

**Proceedings of the Joint Seminar of UArctic Rectors' Forum and the
Standing Committee of Parliamentarians of the Arctic Region**

February 28, 2008 Rovaniemi, Finland

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Introduction

Editors: Outi Snellman, Lars Kullerud, Guy Lindström, Bjørn-Willy Robstad

The joint seminar of the Standing Committee of Parliamentarians of the Arctic Region and the UArctic Rectors' Forum was held on February 28, 2008, at the Arctic Centre of the University of Lapland in Rovaniemi, Finland. The purpose of the seminar was to stimulate discussion and debate on Arctic issues between academics and politicians from the Arctic on the two themes of adaptation to climate change and borders and access to the sea. This proceedings document contains papers presented at the seminar, the two background papers from experts in UArctic's member institutions prepared for the seminar, as well as a summary.

The Conference of Parliamentarians of the Arctic Region (CPAR) is a parliamentary body comprising delegations appointed by the national parliaments of the Arctic states (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, USA) and the European Parliament. The conference also includes Permanent Participants representing indigenous peoples, as well as observers. Between the biannual conferences, the Arctic parliamentary cooperation is governed by a Standing Committee.

UArctic Rectors' Forum was established in March 2007 at Dartmouth College, USA, to facilitate discussion among the leaders of UArctic's higher education members and dialogue between the higher education institutions in the Arctic, policy-makers, governments and other relevant stakeholders.

UArctic and the Standing Committee of Parliamentarians in the Arctic Region have always had excellent relations. It was therefore natural for the Rectors' Forum and the Standing Committee to seek partnership to organize a joint seminar with a focus on issues that were both relevant for higher education institutions and policy-makers in the Arctic region. The seminar was held in conjunction with the second Rectors' Forum and a meeting of the Standing Committee in Rovaniemi, Finland.

The joint seminar attracted a large audience from both the context of the UArctic Rectors' Forum and Arctic Parliamentarians. Both groups clearly endorsed the idea that such dialogue between the

higher education community and decisions makers on topical issues about and in the North is important and necessary. This was also reflected in the discussions and decisions of the Rectors' Forum when 33 university presidents from northern universities and colleges jointly signed the UArctic Charter.

High quality assessments concerning the situation in the Arctic, produced by scientist working in the north, have been an important basis for political decisions in the Arctic for the last 10 years. By bringing academics and politicians together in a joint seminar, a new step in their close cooperation has taken place. We hope this document will be useful in taking the issues discussed forward for the benefit of the Arctic.

Rovaniemi May 2008,

Editorial Committee

Messages from the meeting Chairs

Message from the Chair of SCPAR

Ms. Hill-Marta Solberg

Dear friends of the Arctic,

Climate change has been a sensitive and important topic in Arctic cooperation. The Arctic Council has delivered reports which have been vital in understanding how climate change is influencing the Arctic. The comprehensive report "Arctic Climate Impact Assessment" (ACIA), launched in 2004, showed that the temperature in the Arctic is rising twice as fast as in lower latitudes. As a result, the sea ice is melting at an unprecedented rate, the tundra is thawing, we are witnessing bigger and more frequent storms, and erosion is forcing us to move villages. How should we react to these challenges?

In my view the answer is simple and yet so difficult: We need to mitigate the emission of greenhouse gases and we need to adapt to the changes and challenges we face. Mitigation is about avoiding the unmanageable, while adaptation is managing the unavoidable. We need mitigation to save the earth for future generations; adaptation is needed to help people face the challenges today.

At the seminar in Rovaniemi we discussed how we can adapt to climate change in the Arctic. As you will see from this paper, there are major challenges facing us. We need all the Arctic countries, including the scientists, including the indigenous peoples and other peoples of the North, to work together to find ways to adapt to the changing climate, to find the way forward. We also need to listen to scientists from outside the Arctic. I am therefore very satisfied to register that the Arctic Council has initiated a project to collect and disseminate accessible expertise, ongoing research and strategies on adaptation to climate change.

Borders and access to the Arctic wilderness and resources was the other highly relevant theme of the seminar. This is an important international issue and will continue to be so in the coming years. The Arctic countries and the cooperation in the Arctic Council must get involved in and reflect this process.

Arctic parliamentarians will continue to address the legal perspectives in a changing Arctic. We will con-

tinue to debate and raise international awareness on treaties relevant to the Arctic. We will work to see that the Arctic is governed in a responsible and sustainable way, in accordance with international law.

We, the politicians who have participated at the seminar in Rovaniemi, will take the issues and discussions away with us and try our very best to translate them into political recommendations, both at the upcoming parliamentary conference in Fairbanks on 12-14 August 2008, and in our home parliaments. I would encourage the rectors and scientists to continue to deliver scientific information about what is going on in the Arctic, and to make the University of the Arctic a powerful instrument in building capacity and disseminating knowledge to the citizens of the Arctic.

Arctic parliamentarians have been a strong supporter of the University of the Arctic ever since we were presented with the idea 10 years ago. Educating the people in the North and building capacity is vital to enable Arctic residents to take part in the economic development in the region. Teaching others about the High North is important in spreading knowledge about the Arctic to the world. Bringing academic institutions together and helping them work together is the way to fulfil these visions.

If you share your knowledge with someone else, it does not leave you with less knowledge. I would like to thank all who contributed in making this seminar a success. The staff of the University of the Arctic for excellent assistance in preparing the seminar, the University of Lapland in Rovaniemi for providing a perfect Arctic venue for the seminar, and last but not least, a special thanks to the speakers who have shared their knowledge and visions with us and made us all a little wiser.

Message from the Chair of UArctic Rectors' Forum

Prof. Stephen Jones, Chair of the Rectors' Forum Planning Committee, Chancellor of the University of Alaska Fairbanks

Dear friends,

I know you share my excitement with the great success of our Rectors' Forum in Rovaniemi and our joint seminar with the Arctic Parliamentarians! Allow me to offer a few reflections.

The North has been a homeland for thousands of years. For a few centuries it has been an arena for exploration, exploitation, and land claims by national states, and until very recently the Arctic Ocean was practically protected from most other activities by the strategic games of the cold war. The last decades have given us a melting of the political ice but also serious climate change. The Rovaniemi process started in 1991 and led to a unique partnership between governments and indigenous peoples to safeguard the Arctic environment and ensure the sustainable development of the region. Now, 17 years later, it is more imperative than ever that indigenous and state political leaders work in cooperation with local communities, academic institutions and the private sector to build a resilient and strong North.

The Arctic Council has demonstrated that peaceful cooperation in and about the North is possible. Similarly, the academic community has practiced international cooperation since the first polar year, 125 years ago. It laid the groundwork for a century when the Arctic has become an increasingly attractive arena for scientific research. The current International Polar Year represents hope for a future with intensified research and increased attention to the Polar Regions. We are now in the middle of the 4th International Polar Year. It is the first that also focuses on the human perspective. The people of the north are no longer only an object of study. Instead, we now see a future when indigenous peoples and other northerners take active part not only in the development and governance of the region, but also in defining the research agenda of the North.

Literally all northern universities, colleges, and other organisations engaged in higher education have organized themselves into the University of the Arctic, a network of more than 100 members. University of

the Arctic members are ready to take a collective responsibility as leaders of research and education relevant to northern communities and nature.

It is clear from research that climate change is affecting the North more severely than many other parts of our globe. The University of the Arctic has therefore chosen climate change as a main area for the cooperation in the years to come. Development of northern expertise about how to live with rapid change is a major task for our members. Solutions to northern problems are best found through cooperation in the North. Our members already offer more than 1000 different courses addressing climate change related issues. However, we still need investment in understanding how to practically adapt and build resilience in northern communities. Higher education institutions will be the natural tool to develop such knowledge and to share this knowledge among local and indigenous leaders, as well as business people, farmers, seafood producers and tourism operators.

As Arctic Ocean sea ice melts, the ongoing work to define national borders according to the UN Law of the Sea (UNCLOS) has become a hot topic in the global news. It is reassuring to observe that governments operate and cooperate in accordance with agreed UN conventions and that experts engaged in this work cooperate well across national borders. The seminar associated with our 2008 Rovaniemi gathering made clear that Article 76 of UNCLOS will most likely give the five states surrounding the Arctic Ocean control over most of its sea bed. However, the law of the sea has some maximum rules that will result in at least a small "hole" in west Arctic and a elongated hole in the east Arctic basins that fall outside national jurisdiction. Knowing the history where most of the existing bilateral maritime borders around the Arctic Ocean are still unresolved, it will most likely take a very long time before borders between states within their shared extended continental shelf become finalized. History has however also taught us that disagreements over borders are generally handled in a peaceful manner and that some kinds of management regimes are put into force.

It is encouraging to observe that the Arctic Parliamentarians have taken initiatives to seek solutions on how the North, and in particular the Arctic Ocean, can be governed in the future. The combination of reduced ice coverage and political realities elevates the need for addressing these complex issues. In this seminar we discussed how International conventions like the Law of the Seas can be applied to secure clarity in national rights, while international agreements and actions of the Arctic Council could serve as vehicles for securing joint management and regulation in the Arctic. Jointly the peoples of the north and the Arctic states must assure that the North continues to be a global model for good governance, even in times when mutual maritime borders continue to be unresolved.

An immediate dilemma facing Arctic universities and the research community involves access for vessels doing scientific research in the Arctic Ocean, where we face bureaucratic and sometimes political hindrances. Nor have the International Polar Year or the Arctic Council managed to create a cooperative mechanism between government agencies that fund and regulate research and the eight Arctic states' higher education community. Improved governmental cooperation in science and higher education, enabled by UArctic's member institutions, and initiatives like the UArctic Rectors' Forum Charter signed here in Rovaniemi, can provide a cooperative framework towards building the capacity needed to face the challenges of the North.

Cooperation among governments, politicians, indigenous and local leaders as well as university leaders of the Arctic can make the North a global example for cooperation for a sustainable region! I look forward to continued progress led by the University of the Arctic.

Message from the Host Institution, University of Lapland

Opening of the conference

Prof. Mauri Ylä-Kotola, Rector, University of Lapland

Dear Senators, Rectors, Ladies and gentlemen,

On the behalf of the University of Lapland and the University of Arctic, I have the great pleasure and honour to welcome you to the joint seminar of the UArctic Rectors' Forum and Standing Committee of Parliamentarians of the Arctic region. This is a historical meeting which, like all historical meetings, has its own history. The town of Rovaniemi, located here in Finnish Lapland, has historically been a meeting ground for some of the Arctic's most important circumpolar gatherings.

The University of the Arctic (UArctic) is a cooperative network of universities, colleges, and other organizations committed to higher education and research in the North. The members of UArctic share resources, facilities, and expertise to build post-secondary education programs that are relevant and accessible to northern students. The overall goal of the University of Arctic is to create a strong, sustainable circumpolar region by empowering northerners and northern communities through education, training and shared knowledge. UArctic seeks to promote excellence in knowledge generation and knowledge application in areas that are relevant to the North. UArctic training and education is circumpolar, holistic, and diverse in nature, and draws on the strengths of member institutions to address the unique challenges of the region. UArctic promotes cooperation in a context in which recognized degrees are granted by the members themselves.

UArctic recognizes the integral role of indigenous peoples in northern education, and seeks to engage their perspectives in all of its activities. UArctic and its member institutions further respect the needs of the indigenous peoples, and commit themselves to actively include the needs of the indigenous peoples and indigenous communities of the Arctic in education and training services.

On June 12, 2001, the University of the Arctic officially came into being. At a launch event here in Rovaniemi, 200 hundred people gathered to celebrate the realization of four years of determination

and perseverance since the proposal was made to the Senior Arctic Officials concerning an 'Arctic university.' In those four years the foundations were laid for the 'University of the Arctic' as it quickly became known in the circumpolar world. A joint document entitled 'Shared Voices and the University of the Arctic – Views of Indigenous Peoples,' was published by the Inuit Circumpolar Conference, RAIPON and the Sámi Council, voicing their enthusiasm for the project. 'Shared Voices' has since become UArctic's motto embodying the principles of interdisciplinarity, circumpolarity and diversity; bringing together indigenous and non-indigenous peoples and knowledge to create an empowered and sustainable North. The University of the Arctic has accomplished much since its inception in 2001. The organization has currently 110 members encompassing every region of the Circumpolar North.

The University of the Arctic is a child of the so-called "Arctic Boom". In many aspects the present active international cooperation in the Arctic began through environmental cooperation in the 1990s. The so-called "Arctic Boom" – referring to the rapid multiplication and diversification of international cooperation bodies in the Arctic and the increased international interest in Arctic issues in the 1990s – has its origins in the speech given in Murmansk by the last President of the Soviet Union Mikhail Gorbachev in 1987. In the speech, President Gorbachev called for international cooperation to tackle the environmental problems of the Arctic areas. Later, the so-called Rovaniemi Process – the Arctic Environmental Protection Strategy – instituted by Finland, brought together environmental researchers and experts from the Arctic countries in joint environmental research programs.

The geopolitical map of northern Europe has changed during the past 15 years. Finland and Sweden joined the EU in 1995, and Estonia, Latvia, Lithuania and Poland in 2004. These events greatly increased the Northern and Baltic presence of the EU, and substantially lengthened the common border shared by the EU and the Russian Federation. It has been imperative to address constructively the new challenges and opportunities which these changes have created.

