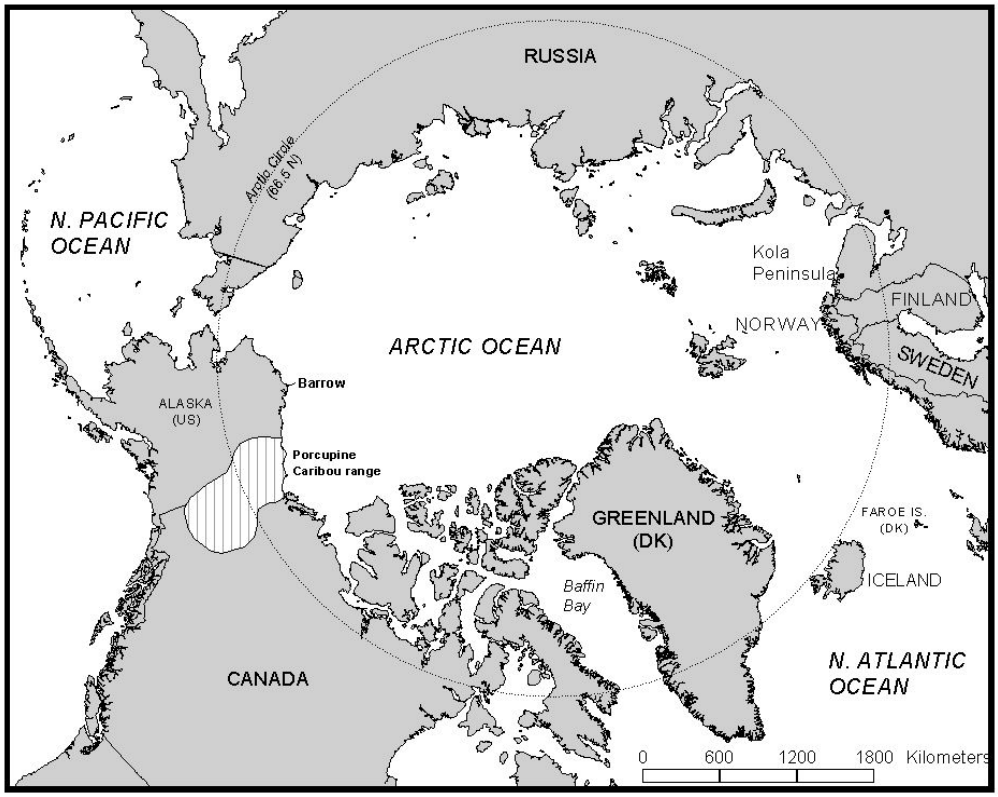
Section A: Background sketch of region & key players

1) Geographic background – historic context

The Arctic consists of the Arctic Ocean, adjacent seas, and the lands that surround them. The southern boundary of the Arctic has been defined in various ways. Astronomically, it is the Arctic Circle, above which in summer the sun remains over the horizon for at least one continuous day. Biologically, it is sometimes regarded as the area north of the treeline, though this definition is difficult to put into practice because the treeline is highly variable and is affected by altitude as well as latitude. Oceanographically, the Arctic is sometimes defined as the region with seasonal sea ice, though ice extends into nearby areas such as the Sea of Okhotsk and Baltic Sea. Another boundary is permafrost, the region where the ground remains permanently frozen apart from a thin top layer that thaws in summer. Politically, the Arctic is usually considered to be the northern regions of Russia, the United States, Canada, Norway, Sweden, and Finland plus all of Greenland and Iceland (see Map, from Huntington et al. 2007).

Whichever definition is used, the Arctic is characterized by cold and dark winters and summers with extensive daylight and bursts of biological productivity. Some marine areas are highly productive, home to large and valuable fisheries. On land, caribou and reindeer can form large aggregations, particularly during the calving period.

Migratory birds such as geese and waterfowl concentrate in many areas of the Arctic in spring and summer for breeding and molting. These and other animals and plants have sustained



the region's indigenous peoples for millennia. Some, particularly fish, whales, walrus, and seals, have attracted commercial interest from southern regions for centuries in the North Atlantic and over 150 years in the North Pacific.

More recently, mineral resources such as gold, lead, zinc, diamonds, uranium, and oil and gas have spurred extensive exploration and development, leading to larger populations, higher incomes, and greater environmental impacts. Far from abating, this trend is increasing

as oil and gas activities extend offshore, prospecting covers larger areas, and the prices of many metals and other resources increase. Environmental change, particularly the loss of sea ice in summer, may make access to Arctic regions easier, allowing even more exploitation of mineral resources.

Arctic indigenous peoples have adapted to the environmental conditions of the region, developing the environmental knowledge, social organization and skills, and flexibility to cope with extreme seasonal and interannual variability. Knowledge of local conditions and the behavior and distribution of animals has allowed hunters, fishers, and gatherers to provide food, clothing, and other materials for their families. Extended family groups provided social structure for division of labor and sharing of food and materials. High tolerance for discomfort and keen awareness of others' feelings helped sustain the cohesion of small groups over long periods. Recognition of many options and the ability to shift patterns of production or living allowed people to survive in years of scarcity.

Northern Eurasia has the greatest number of distinct indigenous peoples, likely reflecting a longer history of habitation and different human expansions into the region from the south. From the Saami (also Sámi) in northern Europe to the Nenets, Dolgan, Nganasan, and others across Siberia, to the Chukchi and Yupik in the Far East, the Arctic peoples of Eurasia have developed reindeer herding, fishing, gathering, and in some cases marine mammal hunting. Reindeer herding in particular was a crucial development that provided more consistent access to food and skins for clothing, allowing for a population increase across the region. Today, reindeer herding remains culturally important throughout the region and economically vital in many areas.

