and relocation in the face of contemporary climate change is particularly poignant given the fact that Sakha already had had a long history of mobility before climate change became an issue. While most northern peoples practice hunting and gathering and/or reindeer pastoralism for subsistence, the one exception to this are the horse and cattle-breeding Sakha.

Sakha adapted a subsistence livelihood originally developed in the south by their Turkic ancestors to the extreme northern climate. Their main adaptive strategy to maintain their horse and cattle breeding livelihood in the northern climate was to keep their cows in barns for nine months of the year and to work intensely during the brief summer to harvest enough fodder for that period.

But the forced collectivization and settlement of the Soviet period led to transformative changes in Sakha's livelihood activities. From the late 1920s through the late 1950s Viliui Sakha were gradually consolidated into larger and larger collective operations which culminated in extensive agro-industrial state farms. Not only did agricultural developments of the Soviet period affect Viliui Sakha livelihoods, but industrial development, particularly diamond mining, also led to changes. The local costs of the diamond mining were quite high, including the contamination of water and air by heavy metals and major changes in the Viliui River due to the massive Viliui

hydro-dam built to power the diamond processing (Crate 2002). Additionally, the Soviet government performed eleven underground nuclear tests, two of which had substantial nuclear fallout (Crate 2002). With the 1991 fall of the Soviet Union, an event that entailed the overnight dissolution of village-level agro-industrial state farm operations where most inhabitants worked and where most meat and milk was produced, Viliui Sakha adapted by developing household-level food production based on keeping cows and strengthening dependence on kin households, a strategy termed 'cows and kin' by the author (Crate 2006b).

The impact on other indigenous communities in the region was substantial. Forced settlement and industrialization policies of the Soviet period extinguished the last two Viliui reindeer herding, hunting, fishing and foraging communities, the Shologinskii (Tugolukov, 1985:188) and Sadinski (Crate 2003). The government relocated the Sholonginskii to the far North in 1952 to make way for what soon became industrial areas, the Udachnyi and the Aikhal diamond mines. The Sadinskii, inhabiting the rugged mountainous regions of the Chona River, were forced to abandon their homelands in order for the area to be flooded and to create a reservoir to generate hydro-power for diamonds.

Analysis of Viliui Sakha communities demonstrates that Soviet policies and the post-Soviet aftermath to date have had a much greater impact on indigenous peoples' livelihoods than climate change. However climate change is affecting the livelihoods of the indigenous communities in the region. Over the course of anthropological interdisciplinary research with Viliui Sakha on environmental change, a majority of inhabitants reported observing nine main changes, including 1) warm winters; 2) cool summers; 3) lots of rain and at the wrong times; 4) land remaining under water; 5) lots of snow; 6) more floods; 7) extreme temperature changes; 8) seasons arriving late; and 9) fewer birds and animals (Crate 2008, 2011b). All of these impact the livelihoods of the community.

However, other factors interact with the effects of climate change and also impact livelihoods, including: 1) the departure of young people from rural settlements for urban areas, depleting rural areas of the next generation cow-keeping cadre; and 2) the economic context which has improved access to consumer goods in village stores, helped to render cow keeping passé and motivated individuals to increase horse breeding activities often at the expense of cattle. In fact, although inhabitants were outspoken about their concern for changing seasonal and weather patterns in 2006 these other entangled changes now seem to be a higher priority.

Viliui Sakha are not yet in need of relocating due to the effects of climate change although given current trends of permafrost degradation, increasing precipitation and overall climatic softening, they may need to move in the future if they intend to maintain their cow and horse breeding practices. When inhabitants were asked if they would move if conditions changed to the extent that they could no longer breed cows and horses, only 15 percent said they would. Participants' responses were overwhelmingly in favor of remaining in their homeland even if it meant changing their mode of subsistence.

Other cases within the Sakha Republic

Although there are no other specific research projects focusing on inhabitants' perceptions of and responses to climate change in the Sakha Republic, there are other sources of information to help ascertain the overall issue of climate change and relocation.

In the Sakha Republic, 92 villages (14.9 percent of the total) are in the direct path of flood incidents. Those 92 villages are home to 136,000 or 7 percent of the total population of the Republic. During 1998 and 2001, (two of the ten hottest years on record), there were catastrophic floods in the Republic. In 2002 the Sakha government passed a resolution to 'relocate the most affected flooded villages.' Relocation work began in Kyllakh in 2005 with plans to move the village from the island to a non-flooding terrace on the right bank of the Lena River. Despite the state's efforts to relocate the community and the continued annual flooding, the population of Kyllakh has slightly increased, from 1,055 in 2001 to 1,181 in 2010. The main issues keeping the residents on the island despite continued and increasing flooding are the huge expense, commitment of energy and the many difficulties involved in moving as well as the problem of psycho-social adaptation to a new place.

Another way the Sakha government is responding to unprecedented change is by handling an increasing number of emergency situations through the Republic's Rescue Service. As they have acquired more experience in dealing with emergencies, specialists in this service have developed a system of making prognoses in order to have early warning and be able to evacuate areas that have an impending catastrophe. Because of the early warning system, the rescue service experts are able to claim that not a single person has died in floods since 2007. The unprecedented flooding of the Lena River in spring 2009 put 33 villages underwater in a few hours. While 1,000 cows died, all residents were saved thanks to the operation of the early warning system.

Other indigenous peoples within the Sakha republic (Even, Evenk, Yukagir, Chukchi) are migrating and, as in the case of the Sakha, they are moving for many reasons, including climate change. For example, climate change is transforming the infrastructure, to the extent that roads and transportation lines cannot function as they used to due to early thawing and late freezing. Also, similar to the Viliui Sakha case, many inhabitants are discontinuing their historically-based subsistence activities, in these cases of reindeer herding, hunting, fishing and foraging, due to the interaction of various factors, including globalization, social transformation, and environmental change.

In comparison with the Sakha, these reindeer-herding/hunting/fishing/gathering populations have both advantages and limitations in respect to mobility and adaptation to climate and other change. Because their subsistence mode is based on mobility—either moving with their herds to access new pastures or moving with the animals and plants for forage, they have a greater flexibility to move in the face of calamity and thereby maintain their subsistence. However, the changes in climate and seasonal patterns do have an overall negative effect on the wild resources supporting reindeer-herding and/or hunter/gathering livelihoods.

In sum, these three cases from within the Sakha Republic drive home important lessons for understanding mobility in the face of climate change. First, if a community such as Kyllakh decides or is told it must be relocated because their present living area is becoming uninhabitable, sufficient research, ideally in collaborative consultation with the affected

communities, must inform an appropriate resettlement site where inhabitants can continue their livelihood practices. Secondly, with increasing emergency situations, early warning systems are needed to enable evacuation of settlements in a timely fashion. Lastly, livelihood type is a critical consideration in understanding a people's need to move or stay and their capacity to adapt to change. The following section compares the Sakha cases with the experiences of other northern Russia peoples.

Comparisons and Contrasts with other Northern Russian peoples – forces of change affecting livelihoods

> Since the beginning of the 1930s, coastal villages [of Chukotka] predominantly inhabited by native Chukchi and Siberian Yupik were officially deemed unprofitable, subsequently closed and their inhabitants relocated to newly founded settlement centers. These state-enforced relocations of native communities, which peaked during the 1950s and 1960s, led to a creeping depopulation of a coastline, whose intricate settlement history traces back for thousands of years (Holzlehner 2011: 1958).

This account, although specific to the Soviet reality of two of northern Russia's indigenous peoples, is a common refrain across the former Soviet Union. This section illustrates through three mini-cases – the Nenets, the Dolgan and Nganasan of the Taimyr Peninsula and the Chukchi and Siberian Yupik of Chukotka – the diverse ways in which climate change affects mobility. These groups all face the impact of climate change within the context of a common post-Soviet legacy that limits their mobility options and adaptation to climate change. They, like Viliui Sakha, are affected by many environment and socio-economic factors, including climate change. In contrast to indigenous peoples of the rest of the circumpolar north, the specific historical legacy of the Soviet period plays a pivotal role in that mix. The full report examines both the commonalities and the diversity among northern Russia's indigenous peoples facing intersecting change factors with an emphasis is placed on how perceptions shape peoples' understandings and responses.

To mention here in brief, the cases in Russia illustrate to some extent the interaction of various factors of change—be it the oil and gas development of the Yamal peninsula affecting Nenets' livelihoods, the restraints on hunters' mobility and access to wild resources of the Dolgan and Nganasan, or the relocation from optimal sea-mammal hunting camps and pastoral access of the Chukchi and Siberian Yupik. They each also highlight the effects of climate in that mix and how perceptions are based in local understandings of the world.

The indigenous response

One major development for Russia's indigenous peoples has been the establishment of the Russian Association of Indigenous Peoples of the North, Siberia and the Far East (RAIPON). Begun as a loosely knit congress of peoples in 1990, today this organization works specifically to protect the human rights of indigenous peoples of the North. In 2002, RAIPON's President, Sergei Haruchi, was quoted as saying, "Their (the 'small-numbered peoples') political representatives are engaged at the highest international levels" (Haruchi, 2002). But while

RAIPON has made impressive progress and while joining forces with international colleagues is important, the key to on-the-ground change for Russia's affected peoples is policy development and implementation which, as detailed in the full text, is challenging.

Other successes in indigenous response include collaboration between local communities and researchers. For example, researchers worked with Yamal-Nenets communities and indigenous activists to help pass three federal laws that (at least theoretically) protect indigenous economic activity in the North from the effects of industrial development.

Additionally, to facilitate indigenous response, a great deal needs to be done in raising awareness among local communities about the impact of climate change. For example, research with Viliui Sakha found that while inhabitants observed changes in their environment and understood its effects on their livelihoods, they attributed most of the cause of the changes to sources other than climate change.

In terms of recommendations, communities need first to be able to understand how the effects of climate change on their present and future livelihoods are at play in daily life. They also need to be able to discern how climate change interacts with the other change factors in their lives. This understanding should then serve as a base for communities to become more assertive with their local, regional and federal representatives about the effects of climate change and in, particular, the likelihood that they might in the future have to relocate as a result of a loss of livelihoods.

The government response

It would be too extreme to say that Russia's federal government is in climate denial, considering how far official policies have come in establishing climate change as a federal policy problem.[2] While there are still murmurs in federal boardrooms of 'scientific uncertainties' and still many skeptical voices in Russia's media, the policy discourse has shifted from discussing causes of climate change to debating its economic and political costs and benefits. One example of this change in federal mindset and climate change's place on the policy agenda is Russia's 2009 Climate doctrine and 2011 action plan. The doctrine focuses on questions of adaptation and preparedness with much less attention to mitigation and international relations (Wilson Rowe 2011).

Another hurdle in Russia is effective implementation of federal policies. However, as in the case of other countries where federal bodies are less active on climate change issues, Russian governmental bodies at the regional level have been more responsive.

At both the federal and regional governmental levels, there is a great need for sharing experiences with international counterparts, particularly in the areas of: 1) how to govern and redesign policy that accommodates indigenous livelihoods in the face of climate change, including implications for relocations and resettlements; 2) how to develop and sustain interdisciplinary research collaborations that bring together in-country and international natural

[2] for example, see the 2009 Climate Doctrine http://archive.kremlin.ru/eng/text/docs/2009/12/223509.shtml

and social science scholars for community-based projects to address issues of climate change and displacement;[3] 3) how to further promote collective action/advocacy by Arctic indigenous peoples; and 4) how to create an 'enabling environment' (Stammler and Wilson, 2006), not only on the local level, but also inclusive of research and policy communities to promote understanding and thereby a greater capacity for action.

Recommendations for other bodies

This research suggests that anthropology plays unique roles in the policy debate on climate change, particularly with respect to indigenous peoples and their livelihoods. (Crate & Nuttall 2009) Further there is a need for transdisciplinary research which draws on the strengths of many academic disciplines. Thirdly, influential think tanks, like the Brookings Institution, should continue this new focus on the effects of global climate change on circumpolar indigenous peoples' mobility, with particular attention to the effects of climate change on livelihoods.

Conclusions

This paper documents how northern Russia's indigenous peoples' livelihoods, like those of other place-based peoples of the world, are increasingly challenged by environmental changes due to the pervasive effects of global climate change interacting with other change factors. This analysis has further shown that Russia's northern inhabitants share a common historical legacy of Russian colonization, Sovietization and de-sovietization, and that these processes worked both to hamper their adaptive flexibility founded on mobility and also to remove them from the resources and land rights they needed to pursue their livelihoods. They also share a common plight of being 'entangled' in other changes including the industrial contamination of their homelands, resulting in the loss of land and resources; the implications of internal economic transformations from a feudal to a command to a market system; the effects of globalization and modernity on rural livelihoods; and the alienation of the next generation from their ancestral homelands and livelihood practice.

[3]One key example here is the Polaris project http://www.whrc.org/education/polaris.html

1. INTRODUCTION AND PURPOSE

> The indigenous populations of the North are already feeling the negative impacts of climate change on their traditional ways of life. Reindeer herds are dying out, and the traditional adaptation strategy in the case of earlier climate changes—to move to harvesting sea mammals and fishing, will not be accepted in many communities. Additionally, the industrial oil and gas and mining activities have rendered the ecosystems unfit for traditional subsistence and are also destroying many alternative forms of economic activity. Unfortunately these problems are not being studied in Russia nor are representatives of the indigenous peoples being asked for their views on the changes that are taking place, even though no one is better placed to do so than the indigenous peoples of the North because these changes are vitally important for their survival.
>
> - 2009, Olga Murashko, RAIPON Information Center Director.[4]

This picture, painted by the Russian Association of Indigenous Peoples of the North, Siberia and the Far East's (RAIPON) Information Center director, underlines the urgency of the impact of climate change on indigenous livelihoods. It also highlights the interaction of various factors that further challenge those livelihoods. Murashko's statement of four years ago still holds and, in fact, the situation is worsening as time moves forward and climate change proceeds. This lack of local, regional, and national response to the interaction of various factors, including climate, affecting indigenous communities is rooted in Russia's historical legacy – both its Soviet and post-Soviet past. This paper focuses on the question of how the effects of climate change are affecting indigenous livelihoods in terms of diminishing resource bases and/or the need to relocate due to the impoverishment of living conditions and the communities dependent upon them?

Different disciplines take differing approaches to these questions. For example, from a natural science perspective, such an inquiry could explore the extent to which environmental change is altering baseline ecosystem services affecting plant and animal ranges and overall ecosystem functioning (Lovejoy and Hannah 2005). From a social science perspective, it could engage the concept that 'wisdom sits in places' (Basso 1996) and if those places move, what then are the implications of climate change for human cultures (Crate 2008), especially those which depend on a situated knowledge system in a sentient world (Nygren 1999; Nuttall 2004:207)? This paper takes an interdisciplinary anthropological perspective, one that understands humans as existing within communities that are *complex adaptive systems* based on a dynamic interplay of 'biophysical systems (e.g. mechanisms of change and communication) and compatible key features of social systems: the holistic nature of culture, knowledge sharing through the senses, and the formative power of traditions, structures/materials, strategies and habits of mind' (Crumley, 2012). Key elements of complex adaptive systems are diversity and 'place.'