The Northern Dimension as an important topic for EU policy was first recognised at the Luxembourg European Council in December 1997. On 21 November 2005, the Northern Dimension ministerial meeting held in Brussels approved unanimously the guidelines for the development of a political declaration and policy framework document for a Northern Dimension policy from 2007.

Today, Rovaniemi plays host to this major event whose purpose is to promote intensive dialogue among members of the research community and a wide range of other northern stakeholders. This dialogue addresses the critical issues, problems and opportunities facing circumpolar peoples in the context of social and environmental changes and economic globalization. The Forum provides an open meeting for policy-relevant discussion on the role of research in addressing issues of sustainable development, community viability, peace and security, social and environmental policy, and the impacts of global change.

I hope that this conference provides a platform for effective, policy-relevant discussion and the sharing of research on northern issues.

I wish you all a successful conference and I hope you enjoy your stay here in Rovaniemi.

You are warmly welcome.

Keynote address

Mr. Hannes Manninen, Chair of the Finance Committee of the Finnish Parliament and Chair of the Finnish Delegation to the Conference of Parliamentarians of the Arctic Region (CPAR)

Your excellencies, ladies and gentlemen,

It is a great pleasure also for me, on behalf of the Finnish Parliament, to welcome you to this meeting. Since the debate on the Arctic and especially on access to potential resources in the High North considerably heated up some months ago, this is the first major gathering of political decision makers in the region together with representatives of the academic community in the Arctic.

We are delighted to have all of you here in Rovaniemi. It is very much in the tradition of the Arctic Council to have a close cooperation between the political and academic communities. Hopefully this will provide also a framework for generating creative solutions to unresolved issues. What we need is a combination of analysis based on cold facts, and a political framework that is supported and respected by the whole Arctic community.

The Arctic Council has now been working for over ten years. It has an established position as the main forum for our cooperation. In the challenging times ahead we need to support the organization we have built up together. We have a framework to serve our needs, also when dealing with difficult issues such as access to natural resources.

Finland has been actively involved in promoting Arctic cooperation from the start. The first steps towards environmental cooperation in the Arctic were taken here in Rovaniemi towards the end of the Cold War. It did, however, take some time before the importance of this work was recognized on a global level. Today, as you well know, the Arctic is one of the major issues in the global debate on climate change, and public opinion closely follows the work taken place in international fora.

The role of the Arctic is crucial in a global perspective, and many of you have been pioneers in bringing this issue into the forefront of the debate. There is now an awareness of the situation that has created a momentum for decisions. Hard work will be needed in the preparations of coming environmental meetings, especially the UN Climate Summit

in Copenhagen in 2009. This work will need to be based on ideas that can work also in practice, and can be accepted by all major players. The discussions we as Arctic parliamentarians have on these subjects will contribute to this process. It will certainly also need all the help it can get from scientists involved in this work. It is very important to be active and to make sure our voice is heard on a global level. The Arctic has now been discovered by the rest of the world. This gives our region a new and stronger role.

Also in this respect I hope that the EU Commission will take a more active role in the Arctic Council in the future. Here the Commission could follow the good example the European Parliament set already years ago, by joining the Arctic parliamentary cooperation from the start. A stronger role for the EU is important, not only for the northern member states, but for Europe as a whole. EU involvement could also reinforce the transatlantic elements of our cooperation. Still more work needs to be done to convince our member states of the importance of this work also from a wider European perspective.

The human dimension of life in the Arctic is of primary concern in our efforts to improve conditions in the region. Indigenous people and other northern residents can provide valuable experience and knowledge when we deal with adaptation issues. Here in Lapland we have a special responsibility to safeguard the culture and livelihood of the Sámi people. I am very glad that the newly elected President of the Finnish Sami Parliament is with us today.

The UN Declaration on the Rights of Indigenous Peoples is an important tool in underscoring the principle of full and effective participation of indigenous peoples in decision making processes. Here in Finland we are continuing our efforts to find a solution to the question of disputes over land rights in the Sámi Homeland with a view to removing the obstacles to the ratification of the ILO Convention on Indigenous People. Work is also ongoing on a Nordic Sámi convention concerning the status and rights of the Sámi. Both issues still involve many unresolved questions.

An important step forward in our northern policy work was the adoption of the new program for the Northern Dimension of the European Union. The implementation of the program started a year ago, and the progress reports have been very positive. A Northern Dimension policy with joint ownership by the European Union, Iceland, Norway and Russia has given added value to the ND work. All parties have now taken a responsibility for the program. We have great expectations for the future of this program in which the Arctic now also features more prominently than before. Good results have already been achieved through the Northern Dimension Environmental Partnership, and now also through the ND Partnership in Public Health and Social Well Being. The environmental partnership has been instrumental in bringing in new resources especially for environmental projects in Russia. It is the most concrete cooperation we have between Russia and the EU.

An option, which is mentioned in the new ND program, and which now will be explored in more detail, is the establishment of an ND partnership in transport and logistics. It has recently been decided to set up a working group to explore this idea further. New openings in this area would be extremely important not only in taking our cooperation with Russia to a new level, but also in providing new opportunities for transatlantic and Arctic cooperation. It is important that Canada and the USA, observers in the ND, remain engaged also in concrete projects.

The USA recently organized an Arctic Energy Summit in Alaska to focus on energy security, energy markets and climate change as well as infrastructure. In Canada the government has made the Arctic one of its top policy priorities. I hope these, and many other initiatives, will also help build an even more active transatlantic cooperation especially on projects related to transport and logistics. In the form of new shipping lanes we can envisage, in the future, a bridge across the Arctic from North-Western Russia to Canada and the USA. The issues involved in developing logistics, and especially logistics in relation to energy, are of the magnitude that an active transatlantic cooperation could only benefit the work taking place in a Northern Dimension context. The active involvement of international financial institutions in transport and logistics will also be crucial. This sector should certainly be able to provide a number of interesting opportunities.

When moving forward with the ND transport and logistics initiative it is, however, essential to keep the word sustainability in mind. Here the work of the Arctic Council can provide us with necessary information and guidelines in the context of the Arctic

Marine Shipping Assessment (AMSA). This assessment of current and future Arctic marine activity is expected to be ready in about a year from now, in time to be discussed at the next Arctic Council ministerial meeting in early 2009.

The new possibilities that the use of the northern sea routes open up are fascinating, and they can now be true much earlier than previously anticipated. On the other hand we need to move with caution. There are immense environmental values and risks at stake. A worst case scenario is a race for resources without regard for commonly accepted rules or guidelines. The discussion that has been initiated on a binding legal framework for Arctic cooperation is important in view of potential future developments. The UN Law of the Sea Convention provides a good basis, hopefully soon with all Arctic states as signatories.

Considering also the latest political developments concerning the Arctic, the International Polar Year 2007 – 2008 could not have come at a better time. It has in a major way contributed to a stronger focus on the Arctic. Especially the overarching themes of climate change and people and communities in the Arctic are very relevant for the future of our region. The efforts also to support a new generation of scientists interested in the Polar Regions are very important. Also in this field the University of the Arctic will have a central role. It can provide more and better opportunities for young people in the region to get a university education.

As a consensus based organization, the Arctic Council can only achieve as much as member states are ready to accept and willing to finance. At this stage, considering the negotiations on climate change on a global level, I find it very important that the Arctic states together work on an agenda for issues of Arctic and northern interest. By speaking with one voice in climate and other negotiations, and by using our influence also through bilateral channels, we can strengthen the role of our region on a global level.

Ladies and gentlemen,

I wish all of you an interesting seminar and a fruitful discussion.

Background Paper on Adaptation to Climate Change in the Arctic

*Prof. Mark Nuttall, Thule Institute, University of Oulu/ University of Alberta
MSc Pierre-André Forest, University of Lapland
Dr. Svein. D. Mathiesen, Sami University College*

The Thematic Network on Global Change in the Arctic is a network consisting of experts from various UArctic member institutions. The main goal of this network is to strengthen the delivery of higher education in areas related to global change, and its aim is to increase the capacity of UArctic member institutions and indigenous peoples to participate in the knowledge generation and knowledge transfer on issues related to global change in the Arctic. The authors are steering committee members of this thematic network (www.uarctic.org/thematic).

Introduction

Recent regional and global assessments (e.g. most notably, the Arctic Climate Impact Assessment, the IPCC 4th Assessment, the Millennium Ecosystem Assessment, and the national Canadian assessment of climate change) show how the Arctic has emerged as a region of dramatic environmental change. Global climate change is being felt first and foremost in the Arctic, and the peoples and communities there are already witnessing and experiencing the effects of these changes. Understanding the human dimensions of current and future global climate change, and thinking about appropriate adaptive strategies, means understanding past climate change, and how human societies have responded to, coped with and negotiated change.

As indigenous and local peoples perceive and experience it, the Arctic is becoming both an environment of risk and an environment at risk. Sea ice is now unstable where Inuit hunters previously knew it to be safe, more dramatic weather events such as floods are occurring, vegetation cover is changing and impacting reindeer herding in northern Fennoscandia and Russia, coastal areas face the threat of erosion which will affect fishing and hunting communities in Alaska and Canada, and around the Arctic people report that particular animals are no longer found in traditional hunting and fishing areas during specific seasons. Climate change impacts are also affecting formal economic activities in the region, namely tourism and various natural resource management activities. The weather is becoming increasingly unpredictable and people are concerned that local

landscapes, seascapes and icescapes are changing under their feet. As the earth's climate is inextricably linked to the Arctic climate system, Arctic climate research is essential for our understanding and increased knowledge of global changes. In addition to the scientific evidence, the peoples of the region are witness to a range of effects on landscapes, ecosystems and on their livelihoods: but in this they are not alone and they have much in common with how peoples in other parts of the world experience environmental change, and how they are confronted with the challenge of responding to it.

• **As global discussion turns to the critical issue of adaptation, what challenges are there for the Arctic and its peoples, and what global lessons are there that can be drawn from Arctic adaptive strategies and constraints?**

It is argued that research projects and policy responses need to be generic in their applicability to and relevance for the wider circumpolar North, as well as for other regions of the world most vulnerable to climate change.

Being Resilient in the Face of Change

Resilience (both social and ecological) is a crucial aspect of the sustainability of local livelihoods and resource utilisation, thus there is a need for greater understanding of how societies build adaptive capacity in the face of climate change. However, there is also a need to be attentive to the reality that communities differ in the ways they perceive risk, in the ways they utilise strategies for mitigating negative change, and in the effectiveness of local adaptive capacity. Policy responses need to be informed by a greater understanding of how potential impacts of climate change are distributed across different regions and populations. Policy responses should also recognise climate change impacts within the broader context of rapid social and economic change and, in their implementation, should underscore the reality that climate change is but one of several problems affecting people and their livelihoods in the Arctic today.

As chairman of the International Centre for Reindeer Husbandry (ICR), Johan Mathis Turi said on the UN environmental day in Tromsø, in June 2007,

"We have some knowledge about how to live in a changing environment. The term "stability" is a foreign word in our language. Our search for adaptation strategies is therefore not connected to "stability" in any form, but is instead focused on constant adaptation to changing conditions."

Learning about Past Adaptive Capacity

The archaeological record, ice cores, ethno-historical accounts and the memories of elders provide detailed accounts of how human life in the Arctic has always been dominated and influenced by periodic, irregular and often dramatic ecosystem changes, triggered by periods of warming and cooling, extreme weather events and fluctuations in animal populations. The successful long-term occupation of the Arctic by indigenous peoples has been possible, in part, because of their profound respect and understanding of their environmental surroundings, and subsequently to their adaptive capacity (in social, economic and cultural practices) to adjust to climate variation and change.

• How did past human communities adapt to and recover from an ever-moving and frequently harmful natural background?

For example, circumpolar reindeer herders and their reindeer live for 8-9 months a year in a world of snow, in relatively extreme environments with changing climatic conditions. Reindeer herding represents an adaptive sustainable model for management that has been developed through generations based on accumulated practical knowledge. Through the year, weather and climate conditions change continuously and these are circumstances to which both reindeer and herders are adapted. Reindeer herding cultures, like Arctic hunting and fishing cultures, represent an adaptation to extreme climate and variability. So while climate change could have serious effects on such livelihoods, people also have unique knowledge about adapting to change.

• Therefore, what lessons are there from the past to aid future adaptation to rapid change?

• And, most critically, how can we disentangle the environmental and cultural consequences of natural change from those of human actions?

Contemporary Adaptive Capacity

• What is the hallmark of successful indigenous and local resource use within a contemporary context of climate change?

• What kinds of flexibility in technology and social organization do people need to cope with climate change now and in the future, flexibility that will allow them to respond both to its associated risks and to seize its opportunities?

To answer these questions we need to understand cultural and ecological diversity within the context of innovation, flexibility and resilient coping strategies used during periods of extreme change. Indigenous production systems in extreme, highly variable, and unpredictable climates are often based on the sequential utilization of a large number of ecological or climatic niches. The essence of such systems is being highly adaptable, flexible and knowing how to distribute risk through diversity. Circumpolar reindeer herders for example maintain high levels of phenotypic diversity in their herds with respect, to the age, sex, size, colour and temperament of their animals. This is the antithesis of a pure bred herd of livestock of the kind developed by careful selection to suit the requirements of a modern, high yielding agricultural ruminant production system. The ability to adapt to change, which reindeer herding has demonstrated repeatedly, is based on knowledge embodied in the language, the institutions of herding, the knowledge, and the actions of individual herders and herders' experiences.