North America has fewer distinct ethnic groups, but in southwestern Alaska some of the highest population density in the entire Arctic thanks in part to abundant salmon that provide reliable food year after year. The Inuit stretch from Greenland across Canada and Alaska to the tip of Russia. Inland, the Dene and Athabascan peoples live in the boreal forest of western Canada and Alaska's interior. Coastal cultures have developed primarily around marine mammals in the northern regions and fishing and marine mammals in areas such as southwestern Alaska. Inland, caribou, moose, and fish provide most food, and bears are culturally vital.

Determining the population of the Arctic depends first on the boundary used and then on the availability of demographic statistics. Apart from Greenland and Iceland, all of which are usually considered "Arctic," no countries distinguish Arctic residents from the population of administrative districts used for compiling statistics, many of which include Arctic and subarctic areas. Nonetheless, a general estimate is that the Arctic has 2-4 million people, of whom perhaps 300,000 to 400,000 are indigenous. Among the major political units of the Arctic, only Nunavut and Greenland have a majority of indigenous peoples. In the Murmansk Oblast of Russia, at the other extreme, well under one percent of the population is indigenous.

The political strength of indigenous peoples varies greatly from country to country, and has changed substantially in many regions over the past few decades. In Alaska, Native land claims were settled by national legislation in 1971, transferring ownership of 44 million acres (~175,000 square kilometres, or approximately one-tenth of the state's area) to newly established Native corporations, which were also provided with nearly $1 billion in cash as capital with which to establish profitable businesses. The United States also recognizes over 220 tribal governments in Alaska, which have domestic sovereignty but, thanks to the land claims settlement, little actual land under tribal control (in contrast to Indian Reservations elsewhere in the country).

In Arctic Canada, the first land claim settlement was for the Inuvialuit in northwestern Canada in 1984. In 1999, the territory of Nunavut was created as part of a settlement with Inuit in part of what had previously been the Northwest Territories. Additional land claims have been settled with the Gwichin and Sahtu among the Dene as well as with the Metis (persons of mixed ancestry), with other claims still under negotiation. As in Alaska, corporations have been created to manage land and business holdings and encourage indigenous peoples to

enter the economic mainstream of the country. Formal co-management bodies have been established through the land claims agreements to govern wildlife use, environmental regulation, and mineral development.

Greenland was administered as a Danish colony until 1979, when it was given Home Rule status to govern its internal affairs. It remains part of the Kingdom of Denmark, with foreign policy, currency, defense, and some mineral rights remaining under control of the Danish Parliament. In 1985, Greenland withdrew from the European Union to protect fisheries in its waters. It remains the only region to have withdrawn from the EU. Greenland has an active political scene with three main political parties vying for leadership of the Home Rule Parliament.

Sapmi, the homelands of the Saami people, span four countries: Norway, Sweden, Finland, and Russia. Since the 1300s, Saami have been taxed by the various countries claiming control over some or all of Sapmi. In 1751, a treaty defined national borders in the region for the first time, solving the problem of some Saami having to pay multiple taxes. On the other hand, traditional annual movements with the reindeer herds became more complex with international borders to cross. In the 20th century, Norway, Sweden, and Finland created Saami Parliaments to address Saami concerns, though special status for Saami as indigenous peoples remains controversial. The Saami Council serves Saami in all four countries and is active in various international forums.

Russia is the most complex jurisdiction. Thirty distinct numerically small indigenous peoples are recognized in the North, Siberia, and the Far East. Of these, some 12 to 16 live in Arctic regions, in several administrative and political districts. Federal legislation recognizes certain indigenous rights, but the implementation of these rights varies greatly across the Arctic zone. In the 1990s, greater local control often meant less recognition of indigenous rights. Since 2000, political control has shifted back to the federal government, but mineral and petroleum industries often dominate the local picture. Many indigenous organizations have developed to press for recognition of rights or economic interests, with some modest successes.

Internationally, some Arctic indigenous peoples have been very active in United Nations forums, in the Arctic Council (a body of the eight Arctic nations with six indigenous peoples organizations recognized as “Permanent Participants”), and elsewhere. Canadian Inuit, Greenlanders, and the Saami have been particularly active internationally, forging alliances with other indigenous peoples and carrying out joint projects and programs. Indigenous peoples in Alaska and Russia have generally been less active beyond the region, though some bilateral efforts have been successful in wildlife management and other areas.

2) Human resources

Arctic indigenous peoples in all countries have long had organizations addressing various aspects of their cultures, lives, and interests. Local and regional organizations have been established on a geographical and cultural basis, providing local services, voicing local concerns, and promoting cultural vitality. Other organizations cut across regions and even ethnicity to address common concerns on one or more issues. International organizations may follow similar patterns, uniting an indigenous people split by national borders, or promoting the rights and interests of, for example, hunters and trappers throughout the region.

The primary relationship that most indigenous organizations have is with regional or national governments. National legislation, including funding, is often a dominant force in indigenous communities and thus requires a great deal of time and attention from indigenous leaders. Relationships with other indigenous organizations are often important in addressing major issues, but traditional divisions along ethnic lines may persist. Some indigenous organizations have established working relationships with non-governmental organizations including industry, pursuing common political goals or addressing resource management and allocation interests. These relationships are less common due to a history of exploitation of indigenous peoples and the distrust that persists.

Alaska In Alaska, indigenous peoples' institutions are generally organized on a regional basis. In the 1930s, federal legislation recognized tribal governments in Alaska. In the 1960s, regional non-profit organizations were created by tribal resolution, to address indigenous health care, housing, economic, and other needs. The Alaska Native Claims Settlement Act in 1971 created twelve regional Native corporations (a thirteenth corporation was also created for Alaska Natives no longer residing in the state), which own lands and subsurface rights. Individual village corporations were also created. In addition, there are various statewide organizations, such as the Alaska Federation of Natives and the Alaska Inter-Tribal Council, plus issue-specific groups such are various commissions that address topics such as marine mammal management.

