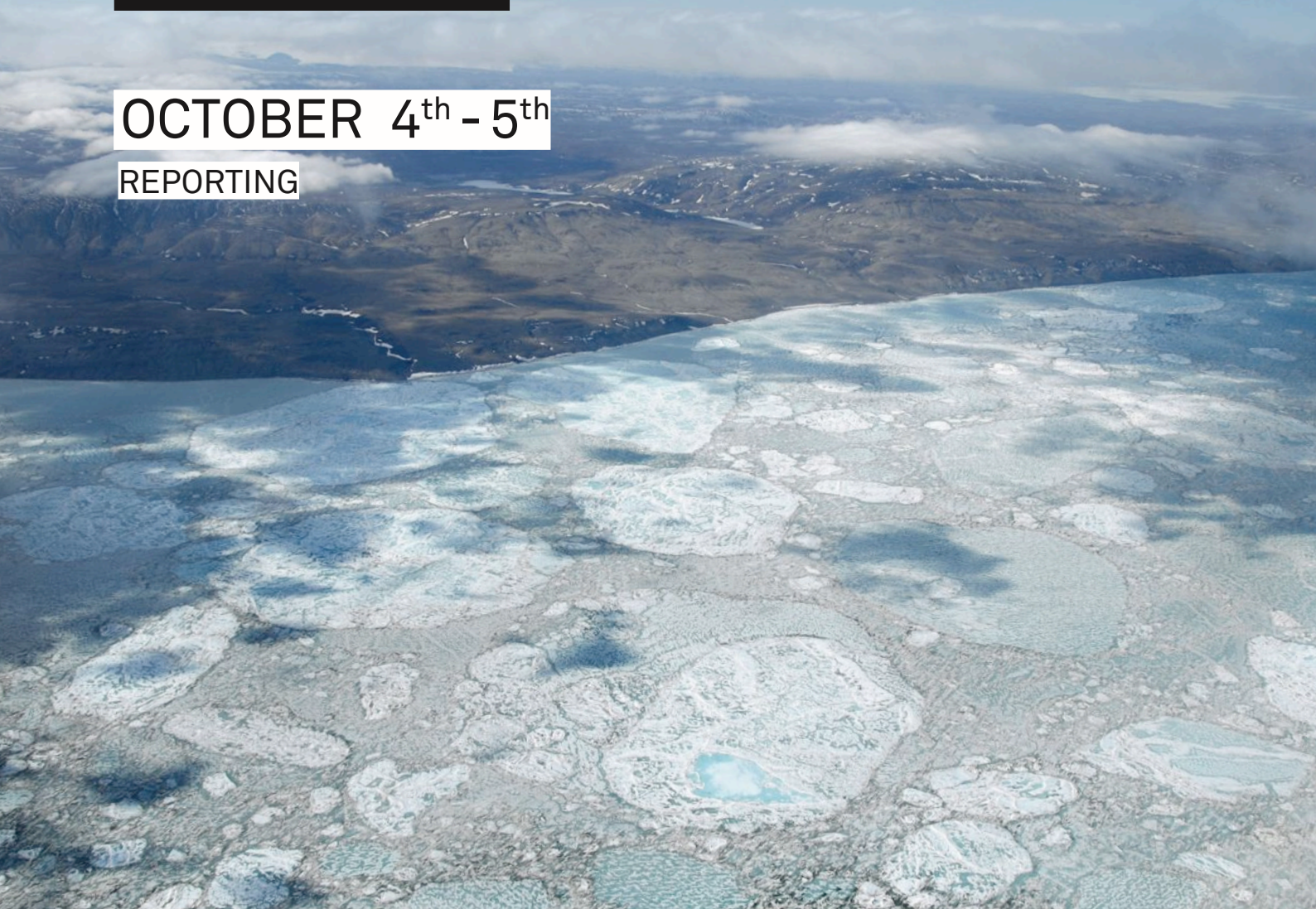


ARCTIC FUTURES SYMPOSIUM 2012

PROMOTING KNOWLEDGE,
RESPONSIBILITY AND ENGAGEMENT
IN THE ARCTIC

OCTOBER 4th - 5th

REPORTING





PREFACE

In October 2012, International Polar Foundation, which works to raise the profile of polar scientific research in order to advance human knowledge, and promote informed action on climate change, and the development of a sustainable society, welcomed policymakers, ambassadors from EU and Arctic nations, polar scientists, representatives of industry and Arctic indigenous peoples groups to a multidisciplinary conference on the future of the Arctic: the Arctic Futures Symposium.

Lively and well-informed discussions are a key ingredient of Arctic Futures with topics covered such as intergovernmental cooperation, results and prospects of scientific research and monitoring, plans for development of natural resources, ecosystem stewardship, transport and infrastructure, and indigenous affairs. EU and foreign policymakers, scientists, indigenous peoples, representatives of industry and academics take part in Arctic Futures, to address the Arctic's challenges, exchange ideas, and to network.

Organised in conjunction with the Belgian Ministry for Foreign Affairs and the Prince Albert II Foundation of Monaco, with the support of the EU Committee of the Regions, the European Commission, and the European External Action Service, the 2012 Arctic Futures Symposium had the distinguished honour to welcome H.S.H. Prince Albert II of Monaco as a featured speaker, along with European Commissioner for Maritime Affairs and Fisheries Maria Damanaki, Foreign Minister of Belgium Didier Reynders, and a number of other highly distinguished diplomats, including five senior Arctic officials. Speakers and participants alike contributed to fruitful dialogue on a host of current and future issues facing a part of the world that is gaining increasing international attention.

What follows are the proceedings of the symposium.

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THURSDAY

4 OCTOBER 2012

OPENING STATEMENTS



THIERRY TOUCHAIS

EXECUTIVE DIRECTOR, INTERNATIONAL POLAR FOUNDATION (IPF)

Mr. Touchais opened the third Arctic Futures Symposium by warmly welcoming all attending, before outlining the main objectives of this year's conference. He noted that some speakers and moderators were attending the conference for a second or third time and wished everyone fruitful discussions during the course of the next two days.



HSH PRINCE ALBERT II OF MONACO

His Serene Highness Prince Albert II of Monaco expressed his pleasure at being back at the Arctic Futures Symposium and said that, despite being a distant region, the Arctic remained a source of constant concern for all. He pointed out that global warming has already become a reality for the peoples inhabiting that region. Therefore, he said, there is need for adaptation measures in order to protect both the distinct Arctic biodiversity and the traditional lifestyle of the people living there.

His Serene Highness called for urgent action in order to fight climate change. He highlighted the promotion of renewable energies as one possible solution, a topic that was discussed at the Earth Summit in Rio de Janeiro in June 2012. Renewable energy is also being promoted by the [Prince Albert II Foundation](#) both in Monaco and worldwide.

The Prince stressed the importance of supporting and including the indigenous peoples of the Arctic in the decision-making process, so that they have the ability to take control of their own destiny.

He further argued for the establishment of more protected zones in the Arctic - and in particular, marine protected areas, which he and his foundation advocate. Prince Albert expressed his hope that several marine protected areas would be created in the Arctic, one of them hopefully in the vicinity of Franz Joseph Land.

The Prince also underscored his support for an intelligent and creative approach to solving problems in the Arctic using technological innovation, underlining the crucial role of the scientific community in the 21st century.

His Serene Highness finished his speech by emphasising the important role of science in tackling the challenges facing the Arctic. Citing Louis Pasteur, who once said that "Science has no native land," he highlighted the need for international cooperation. The Prince ended by saying that "in the face of the upheaval in the Arctic, we all need to feel united by a shared destiny."



MARIA DAMANAKI

EUROPEAN COMMISSIONER FOR MARITIME AFFAIRS AND FISHERIES

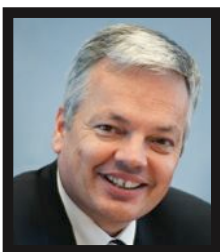
Commissioner Damanaki opened by reminding the audience that public interest in the Arctic Futures Symposium was in line with the global trend of increased international attention being paid to the Arctic region. Referring to different scientific estimates of when the Arctic would see its first ice-free summer, she stressed that, regardless of the pace of the sea ice decline, the changes happening in the Arctic are a reality.

She outlined the main directions of the possible future economic development of the Arctic, which is likely to take place due to the shrinking sea ice cover in the region. There are four industries that are currently moving north due to the new opportunities provided by increased access to Arctic marine territories: offshore oil and gas drilling, shipping, fisheries and mining. These developments can transform the region and have a considerable impact on the global economy in general and on the major economic bloc of the European Union.

However, Commissioner Damanaki recognized that these new opportunities also carry responsibilities. There are many challenges facing the Arctic as it develops, most notably the possibility of oil spills and shipping accidents. She said that while it is the people who live in the region who will ultimately make the decisions about their region, the future of the Arctic is a global and international responsibility.

Commissioner Damanaki explained that, with three Arctic states currently members of the EU (and possibly a fourth if Iceland accedes), the European Union is an Arctic actor and feels responsible to contribute to the region's development. The EU's Arctic policy reached a new milestone in June 2012, when a [new Communication on the EU and the Arctic Region](#) was adopted, after being proposed by Commissioner Damanaki and High Representative Catherine Ashton. The Communication confirms the EU's commitment to ensure sustainable economic development of the Arctic. The EU is also a key investor in the region's economic development and takes an active part in Arctic exploration using space-based Earth observation services. "We are present, and we are present in a good way," she said.

Finally, she reminded the audience that, despite the progress already made, EU policymakers still have a lot to do and a lot to learn. This will require constant and constructive dialogue between the EU and the Arctic governments and peoples."



DIDIER REYNDERS

BELGIAN FEDERAL MINISTER OF FOREIGN AFFAIRS, FOREIGN TRADE AND EUROPEAN AFFAIRS

Minister Reynders commenced by stating that despite new economic opportunities arising from global warming and better access to Arctic resources, climate change poses an imminent threat to the regional infrastructure as well as to the traditional lifestyles of its indigenous inhabitants. Enhancing scientific knowledge and monitoring environmental impacts are essential means to cope with these challenges. However, he said, they are not exhaustive.

Both the EU and Belgium are dedicated to the commitments of the Kyoto Protocol. A new legally binding instrument on climate change is currently being negotiated, and Minister Reynders invited more partners to join them.

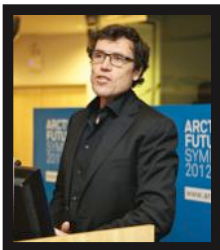
He then highlighted the EU's inextricable link to the Arctic region, illustrated by the [Foreign Affairs Council's Conclusions of 2009](#) and the European Commission's Joint Communication of 2012.

He then commented on the existing legal frameworks for cooperation in the Arctic: the [United Nations Convention of the Law of the Sea](#); the [Polar Code](#) (an international code of safety for ships operating in polar waters) currently being negotiated by the [International Maritime Organization \(IMO\)](#) and the mandatory [IMO guidelines](#) already in force; the Convention of the United Nations Economic Commission for Europe (UN ECE Convention) on [Environmental Impact Assessment in a Transboundary Context](#) and the [Oslo and Paris Conventions for the Protection of the Marine Environment of the North-East Atlantic \(OSPAR\)](#) .

Institutional frameworks for international cooperation are also in place, through the [Arctic Council](#) and the [Barents Euro-Arctic Council](#).

The Belgian government supports the creation of a network of marine protected areas and the application of the European Union for Permanent Observer status in the Arctic Council, according to the Minister. He also mentioned the recent meeting between the Benelux and Nordic countries during the United Nations General Assembly in September 2012, during which the prospects of the EU application to the Arctic Council were discussed.

He concluded by describing the sustainability of the Arctic as a regional issue with a global impact, "If we want to go to a global vision on the Arctic, it is quite important to take the European Union on board."



ALAIN HUBERT

PRESIDENT OF THE INTERNATIONAL POLAR FOUNDATION

Mr. Hubert noted that the Arctic has remained a subject of passionate discussion since the 2011 symposium, and that more time for roundtable discussions had been added to the 2012 edition to encourage more dialogue between stakeholders.

He then outlined the five major themes of the symposium:

- Perspectives from Arctic stakeholders
- The future of energy resources in the Arctic
- Management of Arctic marine resources
- Investigating scenarios for improving maritime safety
- The importance of long-term scientific monitoring in the Arctic

Mr. Hubert thanked all speakers and moderators who had accepted the invitation to participate in the symposium.

PERSPECTIVES FROM ARCTIC STAKEHOLDERS

MODERATOR:

CHARLES EMMERSON

SENIOR RESEARCH FELLOW FOR THE ENERGY, ENVIRONMENT AND DEVELOPMENT PROGRAMME AT [CHATHAM HOUSE](#)

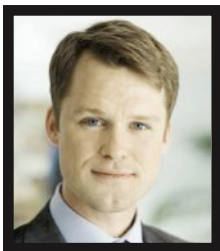


Opening the first session, Charles Emmerson commented on the presence of five out of the eight Senior Arctic Officials on the panel and distinguished representatives from the other three Arctic Council member countries, including the Canadian Ambassador to the EU. He described the high level of representation as “tremendous.”

Inviting the senior officials of Arctic states to give their perspective on the current developments in the Arctic, Mr. Emmerson passed the floor to Ambassador Gustav Lind of Sweden, Chair of the Senior Arctic Officials during Sweden’s 2011-2013 chairmanship of the Arctic Council.

GUSTAF LIND

SWEDISH AMBASSADOR TO THE ARCTIC AND CHAIR OF THE ARCTIC COUNCIL’S SENIOR ARCTIC OFFICIALS



UPDATE ON ARCTIC COUNCIL ACTIVITIES DURING THE SWEDISH CHAIRMANSHIP

Ambassador Lind started his presentation with an explanation of how his role at the Arctic Futures Symposium has evolved, compared to last year’s symposium, when Sweden had just assumed the chairmanship of the Arctic Council. This year, he said he would be able to focus on the first results and main priorities of the Swedish chairmanship.

He recognized the gradual disappearance of ice coverage in the Arctic due to global warming as a source of major concern and a “call to action” on a global level. He mentioned recent publications on the Arctic in *The Economist*, *The International Herald Tribune* and *New Europe* as evidence of the Arctic being the focus of attention in the international community.

“Global warming is the key of the change and the problems in the Arctic,” Ambassador Lind said. He highlighted the importance of putting pressure on the international community to commit to the goal of sticking to only a 2°C increase in global average temperatures compared to the pre-industrial era as the acceptable upper limit of global warming.

Ambassador Lind then gave an overview of some projects that the Swedish chairmanship has been focusing on.

Within the sphere of combating climate change, Sweden is collaborating with other Arctic states to reduce black carbon emissions in order to mitigate global warming. The “[Arctic Resilience Report](#)” project has been designed to define the “tipping point” of climate change in the Arctic and to conduct further monitoring. In an [Arctic Council meeting](#) of deputy foreign ministers in May 2012, a decision was taken to launch a

project called “Adaptation Actions for a Changing Arctic” (AACA). Ambassador Lind informed the audience of a workshop on climate modelling that was to take place in October 2012, organized by the [Arctic Monitoring and Assessment Programme \(AMAP\)](#).

Another priority for cooperation in the Arctic is the ensuring of protection of the fragile Arctic environment from the risks of oil exploitation. As the leaflets distributed by [Greenpeace](#) representatives at the entrance of the symposium venue earlier in the morning demonstrated, this is a very hot issue. Compared to the Deepwater Horizon accident in 2010, the Ambassador explained, a potential oil spill in Arctic waters would have even more dramatic consequences due to the difficulties that ice coverage poses for an efficient response.