[4] http://www.raipon.info/index.php?option=com_content&view=article&id=535:2009-12-04-08-10-24&catid=1:2009-03-11-15-49-27 (translated from the Russian by S. Crate)

Diversity, both biological and cultural, is a generative feature of complex adaptive systems (Gregory, 2006). Inherent to that diversity is the concept of place and indeed "our success as a species turns on our knowledge of and attention to 'place" (Crumley, 2012). The importance of 'place' for many of the world's peoples has prompted the new concept of 'place-based peoples'.[5] Through this interdisciplinary anthropological investigation in 'place,' larger questions can be addressed. For example, what is being and can be done, from the local to the global levels, to ameliorate the effects of climate change on indigenous peoples of the Russian North? What policies, citizen activism, and international engagement already exist and what more can be developed? This paper seeks to frame the issue and to begin the dialogue about what actions are needed in the future.

1.1 Focus of paper and author's approach

This paper explores the effects of climate change on human mobility (displacement, migration, and planned relocations) in the Russian part of northern Eurasia,[6] with a particular emphasis on indigenous communities. The paper is based on longitudinal research with Viliui Sakha, one indigenous[7] group of northeastern Siberia, since 1991. It has a specific focus on local perceptions and responses to the effects of global climate change. Although relocations have not yet occurred, environmental factors suggest that perhaps in the relatively near future, Viliui Sakha, especially those living in low-lying areas, may need to move. However, when asked about relocating to a different area due to the environmental effects of climate change, the majority of inhabitants say they would not move. This speaks to the importance of homeland and place and raises the question of the cognitive impact of forced resettlements and relocations. Via this 'window into one peoples' world,' the author then draws on information on relocations within the Sakha Republic and also from across the Russian North to create a more generalizable picture of what global climate change means for human mobility in this region. The author hopes that, through this research, the situation in the Russian North will become better known and, will contribute to the development of appropriate policy initiatives.

[5] My use of the term 'place-based peoples' is founded on the understanding that 1) place orientation is a feature of all people's experience of their environment (Norton and Hannon 1997) and 2) that peoples who depend upon subsistence production for all or part of their livelihoods would directly depend upon and experience their environment.

[6] The term 'Russian North' is used for most of the paper except when discussing pre-Russian history of the area.

[7] I use the International Labour Organization's 'Convention concerning Indigenous and Tribal Peoples in Independent Countries' (ILO No. 169) definition of "indigenous" as follows, "people are regarded indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present State boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural, and political institutions."

1.2 Human mobility in the Russian North: Physical and Cultural Forces

In the context of the literature on migration, displacement and resettlement, a central question remains: what will happen to those displaced by the effects of climate change? Will they migrate as individuals and families to cities or to other rural areas? Will they move to be with co-ethnics? Will they be sheltered temporarily or permanently in camps for the displaced? Will they be resettled as entire communities in order to maintain their community cohesion and cultural heritage? If so, what will that entail and who will pay for it? Is there a way to facilitate resettlement made necessary by the effects of climate change in ways that avoid the impoverishment that has been a characteristic of those resettled because of development projects? Experience in those cases suggests that the implementation stage is crucial and that successful implementation is determined by a collaborative political environment, a supportive economic base, adequate training, sufficient funding and other case-specific inputs of design and delivery (Oliver-Smith, personal correspondence). Can communities relocate in the face of climate-induced environmental change and both maintain their lives and livelihoods and continue to prosper and thrive on the earth?

In an effort to protect the rights of peoples resettled due to climate change, human rights, development, and humanitarian actors are joining with climate change experts to develop internationally recognized general principles and to specify the land and property issues involved and the legal policy bases for planned resettlement (Oliver-Smith *in press*). All stakeholders, including affected peoples, development and humanitarian actors, and governments need to initiate a consultative process to flesh out concrete guidelines and specific protection principles for those who may be obligated to consider resettlement as an adaptation to climate change (Ferris 2012). However, resettlement, – physically moving to a new place as an adaptation to climate change – carries with it the great risk of trauma at the destination for those displaced (Oliver-Smith, personal correspondence). How do these principles apply in the case of Russia's indigenous peoples?

1.2.1 Mobility as the Historical Rule in the Circumpolar North

Compared to other areas of the world, the circumpolar north has only recently been inhabited by humans. To settle in the Arctic humans first needed the technology of needle and thread to clothe themselves and provide sufficient protection in the extreme northern climate. Because arctic and subarctic ecosystems are not suitable for land cultivation and domestic animal breeding, they have long been used by relatively isolated groups who engage in extensive practices of hunting, gathering, and herding. The main food sources of the north were either terrestrial – caribou, reindeer and musk ox – or maritime – seals, walruses and whales – supplemented with small game hunting, fishing, and foraging. Humans began inhabiting northern Eurasia some 20,000 years ago and from there they crossed the Bering land bridge, the essential link for migrations to the Americas (Hoffecker, et al. 1993). Across the huge expanse of the northern Eurasia, life was, by default, nomadic, requiring continual movement in concert with the natural cycles, following animals and seeking after forage in sync with the seasons. There were no permanent dwellings or any ownership of land. Research shows that northern peoples often alternated the practice of at least two distinct subsistence modes interchangeably as an adaptive strategy in times of fluctuating climatic conditions (Krupnik 1993).

1.2.2. Changing the Rules: Mobility and Migration in the Russian and Soviet North

Prior to mid-seventeenth century Russian colonization, mobility continued to be the key to the livelihoods for the diverse reindeer-herding, hunting/gathering, and pastoralist peoples inhabiting northern Eurasia. Russian colonization of these areas began to change that essential adaptive strategy. Russians demanded *iasak* or fur tribute, which added hours of labor to inhabitants' already labor-intensive existence, which, in turn, had the effect of infringing on their mobility (Forsyth 1992). Likewise, colonists annexed inhabitants' lands, further restricting their mobility and movement. Despite the Russian colonization of northern Eurasia (from here on referred to as northern Russia), the area remained sparsely populated with only few large urban settlements (Slavin 1972: 14). Human mobility, in terms of the need for indigenous peoples to move to secure their subsistence, was also relatively unaffected by Russian colonization.

The historical period that had by far the most dramatic affect on northern Russia's indigenous peoples' mobility and livelihoods and that introduced massive migrations and relocations was the Soviet period.

> The Sovietization and industrialization of Russia's northern regions was a large-scale engineering endeavor that fundamentally changed a wide range of communities in diverse geographical regions, from the dense taiga at the Finnish border to the tundra expanses along the Bering Sea. In the Russian North, this development project was integral to the Soviet Union's efforts to create an all-encompassing economic sphere that included native and non-native communities under the aegis of a communist future (Holzlehner 2011: 1957).

With the 1917 October Revolution, and the 1922 establishment of the U.S.S.R., the feudal Russian system was transformed into a distinctive socialist one, founded on modernization in isolation from the rest of the world (Shaw 1991:31). The process was a long one, marked by its five-year plans for collectivization and industrialization of both rural and urban life (Forsyth 1992: 283). To achieve such technological advancement, in both agricultural and industrial activities, the government 'imported' expertise, mostly Slavic inhabitants from western Russia, Belorussia and Ukraine. The relatively dense population and settlement patterns of the Russian North are the direct result of Soviet industrial and agricultural development based on the demand economy of the socialist period (Heleniak 2009a:129). In other words, it was the state – not the market – that determined settlement patterns (Heleniak 2012:1).

In this time, Russia's indigenous peoples continued to live under colonial rule, first introduced in the seventeenth century (Forsyth 1992: 283; Tichotsky 2000). However, the Soviet period had much more far-reaching effects on mobility than the Russian colonial period, due to the forced collectivization policies which entailed relocations and resettlements into more and more compact agro-industrial production centers. This meant the gradual transformation of the economy from decentralized production, involving subsistence activities that necessitated movement across the land, to centralized production based on concentrating breeding and growing operations in place. In tandem, the Soviet government stepped up existing and developed new industrial economies in its northern areas.

The sparse pre-Soviet settlement pattern of the Russian North changed immensely as the result of three policies. Settlement policies forced nomadic and semi-nomadic subsistence peoples to stay

in one place in order to school their children and have their production accounted for. Collectivization policies, albeit gradual, led to the concentration of populations into larger and larger food production units. Third, the relocation of 'specialists' from western Russia to serve as technological experts in the Soviet modernization plan further altered the demographics of communities in the Russian North., These policies were driven primarily by Stalin's desire to develop the Soviet military-industrial complex which had indeed secured great victory in 1945, and which led to continued economic and military expansion in the post-war period (Shaw 1991: 73). It was in this post-war time that the North saw its greatest economic-industrial development.

> The long-standing campaign to develop the Soviet Union's cold, sparsely populated northern territories and to tap their immeasurable resources has gained fresh impetus in recent years. It is sufficient to note that between 1960 and 1970 twice as much money was allocated to the economic development of the northern territories as had been allocated during the more than 40 years of the Soviet Union's existence prior to 1960. The plans for the development of the Soviet Union's economy are now indissolubly linked with the programme for the development of the North (Slavin 1972:5).

It was during this time that the government designated 16 regions as parts of the 'Far North' (Kraynyy Sever) (Rosstat 2006) (Figure 1). This designation was based on both remoteness from population and resource-hungry industrial centers, and on its high latitude and harsh climate (Heleniak 2009b: 33).

Source: Rosstat (2006).

Figure 1: The Soviet (then Russian) government's designation of the Far North.[8]

Of the 16 regions, 11 are homelands of non-Russian ethnic groups, most of whom were in residence long before seventeenth century Russian colonization. In sync with the ecological sparseness of the extreme northern ecosystems upon which they depend, the human population densities in the Far North are equally low. Although the Russian North makes up 53 percent of the country's territory, in the post-Soviet era it is home to a mere 5.6 percent of the Russian Federation's population (Heleniak 2009b:33). This is down from 6.4 percent in Soviet times and, although still low in density, these percentages, in comparison with other circumpolar regions, are actually relatively dense. Take for example northern Canada, which in 2001 had a population density of three people per square kilometer as compared with northern Russia, having a density of forty- six (Bogoyavlenskiy et al., 2004: 27).

During and up to the time of the 1991 Soviet Fall, many inhabitants of northern Russia were 'temporary,' lured to the north mostly from western areas of the Soviet Union by a combination of Soviet planned economic incentives and state-regulated migration. Incentives included 'northern wage increments' or extra money for laboring in the harsh conditions of remote areas and an accelerated pension accruement. In the post-Soviet era, the region moved to a more market-oriented development strategy in which the state's role was minimal (Heleniak 2010: 9-

[8] Tuva is included because parts of the region are classified as belonging to the Krayny Sever for development purposes. Because much of the analysis was done using social and economic statistics, which are given only at the oblast level, a region had to be either entirely in or out.

10). The January 1992 economic transition entailed the privatization of housing, small businesses, large enterprises, land and agriculture, removal of controls on foreign trade and the liberalization of prices and the exchange rate of the ruble (Hanson and Bradshaw 2000). As a result of these market forces, by 2009 one of every six people (17 percent of the population) had migrated out of the Russian North (Heleniak 2009a:129). Research further indicates that it was primarily the 'temporary' population, mostly Russians, Ukrainians and Belorussians who came for the Soviet planned economy incentives described above that left (Heleniak 2009b).

It is important to note that the post-Soviet diaspora from the Russian North was not homogenous but reflected the demographic composition of particular communities. In general, the populations that left tended to be those who had come on a temporary basis and who had a home base elsewhere. Areas with relatively little Soviet-era industrial development and that are ethnic homelands to non-Russian and indigenous groups saw the least out-migration (Heleniak 2010: 13). Although these were the general trends in out-migration there were exceptions. Many who were lured to the North by economic incentives developed emotional attachment to place, especially those who moved to the North in the early Soviet period and whose descendants were born and raised there (Bolotova and Stammler 2010: Heleniak 2009b: 32). So who *are* the peoples of the Russian North?

1.2.3 Peoples of the Russian North

In addition to the major changes brought about by relocations, the Soviet period also saw the most dramatic changes in classifying and categorizing northern Russia's peoples (Selzkine 1994). In the 1920s the government first divided them into two groups: 1) minority or 'small numbered' peoples, including all groups with population sizes below 50,000 persons, and 2) 'big-numbered' or titular nations, for all non-Slavic peoples above that number.

> After enduring 250 years as autonomous subjects of czarist Russia, the native Siberians became the subjects of a Soviet government program aimed at transforming them from so-called *inorodsty* (aliens or "people of other origin") to socialist workers. The designation for the indigenous Siberian peoples has changed throughout the centuries, reflecting the state of social and political engagement with the outside world. Currently, the preferred term is *korennye malochislennye narody*, or native small-numbering peoples, living in the North, Siberia, and Far East and numbering fewer than 50,000 persons per nationality (Law of the Russian Federation, 1999, 82–F3).

Twenty-eight groups were designated as 'small-numbered' peoples.[9] Referring back to Figure 1, Map of the Russian North, seven of the official northern regions were 'autonomous okrugs'

[9]In the post-Soviet context this number has expanded to 45 as Soviet-period groupings were wrongly determined. 41 of the 45 are peoples living in the Russian North, Siberia and the Far East (Wessendorf 2005: 8) http://www.iwgia.org/iwgia_files_publications_files/Russia_book_introduction.pdf

(AOs). These areas served no other purpose than to allow the populations to access the resources they needed to contribute to production since all AOs were subordinated administratively to their parent region (Heleniak 2009b: 33). For example, The Evenk Autonomous Okrug, located on the south western border of the Sakha Republic, was administratively within the Krasnoyarskii Krai.

In the post-Soviet context, the indigenous peoples of northern Russia number approximately 250,000 individuals belonging to forty-one different peoples, comprising less than 0.2 percent of the entire northern Russian population (Nuttall 2005). The change from twenty-eight to forty-one groups is due to the Soviet government's lack of regard for ethnic differences and therefore grouping what appeared to be similar ethnicities together or grouping them in with the ethnicity of the titular group on whose territory they lived. For example, the Telengit and Tubalar, inhabiting a titular group's territory in the Republic of Altai, have both claimed the status of small-numbered peoples and were accepted by the NGO, Russian Association of Indigenous Peoples of the North (RAIPON). Similarly, the reindeer herding Komi-Izhemtsy have established their own organization and have been recognized by RAIPON. There are also reindeer herding Sakha who live among the small-numbered Evenk, Even and Yukagir and their *obshinas* (collective production group). The "big-numbered" indigenous peoples of Russia continue to live with the rights of so-called "titular nations." They have their republics, constitutional rights and laws concerning their languages, culture and education. One titular group, Sakha, number 466,492 and make up 49.9 percent of the Sakha Republic population.

The post-Soviet period also is the time when more and more indigenous inhabitants are confronting the effects of climate change. As policy-makers and scholars assess how this global phenomenon plays out on local levels, it is clear that the situation in the Russian North is complex. Climate change is by no means the first change these peoples have confronted and, for most, while its effects are sometimes quite substantial, climate change remains a back burner issue compared to the other more immediate changes affecting daily livelihoods. This is the focus of the next section.