Yet not all Arctic resource use systems have this inherent ability for change. Arctic fisheries present a good example of how the effects and influences of global processes are increasingly felt in all aspects of social, cultural and economic life in the Arctic today. The Arctic is one of the most important fisheries regions in the world. Viewed in relation to the relatively sparse population of the Arctic, fisheries is one of the major economic sectors and export earners for the region. In a number of circumpolar coastal areas, fishing is the mainstay of local economies. However, local fisheries are being transformed through changes to the ways of life or through industry changes that are subject to the control and regulation by local, regional and national authorities or global enterprise dominated by a handful of transnational corporations (e.g. the impacts of sending fish caught in the Barents Sea to China for processing, only to be imported back to the area). Another example is the tourism sector, which in many communities across the circumpolar Arctic, is also impacted by the effects of climate change. As external markets respond to these impacts, the security of

this activity as a means of income generation is reduced. As a consequence, such global economic restructuring and the disembodied nature of resource use diminishes local adaptive capacity.

Institutional and Legal Barriers to Adaptation

Arctic hunters, herders and fishers have always lived with and adapted to shifts and changes in the size, distribution, range, and availability of animal populations. They have dealt with flux and change by developing significant flexibility in resource procurement techniques and in social organization. However, the ecological and social relations between indigenous peoples and animals are not just affected by climate-induced disruption, changing habitats and migration routes, or new technology. The livelihoods of the indigenous peoples and local communities of the Arctic are subject both to the historical development and the contemporary influences of markets and to the implementation of government policy and resource management that either contributes to a redefinition of hunting, herding, and fishing, or threatens to subvert subsistence lifestyles and indigenous ideologies of human–animal relationships.

Today, arctic peoples cannot adapt, relocate, or change resource use activities as easily as they may have been able to do in the past, because most now live in permanent communities and have to negotiate greatly circumscribed social and economic situations. The majority of indigenous peoples live in planned settlements with elaborate infrastructures, and their resource activities are determined to a large extent by strict resource management regimes, regulatory and legal regimes, land use and land ownership regulations, quotas and local and global markets. Furthermore, if Arctic Ocean ice disappears for most of the year with the projected warming of the Arctic, we may soon experience an explosion of human industrial activities going north. In advance, this activity will have to be regulated in a way that respects local arctic societies and indigenous peoples' natural resource use rights. While local people may benefit from the opportunities such development could bring, reindeer herders in Fennoscandia and Russia, and hunters and fishers in Alaska and Canada could experience loss of grazing land and hunting and fishing areas to industrial development, reducing their flexibility to respond to change and constraining their ability to adapt to warming of the Arctic. The contemporary reality for many people is that they are placed in very inflexible situations.

- **How do commercial, political, economic, legal, and conservation interests have reduced the abilities of Arctic indigenous peoples to adapt and be flexible in coping with climate variability and change?**

Adaptation as a Human Rights Issue

Climate changes, as well as other global change related impacts (economic globalisation, environmental degradation) pose not only significant threats to human health and food security, but also legal and human rights challenges. Maintaining cultural diversity and recognising indigenous livelihood rights are prerequisites for successful adaptation in the face of change.

Environmental conditions clearly help to determine the extent to which people enjoy their basic rights to life, health, adequate food and shelter, and traditional livelihood and culture. However, more often than not, the most vulnerable members of society are those who suffer most from environmental problems. In this respect the indigenous peoples of the Arctic are in a central position, since they typically depend on their relationship with a sound environment not only for subsistence but also for the very basis of their cultures.

Although most major human rights treaties contain provisions with obvious environmental dimensions, universal recognition and protection of environmental or ecological rights continues to be a great challenge for international human rights law.

- **However, since human rights cannot be secured in a degraded or polluted environment, than the question is whether we are interested in finding solutions for the environment or should concern for human well-being become paramount?**

Socio-economic adaptation to warming of the Arctic includes development of robust local economies based on the customary rights and traditional knowledge to produce local food for human consumption. The diversity of the food cultures of Arctic societies are rich, and based on local natural resources of high nutritional values. Constraining local food production by not respecting indigenous peoples' traditional food cultures and rights to produce their own food is also a serious threat to the ability of Arctic local societies to adapt to change.

The Governance of Adaptation

- What are the political aspects of responding to climate change?

Parts of the Arctic are unique in terms of the political settlements and land claims that have been achieved over the last thirty years or so. The extent

of vulnerability and resilience to climate change not only depends on cultural aspects and ecosystem diversity, but on the political, legal and institutional rules which govern social-economic systems and social-ecological systems.

On the one hand, climate change has the potential to enhance economic development, but with further climate change, the climate in the Arctic is predicted to become more variable and extreme weather events more frequent and severe, which on the other hand can undermine economic activities. Thus it seems particularly important that attention be given to the management of resources and to the effectiveness of governance institutions, and critical questions must be asked as to whether they can create additional opportunities to increase resilience, flexibility and the ability to deal with change.

• How can, for example, new governance mechanisms developed under Home Rule in Greenland or public government in Nunavut, help (or perhaps hinder) people to negotiate and manage the impacts of climate change?

• In Greenland, Alaska, and northern Canada, are the political and management systems already in place that are able to assess the impacts of climate change, allowing local and regional authorities to act on policy recommendations to deal with the consequences, and improve the chances for local communities to deal successfully with climate change?

• How can an assessment and evaluation of past climate change – and the social, economic and political responses (e.g. in the early 20th century) help in understanding current perspectives and policy responses?

• Although migration and resettlement has long been a core survival strategy for peoples of the circumpolar north, how are such experiences perceived today and who should be involved in the planning and initiation of such a strategy?

Conclusion

This short paper has outlined several of the ways that climate change threatens individuals, communities and livelihoods in the Arctic. However, if effective policy responses are to be developed, then the answers to the many questions highlighted in this paper will depend on a range of factors, including the importance of understanding the nature of the relationships between people, communities and institutions.

Since adaptation to climate change is something that primarily takes place on the local level, it is important that indigenous peoples and local societies themselves define the risks related to rapid change. Circumpolar peoples and communities have to pre-

pare themselves, their society and management authorities for change, and reduce their vulnerability to effects of climatic change. Thus, adaptation to climate change will demand the training of local arctic leaders in long term sustainable thinking, based on the best available adaptation knowledge, both scientific and experienced-based traditional and local knowledge.

However, to succeed in developing preparedness and building competencies in local Arctic societies, adaptation to climate change must therefore be priorities for national and regional governments and indigenous people's institutions and organizations. In addition, national adaptation strategies must recognise minorities, indigenous peoples' traditional knowledge, cultural and linguistics rights.

Over the past couple of years, a number of Aboriginal and northern communities and organisations in the Arctic have initiated activities on the subject of climate change and adaptation. See for example:

* Environmental Protection Division, Government of Nunavut <http://www.gov.nu.ca/env/environment.shtml>

* Centre for Indigenous Environmental Resources (CIER), First Nations. <http://www.cier.ca/default.aspx>

* Community Adaptation and Vulnerability in Arctic Regions (CAVIAR) <http://classic.ipy.org/development/eoi/proposal-details.php?id=157>

* Environmental and Social Impacts of Industrial Development in Northern Russia (ENSINOR) <http://www.arcticcentre.org/?deptid=15989>

* Moved: Perspectives on Relocation and Resettlement in the Circumpolar North <http://www.alaska.edu/boreas/move/>

* Reindeer Herding and Climate Change (EALAT) <http://arcticportal.org/en/icr/ealat>

Although these and other initiatives are clearly addressing a need, what has not yet taken place in many northern communities is the systematic planning and analysis effort towards this issue.

Conversely, it must also be said that the development and through understanding of adaptation alternatives (and related consequences) requires a considerable amount of time. Be it for the collection of additional data, or for the challenging re-assessment of needs and values to be done on both an individual and collective basis.

In conclusion, it is important to highlight the need to link research to policy-making, by placing an emphasis on getting research messages to appropriate target groups, linking research to existing local knowledge of climate related hazards and involving local communities in adaptation decision making. In turn, education and awareness creation on climate change among governments, institutions, communities and individuals should be viewed as a necessary step in promoting adaptation to climate change in the Arctic, a region that is already under pressure from climate stresses which increase vulnerability to further climate change and reduce adaptive capacity.

Only through collaborative efforts, between all parties involved, will adaptive capacities be created and sustained!

Papers by the speakers on Adaptation to Climate Change

Dr. Grete K. Hovelsrud, Research Director, CICERO

When discussing the consequences of climate change for people and society, it is necessary to consider both mitigation to climate change through emission reductions, and adaptation to the effects of climate change. Mitigation and adaptation are two sides of the same coin: no matter how much we cut CO₂ emissions today we will still need to adapt for the next few decades to the observed changes in climate as a result of climate change. While discussions and understanding of mitigation is critical, the topic of this note is adaptation. The consequences of climate change are first and foremost felt at the local level and adaptation predominantly takes place locally. Nevertheless the process of adaptation is linked to regional, national and international events and processes. Adaptation to climate change takes place in the context of multiple factors and climate change is one driver of change which interacts and impacts other changes in the economy and society.

The Arctic is a special case when it comes to the impacts of climate change: the rate of change is faster due to the particular feedback mechanisms in the northern regions, the temperature increase is double that of the global average and current observations show that the sea ice in the Arctic Ocean in fact is melting faster than model predictions (National Snow and Ice Center, 2008). Current observations show that climate change has major impacts on the residents of the circumpolar region and that there is need for adaptation to changing conditions, both to new opportunities and constraints.

There are a number of issues to consider when discussing and understanding local adaptation to climate change. Here the focus is on three: 1) there are different concerns within a community, a sector or stakeholder groups. 2) There are indirect consequences of climate change on a local community. 3) It is a challenge for politicians and policy makers to plan under uncertainty and across borders. Hammerfest in Northern Norway may serve as a case for illustrating the range of concerns and opportunities.

Coastal and commercial fisheries are an important sector in Hammerfest. Increasing ocean tempera-

tures cause a change in distribution and migration patterns of important fish species, and introduces new species to the region. As a result, fishermen must adjust their activities in terms of technology, and to new and changing fishing regulations. Other drivers of change in the fisheries are considered in the context of climate change, such as variable access to market, and lack of skilled young men and women in the fisheries because of competing economic sectors. In addition, climate change has consequences for how existing local knowledge of tides and sea conditions may not be as relevant to the new weather patterns caused by global warming.

On the municipal level, the focus is on how new patterns, seasonal and daily levels, of precipitation, temperature and wind speed and direction will require preparations for avalanches in new areas, restricting new construction of buildings in areas of risk, and preparing for damage on infrastructure and roads.

While the oil and gas industry operating outside of Hammerfest at Melkøya, in general does not consider the consequences of climate change as a major concern, the local installations are sensitive to the expected increase in storm surges, increasing wave heights, change in wind direction and increasing sea level, which will have consequences for icing on equipment and installations and environmental safety.

These are three examples of different concerns within the same municipality that are all directly linked to climate change effects and to other drivers of change. In addition to such direct consequences of climate change we find that there are indirect effects which will also have consequences for local vulnerability. In the Hammerfest case we find that global warming may open up for more oil and gas exploration in the region which will decrease the already observed recruitment to fisheries. Oil and gas activities and fisheries are to a certain degree "competing over space" at sea which will continue in a global warming context.

With the retreat of the sea ice, ship traffic through the Northern Sea Route will increase; ships can reduce travel distance by 40% by sailing the Northern Sea Route compared with current shipping routes, and it is expected that the transit transport from Russia will increase. These ships will have to deal with an expected increase in storm surges, wave heights and wind, resulting in icing on equipment, and questions about environmental safety. An increase in ship traffic raises questions about preparedness for shipping accidents that may cause environmental damage along the Norwegian coast. Further access into the Arctic Ocean raises questions about international security and rights to sea bed resources. These are all elements which will affect the local vulnerability of Hammerfest, and increase the need for further adaptation at the local level.

There are several areas of uncertainty with respect to climate change adaptation. First of all, there is a level of uncertainty in the global and regional circulation models that we use to project future climate change. This is because we find uncertainty both in the natural climate variability and how the climate will behave in the future as a result of human influences. Secondly, we find uncertainty in determining the different drivers of change (climatic, social, economic and political) and in their interaction and combined impact on human society. Politicians and decision makers will have to consider various levels of uncertainty with respect to top adaptation to climate change. Thirdly, we find uncertainty in understanding the adaptive capacity of a community, a region, a nation and internationally. Nevertheless we have enough knowledge to understand trends and changes in policy development.

In addition to facing the challenge of planning for adaptation to climate change under uncertainty, politicians will have to consider local adaptation needs and international implications of climate change and its consequences simultaneously. It is also a challenge for politicians to mainstream climate change into policy. In the Arctic we have a unique opportunity to collaborate across communities and borders and to generate transferable knowledge. It is a challenge for politicians to use particular case studies from particular communities to inform policy and learn about adaptation practices that may prove useful in other areas.

There are a number of research and assessment efforts underway that will increase our understanding of how communities adapt to climate change in the Arctic and how we can compare and transfer knowledge across communities and borders.

