

Report July 12, 2013

World Wildlife Fund

Global Arctic Program

Last Ice Area Project

Iqaluit, Nunavut Workshop

June 4-5, 2013

Part 1: Presentations from Day 1

As noted at the opening by the Deputy Mayor of Iqaluit, Mary Wilman, the future of the Arctic is a global concern requiring global actions and noted the commitment of the City of Iqaluit to working in partnership.

Nikolaj Jeremiassen, Siumut, Member of Inatsisartut/Greenland Parliament provided warm words of welcome to the delegates and spoke of the importance of bringing Greenland and Nunavut decision makers together to see how to manage the area in the future. Nikolaj spoke of the fundamental change in the local communities from climate change. Of most concern are the impacts of climate change on subsistence and commercial fisheries. As subsistence fishers and hunters, Greenlandic people are some of the first to feel the effects of climate change. At the same time it is very difficult for them to influence these global changes locally.

We are very dependent on the ice – our communities are not able to move so climate change impacts our communities and the fisheries and hunting.

Joe Adla Kunuk, Deputy Minister of Intergovernmental Affairs Government of Nunavut warmly welcomed "*our neighbours from Greenland*" and all delegates. Kunuk noted the importance of this issue. "*The land and environment touches all our lives and we must work together. Your work will help those of us who live up here as well as people in other places.*"

The theme of partnership began to emerge early on.

Clive Tesar, WWF-Global Arctic Program spoke to the history of the project and referred delegates to the website and considered that perhaps they should have called this project, "The Lasting Ice Area" as it is a story of hope and resilience rather than one of doom and gloom. The Last Ice Area region is modelled to be the most resilient sea ice. The vision of WWF is to focus proactive measures of understanding and management in this area to benefit the environment and the wildlife and also the people in the future.

WWF's mission is to build a future where people live in harmony with nature. This is not just preserving nature, but preserving nature for people to use, and to continue to use as they have always used. WWF has been working in the Arctic for over 20 years in partnership with local people. For example in Nunavut WWF partnered with the community of Arviat and Government of the Northwest Territory (GNWT) to fund a bear monitoring program s with the hope of reducing bear/ human interactions. WWF is NOT an animal rights group – they support the Inuit right to live off the land in a sustainable way and will work to ensure Inuit can continue to hunt.

WWF recognizes that Inuit have many priorities to deal with, among them health, education, employment, housing, poverty and food security. WWF's vision is to bring people together and provide the information on the future of this area for local and regional decision makers – to inform future policy in this area.

This workshop builds on the outcomes of the Nuuk 2012 workshop where many questions were raised and knowledge gaps identified. WWF focused its research on the knowledge gaps identified by Inuit at that earlier meeting.

Mette Frost, WWF Denmark presented information collected on the future, traditional and cultural uses of the Last Ice Area and reported on an expedition and community visits. Frost noted, the Greenland halibut fishery is very important and researchers have little information on changes in stocks in the area. Other priorities include investigating the potential resource development in northern Greenland and what this means for the people and the environment. Further, the north water (NOW) polynya is a vitally important area for both wildlife and people. The impacts on this unique environment by changing climate as well as resource development need to be carefully considered. WWF intends to return to the northwestern Greenland communities and continue a dialogue on the future of the area.

Vicki Sahanatien, WWF Canada (Iqaluit), spoke of the various projects WWF has in Nunavut (Appendix 3). WWF worked with Clyde River to establish the Bowhead Whale Sanctuary and they continue to work together to increase knowledge and understanding of high arctic wildlife and environment. WWF has developed a paper on best practises for Arctic shipping and continues to work with a number of universities on various issues (Greenland Sharks; U of Windsor; Polar Bears; U of Alberta) as well as with the Government of Nunavut on Polar bear and Perry caribou research. WWF's Arctic research continues to be guided by issues of importance for communities and research that may be used for long term planning. WWF is providing information into the Nunavut land use planning process and will work with communities to develop the appropriate future land use plan for the LIA.

Madeleine Redfern, the Former Iqaluit Mayor gave the keynote address on the trends and challenges in the LIA.

Redfern suggested that issues of climate change and the impacts and future trends on the Arctic environment and its peoples tend to be siloed into disciplines and we need to step back and view the issue as Inuit do in a holistic manner. She noted the danger in polarizing these issues as south vs north or indigenous vs non-indigenous as the solutions require partnerships between all peoples and the outcomes affect all people. The trend to portray climate change and Arctic environmental issues from a doomsday perspective turns people off as it is so overwhelming. While not simplifying the issue, we need to empower people that they can contribute to change.

"When we try to do something faster it takes longer. When we try to do something cheaper it costs more, when we try to it alone we do not build the trust and relationship."

Redfern wants to dispel the myth that hunters cannot be environmentalists and rather bring to the world the incredible knowledge and respect Inuit hunters have for the wildlife and the knowledge they have of the changes they are experiencing. In partnership scientists and hunters can more fully understand the change occurring in the Arctic and ensure political decisions are knowledge-based. This is important when considering management options for the LIA, these decisions need to be based on a foundation of knowledge and deliberated in partnership with the

*Polar bears are not Coca-Cola bears.
People live in the Arctic and must be
seen to be part of the issue.*

people. Various management options exist that may see a multitude of uses and conditions of use. Some areas may have no development, other areas may have

We often think we share the same values – we can attend those values differently. We need to be honest and open about our challenges. We need to step out of our comfort zones, accept and acknowledge that sometimes our relationships are struggling but together we can improve them. Coming together is a beginning.....

controlled and regulated uses. Northerners want responsible development. Any decisions must be done with northerners.

In an era of unprecedented change in the Arctic we need good governance, not just for the sake of those who live in the Arctic but for all people and this is an opportunity to work together, build capacity, share visions and goals and provide a strong foundation of knowledge. The need to be more open and more flexible to planning and responses has never been more urgent. There is a great opportunity for northerners to monitor what is happening and to assess and understand their findings in the Arctic. It is strongly recommended that an Arctic university provide this capacity and it should become a foundation of knowledge in this area.

Bruno Tremblay, Professor, Atmospheric and Oceanic Sciences, McGill University presented a talk entitled, "*The Physical Picture - What is projected to happen with the ice? Future Scenarios – Sea Ice of the Arctic Archipelago*". This talk was based on his research, sponsored by WWF, to gain a clearer picture of the future of sea ice in the Canadian Arctic islands and above Greenland. Tremblay presented an analysis and review of the current predictions based on modelling. Using high resolution models scientists can see how the sea ice will behave overtime. Animations of predicted change are available online (see NSIDC <http://nsidc.org/>). Tremblay presented animations of sea ice loss from 1999-2012 showing how throughout the 1980-90's most of the Arctic is covered with sea ice but from the year 2000 things started to change. In 2002 the animation clearly showed that, not just Pacific sector was experiencing sea ice retreat, but the Atlantic sector as well. In 2012 the NSIDC reported the least sea ice (September minimal sea ice measurement) this loss represented more than 50% of the historical sea ice limit. It was noted that the age of ice (thickness) is also as important as the extent of sea ice and that the loss of multiyear (very old) ice is a concern. The animations show that what is left of multiyear ice is being lost through Fram straight and now also through the Beaufort gyre– this is new. Old ice will last the longest in the high Arctic Archipelago.