1.2.4 The contemporary state: changes affecting livelihoods

As mentioned above, it is important to understand a people's historical legacy, in this case, the coercive Soviet resettlement of indigenous peoples from small settlements into larger villages. This resettlement began the destruction of the foundational ecological and social relationships that underpinned subsistence livelihoods. Furthermore, resettlement often meant that families were divided as children were sent to state boarding schools. Inhabitants were, separated from their birth lands to work in mass production in central locations, leaving little if any time to engage in historically-based subsistence practices. All of these changes contributed to the social and spiritual crises experienced across the USSR, beginning in the 1970s and continuing in the post-Soviet period which is characterized by unemployment, alcoholism, and overall social alienation (Vlassova, 2002). The post-Soviet transition from a command to a market economy continues to present daily challenges for many indigenous groups even now, more than twenty years after the fall of the Soviet regime. It is particularly challenging for rural indigenous peoples who continue to pursue their subsistence livelihoods in the absence of sufficient legal reforms, particularly affecting agricultural and traditional lands (Nuttall 2005).

The relationship between mobility, climate change and indigenous livelihoods in the Russian North is a complex one characterized by certain commonalities throughout the region, particularly the common historical legacy discussed above as well as diverse particularities that set each case apart. The natural and social diversity across Russia's eleven time zones results in very different effects in local contexts. In order to understand the complexity of the situation, an understanding of both the local and the global drivers of change are needed (Crate 2011a). This paper uses an ethnographic lens to focus first on local contexts and then compares this context with other diverse cases across the Russian North. The section below provides an overview of the physical science followed by an in-depth look at the physical effects of climate change on the local level.

2. OVERVIEW OF THE PHYSICAL SCIENCE: ACTUAL AND POTENTIAL EFFECTS OF CLIMATE CHANGE IN THE RUSSIAN NORTH

For reasons of both ecology and history, Russia is more vulnerable to the effects of global climate change than most other world areas. Scientific studies show that global warming seriously affects the Russian North including permafrost degradation, increasing ambient air temperatures, precipitation, and frequency of extreme events, and an overall softening of the extreme climate, all triggering changed seasonal timings (phenology) and ranges of animals and plants (ACIA 2005; IPCC 2007; Roshydromet 2008; Perelet et al. 2008). Arctic hydrological and climate cycles have shown significant changes in the last two decades, including an increase in both river discharge and overall average temperatures, and reductions in sea ice thickness and extent (Rawlins et al. 2006). Scientists have documented other trends for at least the past decade. For one, northern Russia, home to 50 percent of the world's boreal forest, is losing that forest as temperatures warm and deciduous forests move north. Global climate models (GCMs) predict that Russia could lose up to 50 percent of its vast boreal forest reserves in the near future (Krankina et al. 1997).

However, to best grasp the actual and potential effects of climate change in the Russian North, it is essential to first understand the country's unique geography. Russia is the largest country on earth, embracing 11 time zones, and is home to a wide diversity of ecosystems stretching from the Arctic tundra to the pre-Caspian deserts. It claims most of the continuous Arctic shoreline.[10] With the fall of the Soviet Union and reorganization of the former 15 republics into independent countries, Russia was rendered a majority northern country, based on latitude.

Since Given space limitations, this analysis focuses on two key effects to emphasize how a global phenomenon – overall warming of the earth – results in local and regional variance or climate change: 1) how the diversity of ecosystems interplays with climate change; and 2) how the country's common ecosystem parameter, permafrost, presents key challenges. An illustration of the way in which ecosystem diversity interacts with change, is the heat wave of 2010 which demonstrates how one climatic variable plays out across a country of 11 time zones and a diversity of ecosystems that interplay with global air and water regimes (Figure 2).

[10] Although only 11 time zones of the 24, the other 13 are comparatively discontinuous (see Fig 2)

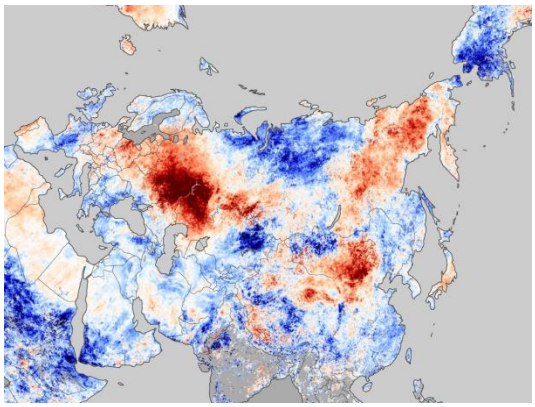

Figure 2: The 2010 Heat Wave in Russia *Source: NASA Earth Observatory*

The world news in summer of 2010 was replete with stories and updates about the heat wave and peat fires in western Russia.[11] Flying into Moscow in early August that summer, we could smell the smoke in the plane cabin a full hour before landing. After spending over an hour to secure masks, we visited the smoke-choked capital city. Temperatures hit a high of 42 C (108 F) in Moscow that summer, a record high for Russia. Figure 2 shows temperature anomalies for Russia for July 2010 in comparison with the period from July 2000-2008. This shows how change in one climate parameter, in this case, increased air temperature, can result in diverse temperature changes, some of which are warming and others cooling, due to a variety of ecological factors. It also illustrates the fact that change occurs from the interaction of forces, in this case, both from natural variability and from man-made climate change.[12]

Second, in order to understand the effects of climate change in Russia, it is equally important to consider Russia's position in the 'cryosphere.' Like most of its circumpolar neighbors, much of its land area consists of permafrost, but unlike its neighbors, Russia is home to the most southerly permafrost areas on earth (Figure 3).

[11] http://earthobservatory.nasa.gov/IOTD/view.php?id=45069&src=eoa-iotd

[12] http://www.carbonbrief.org/blog/2012/02/new-russian-heatwave-study-solves-climate-conundrum

Figure 3: Latitudinal zonation of permafrost. Source: Brown and colleagues (1998).

Figure 3 visually depicts the non-linearity of global permafrost distribution and, is consistent with the non-linearity of most global processes. For example, the coldest place on earth is not the North Pole but rather Verkhoyansk, Russia which is a considerable distance from absolute north. The global nonlinearity of permafrost and the way that global warming is playing out across Russia, with some areas cooler and some warmer, makes the Russian case a formidable one.

> Russia – the world's biggest country by geographical area - is already warming at one and a half times the rate of other parts of the world. If global temperatures do go up by the 4C many scientists fear, the impact on Russia would be disastrous. Much of Russia's northern region would be turned into impenetrable swamp. Houses in several Arctic towns are already badly subsiding (Harding 2009).

Not only are Russia's vast permafrost areas predicted to turn into swamp but northern Russia's, and particularly Siberia's vast permafrost area sits on top of large methane deposits that will further exacerbate global climate change if and when they are released due to permafrost degradation. The Arctic Climate Impact Assessment of 2005 and its 2010 update pointed to Siberia as the main global source of carbon release as its vast areas of permafrost degrade (ACIA 2005; Sommerkorn and Hamilton 2008: 10). In fact, permafrost is as large a carbon reservoir as the atmosphere. Estimates are that half of global permafrost stores of carbon in yedoma (a type of carbon-rich permafrost) are located in parts of Siberia. Yedoma is considered a globally significant potential source of carbon emissions when the permafrost thaws. There is also evidence of a globally

substantial source of atmospheric methane from thawing permafrost below thermokarst lakes in Siberia.

In addition to being ecologically more susceptible to climate change, Russia is also more vulnerable to its effects due to its history. Some have described this phenomenon as Russia's 'adaptation deficit.'

> With a legacy of environmental mismanagement and under-investment in infrastructure and housing, the region is already vulnerable to the current climate conditions because of its "adaptation deficit," which can only increase with projected climate changes. In the near term the region's vulnerability is dominated by non-climatic factors, including socio-economic and environmental issues that are the legacy of the Soviet system. These will exacerbate climate risks and hamper the ability of sectors that could gain from climate change, such as agriculture, to reap full benefits. [13]

The Soviet period held back Russia and its 14 neighboring former Republics in comparison to other developed countries in leaving three major areas underdeveloped: 1) developing the physical infrastructure and civil awareness necessary for environmental protection; 2) establishing a stable economy that was competitive in the world market; and 3) building a democracy in order to delegate responsibility and decentralized power across a vast landscape. This is also a critical consideration when we look at citizen activism, NGO and other movements working to bring about grassroots change.

Russia has been shaped by a conundrum of economic, social and political forces. In the post-Soviet context this conundrum is reflected in the contrast between a relatively solid financial system with a growing GDP and dramatically decreasing social conditions including increased suicide, communicable disease incidences and drug and alcohol use (Verho et al. 2012). Additionally, Russia has an increasingly authoritarian political climate characterized by governmental control of media and the abolition of open elections (Varese 2007).

In terms of global climate change, Russia continues its legacy of presenting the rest of the world with a conundrum. The Russian North is warming faster than the rest of the North, holds the world's largest reserves of methane and yet, geopolitically, within the circumpolar north context, has shown the least cooperation in working with the other seven circumpolar countries to develop climate change policies to ameliorate its inhabitants' worsening situation. Despite this, continued collaboration with the Arctic Council and other initiatives will open the way for such policy development. It is clear that efforts in this direction must focus on local contexts to understand the interaction of forces of change. The next section therefore focuses on how the global phenomenon affects local and regional ecosystems.

2.1 Close-up of actual and potential effects in Sakha and Viliui regions

Not only is the Russian North warming more than other parts of the world, within Russia, the greatest warming is occurring in the Sakha area. In Figure 4 below, the Republic is located in

[13] http://www.worldbank.org/eca/climate/ECA_CCA_Full_Report.pdf 2009: page ix

eastern Russia in the approximate area depicted in black, which represents an area of maximum heat increase.

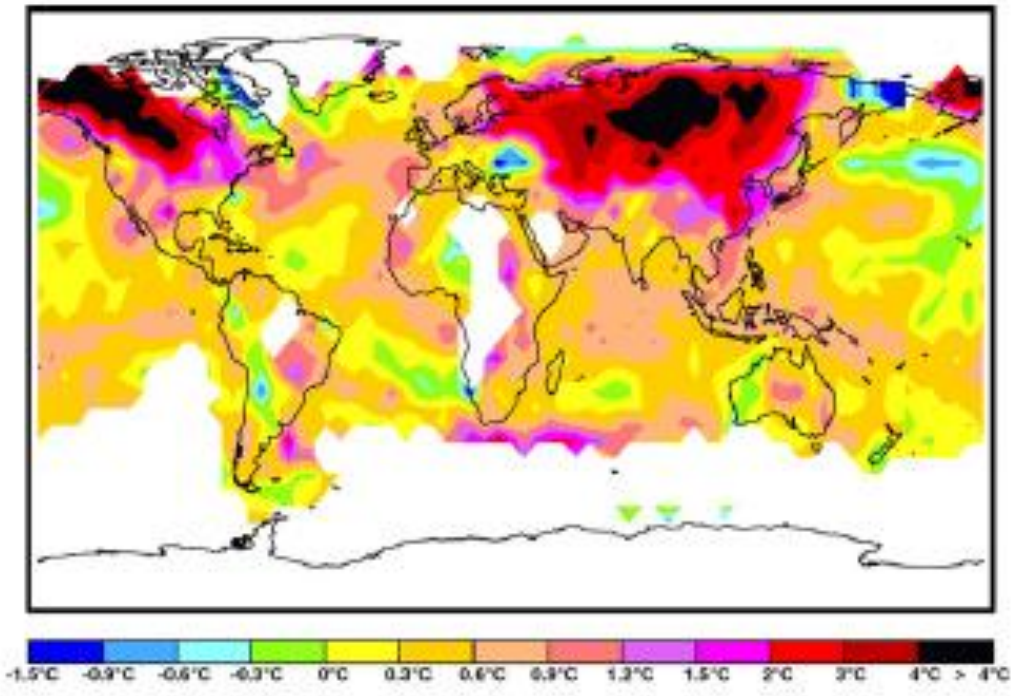

Figure 4: Change of the average winter air temperature on earth for 1965-2004 (according to data of NCDC (National Climate Data Center)

These regions are monitored by in-country scientists who report an unprecedented increase in both average annual precipitation rates and air temperature in the last decade (Fedorov and Svinoboev, 2000; Skachkov, 2005). Both are attributed to global climate change (Roshydromet, 2008; Iijima et al., 2010). Scientists working in the central regions of the Sakha Republic have documented increased permafrost degradation as the direct result of climate change (Fedorov and Konstantinov, 2008, 2009). They explain that out of 30 different kinds of permafrost, the permafrost underlying the natural hayfields of this region is the exact kind most susceptible to degradation from warming. In the last decade, this has resulted in increased flooding, especially of hayfields, the sudden formation of valleys, the swelling up of land to form new hills, and the cascading of adjacent forests as water invades those areas and trees 'drown.' Figure 5 shows how the warming and degradation of permafrost is playing out in the local context, where once flat areas have become valleys and lakes.

Figure 5: Thermokarst attacks disturb areas in Churapcha region in Central Yakutia, at first settlements (photo by A.N. Fedorov).

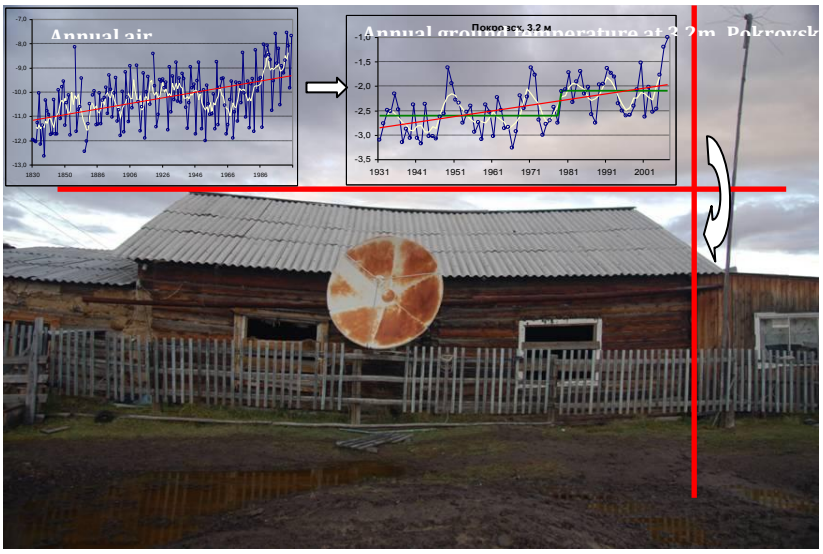

Figure 6: After thermokarst development some houses were damaged, Sylan settlement in Churapcha region in Central Yakutia (photo by V.S.Makarov).

Figure 6 shows the collapse of one household's roof after the degradation of permafrost located under its foundation. The two graphs at the top of the photograph demonstrate that the mean air temperature and the mean permafrost temperatures are increasing simultaneously.

The most comprehensive understanding of how climate change affects local ecosystems and livelihoods in the Viliui regions, a group of eight regions along the Viliui River of western Sakha, is based on anthropological research with Viliui Sakha in the Suntar region and through dialogue on native researchers. An overview of this work is next presented as a case study.