While the U.S. government recognizes tribes in Alaska and administers various tribal programs, the State of Alaska has been less willing to recognize tribal authority. Consequently, state programs have tended to focus on municipal governments (many communities have tribal councils and city councils), school districts, corporations, and other non-tribal groups. Many agencies in both the state and federal governments are active in rural Alaska, though available resources are often spread thin. Inter-agency cooperation occurs on some topics, but creating new mechanisms to address cross¬cutting issues has been problematic. The federally funded Denali Commission was created in part to address this need, and has had some success in providing resources to rural areas to build local capacity to address local needs.

The University of Alaska has educational and research programs throughout the state. Many other universities have active research projects in rural Alaska, examining the physical and biological environment as well as the full range of social science topics. In the past decade or two, indigenous or traditional knowledge has become a popular subject of research, largely as a means of improving understanding of the natural world, but increasingly as a means of developing better ways of designing or managing human activities. The U.S. National Science Foundation was among the first to fund such research, but others have followed suit. To date, however, few indigenous organizations have taken on their own research programs. More typically, indigenous involvement in research has been through partnerships with academic institutions or other researchers.

Canadian Arctic In Canada, indigenous organizations and institutions are organized both at the national and regional scales. For First Nations people, there exists a national organization (Assembly of First Nations) representing interests and rights at the national level and to the Government of Canada, as well as specific organizations which represent the interests and rights of different 'Nations' in the North as mentioned above (Dene, Gwich'in, Metis and the First Nations of the Yukon). Many of these are then associated with international counterparts representing their interests at the international scale (e.g. Arctic Athabaskan Council, Gwich'in International). The First Nations groups are covered under the Federal Indian Act in Canada (enacted in 1867) with regards to the provision of programs, services, and political status in the country. Politically, some have self-government status, while for others self-government is still in negotiation along with land claim settlements.

For the Inuit, two national organizations represent Inuit interests in Ottawa and beyond. Inuit Tapiriit Kanatami is the national Inuit organizing representing Inuit political interests and rights in Canada to the Canadian Federal Government, while ICC-Canada is the Canadian arm of ICC-International working on behalf of Inuit international rights and interests in the circumpolar world. These two organizations work closely together and are both situated in Ottawa close to the Canadian Parliament. The Boards of Directors of these two organizations are connected through membership and hence there is a working relationship between the national and international realms. Inuit Tapiriit Kanatami has a Board which includes representation from ICC-Canada as well as representatives from each of the four Inuit land claim organizations in the Arctic (Nunatsiavut Government – Labrador, Makivik Corporation – Nunavik, Nunavut Tungavvik Incorporated – Nunavut, and the Inuvialuit Regional Corporation – Inuvialuit Settlement Region).

At the regional level, a patchwork of regional organizations and administrative structures across the north reflect the evolution of Inuit political autonomy in the country. In Labrador,

the Nunatsiavut Government, established in 2005, has many of the responsibilities and rights of other regional and provincial governments, such as economic development, protecting and preserving culture and implementing social and health programs on behalf of their beneficiaries. In Nunavik, the northern portion of the province of Quebec, a regional administration for the 14 Inuit communities of the region is called the Kativik Regional Government. This Regional Government has the responsibilities and authority of any regional government within a province. The Makivik Corporation is the development corporation mandated to manage the heritage funds of the Inuit of Nunavik provided for in the James Bay and Northern Quebec Agreement (JBNQA). Makivik's role includes the administration and investment of these funds, and in promoting economic growth through the creation of businesses run by Inuit in Nunavik. Makivik promotes the preservation of Inuit culture and language as well as the health, welfare, relief of poverty, and education of Inuit in the communities.

In the Territory of Nunavut, there is a public administrative (territorial) government as well as the Inuit political organization, Nunavut Tungavvik Incorporated, established under the Nunavut Land Claims Agreement. The Territorial Government is like any other in the country, having the authority to deliver programs and services to its residents, however is particular in its approach with the understanding that approximately 80% of its population is of Inuit ancestry. To this end, language, culture and Inuit heritage and education play prominent roles in government portfolios.

In the far northwest corner of the country, a regional administration exists within the Northwest Territories that includes, but is not exclusive to, the communities of the Inuvialuit Settlement Region. This regional administration is part of the Territorial government of the NWT and provides services and programs to this region and all of its residents. As in two of the other three Inuit regions, there is also an Inuit-owned and -run Corporation, established under the final land claims agreement (IFA) for that area as well. The Inuvialuit Regional Corporation, established in 1984, has the overall responsibility of managing the affairs of the Settlement as outlined in the IFA. Its mandate is to continually improve the economic, social, and cultural well-being of the Inuvialuit through implementation of the IFA and by all other available means.

In all cases, for First Nations and Inuit, health and social services are provided via agreements with the Federal and Territorial (or Provincial) governments via a series of bi or tri-partite agreements. Health Canada has a division specifically pertaining to First Nations and Inuit Health (First Nations and Inuit Health Branch) as well as an office of circumpolar health. The Federal Department of Indian and Northern Affairs administers services and programs outlined under the Indian Act to all reserve and northern indigenous people.

Four Colleges exist in the northern regions of the country (College of the North Atlantic – Nunatsiavut, Nunavut Arctic College – Nunavut, Aurora College – Northwest Territories, Yukon College – Yukon) and offer a selection of professional, general and continuing education and trade programs. No single university serves the Canadian North, and in fact no university physically exists in the Canadian North, although many are engaged in research and educational activities in these regions (notably the University of Alberta and Laval University in Quebec City, which have major research programs taking place in the north; many others operate both field-based and community-based projects, often in cooperation with regional Inuit organizations or community groups incorporating indigenous knowledge).

The Federal research granting agencies in Canada (Social Sciences and Humanities Research Council-SSHRC; Natural Sciences and Engineering Research Council-NSERC; and the Canadian Institutes of Health Research) all have strategic granting opportunities for northern research and NSERC has funded several university-based research chair positions that specialize in northern natural science research issues. Although some strategic initiatives launched by the granting agencies allow indigenous organizations to hold grants, these opportunities are few. Several federal granting programs from the federal departments however, do fund indigenous directed research or partnership initiatives between indigenous organizations and university researchers.