These include CAVIAR-Community Adaptation and Vulnerability in the Arctic Regions – and International

Polar Year 2007-2008 (IPY) Consortium co-lead by CICERO, Norway and the University of Guelph, Canada with participants from all eight Arctic countries, and VACCA - Vulnerability and Adaptation to Climate Change in the Arctic –Arctic Council SDWG project assessing current work on adaptation in the Arctic.

In summary, local focus and local knowledge are essential in studies on and for adaptation. We find variation in adaptation needs and strategies between sectors and different levels within the local community. Local understanding of climate change and adaptation needs are generalizable through the transfer of practical knowledge, and to help increase the scientific knowledge base. Adaptation to climate change has not until recently been on the political and scientific agenda, and this is reflected in the lack of knowledge and lack of focus. More and integrated knowledge about adaptation is needed across scientific disciplines and local/traditional knowledge, and between scientists and decision makers and in the international arena.

Adaptation to Climate Change

Fil.Lic. Klemetti Näkkäljärvi, President of Finnish Saami Parliament

Respected members of the Standing Committee of the Arctic Region and the University of the Arctic,

Climate change influences at first the Arctic area and its indigenous peoples are in the immediate frontline of vulnerability to these changes. For the Arctic peoples, the situation is unfair. The Arctic people have always lived nature-oriented lifestyles and respected the environment. The pollution of Arctic areas is based from the western industries, not from Arctic people. However, we are the ones who will suffer the most from climate change. Climate change is a global problem, and it should be solved and discussed at the governmental level with indigenous peoples. We, the Arctic people pay the cost of the decisions from the western world by losing the roots of our culture. Arctic Climate Impact Assessment is of course important, but somehow I think we have lost the battle, when we only speak about the adaptation to climate change, not about how to prevent it or minimize its impacts.

Climate change is likely to affect the Saami regions severely, with winter temperatures predicted to increase by up to 7 degrees celsius. Precipitation and wind also affect snow quality and quantity, with the quality rather than the quantity of snow being most crucial. The situation is especially serious for the nature-oriented cultures, like the Saami culture. The Saami people have for centuries adapted to changes in habitat, climate or nature by changing habitual areas, migrating and adapting to new livelihoods. Climate change happens rapidly, and since the administration of Saami areas is managed by the Finnish Government, the possibilities for the Saami people to react to the changes are quite small. The livelihood patterns of Saami people have changed, and a great deal of this has come as a result of governmental administration rather than influences from climate change. On the whole, the Saami have had very limited capacities and possibilities to react to climate change. For the Saami people, it's necessary that the government give power and possibilities to the Saami to react to climate change and develop a Saami approach for climate change assessment.

The Saami people and the Saami Parliament want to participate and prevent climate change. For Saami livelihoods, the biggest change is, according to researchers, the increasing precipitation of snow. Likely there will be changes to vegetation cover also. For Saami reindeer herders, high level of snow causes a great deal of difficulties, because the reindeer cannot excavate food underneath high and crusty snowdrifts. This influences the cultural reindeer herding patterns, and compels the herders to feed the reindeer with extra nutrients during the wintertime. Most of the reindeer herders now must feed their herds. This is perhaps the only possible way to react to climate change for the herders, because vast seasonal migration is not possible anymore because of government legislation.

For other livelihoods, such as fishing and hunting, the changes appear most notably in the amount of fish but there will also be changes in animal species. The Saami are experts in reading nature and they have very special and distinct terminology for environmental conditions and phenomenon. Saami language is vast and specific for snow terminology and creates certainty to move and navigate in the landscape. For example, in Finnish language there are not words for certain snow conditions, and the condition must be explained with a sentence. Although the lingual knowledge is vast in practical nature, it also holds more theoretical aspects in perception models, cultural ways of seeing and in exact classification system of natural phenomenon, land forms, terminology and identification models. The knowledge stored in our language can be used to determine the changes that occur due to climate change, because we already have exact concepts for different environmental conditions.

The Saami reindeer herders and hunters are the best informants to tell how the snow condition changes and what the influences of the changes are on snow level. Indigenous communities should be supported in their unique adaptation to marginal areas and ecosystem boundaries. This needs resources from the national and international level.

Respected members of the Standing Committee of the Arctic Region and the University of the Arctic, the main issue what I want state is this – the Arctic indigenous people have been treated mostly as objects, but we need to be subjects. We cannot just watch and follow climate change without our own possibilities to react. Our possibilities to adapt to climate change are limited without new resources and better control of our land. Our cultural livelihood patterns are changing due to climate change and governmental administration. We need help and resources to maintain our cultural core so that we can pass it from generation to generation.

Adaptation to Climate Change

Senator Yoine Goldstein, Parliament of Canada

Introduction

It is a daunting task to follow Dr. Hovelsrud from Norway and Mr. Näkkäläjärvi from Finland, in connection with adaptation to climate change. It is doubly daunting because I am here replacing Bob Mills, whom we all know, and who is the victim of the uncertainty as part of Canada's minority government with the prospect that the government may be falling at any time, provoking a new election. I am sure Bob would rather be here with you than staying in Canada and worrying about whether or not there will, in fact, be another election shortly.

About 50% of Canada's land mass lies within the Arctic and Taiga ecozones. Over a hundred thousand people, half of whom are indigenous people, live there.

Environmental changes associated with climate change are proceeding at a faster pace in the Arctic than anywhere else. The scientific evidence indicates that the Arctic is warming, on average, at approximately twice the rate of the global average. Under the best of circumstances, and assuming significant mitigation, which is by no means certain, global warming will continue in the range of 0.4 degrees Celsius over the next twenty years.

The impact on the North, as we all know, is profound. The permafrost is melting, the Arctic ice is receding and thinning at a remarkable pace, polar bears are having difficulty adapting to changes in ice distribution to the extent that impact their main prey, seals. Inuit hunters must range further and further to hunt their traditional prey. The continued existence and way of life of these people are mortally threatened. As Mary Simon has stated: "When we can no longer hunt on the sea ice, and eat what we hunt, we will no longer exist as a people."

Farley Mowat, a Canadian writer who loves the Arctic, used to remind us that it is more than a place; it is a state of mind. As Nuttall, Forest and Mathiesen put it so excellently:

"The successful long-term occupation of the Arctic by indigenous people has been possible, in part, because of their profound respect and understanding of their environmental surroundings, and subsequently to their adaptive capacity (in social, economic and cultural practices) to adjust to climate variation and change." (1)

Certainly, many Arctic human communities are already adapting to climate change. Indigenous people have long exhibited flexibility and resilience to changes in their local environments and in coping with extreme weather phenomena. Some indigenous communities are adapting through changes in wildlife management regimes and hunting practices. However, while the indigenous people used to be nomadic and could, therefore, follow their prey at times of warming, they now live, generally, in fixed dwellings, and they cannot readily move further North to hunt their prey. While they are able to respond to gradual change, sudden changes together with the cumulative effect of slow change, make the continued existence of many of these communities questionable. They are already under stress: due to the development of mass communications, television, the internet and other types of communication, the younger generation frequently seeks its life and livelihood further South. In many areas, economic development, and predominantly oil and gas exploration, but also, in Canada, diamond exploration and mining, are in the process of displacing traditional indigenous economic activity. Indigenous families are engaged less and less in traditional activities and more and more in servicing oil, gas and mineral exploration companies.

Arnold Toynbee, the classic historian-philosopher and on whose teachings we were raised when I was going to college, posited in his theory of "Challenge and Response" that civilizations and societies survived where their responses to challenges were adaptive and consistent with medium and long-term goals which permitted the society or civilization in question to continue to thrive in changed circumstances.

However, adaptation to the relatively sudden changes in climate and more important, the immediate consequences thereof, coupled with the race to economic development of the apparently mammoth natural resources which exist in the Arctic, make the adoption of systematic and systemic change and responsiveness, an immediate priority.

Preliminary Frameworks for Adaptation

How does one do that? Certainly, many groups, within universities, governments and internationally are working to establish frameworks for climate change adaptation. In Canada, the Intergovernmental Climate Change, Impacts and Adaptation Working Group, consisting of representatives of the Federal government as well as all Provincial governments and Territories, published a "National Climate Change Adaptation Framework" in 2005. It was intended to provide a foundation for collaboration between the various governments of the Provinces and Territories within Canada in raising awareness of the need to enhance, improve and accelerate Canada's adaptation capabilities, including the promotion of research, and the development of tools that will further the elaboration of detailed adaptation plans and initiatives.

That group posited six framework elements for adaptation:

- 1) Raising awareness of adaptation;
- 2) Facilitating and strengthening capacity for coordinated action on adaptation;
- 3) Incorporation of adaptation into governmental policy and operations;
- 4) Promotion and coordination of research on impacts and adaptations;
- 5) Supporting knowledge sharing networks nationally and regionally and
- 6) Providing methods and tools for adaptation planning.

This framework however has never been put in place.

In 2006, the report of the Canadian Commissioner of the Environment and Sustainable Development (a position held within the Office of the Auditor General of Canada) devoted an entire chapter to "Adapting to the Impacts of Climate Change". The report makes it clear that while the melting permafrost was destabilizing the entire Northern infrastructure and

though there was recognition that adaptation strategies were required to respond, no concrete plans were developed. The Commissioner recommended that Environment Canada and the Privy Council Office should identify the responsibilities and accountabilities of the federal departments and agencies that are to be involved in a federal adaptation effort. Those departments and agencies should then clarify how the Government of Canada will manage adaptation to a changing climate, including

- * identifying the extent to which the federal government intends to work with other levels of government and stakeholders, and what it will contribute; and
- * developing and implementing a federal adaptation strategy to address federal priorities. The strategy should include an assessment of the implications of a changing climate for federal policies and programs.

The press release accompanying the Report quoted Mr. Gélinas as follows:

"Canadians are facing risks such as the spread of disease, more drought in the Prairies, melting permafrost in the North, longer and more intense heat waves and smog, and rising coastal waters. Some of the repercussions are inevitable ... therefore, developing the capacity to adapt is crucial."

Again, however, there was no active pursuit of the laudable goals contained in this Report.

Other activities have been initiated at the level of the Federal government. In 2006, the National Round Table on the Environment and the Economy, an advisory body that until recently reported directly to the Prime Minister and now reports to the Minister of the Environment, began a study to examine the influence of Canadian public policy "On How our Communities and Economic Sectors Plan For and Manage the Effects of Climate Change". In recognition of the severe and the sustained character of climate change impacts in the Canadian North, the program initially focussed on "North of 60", that is north of the sixtieth parallel.

In addition, a large scale assessment of climate change impacts and adaptation, entitled "From Impacts to Adaptation: Canada and a Changing Climate 2007" was to be published in the fall of 2007 but, its release was delayed until early March. There seems to be a pattern here. While there is recognition on the part of the Federal government that

adaptation is essential, the process of assessing how to implement adaptation strategies is difficult and slow.

A small step was taken on December 10, 2007, presumably in virtue of the impetus of Bali. Of a total commitment of almost \$86 million, a sum of \$14 million was included for Northern and Aboriginal communities, to assess key vulnerabilities and opportunities and a further \$7 million was earmarked to establish a community-based research program to study health impacts related to climate change in Northern/Inuit populations. This is, however, a multi-year program.

Specific Micro Adaptations

Interestingly, and perhaps inevitably, the most valuable assessment of what is needed for adaptation by the Inuit of Canada comes from the publication, over two years ago, of the Inuit Tapiriit Kanatami publication (2) "Unikkaaqatigiit: Putting a Human Face on Climate Change, Perspectives from Inuit in Canada". That remarkable piece of work, which reflects various ideas coming out of workshops held in communities across Canada's North, provides very specific ideas and thoughts with respect to adaptation. After listing twelve specific concerns, such as unpredictable weather, potential loss of houses and buildings due to erosion and increased heat from the sun, it then proceeds to provide proposed adaptations for four different regions of the Canadian Arctic. These adaptations are, in some cases, obvious, and in other cases, somewhat simplistic, but, in all cases, attainable and sustainable.

I will give you an example. The responses to the challenge of an increased number of unhealthy animals and animals with abnormalities include:

- * being more selective about which animals to consume;
- * creating a testing mechanism for suspect meat; and
- * providing food exchanges between communities.

To respond to increased heat from the sun, some of the suggestions include: the building of houses for elders so that there are cool areas for relief from increased warm temperatures in the summer, the use of sunscreen for protection against ultraviolet rays, the wearing of masks, turning meat more often when it is left out to dry and protecting food by placing it underground or in freezers.

It suggests that the challenge of communication and information dissemination could be met by:

- * the use of community radio facilitating information sharing;
- * increasing access to weather forecasts;
- * the improvement of communications between coastguard and communities;
- * the sharing of information about the conditions on land and sea within and between communities including calling ahead; and
- * the use of satellite phones.

These are specific responses at the micro level. They are, of course, useful and, indeed, essential. They are all the more useful and significant because they are responses created by and for the indigenous people.

Not all adaptation efforts are successful and, perhaps, more importantly, there exist inherent impediments to adaptation. Some forms of adaptation have a cascading effect, that is, some adaptations create their own, additional, adaptation problems. Let me give you just one example from the Canadian experience. Thirteen of nineteen polar bear populations are in the Canadian Arctic. Approximately 15,000 of an estimated 25,000 (up from 5,000 forty years ago) polar bears live in the Canadian Arctic.