3. CLOSE-UP CASE STUDY: ILLUSTRATING THE CHANGES AFFECTING LIVELIHOODS AND TEASING OUT CLIMATE EFFECTS

Local peoples and ecosystems are affected and respond in different ways to climate change. Furthermore, communities are simultaneously faced with other, often more pressing, changes affecting their livelihoods. Therefore the diversity of climate change effects and responses must be understood in the context of other forces of change. This section illustrates, through the case study of one indigenous group of the Russian North, the sheer complexity of the analysis of human mobility in the context of climate change. In the process of displaying that complexity, generalizations will be drawn to both the diversity of cases in the Russian North and globally.

3.1 Introduction- close-up of Viliui Sakha history of adaptation, migration, settlement

Taking a close-up view of Sakha to understand mobility, resettlement and relocation in the face of contemporary climate change is particularly poignant given the fact that Sakha already had had a long history of mobility before climate change became an issue. As mentioned earlier, most northern peoples practice hunting and gathering and/or reindeer pastoralism for subsistence in the North. There is one exception to this: the horse and cattle-breeding Sakha. Although other circumpolar groups attempted this strategy, they have long vanished (McGovern 1980: 245-275).[14] One way of understanding why Sakha continued their 'southerly' subsistence can be explained by cultural tenacity. Sakha's Turkic ancestors transmigrated from Central Asia to the shores of Lake Baikal in southern Siberia around 900 A.D.; then during Genghis Khan's reign, they followed the Lena River northward to settle in their present homelands (Gogolev 1986; Okladnikov 1970). Sakha adapted a southerly subsistence livelihood to the extreme northern climate. Today they are the highest latitude agropastoralists in the world.

There were several northward diasporas of Sakha. Those who today live in the Viliui River watershed of western Sakha, called Viliui Sakha, made a direct migration via the Chona River system to the Viliui from the south (Ksentofontov 1992 (1937): 12). Tungus (Even and Evenk) and Tumat inhabited the Viliui regions before Sakha settlement and subsisted by using both reindeer herding, and foraging (hunting, gathering and fishing). "Tungus of the Viliui regions have a wandering life and are reindeer-herders, hunters and fishers. They go several thousand *versts* (a Russian unit of measure approximately equaling two-thirds of a mile) from their continuous dwelling place to practice their subsistence lifestyle" (Maak, 1994:22-24). Legends and oral narratives document that these Sakha fought and either killed, assimilated or drove away the Tungus. Late nineteenth century explorers noted that the many local Tungus had now assumed a lifestyle, appearance, disposition, clothes and language no different from the agropastoralist Sakha (Tugolukov, 1985:219).

[14] Norse settlers arrived on Greenland between about 800 and 1000 A.D. with an economy based on domestic cattle. However, due to climate change occurring between 1250-1300 and the Norses' inability to adapt alternative subsistence strategies, their settlement vanished within several centuries.

Sakha's main adaptive strategy to maintain their horse and cattle breeding livelihood in the extreme northern climate was keeping their cows in barns for nine months of the year and working intensely during the brief summer to harvest enough fodder for that period. Part of their success was due to their use of indigenous cattle, whose adaptive capacity to the environment was the subject of many early explorers' writings. "Sakha cattle can stand bad weather, hunger, cold, eat everything (twigs of birch, aspen, willow, cane and fodder under the snow), eat very little, fatten quickly, and survive for a long time off their own fat reserves" (Seroshevski 1992 (1896): 144-149). Sakha also used Sakha bulls extensively for transportation, work animals, and in hunting (Maak 1994: 331).

Over the centuries various outside influences, most notably Russian colonization in the 1600s and forced collectivization of the twentieth century Soviet period, challenged these subsistence practices. Russian colonizers demanded *iasak* (fur tribute) and annexed lands. The forced collectivization and settlement of the Soviet period led to more transformative changes in Sakha's livelihood activities. From the late 1920s through the late 1950s Viliui Sakha were gradually consolidated into larger and larger collective operations which culminated in extensive agro-industrial state farms. Not only did agricultural developments of the Soviet period affect Viliui Sakha livelihoods, but industrial development, particularly diamond mining, also led to changes. The discovery and exploitation of diamonds on the Viliui in the late 1950s was propagandized as the people's pride and the region's contribution to Soviet-era progress but the local cost was quite high. These industrial activities resulted in contamination of water and air by heavy metals and in major changes to the movement and productivity of the Viliui River due to the massive Viliui hydro-dam built to power the diamond processing (Crate 2002, 2003). Additionally, the Soviet government performed eleven underground nuclear tests, two of which had substantial nuclear fallout (Crate 2002). With the 1991 fall of the Soviet Union, an event that entailed the overnight dissolution of village-level agro-industrial state farm operations where most inhabitants worked and where most meat and milk was produced, Viliui Sakha adapted by developing household-level food production based on keeping cows and strengthening dependence on kin households, a strategy termed 'cows and kin' (Crate 2006b).

Forced settlement and industrialization policies of the Soviet period extinguished the last two Viliui reindeer herding, hunting, fishing and foraging communities, the Shologinskii (Tugolukov, 1985:188) and Sadinski (Crate 2003). The government relocated the Sholonginskii to the far North in 1952 to make way for what soon became industrial areas, the Udachnyi and the Aikhal diamond mines. The Sadinskii, inhabiting the rugged mountainous regions of the Chona River, were forced to abandon their homelands in order for the area to be flooded and to create a reservoir to generate hydro-power for diamonds. Not only were hundreds of thousands of acres of valuable haying, pasturing, hunting and timberlands lost but also indigenous settlements totaling 600 people. Although Chona inhabitants protested, the government promised that their living conditions would be significantly improved by the resettlement. However, the government failed to keep its promises and to this day many of the evacuated Chona residents still do not have adequate housing, forty years after the initial promises of the Soviet authorities (Crate 2003).

This section demonstrates that Soviet policies had a much greater impact on indigenous peoples' livelihoods than climate change. The next section focuses on how the effects of climate change

have increased in the post-Soviet context and also have integrated into the other forces of change.

3.2 The contemporary context: the forces of change affecting livelihoods and teasing out effects of climate change

Twelve years after in-depth fieldwork revealed the cows and kin adaptation strategy, today there are fewer and fewer cows in the villages but kin remains the vital core to rural life. Initially it was assumed that inhabitants were no longer keeping cows due to the increasing challenges from environmental effects of climate change, including flooded hayfields, increased and seasonally erratic precipitation, an overall softening of climatic extremes, degradation of permafrost, and the overall unpredictability of local environmental conditions (Crate 2008, 2011b).

Over the course of this research on environmental change, a majority of inhabitants reported observing nine main changes, including 1) warm winters; 2) cool summers; 3) lots of rain and at the wrong times; 4) land remaining under water; 5) lots of snow; 6) more floods; 7) extreme temperature changes; 8) seasons arriving late; and 9) fewer birds and animals (Crate 2008, 2011b). Interviews in 2012 also confirmed previously reported seasonal changes including a late spring or a spring which arrived on time but staying cold/ not gradually warming up as in the past accompanied with less rain; a cool summer with too much rain during hay season and cold nights; an elongated fall season which was characterized by a freezing/thawing pattern; and an unusual winter season, with more snow than previously and 'chiskhaan' or freezing winds. These seasonal changes have an overall negative effect and challenge Viliui Sakha in their cow-keeping and other subsistence practices. Without going into detail about all the effects, a few highlights are presented for each season.

Inhabitants emphasized that the elongated fall is generally positive since cows can remain in pastures longer which serves to prolong hay stores. However, the warm temperatures delay the timing of the annual slaughter, performed after temperatures remain below freezing – a delay which requires more hay. Horses are negatively affected since the freeze-thaw pattern keeps them from accessing their fodder, which typically stays semi-green beneath a thick, insulating blanket of snow. Instead they encounter a hard sheet of ice and, unable to find fodder, many starve unless they are given supplemental food. The winter is unusual due to snowfall and freezing wind in an ecosystem where the historical pattern is one of no snowfall and no wind during the three-month winter. This new regime requires much more human labor, since cattle stay in barns for more of the winter due to the uncertain conditions on paths which animals must take to water. Spring starts late or arrives on time but remains cold instead of a gradual warming as before and there is less rain. These extreme spring conditions, particularly the cold and lack of rain have negative consequences on hay growth. The summers recently have been unseasonably cool and rainy and the nights are especially cold, slowing plant growth which means crops must be harvested before they have reached their full maturity. Lastly, summer used to be a relatively dry season, but now there is too much rain which impedes hay cutting and ruins its quality.

Five years of research focusing on climate and seasonal change clarified how other factors are intertwined with the effects of climate change to impact livelihoods. The main interacting factors

are: 1) the departure of young people from the rural settlements for urban areas, depleting rural areas of the next generation cow-keeping cadre; and 2) the economic context which has improved access to consumer goods in village stores, helped to render cow keeping passé and motivated individuals to increase horse breeding activities often at the expense of cattle. Additionally, although inhabitants were outspoken about their concern for changing seasonal and weather patterns in 2006 these other entangled changes now seem to be a higher priority. This led to an investigation of ways to integrate those other factors into the analysis, in this case, to explain why the number of cows continuing to drop when just over a decade ago cows were clearly a central mode of survival.

3.3 Future prospects: particular and potential effects affecting livelihoods

Viliui Sakha are not yet in need of relocating due to climate change effects. When considering the current trends of permafrost degradation and increasing precipitation and overall climatic softening, it is possible that they will need to move in the future, if they want to maintain their cow and horse breeding practices. What Viliui Sakha do when and if that day arrives is not known. During 2012 summer research, two questions were included in the interviews to gauge the future response of inhabitants. The first question asked if they would move if conditions changed to the extent that they could no longer breed cows and horses. A total of 8 out of 54 households in both villages, or 15 percent, said they would move. The 85 percent who would not move explained that it was because they no longer kept cows or they had no desire to leave their birthland. This corroborated with findings from the 2008 survey where participants were asked, in the context of Likert scale statements, 1. If conditions change so that we cannot raise cows, we should move elsewhere; and 2. If conditions change so that we cannot raise cows, we should change what we eat and stay living in our homelands. Participants' response was overwhelmingly in favor of staying in their homeland even if it meant changing their mode of subsistence.

What lessons can be derived from the Viliui Sakha case? First, it illustrates how climate change can affect local environments and human adaptation to that environment in place- and culture-specific ways. It also shows that local inhabitants are confronted with the interaction of various change factors of change in addition to global climate change. Furthermore, the Viliui Sakha case suggests that, given the rate of ongoing environmental change from a changing global climate and other changes disrupting livelihoods, communities may very soon face a decision of whether to move or stay. Other cases in the Russian North further illustrate the complexity of local contexts and provide some ways to understand and appreciate that complexity in diverse Arctic contexts. This is the focus of the next section.

3.4 Other cases within the Sakha Republic

Although there are no other specific research projects focusing on inhabitants' perceptions of and responses to climate change in the Sakha Republic, there are other sources of information to help ascertain the overall issue of climate change and relocation.

3.4.1 The First Relocation in the Sakha Republic[15]

In the Sakha Republic, 92 or 14.9 percent of all villages are in the direct path of flood incidents. Those 92 villages are home to 136,000 or 7 percent of the total Republic population. During 1998 and 2001, which were also two of the ten hottest years on record, there were catastrophic floods in the Republic. In 1998, 80 percent of the villages on the Lena, north of the city of Lensk and 70 percent of villages on the Aldan were hit. In total, 205 villages from 23 regions were inundated and over 50,000 people were affected by the floods.

The settlement of Kyllakh, located on an island in the middle of the Lena River (Figure 7), has flooded consistently since 1998.

Figure 7: Location of Kyllakh on an island area of the Lena River. http://www.maplandia.com/russia/republic-of-sakha/olekminskiy-rayon/kyllakh/

Kyllakh has a history of flooding but only sporadically. According to village elders, catastrophic floods occurred in 1903, 1937, 1948, 1969, 1998 and 2001. In 2002 the Sakha government passed a resolution to 'relocate the most affected flooded villages.' Relocation work began in Kyllakh in 2005 with plans to move the village from the island to a non-flooding terrace on the right bank of the Lena River.

[15] The information herein about the first relocation in the Sakha Republic is based on a report prepared by Victoria Fillipova (Fillipova 2011), gathered during a project through the Institute for Humanitarian Research, Yakutsk. The translation is the author's.

Despite the state's efforts to relocate the community and the continued annual flooding, the population of Kyllakh has slightly increased, from 1,055 in 2001 to 1,181 in 2010. The main issues keeping the residents on the island despite continued and increasing flooding are the huge expense, energy and the many difficulties in moving as well as the problem of psycho-social adaptation to a new place. Although the government is financing part of the relocation, much of the cost is transferred to households. This is where the issues of poverty among some residents come to the fore, considering that half of all households qualify for social assistance and one-third of all households have children of preschool or school age. Moreover the poor planning of the project led to the situation where those who could apply and receive credit to get a new house could not spend the winter there because the house was designed for central heat that did not yet exist. Another example of poor planning was the small size of the allotted land, particularly as the majority of Kyllakh residents breed horses and cattle. Because the new settlement lacks hay lands, many have not and probably will not move.

3.4.2 The Value of Early Warning to Avoid Disaster[16]

One way the Sakha government is responding to unprecedented change is by handling an increasing number of emergency situations through the Republic's Rescue Service. As they have acquired more experience in dealing with emergencies, specialists in this service have developed a system of making prognoses in order to have early warning and evacuate areas that have an impending catastrophe.

In 2007 the Alazea River in the northern part of the Sakha Republic completely flooded and left the villages of Andryushkino (Figure 8) and Argakhtakh waterbound. It has only been in the past several years, as the waters very gradually subsided, that inhabitants can begin to see land and utilize the pastures they used before. In 2012 the village is reported to be almost back to its pre-flood state. But the costs of accommodating goods, people and fodder for animals in the interim years were substantial.

[16] The information for this section is based on an interview with Nikolai Nakhodkin, Rescue Service of the Sakha Republic, July 27, 2012

Figure 8: The view of Andrushka village on the Alazea in September 2007. Photo N Nakhotkin

The comparison of these two villages drives home an important point about subsistence practices and mobility. When the waters first engulfed the two villages in 2007, residents of Argakhtakh, all Sakha horse and cattle breeders, were prepared to move in order to continue their livelihood. Soon thereafter experts told them that the water had stopped rising, and so they stayed. When the water engulfed Andrushka, a Yukagir settlement whose livelihood is fishing, residents had no intention of going anywhere. If anything, the water improved their livelihoods.

In the spring of 2012 the main emergency flood event in the Sakha Republic was on the Yana River. It presented the emergency response team and regional scientists with a conundrum. While in the southern city of Lensk and in the capital city of Yakutsk the Lena River remained frozen solid, there was ice flow on the northern Yana River. Normally the ice flow begins on the upper reaches of the Lena and flows northward to the Arctic Ocean. With ice flow only in the north, there was no place for the ice and water to flow, given the area's flat topography and the frozen Arctic Ocean. The water inundated two villages, Ust Kuga and Nizhne Yansk. However, because the government had a system of early warning, no lives were lost. All residents were safely evacuated by helicopter. In the aftermath of the flood, the government is spending substantial funds to deliver building materials by helicopter to rebuild lost homes before the cold of winter sets in. Such an incident had never happened in the history of human settlement there.

