

SUMMARY

■ PAGE 3

Toxics in the Arctic

The Arctic indigenous people show signs of contaminant levels that supersede sources in their own neighborhood.

■ PAGE 4

Glaciers indicate global change

In South America a number of glaciers are showing signs of change. One scientist believes these changes are linked to the globally changing climate.

■ PAGE 5

First Arctic Human Development Report

The first ever Arctic Human Development Report will be released in 2004. New methods and concepts were designed for this very special task.

■ PAGE 5

Farmed fish on the plate

Sealice, contaminated discharge and escaping fish remain a problem for the fastest growing food sector in the world. In the Barents Sea they struggle with all of these challenges.

■ PAGE 6

Climate changing what we eat

Some of the animals that indigenous people eat will have totally different living conditions as a changing climate alters our world. In the Canadian north the health of indigenous peoples depend on these animals.

■ PAGE 6

Russia's remote communities

Improved health, self-governance and education in the indigenous communities in Russia are hindered by the fact that the communities are remote both in terms of actual distance and the distance to authorities.

■ PAGE 8

Seven ministers on the Arctic ice

Seven ministers, one assistant secretary and the UNEP executive director spent a week on the Svalbard ice in northern Norway. Five of them recall their experiences from the trip and suggest future directions for the Arctic environmental agenda.

■ PAGE 10

Conventions and the Arctic people

In a double pager, the *Polar Environment Times* outlines which Multilateral Environmental Agreements (MEAs) impact on the Arctic people.

■ PAGE 12

Oil exploitation in northwest Russia

About 11,000 people can have their lives turned around if this area in northwest Russia will see further oil exploitation. Conflicts tighten between the indigenous peoples, the oil companies and the local authorities.

■ PAGE 15

2007: Next Polar Year

In four years the next International Polar Year will take place and the preparations are increasing by the days.

■ PAGE 15

Reindeer and Saamis on the run

Saamis and their reindeer herds might soon be on the run away from their traditional ranges as oil exploitation is planned in the Barents Sea region.

PAGE 8

SEVEN MINISTERS ON THE ARCTIC ICE

OLE MAGNUS RAPP



ANDRES RIVERA/CECS

PAGE 4

GLACIERS INDICATE GLOBAL CHANGE



New bombing ranges and their impact on Saami traditions

The Saami Parliament and local reindeer herders are protesting against Norwegian and NATO plans to expand bombing exercises in the traditional summer ranges of Halkavarre, northern Norway. Halkavarre has been used for hundreds, perhaps thousands of years as summer and calving grounds for reindeer, and also contains numerous ancient Saami sacred sites including *sieidit* (stones where gifts and sacrifices were laid down) and *álda* and *sáivu* (sacred hills). The Saami Parliament has raised the issue with the UN International Labour Organization (ILO)-convention and with the UN High Commissioner on Human Rights (UNHCHR). **BY CHRISTIAN NELLEMAN AND INGUNN VISTNES**



BRYAN AND CHERRY ALEXANDER

Blue fiords, snow covered mountain tops, and early blossoming flowers are the first sights that reindeer calves see when they are born in spring on the ranges of Halkavarre in northern Norway. These ranges have been used by the Saami herders for hundreds of years. However, the region is also one of the few areas in Europe which provides opportunities for low-level flying training and combined military exercises involving ground, air and naval forces. Testing of missile systems by Norwegian and allied forces has also been proposed for the area.

Not a new conflict

Over the years there have been many

disputes between the local Saami people and military and government authorities, and relationships have often been characterized by extended legal proceedings. The last formal agreement

the Norwegian Ministry of Defence now wants to expand the existing bombing ranges by up to 500 km²

between the parties on the extent of bombing exercises in the Halkavarre reindeer lands ended in 1996, and for nearly a decade no new agreement has been signed. The Norwegian Ministry of Defence now wants to expand the existing bombing ranges by up to 500 km², plans which have been met with bitter

opposition from the indigenous people in the area.

Mr. Anders S. Utsi, a reindeer herder, was born in a *lavvu* (a Saami tepee tent) in the summer 80 years ago in the middle

the reindeer and the land." Eira goes on to express her commitment to fight for their right to continue their lifestyle in the lands where they have always lived.

The consequences of new military agreements

However, the needs of the defence forces appear to be changing. Recently, Kristin Krohn Devold, the Norwegian Minister of Defence agreed to the location of a new NATO command centre in Jättå, southern Norway. At the same time a practice bombing range was closed in the south, increasing the motivation to find new practice areas in the north.

CONTINUED ON PAGE 2



BRYAN AND CHERRY ALEXANDER

EDITORIAL

Welcome to the Polar Environment Times!

Last year saw the first edition of the *Arctic Environment Times*. This year it has been re-named the *Polar Environment Times* to reflect the incorporation of contributions received from the southern latitudes. **BY STEINAR SØRENSEN AND THE TIMES EDITORIAL TEAM**

The Antarctic and Arctic have many similarities as mentioned in the contributions – most particularly as sensitive indicators of global climate change. The disintegration of the Larsen Ice Shelf on the Antarctic Peninsula that has been proceeding over the last few years has been mirrored most recently in the breakup of the Arctic's largest marine ice shelf, the Ward Hunt in northern Canada.

The Arctic also stands in contrast to the Antarctic in that it has a permanent human population that calls it home. Many of the contributions in this edition of the *Times* reflect in particular the perspectives of Arctic indigenous peoples, and this continues to be a priority for us at GRID-Arendal. We were especially pleased to be able to host a seminar in Arendal in September with the participation of a number of indigenous representatives, the Indigenous People's Secretariat, and the Chair of the Arctic Council, and note that a number of the articles appearing here were generated from the vibrant discussions that took place.

The Arctic remains high on the political agenda, as can be seen from our Ministerial correspondents who write cogently about a range of Arctic issues. The recent expedition to Svalbard hosted by the Norwegian Minister for the Environment, Børge Brende, has had a visceral impact on the participants. The will to make real progress on the Arctic environment and sustainable development issues exists now perhaps as never before.

The issues are real and daunting: the impacts of climate change and pollution on ecosystems and humans; the unsustainable and damaging exploitation of natural resources; the fragmentation of habitats; and threats to traditional ways of life from the development of infrastructure; and, other pressures. New issues are also arising, and it is the intent of the *Polar Environment Times* to provide a canvass for all stakeholders to voice their concerns and perspectives.

GRID-Arendal wholeheartedly thanks the contributors to this edition of the *Polar Environment Times*, and invite our readers to provide feedback and to read more articles on our web site, www.grida.no/environmenttimes. We look forward to continuing our work representing UNEP in the polar regions and working in cooperation with our Arctic and Antarctic stakeholders.

Cheers!