Fennoscandia In this context Fennoscandia means the three nation states, Norway, Sweden and Finland. In this region, several Saami nations, or groups, have specialized in their particular territories and ecosystems. This is best reflected in the variety of Saami languages around Fennoscandia. So the best human resource of indigenous knowledge in the region rests with the survival of Saami languages, some of which are endangered or threatened. Such is the case with the Inari Saami or Skolt Saami languages. North Saami, the biggest of these languages, is likely to survive for at least the next 20 years.

Due to varied political histories of the three nation-states of the region, the human resources regarding indigenous knowledge are varied as well. In the case of Sweden and Norway, it is only the Saami who have rights to conduct the age-old tradition of reindeer herding. In Finland, due to a different social and political context, ethnic Finns have reindeer herding cooperatives as well as the Saami, even though there are marked differences in the deeper substance of these practices. In Finland as in Sweden and Norway, it is the Saami who possess the most significant indigenous knowledge. One of the most powerful organisations to do with indigenous knowledge is the state-established Association of the Reindeer Herding Municipalities of Finland.

Political rights of the Saami peoples have been recognized in various ways in all three countries. Norway is often mentioned as a leader in this regard, due to the Finnmark Act of 2003, which allows the Saami some measurable participation in land use and resource decision-making. Sweden is still formulating its Saami policies, whereas Finland has done the least, in large part because of the history of settlement and ethnic identity in Northern Finland.

Constitutional acts of the three countries provide the Saami peoples with rights to language, culture, and a way of life. Marked differences surface immediately after this commonality, however. Land or water rights have not been recognized in Finland, and since the events of autumn 2007, where clear cutting threatened key Saami forest ecosystems in Finland, many of the Saami have felt that renewed cultural genocide and assimilation is under way. National ministries of Justice, Environment, Foreign Affairs and Forestry usually have responsibility for Saami issues in Oslo, Stockholm, and Helsinki.

All of the three nation-states have established Saami Parliaments, which are the highest ruling self-governance bodies for the Saami. In addition to this, the Saami Council, consisting of the Saami in the four countries in which they live (Fennoscandia plus the Murmansk Region of Russia) represents Saami civil society and external relations to the Arctic Council and the United Nations, for example to the Permanent Forum of Indigenous Peoples.

There are some scientific centres and stations in the northern part of Fennoscandia, some of which are engaged in research and partial recognition of indigenous knowledge. They include, but are not limited to, the Arctic Centre in Rovaniemi, Finland, with its international and EU sponsored research; the Abisko Research Station in Sweden; the Nordic Saami Institute in Norway; and several programmes of the University of Tromsø in Norway. Snowchange Cooperative located in Finland has a community network of Saami participants across the region devoted to the advancement of indigenous knowledge and climate change issues among the Saami peoples from the research point of view. There are new initiatives in the region as well, which will focus on the indigenous knowledge component of the Saami peoples, such as the Norwegian Saami Ealat project.

In addition to this there are some regional museums, such as Ajjte in Sweden, Siida Saami Museum in Finland, and the Museum of Varangerbotn in Norway, which have local and regional indigenous knowledge initiatives.

Civil society organizations that work with or otherwise recognize indigenous knowledge include the Alliance for Finnish Nature, Greenpeace, Bellona, Taiga Rescue Network, regional cultural organizations and regional media, such as Saami TV and Radio as well as newspapers.

Russia The majority of the last nomadic northern indigenous peoples communities are found in the Russian Arctic, which is also the largest physical landmass of the Arctic. Russia is a

society still in a process of transformation. The unstable years of the 1990s have been replaced by the quasi-authoritarian regimes of the 2000s, under presidents Putin and the newly elected Medvedev. Since 2000, after the abolishment of the Ministry of Environment on the federal level, uncertainties of nature protection, indigenous rights and conflicts with oil and gas issues have emerged as significant challenges for Russia's indigenous communities.

The best human indigenous knowledge resource in Russia is the survival of traditional indigenous communities on the land across the North. There are dozens of surviving indigenous nations, from the Kola Peninsula to Chukotka. Despite the colonial impacts from Tsarist times to Soviet and now to Russian times, there are age-old practices and cultures of these nations, which have never ceased to exist on their homelands. Naturally, regional and local characteristics vary considerably.

Legally, the Constitution Act of 1993, as well as several federal laws on indigenous rights inside Russia, provide some windows of opportunity for these nations and communities. However, it is the self-determined drive of these communities to return to taiga and tundra homelands that has enabled them since 1991 to usher in a "neo¬traditional" time as the late, great Alexander Pika called this process.

The various laws, which may or may not be respected in the regions of the Russian Arctic, have allowed several reindeer communities in the Russian North to establish Obschinas, or family/clan-based territorial units. These obschinas do not own their land outright, but until 2006 had the right to exclusive use of these lands.

The 2006-2008 period has seen a new transformation and trend of centralization of land and resource authority to Moscow, which puts the survival of the legal tools that created the obschina system under question. There are no clear results of this process yet, other than the fact that there are several local conflicts inside the Russian North on these questions.

Since late 1980s, the Russian Association of Indigenous Peoples of the North, Far East and Siberia – RAIPON, has been the primary organization at the federal level to advance the indigenous peoples' agenda. Its offices are located in Moscow. RAIPON has regional member organizations, which organize annual meetings and consultations with local indigenous leaders.

There are some problems with representation (few women, few reindeer herders) and consultation, but RAIPON remains a significant network and presence both inside Russia and internationally. It has as well participation in the Arctic Council structure as a permanent participant. The latest strategy of RAIPON is to influence the development of issues by working with ministries and governmental agencies as well as by participating in international projects.