Also in the spring of 2012 on the Kolmya River, the settlement of Srednikolmyinsk, an ancient Russian outpost and former gulag, was flooded. Because of the city's long history, there exist very good records of the climatic conditions. Those records show a history of periodic flooding but never one that flooded the entire city as the 2012 flood did. The process was the same as on the Yana: the ice flowed on the Kolyma River and, because the Arctic Ocean remained frozen, the water stayed in place, backed up and flooded the city. To this day experts are baffled as to

why there was no ice flow for a substantial part of the river, while there was ice flow in the north. There are 2,500 kms between Lensk and where these rivers meet the Arctic Ocean.

Because of the early warning system, the rescue service experts are able to claim that not a single person has died in floods since 2007. The unprecedented flooding of the Lena River in spring 2009 put 33 villages underwater in a few hours. 1,000 cows died but all residents were saved thanks to the operation of the early warning system. In comparison to the increasing number of similar tragedies, this kind of early warning system deserves emulation. For example, the July 2012 inundation of several settlements in the Krasnodar regions of southern Russia, killed 99 people and completely flooded two settlements. There are other signs of the influence of climate change, including increasing reports of a salty taste to the river water on which inhabitants depend on for drinking and agriculture. Some reports are from settlements located 70 km from the ocean. Nikolai Nakhodkin, the author's main source of information on the topic, explained that this is likely due to the unprecedented thawing of the Arctic ice cap, causing more stormy weather that blows salt water inland and up river. There are also concerns about glacial outbursts in the near future as temperatures continue to increase. In the summer of 2012, a record 32 degrees C (90 F) was recorded in some of the 'tarin' (glacial) areas of northern Sakha. The permafrost is already melting and the glaciers will follow suit. If there is a sudden heavy rain, the already warming glacier could burst, inundate the glacial lakes at their base, and cause catastrophic landslides.

3.4.3 The Issues for Herding/Hunter/Gathering peoples of Sakha[17]

Other indigenous peoples within the Sakha republic (Even, Evenk, Yukagir, Chukchi) are migrating and, as in the case of the Sakha, they are moving for many reasons, including climate change. For example, climate change is transforming the infrastructure, to the extent that roads and transportation lines cannot function as they used to due to early thawing and late freezing. Also, similar to the Viliui Sakha case, many inhabitants are discontinuing their historically-based subsistence activities, in these cases of reindeer herding, hunting, fishing and foraging, due to the interaction of various factors, including globalization, social transformation, and environmental change.

In comparison with the Sakha, these reindeer-herding/hunting/fishing/gathering populations have both advantages and limitations in respect to mobility and adaptation to climate and other change. Because their subsistence mode is based on mobility—either moving with their herds to access new pastures or moving with the animals and plants for forage, they have a greater flexibility to move in the face of calamity and thereby maintain their subsistence. However, the changes in climate and seasonal patterns do affect the wild resources supporting reindeer-herding and/or hunter/gathering livelihoods. For example, the range of the tundra is shrinking as the taiga moves northward. For reindeer herders, this translates into less reindeer pasture as lichen fields are invaded by shrubs. Like Sakha, reindeer herders have similar issues with the impenetrable ice

[17] The information for this section is based on an interview with Vyachislov Ivanovich Shadrin, Insitute of the Minority Peoples of the North, Yakutsk.

cover under the snow, resulting from the vacillating warm and cold temperatures in the fall season that cause snow to freeze and thaw repeatedly. This frozen layer prevents reindeer from being able to access their fodder—reindeer lichen. While this also occurred in the past, it happened only every 5 or 6 years. In the last decade it has been occurring at least every other, and sometimes, every, year. Additionally, the warming temperatures are increasing disease among reindeer, most notably, a higher incidence of an illness affecting the animal's hooves. Lastly, herders and hunters depend on their experiential knowledge to choose the best route for winter movement. In the last several years, with conditions increasingly unpredictable, more and more are finding that their knowledge and experience are no longer relevant.

In sum, these three cases from within the Sakha Republic drive home important lessons for understanding mobility in the face of climate change. First, if a community decides or is told it must be relocated because their present living area is becoming uninhabitable, sufficient research, ideally in collaborative consultation with the affected communities, must inform an appropriate resettlement site where inhabitants can continue their livelihood practices. Secondly, with increasing emergency situations, early warning systems are needed to enable evacuation of settlements in a timely fashion. Lastly, livelihood type is a critical consideration in understanding a people's need to move or stay and their capacity to adapt to change. The following section compares the Sakha cases with the experiences of other northern Russia peoples?

4. Comparisons and Contrasts with other Northern Russian people's – forces of change affecting livelihoods

> Since the beginning of the 1930s, coastal villages [of Chukotka] predominantly inhabited by native Chukchi and Siberian Yupik were officially deemed unprofitable, subsequently closed and their inhabitants relocated to newly founded settlement centers. These state-enforced relocations of native communities, which peaked during the 1950s and 1960s, led to a creeping depopulation of a coastline, whose intricate settlement history traces back for thousands of years (Holzlehner 2011: 1958).

This account, although specific to the Soviet reality of two of northern Russia's indigenous peoples, is a common refrain across the former Soviet Union. This section illustrates through three mini-cases how all of northern Russia's indigenous peoples are facing the effects of various change factors, including climate change and how other changes are usually more important because they more immediately impact daily livelihoods. Furthermore the fact that these groups share a common post-Soviet legacy that limits their mobility options and adaptation to climate change. Because the Russian North has the highest ethnic diversity of the circumpolar north, the implications of the effects of global climate change on these ecosystems and peoples are both vast and diverse.

International research has increased the level of knowledge and awareness of the effects of climate change on indigenous peoples of the circumpolar north (Nuttall 2005). Research projects within Russia that deal specifically with how peoples are affected by climate change are few. This is not because climate change is not having an effect but rather because there are often a

host of more immediate threats to livelihoods. For example, the Russian North has the highest concentration of industrial development in comparison with its circumpolar neighbors. The effects of this industrial development on indigenous livelihoods is profound, involving fragmentation, redesignation and contamination of indigenous lands, deforestation, landscape and soil destruction and erosion, flooding and/or draining of areas, and illegal poaching (IASC 2009).

The main objective in these mini-case studies is to examine both the commonalities and the diversity among northern Russia's indigenous peoples facing intersecting change factors. Particular emphasis is placed on how perceptions shape peoples' understandings and responses. This underscores the need to take into account local particulars to tease out changes due specifically to climate change.

4.1 Nenets

Nenets have practiced semi-nomadic reindeer pastoralism on the Yamal Peninsula, in the Soviet-period designated Yamal Autonomous Okrug (YAO) and in the Nenets Autonomous Okrug (NAO) of North West Russia, for at least the last millennium (Fedorova 1998). They are the largest indigenous peoples of the Russian North s within the RAIPON designation explained earlier, numbering 44,640 persons in the 2010 Russian Census. Their homelands are located in two of three oil and gas-rich areas of Russia. Of the three, the Yamal reserves are the largest and, in light of the Peninsula's accessibility by water, have received considerable attention from foreign oil interests (Stammler and Forbes 2006). Exploitation of these three reserve areas began in the Soviet period but was expedited in the post-Soviet context with the promise of foreign hard cash revenue. Largely as a result of this 'oil rush,' today Yamal Nenets' semi-nomadic reindeer pastoralist livelihood is threatened due to the many cascading effects of oil and gas development. The main issues here include: the fragmentation, contamination and reorganization of their pasturelands (Forbes and Kofinas 2000; Golovnev and Osherenko 1999), concomitant overgrazing associated with those land issues (Jernsletten and Klokov 2002), economic forces (Stammler 2005) and, in the background, perceptions and realities of global climate change (Bulgakova 2010; Stammler-Gossmann 2010). In addition to the changes resulting from oil and gas development, there are also issues of atmospheric and oceanic nuclear contamination in the NAO (Stammler-Gossmann 2010).

In addition to these more apparent changes, effects due to global climate change are certainly present and increasing. They include the overall warming and 'softening' (a term used to convey how extreme climates are affected) of the climate, abrupt weather patterns and unstable seasonal characteristics. The latter results in ice crusting that prevents reindeer from accessing their forage, variation in the freeze-thaw cycles of inland and sea-ice, the erosion of important travel routes and pasture areas, the arrival of new species and disappearance of existing ones, and an extension northward of the taiga (boreal) treeline (Bulgakova 2010; Stammler-Gossmann 2010). These changes interact with longer-term socio-economic and environmental changes to affect mobility which is a priority for success in reindeer pastoralism, breeding, forage access, and other resource access.

In addition to understanding the impediments that climate change presents to mobility and overall livelihood success, it is also critical to know how the herders themselves perceive these

changes, to the extent that their perceptions inform their responses. The brevity of this mini-case prevents exploration of the full range of perceptions that recent studies have detailed (Bulgakova 2010; Stammler-Gossmann 2010). However, reference is made to one of these studies because it is found in many climate change research projects focusing on local peoples and because of its importance for those interested in mitigation and intervention. This is the local tendency to explain changes in weather and climate in the context of a native cosmology, based on an animistic belief and practice in living and interacting within a sentient world. Consider, for example, this researcher's account:

> The informant told me about a recent tragedy, where due to heavy spring tides (a recent and frequent phenomena) and sudden spring warming, a big snow avalanche slipped from the flank of a hill in Priuralskij district in Yamal. The avalanche flow washed away an entire choom with all its dwellers resulting in the death of the herder's wife and all his children. Only the herder himself survived. But neither the herder, nor anyone else accused nature and climate for the tragedy. The people explained to the others that it happened because the victim obeyed the Protestant missionaries who advised him to burn his sacral sledge, where the herder kept his idols. (Bulgakova 2010: 85).

Similar instances can be found in other research investigating perceptions of climate change (Crate & Nuttall 2009). At first reading, this account may seem naïve to many. As has been argued before, many contemporary place-based peoples (indigenous and otherwise) live and work in the modern world but also maintain an understanding of the world based in their historical belief system, as recounted by Bulgakova's informant above. This is part and parcel of their adaptive strategy.

This makes perfect sense if it is recognized that subsistence-based peoples, and especially those who inhabit earth's more extreme environments, have developed very specific ways of adapting to those environments. They are prepared to adapt to changing situations based on first-hand knowledge of annual variance in both temperature and precipitation. They change their practices accordingly and also, because they understand the natural world to be inhabited by sentient beings, they will make the necessary appeals, either only on a conscious realm or through ritual acts. Failure to fulfill necessary rituals and other acts to the spirits and gods are often cited as the causes of calamities.

Any understanding of local perceptions of climate change needs to take into account how the affected peoples interpret changes in the weather and climate.

4.2 The Dolgan and Nganasan of the Taimyr Peninsula

> Soviet collectivization and industrial development in the Taimyr Region drastically affected indigenous migration and settlement patterns. Some groups were moved out of the area bordering the Noril'sk industrial zone, and in the remainder of the region the organization and utilization of hunting (*promyslovye*) and herding (*olenevodcheskie*) territories became an administered affair. Relationships to the land through formal allocation of hunting territories,

slaughtering points, and other forms of employment in a foodproducing economy are examples (Ziker 2003).

The mini-case of the Dolgan and Nganasan of the Taimyr Peninsula stands in stark contrast to the Nenets and Sakha in that both are relatively small groups (7,885 and 862 respectively according to 2010 Russian census), practice a hunting/fishing/trapping livelihood and inhabit an area less disturbed by industrial development. Both groups struggled in the post-Soviet context but their struggles were more about attaining and maintaining land rights than adapting to the loss of a large agro-industrial state farm infrastructure (Ziker 2003). Being hunting/fishing/trapping societies, they were essentially foragers of the natural world and highly reliant on mobility. Unlike both the Viliui Sakha and the Nenets reindeer herders discussed above, they did not own and keep animals but rather had to find them anew each time. Because of this, it could be argued that the forced settlement and collectivization of the Soviet period dealt them the largest blow in terms of migration and settlement patterns (Ziker 2003: 335). During this 70-year period, they were able to replace their adaptive need for mobility with an ability to remain settled. As a result, several generations of Dolgan and Nganasan developed careers in state-managed enterprises and technical jobs. After the fall of the Soviet Union, when the majority of those jobs disappeared, they once again had to adapt by returning to their pre-Soviet mobility. The main hurdle to this was access to land, due to the ways that land was attained by the state and reallocated in the Soviet period for collective and state enterprises. In tandem with the land issues of the post-Soviet period, Dolgan and Nganasan livelihoods, today still very much founded in mobility, are increasingly challenged by climate change.[18] Here we find similarities with both the Nenets and Sakha cases. First, inhabitants are reporting warmer springs with snow melt beginning as early as April rather than June when it used to melt abruptly. Secondly, spring rains now begin in April as opposed to June, which creates two problems: a) an icing over of the snow when it refreezes at night making it difficult for reindeer to reach their food sources; and b) the earlier draining of melt water through the watersheds, leading to lower water levels during breakup. This is problematic for several reasons. Historically, during breakup, ice dams were created which caused water to back up and flood the lowlands. These flood waters enabled native people, using canoes and boats, to get out to remote hunting spots, travel across portages to neighboring villages, etc. Without these levels of high water, such travel is either more difficult or impossible. Also, lower levels of water in the rivers during spring and summer makes it more difficult to ship foodstuffs and energy (diesel fuel, coal) to villages. Higher levels of water are needed to use the tug-boats and 100 ton barges necessary for the freight.

Another common observation is that in recent years summers have been longer, affecting fishing activities. Usually fishing for whitefish occurs under ice in late September. However, in recent years, the freeze up has been 2-3 weeks late, interfering with the whitefish run and because of changes in the river waters, inhabitants couldn't use summer fishing methods or under-ice methods. The main response of the Dolgan and Nganasan has been to pursue other hunting and fishing options. The regional government has made an effort to adapt the timing of shipping efforts so as not to coincide with the new fishing period. However, essential work to plan for the

[18] The observations noted in the following text were shared with me via personal communication by Dr John Ziker, in September of 2012.

increasing difficulties that inhabitants will encounter as climate change affects their livelihoods is lacking.

4.3 Chukotka- Chukchi and Siberian Yupik

One final mini-case, based on recent research looking specifically at relocation and resettlement in the Russian North,[19] suggests that we can understand the change from pre-Soviet livelihoods to Soviet ones as a change of 'spatial logic.'

> The Sovietization of the Russian North and the corresponding village relocations in Chukotka led to a collision of different forms of spatial practices, wherein a Soviet spatial logic was implanted on the traditional space usage of native sea mammal hunters and reindeer herders. In Chukotka, where native coastal settlements were located close to preferred subsistence sites, maximum access to subsistence resources, like drinking water, sea mammal migration routes, salmon runs, or plant gathering sites, was traditionally key in choosing the optimal site for a settlement. The Soviet era brought a diametrically opposed spatial logic to the region. For the Soviet economic planners and engineers, maximum infrastructural access to villages and state enterprises was one of the prime motivators for the concentration of the native population in centralized villages (Holzlehner 2012).