In this area, the Arctic Council is working in three directions: Firstly, one of the Council’s working groups is developing best practices on oil spill prevention. In addition, the Arctic states are now negotiating a legally binding agreement on oil spill response. Finally, the Arctic Council is working on defining and protecting sensitive areas in the Arctic.

Furthermore, another project is assessing Arctic biodiversity and making recommendations on endangered species protection.

In order to analyze regional and global regulations on the protection of the marine environment and to check them for gaps, the [“Arctic Ocean Review”](#) is being prepared.

The Arctic Council is also drafting a major report on ocean acidification, which is a consequence of the ocean absorbing more carbon dioxide from the atmosphere. Ocean acidification is having an impact on marine life.

Moving on to the social and economic development of the High North, Ambassador Lind said that better living conditions in the Arctic are a key priority for the Arctic Council, not only from an environmental point of view, but also from a social point of view. He explained the importance of engaging the private sector in the northern regions in the economic development of the region. He also pointed out that food and water security are a major concern for northern and indigenous populations.

Finally, Ambassador Lind addressed the need for improving and strengthening the Arctic Council. The body is now facing more complex challenges than when it was founded in 1996. Consequently, several reforms have been undertaken: Firstly, the Arctic Council is establishing a permanent secretariat established in Tromsø, Norway, with a director. Moreover, several administrative reforms have been implemented, namely the numbering of documents, a revision of the rules of procedure and the adoption of a strategic communication plan. The Council is also considering creating a mobile version of its website. Finally, the Arctic Council is reviewing a number of applications for Permanent Observer status, a core decision that will be taken at the Senior Arctic Officials meeting in May 2013 in Kiruna, Sweden.

Ambassador Lind applauded the progress the Arctic Council has made in moving towards concrete decision-making, referring to the [Search and Rescue \(SAR\) Agreement](#) reached in Nuuk in 2011.

In conclusion, Ambassador Lind invited the Arctic peoples and governments to develop a new strategy and a common vision for the next 20 years, which will be reflected in the “Kiruna Statement”, to be finalized in 2013.



ALEXANDER KRESTIYANOV

DEPUTY PERMANENT REPRESENTATIVE OF THE [RUSSIAN FEDERATION TO THE EUROPEAN UNION](#) AND EUROPEAN ATOMIC ENERGY COMMUNITY

Deputy Permanent Representative Krestiyarov began his speech with the idea that, to Russia, a pioneering nation in polar exploration, the Arctic is not an abstract geographical concept, but a reality.

Committed to exploration and ensuring sustainable development, the Russian government was one of the first to adopt a long-term national strategy for developing the Arctic until 2020, which is currently being elaborated.

Ambassaor Krestiyarov expressed satisfaction with the stable and predictable situation in the region: “There are neither political nor military tensions in the Arctic,” he said, and referred to allegations that there is a “legal vacuum” in the Arctic and calls for global governance of the Arctic as “totally invalid.” Previously perceived as a distant, inaccessible region and a scene of possible Soviet-US confrontation, the Arctic has now transformed into a source of new opportunities and cooperation. With most of the Arctic hydrocarbon resources located within the Exclusive Economic Zones (EEZs) of the Arctic states and with the United Nations Convention on Law of the Sea in force, he clarified the Russian position: “There is nothing to divide in the Arctic, and there is no ground for conflicts - provided, of course, that commonly recognized international rules are implemented.”

For the Arctic states, this part of the world is home. Therefore, it is up to these states to set the rules. However, with the growing importance of international cooperation, both in the Arctic Council and the Barents Euro-Arctic Council, the Arctic will not be isolated.

Mr. Krestiyarov welcomed the successful evolution of the Arctic Council over the past two years and said that it is now evolving into a full-fledged international organization.

He also evaluated the negotiated provisions concerning the role of observers as keeping a balance between the regional Arctic identity and opening the doors to multilateralism in Arctic cooperation through enhanced interactions with non-Arctic states and organizations.

The Deputy Permanent Representative commented on the increasing legal force of the Arctic Council’s decisions and mentioned the first legally binding agreement from the Arctic Council on Search and Rescue in the Arctic under a task force jointly chaired by Russia and the US.

With traffic in Russian waters increasing, Mr. Krestiyarov laid out Russia’s vision of the future of the Northern Sea Route as that of an international maritime route able to compete with traditional sea routes in terms of costs, safety and quality. He mentioned that the Russian government adopted a [new law on the Northern Sea Route](#) in July 2012, and was planning to establish ten modern monitoring and coordinating search and rescue centres along its whole length by 2015.

Russia intends to expand its icebreaker fleet as well. In addition to the existing ten open sea icebreakers, another three universal nuclear icebreakers and six diesel electric icebreakers will be built by 2020.

Committed to further exploration of the Arctic, Russia will develop its telecommunication, navigation and hydrographic systems with the global positioning system [GLONASS](#). The government has also initiated the development of a multi-purpose satellite system “Arktika”, which will be able to collect information on the Arctic environment.

Mr. Krestianov stated that Russia is getting ready to start a new chapter of exploration of the Arctic. He then presented an overview of the most recent developments in Russian activities on its continental shelf. For instance, the deployment of [Gazprom Neft Shelf's](#) Prirazlomnaya oil platform in the Pechora Sea and the recent discovery of the Rusanovskoe and Leningradskoe oil fields in the Kara Sea. Bearing in mind the good prospects of the recent deal between [Exxon Mobil](#) and [Rosneft](#), the two companies have agreed to set up a research centre in Saint Petersburg, Russia. This centre will carry out scientific and technological support for shelf projects. Another agreement, for founding a joint company to explore Perseevskoe oil field in the Barents Sea, was reached in August 2012 by [Statoil](#) and Rosneft.

"We are aware that climate change and expanding economic development of the North may negatively affect the established life cycles of Arctic small indigenous peoples," he said. He recognized that these groups are entitled to governmental support and noted that the protection of indigenous interests was one of Russia's priorities during its presidency of the Barents Euro-Arctic Council in 2007-09. He also drew attention to the recent progress made at the [APEC Summit](#) in Vladivostok in September 2012, when the Russian Foreign Minister Sergei Lavrov and the US Secretary of State Hillary Clinton signed a [joint statement on cooperation in the Bering Strait region](#). The Deputy Permanent Representative then expressed the hope of reaching an agreement on the trans-boundary specially protected area in the Bering Strait region - an agreement that would further develop the existing [Russian-US Beringian Heritage Programme](#), preserve the cultures and identity of indigenous peoples and enhance environmental cooperation.

He concluded by evaluating the Arctic cooperation as successful, stable, equitable and in possession of a sufficient legal basis to provide the mechanisms for resolving all issues by the Arctic states themselves.



DAVID PLUNKETT

AMBASSADOR OF CANADA TO THE EUROPEAN UNION

Ambassador Plunkett began his speech by describing the Canadian High North, which is comprised of three territories – Yukon, Northwest Territories and Nunavut – as a community of 110,000 people living in a land area roughly the size of the European Union. It is a community in which individuals take responsibility for most aspects of their region's affairs. "I'm proud to say that Canada's North is home to some of the most innovative consultative approaches to government in the north," remarked the Ambassador.

Canada is committed to responsible development of its vast natural resources and to economic growth that benefits its people.

Although there is no current offshore oil and gas drilling activity in the Canadian Arctic, the National Energy Board has recently reviewed the [safety environmental requirements for offshore drilling in the Arctic](#). "We now have one of the most robust Arctic oil and gas regulatory regimes in the world," he stated. Moreover, he affirmed Canada's commitment to the Arctic Council's updated set of guidelines for offshore drilling.

Canada takes an active stand in the protection of the environment. In accordance with the [Arctic Waters Pollution Prevention Act](#) that has been in force since 1970, all ships sailing through Canadian Arctic waters are obliged to report to the Canadian Coast Guard.

Canada plays an active part in negotiations on the Polar Code at the International Maritime Organization as well. “Given the challenging conditions that shipping will face in the Arctic, it will be important that the Polar Code set robust standards specifically addressing these conditions,” the Ambassador said.

Canada is also constructively involved in negotiations under the [United Nations Framework Convention on Climate Change \(UNFCCC\)](#). On the global level, Canada is collaborating with international partners to establish a fair, effective and comprehensive global agreement on emissions. On the domestic level, it is advancing towards the ambitious goal described in the [Copenhagen Accord](#): by 2020, Canada is planning to reduce greenhouse gas emissions by 17% of 2005 levels, using a sector-by-sector approach.

In February 2012 Canada, together with the USA, Sweden and other international partners, launched a climate and clean air pollution coalition in order to reduce short-lived climate pollutants such as methane and black carbon, which have a relatively short life span in the atmosphere compared to carbon dioxide and other greenhouse gases. Ambassador Plunkett was stated his pleasure on the news that the EU had joined the coalition.

Another commitment made by Canada is the development of a global legally-binding agreement to control mercury emissions under the [United Nations Environment Programme \(UNEP\)](#). Canada has reduced domestic mercury emissions by 90% over the last 30 years. However, over 95% of mercury comes into the Canadian atmosphere from abroad, hence the necessity for a global treaty on mercury, he argued.

The Canadian government has invested in and expanded its national parks. In August 2012 Prime Minister Stephen Harper announced the establishment of Canada’s 44th national park of 5,000 km².

At the same time, Prime Minister Harper declared that C\$ 124 million will be used to fund the construction and equipment of a [Canadian High-Arctic Research Station \(CHARS\)](#), and another C\$ 47 million have been set aside to fund a six-year science and technology programme. Moreover, C\$ 26 million a year have been set aside for operating the station, which will be located in Cambridge Bay, and is set to open in 2017.

Ambassador Plunkett vowed that when Canada assumes the chair of the Arctic Council in 2013, it will work to encourage collective responsibility and collective action.

He welcomed the Search and Rescue Agreement of 2011 as well as the Arctic Council’s second agreement on oil spill preparedness and response, which is expected to be signed in 2013.

He promised to work closely with other Arctic Council states to strengthen and equip the Council to address emerging issues. He mentioned the recent appointment of Minister of Health and Minister of the Canadian Northern Economic Development Agency Leona Aglukkaq to serve as Canada’s Minister to the Arctic Council. Minister Aglukkaq is expected to work closely with the Canadian regional governments and indigenous peoples to develop and deliver the programme for the Canadian chairmanship of the Arctic Council 2013-2015, in order to ensure that northern communities will play a key role in the development of the region.

The Ambassador briefly touched upon the issue of observers, which he regarded as evidence of the increasing international attention being paid to the Arctic.

“We have and will continue to be a consistent champion of the Arctic as a zone for responsible development, environmental protection and international peace. We will

do so by working with our Arctic partners, including through the Arctic Council, to advance shared priorities and address common challenges,” he concluded.

At this point in discussion, Mr. Emmerson suggested to move to shorter interventions and more direct questions, the first two of which he addressed to the Norwegian SAO, Ambassador Karsten Klepsvik, who was asked to explain the importance of energy development for Norway and to give his opinion on the weak and strong points of the Arctic Council.



KARSTEN KLEPSVIK

NORWEGIAN AMBASSADOR TO THE ARCTIC, SENIOR ARCTIC OFFICIAL

Ambassador Klepsvik said that energy was “highly pertinent” for Norway, and that there seemed to be a misunderstanding in the European and UK Parliaments, which had recently made statements calling for oil and gas exploration in the Arctic to be put on hold.

He reminded the audience that there are five countries with a continental shelf in the Arctic – Greenland (Denmark), Canada, US, Russia and Norway – and all rights and responsibilities with regards to the continental shelf will be regulated by the United Nations Convention on Law of the Sea (UNCLOS), according to which the coastal states have exclusive rights to engage in petroleum exploration activities on their continental shelf.

Those activities are “nothing new” and have been going on for 50 years, although now the industry is moving further north as the area becomes more accessible. Norway has already gained some Arctic drilling experience, he pointed out.

The Ambassador dismissed any allegations of a “race for natural resources in the Arctic.” All Arctic states have declared that they will adhere to the UNCLOS provisions, and as most of the Arctic Ocean will be covered by the EEZs of each Arctic state, nearly all Arctic resources will fall under national jurisdictions.

Norway is quite fortunate to have most of its Arctic territories ice-free already. Ambassador Klepsvik predicted a “great future” for the oil and gas industry in the Arctic.

The main trend for the Arctic Council is that it is becoming a more prominent player in the region, or as the Ambassador put it, “a body that really has been able to take on new challenges as the Arctic gets more accessible because of the melting of ice and as more partners move into the Arctic to look for opportunities.” In his view, the Council’s biggest strength is consensus-based decision-making mechanisms.

The decision to establish a permanent secretariat in Tromsø was a huge step forward. It will start operating with ten professional members and will also be allocated a permanent budget. He mentioned that another strong point of the Arctic Council is the successful inclusion of indigenous peoples as permanent participants.

Ambassador Klepsvik clarified the government’s position on the applications for the role of permanent observers: “Norway believes the observers have legitimate interest in the Arctic, and we do believe it is to the benefit of the Arctic Council and the strength of the Arctic Council that we let in observers.” If all current applicants were to be accepted, the Arctic Council would have 41 permanent observers. Norway does not see how accepting new observers would shift the balance within the Council, as this will not increase the number of members. The Ambassador stressed that the alternative

course of action would mean that those excluded would look for alternative ways to address what they consider to be their legitimate interests in the Arctic.

He concluded by addressing what he considered to have previously been the main weakness of the Arctic Council – the absence of binding decisions. But that has now changed, and many issues facing the Arctic might benefit from binding agreements between its members.

Mr. Emmerson then turned to the Danish representative and, by bringing attention the recent visits of non-Arctic state officials to the Arctic, asked him to suggest some reasons for increased interest in the region.



KLAVS A. HOLM

DANISH AMBASSADOR TO THE ARCTIC, SENIOR ARCTIC OFFICIAL

Ambassador Holm affirmed that the Prime Minister of Greenland and the Danish Crown Prince had received President Lee of South Korea. He said all Arctic issues are regional in nature, dealt with by regional decisions in a regional body. However he states that there isn't a single issue that doesn't have a global impact.

He gave the example of the new Arctic shipping lanes, which are of strategic and economic interest to many Asian countries, including Singapore, Taiwan, China and Japan. At the moment, 50% of Chinese exports pass through the heavily travelled Strait of Malacca between Malaysia and Indonesia; however, diversifying shipping lanes could be advantageous for China.

Moreover, the development of Arctic oil and gas resources could have potential consequences for the Middle East and the rest of the world. Mining activities would have an effect on African countries. The European Union is also an interested player, particularly with regards to fisheries management and an increase in cruise ship activity.

Hence the interest of non-Arctic states in the Arctic is therefore evident, legitimate and bound to increase, Ambassador Holm concluded. "We say to our businesses in the Kingdom of Denmark that they should be active in other parts of the world... we also think that these countries are interested in our part of the world."

Mr. Emmerson then raised the question of Greenland's administrative capacity to handle dealing with transnational oil companies and the willingness of Greenlanders to accept the coming changes. He also wondered about the ways that Greenland could leverage international interest in the Arctic to its interests.