There is a movement in the United States to declare the polar bear a threatened species. The result would be that hundreds of indigenous people in the Canadian North who earn their livelihood as guides for tourist hunters, with some of them earning as much as \$60,000 a year, would lose this means to make a living. This sport hunt, which in no way adversely affects the polar bear population, brings in about \$3,500,000 a year to Nunavut. This would, of course, disappear, if the polar bear were to be listed as a threatened species. So the conservation effort implicit in the categorization of the polar bear as a threatened species, would have the effect of further exacerbating the economic situation of some aboriginals.

Macro Adaptation

However, many of the challenges require response and adaptation at a more massive level, at a macro level. These include government action, international cooperation, planning and sharing of information for the elaboration of policies which encourage, foster and finance adaptation and adaptive techniques. The recent Bali climate change meetings recognized

this by making adaptation a significant part of the negotiations toward improving the implementation of the United Nations Framework Convention on Climate Change (UNFCCC).

In broad strokes, the macro activities include education, both of the population at large (in order to help it understand the significance of the problems and the importance of using financial resources to help communities adapt to the changed environment), and of the indigenous and other residents of Arctic communities.

Adaptation is necessary to impacts often felt at a relatively local level, so it is best driven by community needs in a “bottom up” manner. Formulation and implementing adaptation strategies, however, face a number of constraints, including financial, knowledge limitation and technological that require national government activity and commitment to overcome. In addition, governments are also in control of legislative and fiscal frameworks for such things as natural resource exploitation and building codes.

As a result, some adaptations are beyond individual or community means. Things like the creation of environmental frameworks for natural resource exploitation, including especially, mitigation policies, must be imposed by governments and must be equally stringent across the Arctic in order to avoid strategic choices by industry to locate environmental damaging activities in regions with less rigorous regulation than those of others. This necessarily implies and requires international cooperation, as do all educational programmes, pilot projects and other initiatives.

And no one person and no one country has all the solutions; indeed, it is hard, sometimes, to even formulate the right questions. However, this meeting is part of a larger set of initiatives, including those of the Arctic Council, moving towards the creation of a framework for response and adaptation. And to respond and adapt, we need exactly the kind of exchange of ideas and information in which this group is so successfully engaged.

End Notes:

(1) Adaptation to Climate Change in the Arctic, A background paper prepared for the joint seminar of UArctic Rectors' Forum and the Standing Committee of Parliamentarians of the Arctic Region on February 28, 2008, at the Arctic Centre in Rovaniemi, Finland

(2) In collaboration of the Nasivvik Centre for Inuit Health and Changing Environment at l'Université de Laval and the Ajunjiniq Centre at the National Aboriginal Health Organization.

Background paper on Borders and Access to the Sea in the Arctic

Dr. Timo Koivurova, Research Professor, Arctic Centre, University of Lapland

Continental Shelf Claims by the Arctic Ocean Coastal States – Preliminary Evaluation

The media has presented the broad continental shelf claims by the Arctic states as prompted by melting sea ice, which opens the continental shelf and deep sea-bed to resource development. In this story-line, there is a fierce competition as to who gets there first to occupy the resources (mainly oil and gas).

This is not an adequate picture of what is happening, since the process is largely governed by the United Nations Convention of the Law of the Sea (UNCLOS) – many times referred to as the “Constitution of the Oceans”.

Under UNCLOS, all states that become parties to the Convention – and which have a broader continental shelf than 200 nautical miles (the so called “extended continental shelf”) – are under a legal obligation to make a submission to the UN Commission on the Limits of Continental Shelf (UN Commission) within 10 years from becoming parties to the treaty. Since Russia became a party already in 1997, it made its submission on 20 December 2001, which was also the first submission ever made to the UN Commission (all the other Arctic Ocean coastal states reacted to Russian submission). Norway, of the Arctic states, made the submission in 2006. Canada (deadline November 2013) and Denmark/ Greenland (deadline November 2014) are intensely preparing their submissions. The US is not yet a party to the UNCLOS, but currently the Bush Government tries to become a party to it and the US is already preparing its submission (according to the news paper sources).

The submission must be supported by scientific and technical information in order for the UN Commission – (which is an expert body of 21 members and having expertise in geology, geophysics or hydrography) - to evaluate whether Article 76 criteria is followed by the coastal state in drawing the outermost limit of its continental shelf. On the basis of Article 76, scientific criteria determines, in most

cases, to what extent the legal continental shelf of a coastal state can reach.

The Convention provides very complex criteria for drawing the outermost limits of the extended continental shelf, but in principle (and broadly speaking) Article 76 of the Convention prescribes criteria by which the coastal state can extend its continental shelf to whole of its continental margin (but not to the deep sea-bed). This is the reason why it is so important to have a UN expert body to examine the information submitted by all coastal states since there is a temptation for the coastal states to claim as broad areas as possible as part of their continental shelf (and thereby having sovereign rights over the resources in the shelf).

What is in principle clear is: 1) that there are outermost limits to the continental shelf claim, either 350 miles from the baselines or that the shelf “shall not exceed 100 nautical miles from the 2,500 metre isobath, which is a line connecting the depth of 2,500 metres”. USA, in its reaction, accused Russia for exceeding these outermost limits in certain localities. 2) Oceanic ridges cannot be claimed as part of the state’s continental shelf, and the US argues in its reaction to Russia’s first submission that this is exactly what Russia is doing. 3) Continental shelf cannot be occupied (Art. 77.3) and thus any concerns of Russia occupying some parts of ocean floor (manifested in the planting of Russian flag to the ocean floor) are invalid from the viewpoint of UNCLOS and the law of the sea (4) and that, apart from outermost limits, if the continental margin of a coastal state does not extend up to 200 NM, it will be 200 NM).

Yet, there are also many unresolved issues for the simple reason that the UN Commission has not yet given any recommendations, but only returned Russia’s submission back to Russia for it to collect further scientific information, which Russia has been collecting ever since. Russia’s submission was heavily criticized by the US in its reaction arguing that many regions that Russia was claiming as belonging to its continental margin were of oceanic origin and cannot thus be claimed by any state (but

are governed by PART XI and of the UNCLOS and its implementation agreement as common heritage of mankind and managed by the UN International Sea-bed Authority).

Even though the UN Commission does not have the authority to make a binding decision as to the extent of the continental shelf, its recommendations are very influential. This is so because under UNCLOS the outer limits of the continental shelf will be “final and binding” only after the coastal state has enacted them in accordance with the recommendations by the UN Commission. If the coastal state disagrees with the UN Commission, it must make a new or revised submission to the UN Commission (Article 8 of Annex II). It can be expected that States will follow these recommendations.

The UN Commission does not have the authority to decide overlapping continental shelf claims by coastal states, and these need to be agreed between the states themselves. This applies to the possible overlapping claims by Russia and some other states over the Lomonosov ridge, if it is seen as non-oceanic ridge (the us argued in its reaction that Lomonosov ridge “is oceanic part of the Arctic Ocean basin and not a natural component of the continental margins of either Russia or of any State”). UNCLOS contains also dispute-resolution provisions in case the parties cannot reach the agreement by themselves.

At least so far, the Arctic states have all acted with respect to their continental shelf claims in accordance with their obligations under the UNCLOS.

The possibility for an Arctic Treaty

Arctic co-operation has in a fairly short time been able to transform from the Arctic Environmental Protection Strategy Co-operation (AEPS, commenced in 1991) to the Arctic Council in 1996, a stronger form of inter-governmental forum than the AEPS.

On the other hand, the Arctic-wide co-operation process has – even though the name was changed – developed gradually around the same institutional forms (ministerial meetings, senior arctic officials, working groups, participation by indigenous peoples’ organisations). The Arctic Council made the decision-making process explicit, clarified the rules of procedure, elevated the indigenous peoples’ organisations as permanent participants, and has added two new working groups. Still, much the same institutional structure has been retained from the 1991 onwards.

It is also the case that in recent years, the work and deliverables of the Arctic Council have become more ambitious. This is due to the fact that the working-groups, which are the core platforms of action in the Council, have been able to produce influential scientific assessments, and some cases even recommendations, which have clearly made a difference (prime example being the Arctic Climate Impact Assessment, ACIA).

On the other hand, many observers to the Council have become more critical of its work, and have taken up the question whether its current structure and status should be strengthened. The only actor – clearly the most influential observer to the Council – that has outright informed that a multilateral treaty needs to be negotiated is the WWF Arctic.

Other actors (and observers to the Council), such as the World Conservation Union, Arctic parliamentarians and UNEP GRID Arendal – have preferred a different approach. They have urged that a study be conducted as to the effectiveness of multilateral treaties in the Arctic, and only after such an audit, discussion should be commenced as to whether a treaty should be negotiated.

The points of criticism to the Arctic Council are well-known, having no permanent funding base, no permanent secretariat (currently there is the semi-permanent secretariat till 2012, but no security whether this will continue after that), and no legal status, to name a few. Such a weak inter-governmental platform can not really do much but commission scientific assessments and, at the most, prescribe soft guidelines. With this structure, it seems fairly clear that the vast challenges created by climate change cannot be managed in the Council. As is well known, climate change will radically transform the environment and ecosystems of the Arctic, and open up new economic opportunities to use the Arctic waters (e.g. shipping, fishing, oil and gas exploitation).

Possible benefits of the treaty approach may include, e.g.: encouraging greater political and bureaucratic commitments; establishing firmer institutional and financial foundations; transcending the vagaries of changing governmental viewpoints and shifting personnel; giving legal status to environmental principles and standards; raising the public profile of regional challenges and cooperation needs; and providing for dispute resolution.

Apart from the problem of how to mobilize political will for the Arctic states (or a wider group) to opt for the treaty approach¹ there are possible downsides to negotiating an Arctic treaty, e.g.: lengthy and costly

preparatory and negotiation processes involved; risk of legalizing lowest common denominator standards and contributing another layer of complexity to the already fragmented array of multilateral environmental agreements.

The ultimate problem for those who push for an Arctic treaty is that at least at present there are no real sign from the Council and its member states that they would be ready to go for the treaty approach, at least in the immediate future.

The 2006 Salekhard ministerial (and before it the 2004 Reykjavik ministerial in light of the ACIA findings) asked the SAOs to “examine the organization of the Arctic Council with a view to improve its effectiveness and efficiency, and report back to the next Ministerial” in 2008, but there does not seem to be much progress in this.

It seems that increasingly the Arctic treaty discussions (by NGOs and scholars) center on the Arctic Ocean (since many of the economic opportunities seem to be opening there with melting ice), and how to create a regime to manage that Ocean. Yet, for those AC member states not fronting the Arctic Ocean (Iceland, Finland and Sweden), this change of focus would seem difficult to accept.

End Note

(1) For instance., difficulty in getting consensus on the need for an agreement, primacy given to addressing extra-regional and global sources of pollution and environmental threats, and lack of a sense of urgency and crisis among politicians about the need to further strengthen regional-legal arrangements.

Papers by the speakers on Borders and Access to the Sea in the Arctic

Cross-border governance in vulnerable areas: has the EU anything to offer in the Arctic?

Ms. Diana Wallis, Vice-President, European Parliament

Madam Chairman, Ladies and Gentlemen; I am delighted to be here in Rovaniemi once again.

Rovaniemi, hosted the Fourth Conference of the Parliamentarians of the Arctic Region meeting in 2000 which I attended. It was here that the Finnish Prime Minister Paavo Lipponen was able to report on the progress of the Northern Dimension which, of course, had been a Finnish initiative during their time in the Presidency of the EU.

There is little doubt that the Northern Dimension Programme has begun to fulfil its objectives, especially in its new embodiment with Russia as a full partner.

It was always important that the Northern Dimension was more than just an EU-Russia policy. That is why both the Baltic and the Arctic were seen as equal pillars with the Northwest Russia issue.

It seems to me that the Northern Dimension is a good example of what the EU does best, such that amongst my parliamentary colleagues everybody wants their own 'dimension' now! For so successful has it been, that there are discussions now about an Eastern Dimension taking in EU relations with the Ukraine and Belarus and a Black Sea Dimension incorporating existing and potential members states around that body of water.

We should not forget the Euro-Med Cooperation, which already includes a complex parliamentary organisation. It is interesting that the push for all these types of organisations has come directly from elected parliamentarians.

This current organisation of our own, the Standing Committee of Arctic Parliamentarians, has been no different in pushing messages and action forward from our conferences and forums.

This parliamentary experience involving EU parliamentarians, has always seemed to me a good starting point for dealing with modern governance in vulnerable and sensitive areas and with vulnerable

and sensitive issues.

I have not given up on the idea of a more comprehensive Arctic Charter for cross-border governance and I refer to the speech I gave to this body's Seventh Conference in Kiruna two years ago. I want to emphasise that the background to that speech - the potential unhindered exploitation of the region's resources - remains, and indeed it could be argued that the geo-political stakes have been raised given the events of last summer. Interestingly World Wildlife Foundation is still arguing for a stronger management framework for the Arctic in which an enhanced Arctic Council would play a key role. It is interesting and I am pleased that the Norwegian government called together legal advisers from the Arctic coastal state government to look at the issues - they apparently came to the conclusion that nothing new was needed. Well, I hate to say this against my previous profession, but lawyers are not naturally progressive when it comes to change - and especially not government lawyers in my experience!