In the Russian North there are some regional indigenous peoples' organizations, such as the Association of the Kola Saami, Yasavey of the Nenets Peoples, and Inuit Circumpolar Council-Russia for the Chukotka Yupik Eskimos. Yasavey, especially, has demonstrated significant participation in resource extraction and land conflict issues over the past 15 years.

The Russian Academy of Sciences has its Institute of the Indigenous Peoples in Yakutsk, Republic of Sakha-Yakutia, and several other institutes and organizations which have worked and continue to work with indigenous knowledge. The success of these projects and activities has been varied.

The Arctic Council, the Northern Forum, and the United Nations Environment Programme (UNEP) have, to varying degrees, succeeded in indigenous projects inside Russia, including some focusing on climate change and environmental contaminants. Secondly, there are many international organizations, from conservation groups to scientific organizations, such as Snowchange Cooperative, Wild Salmon Centre, Saami Council, several foreign scientific organizations and many, many more, that work in the field of indigenous knowledge in Russia. There is little, if any, coordination between these activities, due to institutional

agendas, greed, lack of knowledge and communication, regional and national differences, and other issues.

Several individual scientists are known by name to conduct good, proper research in the field of indigenous knowledge in the Russian Arctic, including for example Igor Krupnik, Bruce Forbes, Sergey Zavalko, and others. There is a wealth of observations and knowledge in the published works of these scientists already in existence.

One important project is worth mentioning here is the UNEP/GEF (Global Environmental Forum) sponsored ECORA Project in the Nenets Autonomous Region, Chukotka, and the Republic of Sakha-Yakutia. Among its goals are conservation of biodiversity, providing reliable means of support for the local population, including the indigenous peoples, minimization of biodiversity threats, minimization of fragmentation and degradation of natural ecosystems, and preserving natural territories in their natural condition. ECORA will end in 2010.

In addition to these and other initiatives, there are individual artists, such as film maker/director Markku Lehmuskallio from Finland, who have successfully worked with local communities to produce documentaries and movies about different aspects of indigenous knowledge. Lehmuskallio's work focuses on the Yamal Nenets peoples, including oral histories and cultures.

Section B: examples of IK for resilience building

1) Nature and scale of environmental change

The first genocide and destruction against the Saami peoples and our society began in the 1500s and 1600s. Unless there are dramatic changes in the near future, the Saami culture will die, disappear in my lifetime...Saami knowledge is knowledge about how to be with your environment, how to have your relationships with humans and with the world. Therefore the most effective ways to control a people are to destroy the things that reality consists of for that people. In the North this ancient knowledge has been beaten and destroyed for centuries in order that the indigenous peoples would forget this knowledge. If there is nothing else to do, at least we can try to prolong things. To play for more time to survive. We can try to gather indigenous knowledge from the old people who possess it. We can try to create safe havens of ecosystems, which contain our knowledges – the fjells, forests, and lakes which remain in pristine condition.

--President of the Saami Council Pauliina Feodoroff, Skolt Saami Nation, Finland, January 2008

The Arctic has always been characterized by variability and change. The extremes of seasons are simply the most regular and obvious variation to which indigenous peoples have had to adapt. On other, less regular time scales, the abundance of fish and animals can vary greatly, causing shifts in hunting and fishing patterns and strategies. Weather and associated snow and ice conditions can also vary greatly from year to year, a fact recognized in many indigenous languages that have specific terms indicating a particular classification for a particular winter. For example, Siberian Yupik hunters recognize "man-winters" and "woman-winters," and Saami reindeer herders make similar distinctions in snow conditions. The type of winter or snow, of course, has implications for the availability of animals or grazing, as well as access by humans across ice or snow, and a number of other aspects of human activity. The essential point is that Arctic cultures have adapted to be able to respond effectively to a wide variety of environmental conditions.

More recently, substantial changes in climate in the Arctic have created environmental conditions that are beyond normal variation. In many areas, sea ice is thinner, covers less area, and is present during a shorter period than before. This can lead to increased coastal erosion, reduced hunting opportunities, loss of habitat for many marine species, and perhaps to greater industrial activity without the barrier that sea ice has previously created. On land, snowfall can be late, as can the freezing of rivers and lakes, creating hazardous conditions for

travellers and for migratory animals. Permafrost, the soils that remain below freezing year round, is thawing in many areas, causing the land surface to deform and damaging buildings and roads. Forest fires, insect outbreaks, and new diseases are increasing in many areas, threatening habitats and species and creating new patterns that people have to learn about and adapt to.

Indigenous peoples around the Arctic are well aware of these changes, having been among the first to notice many subtle signs of change. They are also well aware of the scientific and media attention to global warming, and as a result often interpret observed changes as the latest manifestation of climate change. One observation in particular has come up again and again, from region after region, in several independent studies of indigenous observations: the weather is changing, and traditional ways of predicting the weather no longer work. This is a major hazard to people who routinely make long trips on land and sea, relying for safety on their intimate knowledge of their surroundings and the ability to detect hazards in time to act accordingly.

Scientific research in the Arctic has been extensive, confirming that major changes are taking place in nearly all parts of the environment. The Arctic Climate Impact Assessment, published in 2005, provides a comprehensive summary of what is known about climate change impacts in the region (and includes a chapter on indigenous perspectives). While scientific research does not address all aspects of the environment as understood by indigenous peoples, much work has nonetheless examined the implications of change for Arctic residents and has sought to connect indigenous and scientific understanding. Projecting future changes has been more challenging, in that there appear to be thresholds of change, in which the entire system changes the way it behaves and acts, in ways that cannot be predicted with any confidence. What has become clear in the past few years, however, is that projections of sea ice retreat and ice cap melting have, if anything, underestimated the speed of change. In other words, things are happening even faster than had been feared.