INUUTEQ HOLM OLSEN

DEPUTY FOREIGN MINISTER OF GREENLAND

Deputy Foreign Minister Olsen gave a clear response to Mr. Emmerson's query. "Is Greenland ready for this kind of development?" he asked. "The short answer is 'yes.'" This is something Greenland has been working on for the past two decades, with the view towards complete self-governance.

In order to ensure sustainable exploitation of its resources, Greenland has set up consistent regulatory standards. When applying for permits to mine or drill, operators have to go through a screening process and fulfill certain requirements, including

health and safety standards, emergency response plans and they must show previous experience in managing emergency situations that pose a threat to the environment.

With extensive environmental and biological studies being conducted, such assessments have become an important foundation for political decisions on whether an area should be opened up for oil exploration, Deputy Foreign Minister Olsen said.

Before the Baffin Bay and Greenland Sea areas west of Disko Island were opened for oil exploration, a strategic assessment of potential environmental impacts on that area had been prepared in collaboration between the [Greenland Institute of Natural Resources](#) and the [Danish National Centre for Energy and Environment](#).

In Greenland, all necessary regulations are in place and all necessary studies are conducted to ensure that natural resource extraction activities are done responsibly, said the Deputy Foreign Minister.

Mr. Emmerson recalled his recent visit to Helsinki Airport, which had left an impression of a big transport hub supporting Finland's openness and interest in the world. He then asked the Finnish representative about the possible ways for Finland to make commercial gains from the developments in the Arctic, despite not being a coastal Arctic state.



HANNU HALINEN

FINNISH AMBASSADOR FOR ARCTIC AFFAIRS, SENIOR ARCTIC OFFICIAL

Ambassador Halinen commented on what he called “the Finnish phenomenon.” Although Finland is not involved in offshore activities in the Arctic, it has gained tremendous expertise in dealing with icy conditions, as all Finnish bays are covered by ice in winter. He said that 60% of icebreakers operating throughout the world were built in Finland.

In addition, the tourism sector in Finnish Lapland is booming. Finland provides about 100,000 hotel beds north of the Arctic Circle. The mining industry in Lapland is also developing.

The dynamism between Asia and Europe creates a need for northern shipping lanes, and raises the question of how to ensure a sustainable integration of Asian states into Arctic shipping activities. Finland has also been collaborating with Russia with a focus on the Northern Sea Route.

Ambassador Halinen suggested environmental protection and scientific research could be other spheres for potential cooperation to develop between Arctic States and Asian countries.

Mr. Emmerson then addressed the Icelandic Ambassador about the role of Iceland in the Arctic and how it can prevent its voice from being overshadowed by bigger players.



HJÁLMAR W. HANNESSON

ICELANDIC AMBASSADOR TO THE ARCTIC

Iceland is located at an oceanic crossroads in the High North, Ambassador Hannesson stated. It is a coastal state that is an active international player, being party to the [Nordic Cooperation](#), [NATO](#), [EEA](#), and now it is an applicant to accede to the EU.

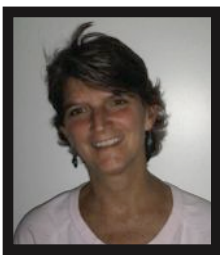
He said that both the Arctic states and other actors interested in the Arctic have a common interest in stability in the region. “The militarization of the area must, of course, be prevented by all means, including strengthening mutual trust and confidence even further than has already been done to a great degree,” said the Ambassador.

He approved of the gradual reform of the Arctic Council and noted that it had “come of age” and should now be increasingly moving towards taking concrete actions.

Iceland, however, has some reservations concerning the “Arctic Five” meetings. Being a coastal state that bases its livelihood on the northern marine resources, Iceland believes that the discussions should include all coastal states.

Although the Arctic Council is experiencing the strong influence of non-Arctic states and organizations, any idea of global governance of the region should be dismissed. The United Nations Convention on the Law of the Sea (UNCLOS) is a comprehensive framework, said the Ambassador. The Arctic is fundamentally different from the Antarctic and does not require a similar global treaty.

Mr. Emmerson then turned to the US State Department representative to comment on the US sometimes seeming to be a reluctant player in the Arctic and to asked her for an update on the state of ratification of UNCLOS in the US Congress.



CAROLINE BROUN

ECONOMIC OFFICER FOR ENVIRONMENT, SCIENCE AND TECHNOLOGY, UNITED STATES MISSION TO THE EUROPEAN UNION

Ms. Broun responded to the perspective of the US being “reluctant” to engage in the Arctic as “misguided” and said that the country’s commitment to the region was evident. Hillary Clinton became the first US Secretary of State to attend one of the Arctic Council ministerial meetings in Nuuk in May 2011, which set the tone for Obama Administration. She mentioned US commitment to the Arctic was strong during the Bush Administration as well. Both Republicans and Democrats support US commitment to the Arctic.

The US is involved in discussions on climate change, maritime emissions, search and rescue agreements and marine oil spill response plans. They are already planning the future US chairmanship of the Arctic Council, which they will take over from Canada in 2015.

Ms. Broun added that there is agreement among the Obama Administration, the US military and businesses on the need to ratify UNCLOS. She said they are all “a bit flabbergasted” at the resistance of certain members of the US Congress to ratify the treaty.

Mr. Emmerson’s next question, which was directed at the representative from the European External Action Service, focused on the EU’s ambition to become a permanent observer in the Arctic Council. He wanted to know what the EU could bring to table.



GUNNAR WIEGAND

DIRECTOR FOR RUSSIA, EASTERN PARTNERSHIP, CENTRAL ASIA, REGIONAL COOPERATION AND OSCE AT THE [EUROPEAN EXTERNAL ACTION SERVICE](#).

Mr. Wiegand stated that the Arctic is strategic to EU policymaking. He said this was exemplified by the recent visits of High Representative Catherine Ashton to the High North.

The EU wants to be engaged in areas where it is competent and can contribute to research programmes. Since 2007, the bloc has invested more than €1 billion towards the development of the social, economic and environmental potential of the Arctic region.

“What we believe the EU’s contribution can be is to get the balance right between meeting the challenge of safeguarding the environment, while ensuring the sustainable development of the region,” he said.

He reminded the audience that three Arctic states (and possibly a fourth if Iceland joins the EU) are EU member states. European interest and involvement in the Arctic is not a new phenomenon. The EU is determined to make a positive contribution to the region’s sustainable development.

The EU has recently concluded an agreement with China on a joint Arctic project and intends to continue mainstreaming strategic cooperation with its Arctic partners.

DISCUSSION

Associate Professor of Copenhagen Business School Jeppe Strandsbjerg wondered if there was really nothing special about the Arctic, given the fact that the Arctic officials had just assured everyone of the stability that the region was enjoying. Hans Bolscher of the [Arctic NGO Forum](#) echoed this question: if all was under control, what was the need for everyone to be there?

Ambassador Klepsvik replied that the need to attend such meetings was stipulated by the need to give perspectives, correct misconceptions and answer questions. The Arctic states, he said, are committed to managing the region in a sustainable and responsible way, and have the instruments to do so. Ambassador Lind specified that from a legal point of view, things are quite clear, but there is urgent need for action, as the Arctic is changing and it is important to see the issues from the prospect of the people living in the North. Ambassador Holm further clarified that one of the reasons to be there was to calm things down a bit, as some researchers, he said, like to dramatize the situation. No country can deal with this fragile environment on its own; there is need for cooperation and discussion, he said. Ambassador Plunkett said he did not see how one could argue that the Arctic was not special. He drew a difference between sailing in the North and cruising in the Mediterranean Sea. “It is clearly not ‘business as usual,’” he remarked. Ambassador Hannesson described how special the region is, citing examples of the difficulties that cruise ships faced in Reykjavik in summer 2012 because of what was for the locals “a slight wind.” Ambassador Halinen noted that Arctic cooperation is relatively new, the Arctic Council having been founded only in 1996. It is now being gradually reformed into an international organization and it is necessary to look at its role in the global context.

Einar Svendsen from the [Institute of Marine Research in Norway](#) said it was contradictory to say on one hand to claim a concern for the environment and global warming, while on the other hand planning to increase oil and gas extraction in the Arctic.

Ambassador Klepsvik responded that the question was “highly political.” He wondered, rhetorically, if countries should forfeit their offshore wealth, or try to extract it without

producing CO₂ emissions. An alternative idea might be to invest in research on methods of oil and gas extraction with no CO₂ emissions, he said, but such idea would be very ambitious.

A gentleman from the audience commented that the goal to limit average global temperature rise to 2°C warming was already not being met, and due to the Arctic amplification effect, this translated into a 6-7°C temperature increase in the Arctic.

Ambassador Lind explained that the Arctic is indeed warming up twice as fast as the rest of the world. Therefore, a 4-5°C warming target has been set for the Arctic. The Arctic Council is trying to reduce short-term climate forcing mechanisms such as black carbon emissions as well as design adaptation measures for those living in the region. The Arctic is transforming, the Ambassador admitted. According to AMAP estimates, in 30-40 years there will be no summer sea ice. Mr. Emmerson also commented on the 2°C warming limit, saying that very few still believe that it can actually be met. If this global target is not met, then the Arctic could be on a 5-6°C warming trajectory.

Ethan Bilby from Thomson Reuters asked how EU regulations could make a difference in the Arctic.

Mr. Wiegand replied that the EU, being an active proponent in the fight against climate change, could share its regulatory experience with other states if granted permanent observer status on the Arctic Council. Ambassador Halinen added that the EU's presence on the Council could open up interesting joint research opportunities and foster enhanced dialogue with other Arctic players.

Jörn Thiede from [Saint Petersburg State University](#) asked what was being done to harmonize regulations for licensing foreign vessels.

Ambassador Lind replied that there was indeed a need to think about how to improve icebreaker registration, on either a bilateral or global level.

Steffen Weber of the [EU Arctic Forum](#) brought up the 20-year perspective on Arctic development and wondered how this future would look once new players get involved. He also mentioned a presentation given by a representative from the [World Wildlife Fund \(WWF\)](#) in a recent EU Arctic Forum meeting which mentioned that Arctic biodiversity is going to change dramatically, as well as a presentation by the former director of the [Nansen Institute](#), which envisioned the Arctic becoming a new Mediterranean or mare nostrum.

Ambassador Klepshvik stressed the need to demystify the Arctic. Access to natural resources, new shipping routes, and other new opportunities are opening up in the Arctic. Climate change cannot be dealt with overnight, he said. But in the meantime, adaptation measures must be put in place.

Deputy Foreign Minister Olsen agreed with the importance of coming up with adaptation measures, while Ambassador Holm stated that cooperation is necessary and that there is some ground for optimism.

Ambassador Plunkett commented that there are many overlapping ideas, and hence a need for cooperation. "The world is changing very quickly, and so is the North," he said.

Ambassador Hannesson recalled his experience of travelling to Nunavut ten years before when he was Ambassador of Iceland to Canada, during which he talked to the local people and found out that they were already feeling the change. After that, as Ambassador of Iceland to the United Nations, he had discussions with representatives of small island states that were in danger of drowning. "We are all in this together globally," he concluded.

There was a comment from a lady in the audience who said that, despite all the research going on in the Arctic, there was still too little information for effective decision-making to be made. Another lady expressed the view that the panel was minimizing the issue of having to handle both natural resource exploitation and climate change.

Andreas Østhagen of the [North Norway European Office](#) inquired how it might be possible to include not only indigenous peoples, but also regional and local politicians in the discussions, as the European part is more populated compared to other parts of the Arctic.

Jens Boye of [Royal Arctic Line](#) asked if the panel felt that enough was being done to push for the development and ratification of the Polar Code.

Liisa Holmberg of the [Sámi Education Institute](#) in Finland inquired about practical solutions to protecting the rights and traditions of indigenous peoples.

Ambassador Halinen said that all states agree on the Polar Code and it is only the technicalities that remain to be solved; he hopes these can be resolved in the next two years. He added that the situation of the Sámi people in Norway, Sweden, Finland and Russia was different in each country. There are Sámi parliaments in Norway, Sweden and Finland, and a common forum, [Sámi Council](#) exists. Discussions on a Nordic Sámi convention have also begun.

Arni Snaevarr of the [UN Regional Information Centre \(UNRIC\)](#) for Western Europe commented on the “UN-led world” policy of Norway, wondering how Norway could be making recommendations to the rest of the world but at the same time be “baffled” by outside attention being paid to the Arctic.

Ambassador Klepssvik responded by saying that Norway is a strong proponent of observers and cooperation within the Arctic Council and the Barents Euro-Arctic Council.

Ambassador Lind concluded the session, remarking that there had been a good discussion, and that there is room for further discussions during the remainder of the Arctic Futures Symposium.

THE FUTURE OF ENERGY RESOURCES IN THE ARCTIC

MODERATOR:

BERNARD W. FUNSTON

CHAIR, [CANADIAN POLAR COMMISSION](#)



Opening the session, Mr. Funston commented that the word “energy” is all-inclusive, and therefore the discussion should focus not just on fossil fuels, but also on renewable energy. Underlining the importance of energy in human life, he called it the “cornerstone of civilization.” He drew a distinction between onshore and offshore activities and noted that most reports on Arctic energy resources refer to oil and gas exploration and exploitation. He gave examples of some of the major ongoing projects in Hammerfest off the Norwegian coast, in the Pechora Sea in northern Russia, and in the Beaufort Sea off Alaska, in particular at Prudhoe Bay.

He also noted that the [2008 US Geological Survey](#) estimates of undiscovered oil and gas resources in the Arctic is often the figure everyone focuses on, instead of the resources that have been found and extracted so far.

Mr. Funston suggested three issues to discuss during the course of the session:

- The impact of the shale revolution on the oil and gas production;
- Alternative energy sources and options for people in small communities;
- The Arctic not just as an energy producer, but also as an energy consumer.

CHARLES EMMERSON

SENIOR RESEARCH FELLOW FOR THE ENERGY, [ENVIRONMENT AND DEVELOPMENT PROGRAMME AT CHATHAM HOUSE](#)



RISK INSIGHTS REPORT: BENEFITS OF DRILLING WORTH THE RISKS?

Mr. Emerson mentioned the recent [recommendations of the European Parliament and the UK Parliament](#) to halt all oil production in the Arctic as well as the Arctic campaign of Greenpeace as evidence of the increasing political temperature surrounding energy production in the Arctic. The actual picture is “much more mixed,” he said. There has been obvious progress in the sphere of Arctic energy resources: several major deals in the Russian Arctic as well as active licensing in the Barents Sea. But at the same time, several projects – including the expansion of the Snøhvit gas field off Norway or the development of the Shtokman gas field in Russia – have been shelved. Although it is said that Arctic resource exploitation in the Arctic is coming closer and closer, all the major projects always seem to be five or ten years away.

With such a mixed picture on one hand and global uncertainties on the future of global energy needs on the other, if Arctic development expands at all, it will be slow, Mr. Emerson concluded. Despite the estimates of undiscovered energy resources in the region, for him the key word remains “undiscovered.” These potential resources are

likely to be expensive to extract and will involve economic, environmental and political risks. Risk-opportunity studies should be conducted before new ventures are started, he argued.

Mr. Emmerson then pointed out that the Arctic is not uniform; rather it consists of several parts with different natural conditions, different risk and reward situations, and different strategic and political motivations. For example in Russia, oil and gas development is “essential to social stability in that country; it’s also essential to geopolitical power as seen by those who run Russia.” In the US, in contrast, the national arguments are quite weak. Production depends on whether the economic benefits match the potential risks. In Greenland, even a relatively small amount of oil production would transform economic and political opportunities for the country.