It is noteworthy, that back here in 2000 not only did we hear from Prime Minister Lipponen, but we also had a very thorough and careful paper from Professor Oran Young on the structure of Arctic cooperation. Even when I heard from Professor Young back then, I thought that the EU could have something to bring to the table, in that we provided evidence of how you can work across borders in sensitive difficult areas. As I said in some ways, the EU already has an interest in the Arctic: firstly through the Arctic Window of the Northern Dimension policy and secondly through the various policy areas, whether it be energy security, climate change, maritime issues, or fishing, just to name a few. Yet, frustratingly, there has tended to be a lack of coordination across these various areas and thus a failure to create a holistic Arctic or High North policy within the EU.

From an EU perspective, I started the process of looking at whether the EU should set up an Arctic Unit within the Commission to manage these various cross-cutting issues which I have mentioned. It seems to me that there is a lack of coordination

between the various institutions of the EU and just as importantly, between the various directorates of the European Commission which needs fixing.

At the very least I wanted to see some sort of Arctic Desk which would support the EU's long mooted full membership of the Arctic Council. Such support would be vital in my opinion because, although the EU has observer status at present in the incarnation of the Commission, it does not appear to be properly or actively exercised. Such detachment, we are told, comes back to resources.

In actual fact, I think we have moved on from these modest objectives. I have a battle with my colleagues in the European Parliament to maintain a focus on a Northern Dimension which is more than just the Baltic strategy. I can say that on the one hand I am delighted that since the expansion of the EU to take in the new members from the Central and Eastern Europe more MEPs are taking an interest in the Northern Dimension. However on the other hand, because their constituencies are very much Baltic linked, it is inevitable that the focus is more on the Baltic and less on the other two pillars of the Northern Dimension.

The time might be right for the EU to bite the bullet, so to speak, and take a much more proactive role in the Arctic. Although I am now thinking in terms of a dedicated Arctic Policy, I believe from the other side that such a greater engagement would be welcomed.

It always seemed to me a shame that over the years we have had a steady stream of Norwegian ministers beating a path to Brussels to present the latest version of their high North strategy. Yet, whilst being politely received, these visits and presentations have not perhaps had the impact they deserved. These have been hugely important documents but the very lack of Arctic coordination in the EU Commission has meant that there is real uncertainty as to whom this policy document should be presented. Is it foreign policy? Is it environment or energy? Or fishing? Of course it is all of these things and yet such documents, because of the nature of the EU as I have mentioned, do not fit well.

I have wanted to see the EU put together its own Arctic policy along Norwegian lines. I would like to see the Arctic Window, increasingly sitting uneasily within the Northern Dimension stripped out and given a policy of its own. It is interesting to see after our efforts that the communication from the Commission relating to the EU's Maritime policy published in October saying: Attention will be given to the geopolitical implications of climate change.

In this context the Commission will present in 2008 a report on strategic issues relating to the Arctic Ocean. At last!

We have also received hints and nudges from the Commission's External Services Directorate that we could see a comprehensive Commission communication on Arctic policy in the coming months. In this respect, I have an outstanding and marked urgent Parliamentary question to try and establish the exact timescale and nature of this. The answer to this I hope to receive in the next few days.

What I want to share with you today is my overriding feeling that the EU collectively has the advantage of certain experiences and the attachment to certain values which make it well suited to help such a vulnerable area as the Arctic deal with its issues of cross-border governance and decision-making.

Since my speech in Kiruna, I find it especially interesting that steps have been taken as a result of our discussions to initiate a UN Treaty Day on those treaties having relevance in the Arctic area. Whilst I think this is a hugely important initiative, we should not forget that international law in general is not receiving the support and acknowledgment that our forebears, who created such systems, might have hoped for. International law in the traditional sense after the Iraq War looks sadly in a very tattered state. Whilst on the positive side the EU as a set of international institutions which at its best represents the high point of what novel and modern international law can achieve by a pooling of sovereignty and decision-making bodies.

In terms of creating any novel inter-governmental structure and restating the importance of respect for international law and treaties, nobody could be more appropriate than the EU. It exists only on the basis of the choice of its Member States in creating an international legal framework. The EU is basically a legal creation and is the example par excellence of international law functioning in an age in which it otherwise appears to be in some disrepair. This for me is an important signal or symbol which can sometimes be of crucial value.

Add to this EU's actual daily experience of cross border work; the EU is fundamentally about breaking down barriers in order to recognise the economic potential of all areas and regions. Now that it is especially important that we do not create new frontiers that are barriers with our new or indeed old neighbours; particularly in the North.

The relevance of the EU to the North, in the current context, becomes even more persuasive when one

looks at the leadership role the EU has played and continues to exert globally in respect, not only of the debate on climate change, but also action in terms of practical legislation across one of the world's largest and most developed markets. It should make more of the experience and that of its own Arctic nations in this context.

Again management and care of the oceans goes far beyond national frontiers and is already represented in many international treaties. However, the EU is trying to push the debate, and more importantly action, even further amongst its own Member States. It has proved rightly impossible to create a new maritime strategy without having regard to Arctic issues. The discussion over the new maritime strategy well illustrates the way in which the EU's systems of cross border governance and legislation have to perform the delicate balance of interfacing with existing international agreements. Whilst at the same time, creating a regime amongst the member states that goes further and deeper and thus may well by example help push or guide the international debate.

Security of energy supply, along with climate change, are the dual issues that will dominate the debate in the coming years. The Member States are now developing a more coherent energy policy of which the Arctic resources and impacts should form a key part. It is ridiculous to have this debate without an Arctic dimension.

It is quite clear in relation to many of these issues that various countries still continue to have bilateral negotiations and agreements. This continued bilateral method of working creates tensions. Here one could cite the proposed Nordstream gas pipeline across the Baltic. In situations where there are political and environmental sensitivities, it is particularly important that countries should try and work in a transparent and multilateral cooperation. The EU provides this potential framework and increasingly from its own internal and external experiences can help provide a template for a more modern and flexible form of cross border governance, which most importantly has the advantage of the deep involvement of directly elected parliamentarians and representatives.

Finally, the Arctic is now generally acknowledged to be the epicentre of global climate change. This centre point is not merely at the EU's backdoor; indeed arguably if you take into account our three Arctic member states, it is already well over the threshold. What I would like to see is all the family members, both near and extended, sitting down together at the kitchen table!

The Arctic Council has historically provided this forum but we need to develop this into more modern, flexible and innovative ways. In this respect the EU has a narrative which it should not be shy about telling and I hope others would be equally willing to listen about our experience of cross-border issues.

Borders and Access to the Sea

Dr. Bernard Coakley, Associate Professor, Geophysical Institute, University of Alaska Fairbanks

The early exploration of the Arctic was motivated by nationalist desire to claim territory and seek riches during the 18th, 19th and early 20th centuries. Since the end of the great age of exploration, through the cold war semi-militarization of the ocean, science has replaced nationalism and defence as the motivation for heading north.

Two factors combine to promote international cooperative study of the Arctic Ocean. Each expedition is expensive. To maximize the benefits of access to these logistically difficult regions, most cruises sail with an international science party drawn from many nations. While this access is precious and infrequent, the data collected is often incomplete. Due to the limitations imposed by the shifting sea ice, no single platform (ice camps, ice breakers, submarines, airplanes and satellites) collects a complete dataset or can access all parts of the ocean basin. In addition to working together during arctic science programs it is also necessary to compile data from a number of programs to form a more complete picture of the Arctic Ocean.

During the last twenty years, marine geophysical data acquired during many different programs have been compiled to make the first comprehensive maps of the Arctic Ocean. These compilations have resulted in the first reliable, interpretable bathymetry (Jakobsson et al., 2000; see the website at; <http://www.ngdc.noaa.gov/mgg/bathymetry/arctic/>), gravity anomaly (Kenyon et al., submitted; see the website at; <http://earth-info.nga.mil/GandG/wgs84/agp/>) and magnetic anomaly maps (Verhoef et al., 1996) of the earth north 64° N latitude. With these data it has been possible to formulate hypotheses about the formation of the various features in the basin and test these hypotheses during recent cruises, further building the maps with well navigated modern geophysical data and extending our knowledge into depth through the acquisition of multi-channel seismic reflection data.

The Convention on the Law of the Sea presents, for the first time, a process for extending the dominion of coastal states beyond the recognized 200 nautical mile limit for exclusive economic zones.

The process is based on the recognition of natural prolongation of the continental shelf and promotes, through the assignment of territory to particular coastal states, management of structurally contiguous regions of the seabed. The distinction between Extended Continental Shelves (ECS) and the deep ocean provides for a regime of management for resources associated with the seabed across the entire globe. The seabed resources of the ECS, primarily oil and gas, belong to the coast state. The seabed resources of the deep ocean belong to mankind and are to be shared among the states parties to the convention.

Definition of the limits of an ECS are the subject of Article 76 of the treaty. The limit is defined by interpreting bathymetry and sediment thickness data. The bathymetric features of interest are the 2500 meter isobath or depth contour and the foot of the slope (FOS). The FOS is the point at which a bathymetric profile has maximum curvature or the largest change in slope. It might correspond, in the real world, to what is known as the top of the continental rise. Sediment thickness data are also needed to identify the point where the sediment thickness is 1% of the distance to the FOS. Bathymetry data and multi-channel seismic reflection data are among the classical datasets of marine geology and geophysics, as a result the marine geology community is heavily involved in data acquisition for determination of ECS limits.

It is worth noting that this article was drafted with profile data in mind and a limited view of the real bathymetric complexity of the ocean basins. Up until the early eighties, narrow beam bottom sounders collected most bathymetric data. These data record the ocean depth directly below a ship. At about this time, the first swath bathymetric systems were installed on academic research vessels worldwide. A ship collecting swath bathymetric data maps a stripe of the seafloor, typically 3-4 times the depth of water under the hull. These new data made it possible to characterize the seafloor in three dimensions as a map, without relying on extensive interpolation between narrow beam ship tracks. What has been learned about the seafloor since the early eighties

has exposed many ambiguities in the simple definitions encoded in Article 76.

The circum-Arctic states have seen the benefits of Arctic Ocean cooperation during the last two decades. With many of the same scientists from Canada, Norway, Greenland and the us involved in this effort, it has been natural to work together again to collect the ECS data sets. Cooperation avoids the duplication of effort, particularly near mutual boundaries, leverages the investment of individual countries and expands the pool of expertise to plan, execute and interpret the resultant data. Joint us-Canada and Canada-Greenland/Denmark programs are either underway or being planned for 2008.

This cooperative effort puts the lie to various press accounts about “land-grabs” and national conflict over seabed resources in the Arctic Ocean. While there are serious questions about the location of mutual boundaries in the arctic, (eg. Hans Island) all of the circum-Arctic nations are committed to an orderly process of establishing ECS claims under Article 76.

This is not charity, of course, but is based on each nation’s assessment of its’ best interests. This same self-interest could be a powerful argument to support joint submission of an Arctic Ocean ECS claim. The uncertainty about position of existing mutual boundaries between Canada, Greenland and the us would, until resolved, prevent consideration of an arctic ECS claim from a single nation. Building on the mutual desire to maximize the enclosed seafloor, a joint submission could defer the question of mutual boundaries for later resolution one on one. Also, given the complex bathymetry, Canada and Greenland might, as a result of their claims, have a newly defined boundary with Russia. A joint submission to the technical commission, which evaluates ECS claims, would be a powerful statement by the circum-Arctic nations that would almost certainly facilitate favourable consideration by the commission.

The idea that nations might work together to determine the limits of their sub-sea territories is a relatively new and almost radical notion. Figure 1 shows one estimate of the remaining extent of the arctic high seas once all the independent ECSs have been established. As a result of these claims, much of the deep Arctic Ocean would be restricted to science. For scientists, this is a dystopian vision of the future.

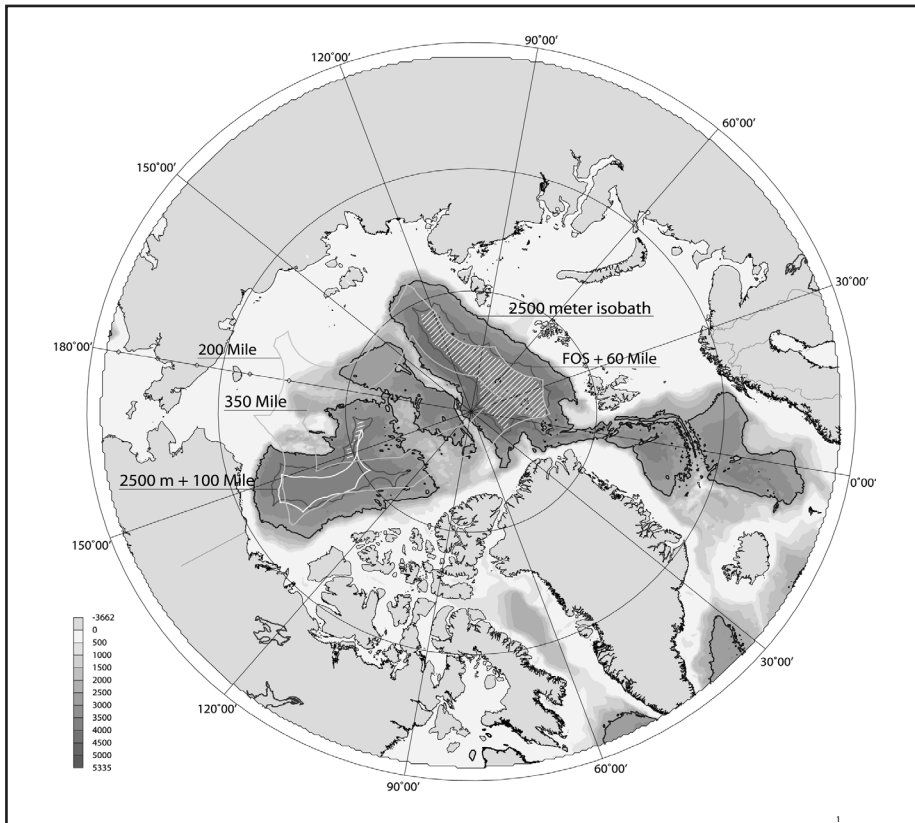
Many of the critical questions for marine geology and paleoceanography, framed by studies at lower latitudes, could be answered with data that would be acquired in the Arctic Ocean. Limited access to

these regions will impose obstacles to future cruises. The difficulties gaining access to the Russian arctic EEZ do not inspire optimism for the future.