In this context, the need for adaptation has become ever more critical. Preventive measures as the global level may still have a chance of preventing the loss of all Arctic sea ice, for example, but time is running short. In the meantime, coastal peoples have to adapt their practices to thinner ice that is present for a shorter period. Similarly, coastal erosion remains a major threat to many communities and will require extensive investment in infrastructure and even re-location. Ironically, many of the benefits of modernization, such as running water and reliable access to food and other necessities through modern transportation, have come at the expense of reduced flexibility. Formerly, people could adjust mobile hunting camps without great difficulty. Now, extensive community infrastructure, schools, and so on tie people to a particular location, whether or not it remains a suitable place to live.

2) Examples of IK in use for adaptation

Alaska In Alaska as elsewhere, IK has been used primarily and predominantly by those who generate and hold this knowledge as a means of conducting their normal daily lives. In other words, IK continues to be a living, vital form of knowledge and practice. Additionally, academics and others have engaged with IK in various ways, typically through studies or other means of including IK in research. Less has been done to incorporate IK into actual management and decision-making or into adaptation apart from the adjustments that IK holders have of course made to their activities in response to environmental change.

Studies involving IK have included documentation projects as well as the inclusion of IK through workshops and other discussions during the course of research. Even if adaptation wasn't the goal of these activities, documentation and involvement of IK and its holders is perhaps still a useful step in that direction. Among other things, these studies have helped raise the profile of IK, both among its holders and among outsiders. Ten or 15 years ago, much less attention was given to IK in Alaska, and for many of its holders, this lack of attention meant under-estimating the value of their own knowledge. More recently, the tide has shifted and IK is a common (if not yet standard) part of social-ecological research around the state.

The results of these studies have helped increase awareness of indigenous perspectives and values, which has likely had some influence on management activities and decisions regarding topics such as forest fires, hunting, fishing, and pollution clean-up and prevention. Additional research is needed to show more clearly the link between IK and its application to environmental management and adaptation.

For example, how exactly do people change their behavior in response to environmental changes? On the Pribilof Islands, for example, local knowledge of hunting and fishing practices and associated ecology could help determine appropriate hunting seasons and fishing regulations. At present, however, local adaptive capacity is limited by regulatory control, in that island residents cannot adapt as they see fit because some changes would violate current laws and regulations.

One study in Barrow, Alaska, examined storm-surge flood patterns and potential impacts on infrastructure. The researchers found that their project plans benefited greatly from local involvement from beginning to end, from planning to gathering and interpreting data, to analysis and recommendations. A new hospital was being planned at the time of the study, and its location was determined in part by the results of the flood study, which helped identify high- and low-risk locations in the community in terms of flood likelihood. (The topography of this coastal community is generally flat and low, and land availability is determined by patterns of ownership, so determining a good location is not necessarily straightforward.)

Another example of adaptation and transfer of knowledge concerns walrus. In the 1990s, following the break-up of the Soviet Union, Alaska walrus hunters helped hunters in Chukotka, Russia, regain hunting skills appropriate to traditional hunting (as opposed to commercial hunting for fox farms, as had been the practice in Soviet times). Today, Chukotka hunters are able to help Alaska hunters learn how to hunt walrus that have hauled out on land (which they have always done in Chukotka, but have just started to do in northern Alaska in response to summer sea ice retreat).

Holders of IK, as mentioned, have of course been adapting all along. In some cases, they have the flexibility to change as they need to. On St. Lawrence Island in the northern Bering Sea, for example, whalers started hunting whales in November and December when sea ice started forming later in the fall, allowing access to the whales then instead of only in spring. Some whalers have stopped whaling in spring entirely, because it requires more gasoline (and thus greater expense) and snow conditions have limited the length of the season. The key feature in this example is that the whalers themselves can make the adaptation without regulatory change or permission or involvement of anyone else.

Canadian Arctic Numerous examples of how IK is supporting current adaptations exist in Canadian Arctic communities. Predominantly they are related to supporting changes in hunting and traveling behaviours, survival skills, or the management of wildlife resources. Some examples of IK and its application for adaptation in the Canadian Arctic are in the context of co-management of resources between Federal, Territorial and indigenous representatives. However, with the focus on climate change research at the community level in recent years a number of examples of how IK is being used for adaptation have been documented. In a case study in Arctic Bay, Nunavut, James Ford and colleagues highlighted the importance of traditional skills and knowledge, social networks and flexibility towards resource use in the context of community vulnerability to climate change and variability. In this community, where the ice is now reported to break-up as much as three weeks earlier than in recent memory, there have been significant impacts on the hunting of narwhal from the ice which typically migrate through open leads during this break-up period. As break-up is happening much earlier today, the ice conditions at time of migration are significantly less stable than was traditionally the case.

According to community representatives, this has decreased hunting success and safety. The community manages the spring and summer hunts with a total quota approved and enforced by the Federal Department of Fisheries and Oceans. Upon the realization of this shift in hunter safety and success the community Hunters and Trappers Organization shifted a

portion of the number of whales allocated for the spring hunt to the summer hunting seasons to improve success and safety. As a result, it is those hunters with the skills and knowledge to hunt whales in open water that are able to take advantage of this change only. Significantly more challenging than hunting from an open lead, the importance of IK and traditional skills for open water hunting have become more important in that community.

In a Nunavik community project looking at potential impacts of climate change and weather variability impacts on access to food and resources, Tremblay and colleagues documented that some hunters, through the use of IK and traditional land skills, were able to mitigate the impacts of environmental change and variability via the use of alternate routes and travel times and through prey switching, or hunting other species available at the time when some were becoming more scarce. In Nunavut communities, the use of new technologies, in combination with IK and traditional skills is supporting safe travel and use of the ice edge. The use of such things as handheld GPS units and accessing online satellite imagery of regional ice conditions prior to hunting trips is supporting safety in such communities as Igloolik, Pangnirtung and Cape Dorset.