Mr. Emmerson insisted that putting a blanket ban on all oil and gas exploration in the Arctic would not make sense for two reasons: Firstly, no country would agree to that, and secondly, as the region is not homogenous in terms of risks, such a ban would be discriminative to some parts of the Arctic.

He agreed that there is need for to improve knowledge before any decisions can be made. Risk management should include not only the definition of risks, but risk response as well.

He drew attention to reputational risks oil and gas companies face: a major crisis in the Arctic could affect the whole industry. He said that there were far too many knowledge gaps about ecological baselines and about how effective oil spill clean up can be under difficult conditions.

Mr. Emmerson said the question “Are opportunities worth the risks?” is a fundamentally subjective question, as there are multiple interests involved in each situation – those of companies, local inhabitants, local governments, fisheries and interest groups.

In conclusion, Mr. Emmerson argued for a “shift in our presumptions” on Arctic development, and suggested that instead of putting a blanket ban on energy production in the Arctic, the initial presumption should be that it should not take place, and after that make arguments and present evidence as to why it should.



ROBERT J. BLAAUW

SENIOR ADVISOR GLOBAL ARCTIC THEME AT [SHELL](#) INTERNATIONAL EXPLORATION AND PRODUCTION B.V.

CONFRONTING THE CHALLENGES OF DEVELOPING HYDROCARBON RESOURCES IN THE ARCTIC

Mr. Blaauw opened by saying that 2012 was a very eventful year for the oil and gas industry in the Arctic, with due to new agreements and postponements.

Shell predicts energy demand will double by 2050, and sees the need to look for all the feasible energy sources available. Governments think the same, Mr. Blaauw claimed, referring to the licensing processes as proof.

While there is an estimated 412 billion Barrels of Oil Equivalent (BOE) located in the Arctic, very few wells have actually been drilled. It takes a long time to become a responsible oil economy, he said, and only the big fields will be developed in the near future, as a lot depends on having the right infrastructure and technology. He compared the relatively easy offshore energy development in the Barents Sea with the more difficult conditions off the shores of Greenland.

He pointed out that industrial development in the Arctic is not new and neither is oil and gas exploration, which began a century ago. The industry has learned to work while facing Arctic challenges, looking for tangible and lasting benefits that will remain in place long after the oil company is gone.

Shell's experience in the Arctic is centred around three locations:

- 1 Alaska. Shell drilled around fifteen wells in the Beaufort and Chukchi Seas in the mid-1980s and early 1990s. However the development of those wells was not deemed to be commercially viable at the time. Shell returned in 2005, making preparations to start drilling. At the moment, there are 1,500 people working offshore in Alaska, facing an enormous logistical challenge. During 2012 Shell planned to drill only top holes, and then return the following season.
- 2 Sakhalin. Mr. Blaauw remarked that although it is a sub-Arctic region, it is Arctic in its challenges. Shell has learned to work with the indigenous population and environmental organizations there. Shell has built a Liquid Natural Gas (LNG) plant, oriented towards the Japanese market.
- 3 Greenland. There are two exploration blocks, together 20,000 km² in size. Shell is exercising a "very diligent" approach in the region. Mr. Blaauw claimed that the activities posed no threat to the environment and biodiversity. "If you come too close to the whales, you stop," he said.

Mr. Blaauw recognized that Arctic opportunity comes with great responsibility. After the Deepwater Horizon accident in 2010, the industry has focused on a risk management approach. There are now nine companies participating in the oil spill research Joint Industry Programme under the auspices of the International Oil and Gas Producers Association.

Referring to a recent meeting of the [Arctic Council's Sustainable Development Working Group \(SDWG\)](#) in Iceland, he highlighted the importance of inclusive stakeholder engagement at early stages.

He also agreed that science is extremely important, as it is required not only for licensing terms, but also to understand how to minimize impacts over the long term.

He emphasized the importance of cooperation, especially through the Arctic Council (he mentioned Shell had become an ad hoc observer at the [International Oil and Gas Producers Association](#)). Member states engage in dialogue with industry, and Sweden has been promoting this dialogue under its chairmanship of the council.

The oil and gas industry is also engaged in dialogue with government regulatory agencies, NGOs and environmental partners, he said. Collaboration on and discussion of environmental concerns and risk management within international frameworks such as the [International Oil and Gas Producers Association](#) and the Arctic Charter initiative (which Mr. Blaauw is chairing) are also key.

In conclusion, Mr. Blaauw said that it is obvious that the public is paying more attention to the Arctic. However, new offshore oil and gas developments will be few and far between for the time being. "Shell and others have the experience to see through big Arctic projects. There will be only a few, and the focus will be on safety, the environment and the people who live out there," he stated.



LARS-ANDERS BAER

CHAIR OF THE [WORKING GROUP OF INDIGENOUS PEOPLES IN THE BARENTS EURO-ARCTIC REGION](#)

ARCTIC INDIGENOUS PEOPLES' HUMAN RIGHTS UNDER THREAT?

In his opening, Mr. Baer outlined three priorities of Arctic indigenous peoples when talking about the future of the Arctic:

- Promoting knowledge-building
- Emphasising shared responsibility
- Underlining lasting engagements

He touched upon past notions past perceptions of the Arctic held by those outside the Arctic. He spoke of times when the High North was perceived as the mythical “Ultima Thule” north of which lay the frozen Cronian Sea, the name some previously used to refer to the Arctic Ocean. “This region was considered a mythical landscape with strange natural phenomena such as midnight sun, the aurora borealis and unlimited natural resources, inhabited by strange beasts and human beings of certain kind.” Distinguishing between myth and reality was not always easy.

He said that the “mega trends” such as rising energy demand, climate change, globalization, urbanization and population growth are already affecting the everyday lives of indigenous peoples today, and will influence the developing social order in the Arctic. With global attention turning to the Arctic, the indigenous peoples have to find an equilibrium in the economic boom created by new Arctic opportunities and the new “multipolar” state of geopolitical affairs. Mr. Baer expressed his hope that this can be accomplished via multilateral cooperation and dialogue on equal footing with regional, national and international bodies like the UN and the EU, as well as the scientific and business communities.

In this new geopolitical context, Mr. Baer outlined the importance of:

- 1 Open and inclusive dialogue between stakeholders on equal footing
- 2 Implementation of relevant human rights standards
- 3 Developing new policies, guidelines and standards for recognizing indigenous land rights and resource development
- 4 Fair and transparent decision-making processes that include indigenous peoples' free, prior, informed consent pertaining to issues affecting them
- 5 Benefit-sharing in relation to natural resource extraction

Mr. Baer welcomed the development of indigenous peoples rights from an avant-garde movement in the 1970s to a mainstream human rights issue in the first decade of 21st century, calling it a “paradigm shift.” The [Declaration on the Rights of Indigenous Peoples](#) was adopted by the United Nations General Assembly in 2007, with only four states voting against, including Canada and the US, while Russia abstained. The four states that voted against the Declaration have since changed their position and now support the position of the Declaration; Russia has so far not clarified its position.

Mr. Baer pointed out the key issue in finding the balance between economic development and human rights law as the “implementation gap” between the internationally agreed human rights standards and their practical realisation.

History tends to repeat itself, he said, drawing a parallel between the contemporary perception of the Sámi territories as “treasure chests” to be mined by the governments of Sweden and Norway, and the dramatic exploration of the Nasafäll mine in the mid-17th century.

With the mineral and hydrocarbon reserves and hydroelectric power production in the territories traditionally inhabited by the Sámi people, this vast wilderness may be one of the most economically dynamic regions of Europe. This poses an undeniable challenge for the indigenous people living there.

Globalisation is forcing the Sámi communities to modernise their traditional economic activities such as reindeer herding. The Sámi people are capable of adaptation. However they have difficulties in coping with the complexity of issues they are facing – economic globalisation, climate change, land fragmentation, natural resource exploitation, dwindling access to land – without help from the outside. Mr. Baer expressed his frustration at the different situations of the indigenous peoples in the European Arctic and those in North America and Greenland, where they are included in the decision-making process and hold considerable political power.

He highlighted that the European Union has an important role to play in the implementation of the principles of the United Nations Declaration on the Rights of Indigenous Peoples in the European Arctic. He also expressed his hope that the Nordic and Russian indigenous policies would become more modern, instead of being limited simply to cultural conservation.



JULIE GRIGNON

*DIRECTOR GENERAL FOR ELECTRICITY, MINISTRY OF NATURAL RESOURCES,
GOVERNMENT OF QUÉBEC*

THE NORTHERN CHALLENGES OF ENERGY DEVELOPMENT IN QUÉBEC

Ms. Grignon said that her presentation would explain how energy has shaped Québec, the challenges the province is facing, and future plans.

The Province of Québec covers 1,667,441 km² and has a population density of six inhabitants per square kilometre, most of which is concentrated in the south along St. Lawrence River.

Electricity represents 40% of total energy consumption. This is nearly the same percentage as oil, which is used mainly for transportation. 97.3% of electricity is produced by renewable sources, 96% of which is hydroelectric.

Québec has more than 40,000 MW of installed hydroelectric power, with more than 35,000 MW belonging to crown corporation [Hydro-Québec](#). Thermal installations are located in the north in isolated areas, and are not linked to the global network.

“Québec’s hydroelectric development can be described as a succession of different phases that could be illustrated by the facilities installed in specific regions,” Ms. Grignon said.

Before the 1940s, hydroelectric plants were constructed for industrial needs by the private sector at places such as Beauharnois, Shawinigan 2 and 3, and Rivière-des-Prairies.

Hydro-Québec launched large development projects following the nationalization of electricity in the early 1960s. Production facilities began to move away from urban areas. The Manic-Outardes Complex was built at this time. The early 1970s saw even

bigger projects, much farther north, up to 900 km away from Montreal, including La Grande Complex.

In 2002, the government of Québec reached an agreement with the Grand Council of the Crees. This agreement, called “[La Paix des Braves](#)” ([Peace of the Braves](#)), enabled new large-scale projects: Eastmain and La Romaine. Eastmain-1 became operational in 2006. La Romaine-2 is currently under construction. It is part of the large La Romaine complex, which is scheduled to start operating in phases between 2014 and 2020.

Ms. Grignon outlined four main challenges for renewable energy development in Québec:

- 1 Knowledge of the province’s potential. Québec is currently working on mapping for wind energy projects. New hydroelectric projects need geological information. Marine current potential for underwater turbine projects needs to be measured. While there has been in-depth research into hydroelectric potential conducted since the 1960s, underwater turbine potential needs serious research.
- 2 Remoteness. Most hydroelectric production is located far north. Remoteness translates into the need for energy transportation infrastructure. Hydro-Québec has already constructed 30,000 km of lines stretching to the south.
- 3 Extreme climatic conditions. Low temperatures pose technological challenges to equipment and machinery. Higher air density reduces the productivity of wind power. Storms and avalanches restrict visibility and slow down production. Building on permafrost requires specially adapted technology. The severe climate also limits accessibility during certain times of the year.
- 4 Cohabitation and participation of indigenous communities. “The success of the energy projects will rest on the participation of local stakeholders, like First Nations communities,” Ms. Grignon stressed. The first step towards mutual recognition was the James Bay and [Northern Québec Agreement of 1975](#). Great progress was made with the Paix des Braves Agreement of 2002, which contains provisions for the integration of workers. The Québec government plans to maintain this special relationship through collaborative approaches and the development of tools for dialogue, including, for instance, the [DIALOG network](#).

In the future, the government of Québec will continue to prioritize renewable energy development while taking the public’s concerns into consideration and making a commitment to serve local communities.

DISCUSSION

Michel Genet of Greenpeace Belgium commented that oil exploration is good neither for the climate, nor for the Arctic. He addressed two questions to Mr. Blaauw. The first was about the recent proclamation of Total saying that oil and gas exploration in the Arctic was not worth the risks; the second was about the oil spill recovery plans of Shell, which he said were designed only for cleanup under summer conditions, not for winter conditions.

Others asked the speakers to give some more insight into the oil spill research done by the oil companies and about the potential of exploiting gas hydrates.

Greenland Deputy Foreign Minister Inuuteq Holm Olsen brought up the UK Parliament committee’s recommendation of the ban on oil drilling in the Arctic and asked, “Why care at all?” if the UK Parliament has no jurisdiction in the Arctic.

Mr. Emerson argued that parliament committees ought to be allowed to state their views, whether or not they are legally binding. Being one of the people who gave evidence to the UK Parliament committee, he said he disagreed with its final opinion.

In his view, a ban is not a solution; the first responsibility should be to listen to what people in the Arctic actually want.

Mr. Emmerson also responded to the question about gas hydrates, saying that it was not clear whether it was a question of climate change or energy resources, but it is certainly hard to see them being used as an energy resource in the near future.

Mr. Blaauw said that technology hasn't been developed enough to a point to responsibly exploit methane hydrates, so they are not part of Shell's energy portfolio. As for the recent statement by Total, Mr. Blaauw said that while they do not have Arctic oil in their portfolio, Total is a good contributor to oil spill response research. However, he said the question about the statement they made about exploiting oil and gas in the Arctic not being worth the risks should be addressed to Total, not Shell, he said.

As for Shell's oil spill response plans, Mr. Blaauw mentioned that as exploration activities happen during the ice-free season and avoid areas with difficult types of ice, spill response is possible even at the end of the season. The company is doing research on oil behaviour in extremely cold conditions, including a project that was launched after the [Arctic Frontiers conference](#) in January 2012, which will take place over 4 years. Previous research includes the Joint Industry Programme carried out under the auspices of [SINTEF](#), which focused on a potential oil spill in the waters around Svalbard. The programme was a success, so it was decided that a follow-up exercise should be done.

Jens Boye of [Royal Arctic Line](#) asked how one defines the Arctic. Mr. Emmerson then briefly discussed the fact that the Arctic can be defined differently depending on which aspect you're looking at and for what purpose: by geographical boundaries (north of the Arctic Circle, or 66° 33' 44" N), by climatological boundaries (isotherm where average temperatures never go above 10°C in July), ecosystem boundaries (where certain flora and fauna live), or political boundaries (certain countries or parts of countries).

Ambassador Hannesson commented that Iceland is well-known for its use of geothermal energy. There are geothermal sources in other parts of the Arctic such as Alaska, Canada and Russia. He said they could be used for small-scale energy production to power local communities. He invited Mr. Emmerson to comment about this geothermal potential.

Steffen Weber of the EU Arctic Forum expressed his concern that the emphasis on lack of knowledge may be an excuse not to make political decisions on whether or not to take certain risks.

Getting back to the prospect of using gas hydrates as an energy source, an audience member mentioned that there are a number of studies, including one from [Gubkin Russian State University of Oil and Gas](#), which say gas hydrates could supply the planet's growing energy demand for the next 200 years.

Mr. Emmerson called geothermal energy "fantastic." He addressed Mr. Weber's question by stressing the importance of knowledge gathering, and that it needs to be combined with vision and the precautionary principle as a guideline for Arctic development. He repeated his previous comment about gas hydrates not being an easy energy source to exploit at the moment. Returning once more to the UK Parliament committee recommendation to put a hold on oil and gas exploitation in the Arctic, he said that the committee gathered a lot of evidence in the process, and that there were many legitimate things that the UK could do to improve conditions.