STEINAR SØRENSEN is the Managing Director of GRID-Arendal. The **TIMES EDITORIAL TEAM** consists of **KATHRINE I. JOHNSEN**, *Polar Environment Times* coordinator and leader of the Arctic Indigenous Peoples' Programme; **MARIANNE HARTZ**, Media and Information Officer; **CHRISTIAN NELLEMANN** who leads the Global Methodology for Mapping Human Impacts on the Biosphere (GLOBIO) initiative; **TIINA KURVITZ**, Manager for the Global Environment Facility ECORA project for the conservation of biodiversity in the Russian Arctic; and **KEITH FINLAYSON**, Polar Programme Manager.

CREDITS

POLAR ENVIRONMENT TIMES NO.3

Published by **GRID-Arendal**
Longum Park, Service Box 706
N-4808 Arendal, Norway
Tel: +47 37 03 56 50
Fax: +47 37 03 50 50
e-mail: polartimes@grida.no
www.grida.no/environmenttimes

Editorial team:	Assisted by:
Kathrine I. Johnsen	Tracey Taylor
Marianne Hartz	Janet Fernandez Skaalvik
Keith Finlayson	
Christian Nellemann	
Tiina Kurvitz	

The opinions expressed in the articles submitted to the *Polar Environment Times* are those of the authors only, and are not necessarily official positions of UNEP, GRID-Arendal or any cooperating agencies. The designations employed and the presentations do not imply the expression of any opinion whatsoever on the part of UNEP, GRID-Arendal or cooperating agencies concerning the legal status of any country, territory, city or area of its authorities or of the delineation of its frontiers or boundaries. Mention of a commercial company or product in this paper does not imply endorsement by UNEP or GRID-Arendal. The use of information from this publication concerning priority products for publicity or advertising is not permitted.

The publication of the *Polar Environment Times* is facilitated by the GRID-Arendal Publication Service. For subscription and other inquiries please visit www.grida.no/environmenttimes.

Printed at Agderposten Trykk
August 20, 2003
2000 copies

The Arctic – a new victim of global development?

The vision of the Arctic before the global community is a contradictory one. While on the one hand it is seen as the last frontier – a limitless, rich environment that can be exploited for commercial gains – it is also seen as an unspoiled area of pristine beauty, which can and should be preserved in all its glory. **BY SVEIN TVEITDAL**

The Arctic is both rich and extremely vulnerable – rich in natural resources such as timber, oil, gas, minerals and fish. Vulnerable since these resources are getting increasingly attractive to industry, consumers and decision makers located far beyond the Arctic.

Resource exploitation is already creating environmental hot spots in the Arctic as it faces reduction of its wilderness area by 50 percent over the next fifty years if strong action is not taken to protect it. Global climate change warms this region at a rate twice the world average, melting sea ice, interrupting the food chain, and threatening wildlife on which some indigenous populations depend on for food, medicine, and clothing. Long distance air pollution emanating from main industrial areas of the world is poisoning the entire food chain from micro-organisms to human beings.

The Arctic's indigenous peoples that have lived in harmony with the Arctic nature for thousands of years are now seeing their existence threatened by global development, even bringing some groups to the brink of extinction. It is important to remember that these Arctic peoples are not the causes of the environmental deterioration – the major

impacts are coming from activities beyond their direct control and from regions far removed from their home.

Nature might however strike back. The threat to the Arctic is also a threat to the global environment and the well being of everyone on the planet. Arctic climate change and melting of permafrost accelerates global warming. Reduction of species and wilderness contributes significantly to a reduction in global biodiversity. Over-fishing puts the global catch at stake.

Do special conditions exist for a different kind of sustainable development of the Arctic region? Will Arctic development become just a component of the development process that has characterized the rest of the world? Will traditional Arctic societies and cultures be taken as a basis for sustainable development in the region? Will an alternative model of development specific to this region emerge?

I know answers to these questions are not easy. They challenge the very basis of the current process of globalisation. After all, it must not be forgotten that the Arctic region has over the years become a well-integrated part of the international political and economic



CONTINUED FROM PAGE 1

Press releases from the Ministry of Defence on June 12th and 23rd 2003, suggest that an increase in allied training exercises will accompany the new NATO command center.

Feelings among the Saami people and representatives are running high. "Norway offers traditional Saami reindeer areas to NATO for bombing purposes totally without our consent or approval", says Sven-Roald Nystø, president of the Saami Parliament. Ragnhild Nystad, vice-president of the Saami Parliament adds: "Completely unacceptable without any agreement with the Saami people. Sacred sites must be left in peace and it is very disrespectful to the Saami people to do this", a message conveyed also by Samuel John N. Anti, chief of the local herder district.

"NATO has never bombed or will target any location with religious or sacred sites. We only address strictly military targets. That also applies to training and exercises, of course, and we trust that member countries do the same. We would be most opposed to any such thing", says Francois Le Blevenec,

press officer at NATO, Brussels.

In Norway, the response to the issues being raised with UN officials by the Saamis is measured: "We do not consider this a formal complaint to UNHCHR and thus not legally binding in any way", says Eirik Bergersen, spokesman for the Norwegian Ministry for Foreign Affairs. "Besides, in order to have any legal effect, the Saamis will need to have exhausted national level procedures – including all court systems – before they can complain. Norway supports the ILO Convention and works internationally to support indigenous rights. But we were not aware that any sacred or religious sites were involved in these existing or proposed bombing ranges", he says.

Unregulated piecemeal development can be devastating

In addition to the concerns raised by expanding military exercises, there are significant issues about increasing private and public sector development in the Barents region, and the impacts this may have on the Saami people. Some studies suggest that over one third of the traditional lands – used for reindeer

system. Can the Arctic region develop the means to escape the depletion of its natural resources that form the basis of our current developmental model?

UNEP welcomes the initiatives and efforts made by the Arctic Council in assessing the state of the Arctic environment and making recommendations to policy makers on its conservation. We also welcome similar efforts made by parliamentarians, indigenous peoples and the scientific community of the region through the University of the Arctic.

UNEP is also pleased that through enhanced environmental awareness, action is being taken by the Arctic governments and stakeholders to protect the Arctic environment. Clearly, sustainable development of the Arctic is an emerging challenge that only can be achieved through global cooperation and action.

UNEP, with its key polar centre GRID-Arendal, is dedicated to placing the sustainable development of the Arctic on the global agenda. Amongst our main priorities are the Arctic environment and a sustainable future for the Arctic indigenous peoples. Their survival and future well-being will be the best indicator of sustainable development of this rich but vulnerable region of the world.

This increased awareness and the willingness of the partners to work together for the Arctic will be on the global agenda both at the Special Session of UNEP' Global Ministerial Environment Forum in March next year in the Republic of Korea as well as that of the Commission of Sustainable Development meeting in New York in April 2004.