The notion of an Arctic treaty, analogous to the Antarctic Treaty, while appealing, is not appropriate to the arctic. The Antarctic Treaty, which as its first statement suspends without prejudice until a future time land claims made on the basis of physical presence and exploration, may not have a direct application to a region where sovereignty is well established, but it may provide a way to begin to think about future science access and administration of the region.

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Caption1. There will most likely be left two areas in the Arctic ocean that remain outside the continental shelf of any state after applying the UN law of the seas article 76 (marked with white stripes).

Around the Gakkel Ridge (between Russia, Norway, Greenland and the north pole) the foot of slope (FOS) + 60 Nautical Mile will most likely be the limiting rule with only modest further extensions due to thin sediment thicknesses.

In the Canada basin the sediments are so thick that the maximum rules of 350 Nautical Mile or 2500m isobath + 100 Nautical Mile will likely decide the outer limit. States can choose which is better for them.

This map is an rough estimate of how the rules of UNCLOS article 76 may work in the Arctic ocean created by Dr. Yannick C. Beaudoin, at the UNEP Shelf program (www.continentalshef.org) and Harald Sund at Geocap (www.geocap.biz).

Closing comments

Prof. Lauri Lajunen, Rector of the University of Oulu

As global change or global warming have been accepted as fact and the natural and cultural conditions of the circumpolar area rapidly change, there is an increasing challenge in the actions to be taken. Various interests from national states, multi-national corporations, indigenous cultures and the academia all too often seem to collide on Arctic grounds.

Undefined issues are potentially dangerous. Even though we seem to be in the clear now about certain developments in the climate of the planet, we by no means have defined the measures to be taken. This can be dangerous, but many see it as an opportunity: as long as there is no common understanding and common policies as to how we deal with the various issues brought up by the global change, there will be groups and stakeholders who shamelessly will exploit the situation. This exploitation – even if it might bring short term economic benefits – will endanger the fragile nature and the delicate cultural mosaic of the Arctic peoples. Furthermore, it may permanently alter the global ecosystem.

The European Parliament's Resolution on the Northern Dimension from 2005 states that the Northern Dimension supports stability, well-being and sustainable development in Northern Europe and the Arctic region. The Parliament emphasises the importance and impact of the Northern Dimension environmental policy in the entire region and requires the intensification of coordination between different operators, in particular between the EU, Arctic Council, Council of the Baltic Sea States, Nordic Council, Barents Euro-Arctic Council and other operators participating in cooperation in northern regions.

Now more than ever we need cooperation. The vast natural resources of the global North need to be assessed and made use of based on international cooperation. In connection to oil, natural gasses and minerals, policies have to be crafted based on research and open discussion between the stakeholders. Challenges of land use and land cover, cultural rights as well as health and wellbeing are some of the issues which we have to bear in mind when operating in the North. Strong networks of

politicians, research universities and other research institutions, local cultural institutions and industries will be able to formulate sustainable solutions for meeting the interests of the different players.

A central development objective in the circumpolar area will be the social and environmental innovation community that complements the technology platforms introduced in the previous European framework programme and operates as a part of the possible Northern Dimension Forum. Ecologically sustainable use of natural resources and the socio-cultural sustainability of native populations and peripheries require, in addition to technical and financial expertise, also strong knowledge in environmental and social issues as well as entrepreneurship.

There are ten million people in the Arctic area of this planet. This number is divided into about ten nations. What does this mean for national decision making? It means simply this: there are not many voters per nation in the Arctic area. This has inevitable consequences: decisions about the Arctic are potentially made by people outside the circumpolar area. So far the decisions have often been made by people who will not physically live with the consequences of their decisions. This, too, is changing as we truly are acknowledging that global change affects us all. This is one more reason why we need strong cooperation in the Arctic.

The financial assets at our use are limited. Initiatives like Northern Research Forum and University of the Arctic are essential also in this respect. Strong networks like these have a potential to influence national and international policies and their priorities so that we will in the future have more funding opportunities for both social and research initiatives in the circumpolar area. Work needs to be done to promote financial instruments targeted for northern and Arctic research and cultural initiatives. In addition, good networks of circumpolar stakeholders must produce good funding applications for generic programmes to ensure that our Arctic mission will be on the agenda wherever funding for culture and research is decided.

According to a study done by Statistics Norway in 2007, the Arctic currently supplies about 16 percent of all oil and gas to the global economy. The substantial production and reserves of minerals are indirectly involved in the large-scale emission of the greenhouse gases as they are processed in coal-based and polluting smelters around the world, including some Arctic regions. About 8 percent of the world's forests are in the Arctic and trade in carbon storage, which at present is a small, but emerging market globally, may turn the forests into an even more highly appreciated asset, which can earn compensation for its services in the carbon cycle. The resource wealth of the Arctic seems capable to respond to global development and possibly change its character over time. Resources which have been extracted from the ground are basically a loss in wealth of the region. Short-term profit may dominate over long-term generation of income. The Alaska Permanent Fund with its dividend program of annual financial return to individual inhabitants now makes clear to every citizen that there is a trade off between consumption today and in the future. (The Economy of the North, Statistics Norway 2007)

In order to better understand the cultural and scientific features of the Arctic we need to listen to the peoples of the Arctic and to the scientists who provide us with relevant information. We need to work together to ensure that the future generations of the North will have the opportunity to study their chosen subjects in the higher education institutions located in the circumpolar area. In addition, as the representatives of the political system and the higher education system we need to voice the facts about the meaning and importance of the circumpolar areas in policymaking arenas of the world. We have a duty to the circumpolar areas and people, but we also have a global responsibility to shoulder.

Summary

Mr. Scott Forrest, Researcher, Arctic Centre, University of Lapland

Dr. Timo Koivurova, Research Professor, Arctic Centre, University of Lapland

On February 28, 2008 Arctic political and education leaders came together in Rovaniemi for a joint seminar to examine and discuss key issues facing the region today. While the chosen themes of the seminar (Adaptation to Climate Change, and Borders and Access to the Sea) are topical and challenging in their own right, they also serve to underscore how the Arctic has emerged as a region especially over the past decade. Northerners have become empowered with their own voice in determining their future, and how the Arctic agenda has evolved... and is changing. The seminar discussion thus went beyond the thematic topics chosen to examine some fundamental questions about how the future of the Arctic will be shaped. The following summary encapsulates the major themes and points of discussion raised by both the invited speakers (whose full texts appear elsewhere in this compilation) as well as the discussion and debate that took place among all the participants in the seminar. The seminar was chaired by Ms. Hill-Marta Solberg, Chair of the Standing Committee of Parliamentarians of the Arctic Region, and Prof. Stephen Jones, Chancellor of the University of Alaska, Fairbanks.

The opening speech of the Seminar by University of Lapland rector Mauri Ylä-Kotola, representing the rectors of the University of the Arctic, reflected back on the major developments in Arctic cooperation since Mr. Gorbachev's Murmansk Speech in 1987, where he opened up cooperation in the High North for discussion. This was the start of the Rovaniemi Process leading to the Arctic Environmental Protection Strategy (AEPS) in 1991 that developed into the Arctic Council in 1996. This tour through the recent history of Arctic cooperation highlighted the central role that Rovaniemi has played as a meeting point. It hosted not only the founding of the AEPS, but also the launch of the University of the Arctic.

The particular character of regional cooperation in the Arctic comes across clearly in this story. The critical issues of 'high politics' - national security and economic trade - are eclipsed by environmental, social, and cultural concerns on the Arctic agenda. Economic development in the North is rooted in

the need for sustainable development and places emphasis on community viability rather than raw figures of industrial output and gross domestic product. The actors involved in cooperation in the Arctic are also noticeably different than in other regions of the globe. Here indigenous peoples organizations, scientific and education institutions and environmental NGOs take leadership roles alongside national and importantly regional governments.

The Seminar's keynote address was delivered by Finnish Member of Parliament Mr. Hannes Manninen. Mr. Manninen noted that the challenge to current political structures has been increasing with the amount of attention being paid to the Arctic due to global climate change and related interests to natural resources and transportation routes. Mr. Manninen stressed that the Arctic Council enjoys the support of the Arctic community, and has developed as a strong forum for addressing the issues facing the region. Mr. Manninen credited the strong role of science in supporting the political work of the Council, particularly in bringing their expertise to the current climate change debate. The voice of indigenous peoples in the Arctic community was raised with the efforts to ratify ILO 169 and the current development of the Nordic Saami Convention. While new shipping lanes will be important for the economic development of the region and creating new linkages across the Arctic, there are immense risks that need to be addressed and a strong legal framework that can also ensure environmental safety and sustainability is critical. The UN Convention on the Law of the Sea (UNCLOS) is seen as a good basis for this legal framework.

Thematic Session 1: Adaptation to Climate Change

Dr. Grete Hovelsrud of CICERO (Center for International Climate and Environmental Research – Oslo) led off the discussion on the first theme of the seminar, Adaptation to Climate Change. Dr. Hovelsrud's presentation was underpinned by the idea of both communities and governments needing to make decisions in the face of uncertainty. She would be the first to raise a fundamental question

– whether the focus on adaptation ignores the need to also consider efforts to mitigate climate change. The example of the northern Norwegian community of Hammerfest illustrates the mixture of challenges and opportunities that climate change is bringing to the Arctic, and the difficulties faced by different levels of decision makers in preparing for and adapting to these changes. Oil and gas development will be increased as loss of sea ice opens up new drilling and transportation opportunities, but brings new risks including environmental safety and issues of national sovereignty. Variability and uncertainty in global climate models highlight the need for scientific research and the integration of that knowledge to bolster the decision-making and adaptive capacity of political actors (from local to international).

Newly elected president of the Finnish Saami Parliament, Mr. Klemetti Näkkäläjärvi, next presented a view from northern indigenous peoples. He made the point that while the sources of climate change are western industries, Arctic indigenous peoples will suffer the most from its consequences. Raising again the balance between mitigation and adaptation, Mr. Näkkäläjärvi commented that the battle may already be lost since we speak only about adaptation rather than how to minimize climate change's effects. While Sami people have been able to adapt to many changes over the past centuries, he argued that their capacity for adaptation is being severely limited by the past and current policies of the Finnish government. He called on Finland to give the Saami the resources they need in order to have their own possibilities for action and to manage their lands and resources.

Canadian Senator Yoine Goldstein continued on the idea of bottom-up approaches to adaptation (what he referred to as either 'micro', or 'community') versus top-down ('macro' or government-initiated) forms. The survival of societies depends on how they respond to challenges. Senator Goldstein used examples both from Canadian national climate change policy (a national climate guide and adaptive planning framework) and initiatives arising in northern communities (food exchange networks to increase food security) to illustrate how these different approaches may complement each other, but may also work at cross-purposes. The increased use of biofuels, for instance, is seen by many governments as a potential solution to the reliance on fossil fuel, but has created problems for local peoples in many regions by raising the prices of staple foods such as corn. The Arctic Council, as a forum where the Arctic states and indigenous peoples meet and discuss is seen as the best basis for creating an adaptive framework for climate change within the region.

The chairs then opened the floor for discussion, which followed from the questions of adaptation versus sustainability, bottom-up versus top-down, and planning within uncertainty that were raised throughout the presentations. Dr. Andy Greenshaw noted that planning in the face of uncertainty is not something new for humanity, and that major trends are still discernible. The risk, he noted, was that societies may be paralyzed by inaction leading to consequences potentially worse than making the best choices available given current knowledge. Other discussants noted that what individuals most want to know about climate change is what they can do in their everyday lives to make positive choices, both concerning adapting to and mitigating its effects. Mr. Klemetti Näkkäläjärvi noted in this regard that research, both from the perspectives of western science and traditional knowledge was needed to address these concerns. Another discussant raised the need to learn from the environmental disasters that many communities have experienced, to create better preparedness.

Within the debate between adaptation and mitigation, Dr. Florian Stammer noted that we need more understanding of how changes to the climate are not simply positive or negative in an objective sense but given social relevance by how they are perceived by people. It was also noted that local concerns over climate change can miss the 'big picture', while conversely major economic opportunities created by the opening of the Northeast Passage, for instance, can cloud the judgement of major international economic interests and put local communities in greater peril. Dr. Jim MacDonald helped capture some of the broader themes of the discussion by concluding that the people of the circumpolar region need to have a voice and authority over the changes that are happening in the region. Those who are making the decisions that will effect the future of the North have a responsibility to listen to the people who are living there.