This passage succinctly captures the problem for many indigenous peoples of Russia in the post-Soviet context—pre-Soviet settlements were 'in place' to maximize subsistence success based upon their ancestral and evolving adaptation to an extreme ecosystem. Soviet spatial logic demanded a new definition of 'in place' as one where production would be maximized based upon the Soviet industrial and economic model. In 1991 that production model collapsed with the Soviet Union. Holzlehner includes a visual representation of that spatial change, showing how inhabitants had settled to maximize their subsistence success (Figure 9), and how the state had resettled them for concentrated production output (Figure 10):

[19] This is part of a larger effort looking at those issues within the circumpolar north (http://www.alaska.edu/move/)

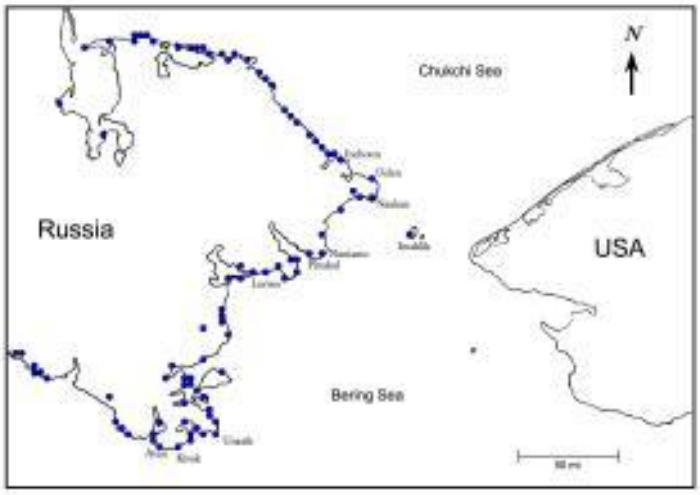

Figure 9: Select historic settlements on the Chukchi Peninsula 1900-1970 (Holzlehner 2011: 1961)

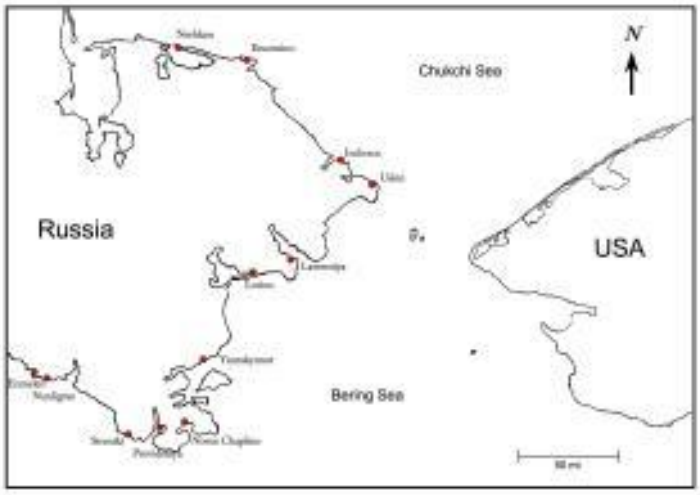

Figure 10: 2008 settlements on the Chukchi Peninsula (Holzlehner 2011: 1962)

Furthermore, Holzlehner explains that in the post-Soviet period, attempts to 'go back' to some semblance of pre-Soviet settlement and subsistence have failed, largely due to the difference that three generations makes in life expectations and consumerism. Having said that, the formerly closed villages have played an important role in post-Soviet subsistence. Individuals and groups have moved back to them to establish contemporary hunting bases due to the fact that they are ideally situated for that purpose. Several examples include the former villages of Nuniamo, Pinakul, Akkani (Holzlehner, personal communication).

Again, the Chukotka case stands in contrast to the others in that it is located in one of the furthest outlying areas of the Russian North with little, if any Soviet period industrial development that affects local populations. The main livelihood of the two native ethnic groups, Chukchi and Siberian Yupik (2010 Russian Census numbers them at 15,098 and 1,738 respectively), is sea

mammal hunting, which is highly dependent on sea ice and the seasonal changes of the coastal environment, which in turn triggers migratory routes.

How are the Chukotka inhabitants affected by climate change and how is this a factor in their mobility, relocation, resettlement and migration? Sea Ice Knowledge and Use (SIKU), a project of the 2007-2008 International Polar Year (IPY), looked at local knowledge of ice and change, predicated on the fact that local inhabitants' subsistence use of the natural environment was squarely dependent on understanding the various forms of and seasonal patterns in the ice regime. The project's work with Chukotka residents revealed that inhabitants observed an overall warming that dramatically affects ice and therefore their livelihoods (Krupnik 2010).

Although not specifically researching climate change, Tobias Holzlehner reports that the topic has come up in the process of his research on mobility. Based on interviews with coastal inhabitants along the Chukchi and Bering Sea, the main changes are:

1) the sighting of new fish species in coastal lagoons (e.g. Inchoun and Uelen) and in the open sea (e.g. shark sightings in the Chukchi Sea);
2) the observations of new diseases in sea mammals ("stinky whale" phenomenon), yet it remains unclear if this is related to climate change;
3) concerns about how the weather has become increasingly unpredictable; and
4) livelihood problems associated with the fact that ice appears now very late in the season.

In addition, Holzlehner's research also illustrates the interaction of various factors of change again signaling the need for a closer investigation to discern what is an effect of a changing climate and what is the result of other forces of change. For example, the pre-climate change advent of central heating plants and diesel generators in the villages correlates with the generally observed disappearance of walrus haul-outs (harvests) close to settlements along the Chukchi and Bering Sea coast. In contrast, the mass deaths of thousands of walrus in the summer of 2007 can be directly tied to global climate change as that summer the polar ice cap was at its minimum. Walrus starved that summer because they were forced to stay on the coast and therefore unable to dive for mollusks, due to the extreme retreat of a stable ice platform beyond the coastal shelf. Then, the walrus panicked, probably due to the airplanes and helicopters that circled in rescue mode and 4,000 walrus were trampled with direct consequences on the local hunting communities (Holzlehner, personal communication).

4.4 Concluding Remarks on the Mini-Cases and the interaction of various factors of change

The daily lives and livelihoods of indigenous peoples of northern Russia are affected by many factors, including climate change. In contrast to indigenous peoples of the rest of the circumpolar north, the specific historical legacy of the Soviet period plays a pivotal role in that mix. All the cases in Russia illustrate to some extent the interaction of various factors of change—be it the oil and gas development of the Yamal peninsula affecting Nenets' livelihoods, the restraints on hunters' mobility and access to wild resources of the Dolgan and Nganasan, or the relocation from optimal sea-mammal hunting camps and pastoral access of the Chukchi and Siberian Yupik. They each also highlight the effects of climate in that mix and how perceptions are based

in local understandings of how the world works and the intimate ties to the natural world that people have.

While there are other relevant cases demonstrating the interaction of climate and other change factors, such as the indigenous peoples of Kamchatka (Graybill *in press*) and the Yukagir (Willerslev 2009), this paper now turns to the question of how local issues can gain ground in policy and action.

5. THE INDIGENOUS RESPONSE AND THEIR RELATIONSHIP WITH GOVERNMENT

The indigenous response to the effects of a changing conflict and their relationship with the government is shaped by the historical legacy and particularly to three areas which remain underdeveloped: 1) the physical infrastructure and civil awareness of environmental protection; 2) a stable economy which is competitive in the world market; and 3) a democracy to delegate responsibility and decentralized power across a vast physical landscape. In terms of building democracy and civil society, in the years leading up to and the decades since the 1991 fall of the Soviet Union, there have been substantial efforts to develop and build citizen activism, non-governmental organizations, and other movements working to bring about grassroots change. This period was a crash course for concerned citizens in the concept and realization of civil society. While there were many accomplishments in these efforts, most were limited geographically to large urban centers, especially Moscow, and most enjoyed international funding support (Bradley 1997; Cook 2006).

5.1 Indigenous Response: Non-Governmental Organizations

One major development for Russia's indigenous peoples during that time was the establishment of the Russian Association of Indigenous Peoples of the North, Siberia and the Far East (RAIPON). In 2002, RAIPON's President, Sergei Haruchi, was quoted as saying, "Their (the 'small-numbered peoples') political representatives are engaged at the highest international levels" (Haruchi, 2002). Begun as a loosely knit congress of peoples in 1990, today this organization works specifically to protect the human rights of indigenous peoples of the North. Nationally, RAIPON works with the Russian Federation's State Duma (parliament) committees, Russian federal agencies and regional authorities. RAIPON is actively involved on the international level, most prominently, as a permanent participant of the Arctic Council, and also with the UN Human Rights Council, the UN Permanent Forum on Indigenous Issues, the World Bank, and the International Working Group of Indigenous Affairs (IWGIA). Through this international status, RAIPON has been successful in representing Russia's indigenous peoples in international agreements and meetings.

Although RAIPON has solid federal connections and, as an older NGO, is well established within Russia, they have not been able to improve the situation on the ground for Russia's indigenous peoples. While this is not intended as a criticism of RAIPON, it reflects the reality that indigenous issues are not high priority within the federal government as well as the fact that there is often confusion of who exactly RAIPON represents. Perhaps RAIPON's greatest

successes are in contexts where their representation is clear, especially their training programs for regional representative offices in communications, lobbying, and advocacy. While joining forces with international colleagues facing similar challenges[20] is in itself a huge accomplishment and can provide with valuable insights to learn from other countries with longer-standing traditions of civil society, the key to on-the-ground change for Russia's affected peoples is policy development and implementation.

> RAIPON's initial work on climate change impacts suggests an important way forward: indigenous observations of climate change must be examined together with greater emphasis given to the concerns of indigenous peoples in terms of environmental degradation and habitat loss due to other factors. A broader understanding of change and discussions on how to deal with this must be included in environmental impact assessments, in environmental policy, and in the elaboration of local programs for sustainable development. (Nuttall 2005: 680).

RAIPON has identified the necessary first step to inform policy as understanding the local effects and perceptions of climate change for Russia's indigenous peoples. RAIPON signed the 'Moscow Declaration: Industrial Development of the Arctic Under Climate Change' in April 2010 along with the other permanent participants of the Arctic Council. This document is mainly a human rights appeal and outlines how industry in the circumpolar regions needs to take into consideration human rights protections and implications of climate change for indigenous peoples to allow them to continue their historically-based livelihood practices in tandem with development. So far it has been difficult to assess the impact of this agreement on the Russian North.

One of RAIPON's structures, the Centre for Support of Indigenous Peoples of the North (CSIPN), competed for and won funding from the World Bank for a project to "gather, systematize and analyze the facts of climate change, to combine the materials with traditional knowledge and make an initial step to developing adaptation plans to mitigate climate change adverse impacts to traditional living." The project began in 2010 and runs through December 2012. To date the work has included educational seminars, roundtable discussions, stakeholder meetings to develop preliminary adaptation plans, and participation in the 2011 International Scientific Conference, "Problems of Adaptation to Climate Change" held in Moscow.[21] Not unlike other academic research initiatives, the direct impact of these activities on policies often seem unclear. However, there are 'less tangible' effects, including awareness-raising and development of a vocabulary for talking about these issues – such as climate change, adaptation, resilience and vulnerability – which may affect policy down the road.

[20] The permanent members are all representatives of indigenous peoples' organizations of the other circumpolar countries.

[21] http://www.pacc2011.ru/

5.2 Indigenous Response: Research Collaborations

Other successes include collaboration between local communities and researchers. For example, researchers worked with Yamal-Nenets communities and indigenous activists to help pass three federal laws that (at least theoretically) protect indigenous economic activity in the North from the effects of industrial development, "One guarantees the rights of indigenous minorities, the second one stipulates the establishment and tasks of indigenous community enterprises (*obshchiny*), and the third deals with "territories of traditional nature use" (*territorii traditsionnogo prirodopol'zovania*)." (Stammler & Forbes 2006). The success of this initiative is attributed to agreement among a majority of stakeholders about the negative effects of oil and gas development on indigenous livelihoods.

In addressing climate change, some stakeholders are skeptical and others lack understanding. For example, in the case of examining the effects of climate change for reindeer-herders, Russian officials and scientists tend to neglect the topic while affected communities do not have enough understanding of how this global phenomenon affects local contexts, to bring it to the fore in meetings, congresses or mass media (Bulgakova 2010: 84). Take for example the testimony shared here: 'When in the congresses, Nenets people argue about the deficiency of winter pastures', the reindeer herder Denis says, 'they affirm that it is caused by building roads in the territory of pastures and by extracting oil there. They also say that the oil production enterprises receive good benefits from their industry, but they pay too little to them, to the native people who live here.' 'Why [don't] our native people say anything in such meetings about climate change, about what is happening in nature itself?' wonders Denis. 'Maybe some of them do not realize how much it harms the reindeer husbandry. Maybe they do not pay enough attention to it, do not feel it in the right way, do not observe it well, I do not know!'(ibid).

These assessments of the causes of local change echo findings found in this research in which Viliui Sakha inhabitants observed changes in their environment and understood its effects on their livelihoods, but attributed most of the cause of the changes to sources other than climate change. While other factors are indeed contributing factors, climate change is an all-pervasive driver of local change, as confirmed by collaboration with regional in-country scientists. Without an understanding of the way climate change interacts with those other changes, local inhabitants cannot fully grasp the immediate and long-term implications of change. At the same time, inhabitants possess detailed, ecosystem-specific local expertise on how their immediate place, livelihoods and lands were and are affected, an invaluable source of knowledge for our regional scientific colleagues and for this research. To take full advantage of these dynamic knowledge systems, 'knowledge exchanges' were initiated in the summer of 2010, to bring two groups into dialogue: inhabitants' with their experience of change in their livelihoods and communities and regional scientific experts who could describe the effects of climate change, particularly the degradation of permafrost systems (Crate *under review* B). These exchanges were supported with baseline data from Viliui communities on perceptions, understandings and responses to local change and by documented climate change data from regional scientists. By bringing these knowledge sources into dialogue, an 'enabling environment' was created (Stammler and Wilson, 2006) for the integration of local and scientific understandings. The process worked to build a certain level of community verification and consensus on observations of change—a sort of village-level 'environmental change support group.'

Considering the future projections of climate change effects, the need to integrate knowledge systems for a more holistic understanding across stakeholder groups is critical. Regional scientific information translated into the local vernacular gives individuals and households insight into the change process and guidance on preparing for the future. In other words, human and community adaptive response is enhanced with a more holistic understanding of risk (Mozumder, 2009; Briggs, 2003; Daley et al., 2006; Lowe, 2010). Additionally, sharing concerns in an 'enabling environment,' brings people together and is an essential first step in strengthening social and community cohesion (Duhaime et al., 2004; Kingston and Marino, 2010). The inhabitants' intimate ecosystem knowledge can inform the science and policymaking communities about how global climate change is affecting the locales and inhabitants under their policy purview and thereby aid in developing an advocacy base and appropriate policy decisions. Bridging the abyss of research-to-policy is never easy and this challenge is even greater within Russia (Crate, 2006b; Forbes and Stammler, 2009; Stammler-Gossman, 2010).