SVEIN TVEITDAL is the Director of the Division of Environmental Policy Implementation (DEPI) and Officer-in-Charge of the Division of Environmental Conventions (DEC) in UNEP. Previously he served as Managing Director for GRID-Arendal.

grazing over thousands of years – may already be lost due to piecemeal development of roads, powerlines, dams and recreational cabins. By 2050 – in a scenario of unregulated development – as much as 78 percent of the vital coastal summer grounds may no longer be viable for reindeer herding. The proposed opening of the Barents Sea for full oil exploration also has the potential to contribute to coastal development and provoke further disputes over land use. Similar conflicts between development and the chosen lifestyles of indigenous people arise around the Arctic. The Nenets people in the Yamal Peninsula of Russia are being affected by oil and gas exploration and development, and similar issues arise in Alaska and much of northern Canada. Indigenous peoples have often fought against – but have also sometimes successfully cooperated with - multinational power and oil companies.

While protocols are developed to address climate change issues, the issues of military activities and piecemeal development conflicting with traditional land use still presents one of the greatest policy gaps in the Arctic. Without facing up to these issues, hope will dwindle for many who wish to live with the land as hunters or herders.

CHRISTIAN NELLEMANN is a Senior Associate in the GRID-Arendal Polar Programme, and is working on a report on the possible futures for the Saami people and their traditional lifestyles in the Barents region. The report will be released in the spring of next year. **INGUNN VISTNES** holds a position in the Department of Ecology and Natural Resource Management at the Agricultural University of Norway. She has conducted research in the Polar regions with emphasis on development, indigenous peoples, and impacts on wild and domestic reindeer



Why the Arctic matters

Several years ago, scientists studying the effects of toxic chemicals found in the blood of people from heavily industrialized areas decided that they needed to compare these people with another group who would not have such chemicals in their blood. They went to the Arctic, thinking that would be the least likely place to find toxic chemicals. **BY JOHN CRUMP**

However, when the scientists examined blood taken from the Arctic people they were surprised by the high levels of toxins they found. Research from Arctic countries soon showed that far from being the clean, unpolluted land of everybody's imagination, the Arctic was in danger of becoming one of the more polluted spots on earth. Air and water currents carry the chemicals to the Arctic. Once there, they tend to stay. They are taken up by Arctic plants and animals and ending up in the bodies of indigenous peoples who rely on local foods.

Survival or store foods

For Arctic indigenous peoples, contaminants are an issue of survival. Most people still rely on the land for a large portion of their nutritional intake. If they can not eat locally available food – seal, walrus, fish, polar bear – there will be direct health consequences. Even with the current contaminant load, in most

Saami are seeing their reindeer grazing pastures change, Inuit are watching polar bears waste away because of a lack of sea ice, and peoples across the Arctic are reporting new species

places it is still better to eat this food than substitute fatty, high calorie but low nutrition store-bought foods. Study after study has confirmed the benefits to human health of wild food. And for Arctic indigenous peoples, eating local food is tied to their identity and value systems.

Arctic indigenous peoples used the information from these studies on toxins to lobby for international negotiations. Their influence was important in two international environmental treaties – the Aarhus Protocol on Persistent Organic Pollutants (POPs), which was signed in Denmark in 1998 and came into force earlier this year, and the Stockholm POPs Convention, signed in 2001.

Through these negotiations, indigenous peoples from around the Arctic formed an effective coalition that raised awareness, lobbied delegates and

governments, and conducted an effective media campaign. As a result, the Stockholm Convention is the first such agreement that specifically mentions the Arctic and its indigenous peoples. The Chair of the Stockholm negotiations, John Buccini, described the role of the indigenous peoples as “putting a human face on what many people considered a scientific or abstract issue.”

Climate change in the Arctic

Now, indigenous peoples are bringing their concerns, perspectives and influence to bear on an even larger issue: climate change. Evidence of climate change is being seen and felt in the Arctic right now.

Saami are seeing their reindeer grazing pastures change, Inuit are watching polar bears waste away because of a lack of sea ice, and peoples across the Arctic are reporting new species, particularly insects. Some communities

have to sandbag their shorelines to try to slow down an increase in coastal erosion, while in others buildings, pipes, and roads are slumping because the permafrost is thawing. Vital travel routes linking communities to each other and to harvesting sites are becoming dangerously unpredictable.

All Arctic climate information in one place

These observations are informing the Arctic Climate Impact Assessment (ACIA), a project of the Arctic Council and the International Arctic Science Committee (IASC). The ACIA will be submitted, along with a plain language summary and policy recommendations, to the Foreign Ministers of the eight Arctic Council nations at the Arctic Council Ministerial meeting in Iceland in September 2004.

The assessment is an attempt to

gather all of the information on climate change in the Arctic and to predict future changes. It will also recommend steps to governments and northern peoples that could be taken to reduce the amount of change, and the negative impacts of that change. The original direction from the eight Arctic Council states was to consider the environmental, social, economic and cultural implications of climate change. This means indigenous peoples have a key role in this process.

This is one of the first attempts to incorporate indigenous knowledge and perspectives on a regional basis. This partnership lays the foundation for future collaboration and sets a benchmark against which all other Arctic Council projects will be measured.

Indigenous peoples help with assessment

Having indigenous peoples intimately involved with the collection of data, producing the assessment, and drafting policy recommendations is important. It brings to the debate some important allies. Arctic indigenous peoples are likely to be in the forefront of any international campaign to raise awareness about the assessment, its results, and its recommendations. Needless to say, part of this campaign will be designed to put pressure on the very governments that instituted the study – to get them to take the lead in negotiating new international agreements.

Having indigenous peoples speaking about the assessment and the recommendations will be important to their marketability. Indigenous peoples are participating with country representatives in developing these recommendations, and this will lend them greater weight and acceptability. Their voices will reinforce the message that the Arctic is an indicator region for global environmental health.

JOHN CRUMP is Executive Secretary of the Arctic Council Indigenous Peoples Secretariat in Copenhagen. The views expressed in this article are personal.

The impact of climate change on traditional food

Northern food production systems are under stress from a variety of forces. Many northern aboriginal communities experience periods of crisis in food supply due to the temporal fluctuations in natural food resources. **BY CINDY DICKSON**

Climate change will increase temporal fluctuations in species distribution, population abundance, morphology, behaviour and community structure. Some of the predicted and currently experienced changes in the north may create positive changes in animal numbers and distributions or provide opportunities to hunt new species as migration patterns and distributions shift.

The Canadian north is vast, rich in natural resources and includes the boreal forest, taiga and Arctic ecosystems. Indigenous peoples top the food chain in all three ecosystems. Athabaskan peoples in northern Canada eat large quantities of traditional foods obtained through hunting, fishing, trapping and gathering. Since market foods are much more expensive in many northern communities than in the south, traditional food provides many components of a quality diet at relatively low cost.

Besides its nutritional values, the traditional diet is also a source of cultural strength and is critical for the social, mental and spiritual well-being of individuals and communities.

Improving indigenous health?

The potential health effects of fluctuations of natural food resources on indigenous peoples may be indirect as well. Environmental contaminants, long-range transport, accumulation and biomagnification in the Arctic environment will be affected by climate change. Predicting how climate change will alter contaminant mechanisms in the Canadian north in a global environmental context remains a challenge. Traditional foods can also provide protection against many diseases, which are more prevalent among southern populations. Environmental influences on the availability of and ac-

cess to these important sources of food, present the risk of losing these beneficial factors as well.