Why will this last multiyear remain in the northern Archipelago? Sea ice loss is influenced by weather and currents. The pattern in Eurasian shows ice being blown offshore and deposited on the Canadian side with this ice being punched up against land. The circulation patterns allow ice to build in the Archipelago as it gets stuck between the islands. The animation of minimum sea ice extent shows that the last ice will remain in the Archipelago and north of Greenland, the LIA.

The *ice albedo* effect will also increase ice loss through a positive feedback, open water is dark which absorbs the solar radiation, ice cover reflects the solar radiation. Sea ice loss can be variable. We know September ice, which is the minimal sea ice extent that is usually measured, is tending to retreat. From the models of predicted sea ice cover in May 2050 it will be very similar to today due to presence of first year ice, and in November 2050 it may also look the same as today, again for the same reason. So the "ice free" Arctic is really only a short time in part of August, September part of October. The problem is however, the loss of the thick multi year old ice.

The later you react the less effect a change will have. Smaller changes earlier make more impact – like a bank account investing early has more impact in the future than investing late in life.

If we do not do anything to reduce CO₂ emissions we will see very little change in sea ice until later in the century, then we will see a drastic change. If we do reduce CO₂ emissions, it has been shown that sea ice recovers immediately, land ice responds much slower.

Warwick Vincent, Scientific Director Centre d'Etudes Nordiques, Professor & Canada Research Chair, University of Laval presented a talk entitled, "*The Biophysical Picture. The ecological implications of what will happen with changes in sea ice - from microorganisms to vertebrates*".

Vincent opened with the dynamic biodiversity related to sea ice and spoke to the importance of the small ice-associated organisms to the overall biodiversity of the Arctic ocean from plankton to whales and man. The sea ice is the natural infrastructure of the Arctic. Vincent posed the question of how changes in this infrastructure may affect the "grey" or manmade infrastructure we depend upon.

Ice is very porous and the sea ice is a great habitat for many species of organisms – when you can see microscopic life without a microscope you know there is a lot going on. The diversity of life in the ice is exceptional. These are fat filled cells – usually of the good fats and play an important role as they move through the ecosystem.

The algae associated with the ice is a vitally important carbon source for the Arctic food web, further an algae bloom that forms at the ice edge that gives a "boost" to the health of the Arctic ocean. The algae form a two stage turbo thrust of carbon to fuel the whole Arctic ecosystem - so if we lose sea ice we lose both of these. Interestingly, new German research close to the North Pole, has shown long algae/diatom strands that form beneath the ice. These stands are full of silica and become so heavy, in the middle of winter, that they fall to the bottom and provide a feeding frenzy on the Arctic Ocean floor. The timing of these events is critical to support the eggs and larval stages of the phytoplankton which fuels the entire ecosystem. We have known about these diatoms for over 100 years, however, what is new is the application of new techniques which can see the diversity of microscopic life within the ice that we have not seen before. For example, a new species *Polarellaglacialis* was found that sometimes photosynthesizes and sometimes feeds; it can convert from plant mode to animal mode. This is only one example of the incredible diversity being found in the sea ice.

There are also unique ecosystems in the ice shelves and melt pools and we are finding interesting and unique kinds of biodiversity, hundreds of species including viruses, archaeobacteria, eukaryotes, a variety of bacterial groups, cyanobacteria among others. Microbiologists using new techniques are able to ask the same questions plant and wildlife biologist have been able to ask, " *What is there and what do they do...*" There are also newly discovered ice binding proteins which have a great deal of commercial interest.

There is a great deal of work being done to learn and monitor these areas before they are gone. We do not know what the implications biologically may be from losing ice as we barely understand the biology and the impact of these changes on the food chain now. The CEN

We often thought the multiyear ice was sterile but now we are seeing there is real diversity in this ice.

Network for Arctic Observation

(<http://www.takuvik.ulaval.ca/host/host.php>) has nine field stations where some of the most rapid changes are being seen in LIA for example Ward Hunt Island in Quttinirpaaq Park. Early data from Ward Hunt Lake in 1953 showed 4.3 meters of ice and suddenly over the last 10 years (2001-2012) this lake now has had

open water. Scientists have been following ice shelves such as the Milne ice shelf which is estimated to have lost 40% of ice thickness. Ward Hunt Island has ice shelves that date back 4000 years but over a period of one month in August 2012 it lost enough ice to have open water to the Lincoln Sea. These Arctic ecosystems are in rapid transition.

In the Beaufort the ecosystem regime is shifting, we are moving from an ice dominated system to a phytoplankton (open water) system due to the ice loss. If the timing of the algal blooms and the algal/diatom strands result in a decline in the animals that feed on algae and on the strands that fall to the bottom (benthos) this could have population repercussions up the food chain to the Bowhead whale populations. It is not a stretch to surmise that the Bowhead whale may decline and be negatively affected by loss of sea ice. Like the walrus who are hauling out in places never seen before, 50,000-100,000 animals can be seen in new areas in the Russian Arctic. We must be proactive to ensure these areas are able to protect these massive and unpredictable shifts.

We also need to be aware that billions of people are looking to the Arctic. The development and commercial interest in the Arctic is here. Recently the Arctic Council provided observer status to five Asian states. As these ecosystems are in transition so are global communities. Research and knowledge exchange must be a viable part of any discussions and research and monitoring partnerships with northern communities must inform decision about this vast ecosystem.

Pitsey Moss-Davies - Inuit Circumpolar Council spoke to the draft report on the Traditional Ecological Knowledge of LIA, sponsored by WWF as part of the provision of both scientific and traditional knowledge to inform future management of the Last Ice Area. The Inuit of Nunavut live in north-eastern Canada and share family ties with the Inuit of Greenland to their east and the Inuvialuit and Inupiat to their west. They depend greatly on marine mammals, fish, caribou and seabirds for food, clothing and other materials.

Report July 12, 2013

Inuit rely on Traditional knowledge to guide and inform all aspects of their lives and decisions. This knowledge, gained over centuries, helps us to understand the Arctic, its animals and what our actions, and the changes that are being observed, mean.