6. RECOMMENDATIONS OF WHAT SHOULD BE DONE BY COMMUNITIES, GOVERNMENTS AND OTHER BODIES

> Co-operation on climate change was identified as a priority area in the EU–Russia "Partnership for Modernization". The EU hoped climate change was an apolitical area in which the chance of co-operation would be higher. There is some co-operation between the EU and Russia. But when Russian commercial interests are threatened, this cooperation disappears. Russia has not yet really overcome its climate-change skepticism. In particular, it continues to exploit its vast forests to claim a special status in the global climate change regime. In September, Russia joined forces with China to denounce the European Emissions Trading Scheme (ETS), claiming it violated national sovereignty and was a breach of the Chicago Convention. Russian airlines are likely to refuse to pay EU gas-emission fees. Russia shows no sign of moderating its drive to target energy resources in the Arctic. The EU is still pushing for a cap and trade system for greenhouse gas emissions and a tax on CO2 emissions and energy content.[22]

As this recent scorecard poignantly communicates, there are huge forces blocking efforts to increase research in local contexts to enhance knowledge, understanding and adaptive capacity for Russia's northern inhabitants. However, international experience has repeatedly emphasized the importance of community-based knowledge and response in bringing about lasting change. Take as one example the words of Wangari Maathai, Kenyan environmentalist and political activist,

> The problems of Africa are shadowed for the rest of the world. There is a problem here and it is deforestation. If you do not address the environmental situation you address nothing ... ***And until the village people understand the problem, the problem will not be solved.***" (Williams 2012: 100)

[22] http://www.ecfr.eu/scorecard/2012/russia/24

Although its geopolitical and socio-cultural legacies make it unlikely that Russia and its inhabitants will soon realize the village-level understanding promoted by Maathai, the small successes in building community activism and knowledge give cause for hope. Additionally, circumpolar research increasingly demonstrates the variety in academic and political discourse on change between Arctic nations, opening up the potential for Russia and its indigenous peoples to move forward (Forbes and Stammler 2009). In that vein, the following section presents recommendations for different stakeholders.

6.1 Recommendations for community response

> It is within this extremely complex socio-economic and changing ecological situation that indigenous peoples in the Russian North must deal with climate change issues. RAIPON's initial work on climate change impacts suggests an important way forward: indigenous observations of climate change must be examined together with greater emphasis given to the concerns of indigenous peoples in terms of environmental degradation and habitat loss due to other factors. A broader understanding of change and discussions on how to deal with this must be included in environmental impact assessments, in environmental policy, and in the elaboration of local programs for sustainable development (Nuttall 2005).

The cases presented in this paper show that communities respond to both local and regional actors who provide a bridge to relevant knowledge. They also respond to research activities that are built on trust and mutual understanding. In both cases, these relationships have the potential to inform broader policy initiatives. Similarly, NGOs like RAIPON, working on issues specific to the minority peoples of Russia, can also serve a vital link to policy and government. However, the cases also demonstrate that community response often requires a learning process. Projects that have been successful in providing such learning experiences can be used as models to bring about a change in mindset of community ownership of lives and livelihoods. With those skills in place, communities need first to be able to understand how the effects of climate change on their present and future livelihoods are at play in daily life. They also need to be able to discern how climate change interacts with various change factors in their lives. This understanding should then serve as a base for communities to become more assertive with their local, regional and federal representatives about the effects of climate change and in, particular, the likelihood that they might in the future have to relocate as a result of loss of livelihoods.

6.2 Recommendations for government response

It would be too extreme to say that Russia's federal government is in climate denial, considering how far official policies have come in establishing climate change as a federal policy problem.[23] While there are still murmurs in federal boardrooms of 'scientific uncertainties' and still many skeptical voices in Russia's media (not unlike in the US), the policy discourse has shifted from discussing causes of climate change to debating its economic and political costs and benefits. One example of this change in federal mindset and climate change's place on the policy agenda

[23] for example, see the 2009 Climate Doctrine http://archive.kremlin.ru/eng/text/docs/2009/12/223509.shtml

is Russia's 2009 Climate doctrine and 2011 action plan. The doctrine focuses on questions of adaptation and preparedness with much less attention to mitigation and international relations (Wilson Rowe 2011). It is a matter of speculation whether this emphasis on adaptation is because the government knows its priorities or because mitigation is more difficult to implement. However, the country's economy is based on non-renewable resources and, as is well-known, global climate change mitigation efforts may threaten that base.

Another hurdle in Russia is effective implementation of federal policies. Within Russia's centralized government system, the implementation of policies requires the cooperation of regional and local actors. This cooperation at the regional and local levels often requires action by quite senior central actors. (Wilson Rowe, personal communication). Like other powerful nation-states, concerted attention to climate change adaptation domestically by federal decision-makers may only come in the event of a major disaster.

But as in the case of other countries where federal bodies are less active on climate change issues, Russian governmental bodies at the regional level have been more responsive. Regional bodies are more directly related to climate change's effects on their constituents and thus are more quickly coming to terms with the reality of climate change and its impact on their area. The examples in the Sakha Republic, specifically the early-warning emergency evacuation system and the government's efforts to relocate critical settlements (although not without shortcomings), are signs of government response which need to be supported and built upon.

Furthermore, at both the federal and regional governmental levels, there is a great need for sharing experiences with international counterparts, particularly in the areas of: 1) how to govern and redesign policy that accommodates indigenous livelihoods in the face of climate change, including implications for relocations and resettlements; 2) how to develop and sustain interdisciplinary research collaborations that bring together in-country and international natural and social science scholars for community-based projects to address issues of climate change and displacement;[24] 3) further promote collective action/advocacy by Arctic indigenous peoples; 4) how to create an 'enabling environment,' not only on the local level, as cited above, but also inclusive of research and policy communities to promote understanding and thereby a greater capacity for action.

Action in all three of these areas will bring a greater recognition among various stakeholders of the implications of climate change for affected populations' livelihoods, their potential to adapt and the various options in the case of relocation. Additionally, work in these areas will promote broad public education on climate change and its effects on livelihoods. This in turn will serve to promote climate literacy for populations who are not immediately threatened but will need to deal with the implications of climate change in the near future.

6.3 Recommendation of what should be done by other bodies

Three general recommendations are offered here, the first based on my direct experience as an anthropologist, the second as a transdisciplinary scholar and the third as the author of this paper for the Brookings Institution. Anthropology has unique roles to play in the policy debate on these

[24]One key example here is the Polaris project http://www.whrc.org/education/polaris.html

issues(Crate & Nuttall 2009), most notably in understanding the ways that climate change renders locales uninhabitable and thereby generates "disasters" (Button & Peterson 2009, Oliver-Smith 2009). Anthropolgists are pursuing ways to understand and bring social science into interdisciplinary efforts. One prime example of such an interdisciplinary effort is the Waterworlds project,[25] headed by Kirsten Hastrup at the University of Oslo. This group's work strives to humanize the concept of resilience, characterizing it as "...an emergent quality of all responsible social action; it is the rule and not the exception of social life, given that all societies must demonstrate a degree of flexibility to operate and ultimately to survive ... Resilience, therefore, is not simply a question of systemic (social and cultural) adaptation to external factors, but a constitutive element of any working society" (2009: 28).

Beyond bringing anthropology's insights and understandings of climate change into interdisciplinary dialogue, many are calling for anthropologists to bring their work and expertise outside the academy to contribute to a new disaster-related public anthropology (Kelman and Gaillard 2010). Because displacement and migration are related to governance, resource rights, and politics on both domestic and international levels, anthropologists, provide a critical link to international institutional initiatives by focusing on disaster and displacement. For example, the United Nations University (the UN's academic arm) has conducted studies on how local populations are affected and respond to the interactions of environmental and social vulnerability (Oliver-Smith and Shen 2009).

There is an urgent need for a comprehensive effort to effectively bring an understanding of global climate change and its future implications to all people. Global climate change not only affects us all, but in which we all bear some responsibility (Leduc and Crate *in press*). Progress in increasing global understanding will come about through the efforts of individuals and groups who apply their expertise and experience, to bring about change on local and regional levels.

Lastly, I recommend that influential think tanks, like the Brookings Institution, continue this new focus on the effects of global climate change on circumpolar indigenous peoples' mobility, with particular attention to the effects of climate change on livelihoods. A fair amount isknown about how livelihods are affected and about what relocations mean to communities. Experiences in Arctic communities such as Alaska and Siberia can contribute to the development of sound regional and national policies and international commitments. In the words of the late renowned environmentalist, Barry Commoner, "Everything is Connected to Everything Else. There is one ecosphere for all living organisms and what affects one, affects all" (Commoner 1971). A broader education effort is needed to communicate why the rest of the world should be concerned about what is happening in the Arctic.

7. CONCLUDING REMARKS

The late Elinor Ostrom's words poignantly ring true in the context of understanding mobility, displacement and relocation for Russia's northern indigenous peoples and the need to draw

[25] http://waterworlds.ku.dk/

connections between global phenomena and local communities.

> Acknowledging the complexity of global warming, as well as the relatively recent agreement among scientists about the human causes of climate change, leads to the recognition that waiting for effective policies to be established at the global level is unreasonable. Instead, it would be better to self-consciously adopt a multi-scale approach to the problem of climate change, starting at the local level. This approach serves to maximize the benefits at varying levels and encourages experimentation and learning from diverse policies adopted at multiple scales. Currently, efforts to address climate change are being orchestrated primarily by global actors, but waiting for international solutions is wasting valuable time. Conventional wisdom tells us that there are only two options to deal with managing resources: either privatization or management by the state. This view is hindering progress. To successfully address climate change in the long run, the day-to-day activities of individuals, families, firms, communities, and governments at multiple levels—particularly those in the more developed world—will need to change substantially. Encouraging simultaneous actions at multiple scales is an important strategy to address this problem (Ostrom 2010).

In this paper, I have argued that northern Russia's indigenous peoples' livelihoods, like those of other place-based peoples of the world, are increasingly challenged by environmental changes due to the pervasive effects of global climate change and that these environmental changes interact with other change factors. It is the ethical and moral imperative of those in, as Ostrom describes, the 'more developed world' to make substantial changes at multiple scales and to engage multiple actors. Those of us working in the field of knowledge-generation have the responsibility to use this knowledge to engage key actors. In the context of the case of Russia's northern indigenous peoples, the questions posed at the beginning of this paper remain. Murashko's statement still holds—nothing is being done and no one is studying this problem, at least on the Federal level. External actors should consider ways of 'bypassing the state' or at least of being wary of projects that focus largely on state actors, where the state is not effective on issues such as mobility and livelihood of Russia's indigenous peoples in the face of climate change.

This analysis has shown that Russia's northern inhabitants share a common historical legacy of Russian colonization, Sovietization and de-Sovietization, and that these processes worked both to hamper their adaptive flexibility founded on mobility and also to remove them from the resources and land rights they needed to pursue their livelihoods. They also share a common plight of being 'entangled' in other changes including the industrial contamination of their homelands, results in the loss of land and resources; the implications of internal economic transformations from a feudal to a command to a market system; the effects of globalization and modernity on rural livelihoods; and the alienation of the next generation from their ancestral livelihood practices.

The ethnographic lens used herein shows how these common issues play out in very different ways on the local and regional levels. It is through this 'close-up' view that the reality of human communities as 'complex adaptive systems' comes to life.

8. REFERENCES CITED

ACIA (Arctic Climate Impact Assessment). 2005. AMAP, IASC, Cambridge: Cambridge University Press.

Basso, Keith H. 1996. Wisdom sits in places: landscape and language among the Western Apache. Albuquerque: University of New Mexico Press.

Black, B., N. Adger, N. Arnell, S. Dercon, A. Geddes, and D. Thomas. 2011. The effect of environmental change on human migration. *Global Environmental Change*. 21S: S3-S11.

Bolotova, A. and Stammler, F. 2010. How the North became home. Attachment to place among industrial migrants in Murmansk region. In Migration in the Circumpolar North: New Concepts and Patterns, C. Southcott and L. Huskey, eds. Edmonton, Alberta, Canada: Canadian Circumpolar Institute Press, University of Alberta.

Bogoyavlenskiy, D. and A. Siggner. 2004. Arctic Demography, In Níels Einarsson. 2004. Arctic human development report. Akureyri: Stefansson Arctic Institute, 27-41.

Bradley, Joseph. 1997. State and civil society in Russia: the role of nongovernmental associations. Washington, D.C.: National Council for Soviet and East European Research.

Briggs, C. L. 2003. Why nation-states and journalists can't teach people to be healthy: power and pragmatic miscalculation in public discourses on health. Medical Anthropology Quarterly, 17: 287–321.

Bulgakova, Tatiana. 2010. Ch 4: Climate Change, Vulnerability and Adaptation Among Nenets Reindeer Herders. In G.K. Hovelsrud, B. Smit, eds., Community Adaptation and Vulnerability in Arctic Regions, DOI 10.1007/978-90-481-9174-1_6, ! Springer Science?Business Media B.V.: 83-105.

Button G, Peterson K. 2009. Participatory action research: community partnership with social and physical scientists. See Crate & Nuttall 2009, pp. 327-40.

Cook, Linda J., and Elena Vinogradova. 2006. NGOs, civil society, and social policy in Russia's regions. Washington, D.C.: National Council for Eurasian and East European Research.

Commoner, Barry. 1971. The Closing Circle: Nature, Man, and Technology New York: Knopf.

Crate, Susan A. 2002 Co-option in Siberia: The Case of Diamonds & the Vilyuy Sakha. *Polar Geography*, 26(4): 289-307.

_____. 2003 The Legacy of the Viliui Reindeer Herding Complex. *Cultural Survival Quarterly*, 27(1): 25-27.

_____. 2006a. Elder knowledge and sustainable livelihoods in post-Soviet Russia: Finding dialogue across the generations. Arctic Anthropology. 43(1): 40-51.

_____. 2006b. Cows, kin and globalization: An ethnography of sustainability. Walnut Creek: Alta Mira Press.

_____. 2008: Gone the bull of winter: Grappling with the cultural implications of and anthropology's role(s) in global climate change. *Current Anthropology*, 49(4): 569-595.

2011a Climate and Culture: Anthropology in the Era of Contemporary Climate Change. *Annual Review of Anthropology* 40(1): 175-194. doi: 10.1146/annurev.anthro.012809.104925.

2011b A Political Ecology of *Water in Mind*: Attributing Perceptions in the Era of Global Climate Change. *Weather, Climate and Society*. Vol 3 (publication date July 2011)

Crate *under review* A, An Ethnography of Change in Northeastern Siberia: Whither an Interdisciplinary Role?, American Ethnologist.

Crate *under review* B, Knowledge exchanges_Arctic.

Crate, S. A., and M. Nuttall, eds., 2009: Anthropology and Climate Change: From Encounters to Actions. Left Coast Press, Walnut Creek.

Crumley, C.L. 2012. A Heterarchy of Knowledges: Tools for the Study of Landscape Histories and Futures. In T. Plieninger and C. Bieling, eds., *Resilience and the Cultural Landscape: Understanding and Managing Change in Human-Shaped Environments* (pp. *forthcoming*). Cambridge, U.K.: Cambridge University Press.