Fennoscandia The context of use of indigenous knowledge of the Saami for adaptation varies in the four countries in which they live. Climate change is perceived to be a threat but is only one impact among many – other changes imposed on the Saami remain perhaps higher of higher priority and concern than adaptation to changes in the weather. Saami are nonetheless aware of the capacity and limits of their existence to be able to adapt in a rapidly changing world.

Past changes and challenges to which the Saami have tried to respond and adapt since the 1500s include imposition of taxes, Christianity, and rule of nation-states. More recently imposed changes have included, but are not limited to, assimilation policies into the Nordic societies, creation of large industrial hydroelectric dams and reservoirs such as Porttipahta and Lokka in the Finnish Saami areas which flooded homelands and reindeer herding areas without any consultation of local peoples, and mining and forestry practices, many of which are new or on-going, such as the one in Nikel, northwestern Russia, or come on top of earlier natural resource extractions. Many people feel that adaptation may be possible, if the survival of language, indigenous knowledge, and living territories are guaranteed – but none of these are currently guaranteed and therefore many Saami put their primary focus on these rather than on direct impacts from climate change.

More specifically in the context of weather and climate changes, the Saami have witnessed unparalleled changes to winter conditions. Extreme temperature changes, changes in snow and ice formations, unstable and warm winter conditions, and warmer summers are some of the observed changes. Especially the winters 2006-2007 and 2007-2008 are the warmest on record.

Some Forest Saami in the Vuotso area have switched fish diets away from trout and salmon to more “southern” species, such as pike and perch. For reindeer herding, climate change has meant that as the natural foods, such as lichen, are under ice cover from the new ice rain that falls in the autumn and freezes the ground, new feeding with fodder has been forced on the reindeer herders. Little state support has been provided for this activity.

In the northeastern Swedish-Norwegian borderlands, where the Saami conducted reindeer herding during the winter of 2006-2007, several families of Saami used their savings and sold personal belongings to pay for the extra food for reindeer. These personal and family resources are now gone, and the winter 2007-2008 is even warmer than the year before, yet the people do not have the funds to help them cope.

The Saami have as well chosen to adapt and use indigenous knowledge and share it by participating in several scientific and policy initiatives, such as the Arctic Climate Impact Assessment, Convention on Biological Diversity, and others. There are, however, bitter voices coming out which point to battle fatigue and disappointment in the perceived lack of tangible results from these activities, even though the Saami chose to participate.

Russia Due to the gigantic size and variability of the Russian North, the space does not allow here a proper treatment of this question. It can be mentioned, however, that the best adaptation capacity for the indigenous communities rests in their autonomy to produce food for their peoples, which means subsistence and traditional livelihoods even under the rapid, new conditions of change. In addition to climate and weather changes, indigenous communities have to struggle against bad policy, greed, mega projects, and other social and political issues, some of which have been solved in North American Arctic decades ago.

For example, the Evenki of Iengra, who have taken the full force of Soviet gold and coal mining in their territories in the past, are now under impacts from hydropower and Transneft oil pipeline constructions. This all comes on top of new weather and changes in snow and ice conditions.

3) New ideas that could and should be put into practice

Alaska In Alaska, where IK has gained visibility and respect as a source of information, the next step is to determine how it can best be used to facilitate adaptation. A starting point is to examine how it is used for that purpose by its holders already. Documentation of local management and adaptation practices would be useful to demonstrate that IK has applications beyond using its insights in governmental management regimes or academic research. Further studies could look at the constraints on adaptation in various areas, to see where adaptation requires more information and where it requires the ability to use available information (much of which is likely to come from IK) where that information cannot be acted upon today due to regulatory, social, economic, or other constraints.

In addition to studies, more work is needed to help IK holders share their experiences with one another, within Alaska and beyond. The example above about Alaska and Chukotka hunters is but one illustration. It is also important for IK holders to be aware of the value of what they know. As also mentioned earlier, IK holders have often under-valued their information. Recent attention to IK has helped rectify this situation to some extent, but primarily in regard to the value of IK as a source of information. Doing the same for the use of IK as the basis for action requires more work, particularly with regard to non-traditional applications such as infrastructure planning or business development within indigenous communities.

Canadian Arctic As identified by Ford and colleagues in vulnerability research in Igloolik, significant value exists in formalization of traditional learning processes to compensate for the existing erosion or breakdown of these process and links in communities. For example, the establishment of “land camps” for the transmission of traditional knowledge and skills to youth may be very valuable in the future as more and more youth continue to spend increasing amounts of time in community and less on the land, as a result of wage earning employment, and other trends in Canadian Arctic regions (social, cultural, and economic).

As is evidenced by the responses from communities currently accessing satellite imagery of ice conditions in the region through projects such as that operated by Furgal and Laidler in Nunavut and Nunavik, or by Gearheard in Clyde River, Nunavut, the connection of technologies with traditional knowledge and skills may be yet another way to enhance local resilience to environmental change and variability. Through training and increased technology access, complements may be identified that further support adaptation at the individual and collective scales.

Russia The Chukchi nomadic community of Nutendli, located on the northeast bank of the Lower Kolyma River in the Republic of Sakha-Yakutia, Russia, created in 2002 a nomadic school for their peoples. The establishment of this school is a historic attempt for self-preservation of the key areas of the Chukchi civilization and knowledge, in a context where the continuous permafrost is melting around them. Such initiatives, on the terms of the communities themselves to stay on the land, should be recognized and supported by all possible means, allowing for self control of the indigenous communities over the projects rather than management and interference from outside.

Section C: Responses to value of workshop

1) Would an international event be useful to increase resilience in this region?

Alaska The responses from Alaska indicate strong interest in an international event. One respondent said, “I would be interested to know how governments or NGOs [elsewhere] support a community or indigenous group’s adaptation choices.” Others indicated interest in sharing information, learning from experiences elsewhere, and generally raising the profile of community adaptation capacity, whether related to IK or not. As people are beginning to address the question of adaptation, information from people in similar circumstances will be especially helpful in demonstrating the range of options and ideas, or at least common concerns and the need for developing new options and ideas.