The purpose of the report is to gather and synthesize existing published and grey literature on traditional knowledge of selected topics from both Nunavut and Greenland related to the LIA and to identify knowledge gaps, and to contribute a knowledge base to future stakeholder discussions and decisions within the LIA. The information presented in this report will be used in conjunction with a report on scientific knowledge of the LIA to establish a baseline of information to assess the current state of relevant knowledge, identify gaps and assist in communicating the significance of the project. This document focuses a lens on the long history of use of the LIA by Inuit from the Inuit perspective as much as possible, but this is a living document, to be revised as comments and reviews are received and more information becomes accessible and/or available.

Inuit culture and identity continues to be integrally connected to the land and Inuit depend for their subsistence on the seasonal migrations and shifts of wildlife availability in the Arctic, while adopting and incorporating modern ways. Inuit in both Canada and Greenland have relied on marine life, in particular seals, fish, whales and birds, for cultural and physical sustenance for millennia. Subsistence hunting remains crucial to cultural, economic and physical well-being. As such, Inuit culture and identity and livelihoods are based on free movement on the land, water and sea ice. Inuit also temporarily move out from communities in the spring and summer to harvest resources that are sometimes shared, bartered, commercially sold or traded, but mainly contributes to achieving food security through family consumption. Their understanding of weather, sea and ice conditions, migration routes, behaviour and ecology of the wildlife within the LIA region was bestowed upon younger generations through the collection of extensive and detailed knowledge of the many systems --environmental and biological-- that ensured Inuit survival.

Inuit observations from the 1980's and before, on both sides of the LIA area of interest, in Greenland and Canada, suggest the ice is changing, the ice forms later in the year, is thinner and breaks up earlier in the spring. Observations suggest that changes have been more noticeable since the 1990's. These changes impact the wildlife in many ways from changes in migration routes, wildlife health, population densities and animal behaviour.

Recommendations from this literature search and TK report would support locally-based enhanced long-term and spatial monitoring programs based on systematic traditional knowledge studies to provide supplementary information on trends in distribution and local density of wildlife in the LIA area of interest, the use of these species by communities and the impact of change on the human and ecological community.

Mads Ole Kristiansen, spoke of his life as a hunter in his home community of Qaanaaq. Qaanaaq's population has 800 people and approximately 80 hunters. The area they hunt in ranges from Melville Bay up to Inglefield land where they hunt marine mammals, caribou, birds, and fish. They also hunt near Cape York close to Umiaaq. They hunt according to the Regulations which state which species they are allowed to hunt. As a boy Mads lived completely by hunting and hunters were very much respected at that time. They used to have to break ice to get out to the hunting area. They could disappear behind the mounds of ice, now the ice goes only up to their knees. While he was a child they would hunt on the

All in all this is a very disturbing time we are living in. We, who are living in the high Arctic, are not happy to see ice breakers heading north.

ice starting before the darkness, today there is only ice in dark period of winter. Today the ice is very insecure in his area. When the ice starts coming in they start fishing with nets, according to the thickness of ice they move these nets out further, then they start to hunt for seal. This year in April the ice in the fiord of Qaanaaq was very unsafe to travel on with the dog sleds. Compared to last year the

temperature had increased 1⁰. Polar bears that used to turn up in September or October are now there in May and June.

A couple of years ago there was a huge iceberg that broke away from the Greenland ice cap. It was 100 kms. long and people in the communities have no idea where it went. The community would like to know this. The youth learn from the elders about hunting and ice – there is much to learn; they are the experts amongst us.

Although the ice conditions are changing significantly he still has grounds for optimism. He sees that the hunting animals he depends on are growing in number and water is getting warmer with climate change – He is not that

Money is important, but I hope we do not forget that the Inuit of the Arctic and our hunting of animals must secure jointly and continue our way of life. We still use old hunting methods, kayaks, dog sleds and gear which has been handed down from our elders.

The elders have that experience and knowledge; it is my sincere hope that we make it a reality to communicate and work together between scientists and hunters of Arctic.

pessimistic – he is looking for a bright future for people of the high Arctic in Greenland.

He hopes that mineral resources in his region will not ruin the optimism the community has for the animals they hunt. They are however, worried about the growing shipping (vessel) traffic. They worry if oil is found the ice will melt faster and there will be more

vessel traffic.

Theo Ikummaq, Igloodik Nunavut spoke to the cultural implications of ice change – what would this change mean to Inuit? Ice, harvest and hunting, wildlife, culture and climate change. In 1987, Theo visited Qaanaaq from Igloodik and was able to cross the strait to Greenland, something they can no longer do. He noted that changes are occurring each year. Ice is not forming as early. Inuit believe that ice forms from the land out. If the land is frozen ice will form in the sea. Now there is snow on land (keeping it warmer) before ice forms. In 1952 this happened and the ice did not form between Igloodik and Qaanaaq and they had to take a more northerly path. In last 5 year Theo, reported that they do not see sun from end of November to end of January and the direction of sunrise

We are seeing robins, red polls, things with no Inuktitut name because they were never seen before – a little shrew can scare a hunter because they have never been seen before. There are different types of bugs and bees... We do not know how to react sometimes and we just freak out.

Because it is not as cold polar bears do not need as much food. We used to think polar bears needed ice to eat. We have watched polar bears hunt from islands. Adaptation is key and like animals we also must adapt. They were lean for a few years now they are not; they have adapted – as for their cubs the average is 2. Sometimes this season we see mothers coming out of dens with 3 cubs...

is now from southwest. The fiords and inlets are much warmer now, if the sea bed is melting things will change and different species will come. Theo noted, Jelly fish from very small to very large are increasing and sometimes you cannot see bottom of sea bed because of these jelly fish – what changes is this creating, what new species are coming? All questions the community have.

Inuit and bears have to compete now with wolverines, foxes and wolves, which are also hunting seal pups. Hunters have noted that these animals have changed their diet. Even the wolves have become hunters on the sea ice. Killer whales are moving in and groups of 10 whales have been seen, they too are competing with Inuit for food.

New species coming north are having an impact on people and culture. Grizzly bear have also been in Igloodik. In 2007 Theo travelled from Iqaluit to Greenland by dog team and saw strange streams on top of the mountains. Because the snow is falling earlier the land is not freezing and there is increased flooding.

In Foxe Basin the ocean water is making it to the land and it is affecting where the animals are.

As an island, Igloodik is isolated in the fall when the water around it is open. It used to be for only two weeks now it lasts two months. It is January before local people can cross on the ice to Baffin Island. The fishing season is down from six months, 16 years ago to two weeks now. Hunting now takes longer and we have to go further and it cost more.

Socio-economic Implications of Ice Change. Discussion of what opportunities are foreclosed and created by the change in ice conditions?

Report July 12, 2013

Genevieve Carr, Ph.D., Northern Petroleum and Mineral Resources Branch – Aboriginal Affairs and Northern Development Canada

This presentation is available on the website. The role of AANDC was discussed in relation to oil and gas and mineral exploration. Oil and gas exploration and development are said to be key to Canada's economic well-being. One quarter of Canada's discovered resources of conventional petroleum are in the North and remain undeveloped, as well as about one third of the country's estimated potential.