MANAGEMENT OF ARCTIC MARINE RESOURCES

MODERATOR:

VERONIKA VEITS

HEAD OF UNIT FOR INTERNATIONAL AFFAIRS, LAW OF THE SEA AND REGIONAL FISHERIES ORGANIZATIONS, DG MARE



Ms. Veits briefly introduced all members of the panel before giving the floor to the first speaker.

STEINGRÍMUR JÓNSSON

PROFESSOR OF PHYSICAL OCEANOGRAPHY, UNIVERSITY OF AKUREYRI



CLIMATE VARIABILITY, CLIMATE CHANGE, ARCTIC AND SUB-ARCTIC MARINE ECOSYSTEMS

Professor Jónsson began his presentation by giving the audience an idea of the immense size of the Arctic Ocean and its marginal seas, which altogether cover 14 million km², about three times the area of the EU.

Referring to the [2005 Arctic Climate Impact Assessment Report \(ACIA\)](#) as perhaps “the most comprehensive report on ecosystems and biodiversity in the Arctic”, he suggested that compiling a second report would be a good idea.

According to the 2005 report, climate change will have less of an impact on fish stocks than enforcement of fisheries management policies. This is still true today, he argued. However he was sceptical about the report’s conclusions that climate change is unlikely to have long-term effects on national fisheries, as things have been changing more rapidly in the Arctic than was foreseen in 2005.

Most fishing activities take place in the Pacific and the Atlantic on the margins of the Arctic Ocean, with limited small scale fishing taking place in the Arctic Ocean. In order to answer the question as to why there are so few fish in the Arctic, Professor Jónsson said one needs to consider two important properties of seawater: temperature and salinity.

There are a number of water masses of interest in the Arctic. Professor Jónsson chose to focus on the Atlantic part of the Arctic. The North Atlantic is relatively warm and saline, due to an influx of water from the Gulf Stream. The water in the Arctic Ocean, on the other hand, is much colder and less saline. Its low salinity is due to fresh water influx from Russian rivers and the Pacific. The Arctic waters in the Iceland and Greenland seas, which is a cooled mixture of mixture of polar and North Atlantic water.

Strong stratification of the water column in the Arctic Ocean is one of the main reasons for the low numbers of fish in the Arctic, he said. In addition, the ice cover reduces the amount of solar radiation the water receives, which in turn inhibits phytoplankton growth, which is food for many marine species in the Arctic. In the Atlantic sector at least, the water column in the Arctic Ocean is stratified, with the top tens of metres

comprised mostly of nutrient-poor colder, fresh water from rivers and streams feeding into the Arctic Ocean. The bottom of the water column in the Arctic Ocean in the Atlantic sector tends to contain more nutrient-rich water from the Atlantic. However the stratification of the water column keeps the surface of the Arctic Ocean nutrient poor. In the spring, when the sea ice starts to melt and phytoplankton begins to grow, it quickly uses all the nutrients available in the water right away, using the Arctic Ocean's nutrients.

Professor Jónsson said that fronts (where masses of water of differing temperatures meet) play a major role in delimiting fish habitats. Fronts of water masses are bound by topography, and are therefore unlikely to move significantly, except if some drastic climate event happens. Therefore, most commercial fish stocks are found within a single water mass, and are thus unlikely to cross fronts into a different water mass. Fish habitats are concentrated in areas where warmer and more saline Atlantic water is concentrated.

At the same time, the melting of sea ice due to climate change creates more open water and allows for more phytoplankton growth in the Arctic Ocean, which will have an impact on marine ecosystems. The waters in the sub-polar gyre in the North Atlantic to the south of Iceland have warmed as much as 2°C, while the colder polar waters north of Iceland have warmed very little.

Iceland has been taking part in measuring the inflow volume transport between Greenland and Scotland through many EU projects, the latest being [THOR](#). There are three flow branches in the North Atlantic, and the flow in each of them seems to be very constant. However, the temperature of these flow branches has been increasing.

Professor Jónsson wondered whether this warming was due to climate change or natural climate variability. He mentioned that there was a very abrupt change in water temperatures in the Atlantic waters off of Iceland, which he attributed to natural variability. Prior to 1995, the circulation in the polar gyre around Iceland was strong; after 1995 it weakened. This resulted in warmer and saltier water encroaching northward from the sub-tropical gyre further to the south.

As a consequence of an abrupt change to warmer and saltier waters, there have been considerable changes in the distribution of fish stocks in the North Atlantic, which has implications for the countries that fish in that area. For example, prior to 1995, monkfish stocks were concentrated in the waters south of Iceland; after the change in temperature and salinity of the water, the species spread northward along the west coast of Iceland, even reaching the north coast of Iceland. While this expansion in species distribution had led to some local issues regarding new fishing activities in new areas, these issues have since been resolved.

However for mackerel the story is different: The species has also seen its distribution change due to the abrupt changes in the temperature and salinity of the water. Given that Iceland, the Faroe Islands, Norway and the EU all fish for mackerel in the North Atlantic, the resulting changes in its distribution have caused some conflict. Professor Jónsson said it is up to the politicians to resolve this conflict.

In his conclusion, Professor Jónsson said that he believes fish stocks will expand within a given water mass, with much less migration of fish stocks between water masses. He emphasized that monitoring is essential to document the changes occurring and research is needed to see how climate change might be affecting marine ecosystems. He said the problem of having too little scientific information on the Arctic has significantly improved in recent years, especially after the International Polar Year (IPY) 2007-2008 succeeded in increasing research activities in the region. He advocated that this trend continues.



ALFRED JAKOBSEN

EXECUTIVE DIRECTOR, [ICC GREENLAND OFFICE](#)

MEETING SUSTAINABLE OBJECTIVES IN THE FISHING INDUSTRY

Greenland enjoys a “special relationship” with the EU via two agreements: the [Partnership Agreement](#) and the [Fisheries Partnership Agreement](#), Mr. Jakobsen said. Sharing marine resources with the EU, Iceland, the Faroe Islands and Canada, the government of Greenland has designed a long-term fisheries management strategy.

The Act on Fisheries in Greenland was amended in 2009. Its fundamental principle of administration is based on conservation and stable reproductive capacity of the resources, with the impact of fishing on the ecosystem kept to an acceptable level. The focus is on the rational use of resources, based on sound scientific advice and public needs.

Management plans for a number of species have been developed in the last 3-4 years by a working group established by the Minister of Fisheries in Greenland, which represents the Department of Fisheries, Industry Representatives, and a new association called Sustainable Fisheries in Greenland. This working group has come up with proposals for management plans, including for the cold water prawn, applying Marine Stewardship Council guidelines. A management plan for cod has been adopted, and the Greenland halibut is next in line.

Although the retreating ice creates new fishing opportunities, fishing activities should be based on both scientific and traditional knowledge, Mr. Jakobsen stated. He expressed his hope that, with certain lessons learned from history, illegal, unreported and unregulated (IUU) fishing will not be repeated.

Greenland has several marine protected areas established in Baffin Bay, the area between Nuuk and Maniitsoq, and the Ikka Fjord area. Mr. Jakobsen drew attention to problems with legislation concerning several marine areas. For example, there is no special legislation governing a coastal area of a national park in the northeast of Greenland, although it should be protected. He said the area is now receiving a lot of attention due to its hydrocarbon resource potential.

He pointed out areas of conflicting interests in the Baffin Bay reserve, where seismic surveys are being conducted for hydrocarbon and mineral resources. Some of these surveys are being conducted in a narwhal marine protected area. However as the [Mineral Resources Act](#) is blanket legislation in Greenland, if retrievable resources were to be found in the seabed in a protected area, the Mineral Resources Act would overrule the protection of the zone.

Mr. Jakobsen also mentioned the protection of coral reefs off the coast of Greenland, including the coral reef located off Ikka Fjord, which have been protected from shipping traffic, and which scientists are intensely studying.

He then presented fish quotas for the waters around Greenland for 2012, which are regulated and surveyed by [Greenland's Institute of Natural Resources](#). Based on fisheries agreements with the EU, Greenland is obliged to develop scientific advice on these commercial species.

He briefly touched upon the issue of warming waters off Greenland bringing more southerly species northward, including certain species that have been the source of tensions between several countries that fish for them (he hinted that this species was mackerel).

Mr. Jakobsen concluded by outlining the main objectives for marine resource management in Greenland:

- Sound stewardship of resources
- Keeping the environment clean
- Further developing relations with the EU
- Further developing the scientific base of marine management, combined with traditional knowledge

Mr. Jakobsen expressed his support for implementing the precautionary principle when it comes to managing new fisheries, in the event that new fisheries are developed in the Arctic Ocean as sea ice recedes – don't allow fishing until the area and its reproductive capacities have been studied and are well understood. He advocated international cooperation that would be mutually beneficial for all interests.



DOROTHÉE HERR

MARINE PROGRAMME OFFICER, GLOBAL MARINE AND POLAR PROGRAMME,
INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)

IMPLEMENTING ECOSYSTEM-BASED MANAGEMENT IN THE ARCTIC ENVIRONMENT

In her introduction, Ms. Herr reminded the audience that the IUCN is the world's oldest and largest environmental organization, with 1,200 members in governments and NGOs and over 1,000 volunteer scientists in six commissions worldwide.

Concerned with the effects of rapid changes in the Arctic, including climate change and ocean acidification, in 2010, the IUCN founded a [Pan-Arctic Ecosystem-Based Management \(EbM\)](#) project, which has two components:

- Policy arrangements for implementation
- Identification of ecologically and biologically significant areas in order to formulate recommendations to the Arctic Council

Ms. Herr introduced the concept of ecosystem-based management (EbM) for marine resources, as defined by the IUCN:

“Comprehensive integrated ecosystems-based management of human activities is based on the best available scientific knowledge about the ecosystem and its dynamics. It identifies and takes action on influences which are critical to the long-term health and resilience of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity.”

The Arctic Marine EbM Strategy, which is based on the latest scientific information available, is being developed under the auspices of the Arctic Council. Ms. Herr suggested that it should be implemented on a national level, by both Arctic and non-Arctic states, rather than becoming new international law.

She addressed the perceived barriers for implementing EbM in the Arctic as “largely unfounded” and presented evidence that some elements of the EbM principle have already been “enshrined” in international law and policy, including in the [Commission for the Conservation of Antarctic Marine Living Resources \(CCAMLR\)](#) since 1980, the

UN Fish Stocks Agreement of 1995, the [World Summit on Sustainable Development of 2002](#), and various United Nations resolutions. She also gave examples of some Arctic states that are already implementing the EbM principle in their waters.

She stated EbM is not anti-development, but rather a concept to help manage development and identify possible areas of conflicting interests. The main mechanisms of EbM are multi-sectoral, place-based monitoring and assessment. Ms. Herr stressed that EbM strategies have already been developed by several states on their own does not infringe on their sovereignty.

She outlined how EbM can be implemented in a phased approach:

- Phase One - Initial Steps: Definitions, goals, objectives
- Phase Two - Component parts at the regional level and what is already under way
- Phase Three - Periodic Reviews of scientific research and management

Ms. Herr said she was excited to see the Arctic Council put EbM on its agenda through the Protection of the [Arctic Marine Environment Working Group \(PAME\)](#); the projects of Large Marine Areas, [Best Practices in Oceans-Based Ecosystem Management \(BePOMAR\)](#); and Phase II of Arctic Ocean Review.

The Arctic Council has asked the IUCN to identify sensitive ocean areas, and the IUCN has come up with thirteen Super Ecologically and Biologically Sensitive Areas (Super EBSAs).

One of the projects focuses on in the Bering Strait region (one of the most biologically productive areas in the region) is designed to look at the changes that are likely to take place due to increased shipping and to suggest protection measures from possible negative effects. The IUCN sees four areas for action:

- Communication and outreach, including identifying instruments that could be more effective and engaging with local communities in order to better meet their needs;
- Tools for area protection, such as creating maps on subsistence use of marine resources, developing voluntary measures (as mandatory measures take longer to be developed); on the mandatory regulatory side, options include designating Particularly Sensitive Sea Areas (PSSAs) under the IMO as well as getting the [International Convention for the Prevention of Pollution from ships \(MARPOL\)](#) to address waste and sewage disposal issues and establishing [UNESCO](#) World Heritage sites; each country also develop its own national policies in developing and implementing marine protected areas (MPAs)
- US-Russian bilateral relations. Despite good progress in finding bilateral solutions, there is need for more cooperation. For example, the US and Russia could develop a joint proposal to the IMO for creating a PSSA, which would include risk assessment and voluntary ship traffic code handbook. Scientific cooperation is essential, for example in developing buffer zones in the region.
- Development of an international Polar Code for shipping by the IMO. Ms. Herr regretted, that its development is showing rather slow progress, which she said is why voluntary measures, which can be developed more quickly and easily, could be a good interim solution until the mandatory code is adopted.

In wrapping up, she underlined the importance of engaging indigenous communities when it comes to emergency response, underlining the need to determine how to use

their capacities in setting up an oil spill response organisation, for example, which at the moment, which does not exist in the Bering Strait region at the moment.

DISCUSSION

A lady from the audience asked the panel to give an update on the development of the IMO Polar Code.

Professor Konrad Steffen of the [Swiss Federal Research Institute of Technology](#) said that he had heard about the increase in Greenland halibut stocks from the local people in Ilulissat. He inquired whether the numbers for quota changes in the last 10 years that might be associated with temperature changes.

Caroline Kim from [Politique Internationale](#) wondered why the seismic surveys in the Baffin Bay reserve were authorised if they were overlapping with the protected zone there.

Einar Svendsen of the [Institute of Marine Research in Norway](#) remarked that recently they have seen more cod in Norway than they have in the last 50 years. However, if one goes deeper into the central Arctic, there is so little known about the species up there and how it might change as the region is altered by climate change. He stressed the need for joint circumpolar research and monitoring efforts to go into these areas and conduct monitoring and research activities. He said the Arctic Council needs to bring this to the attention of national politicians to consider such an initiative.

Arne Riedel of the [EcoLogic Institute](#) in Berlin said that the opening up of new areas for fishing could lead to conflict not only between industries such as shipping and fisheries, but also between institutions such as the [North East Atlantic Fisheries Commission \(NEAFC\)](#), other regional fisheries organizations (RFOs), the Oslo and Paris Commission (OSPAR), and the International Convention for the Prevention of Pollution from ships (MARPOL). He asked which of these institutions would play a key role.

Ms. Herr repeated that the progress on the Polar Code is quite slow at this stage, in spite of general support for their initiatives. She echoed the call for increased research in the Arctic and said the Arctic Council can promote these initiatives on a regional basis.

Mr. Jakobsen said there had been many changes in fish stocks in Greenland in the past few decades. In the 1960s and 1970s there was a lot of cod. In the early 1970s they started fishing North-Atlantic salmon in huge numbers. However, the cod disappeared as the water temperature fell in the early 1980s. He recalled when his father fished for Greenland halibut in the 1970s as well, but these also disappeared in the late 1980s. Now the cod is returning to Greenland, and this is likely due to warmer water temperatures. At the same time, over the last two years, more than 100 new species (including new eel and herring species) have been documented in Greenland by the [Institute of Natural Resources](#).

In the case of Baffin Bay, the blanket legislation (Mineral Resources Act) overrules the protection of the area. However, he pointed out that there are efforts to improve the legislation. He said the government of Greenland was presenting an amendment to the Resources Act, so that the responsibility of dealing with any impacts on the environment will be moved from the Bureau of Mineral and Petroleum to a different ministry dealing with the environment.