Thematic Session 2: Borders and Access to the Sea

The seminar's second theme addressed the issue of Borders and Access to the Sea. As was seen in the first thematic session, there are clear linkages between climate change and the literal 'opening' of new maritime areas. The continued use of oil and gas lies behind human-caused climate change, while the effects of warming in the Arctic seas open up new opportunities for transportation, new areas for oil and gas exploration and extraction, as well as changes in fisheries. Inevitably, the economic potential of the Arctic has brought a return to the de-

bate on issues of sovereignty and territorial claims in the Arctic region. Will the Arctic Council, current instruments of international law, and other regimes be sufficient to respond to these challenges, and serve as a strong authority for the voices of the Arctic region?

Ms. Diana Wallis, Vice-President of the European Parliament and a long-standing member of the Standing Committee of Arctic Parliamentarians asked the question of whether the EU has anything to offer in the Arctic region. She noted that within Europe the Northern Dimension policy put forward by Finnish Prime Minister Mr. Paavo Lipponen has sparked interest in other European border zones, and been echoed in the Mediterranean and elsewhere. Despite often being cited as an innovative model of governance, some actors (notably the World Wildlife Fund) are calling for a much stronger legal basis for management of the Arctic in order to safeguard against the unhindered exploitation of Arctic resources. The European Union has great interest in the Arctic and the possibility of the EU to articulate its own Arctic policy is being looked into. Ms. Wallis also feels the EU has much to offer the Arctic as a legal creation resting upon the interests of its member states and dealing daily with cross-border issues. The upcoming UN Treaty Event is important from the perspective of future international law in the Arctic.

Dr. Bernard Coakley of the University of Alaska's Geophysical Institute brought an overview of the unique challenges and demands of the various scientific methods used to map the under-ice geology and bathymetry of the Arctic Ocean. He demonstrated that this is only possible with extensive cooperation among scientists globally and notably among all Arctic states. He noted that much of this work is now being driven more by political interests than the scientific challenges of understanding the Arctic Ocean and its geological and climate history. The political interests are driven largely by the UN Convention on the Law of the Sea (Article 76 of UNCLOS) that requires states to submit the limits of their continental shelf (beyond the 200 nautical miles exclusive economic zone) to the UN. State borders are documented with geophysical and geological data. Interestingly, despite the image of international rivalry and economic competition behind these claims, many Arctic nations are collaborating on the collection of the necessary data. The reality is, however, that following the UNCLOS Article 76, the greater proportion of the Arctic seabed will come under national sovereignty.

Dr. Kari Hakapää, Professor of Public Law at the University of Lapland brought his extensive ex-

perience as a legal scholar and participant in the UNCLOS negotiations to this discussion, noting the strong interplay between lawyers, politicians and scientists in the development and implementation of policy on law of the sea. A particular characteristic of international law is its voluntary basis, which means that common agreement is necessary for action. UNCLOS is the most significant instrument of international law that relates to Arctic waters, with over 150 signatories since it came into force in 1994. Dr. Hakapää observed that the United States is a notable absentee from its signatories. Again drawing a connection to the discussions of the first thematic session, the loss of Arctic sea ice will test the usefulness of UNCLOS in regulating access to the resources of the Arctic. The media coverage of events like the planting of a flag at the bottom of the Arctic Ocean by a Russian submarine perhaps give a distorted picture that obscures the effectiveness of legal regimes like UNCLOS and the work of the Arctic Council.

Dr. Timo Koivurova opened up discussion of this theme from the audience by questioning Coakley's assessment that the unclaimed areas of the Arctic would actually be so limited, based on a earlier position paper by the us government. This discussion continued with comments from Lars Kullerud and responses from Dr. Hakapää that UNCLOS has an article on semi-enclosed seas that may come into play for the Arctic Ocean, thus the UN Law of the Sea may in the end regulate most of the Arctic Ocean. The chairs of this session also spoke to the question of the need for a new political treaty to create a legal basis for Arctic cooperation, noting that this would be examined in the upcoming UN Treaty Event. The conclusions of the discussion were a confirmation of the need for discussions between politicians and scientists in the Arctic community such as this one, with recognition that sound policy and decision-making needs to be informed by sound scientific knowledge, with involvement also by indigenous peoples and environmental organizations as key stakeholders and community representatives.

It was left to University of Oulu rector Lauri Lajunen to bring the seminar to a close with some concluding observations. His message carried forward the call for collective action among politicians and scientists to address climate change, noting that the impacts are now beyond doubt and only questions of how to react to be debated. In assessing these options, care must be taken as there will be those that would exploit the situation, seeing opportunities that would cause harm to nature and northern cultures. This point brings back the need for local stakeholders to have a strong voice in how these decisions, and how the continued exploitation of northern resourc-

es, will take place. The small population of the region underscores the need for strong networks and frameworks to ensure these voices are heard, and can respond to interests from outside the region. In order to better understand the Arctic, there is a need to listen to its people.

Appendix 1: Seminar Programme

Joint Seminar of UArctic Rectors' Forum and the Standing Committee of Parliamentarians of the Arctic Region on February 28, 2008

Arctic Centre, University of Lapland, Finland

Chairs: Ms. Hill-Marta Solberg, Chair of the Standing Committee of Arctic Parliamentarians, Parliament of Norway

Prof. Stephen Jones, Chair of the Rectors' Forum Planning Committee, Chancellor of the University of Alaska Fairbanks, USA

Welcome: Prof. Mauri Ylä-Kotola, Rector, University of Lapland, Finland

Keynote: Hannes Manninen, Chair of the Finance Committee, Parliament of Finland

Thematic Session 1: Adaptation to Climate Change

Dr. Grete K. Hovelsrud, Research Director, CICERO, Norway

Fil.Lic. Klemetti Näkkäljärvi, President of the Finnish Sámi Parliament, Finland

Senator Yoine Goldstein, Canada

Discussion

Thematic Session 2: Borders and Access to the Sea

Ms. Diana Wallis, Vice-President, European Parliament, United Kingdom

Prof. Bernard Coakley, Associate Professor, Geophysical Institute, University of Alaska Fairbank, USA

Dr. Kari Hakapää, Professor in Public International Law, University of Lapland, Finland

Discussion

Sum-up of Discussion by Chairs

Closing comments: Prof. Lauri Lajunen, Rector of the University of Oulu, Finland

Appendix 2: List of Participants

RECTORS' FORUM

Canada

Dr. John Alho Associate Vice-President, University of Manitoba

Dr. Jim Basinger, Associate Vice-President, University of Saskatchewan

Dr. Edwin Bourget Vice-Rector, Research and Innovation, Université Laval

Dr. Michael Collins Acting Vice-President, Memorial University of Newfoundland

Dr. Donald Cozzetto, President, UNBC

Dr. Andy Greenshaw Associate Vice-President (Research), University of Alberta

Dr. Denise Henning, President & Vice-Chancellor, University College of the North

Ms. Margaret Imrie, Vice-President (Academic), Aurora College

Dr. James McDonald, Director, Northwest Community College

Dr. Deanna Nyce, Chief Executive Officer Wilp Wilxo'oskwhl Nisga'a

Dr. Frits Pannekoek, President, Athabasca University

Mrs. Linda Pemik, Senior Academic Officer, Nunavut Arctic College

Dr. James Randall, Acting Provost, UNBC

Finland

Dr. Paula Kankaanpää, Vice Rector, University of Lapland

Dr. Kari Laine, Director, University of Oulu

Dr. Lauri Lajunen, Rector, University of Oulu

Dr. Lauri Lantto, Rector, Oulu University of Applied Sciences

Dr. Ilkka Niiniluoto, Rector, University of Helsinki

Ms. Outi Snellman Director of Administration and University Relations, University of the Arctic

Dr. Lassi Valkeapää, Principal, Sámi education Institute

Dr. Mauri Ylä-Kotola, Rector, University of Lapland

Iceland

Dr. Thorsteinn Gunnarsson, Rector, University of Akureyri

Norway

Dr. Gerd Karin Bjørhovde, Pro Rector, University of Tromsø

Dr. Ulf Christensen, Rector, Tromsø University College

Dr. Ketil Hanssen, Rector, Finnmark University College

Dr. Lars Kullerud, President, University of the Arctic

Dr. Eystein Markusson, Director of Research, University Centre in Svalbard

Dr. Tore Nesheim, Deputy Director General, Tromsø University College

Dr. Steinar Pedersen, Rector, Sámi University College

Dr. Berit Skorstad, Vice Rector, Bodø University College

Russia

Dr. Klavdia Fedorova, Director, Sakha State University

Dr. Valeriy Fridovskiy, Vice Rector, Sakha State University

Dr. Alexander Krylov, Vice Rector, Pomor State University

Dr. Nikolay Pelikhov, Director, Yugra State University

Dr. Yuriy Reutov, Rector, Yugra State University

Dr. Andrey Soloviev, Deputy Director, Institute Northern State Medical University

Dr. Ruvyn Trypolsky, Rector, Murmansk State Pedagogical University

Sweden

Dr. Henrik Michael Kuhmunen, Rector, Samernas Utbildningscentrum, Sámi

Educational Center

United Kingdom

Dr. David Green, Vice Chair, Executive Board UHI Millennium Institute

USA

Prof. Stephen Jones, Chancellor, University of Alaska Fairbanks

Dr. Barry Scherr, Provost, Dartmouth College

Observers/Experts

Canada

Ms. Carolee Buckler, Project Manager, IISD

Dr. Greg Poelzer Dean, Undergraduate Studies, University of the Arctic/University of Saskatchewan

Ms. Mary Simon, President, Inuit Tapiriit Kanatami

Denmark

Dr. Erling Olsen, UArctic Board of Governors

Finland

Mr. Pierre-André Forest ,UArctic Graduate Area Lead, University of Lapland

Dr. Kari Hakapää Professor in Public International Law, University of Lapland

Ms. Jenni Koistinen, Political Program, Embassy of Canada

Dr. Timo Koivurova, research Professor, University of Lapland/NIEM

Dr. Atte Korhola, Professor of Environmental Change, University of Helsinki

Mrs. Outi Korpilähde, Lecturer, Sámi education Institute

Mr. Kimmo Kuortti, Director of International Relations, University of Oulu

Mr. Juhani Lillberg, Director of Administration, University of Lapland

Dr. Mark Nuttall, Henry Marshall Tory Chair, University of Oulu/University of Alberta

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Mr. Mikkel Berg, UArctic Board of Governors

Dr. Grete Hovelsrud, Research Director, CICERO

Mr. Jan Henry Keskitalo, UArctic Board of Governors

Dr. Gunn Mangerud, Director, Norwegian Centre for International Cooperation in

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Ms. Daria Kocherga, Interpreter, Murmansk State Pedagogical University

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Mr. Anna-Margith Påve, Lecturer Sámi Educational Center

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Dr. Rune Ryden, UArctic Board of Governors

USA

Ms. Donna Anger, Associate Director, University of Alaska Fairbanks

Dr. Bernard Coakley, Researcher, Geophysical Institute, Germany /University of Alaska Fairbanks

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Mr. Scott Forrest, Researcher, University of the Arctic, Finland

Ms. Raija Kivilahti, Information and Congress Secretary, University of Lapland, Finland

Ms. Shannon Mallory, Intern, University of the Arctic, Norway

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Canada

Senator Yoine Goldstein

Mr. Tim Williams, Science and Technology Division, Parliamentary Information and Research Service

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Mr. Peder Pedersen, Adviser

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Ms. Bilyana Raeva, MEP

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Mr. Sergey Aksyonov, Advisor, Council of Federation

Mr. Ildar Gimaletdinov, MP, State Duma

Ms. Irina Kuzmina, Secretary, State Duma

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Ms. Sinikka Bohlin, MP

Ms. Eva Hjelm, Senior Officer, International Department

Permanent Participants

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Sami Parliamentary Council

Ms. Eva Jelid, Sweden

Indigenous Peoples Secretariat

Ms. Alona Yefimenko

Observers

Nordic Council

Mr. Niels Sindal, MP

West-Nordic Council

Mr. Karl V. Matthiasson, MP

Mr. Thordur Thorarinsson, Secretary General

Guests

Ms. Diana Wallis, Vice-President, European Parliament

Mr. Stewart Arnold, Policy Adviser, European Parliament

Mr. Robert Kvile, Senior Arctic Official, Ministry of Foreign Affairs, Norway

Mr. Jyrki Kallio, Senior Arctic Official, Ministry of Foreign Affairs, Finland

Dr. Lassi Heininen, Chair of Steering Committee, Northern Research Forum

Mr. Harro Pitkänen, Senior Vice President, Nordic Investment Bank

Ms. Jane Messenger, Economic Chief, Embassy of USA, Helsinki

Ms. Kathrine Johnsen, UNEP Grid-Arendal, Norway

Dr. Ole Henrik Magga, Project leader, EALAT

Mr. Mauri Gardin, Mayor, City of Rovaniemi

Ms. Outi Mähönen, Senior Adviser, Ministry of the Environment, Finland

Mr. Leidulv Namtvedt, Ambassador of Norway,

Helsinki

Mr. Hannu Viranto, Head of International Unit, State Provincial Office of Lapland, Finland

Finnish parliament

Mr. Kari Salo, Counsellor of International Affairs

Mr. Tapio Pekkola, Secretary for International Affairs

Ms. Maarit Immonen, Administrative Assistant

Ms. Tiina Virtanen, Information Officer

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