AANDC works in partnership with Northern and Aboriginal governments and people to:

- govern the allocation of Crown lands to the private sector for oil and gas exploration;
- develop the regulatory environment;
- set and collect royalties; and
- approve benefit plans before development takes place in a given area.

Benefit plans define oil and gas operators' policies and activities to maximize employment and training prospects for Northerners. The plans also ensure that Northern businesses have opportunities to supply goods and services on a competitive basis.

MajaSofie Burggaard, Bureau for Minerals and Petroleum, Greenland Government. Potential for mineral and hydrocarbon development in the Greenland Last Ice Area

Ms. Burggaard spoke to the permitting process in Greenland and the slides are available on the website. The Bureau of Minerals and Petroleum is responsible for the whole chain of tasks linked to the production and transportation of minerals and petroleum. The task is to ensure the legal and political framework for reliable, environmentally sound and clean exploitation of energy and minerals resources in Greenland. The Bureau of Minerals and Petroleum was established in 1998, and is an agency under the Ministry for Industry and Minerals <http://www.bmp.gl>

Martin von Mirbach, WWF Arctic shipping: current status and future trends http://www.wwf.ca/conservation/arctic/a_new_frontier_for_shipping/

In an effort to gain a better understanding of the potential for Arctic shipping to be carried out in an appropriate manner, WWF-Canada has commissioned an independent benchmark study of potential impacts of shipping in Arctic waters, and measures currently in place across the Arctic to address these impacts.

Martin Sommerkorn, WWF Norway: International models of conservation management.

Martin spoke to various international management options and of the example of Biospheres Reserves in particular. Martin discussed the need for managing for sustainability which is not put into practise in many areas. He discussed why we have to manage our relationship with environmental systems and some of the lessons we have learned from international experiences.– Inuit have

The potential opening of the Arctic as a result of climate change is a seminal event. A region that has generally been understood as being outside the current global affairs is becoming central to them.

Report July 12, 2013

adopted the UN definition of sustainable development, “as development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission). WWF shares this view. Nature has people in it and sustainability is best managed with people, using their structures.

Why is there a need to think or re-think governance structures of the LIA? Global Governance 2025 a joint publication between security and intelligence agencies of the European Union and the United States, stated “A region that was generally understood as being outside global affairs is now central to them”. However, there are new interests and new challenges – people who call this home want to continue to live off this land for 1000 more years.

Martin reviewed some international approaches and management options and noted that there is a relatively scarce collection (dataset). He noted that nature, people and culture all need to be considered on management option. Change is coming and this must be acknowledged.

UNESCO Biosphere Reserves are sites established by countries and recognized under UNESCO's [Man and the Biosphere \(MAB\) Programme](#) to promote sustainable development based on local community efforts and sound science. As places that seek to reconcile conservation of biological and cultural diversity and economic and social development through partnerships between people and nature, they are ideal to test and demonstrate innovative approaches to sustainable development from local to international scales. The Biosphere Reserve concept has various levels of conservation/protection and allowable activities these are represented as a core (no development or activity), buffer (limited activity) and transition zone (full activity). There are 610 Biosphere reserves – 117 countries – 12 are trans-boundary.

There are three functions that serve sustainable area management: Conservation: cultural diversity and biodiversity; Development: socio-cultural development that is economically viable and environmentally sustainable; Learning: Logistic support for environmental practiced and education, research monitoring. Emphasis on involvement of local communities – integrate cultural and biological diversity.

Martin gave two examples of Biosphere Reserves:

Benin: Pendjari Biosphere Reserve three zones. In all three areas there is a learning component.

- Core zone (conservation, monitoring etc.)
- Buffer Zone
- Transition Zone

Wadden Sea, Biosphere Reserve and World Heritage Site (3 different countries) it is the fly-way staging area for millions of birds. People live here, there is intensive agriculture, fisheries and one drilling platform in this area. Although highly controversial it has served as stage for developing new technology. In core zones, during specific periods of time there is no activity, when birds are not there activity can occur.

Marie-Claude Fortin, Science Advisor DFO (Aquatic Climate Change Program)

Report July 12, 2013

Ms. Fortin spoke to DFO's science-based management in the context of a changing environment in the Canadian Arctic. Ms. Fortin spoke about the Canadian government structure and specifically the Aquatic Climate Change Adaptation Service Program (ACCASP). DFO has the mandate for three Canadian coasts and the delivery of its program remains unique in the Arctic. Ms. Fortin's slides are available on the website.

- Economically Prosperous Maritime Sectors and Fisheries
- Sustainable Aquatic Ecosystems
- Safe and Secure Water

The Government of Canada [renewed domestic climate change adaptation funding](http://www.dfo-mpo.gc.ca/science/oceanographie-oceanographie/accasp/index-eng.html) in 2011, with a \$148.8 million contribution over five years. This funding will continue to expand federal programs across nine departments and agencies, designed to improve our understanding of climate change and to help Canadians prepare for climate-related impacts. The investment includes a \$16.5 million commitment to the Ecosystems and Oceans Science Sector of Fisheries and Oceans Canada for the implementation of a five-year aquatic climate change program. <http://www.dfo-mpo.gc.ca/science/oceanographie-oceanographie/accasp/index-eng.html>

Martin Schiotz: Ministry of Housing, Nature and Environment - Management view from the Government of Greenland. Mr. Schiotz noted that his department in Greenland has only three people in it compared to the larger Canadian government departments. The Ministry of Housing, Nature and Environment is responsible for international agreements and works with CAFF (Arctic Council working group Conservation of Arctic Flora and Fauna). The management of living resources in Greenland is shared between Housing, Nature and Environment (more conservation) and the Ministry of Fisheries and Hunting and Agriculture (utilization).

Ministry for Fishery, Hunting and Agriculture - oversees the legal and institutional framework and the Nature Protection Act 2003, which regulates conservation of flora and fauna; protected sites; import export of species; access to nature and restoration; and risks with regards to EIA. The Home Rule Act 1999 and amendments regulates hunting. A series of executive orders protect sites and species, the Bureau of Minerals and Petroleum legislate under their own act.

For hunting quotas, biological advice is obtained through the Greenland Institute for Natural Resources and international bodies and the hunters and fishers (Boards) and is used to establish the quotas. For example the Fishery Board consisting of scientists, fishers and industry meets 4-5 times a year to give advice to administration. Involving local stakeholders on monitoring natural resources and climate change in the Arctic, the Greenland Government is collaborating with communities in Disko Bay and Uummannaq Fjord on pilot testing the use of locally based monitoring of natural resources as a tool for improving Arctic resource management (<http://www.PISUNA.org>). Because many of the stocks are shared between different regions or internationally, quotas must be coordinated i.e. *we may be able to monitor locally, but does not necessarily mean we can manage shared species or quota locally.*

Northeast Greenland Park: Situated in north-east Greenland, this biosphere reserve is the largest biosphere reserve in the world, covering 97,200,000 hectares. There is no permanent settlement in the

Report July 12, 2013

biosphere reserve, since most of the area is inland ice and the rest is a composite fjord landscape. Many bird species are breeding in the summer within the biosphere reserve, which also includes two Ramsar sites.