A project developed in partnership by two members of the Arctic Athabaskan Council, the Council of Yukon First Nations (CYFN) and Dene Nation, as well as the Inuit Tapiriit Kanatami and the Center for Indigenous Peoples Nutrition and Environment (CINE) of McGill University and Laval University will investigate the potential health impacts of climate change on three northern Indigenous communities.

The effects of climate changes in the north on indigenous peoples' ability to locate and procure these physically, social, culturally, mentally and economically important food sources are not simply predictions for the future, they are a reality in many communities today. However, the extent of these impacts and their implications for the nutritional well-being of individuals and communities is not yet well understood.

The project will work to develop strategies for adaptation to minimize potential impacts on the communities involved. These strategies will integrate local and traditional knowledge, wildlife biology, information on toxicology of environmental contaminants, food composition and nutrient requirement, food availability and effects of environmental changes, cultural and socioeconomic factors. Education and communication initiatives are also planned to assist individuals in making their own informed decisions on food choice.

Appropriate adaptation strategies will be cooperatively developed in the three communities. These strategies will be of value for environmental and health-planning exercises throughout the Canadian north and potentially the circumpolar world in the face of climate related changes.

CINDY DICKSON is the Executive Director of the Arctic Athabaskan Council.

OPINIONS OF THE WORLD

Climate change is a weapon of mass-destruction

Sir John Houghton, co-chair of the Scientific Assessment Working Group of the Intergovernmental Panel on Climate Change and former Chief Executive of the Meteorological Office, wrote in *The Guardian* in July 2003 that global warming is a “weapon of mass-destruction”. He said: “...And yet our long-term security is threatened by a problem at least as dangerous as chemical, nuclear or biological weapons, or indeed international terrorism: human-induced climate change. Like terrorism, this weapon knows no boundaries. It can strike anywhere, in any form – a heatwave in one place, a drought or a flood or a storm surge in another. Nor is this just a problem for the future. The 1990s were probably the warmest decade in the last 1,000 years, and 1998 the warmest year. Global warming is already upon us.”

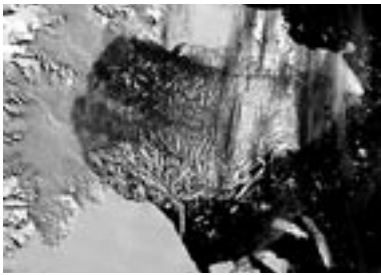
Source: *The Guardian*

New concerns on the stability of the west Antarctic ice sheet

Increased global temperatures are taking their toll on the Antarctic ice shelves. Here are eight points of concerns regarding the west Antarctic Ice Sheet. **BY GINO CASASSA**



BELOW MODIS satellite image of the collapse of Larsen B ice shelf.



1. Antarctica accounts for 91 percent of the total mass of ice on the Earth, contained in a vast ice sheet up to 4.6 kilometres thick. If the Antarctic ice were to melt entirely, it would raise global sea level by 55 metres, a truly catastrophic scenario. Thankfully, this full-scale melt-down of the Antarctic ice is unlikely to occur over the East Antarctic Ice Sheet (EAIS), which accounts for 50 metres of global sea level and is considered stable because its bed lies well over sea level.

2. Some believe that the interior of the Antarctic continent is too cold to be affected by potential melting produced by surface warming of a few degrees expected to occur from over the next century. On the contrary, parts of inland Antarctica, such as the South Pole, are growing because of enhanced snow precipitation in a warmer atmosphere, which can retain higher humidity.

3. However global warming is already having a discernable effect on the fringes of the continent, as evidenced by the dramatic break-up of the Larsen A ice shelf and other smaller floating ice shelves on the Antarctic Peninsula, where summer temperatures are frequently above zero.

4. There is evidence that these peripheral changes are having a strong effect on glaciers of the inland Antarctic ice due to ice dynamics. The glaciers that used to feed Larsen A ice shelf have accelerated threefold after the collapse of the ice shelf, suggesting that the ice shelves have a critical role in restraining the flow of the inland ice. A similar behaviour might be occurring on the Amundsen Sea sector of the west Antarctic Ice Sheet (WAIS), where Pine Island and

Thwaites glaciers have lost significant portions of their fringing ice shelves, and show signs of recent acceleration. This ice sheet is a fraction of the size of the dominating east Antarctic ice sheet, but its mass is still great enough to raise global sea-level by five meters.

5. The east Antarctic ice sheet is known as a continental ice sheet since it is supported by land above sea level. Unlike its eastern sister, the western ice sheet is a marine ice sheet which is grounded on bedrock well below sea level. In addition, the underlying bedrock in many areas has a downward slope away from the coastline. This circumstance could result in a run-away effect leading to total collapse should the edges of the ice sheet start to retreat due to an initial trigger such as atmospheric and/or oceanic warming. The western ice sheet would therefore largely disappear if the ice would melt.

6. The west ice sheet has been the subject of considerable research over the last 25 years.

Theoretical: Modelling has been developed to understand the nature of potential instability of West ice sheet, and the roles that ice shelves play in stabilizing the ice sheets. Differing views exist on the importance of the buttressing effect of ice shelves. Early models predicted an important stabilizing role of ice shelves, but later more sophisticated models suggested an insignificant role of ice shelves. There is now compelling evidence that shows the relevant stabilizing role of ice shelves, and in a few cases this new information is already being incorporated into the models.

Experimental: Of the major glaciers – ice streams – in the Antarctic Peninsula and

in western Antarctica studies are being conducted to detect whether they are speeding up or slowing down. Results in the west ice sheet are contradictory. Ice streams in the Ross Sea sector are slowing down while the glaciers in the Weddell Sea are in near steady state.

Overall conclusion reached by the scientific community by the mid-1990s was that the west ice sheet appeared to be relatively stable, and any retreat of the ice sheet would occur relatively slowly over hundreds or thousands of years, despite loss of ice shelves.

7. Over the last few years, new evidence that changes may indeed be happening faster than previously thought has emerged:

Recent satellite image analyses show that the ice streams in the Amundsen region are clearly retreating, thinning and accelerating, particularly Thwaites and Pine Island glaciers;

New theoretical models suggest that ice shelves are important for the stability of ice sheets;

Small glaciers on the Antarctic Peninsula have speeded up greatly following the collapse of the Larsen A ice shelf.

8. A new urgency has been injected into the study of the stability of West ice sheet. A team from the Center for Scientific Studies of Santiago (CECS), NASA and the German Geological Survey (BGR) plans a new series of investigations, concentrating on the Amundsen Sea region in 2004/2005.

GINO CASASSA is Head of the Glaciology and Climate Change Laboratory at Centro de Estudios Científicos in Valdivia, Chile. He is the glaciology representative of Chile's Scientific Committee for Antarctic Research (SCAR), and member of the International Council of Scientific Unions (ICSU) Planning Group for the International Polar Year 2007. He is currently also the head of the Andean Working Group on Glacier Mass Balance sponsored by the International Commission on Snow and Ice/International Association of Hydrological Sciences.