Mr. Jakobson also highlighted the importance of traditional knowledge, sharing his experience when he was still working at KNAPK (a Greenland hunters and fishers organization) in the 1980s with the [Inuit Circumpolar Council \(ICC\)](#) on developing the an Inuit Regional Conservation Strategy (IRCS). In this project, he travelled along the coast of Greenland with biologists and other researchers to conduct interviews with the local Inuit hunters and fishermen about their local traditional knowledge. He

mentioned a man in a small village in Baffin Bay had noticed that one of the local glaciers had been retreating, before anyone had been paying much attention to the changes in the Greenland Ice Sheet. He also said that the solid ice that was once there in the 1980s is not so solid anymore, and is shrinking, which reduces the amount of time during the year hunters are able to go out on the ice to hunt.

Professor Jónsson agreed with Mr. Svendsen about there being an increase in fish stocks in the North Atlantic. He recognized that many changes in fish stocks are occurring, but pointed to the fact that these changes are happening mainly within the Atlantic water mass. While we know less about the Arctic water masses, this is due to the fact that there are fewer fish there and thus fewer so there has been little interest to study this part of the world. But he agreed that as the sea ice retreats, this will open up new opportunities to monitor what's happening in the Arctic Ocean, and it should be pursued. The question is who will do it, as it costs a lot of money. He also said that the [International Council for the Exploration of the Sea \(ICES\)](#), which all Arctic states are members of, is well-suited to oversee fisheries activities in the area.

Ms. Veits noted that a common theme in all presentations was the need for more research, and suggested that it was a message to politicians to fund research. Referring to the EU's promoting of investment in Arctic research, she mentioned the EU contributes to many research programmes in the Arctic, and encouraged all other coastal states of the Arctic and non-Arctic states with an interest in the region to do the same. She also commented that, despite the Arctic Council being a good international body to oversee marine management, to do it properly requires authorisation to not only supervise activities, but also to make sure that the measures are implemented and controlled. She suggested to everyone to consider mechanisms that could do that.

Vice President of the Intentional Polar Foundation Nighat Amin wondered if the Arctic Council could ever have any mandate to regulate fishing.

Another audience member brought up the problem of ocean acidification, which was not addressed in the discussion. He said ocean acidification will likely affect the Arctic more quickly than other parts of the world's oceans. Norway is setting up a monitoring scheme for ocean acidification, and he encouraged other Arctic countries to set up similar monitoring schemes.

Ms. Herr reassured this person that the IUCN takes ocean acidification seriously and tries to address this problem through the framework of the United Nations Framework Convention on Climate Change. The EU also funds the [European Project on Ocean Acidification \(EPOCA\)](#).

Ms. Viets replied to Ms. Amin's comment that if the Arctic Council does not currently have any mandate to regulate fisheries activities amongst its members. If it wanted to do so, it would need to change its mandate and statutes.

FRIDAY

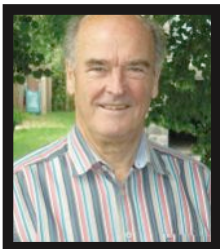
5 OCTOBER 2012

INVESTIGATING SCENARIOS FOR IMPROVING MARITIME SAFETY

MODERATOR:

JOACHIM SCHWARZ

FORMER DIRECTOR OF THE [ICE AND ENVIRONMENT DEPARTMENT](#), HAMBURG SHIP MODEL BASIN



Following a brief introduction of the day's activities given by Alain Hubert, President of the International Polar Foundation, Mr. Schwarz gave an overview of his professional background before giving the floor to the first speaker.

JENS BOYE

FLEET MANAGER, [ROYAL ARCTIC LINE](#)



[OPERATIONS IN THE ARCTIC FROM A SHIP OWNER'S VIEW](#)

Mentioning that he would not focus too much on scientific data, Mr. Boye joked that his goal was to make sure that anyone would be able to navigate the fleet of the Royal Arctic Line by the end of his presentation.

The Royal Arctic Line has 250 years of experience in providing shipping services in Greenland. It operates passenger services, and with a monopoly concession of the Home Rule Government, maritime cargo transport as well.

Greenland is a big island, but most people live along the western coastline. There are no roads, so the only way to transport cargo is either by water or by air.

Comparing it to European ports, Mr. Boye said the port in Nuuk is “a normal port” that operates like any other port. However in areas of small settlements, shipping operations face greater logistical challenges and require a lot of local knowledge. Due to the lack of infrastructure in these areas, ship operators have to unload cargo from the ships themselves, which can be quite costly.

“Ice will always be a challenge in Arctic waters,” Mr. Boye explained. A small change of wind can dramatically alter the ice situation within just a few hours.

There are several types of ice, each of which has its own characteristics and poses a different level of challenge for shipping operations:

- 1 First-year winter ice that is one season old, 70-80 cm thick. It is not problematic; ships can simply break through it. However, as in some parts of Greenland

the locals use sea ice as a means of transportation, the ship must look out for pedestrians on the ice.

- 2 “West ice” is first- and second-year ice coming from the Canadian east coast to the west coast of Greenland. It is quite thick and heavy and also quite difficult to manoeuvre in. It is still possible to break, although it is quite difficult.
- 3 Polar ice, which is multi-year ice, is 7-8 metres thick. For ships, it’s the most feared type of ice, as it can cause a lot of damage. Ships usually operate with a helicopter onboard so they can do aerial surveys to know where the thickest ice is.

Another major challenge for Arctic shipping is the icing that occurs on ships, affecting stability and cargo operation. A layer of ice 20-25 cm thick translates into an extra 2-5 tonnes of extra weight on the ship. When faced with the prospect of severe icing, the crew and vessel must be “winterized” so the equipment can work in temperatures of -35°C. The crew’s knowledge and experience plays a key role under these circumstances.

At the moment, navigation is difficult in the Arctic, as there are a lot of areas that have not been surveyed. Rocks are very dangerous for ships, for example. If a ship runs aground, it can take a lot of time and money to get it back on water. Such accidents happen simply due to lack of local knowledge, Mr. Boye said.

Royal Arctic Line believes that neither the Northwest Passage nor the Northern Sea Route will be the main transcontinental shipping routes over the long term. When sea ice extent diminishes to the point that it becomes possible to cross the Arctic in a ship via the North Pole, many navigators may choose this route, as there is much lower risk of certain obstacles such as shallow waters or strong currents, which can pose problems to large vessels.

The Arctic is also witnessing growth in cruising activity. Fourteen cruise vessels can transport more than 10,000 people per day. So far there has not been a serious shipping accident. But even if a small liner with two hundred people onboard were to have an accident, the offshore rescue capacity in Greenland is insufficient to cover both coasts of the island. Onshore capacity is also insufficient, as small hospitals with only twenty beds tend to be the norm.

Most of the west coast of Greenland is covered by licenses for test drillings. Mr. Boye is convinced that the shipping industry will play a role as these regions develop economically. In light of this, Mr. Boye stressed the urgency of coming up with the Polar Code, and “the sooner, the better.” He criticised the rush of the tourist industry into newly opened waters when not all operators know what they are doing. He explained the importance of having a good relationship with insurance companies, having local knowledge (including knowing the local hydrography) and respecting environmental concerns.

When asked by Mr. Schwarz about the frequency of damage to ships, he said that the damage rate was one or two cases of minor ice damage per year. Severe damage happens once every four to five years, which Mr. Boye described as “acceptable.”



HELGE TANGEN

REGIONAL DIRECTOR, [NORWEGIAN METEOROLOGICAL INSTITUTE](#)

EARTH OBSERVATION AND SAFETY IN THE ARCTIC

Mr. Tangen argued that Earth observation plays a key role in guaranteeing maritime safety. With the melting of the ice in the Arctic, the need for observation will increase as new uncharted areas open up.

The last thirty years have seen great steps forward in technology used for weather forecasting. Nowadays the resolution is higher and more detailed, and data can be communicated farther north.

Part of the Norwegian Meteorological Institute's area of responsibility includes the North Atlantic, Svalbard, and Jan Mayen Island.

One of the most modern tools is the use of multilayer screens that include surface pressure and surface wind information. Meteorologists add satellite data to subjective drawings done by meteorologists to create them.

Even with new satellites monitoring all parts of the planet, traditional means of observation, such as meteorological stations and weather balloons, are still important, Mr. Tangen emphasized.

The [World Meteorological Organization \(WMO\)](#) has concluded an agreement in which all open water areas on the globe will be covered by forecasts. No one had undertaken this task in the Arctic until now. Norway, Canada, and Russia have agreed to take on the task of covering all northern ocean areas. The permanent ice cover makes it impossible to do water surface forecasts for the North Pole; therefore, it is only possible to name the sites comprising the respective area of responsibility, and to update the ice edge (where sea ice ends and open water begins) in the forecast. The Norwegian sites have already been named, and the ice edge forecast is updated twice a day.

One special characteristic of the Arctic is its cold air masses, which produce showers when they move off Greenland over the relatively warm sea. But sometimes meteorologists encounter a polar low – a short-lived and deeply unstable air mass with homogenous surface inflow and a strong supply of energy coming in. Until thirty years ago, not much was known about them; now there is a lot of research going on and numerical models being produced for forecasting polar lows.

Satellite images produce maps to determine where polar lows are generated. Between 1999 and 2010, 100 polar lows were recorded. In 2010, a polar low formed north of Svalbard – the first time one had appeared so far north. Mr. Tangen said this was linked to the sea ice disappearing, as a polar low needs sufficiently large areas of open water to form.

Mr. Tangen highlighted the fact that satellites are the only means to monitor large areas. Traditionally, optical instruments have been used. However several years ago Synthetic Aperture Radar (SAR) began to be used on satellites, including RADARSAT 1, RADARSAT 2 and the now defunct ENVISAT. This made it possible to make certain observations when there was no sunlight, as well as through cloud cover.

While ice services started to use radar satellite data some fifteen years ago, it is still necessary to do some hands-on work to deliver the final product for end users. Scientists must look at satellite pictures, and from this, draw the map. Dual polarization technology allows one to put colours and images together to create a nice product for the end user.

Transferring the information to ships still poses a challenge, however. Access to ice charts varies from country to country. The European Union has supported several projects aimed at improving ice services in the past decade, one of the latest being the pilot [ICEMAR](#) project, which is focused on bringing ice charts to ships in electronic form.

The Tromsø Regional Ice Prediction System (TRIPS) is a modelling project in the Barents Sea with a 2 km resolution grid, which can be used for navigation. Another new kind of observation is the Automatic Identification System (AISat-1), which can help maritime authorities recognize and locate vessels, helping improve the transparency of maritime activities in the Arctic.



DUANE SMITH

PRESIDENT AND VICE-CHAIR, [ICC CANADA](#)

AN INUIT PERSPECTIVE ON ARCTIC SHIPPING: BENEFITS AND DRAWBACKS

Commenting on the lack of very much social component to the discussion, Mr. Smith said that that he came in peace, despite the many differences between the European Union and the Inuit Circumpolar Council (ICC).

The changing Arctic brings about an increase in shipping, which will in turn have an impact on Inuit living in coastal communities. He said he will look at both the drawbacks and benefits to increased Arctic shipping for these communities.

For those unfamiliar with the ICC, Mr. Smith gave a brief description and history of the organization, which advocates for the rights of some 160,000 Inuit living in Greenland, Canada, Alaska, and Chukotka (Russia) via its four regional offices. Founded when the Inuit community living on the North Slope of Alaska came together in 1977 to discuss how exploitation of oil and gas in the region would affect their daily life, the ICC aims to insert the collective voice of the Inuit people into Arctic policymaking. The organization has a consultative status with the [United Nations Economic and Social Council](#), and is a Permanent Participant in the Arctic Council.

The Arctic coastline plays an exceptional part in the life of the Inuit people. The ocean has been their past and has defined them, Mr. Smith said. But they hope it will also be their future.

“To understand shipping in the Arctic, you must understand who we are... and in order to understand us, you must understand the Arctic coast, and how it plays such a central role in who we are,” Mr. Smith said, referring to the coast a “fountain of traditional knowledge.” He pointed out that 95% of Canadian Inuit communities reside along the coast, and their lifestyle relies on the entire marine ecosystem, including the ocean, the ice, the rivers that flow into the sea, and the coast itself.

The sea ice is a “highway” for the Inuit. As it melts, the possibility to use it for transportation is being reduced. The Inuit view is that shipping should be done on the peripheral ice, as the ice needs to be maintained and shipping can damage the sea ice by breaking it up. Although some shipping companies want to expand and provide more services to the Inuit living in Northern communities, they do not yet have the expertise, as many areas remain uncharted.

The shorelines are also eroding due to climate change and receding ice, which no longer protects the coast from erosion. Coastal erosion affects communities near the coast, as facilities have to be moved further inland to avoid floods and sea storms.

The Arctic Council's Arctic Marine Shipping Assessment (AMSA) report concluded that the human dimension was extensive. However, Mr. Smith argued, very few studies have actually been done on how shipping affects the communities. He referred to the AMSA study as "neither comprehensive, nor exhaustive" in this regard.

An important issue for Inuit communities is beluga migration between the Bering and Chukchi Seas and the effects increased shipping may have on it. More shipping also means an increased risk of oil spills. In this regard, the ICC has contributed to Arctic Council Task Force discussions. However the Inuit are alarmed that the plans focus only on what to do after a spill. The ICC has asked for a compensation fund, similar to the one that Greenland asked for, which would provide relief to communities affected.

The ICC view on the increasing amount of industrial activity in their homeland is outlined in the [Circumpolar Inuit Declaration on Resource Development Principles](#).

Mr. Smith wondered if the benefits from increased shipping would really turn out to be benefits. More frequent shipments of foodstuffs could provide greater food security on one hand, as food imported from further south would be more readily available. However on the other hand, it could also lead to greater food insecurity, as increased shipping could affect the calving areas of many of the marine mammals such as seals, whales, narwhals, etc. the Inuit have hunted for subsistence for several millennia. Yet if the development is moderate and sustainable, it can make a good contribution to Inuit communities, as it could lead to better education and employment opportunities.

Mr. Smith concluded by saying that the ICC feels that potential impacts have not been adequately assessed. While there may be some benefits to increased shipping activity, the ICC believes they should be properly integrated at a mutually beneficial and sustainable pace.



GEORG LARUSSON

DIRECTOR GENERAL, ICELANDIC COAST GUARD

THE ICELANDIC COAST GUARD AND SEARCH AND RESCUE IN AND AROUND ICELAND: A ROOTED SERVICE IN A DYNAMIC AMBIANCE

Located far from the neighbouring countries, Iceland must be self-sufficient in search and rescue (SAR) capabilities, Mr. Larusson explained.

SAR in Iceland is administrated by the [Icelandic Ministry of Interior](#) and the [Ministry for Foreign Affairs](#), which manage cooperation with international partners.

The Icelandic Coast Guard is responsible for SAR on water, while the Icelandic police are responsible for SAR on land. The [Icelandic Association of Search and Rescue \(ICE-SAR\)](#) is frequently called upon by the Coast Guard to take care of near-shore accidents.

The tasks of the Coast Guard include:

- Safety and security, surveillance and law enforcement on sea
- Search and rescue
- Emergency medical transport
- Explosive Ordinance Disposal "EOD"
- Hydrographic surveying and nautical charting

- Assistance to law enforcement on land
- Civil protection
- Radar surveillance/operation of Keflavik security zone

The National Rescue Centre in Reykjavik includes:

- The coast guard operation centre
- National Commissioner of Police Communication Centre
- 112 Emergency Telephone Hotline Centre
- National Crisis Centre/Incident Command Post

The National Rescue Centre also monitors shipping activity.