He noted that Greenland has developed a Biodiversity hot-spot analysis; the scientific report is due out this year (2013).

Naaja Nathanielsen, Member of the Greenland Parliament

As a member of the Greenlandic parliament, Inatsisartut, I work with our natural resources, our environment and our economy, from a political perspective. Every day in politics we make “qualified guesses” about the future. We have to make decisions today, that will affect tomorrow, and we also need to take into account the role of our past – our history.

I've been asked to speak about potential managing options regarding the ice changes. But as I have listened to the different presenters I think we need to start another place. We need to specify to each other our aim, before we can venture into a partnership. Because I am not sure, that the different agents represented at this workshop, share the same goals and aims regarding the managing of ice changes. But we do have one important thing in common and that is the will to take action and begin a dialogue.

Someone yesterday mentioned that in order to make a successful collaboration between Inuit and others, there needs to be trust. And in this case the trust is not about trusting that the money provided for a given project goes into the right pockets or trusting that the research is valid or relevant. The trust that was referred to goes deeper and relates to our history as Inuit. It is a history where our natural resources, has been given a higher value than the people. And it is a history where we have been outnumbered and out-manuevered when it comes to power, money and educational level – leaving us with skepticism towards groups that are interested in our region. WWF has 5 million supporters – in Greenland we are 55.000 people. We need to acknowledge that many Inuit won't back a project if they don't feel trust or feel respected. My country is very big, but we are vulnerable and small as a people. And because of our history, Greenlandic politicians are far more worried about being accused for favoring big companies, organizations or powerful countries, than for being accused of anything else. You need to understand this if you want to cooperate with Greenland. There is a lot of sensitivity when it comes to “outsiders” having an opinion of our nature, our resources and our governance.

But it can be done and it is also being done today. In Greenland a success story is about the MSC certification of our shrimps. In this case the government of Greenland and the fishing industry saw the potential and understood that this issue was not about making Inuit catch less or earn less, but about securing a sustainable industry and make sure that we also provide for our grandchildren.

Yesterday Madeleine spoke about sustainable development – how we all want that. I agree completely. But I also find that Inuit and organizations like WWF have different understandings and hence different approaches when we discuss sustainable development. One of the reasons for this is probably a difference in how closely we are affected in our everyday life. Most people TALK about the arctic, while

Report July 12, 2013

few people LIVE in it. I often talk to researchers and journalists, and it always surprises me how uninformed they are about the reality of the people. They may know a lot about ice or polar bears, and they may have talked to politicians, fishermen and hunters, and they may have an opinion on whether or not we should mine or drill for oil – but they have never met an unemployed person or talked to an Inuit with addictions or a blue-collar worker getting paid very little for very hard work. So they are ignorant of the poverty of many of my fellow citizens, and the poor level of education, that is creating basis for social tension between those who have and those who have not. So when I talk about sustainable development, I talk about environmental sustainability, as well as cultural and economic sustainability.

When WWF say they are committed to living in harmony with nature, I think most Inuit can relate to that idea and that aim. But there might be a difference in the way we understand “living in harmony with nature”. Does that mean “conserving” nature or does it mean “adapting” to nature? And this will greatly affect our approach to managing the ice changes. It is my hope that both sides will be willing to listen to the other even though we might end up realizing that we will never agree completely. But that does not mean that we cannot have a fruitful relationship and cooperate on some valuable projects. And hopefully an organization such as WWF can use its power and its 5 million backers, to spread knowledge on the reality of the people of the arctic, as well as the polar bears of the Arctic.

I have no brilliant plan for managing the last ice area, part of that is really outside the power of my government. I could say: stop the excess consumption in the western world, but I doubt that will work. So we need organizations such as WWF to help us to get the world's attention to the climate changes. And I think it could be great, if organizations such as WWF broaden their scope, when it comes to funding research. I am not saying that research on microorganisms is not relevant or interesting. It is. But I also would like to see more research on culture and history. And that type of research is not as hot as climate change and therefore more difficult to fund. Would WWF consider supporting studies made by sociologists or other academics working with people and societies? Because I think that we need to understand the nature of people, as well as the nature of nature. If we really want to create motivation for change, politicians need to hear how the people is affected, and what consequences there might be for the society or even better, for the economy.

I question if we really need to exploit every option we have or can we make with less, for the sake of the environment and the culture. But this thought will not fare well if presented by an outsider. Again because of our history. For my part I will look on a common project with delight – seeing it as a possibility to bring the outside world to the far north and widen the understanding of the arctic in the world. Maybe we can start with a workshop like this, but with a focus on the people and the consequences for the people.

Josef Tuusi Motzfeld

As the sea ice continues melting the way of looking the planet has started to change. More and more scientists, politicians and military personnel have changed their point of view. It seems like they look the planet as a globe not as a map any longer.

Report July 12, 2013

The present angle is more from the top of the world. A new Ocean, the seventh of the oceans in the world, is opening. New seaways even for heavy carriers cause new ways of thinking.

Thanks to the new situation of the presence of climate change and the hunger for oil, gas and minerals Greenland is in focus between continents and superpowers today. Probably Greenland is on its way to be a superpower in the Arctic. Not because of military matter. Not because of its economy. Just because of its extent and its admission to riches of resources, both on and offshore.

I think that it is of extreme importance that people all around the world have real access to information about the extremely serious situation, not only for us in the Arctic but for the whole planet.

Even if Greenland is on its way to become superpower in the Arctic, we the people in the Arctic have limited resources to initiate campaigns like this workshop. Therefore we are grateful to know that we have devoted friends abroad, who shares our views and devote their lives and talents for the common good, and especially for our cause.

Greenland and the Arctic as well, on the other hand, cannot afford to isolate themselves and build barriers towards the rest of the world. We cannot decrease or cut down international relations.

Control over the fishing and hunting resources was the most important factor in building the new Greenland. That's why it is our obligation to secure that we people of the Arctic are the most important part in making decisions in questions about exploitation and production of the oil-, gas- and mineral resources in our region within the exclusive economic zone. Outside the EEZ it is my idea which I have suggested both the Nordic Council and West Nordic Council to invite all nations with coastline to the Arctic Ocean to establish a joint committee for the 'Ocean'. The committee will be the authority to make decisions on all issues and activities in the Arctic Ocean, the Arctic Ocean Council.

The council should make decisions about the utilization of both the living- and natural resources.

The council should make decisions about shipping lanes in the ocean. The budget for the council should be a common responsibility for all coast states.