South American glaciers on the retreat

Recent studies indicate that most of the South American glaciers are drastically reducing their volume at an accelerated rate and could even disappear in the next few decades. **BY GINO CASASSA**

Southern South America accounts for about 65 percent of all Andean glaciers. The main areas in this region are the northern Patagonia Icefield with an area of 4,200 km², the southern Patagonia Icefield with an area of 13,000 km², and Cordillera Darwin with an area of 2,000 km². These icefields contain the largest glaciers in the southern hemisphere outside of Antarctica, and are a potentially invaluable source of present and past environmental information from the mid-latitudes, providing a link between the southern tropical and equatorial regions and Antarctica.

There are currently many examples of drastic glacier retreat within the southern South American icefields. O'Higgins Glacier has retreated 15 kilometers during the last century in what is probably the largest retreat in all of South America. A recent thinning of 14 meters a year has been measured at Upsala Glacier, and a record thinning of 28 meters a year has been detected at HPS 12 Glacier in Falcon fjord.

Glaciers of all the South American Andes, including the tropical and equatorial regions, cover a total area of 31,000 km². Although they store an equivalent global sea level rise of only a few centimeters if they were to melt completely – which represents much less than ten percent of the total volume of mountain glaciers of the world – they are presently contributing more than ten percent of total global sea level rise from mountain glaciers. Glaciers have a critical importance for the water resources in the region, and are of great significance to mining, tourism and agriculture. There have also been numerous incidents of catastrophic glacier floods and mudflows originating from glacier melt due to volcanic eruptions, which have affected human activities and settlements, causing several tens of thousands of casualties, such as in Nevado del Ruiz, Colombia, the Cordillera Blanca in Peru, east of Mendoza, Argentina, and at the Copiapó River, the Villarrica Volcano and the Paine National Park in Chile.

The Chacaltaya glacier in Bolivia, which provides water resources to the City of La Paz, is predicted to melt completely within the next 15 years if the present atmospheric warming trend continues into the future. The incidence and speed of glacial retreat has generally accelerated during the last decades, and hundreds of years old glaciers will collapse within our own lifetime.

The global picture for Andean glaciers

Although a few glaciers around the world are advancing and increasing in volume – in response to increased local precipitation, such as in New Zealand and Norway – there is an overall tendency for retreat and thinning as a result of the global climate warming observed during the last one and a half centuries, since the so-called Little Ice Age, the last cold period which affected the Earth during 1400-1900 AD.

A direct effect of glacier retreat is sea level rise. The water frozen in all the glaciers of the world, mainly in the ice sheets of Antarctica and Greenland, but also in



smaller ice caps and glaciers, would be sufficient to raise sea level by 70 meters at a global level. Global sea level is presently rising by nearly 2 millimeters per year, partly due to glacier melt.

Signs of recent glacier wastage have been detected in the ice sheets of Greenland and Antarctica, and also in many of the earth's mountain ranges, including Africa, the European Alps, the Himalayas, Alaska and the Andes.

In spite of important studies carried out on South American glaciers by European, North American, Japanese, and South American scientists, many basic scientific issues concerning the present and past glaciations in South America and their relation to climate are yet to be explored and studied. Moreover, the potential impact of the retreat of glaciers on the environment and human activities has yet to be adequately assessed.

Climate change needs to be better understood

The climate is undergoing drastic changes on a global scale, with clear evidence of recent warming. In nine of the last twelve years, the mean global average temperature has been higher than at any time since the start of historical records at the beginning of the 19th century. The mean global temperature during the 1990s is probably the warmest of the last 1,000 years according to records, and the extreme heat which affected Europe this summer is not running counter to the trend: temperatures were recorded at five to ten degrees higher than normal, in several cases exceeding 40°C.

There is a general consensus within the scientific community that global warming is at least partly due to the enhanced greenhouse effect as a result of the burning of fossil fuels since the Industrial Revolution. It is not clear yet how much of this warming is attributable to anthropogenic greenhouse gases as compared to warming due to natural climate variability since the Little Ice Age. The role of natural solar variability in global warming is also not clear. There is high priority in resolving these issues, especially considering ongoing international efforts to limit the emission of greenhouse gases, in particular the ratification of the Kyoto Protocol.

Continued research on the world's glaciers – including those of South America – will contribute important knowledge for understanding why, how and how quickly our global climate is changing.

For GINO CASASSA brief see top left article.

Climate is a north/south challenge

The *Polar Environment Times* spoke to ØYSTEIN DAHLE about the recent international climate debate on the rise of sea levels from ice melting on the poles due to increased global temperature and the consequences to developing nations like Bangladesh.

“We, in the western world, have not sufficiently recognized the fact that the changing climate is a north/south problem. We have already seen a number of the climate related extreme weather events around the world and we know that these changes first and foremost will hurt the developing nations. In the Western part of the world we have resources to meet any kind of challenge from for example rising sea levels. But in the developing world no such resources are available and the victims will be the

many poor and unprotected people”, Mr. Dahle says.

He mentions two possible strategies in which the world can deal with these issues:

“The first is the adaptation strategy, in which the world accepts that we in the future will have to deal with more frequent extreme weather events. We prepare ourselves, make sure not to settle in vulnerable areas, and we adapt in different ways. This strategy equals a defeat: We are giving up too easily.

The second and more important strategy is based on the Kyoto Protocol and the realization that the Kyoto goals are far from enough but a step on the way. We have to recognize that climate change is a human creation and that it is extremely difficult to get remove the causes, but that we have no other option than to try.”

ØYSTEIN DAHLE is director of the board for the World Watch Institute and member of the GRID-Arendal Board of directors.



Fish farming in the Arctic

Aquaculture is the fastest growing food sector in the world. In the Arctic sealice, contaminated discharge, and escaping fish remain problems. **BY DAG NAGODA AND MAREN ESMARK**

More stable and predictable production volumes, as well as large markets in the EU and the US, are among the advantages of aquaculture, the farming of marine organisms, seen from a business perspective. There is already a large salmon and trout industry in northern Norway. In northwest Russia there is some production of salmon, rainbow trout and mussels. The Russian market for seafood is growing, and both the Norwegian and Russian governments advocate further development of aquaculture in the Barents Sea Region.

Impacts of aquaculture on the Arctic environment

If properly regulated, aquaculture can provide good opportunities for local development without large impacts on the ecosystem. Poorly managed and poorly regulated aquaculture, however, can

poorly managed and poorly regulated aquaculture can have severe negative impacts through the release of excessive nutrients and chemicals, as well as escapes of farmed fish

have severe negative impacts through the release of excessive nutrients and chemicals, as well as escapes of farmed fish and the risk of disease transfer. The expansion of the aquaculture industry gives rise to two overriding concerns: the intrusion of fish farms into vulnerable marine and coastal areas, and the overall sustainability of an industry that depends on large catches of wild fish to feed farmed fish.