The Coast Guard cooperates with the Directorate for Fisheries on the Fishery Control Centre, and with the Directorate for Migration on the Maritime Border Control Centre. The Coast Guard is in charge of some 1.9 million km² of marine areas with intense traffic, which is twenty times the size of Iceland. All maritime borders have been internationally established through agreements with Greenland, Norway, and the United Kingdom.

The main assets of the Icelandic Coast Guard include offshore patrol vessels, coastal patrol vessels, long range helicopters and maritime patrol aircraft. SAR operates as a network in Iceland. Fifteen lifeboats are strategically stationed at different points around the coast.

It is important to be able to put together as complete a picture as possible of the situation in the region at any given time. Therefore the Coast Guard consults several monitoring systems:

- The Icelandic Vessel Monitoring System
- Icelandic Automatic Identification System
- IMO's Long-Range Identification and Tracking of Ships (LRIT) System
- GREENPOS – Greenland Vessel Monitoring System

The Coast Guard uses coastal maritime radar, which is located in the south of the country.

With the strategic location of Iceland on the edge of the Arctic, it is important that deep sea ports and associated facilities be available at the northwest, north and east coasts of Iceland. They are all near designated international airports, making it possible to refuel and replace certain SAR assets participating in High North operations. Many facilities are located at a former NATO naval air station in Keflavik, which is now operated by the Coast Guard and contains fuel depots, runways, warehouses and lodging.

SAR is not new, Mr. Larusson said. It is based on the obligations within the IMO and the [International Civil Aviation Organization \(ICAO\)](#). Formal agreements, including SAR agreements, have been signed with neighbouring countries, as well as the multilateral SAR Agreement in the Arctic Council, for which the Icelandic Coast Guard is the contact point on behalf of Iceland.

This agreement has eliminated grey areas and established new boundaries. It has also facilitated transit operations and training exercises.

The Coast Guard participated in the SAR exercise in Canada in 2011, as well as in [Search and Rescue Exercise \(SAREX\)](#) in the Greenland Sea in 2012, when five out of the eight Arctic countries sent teams to participate, and the remaining three countries sent observers. The exercise consisted of searching for a missing passenger ship as well as rescuing crew and passengers from a grounded and damaged ship.

In conclusion, Mr. Larusson said that the Arctic is bringing new challenges, and the Icelandic Coast Guard is improving its operations and reinforcing its capabilities. In light of this, he highlighted the importance of international cooperation based on trust and reliability.

DISCUSSION

Caroline Kim of [Politique Internationale](#) asked when the next SAR exercise is scheduled.

Finnish Ambassador to the Arctic Council Hannu Halinen replied that it will most likely be scheduled at the next Chief of Staff meeting of the Arctic states. He expressed his hope that it will happen sooner rather than later.

Dr. Olav Orheim from [UNEP/GRID-Arendal](#) brought up what he saw as a contradiction in a remark Duane Smith made in his presentation: Mr. Smith expressed concern over ships posing a threat to the coastal marine environment and contributing to the break-up of sea ice, yet it seemed as if Mr. Smith was in favour of ships passing through the Northwest Passage, close to the coastal communities. Duane Smith replied that he meant ships should go around the edge of sea ice, so as to avoid breaking it up. Dr. Orheim then made a point that climate change was breaking up the ice, not ships. Ships would not venture through the thick multi-year ice, but would rather travel through the ice-free waters.

Nighat Amin, Vice-President of the International Polar Foundation, asked Mr. Larusson if the Icelandic Coast Guard would be able to respond to an accident involving 2,000 people with the 15 vessels they have.

Mr. Larusson agreed that their capabilities would not be enough for such an accident. He suggested that only a cruise vessel would have the capacity to rescue another cruise vessel, and Mr. Boye agreed with him. In this respect, Ambassador Halinen emphasized the urgency of adopting the IMO Polar Code. He said that a ship should never travel alone; there should always be two ships travelling in close proximity to each other due to the lack of SAR capacity.

There was a question regarding a recommendation to limit the size of cruise ships operating in the Arctic, similar to regulations for ships operating in the Antarctic. Mr. Boye responded that vessel size limitations have not been considered.

President of the International Polar Foundation, Alain Hubert, wondered if the Arctic Council could do anything to push for the ratification of the Polar Code.

Bernard Funston, Chair of the Canadian Polar Commission, replied that it was within the IMO's competence to handle this. Mr. Boye added that Arctic waters are covered under the Arctic states' individual jurisdictions, and each country is doing the best it can to push for adoption of the Polar Code. Some states have developed their own regulatory legislation in the meantime.

Mr. Schwarz commented that the ratification of the Polar Code could be faster, and suggested setting a deadline for ratification.

The discussion then turned to how economically viable it was to explore new shipping routes in the Arctic. Mr. Boye said that the shipping industry was very interested in exploring new routes. But as some huge vessels cannot navigate the Northwest Passage or the Northern Sea Route very easily due to shallow waters and difficulty in manoeuvring in certain areas, shipping companies are waiting for a route across the North Pole to open up. He added that the problem of pirates hijacking ships off the coast of Somalia also prompts ship owners to look for alternate routes to the Suez Canal. Mr. Schwarz argued that it is very economical to use the Northern Sea Route. Ms. Amin commented that the time window to use the northern routes was too short, and extra costs would emerge, as icebreakers would be needed.

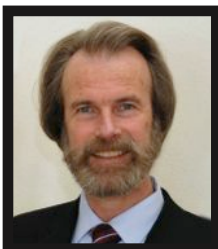
Mr. Schwarz concluded the session by stating that the ice forecasts can and should be improved to improve safety for mariners in the Arctic.

THE IMPORTANCE OF LONG-TERM SCIENTIFIC MONITORING IN THE ARCTIC

MODERATOR:

KONRAD STEFFEN

DIRECTOR, SWISS FEDERAL INSTITUTE FOR FOREST, SNOW AND LANDSCAPE RESEARCH



CONTRIBUTORS:

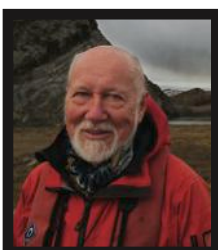
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OLAV ORHEIM

CHAIRMAN OF THE POLAR GROUP, UNEP/GRID-ARENDAL



As he began his session, Professor Steffen noted that most of the policymakers were absent.



BERNARD W. FUNSTON

CHAIR, [CANADIAN POLAR COMMISSION](#)

ARCTIC MONITORING NETWORKS: SOME OBSERVATIONS

Mr. Funston stated that he regards the words “monitoring” and “observation” as synonymous. For the challenges facing scientific monitoring in the Arctic, he used the definition used in the March 2006 [“Toward an Integrated Arctic Observing Network”](#) report by the US National Academies of Science.

“Rapid changes in the Arctic region - due to climate change, pollution, and other factors - are having social and environmental impacts both regionally and globally. To understand and respond to these changes, it is essential that observational records be relatively complete. However, the current observing network and long-term records are patchy and inadequate. A new Arctic observing network should be developed that delivers complete pan-Arctic observations.”

Mr. Funston said that understanding the causes and consequences of the changes can be difficult due to their dependence on external factors.

He said that Arctic monitoring networks should form an overarching framework for managing, storing, accessing, and disseminating data. Maintenance and international cooperation matters are also important, as infrastructure and technology are challenged by a range of geographic and climatic factors. He also highlighted the importance of traditional indigenous observations in conjunction with observational infrastructure.

The [Sustaining Arctic Observing Networks \(SAON\)](#) initiative has captured a lot of attention since the International Polar Year. Mr. Funston referred to it as “the network of networks.” It is not intended to carry observations itself, but rather coordinate and integrate other networks. The project has already prepared an inventory of existing national observing networks.

As a concerned and organized effort to study the region, the International Polar Year (IPY) launched several helpful monitoring initiatives. The main issue now is how to maintain the momentum to continue these monitoring programmes. This will depend on investment in scientific monitoring.

Despite the fact that “From Knowledge to Action” was one of the main messages to come out of the IPY, scientific monitoring does not always translate into specific application, Mr. Funston lamented. The main problem, he argued, is the “crossover issue between the scientific gathering of data and information, and its application in the political economy of the countries that fund it.” Changes in the Arctic are happening rapidly and will continue, and these changes concern local, regional, and global actors. Observational records can guide decision-makers in responding to these changes. However sometimes it is difficult for them to take action, and decision-makers often make decisions “in spite of what they know” from the data collected.

Science provides knowledge. But policymaking requires making decisions and balancing interests, which does not necessarily rely purely on knowledge. This is where the misalignment in the science-policy interface occurs.

He gave an example of a scientist who was at the end of his fourth ten-year cycle of monitoring snowshoe hares in the Yukon Territory when the politicians cut funding for his research project. Mr. Funston recognized that it’s difficult for politicians to plan funding for research projects if they only see the results 50 years later. Therefore the challenge is to align the long-term monitoring issues with the short-term political cycles.

Perceptions are another factor that affects the context of monitoring. Depending on who the monitoring is done for and the ultimate objective, it can be either science-driven or user-driven. How it is done depends on the perspective of the place the research is done and the people involved: It can be perceived as a homeland, a frontier, a region full of commercial opportunities, a laboratory, or a wilderness.

Recognizing the lack of knowledge about the Arctic, Mr. Funston concluded by pointing out the need to harmonize monitoring activities despite widely varying perceptions and a certain gap in the science-policy relationship.



WALT MEIER

RESEARCH SCIENTIST, [NATIONAL SNOW AND ICE DATA CENTER](#), UNIVERSITY OF COLORADO, BOULDER

ARCTIC SEA ICE IN SUMMER 2012: AN EXCLAMATION POINT ON A LONG-TERM DECLINING TREND

Dr. Meier reminded the audience that long-term satellite monitoring of the Arctic has been going on since 1979.

He then elaborated on the well-known maps showing the dramatic sea ice loss in the Arctic during the summer melt season of 2012. Sea ice extent reached an all-time record minimum of 3.41 km² on 16 September 2012. Ice melt had already surpassed the previous record low extent (18 September 2007) on 26 August 2012. While in 2007 there was a still much ice in the Northern Sea Route well into the summer melt season, in 2012 the passage was ice-free for most of the summer melt season. This is in spite of the fact that sea ice extent had been at almost an average extent in mid-April 2012. However dramatic ice melt occurred over the summer, and a strong storm in August seems to have contributed to some extent to the ice loss, although how much of an affect the storm had was yet to be determined.

Despite the dramatic sea ice loss, Dr. Meier pointed out that there have never been two record low years in a row, implying that the minimum summer 2013 sea ice extent is unlikely to be below the minimum summer 2012 sea ice extent.

In total, 1979-2012 saw a 51% decrease in the annual minimum extent of sea ice, accelerating dramatically over the past few years in particular. The monthly data shows an average 13% decline in ice coverage per decade, while the trend of ice loss per decade has doubled since 2001.

Dr. Meier emphasized that while average sea ice extent has declined by 50% since 1979, its volume has decreased by 75%. As a rule, the older the ice is, the thicker it is. With a lot of the older multiyear ice having melted, it has been replaced by thinner first-year ice when the ice re-grows during the winter following a dramatic summer melt. Submarines and satellites are used to measure the trends in changing sea ice extent and volume.

Dr. Meier presented an animation that highlights how much older multiyear ice has been lost. The period March-September 2012 saw a stretch of older multiyear ice disappear from the northern coast of Alaska. The ice cover also dropped dramatically during the August storm that hit the Arctic, with sea ice loss rates of up to 200,000 km² per day. Normally such large Arctic storms hit the ice and lose the power; however due to the thinner and less consolidated nature of the sea ice, the cyclone had a larger impact than expected.

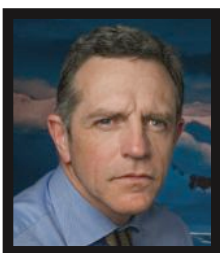
Dr. Meier explained how the future of sea ice cover can be predicted through modelling. While models have done a good job of recreating historic sea ice conditions, he mentioned that the [IPCC models from the 4th Assessment Report](#) released in 2007 predicted a slower decline of the sea ice cover than the sea ice decline that has been observed since the report came out. With an “ice-free” Arctic defined as any sea ice extent below 1 million km², the models being used in the IPCC’s 5th Assessment report, set to be released in 2014, predict the first ice-free summer in the Arctic will take place sometime around 2030.

There is still a lot of uncertainty, however, as natural variability plays a role and must be taken into account; it could play a substantial role in what we see beyond a long-term declining trend, Dr. Meier noted. While the models show rapid ice loss over a period of few years, they also show potential periods of stasis. This creates a lot of uncertainty about modelling on seasonal, decadal and regional scales.

He also drew attention to the problem of Arctic amplification, which involves certain feedback mechanisms like the albedo affect (white sea ice has a higher albedo and thus reflects more solar radiation back into space than dark open water, as sea ice disappears, it creates a positive feedback loop that leads to more warming and thus more ice loss), and what happens to the extra heat the open ocean has been absorbing. In the autumn, this extra heat is released into the atmosphere, which leads to additional warming in the region, creating a positive feedback loop that leads to further ice loss and further warming.

Dr. Meier then mentioned that a warmer Arctic leads to a weakening of the jet stream (a high-speed current of air 10 km up in the stratosphere that governs a lot of the weather patterns over the Northern Hemisphere) as well as increased meridional flow. This contributes to a higher likelihood of extreme weather events, such as heat waves, droughts and flooding.

In conclusion, Dr. Meier stated that while there is still uncertainty about future projections, one thing is certain: the ice is changing faster than expected, and this is already having impacts, both in the Arctic and beyond.



DAVID VAUGHAN

GLACIOLOGIST, BRITISH ANTARCTIC SURVEY; LEAD COORDINATOR, [ICE2SEA PROJECT](#)

THE FUTURE OF ICE SHEETS AND SEA LEVEL RISE

Professor Vaughan explained that his goal was to help understand why the research being done on the Polar Regions is of global importance.

The rising sea level is a “one-way street” he said - once it has started to rise, it will continue to do so. The geological record says it is actually harder for sea level to drop (from an increase in glacier and ice sheet formation) than it is for it to rise. Professor Vaughan showed a graph illustrating recent observed global sea-level rise. The graph highlights an increase in annual average rate of global sea level rise since 1880. At the moment, the rate of global sea level rise is about 3 mm per year.

There are many sources of sea level rise, he explained. “Currently, sea-level rise is the result of several different climate-driven processes: thermal expansion of the oceans (~1 mm per year), melting of mountain glaciers around the world (~1 mm per year), and retreat of the world’s polar ice-sheets (0.7 mm per year).” www.ice2sea.eu All these factors must be taken into account. Some are relatively easy to look at – for example, thermal expansion of the oceans and perhaps glaciers.

The IPCC's 4th Assessment Report released in 2007 highlighted the major uncertainties in sea level rise projections were due to a lack of adequate understanding of the dynamics of ice sheets and how they respond to warming – how ice flow and glaciers can be altered by climate change in the future. Professor Vaughan considered the 4th Assessment report's projections of ice sheet retreat to be quite conservative, as it did not include all of the factors that could contribute to ice loss (eg. future rapid dynamical changes in ice flow), and it did not include all the potential feedbacks from the Arctic and the Antarctic.