We are at a very critical time in the Arctic right now. We have two paths that we can go down in regards to international relations. One is a path of competition and conflict, and the other is cooperation and diplomacy. That's why the necessity for the Arctic Ocean Council.

We may be a small society. But we are not too small to care about the environment to secure the biodiversity. And we are not too small to make an effort. These efforts as well as active work in international organizations are essential in order to maintain and strengthen the position of Arctic in the world.

Part 3: Questions and Answers:

"With more research there is an opportunity to make better decisions."

Report July 12, 2013

Part of the purpose of the workshop was to gather peoples' remaining questions about the Last Ice Area. We will use the questions to help guide our research in coming years, and also share these questions with other organizations conducting research in this area (e.g. ArcticNet, Greenland Institute of Natural Resources).

1. Polynyas (areas of open water in the ice) - is it possible to model how long these will persist? What are the drivers of polynyas, how may the locations/number shift?

New polynyas are starting to show up where currents are not as strong, ice not as thick and this allows water to come up. My community lost 2 people through the ice. Polynyas are occurring where they were not before.

- Have you looked at what is affecting ice formation; temperature of water, snow on land? We used to *dip a finger in and "oh it is cold today"*. *We do not take temperature per se but we feel/know it is warmer.*
2. Research should include culture and history (social science). "The nature of people as well as the nature of nature".

There is too much focus on the animals of the Arctic and not enough on the people of the Arctic, because we are dependent on each other.

3. How can WWF include more community/hunter knowledge in research?

A lot of discussion and agreement between the biologists and the hunters and fisherman to work together. We should promote a model of more constant interaction between two groups.

Since my childhood I have lived on the ice and my livelihood comes from the ice. Since we were kids we have been watched certain small – hunters and elders say if these small animals grow too much in number various disease will hit animals – We have always respected our animals; for example we respect the direction of the wind when we go walrus hunting so as to not disturb them. In the same way, with beluga, first we observe the movement – if they are eating we will not disturb them. We are very respectful of the animals we depend on.

There is an issue of cooperation between hunters and biologists. We would really like to try and push for that. We would like to urge this workshop to consider the realization that better cooperation between biologists and the hunters and fishers of the Arctic is important.

Do you not trust our advice? - When you are doing your scientific work, are you asking the residents or the hunters? Last year in October when we set nets in water we were using light bulbs – saw a lot of small shrimp like animals (millions of them) My father put the question to the scientists in Nuuk asking

Report July 12, 2013

them what these animals are and still we have not heard from the scientists – We have to be equal and respectful mutually to each other.

Need to believe and trust the knowledge of elders and hunters more – they are experts. In the last two years we had a lot of fish – lots of fish we have never seen before. Strange fish to us they were sea run only and did not go into lakes. “I love them” – some do not like them (Arctic Bay).

A number of groups are interested in building community- based monitoring programs (CBM). There are more projects in western Arctic using different types of monitoring strategies. The Canadian High Arctic Research Station (CHARS) is thinking about ways of developing and implementing CBM. ICC has recently launched a CBM Atlas (www.ArcticCBM.org)

4. What are the likely changes in ocean currents and Arctic weather (precipitation, humidity/fog, snow)?

The current around the west coast of Greenland is freshening and warming due to inflow of land melt (glacier). In terms of humidity, the more open water, the more humidity.

Summer weather impacts sea ice formation. For example if there is stormy summer weather, then you get more mixing sea and keeping it colder – then would expect ice freeze up earlier.

If have snow early on ice you get less ice growth. We should expect more precipitation at high latitudes but, later arrival of snow results in less ice. It is harder for seals to den if there is less snow and later ice. Changes in the hydrological cycle also affects what is happening on land i.e. snow cover on permafrost. If there is more snow on the land you tend to see permafrost loss. Some are working with communities to see what is happening in communities. Snow acts as an insulator and allows permafrost to melt out. Very important for adaptation.

When the ice is really thick we know that it breaks up faster; when it is thinner it breaks up more slowly and it stays longer.

This brings up an interesting point – thick ice is multiyear ice – multiyear ice flows are gelled together with young ice. In summer these break apart and are surrounded by water, which then melts it more quickly. Used to think thick ice was better to put the instruments on, but it is in fact more fragile.

In Greenland (Northern part of Greenland) most communities continue to live off the sea ice – last ice area. I have been living there now and ice is disappearing and has been impossible to fish from the ice. There seems to be lots of ice is floating by, the humidity is higher and the storms are more frequent. Conditions are very serious and maybe it is because of the humidity. Can you monitor this to see if the humidity is impacting the weather?

5. How will ice-breaking and seismic testing, related to resource development and shipping, affect animals?

Report July 12, 2013

Our hunting of sea mammals has not been very good lately is there a relationship to the seismic testing done last year? When Greenland makes decision on seismic testing, seek knowledge and verify that there will not be any specific effect on the environment. The scientific community needs to tell the government if the sound is affecting animals.

KNAPK and industrial fisheries and individual fisheries- we have not been told by anyone that the seismic testing has had any impact on the wildlife. Same goes for the seals KNAPK has not reported any decline in the hunting of seals. If this was the case it would factor into the seismic testing decision.

When seismic testing took place in Melville Bay we did not see/feel any change in Qaaanaq, but no seals were found in another community (Sivversimut).

(Community unknown) In past three years there were many cod found dead – perhaps killed by seismic testing. Sampling was done but the sampled results were never brought back to the communities – lots of mussels, crustaceans, as well. What is killing them? This was never heard of before so we can only think it is because of what is happening today. I think Arctic communities have to work much closer in the future.

6. How can Inuit hunters best adapt to change in climate and species?

We certainly know and have knowledge and are ready to give advice. How will the world and our environment change?

During formation of ice in the fall and winter – animals are moving southwards and in the spring and summer they move north as the ice melts, If we look at the west coast of Greenland in Uummannaq, we used to hunt for beluga at the edge of the ice – this year (and a few others) we cannot go hunting on the ice with dogs. With climate change we have less and less ice which affects hunting. Movement of narwhals from Iceland up the west coast of Greenland – usually marine mammals are available for hunting from October to March – they say that by 2040 we will have no fast ice in our areas. Are there any thoughts or studies of how we should adapt to this? As far as I can see the prospects for our northern hunting communities are very much in danger – what types of adaptation are there?

As species move out of an area, new species move in and we may have difficulty knowing how to use them. I am not sure how to adapt; there will be other resources that move in, but they may be not as easily harvested. The projections are 2050 – because do not have good idea even for 10 years now it is going to be sooner. It is not just where the animals are now, but where they will be going. May have to move our hunting to where the animals are moving.

There are several relevant activities occurring within the Arctic Council i.e.: a large study looking into the resilience of Arctic communities with a specific focus on food security, the Arctic Resilience Report (ARR). Some advice from AACA 2050....both studies should be very useable...pilot project Baffin Bay.