In the Barents Sea there are different types of aquaculture. Mussel farming is conducted in sea, with natural seeding, and apart from potential local conflicts with seabirds, this production has no significant environmental impact on the marine ecosystem. On-shore fish farming of species such as charr and trout is possible in Arctic areas, even in low temperatures, if clean water and energy for heating is available. Environmental impacts of such production are limited. However,

the extraction of freshwater from rivers can have severe impact on the river habitat. Discharge of waste water can contain harmful concentrations of nutrients, chemicals and be a potential source for infection of, for example, the lethal salmon parasite *Gyrodactylus salaris*.

Less discharge – for now

The most common aquaculture production in the Barents Sea is that of open sea cage farming of Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*). Improved farming techniques over the last ten years have severely cut the amount of nutrients released from such farms and good monitoring systems address local impacts on bottom habitats. However, sufficient regulations for controlling cumulative effects of several farms in one area are missing. The use of antibiotics has been signifi-

cantly reduced, but might increase as new species are developed and new diseases appear. Copper is toxic to marine organisms, and is used as an anti-fouling agent on nets. As the industry grows, so does the total discharge of copper.

600,000 escapees a year

The total number of escaped farmed fish in Norway in 2002 was 630 000 salmon and trout. Ecological impacts of escaped fish are mediated through habitat and feed competition, genetic pollution and the spread of parasites and infectious diseases. Historically, the amount of escaped fish has been low in Troms and Finnmark county. However, the numbers for 2002 shows that at Kinn, in Troms/Nordland, there was an alarming 48 percent of farmed fish caught in the sea fishery. In the Altavassdragnet (Altariver) the catch included 20 percent escaped fish in 2002.

Sealice infect the fish

Sealice is another problem connected with fish farming. The louse is a marine parasite, naturally occurring on salmonids. More than ten lice can be lethal to migrating smolts. The millions of farmed fish that stay in coastal areas all year round now serve as a host for the sealice and can be a reservoir for the parasite. In 2002, results from Møre and Romsdal County up to Finnmark County show that infections of sealice are significant, and are likely to affect local stocks of seatrout and Arctic charr.

Indirect impacts on wild fish stocks

Because most species used in marine fish farming are carnivores, fish farming causes a high demand for fatty and protein-rich fish feed. Most fish species used for fish feed are important for the marine ecosystem, as they are prey for fish, birds and mammals. In Norwegian fish farms, 1 kg of farmed salmon requires 3–4 kg of wild caught fish. Species occurring in the North Atlantic, such as capelin, herring, Norway pout and blue whiting are frequently used in fish feed. An expansion of the aquaculture industry in the Arctic will therefore increase pressure on wild fish stocks.

Given the increasing interest in aquaculture in the Barents region and its potential negative impacts on the ecosystem, the mitigation measures undertaken in the future will decide if the industry develops in a sustainable fashion or turns into a new major threat to the biodiversity in the Barents Sea.

DAG NAGODA is the Barents Sea Coordinator and **MAREN ESMARK** is the Marine Conservation Officer at WWF-Norway.

This text is part of a large report to be published in November 2003 by WWF, A Biodiversity Assessment of the Barents Sea Ecoregion. Please contact WWF's Barents Sea Program for more information at + 47 22 03 65 00 or info@wwf.no

Understanding human development in the Arctic

A first-ever Arctic report on human development will be issued in 2004. The report is uniquely based on a mix of UN and traditional values and concepts.

BY ORAN R. YOUNG

The concept of human development has become popular in recent years among those seeking an alternative to Gross Domestic Product (GDP) per capita as a measure of the quality of life. But what does this concept mean in the Arctic? This question has emerged as a key issue for those seeking to fulfill the Arctic Council's mandate to produce an Arctic Human Development Report (AHDR) in time for delivery at the next ministerial meeting in 2004.

The UN Development Programme (UNDP) has devised a Human Development Index (HDI) based on an average of three distinct factors: (1) a long and healthy life measured in terms of life expectancy at birth; (2) knowledge measured as a combination of adult literacy and school enrollments; and, (3) a decent standard of living construed as GDP per capita. Simple as it is, the HDI has allowed UN statisticians to show that beyond a certain point this broader measure of human development diverges significantly from GDP per capita.

This is an important result. But is the HDI a good measure of human development in the Arctic? It is hard to quarrel with some aspects of the HDI. Who does not wish to enjoy a long and healthy life? But the deeper team members behind the new Arctic report have delved into the meaning of human development in the Arctic, the more they have come to doubt the usefulness of the HDI in this setting.

The good life

Many Arctic residents – especially those who are indigenous to the region – associate a good life with the maintenance of traditional hunting, gathering, and herding practices. Yet it is difficult to use indicators like GDP per capita to measure the health of these subsistence systems. For many, a good life is one that minimizes the need for the sorts of material goods and services implicit in the idea of GDP per capita

as a measure of welfare.

Nor is the situation any clearer with regard to knowledge. Arctic residents often possess extraordinary knowledge. But their education may not produce high scores in terms of measures like adult literacy and gross enrollments. Even the simple notion of life expectancy at birth is suspect in this setting. Living a long life is undoubtedly desirable. But what if the choice is between a shorter life rooted in traditional activities and a longer life spent trying to adjust to the loss of a deeply valued lifestyle and the need to function in an alien setting?

A broadened concept of HDI

Considering these issues, the Arctic Report's Steering Committee decided early on that computing and tracking changes in the HDI should not be the starting point for the assessment of human development in the Arctic. The report will not contain an alternative index of human development that can be compared directly with the UN's HDI. The issues at stake – ranging from efforts to establish rights through responses to rapid social change and on to the challenges of changing gender roles in the circumpolar world – are too complex for that.

Rather, the report will seek to broaden the concept of human development, documenting dimensions of the quality of life that are critical to Arctic residents but yet do not show up in any meaningful way in the HDI. The goal is to contribute to the development of Arctic-specific policies that will improve the quality of life in this region, without imposing a concept of human development that is not based on the realities of life in the Arctic and that does not capture the aspirations of many of the region's residents.

ORAN R. YOUNG is Chair of the Board of Governors of the University of the Arctic. In that capacity, he serves as Co-chair of the Steering Committee of the Arctic Human Development Report.

For more information on the project in terms of structure and process, chapters and lead authors, I recommend a visit to the web site of the project secretariat at the Stefansson Arctic Institute, www.svs.is.

The chapters of the Arctic Human Development Report

1. Introduction to Sustainable Human Development in the Arctic
2. Arctic Demography
3. Arctic Economies
4. Arctic Environments and Resource Governance in the Arctic
5. Globalization and the Arctic
6. Arctic Political Systems
7. Arctic Legal Issues
8. Arctic Societies and Cultures: Change and Persistence
9. Human Health in the Arctic
10. Human and Social Capital in the Arctic
11. Community Viability in the Arctic
12. Gender Issues in the Arctic
13. International Cooperation in the Arctic
14. Conclusions and Key Issues

Traditional food and participatory research: a Canadian experience

Traditional/country food has a central role in the life and health of indigenous peoples in the north. Unfortunately, there is a general declining trend of the use of traditional food in northern Canada. **BY LAURIE H.M. CHAN AND HARRIET V. KUHNLEIN**

Indigenous peoples have clear perceptions of factors contributing to environmental change, lifestyle change and ultimately to dietary change. These factors have been described to include: a reduced density of species and available harvesting areas; restricted harvesting in accessible areas; time and energy limitations for traditional harvesting; interruption of knowledge transfer to youth due to employment of adults and schools for children; availability and accessibility of new food products; acceptability of new food products as a result of media, social contact and education; and concerns for wholesomeness and the presence of contaminants in traditional food.