As far as logistics, the responses did not show a preference for a single event over multiple events. That said, a single international event would provide exposure to a greater range of ideas and provide a higher profile than a series of regional events. Having the ability to get together again a year or two later might be even more useful as people can try out the ideas they learned and then share their new experiences. It will important to have a substantial number of people from communities, so they can share direct, on-the-ground experiences and have greater confidence that they are learning from proven experiences rather than untested ideas. While no preferences were expressed for timing or location (though a warm location during winter is always nice!), the main aim that respondents suggested was the ability to share experiences with others in similar situations.

Canadian Arctic The following is a compilation and synthesis of responses (6 responses) collected from Canadian indigenous organization representatives and university researchers working in northern Indigenous communities in this country. No responses were received from government representatives in time to include in this synthesis.

In general, all respondents were positive that an event of international scale would be helpful and interesting. Many reasons were provided for this and included the current trends in interest from communities for training and network building opportunities, the increased interest and attention being given to resilience and adaptive capacity rather than simply predicting where impacts “might” happen, and the positive framework within which a resilience focused approach brings to looking at and addressing community challenges with environmental change and variability. Finally, a few of the respondents noted the importance of identifying and working with the commonalities among indigenous peoples worldwide facing these issues, as many had experienced this recognition (the similarities among indigenous communities and people in these circumstances) regardless of geographical location.

Many of the respondents expressed their support but also some caution in being sure to be aware of and to not duplicate ongoing complementary initiatives in this field if/when planning such an event. It was identified that there are a number of indigenous initiatives going on currently around learning about and supporting resilience that should be partnered with or respected (so as not to give the impression of duplicating). These included such things as:

- The “Many Strong Voices” initiative (http://www.manystrongvoices.org/) which are planning their next stakeholders meeting for later this year. It was identified that this group could be a partner in such an event or that an event could be planned in collaboration with their upcoming meetings. This initiative was identified as it had also gained significant attention at the most recent COP.
- The Inuit Circumpolar Council initiative for the upcoming UNFCCC COP 14 in Poland and the COP 15 in Copenhagen were also mentioned as complementary initiatives. As well it was identified that Patricia Cochran (ICC Chair) is organizing the “Global Indigenous Summit on Climate Change” in Anchorage next spring and it was expected that resilience would likely be a major theme at that meeting.

• Finally, one respondent identified the most recent meetings held by the International Working Group on Indigenous Issues (IWGIA) in February in Copenhagen on Climate Change Adaptations Strategies for Arctic Indigenous peoples (http://www.iwgia.org/sw27034.asp) as something to be aware of and the fact that the Indigenous Peoples Secretariat is planning a meeting on this topic this fall (2008).

When asked about the recommended "scale" for such an event the people consulted identified "small" as the preferred gathering size to facilitate discussion between and among community/regional representatives and then also with key researchers in attendance. Another suggestion raised for the initiative was the development of a small working group tasked with comparative analysis of climate change, vulnerability, adaptation and resilience between indigenous communities in different contexts around the world. The unanimous suggestion re: content was to focus such an event more on practice and lessons learned than theory.

Fennoscandia and Russia In general, all people interviewed welcomed in principle the idea of an indigenous international event. There were several questions however about such a process. They included:

a) What will make this new initiative worth participating, in addition to the over¬burdened stress and fatigue to participate in Arctic Council, ACIA, ECORA, Convention on Biological Diversity (Article 8j), national, regional, and local processes already?
b) Who sets the frame of terminology, focus, and aims of this process?
c) What is the agenda of such an initiative?
d) For Russia, what changes will come if people participate, as the political and social context of indigenous issues is already very difficult (furthermore, intervention of a foreign organization will trigger responses from the power structure so that local indigenous peoples suffer a backlash from their participation)?
e) What are the benefits of participation for local community people who do not get their voices heard in the international level (reindeer herders, women, hunters, fishermen) but who are at the front lines of facing these changes?

Section D: Conclusions

The Arctic is both vulnerable and resilient to climate change. Vulnerable because the traditional lifeways of its peoples can be disrupted by warming. Vulnerable because modern society constrains traditional adaptive mechanisms such as mobility, social re-organization, and flexible use of natural resources. Vulnerable because indigenous peoples have too often been pushed aside in the name of development, security, or expedience. Vulnerable because in a warming climate, cold-dominated ecosystems cannot simply shift to the north, but will run out of room.

But also resilient, because Arctic countries are among the world's wealthiest, with extensive governmental support, infrastructure, and financial resources to draw upon. Resilient because some countries have recognized indigenous rights in one fashion or another. Resilient because indigenous peoples have learned to cope with variability in weather and fish and animals, developing social, psychological, and practical means of surviving through change. Resilient because there is no other choice.

Climate change today takes place in a context of wholesale cultural, social, and economic change in the Arctic. Indigenous knowledge today receives considerable attention, in contrast to having been largely ignored or marginalized outside of indigenous communities until recent years. Nonetheless, the application of indigenous knowledge, by itself or together with other forms of knowledge, to environmental and other problems is still under-developed. With so much changing so quickly, few people have had the chance to step back and consider how indigenous knowledge is already being applied as people adapt out of necessity, and how much more could be done if some strategic and tactical thought were given to making better use of the knowledge and skills of those who live in the region.

The Arctic has much experience and many lessons to offer the rest of the world when it comes to indigenous knowledge and traditional practices, but also a great deal to learn from the rest of the world, too. Moral support and the knowledge that others share your situation can be valuable by themselves. Ideas that can be put into practice at the community level offer mutual empowerment. Approaches to addressing societal and governmental obstacles to adaptation and self-determination can be invaluable tools. There is a great deal to be gained through conversation and collaboration with people from other parts of the world. Provided that such work addresses the real needs of local people and involves those who are directly affected, residents of the Arctic are ready to join that conversation with their peers from around the world.

Section E: Reference

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