AANDC – has a program that is supposed to help communities understand the changes and adapt...

7. To what degree may the oil industry offshore affect our countries? Issues were raised about pollution hazards from an oil spill in ice.

From science side at DFO we are looking at the effectiveness of remediation methods – to see, should a spill occur, if southern remediation techniques be applicable. – CCG is working on a National Plan for Spill Response with National Defence – community first responders. AANDC is looking at prevention, preparedness and response. Primarily industry is looking at methods. In Greenland there is no drilling allowed in the ice season – operators need to have dual rigs to ensure capability of shut off valve – relief well.

8. In Greenland we have world's largest National park and there are plans to open zinc and copper mines in most of the northern part of Greenland. What happens in Canada if resources are found in a protected area?

Once an area in Canada is designated as a National Park, through an Act of Parliament, mineral exploration/development is not allowed within the boundaries of that National Park – so making the park delineation/boundaries is done in full understanding of where the mineral resources are.

There are other types of protected areas in Canada: i.e. marine sanctuaries and territorial protected areas. From a leasing perspective – if area being is considered as protected this immediately shows up on the dispossession map. We alert industry that this area may become protected and if you nominate and bid on a block in that area which eventually becomes protected you will be expected to follow law. It can take a long time for a proposed area to become a protected area.

9. In 1979-early 80's we really noticed a change in our environment and weather. We had a warm spell (Coral Harbour) where many small lakes had no water and the ice was not forming – in the sea as well. But the Arctic seems to be getting cooler – we had one of the coldest winter and a lot of ice fog. Ice broke in early June but now we can still go hunting ...perhaps climate is cooling?

We do know climate projections are averages – in the Arctic the variability is huge – periods of warming and cooling superimposed over long period of time – it could be cooling now – the last two years the ice was thicker – but on average it will keep warming...

There are good resources to track change. The Polar Data catalogue gives specific local information and the Global Satellite Sea Surface Temperature Project– tracks flow edge and ocean warming.

The Gulf Stream along the coast of Greenland and the currents attached to the Gulf Stream have changed - made it warmer. Fjord of Nuuk is 3° C warmer now. In other words currents are important to understand the effects of marine currents.

10. What are other options / models for land management? Is there more discussion about management options? – The Biosphere Reserve idea is an idea which is being tried elsewhere and may be applicable. What sort of management would you like to see?

Report July 12, 2013

Visions and principles should inform any management strategy. A lot of organizations and community groups have interests. There is a need to be innovative; the success of biosphere reserves is dependent on the people developing them – seek knowledge from other aboriginal peoples about how they are working. Two in Canada developed in consultation with aboriginal peoples...

Look at successful management of an area like this needs good buy in – also needs policy or legislation to back up this support.

The WWF is being careful not to put forward a model, rather they are asking people what they would like to see in this area.

A lot of time and money is required – not trying to rush process. We (WWF) are really at the information- gathering stage. Discussions are very preliminary and wide open still. This is one of several areas of resilience we are looking at. Focussed this morning on what should be considered rather than providing options. What we can do now? – When it comes to forward-looking action the focus is on strength and options in the system – resilience. How well can people and ecosystems cope with change? Proactively look at areas where people can change adapt.

11. How will ocean acidification affect marine sea life – especially animals with shells made of
(?)Calcium carbonate.

Some species will be very sensitive and species coming from the south will invade to take advantage of changes. Some work in Alaska looking at natural variability that may instil resiliency.

Report July 12, 2013

Appendix 1: Agenda



The Last Ice Area Workshop

June 4-5, 2013

Frobisher Inn, Iqaluit, NU

Background:

The *Last Ice Area* is a project to examine the future of the summer sea ice, and its importance, both locally and internationally. WWF started the project two years ago and has progressively involved partners, including Inuit representatives, governments, researchers, and funders.

The Arctic is losing its summer sea ice at a rate of 11% every ten years. Scientists are projecting that the last area in which summer sea ice will persist is around Canada's High Arctic Islands and northern Greenland. This is the core of an area that will likely be important ecologically because of the life that is associated with sea ice, and will likely also be culturally important to Inuit. The persistent summer sea ice habitat of the Last Ice Area will provide the high arctic with an area that is likely to experience less change than other parts of the Arctic. This makes it very important to conserving at least a portion of the Arctic in something close to its present state. WWF is supporting a 2 day workshop in Iqaluit, Nunavut in June 2013 that will present information about the Last Ice Area, encourage contributions of new information, and examine options for how this *Last Ice Area* could be managed. The workshop will review the existing knowledge on the region (both traditional and scientific) and projections for its future.

Objective:

The workshop is an important step in the process to begin discussions about the future management of a unique region– the last summer sea ice area. The future of the Arctic is a global concern, with many organizations and states advocating for different management approaches. It is WWF's intent that the workshop will provide one avenue for Inuit to be part of the international conversation, along with other stakeholders. The workshop outcome will be a report that will reflect what we heard and will supply ideas for what next steps should be taken, and by whom.

Participants:

Inuit organizations, Governments, Industry, Academics, NGOs and individuals in both Nunavut and Greenland.



for a living planet®

The Last Ice Area Workshop

June 4-5, 2013

Frobisher Inn, Iqaluit, NU

Agenda

Day 1 – Tuesday June 4 2013

8:00 Registration

8.30 Light Breakfast/ Coffee

9:00 WWF welcome

9:03 Welcome addresses
Deputy Mayor of Iqaluit – Mary Wilman
Nunavut Tunngavik Incorporated, Vice-President James Eetoolook
Representative from Greenland – Nikolaj Jeremiassen, Siumut, Member of
Inatsisartut/Greenland Parliament
Representative from the Government of Nunavut – Joe Adla Kunuk, Deputy
Minister, Executive and Intergovernmental Affairs

9:25 Introduction to the Last Ice Area (LIA)
Review of the history and intent of the project, investments to date
Speakers: Clive Tesar – WWF-Global Arctic Program, Mette Frost - WWF
Denmark, Vicki Sahanatien – WWF Canada

9:35 Keynote Address
Trends and Challenges
Speaker: Madeleine Redfern, LLB, President of Ajungi Arctic Consulting Group;
Former Iqaluit Mayor

10:05 The Physical Picture
What is projected to happen with the ice? Future Scenarios – sea ice of the Arctic
Archipelago

Report July 12, 2013

Speaker: Bruno Tremblay, Professor, Atmospheric and Oceanic Sciences, McGill University

10:35 Break

10:50 The Biophysical Picture
The ecological implications of what will happen with changes in sea ice -from micro-organisms to vertebrates
Speaker: Warwick Vincent, Scientific Director Centre d'etudes Nordiques, Professor & Canada Research Chair, University of Laval