To study the importance of traditional diets, researchers at the Centre for Indigenous Peoples' Nutrition and Environment (CINE) at McGill University in Canada conducted three comprehensive dietary surveys in the last ten years in 44 communities in the Canadian Arctic and sub-Arctic regions with the support, participation and guidance of Aboriginal partners including the Inuit Tapiriit Kanatami of Canada, Dene Nation, Métis Nation of the Northwest Territories, and Council of Yukon First Nations. Participants were randomly selected for interviews, and a total of 3689 interviews were made. Approximately 600 food items prepared for consumption were sampled for analysis of nutrients and contaminants. Traditional food was reported as being consumed frequently and included a large variety of species and body parts. Traditional food used by Dene/Metis, Yukon First Nations and Inuit communities included 62, 53, and 129 animal species and 40, 48 and 42 plant species respectively in the three areas. The proportion of energy from tra-

ditional food varied among communities and seasons, ranging from about 10 to 40 percent of all calories in the average day from traditional food.

Traditional/country food also provides economic benefits to families. Many respondents in communities stated that they would not be able to afford all their food needs, if required to buy it from the store. The majority of respondents also stated that harvesting and using traditional food by the family provided many benefits, such as improved physical fitness and good health, and as a way for adults to model responsibility for their children.

Throughout Canada, indigenous peoples are assuming a greater role in determining the kind of research that takes place with them. Research projects on health and nutrition issues, in particular, require support from community leadership councils and individual participation. A good partnership between research scientists and the communities ensures the relevance of research objectives, the appropriateness of the methodology and the effectiveness of the communications of the results and the overall success of the project. For example, the dietary surveys conducted by CINE were community driven and involved community agenda setting, and community participation. Results were freely shared with northern communities. Cultural traditions with respect to the ownership and use of traditional knowledge were respected. The format and time frame of the release of any information resulting from the research activities were agreed upon by all parties (the university, its researchers, partners and participating communities) in advance. Students and researchers

joining the project were trained to respect traditional knowledge and community participation. Research results were communicated to the communities in plain, easily understood language, and in an appropriate dialect. Based from the CINE experience, the World Health Organization recently published a document titled *Indigenous Peoples and Participatory Health Research – Planning and Management and Preparing Research Agreements*. The document may serve as a template of basic principles to be observed in planning, organizing, and carrying out research on Indigenous health issues.

LAURIE H.M. CHAN is an Associate Professor and holds a NSERC Northern Research Chair in Environmental Contaminants, Food Security and Indigenous Peoples of the North at McGill University. **HARRIET V. KUHNLEIN** is a Professor in Human Nutrition at McGill University. She is the Founding Director of the Centre for Indigenous Peoples' Nutrition and Environment and was recently awarded the Jack Hildes medal in 12th International Congress on Circumpolar Health.

The Centre for Indigenous Peoples' Nutrition and Environment (CINE) opened in 1993 in response to a need expressed by Aboriginal Peoples in Canada for participatory research and education to address their concerns about the integrity of their traditional food systems. The mandate of CINE is to undertake, in concert with Indigenous Peoples, community-based research and education related to traditional food systems. The empirical knowledge of the environment inherent in indigenous societies is incorporated into all its efforts. Governance of the CINE is provided jointly by the Assembly of First Nations, Council of Yukon First Nations, Dene Nation, Inuit Circumpolar Conference, Inuit Tapiriit Kanatami, Metis Nation (NWT), and the Mohawk Council of Kahnawake. The Centre is interdisciplinary and based at McGill University's Macdonald Campus in the Faculty of Agricultural and Environmental Sciences. See www.cine.mcgill.ca for more information.

There and back again: accessibility is the key

Though the indigenous peoples' communities in Russia may seem more reachable now, the accessibility of the remote settlements, government bodies and sources of information continues to be the hurdle for improvement of self-governance, education and health. **BY TAMARA SEMENOVA**



ABOVE The distance between Naryn-Mar (capital of Nenets region) and the Kanin Peninsula is far. It is necessary for the project team to travel by helicopter.

More than 200,000 people live in the Russian north. The area of their traditional territories is very extensive and spreads from Karelia in the west to Chukotka in the east, and from Taimyr in the north to Buryatia in the south. But getting access to these remote communities is a struggle both for the people living there and people from the outside. Issues varying from education, health care and information to availability of primary facilities like plumbing, is often aggravated by the difficulties in accessibility to these communities.

The importance of accessibility to the Russian indigenous communities and its effect on the communities' health and environment has been assessed by the all-Russian non-governmental umbrella organization Russian Association of Indigenous Peoples of the North (RAIPON) within the framework of the project: Local Health and Environment Reporting by Arctic Indigenous Peoples, conducted in partnership with GRID-Arendal. The project is the first study extensively covering this issue in the Russian north.

The total indigenous population in Russian rural regions is approximately 150,000 people, residing in over than 750 settlements, which considerably vary in size, natural and geographical conditions. They are mostly located in the boreal zone, and only a limited number of tundra settlements belong to the Arctic zone. The population of a northern settlement falls within the range of 1 to 9,000 inhabitants, its average size being 200 people. These are relatively small settlements, which significantly differ in the proportion

of indigenous population. In general, the smaller the community – the larger this proportion is.

The study has indicated that, due to the remoteness, local aviation is, by far, the prevailing means of transportation to northern settlements. In 55 percent of cases local aviation is a predominant and in 37 percent – the only means of transportation to the regional administrative center. Cars, 4-wheel drives and tractors are used in 33–40 percent of the communities; motorboats and snow mobiles – in 28 and 21 percent, respectively. Thirteen percent indicate motorboats as their main means of transportation. The motorcycles, buses and speed motorboats are used in 11–17 percent of the communities, but if there is a regular bus line to a regional center, bus is the main vehicle for commuting.

The indigenous communities' access to governmental bodies and power structures seems to have slightly improved. Naturally, the most accessible ones are reported to be local council deputies and local militia, then comes district administration and finally regional authorities. Deputies of the national (federal) level are regarded as practically inaccessible. RAIPON's local and regional chapters are perceived as much more open bodies to indigenous people.

Northern communities are very isolated and their access to mass media is of high importance to residents. Television and radio are reported to be out of reach in 27 and 15 percent of the communities, respectively, and 64 percent are not able to receive regional or national periodicals.