There is a lot of uncertainty about how much and how fast the sea level will rise. While the range of uncertainty may not seem like much to some, Professor Vaughan pointed out that if one looks at the potential impacts, it is evident why the uncertainty needs to be resolved. Sea level rise could have significant consequences for coastal areas in Europe, especially low-lying urban areas.

Professor Vaughan mentioned that London has responded to changes in sea level and past flood events: the higher the water, the higher they built the city's flood defences. The Thames Barrier is a key protection measure against flooding.

Current projections are not sufficient to characterize the risks, Professor Vaughan explained. He stressed that the level of uncertainty needs to drop in order to have more accurate projections over the next 50 years.

Professor Vaughan displayed a graph showing that both the Antarctic and Greenland Ice Sheets were losing mass. The international scientific community has made a lot of progress in better understanding what is happening to each of these ice sheets since then. Scientists are able to monitor ice loss from individual outlet glaciers on the ice sheets using satellite data.

The FP7-funded Ice2sea project was developed to respond to the uncertainties in ice sheet mass loss mentioned in the IPCC's 4th Assessment Report. Ice2sea is a collaboration between several countries and research institutions. The objective of Ice2sea was to build, for the first time, an "end-to-end projection", which would begin with a emissions scenario, work through the global climate, and then make regional climate projections.

A particular area of research interest is iceberg calving from outlet glaciers in Greenland, and how calving rates are being affected by warming oceans as they come in contact with the outlet glaciers. According to the assessments of current ice loss satellite measurements, meltwater from the Greenland Ice Sheet is the biggest single contributor to sea level rise from land ice. The ice sheet loses 250 Gt of mass per year, which translates into 0.7 mm of global sea level rise. In the Antarctic, the focus is on how the heat is being delivered to the ice sheets by ocean.

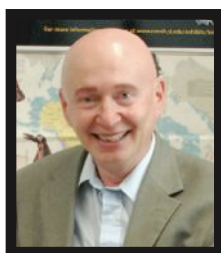
Professor Vaughan presented the work of Ice2sea:

- Monitoring Hansbreen Glacier in Svalbard from the Polish Polar Station in Hornsund;
- In Greenland, scientists have placed instruments that can report how the basal hydrology beneath the ice sheet is changing throughout the year;
- In the Antarctic, Ice2sea has established that ice loss is driven primarily by warmer ocean waters coming into contact with ice shelves and outlet glaciers. Better projections on ocean temperature rise are necessary. They are more important than projections of atmospheric temperature rise, as the warmer atmosphere plays a comparatively lesser role in contributing to ice loss from the ice sheets;

- The new generation of ice sheet models can describe individual glaciers and the way they flow. Ice2sea is now starting to devise models that can project the way those glaciers will flow. Different glaciers behave differently.
- Regionalizing the global distribution of projected sea-level rise. For example, compared to the rest of the planet, Europe is seeing average levels of sea-level rise.

Professor Vaughan highlighted satellite monitoring as the most important means of monitoring in the Polar Regions. He also called for more monitoring of oceanographic environments.

Ice2sea is currently synthesizing all of the projections of land ice loss. In total, about fifteen papers have been submitted under the project, and Ice2sea will present them early in 2013. Ice2sea will also focus on near-polar glacier systems, such as those found in Patagonia, Alaska, Greenland, Iceland, the Canadian archipelago, and Svalbard, as they will have a unique position in the next round of sea-level rise. The changes there are very difficult to predict because those regions are affected by both atmospheric and ocean change. Climate change is very rapid there, and the amount of ice is poorly mapped. A workshop planned in 2013 will kick-start new methods of projections.



IGOR KRUPNIK

ANTHROPOLOGIST AND CURATOR OF ARCTIC AND NORTHERN ETHNOLOGY COLLECTIONS, [ARCTIC CENTER](#), [SMITHSONIAN INSTITUTION](#)

WHY DO WE NEED INDIGENOUS MONITORING OF ARCTIC CHANGE?

Indigenous monitoring is the oldest way of tracing environmental changes, Dr. Krupnik stated in opening his presentation. Community-based monitoring has been going on for more than a thousand years, whereas scientific monitoring has been going on for much less time.

Dr. Krupnik mentioned one of the very first books on indigenous observations of climate change published in 1997: *Voices from the Bay* (McDonald et al. 1997). The book was based on the 1992-1994 study “Traditional Ecological Knowledge and Management Systems.”

Indigenous monitoring came into the spotlight during the International Polar Year, which launched many projects involving indigenous participation.

Dr. Krupnik presented the five types of monitoring strategies, depending upon the participation of local people:

- 1 Pure science-driven projects done by professional scientists (ship cruises, biotope plot studies, satellite data collection, etc.);
- 2 Monitoring schemes undertaken by outside researchers, employing some local data collectors;
- 3 Collaborative projects when all parties are engaged in the planning and data collection, but the analysis is undertaken by external scientists.
- 4 Local people are in charge of the planning, collection, and interpretation of data; scientists provide external expertise, equipment, and resources;

- 5 Monitoring procedures planned, executed, and analyzed exclusively by the locals, with no direct involvement of external partners, except perhaps as advocates.

Most of the IPY projects fell under categories 3 and 4, including the [Sea Ice Knowledge and Understanding \(SIKU\)](#) project, which Dr. Krupnik was involved with.

Researchers group the data, insights, and interpretations generated by indigenous monitoring into three categories: observing change, understanding change, and responding to change. Indigenous monitors are using several dozen indicators, which include much more than scientists usually use. This can produce remarkable resolution for certain aspects.

Indigenous people documented the first dramatic change in ice in the late 1990s. They said it had been going on for some time. They knew by mid-1990s that the system was in transition, but the international community did not listen to them at that time. Even ten years ago, most scientists were not sure if the changes were sustainable; however the locals already knew this from their own observations, Dr. Krupnik said.

The local people of St. Lawrence Island, Alaska reported about twelve years ago that they had seen dramatic changes in how the sea ice formed. They observed the sea ice during what they refer to as “locally born winter” – that is, winter conditions shaped by the locally-formed ice. To the local people, the winters have stopped being cold enough, particularly in February, when the ice is the most useful for their traditional hunting lifestyle. In addition to a warming Arctic, an increase in winter storms also prevents the formation of new ice.

Recent winters now only produce thin and dangerous sea ice. In contrast to the ship navigators, for whom this development is beneficial, this sea ice is no good for the local people. Preserving the sea ice is necessary for the survival of the habitat of both the people and animals, Dr. Krupnik pointed out.

He called for support of indigenous monitoring, which can last as long as the local people can go on the ice. Many projects began during the International Polar Year; however at the moment there are only five to seven years of records in just a few places – an “extremely thin” record, according to Dr. Krupnik. There are huge areas of the Arctic where indigenous monitoring has not been recorded, in spite of the fact that people are doing it and have been doing it for ages.

The International Polar Year was extremely beneficial as it required scientists to work with indigenous populations, and also required data to be put into a format that could be shared with the indigenous monitors. Arctic monitoring is now a “joint venture” Dr. Krupnik said. Indigenous people do not contribute, but co-produce. Attention and respect are key to an equal partnership between the two different kinds of data: scientific and indigenous.

The uniqueness of indigenous monitoring is that the people perform, on a daily basis and all year round, what scientists do over a limited period of time. They monitor the weather according to their own indicators in their daily activities, persistently, generation after generation. Dr. Krupnik claimed that the daily monitoring a small northern community does can easily beat a good university by the number of experienced people monitoring weather and wildlife every day, year after year.

Dr. Krupnik concluded that the pace of change urges progress in partnership. “We’re all in this together, and all contributions matter,” he said.



TERRY CALLAGHAN

(DISTINGUISHED RESEARCH PROFESSOR, ROYAL SWEDISH ACADEMY OF SCIENCES; COORDINATOR, [INTERACT CONSORTIUM](#))

LONG-TERM ENVIRONMENTAL MONITORING, EXPERIMENTAL MANIPULATIONS AND MODELING AS AN INTEGRATED TOOL TO UNDERSTAND IMPACTS OF ARCTIC CLIMATE CHANGE: THE INTERACT EXPERIENCE

Professor Callaghan promised to deliver a different view of the Arctic, one that includes natural variability. In contrast to geographical representation of the Arctic, another way to look at the region would be through the environmental envelope perspective, which consists of axes of varying mean annual temperatures, precipitation, vegetation types, and permafrost and glacier thresholds.

Funded by the European Union, the INTERACT Consortium, which Professor Callaghan leads, operates 45 research stations throughout all Arctic countries. The consortium is made up of 33 partners in 19 countries, and is underwritten by several international organizations. INTERACT does not have any scientific objectives as a consortium; rather its goal is to function as an infrastructure. The activities of INTERACT have several dimensions: transnational access, a station managers' forum, joint research activities, outreach, and international networking.

On the global level, if put together, all research conducted in the Arctic is aimed at putting pressure on the rest of the world to reduce their greenhouse gas emissions. On the local level, research is aimed at helping the local people adapt to the changes that are happening in the Arctic.

Monitoring alone is not sufficient, Professor Callaghan said, and neither is simply detecting change. It is necessary to understand it, which can be achieved through manipulating the environment through experiments and modelling.

A three-step approach is essential:

- 1 Monitoring (identifying changes, validating models),
- 2 Manipulation (understanding the causes of change)
- 3 Modelling (integrating disciplines, predicting future changes).

Professor Callaghan showed the importance of looking both at the global and local pictures of change in the Arctic. He gave an example of the "greening of the Arctic." Satellites can measure a proxy of plant productivity throughout the Arctic. If we look in detail, only 35% of the Arctic has greened in the last 30 years. There has also been a bit of browning (3%). And the rest - 62% of the Arctic - has not changed in terms of its vegetation. If we look at the big picture, one can correlate the greening of the region with global warming. However, it would be wrong not to take into account the 33% decline in reindeer population, which has likely had an effect on Arctic vegetation as well, as they consume the vegetation.

He also addressed what he said was a question not asked before during a previous discussion concerning what happened during the previous warming period in mid-20th century (1930s and 1940s). Satellite technology and data is only recent, so the warming period was not closely monitored at the time as it could be now. But we know now that the current warming period is definitely warmer than the climatic maximum seen during the mid- 20th Century. If we look at the last 30 years of sea ice decline, all of the elements (snow depth, sea ice formation, sea ice break-up and ice duration) are changing at an accelerating rate.

There are many ways to get insight from old data as well. INTERACT's project "Back to the Future" has allowed participants from some old research projects to go back to their former research sites with young researchers in order to see what has changed since. This makes it possible to pass knowledge from one generation of scientists to the next. The project has found very different results depending on the location: for example, while there were dramatic changes in vegetation distribution in the region of Abisko in Swedish Lapland between 1977 and 2010, there were almost no changes in vegetation distribution in Svalbard between 1936 and 2008.

Professor Callaghan recognized the involvement of indigenous peoples in helping to better understand the processes associated with climate change. For instance, the Sámi people can read weather conditions by digging into the snow to see the ice layers created by the consecutive melting and freezing cycles of the snow. The warmer it gets, the more ice there is in the snow. This is something they take great care in monitoring as it has a direct impact on the ability of the reindeer they traditionally herd to feed on the moss and lichens underneath the snow and ice. He also recognized that scientists rely on indigenous monitoring during the winter, when scientists generally do not conduct field research.

Adaptive monitoring also needs to be taken into account. When you have a region of permafrost with little vegetation turning into a forest in only ten years, and changes even in vegetation growth forms, such changes need to be monitored as well.

Professor Callaghan also mentioned the usefulness of opportunistic monitoring, or getting data from unexpected sources, such as ongoing environmental manipulation experiments.

Tree lines (where the boreal forest ends and the tundra begins) can advance, recede or stay the same within a zone of a few hundred kilometres. Vegetation modelling at 50 metre resolution can produce results that would help the Sámi people adapt to the changes taking place. Environmental manipulation experiments are necessary to understand the change.

Integrated monitoring is also important. Pioneered by the Zackenberg research station in Greenland, the goal is to carry out an integrated programme of climate-based, geo-based, marine-based, bio-based, and glacio-based programmes.

Climate extremes have also been increasing as well, and they have been becoming more frequent. Record rain events are more common, as are avalanches and insect infestations. Tundra fires are quite rare now, but they are likely to become more common in the future.

Professor Callaghan concluded that in the one and a half years of its existence, INTERACT has shown good progress, having grown from 33 research stations to 45. He said that the change that has been monitored is bewildering, and that the changes need to continue to be monitored to be better understood. He invited the audience to follow the consortium's activities at www.eu-interact.org.

DISCUSSION

Dr. Orheim applauded the "fine updates" from the speakers. Referring to the "knowledge to action" problem, he said that action is made of much more than just knowledge. Scientists have to provide the knowledge that will hopefully become transformed into action. He stated that the melting of the sea ice will have implications not just for the Arctic, but for other regions of the globe as well. He also supported the importance of indigenous observations and noted that the knowledge of the local residents is necessary. He expressed his surprise that the discussion always refers to just the indigenous people. He said that all people living in the Arctic should be involved in making observations, indigenous or not.

Professor Van Ypersele highlighted the need for long, uninterrupted monitoring to guide decision-makers. Although the indigenous peoples indeed have a long-term record, unfortunately their observations do not cover all parameters scientists need. Monitoring deals with the complexity of the systems involved: atmosphere, ocean, sea ice, human aspects, biosphere and ecological systems. Collaborations are needed between scientists and nations, he said. Many decisions have been taken in spite of what the scientists know, hence there is need to improve how scientific knowledge is used. Monitoring and modelling approaches need to be combined.

Zuzanna Bieniuk from [European External Action Service \(EEAS\)](#) asked if results from scientific studies were being shared with the local population.

Professor Steffen gave an example of the [USAID foundation](#) sponsoring a public presentation on scientific findings given in Nuuk, Greenland. Getting the scientific knowledge back to the local population is also done through the school systems. While it is getting better, is not yet as good as it could be. Dr. Meier cited another example – the [ELOKA](#) project, which looks at knowledge exchange programmes in the Arctic.

Einar Svendsen of the Institute of Marine Research in Norway pointed out that for more than 50 years Norway and Russia have carried out good monitoring in the Barents Sea and the Norwegian Sea near Svalbard. He said he was sure that the two countries would extend the scientific monitoring to the north when the ice retreats.

Professor Callaghan said that scientists come and go, take data with them and leave their rubbish behind. However this has been improving. Stakeholder gatherings enable some exchange of information between scientists and the local population. He also noted that scientists should not just give the results back to the locals, but also ask them about what to monitor.

In response to Dr. Orheim's comment on non-indigenous Arctic residents conducting monitoring in the Arctic, Dr. Krupnik mentioned a recent project in the Russian Arctic in which scientists obtained sets of records from remote places done by both indigenous and non-indigenous people. Those records, each diligent in its own way, have demonstrated remarkable differences in the ways in which the two sets of observations were done.

CLOSING REMARKS



Vice-President of the International Polar Foundation Nighat Amin reflected on the main issues discussed at the 2012 Arctic Futures Symposium. She said it is important to come together and share views of the prospects of the region. The Symposium made it evident that climate change is actually happening. Ms. Amin said that perspectives from all stakeholders are important. She also addressed the issue of facilitating the transfer of technology to policymakers by designing tools to facilitate this process. She said it is an issue that the International Polar Foundation focuses on in its work.

In conclusion, she thanked all the panelists for accepting the invitation and for educating the audience.

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