Day 1 - continued

11:20 Traditional Ecological Knowledge of LIA
Speaker: Pitsey Moss-Davies - Inuit Circumpolar Council

12:05 Lunch

1:15 Questions and Answers with morning presenters
Participants have the opportunity to ask questions and seek clarifications/further information on topics presented
Moderated by Clive Tesar, WWF-Global Arctic Program

2:00 Cultural implications of Ice Change – what would this change mean to Inuit?
Ice, harvest and hunting, wildlife, culture and climate change
Speaker - Nunavut: Theo Ikummaq, Igloodik
Speaker - Greenland: Mads Ole Kristiansen, Qaanaaq

3:00 Break

3:15 Socio-economic Implications of Ice Change
Discussion of what opportunities are foreclosed and created by the change in ice conditions, followed by Questions & Answers with audience
Speakers:

Genevieve Carr, Ph.D., Northern Petroleum and Mineral Resources Branch - Aboriginal Affairs and Northern Development Canada

MajaSofieBurgaard, Bureau for Minerals and Petroleum, Greenland Government
Potentials for mineral and hydrocarbon development in the Greenland Last Ice Area

Martin von Mirbach, WWF Canada
Arctic shipping: recent activity, future trends

Report July 12, 2013

- 5:00 Wrap up and review of Day 1
- 6:30 Dinner –Shuttle Bus from Frobisher Inn to Sylvia Grinell Park Pavillion at 5:45 pm. Country (local) foods to be served. Shuttle will return from the park at approximately 8:30 pm. *Please note that there may be some walking through snow involved to get to the pavilion, so please dress appropriately (boots and jackets recommended).*

Report July 12, 2013

Day 2 – Wednesday June 5 2013

- 8:30 Light Breakfast/Coffee
- 8:45 Management options
Examples from other places
Speaker: Martin Sommerkorn, WWF Global Arctic Programme
- 9:00 Management view from the Government of Canada
Plans to respond to changes in sea ice condition – efforts in conservation,
research
and development
*Speaker: Dr. Marie-Claude Fortin Conseillère scientifique/Science Advisor
Pêches et Océans/Fisheries and Oceans Canada*
- 9:45 Management view from the Government of Greenland
Plans to respond to changes in sea ice condition – efforts in conservation,
research
and development
Speaker: Martin Schiøtz, Nature Division Lead, Greenland Government
- 10:30 Break
- 10:45 Questions and Answers with WWF
Answering questions about the Last Ice Area project
- 12:00 Lunch
- 1:00 Management options for ice change?
Discussion and Questions for participants: what options do people favour to
manage the Last Ice Area? What are the principles that should inform that
management? What are the steps required to reach desired management
options?

A view from Greenland
Speaker: Naaja Nathanielsen, IA, Member of Inatsisartut/Greenland Parliament
- 2:50 Endnote
Vision and Ideas for the Last Ice Area
*Speaker: Josef Tuusi Motzfeldt, former President of Inatsisartut/Greenland
Parliament (2009-2013)*
- 3:40 Closing Remarks
Summary of the workshop, next steps – where to from here?
*Speakers: Clive Tesar – WWF-Global Arctic Program , Mette Frost WWF -
Denmark, Vicki Sahanatien – WWF-Canada*
- 4:15 Workshop concludes

Report July 12, 2013

Report July 12, 2013

Resources

WWF

http://wwf.panda.org/what_we_do/where_we_work/arctic/last_ice_area/

http://www.wwf.dk/wwfs_arbejde/gronland_og_arktis/

Arctic Council Conservation of Arctic Flora and Fauna - Life Linked to Ice

www.arctic-council.org/index.php/en/document-archive/category/443-caff?download=1729:life-linked-to-ice

Inuit Circumpolar Council

<http://www.inuitcircumpolar.com>

ICC has recently launched a CBM Atlas (www.ArcticCBM.org)

Inuit Qaujisarvingat / Inuit Knowledge Centre

<http://www.inuitknowledge.ca>

Living Cybercartographic Atlas of Indigenous Perspectives and Knowledge

<https://gcrc.carleton.ca>

Polar Data Catalogue

<http://www.polardata.ca>

CEN

<http://www.takuvik.ulaval.ca/host/host.php>

ArcticNet

http://www.arcticnet.ulaval.ca/research/summary.php?project_id=45

Geomatics and Cartographic Research Centre (GCRC) - SIKU Atlas

<http://sikuatlas.ca/index.html>

National Snow and Ice Data Centre

<http://nsidc.org/arcticseaicenews/>

ARCUS

Report July 12, 2013

<http://www.arcus.org/witness-the-arctic/2011/2/article/1661>

Canadian government

Department of fisheries and Ocean Climate risk assessment

<http://www.dfo-mpo.gc.ca/science/oceanography-oceanographie/accasp/index-eng.html>

Aboriginal Affairs and Northern Development Canada

<http://www.aadnc-aandc.gc.ca/eng/1329158189051/1329158264671>

Environment Canada: <http://www.ec.gc.ca>

Greenland Government

Greenland Government, Ministry for Housing, Nature and Environment. Overview of protected areas
http://dk.vintage.nanoq.gl/Emner/Landsstyre/Departementer/Dep_for_boliger_Natur_og_Miljoe/NaturAfd/Nunat%20eqqissimatitat.aspx

Greenland Government, Ministry for Domestic Affairs, Nature and Environment. National Park/Man and Biosphere Reserve Workshop, Nuuk (May 2010). Presentations are found here:

<http://naalakkersuisut.gl/da/Naalakkersuisut/Departementer/Boliger-Natur-og-Miljoe/Naturafdelingen/Nationalparken-i-Nord-og-Oestgroenland/Workshop-2010>

Greenland Government, Ministry for Domestic Affairs, Nature and Environment. Redegørelse FM 2010. Status for strategiarbejdet om Nationalparken og Biosfæreområdet i Nord- og Østgrønland.

<http://naalakkersuisut.gl/~media/Nanoq/Files/Attached%20Files/Natur/DK/Nationalparken/Redeg%C3%B8relse.pdf>

Greenland Government, Bureau for Minerals and Petroleum. Website with information on current licenses, legislation, current strategies (2009 hydrocarbon strategy and 2009 mineral strategy).

<http://www.bmp.gl/>

Danish Center for Environment and Energy (formerly DMU). Biologiske beskyttelsesområder i nationalparkområdet, nord og østgrønland. Faglig rapport 729 (2009). Mapping biological hot spots in the Greenland National Park area.

<http://www2.dmu.dk/pub/fr729.pdf>

Danish Center for Environment and Energy (formerly DMU). Identifikation af sårbare marine områder i den grønlandsk/danske del af Arktis. Videnskabelig rapport 43 (2012). Scientific report mapping vulnerable marine areas in relation to shipping in Greenland.

<http://www2.dmu.dk/pub/sr43.pdf>

Report July 12, 2013

Report July 12, 2013