Daley, C., James, A., Barnoskie, R., Segraves, M., Schupbach, R. and Choi, W. 2006. "Tobacco has a purpose, not just a past": Feasibility of developing a culturally appropriate smoking cessation program for a pan-tribal native population. Medical Anthropology Quarterly, 20: 421–440.

Duhaime, G., Searles, E., Usher, P., Myers, H., and Frechette, P., 2004. Social cohesion and living conditions in the Canadian Arctic: From theory to measurement. Social Indicators Research 6(63): 295-318.

Fedorov, A., and Konstantinov, P. 2009. Response of permafrost landscapes of

central Yakutia to current changes in climate and anthropogenic impacts. Geography and Natural Resources 30(2): 146-150.

Fedorov, A., and Konstantinov, P. 2008. Recent changes in ground temperature and the effect on permafrost landscapes in Central Yakutia. In: 9th International Conference on Permafrost, Kane and Hinkel, eds. Institute of Northern Engineering, University of Alaska, Fairbanks, 433-438.

Fedorov, A., and Svinoboev, A. 2000. Recent dynamics of cryogenic landscapes of Central Yakutia. Science and education 19(3): 15-18. in Russian.

Fedorova, N. ed., 1998. Ushedshie v kholmy (Gone to the hills: culture of the coastal residents of the Yamal Peninsula during the Iron Age). History and Archaeology Institute, Ekaterinburg.

Ferris, Elizabeth. 2012. Protection and Planned Relocations in the Context of Climate Change. Geneva: UNHCR.

Fillipova, Victoria. 2011. Социальные вызовы периодических наводнений в Якутии (The Social Challenge of Periodic Flooding in Yakutia). *Arctic and the North.* 4: 1-5.

Forbes, B.C. and G. Kofinas, eds., 2000.The human role in reindeer/caribou grazing systems. Polar Research, 19: 1–142.

Forbes, B.C. and F. Stammler. 2008. Arctic climate change discourse: the contrasting politics of research agendas in the West and Russia. *Polar Research* 28-42 doi:10.1111/j.1751-8369.2009.00100.x

Forsyth, James. 1992. A History of the Peoples of Siberia. Cambridge: Cambridge University Press.

Goble, Paul. 2009. Window on Eurasia: Climate Change Hitting Russia's Northern Peoples First and Hardest, Experts Say. http://windowoneurasia.blogspot.com/2009/12/window-on-eurasia-climate-change.html

Gogolev, Anatolii I. 1986. *Istoricheskaia Etnografiia Iakutov: Voprosy proikhozhdeniia iakutov* (Historical Ethnography of the Sakha: The Question of Sakha Origins). Yakutsk: Yakutsk State University Press.

Golovnev, A.V. and G. Osherenko, 1999. Siberian Survival: the Nenets and their Story. Cornell University Press.

Graybill, Jessica. *In press.* Imagining resilience: Situating perceptions and emotions about climate change on Kamchatka, Russia, Geoforum.

Gregory, T.A. 2006. An evolutionary theory of diversity: The contributions of grounded theory and grounded action reconceptualizing and reframing diversity as a complex phenomenon. *World Futures, 62,* 542–550.

Hanson, Philip, and Michael Bradshaw. 2000. *Regional Economic Change in Russia.* Cheltenham, UK and Northampton, MA: Edward Elgar.

Harding, Luke. 2009. Climate change in Russia's Arctic tundra: 'Our reindeer go hungry. There isn't enough pasture'. Guardian, 10/20/2009. http://www.guardian.co.uk/environment/2009/oct/20/arctic-tundra.

Haruchi, S. 2002. Our life and future are in our hands. In Køhler, T., and Wessendorf, K. eds., *Towards a New Millennium: Ten Years of the Indigenous Movement in Russia,* IGWIA, Copenhagen, pp. 34–48.

Hastrup, K., ed. 2009. *The Question of Resilience: Social Responses to Climate Change*. Copenhagen: The Royal Danish Academy of Sciences and Letters.

Heleniak, Timothy. 2009a. Growth Poles and Ghost Towns in the Russian Far North, in, Wilson Rowe, Elana, ed. Russia and the North. Ontario: University of Ottawa Press : 129-163.

Heleniak, Timothy E. 2009b. 'The role of attachment to place in migration decisions of the population of the Russian North',Polar Geography,32:1,31-60.

_____. 2010. Population Change in the Periphery: Changing Migration Patterns in the Russian North. Sibirica, Vol. 9, No. 3, Winter 2010: 9–40.

_____. 2012. International Comparisons of Population Mobility in Russia. *International Journal of Population Research* Volume 2012, Article ID 361497, 13 pages doi:10.1155/2012/361497

Hoffecker, John F., W. Roger Powers and Ted Goebel. 1993. The Colonization of Beringia and the Peopling of the New World. *Science* 259(5091): 46-53.

Holzlehner, Tobias. 2011. Chapter 108: Engineering Socialism: A History of Village Relocations in Chukotka, Russia, In Brunn, Stanley D. 2011. Engineering Earth the impacts of megaengineering projects. Dordrecht: Springer. http://site.ebrary.com/id/10459343.

Holzlehner, Tobias. 2012. Moved by the State and Left Behind: Histories of village relocations in Chukotka, Russia. http://www.alaska.edu/move/result/chukotka/.

IASC (International Arctic Science Committee). 2009. Climate change impacts on Indigenous peoples of the Russian North. In: Encyclopedia of Earth. Eds. Cutler J.

Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth September 28, 2009; Last revised Date August 2, 2012; Retrieved September 18, 2012 http://www.eoearth.org/article/Climate_change_impacts_on_Indigenous_peoples_of_the_Russian_North?topic=71691.

Iijima, Y., Fedorov, A., Park, H., .Suzuki, K., Yabuki, H., Maximov, T., and Ohata, T. 2010. Abrupt increases in soil temperatures following increased precipitation in a permafrost region, central Lena river basin, Russia. Permafrost and Periglac. Process. 21: 30–41.

IPCC 2007 Climate change 2007: Impacts, adaptation and vulnerability. Working Group II Summary for Policymakers. Geneva: IPCC Secretariat. Accessed 2/17/12. http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf.

Jernsletten, J.-L. and K. Klokov, 2002. Sustainable Reindeer Husbandry. Arctic Council/Centre for Saami Studies,Tromsø.

Kelman I, Gaillard J. 2010. Challenges and opportunities of disaster-related public anthropology. *Asian J. Environ. Disasters* 1(2): 117--37

Kingston, D., and Marino, E. 2010. Twice removed: King Islanders' experience of "community" through two relocations, Human Organization. 69(2):119-128.

Krankina, O.I., R.K.Dixon, A.P.Kirilenko and K.I.Kobak. 1997. Global Climate change adaptations: Examples from Russian Boreal forests. *Climatic Change* 36: 197-216.

Krupnik, Igor. 1993 *Arctic Adaptations*. Dartmouth: University Press of New England.

Krupnik, Igor. 2010. SIKU knowing our ice: documenting Inuit sea ice knowledge and use. Dordrecht: Springer.

Ksenofontov, G. V. 1992 (1937). *Uraangkhai Sakhalaar,* (Points in Ancient History of the Yakut (Sakha) 2nd ed., vol. 2. Yakutsk: Natsinal'noye Izdatel'stvo.

Law of the Russian Federation. 1999. No. 82-F3 (30 April) "O garantiiakh prav korennykh malochislennykh narodov RossiiskoiFederatsii" ["About guarantees of rights for the small numbering peoples of the Russian Federation"].

Leduc, T. and S Crate. *In press.* Reflexive Shifts in Climate Research and Education: Towards Relocalizing our Lives. *Nature and Culture.*

Lovejoy, Thomas E., and Lee Jay Hannah. 2005. Climate change and biodiversity. New Haven: Yale University Press.

Lowe, C. 2010. Viral clouds: Becoming H5N1 in Indonesia. Cultural Anthropology, 25: 625–649.

MA (Millennium Ecosystem Assessment). 2005a. *Ecosystems and Human Well-being: Current State and Trends*. Volume1, Island Press, Washington, DC.

Maak, R.K. 1994. *Viliuiski Okrug* (The Viliui Okrug). 2nd edition. Moscow:Yana.

Marino, Elizabeth. 2012. The long history of environmental migration: Assessing vulnerability construction and obstacles to successful relocation in Shishmaref, Alaska. *Global Environmental Change.* 22: 374-381.

McGovern, Thomas. 1980. Cows, Harp Seals, and Churchbells: Adaptation and Extinction in Norse Greenland. *Human Ecology* 8(3): 245-275.

Mozumder, P., Helton, R. and Berrens, R. P. 2009. Provision of a wildfire risk map: Informing residents in the wildland urban interface. Risk Analysis, 29: 1588–1600.

Norton, B. G., and B. Hannon, 1997: Environmental values: A place-based theory. *Environmental Ethics*, 19(3), 227-245.

Nuttall, Mark, 2005. Ch 12: Hunting, Herding, Fishing, and Gathering: Indigenous Peoples and Renewable Resource Use in the Arctic. In ACIA (Arctic Climate Impact Assessment). 2005. AMAP, IASC, Cambridge: Cambridge University Press.

Nuttall, M., 2004: Epilogue: Cultivating arctic landscapes. In *Cultivating Arctic Landscapes*, D. G. Anderson and M. Nuttall, eds. Berghahn Books, New York, 200-209.

Nygren, A., 1999: Local knowledge in the environment-development discourse: from dichotomies to situated knowledge's. *Critique of Anthropology*, 19(3), 267-88.

Okladnikov, A.P. 1970. *Yakutia*. Montreal: McGill-Queens.

Oliver-Smith, Tony. *In press*. An article forthcoming in Nov 2012.

Oliver-Smith A. 2009. Climate change and population displacement: disasters and diasporas in the twenty-first century. See Crate & Nuttall 2009, pp. 116-36

Oliver-Smith A, Shen X, eds. 2009. *Linking Environmental Change, Migration and Social Vulnerability*. Bonn: United Nations Univ.

Ostrom, Elinor. 2010. A Multi-Scale Approach to Coping with Climate Change and Other Collective Action Problems. *Solutions*. 1(2): 27-36. http://www.thesolutionsjournal.com/node/565.

Perelet, Renat, Serguey Pegov and Mikhail Yulkin. 2007. Climate Change Russia Country Paper. UNDP Occasional Paper. http://hdr.undp.org/en/reports/global/hdr2007 2008/papers/perelet_renat_pegov_yulkin.pdf.

Rawlins, M.A. C. J. Willmott, A. Shiklomanov, E. Linder, S. Frolking, R. B. Lammers, and C. J. Vo¨ro¨smarty. 2006. Evaluation of trends in derived snowfall and rainfall across Eurasia and linkages with discharge to the Arctic Ocean. *Geophysical Research Letters* 33: L07403, doi:10.1029/2005GL025231

Roshydromet. 2008. Assessment report on climate change and its consequences in the Russian Federation. Moscow: ROSHYDROMET.

ROSSTAT, 2006, Chislennost' i migratsiya naseleniya Rossiyskoy Federatsii v 2005 godu: Statisticheskiy byulleten' [Number and Migration of the Population of the Russian Federation in 2005: Statistical Bulletin] (Moscow: Federal'naya Sluzhba Gosudarstvennoy Statistiki (Rosstat)).

Seroshevski, V.L. 1993 [1896]. Yakuti (The Yakut). Moscow: ROSSPEN.

Shaw, Dennis. 1991. Russia in the Modern World: A New Geography. Oxford: Blackwell.

Skachkov, Y.B. 2005. Trends of recent air temperature changes in Sakha Yakutia Republic. In: Studies of cryogenic region landscapes. Problems of geography of Yakutia 9: 27-31. in Russian.

Slavin, S. V. 1972. *Sovetskii Sever* [The Soviet North]. Moscow: Prosveshchenie.

Slezkine, Yuri. 1994. Arctic mirrors: Russia and the small peoples of the North. Ithaca: Cornell University Press.

Sommerkorn, Martin, and Neil Hamilton. 2008. Arctic climate impact science: an update since ACIA. Oslo: WWF International Arctic Programme.

Stammler, F. 2005. Reindeer nomads meet the market. Culture, property and globalisation at the 'end of the land'. Muenster: Litverlag.

Stammler, F., and B. Forbes. 2006. Oil and gas development in Western Siberia and Timan-Pechora. Indigenous Affairs. (Arctic oil and gas development) 2–3: 48–57.

Stammler, Florian & Emma Wilson 2006. "Dialogue for development: an exploration of relations between oil and gas companies, communities and the state" in: *Special issue on the oil and gas industry local communities and the state*, edited by Emma Wilson and Florian Stammler. Sibirica vol 5 issue 2, 2006, Oxford / New York: Berghahn, pp. 1-42.

Stammler-Gossman, Anna. 2010. Chapter 6 ‘Translating’ Vulnerability at the Community Level: Case Study From the Russian North. In G.K. Hovelsrud, B. Smit (eds.), Community Adaptation and Vulnerability in Arctic Regions, DOI 10.1007/978-90-481-9174-1_6, ! Springer Science?Business Media B.V. : 131-162.

Tichotsky, John. 2000. Russia's diamond colony: the Republic of Sakha. [Amsterdam, the Netherlands]: Harwood Academic.

Tugolukov, V.A.1985. *Tungusy Srednei i Zapadnoi Sibiri* (Tungus of Middle and Western Siberia). Moscow: Nauka.

Varese, F. 2007. The Russian Conundrum: Growing Economy, Failing Society. *Dissent*. http://www.dissentmagazine.org/article/?article=768.

Verho, A, T. Laatikainen, E. Vartiainen, and P. Puska. 2012. Changes in Alcohol Behaviour among Adolescents in North-West Russia between 1995 and 2004, Journal of Environmental and Public Health, v. 2012, Article ID 736249, 7 pages, 2012. doi:10.1155/2012/736249.

Vlassova, T.K., 2002. Human impacts on the tundra - taiga zone dynamics: the case of the Russian Lesotundr.

Warner, K, M. Hamza, A. Oliver-Smith, F. Renaud, A. Julca. 2010. Cimate change, environmental degradation and migration. *Natural Hazards*. 55: 689-715.

Wessendorf, Kathrin. 2005. An indigenous parliament?: realities and perspectives in Russia and the circumpolar north. Copenhagen: IWGIA.

Willerslev, Rane. 2009. Hunting the Elk by Imitating the Reindeer: A Critical Approach to Ecological Anthropology and the Problems of Adaptation and Resilience among Hunter-Gatheres. In Hastrup, K., ed. (2009). *The Question of Resilience: Social Responses to Climate Change*. Copenhagen: The Royal Danish Academy of Sciences and Letters: 271-292.

Williams, Terry Tempest. 2012. When women were birds: fifty-four variations on voice. New York: Sarah Crichton Books.

Wilson Rowe, Elana. 2011. Encountering Climate Change. In: Julie Wilhelmsen and Elana Wilson Rowe, eds. Russia's Encounter with Globalization. New York: Palgrave: 40-70.

Ziker, John. 2003. Assigned Territories, Family/Clan/Communal Holdings, and Common-Pool Resources in the Taimyr Autonomous Region, Northern Russia. *Human Ecology*. 31 (3): 331-367.