TAMARA SEMENOVA is research and project coordinator in RAIPON.

For the project report see www.raipon.org.



ABOVE ESA's satellite for environmental monitoring – Envisat.
LEFT James Bay, Canada in summer and winter.

Northern eyes in the sky

A new initiative is helping to make better use of satellite data for monitoring the environment in the north. **BY KEITH FINLAYSON**

The European Space Agency and the European Commission are sponsoring a global initiative to facilitate the use of Earth Observation data in the monitoring of the environment. Northern View is a key component in the initiative, and draws its name from its geographical focus of the north and Arctic.

A wide range of collaborators, including governmental and inter-governmental agencies, the private sector and NGOs

are working together to operationalize Earth Observation services to detect oil spills and discharges, track ice bergs and sea ice, and monitor glaciers, snow and land-cover. In addition Northern View welcomes – and actively seeks – the participation of end-users to design and implement new Earth Observation services, and link them into other sources of environmental information.

KEITH FINLAYSON is GRID-Arendal's Polar Program Manager and a member of the Northern View strategy team.

You can learn more about Northern View at www.northernview.org. You may also like to check out a very practical earth observation trial service in northern Canada that provides updates on the position of the sea ice-edge that is much-used by the local communities in the region: visit the floe edge at <http://ice-glaces.ec.gc.ca>.

Aleut communities in charge of environmental health monitoring

Over half of the Aleut households in the Aleutians and Pribilofs eat marine mammals and selected sampling has shown higher than normal levels of contaminants in their blood. More cooperative efforts are needed, as well as continued monitoring. **BY VICTORIA GOFMAN**



ABOVE Seal and pup sleeping on St. Paul Island, one of the two Pribilof islands.
LEFT Subsistence fisher and life-long resident from the village of Nikolski in the Aleutians.

For thousands of years Aleuts have relied on marine resources for their survival. Traditional foods continue to be critical for individual and community health. Over 90 percent of the households of the western Aleutian village of Atka consume marine mammals, mostly sea lions and harbor seals. Over 70 percent of the households of St. Paul in the Pribilofs consume marine mammals, predominantly northern fur seals. Because of this dependence on sea mammals, Aleut communities have become a driving force behind efforts to better understand the risks associated with environmental contaminants and the potential effects on public health.

In the year 2000, the State of Alaska conducted testing for Persistent Organic Pollutants (POPs) in blood samples from human subjects in five Aleutian and Pribilof Island villages. The results showed higher than normal levels of some contaminants, including Polychlorinated Biphenyls (PCBs) and Dichloro-Diphenyl-Trichloroethane (DDE). These findings have raised new questions about the fate and transport of POPs and the need to study the exposure level and impacts.

Another study from this area is focusing on the most sensitive members of the population: mothers and newborn infants. Ten Aleut tribes are enrolled in the Alaska Native Traditional Food Safety Monitoring Program, which monitors contaminant levels in blood, hair and urine. Health care providers obtain dietary data from the mothers and follow the health of children for several years. In September 2003, the project was extended to include Russia's Aleuts and other indigenous peoples from the Kamchatka Peninsula and Commander Islands. The expansion of this program is the first step in creating an international environmental health-monitoring network in the Bering Sea region.

More cooperation needed

One of the challenges with contaminants in indigenous peoples food is the lack of collaboration between communities, scientists and healthcare providers on studies about contaminants pathways in

order to improve public health. The rise of cardiovascular diseases, diabetes, and obesity makes it necessary to reassess not only the risks but also the benefits of a traditional diet.

New projects happening

St. Paul and Atka are currently working with regional and tribal agencies on a four-year contaminants study: Dietary Benefits and Risks in Rural Villages. This study provides a model for village specific assessments of contaminant concerns and the broader implications of diet from a public health perspective. The project addresses several issues: levels of pollutants, nutritional value in traditional vs. available commercial foods and health consequences of dietary change based on epidemiological data about diabetes, heart disease and other emerging village health problems.

The process includes dietary surveys to determine types and quantities of foods consumed, testing of traditional food samples for contaminants (PCBs, pesticides, radionuclides, and heavy metals) and nutrients, as well as community education. Hiring village-based coordinators and research assistants enhances the effectiveness of two-way communication and makes local residents active participants in the research and remediation of the impacts.

A video documentary about the project features Aleuts speaking about the significance of traditional food. This film provides an opportunity for the non-indigenous audiences to acquire insight into native lifestyles and to understand the interconnection between the native people, diet, environment and health. The Aleut community strongly believes that an understanding of the importance of diet to native culture is critical to the successful collaborative research.

Aleut tribes and organizations are actively engaged in finding ways to ensure a healthy environment and lifestyle for their people. They have established partnerships with scientists, government authorities and policy makers, and have begun developing local capacity to perform on-going research and monitoring. The growing understanding of the transboundary nature of the environmental impacts calls for international collabora-

tion where the Aleut organizations could become valuable partners.

VICTORIA GOFMAN is the executive director of the Aleut International Association (AIA), an Alaskan Native non-profit formed by the Aleutian/Pribilof Islands Association (regional consortium of 13 Aleut tribes in the United States) and the Association of Indigenous People of the Aleut District of the Kamchatka Region of the Russian Federation. AIA is a Permanent Participant in the Arctic Council. The organization's mission is to facilitate international cooperation aimed at protection of the environment, health and sustainable development of the Bering Sea region and to rebuild ties between the American and Russia's Aleut people.

The Dietary Benefits and Risks in Rural Villages is administered by the Aleutian/Pribilof Islands Association (A/PIA). Principal researcher is Michael Brubaker, A/PIA Community services director. For more information go to www.apiai.com.

The Traditional Native Food Program in Kamchatka is administered by the Alaska Native Tribal Health Consortium and the Aleut International Association. Principal researcher is Dr. James Berner, ANTHC. For more info e-mail victoriag@api.ai.

Health & Environment Linkages Initiative

There is a growing appreciation of the linkages between environmental conditions and human health. Up to one quarter of the global burden of disease may be associated with environmental factors. **BY GEOFF BARRETT**

Inadequate sanitation, lack of access to safe water, poor air quality and toxic substances are major causes of ill health and death. Vulnerable populations, including the poor and children, share a disproportionate burden of disease from environmental sources.

Although a wide body of knowledge on the linkages between environmental hazards and threats to human health exists, that knowledge base is not systematically harnessed to influence decision-making. It is necessary to develop mechanisms and tools to provide access to relevant knowledge and experiences in a logical framework that facilitates the identification and solution of connected environment and health problems. There is also a need to build capacity for implementing policy change and taking action to protect the environment and human health at local, national and regional levels, in ways that are appropriate to social, cultural and economic contexts.

A Global Initiative

At the 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg in South Africa, Canada launched a global initiative called Strengthening Health and Environment Linkages: From Knowledge to Action (Health and Environment Linkages Initiative). Canada has been working since then in partnership with the World Health Organization (WHO), the United Na-

tions Environment Programme (UNEP) and the United States Environmental Protection Agency (US EPA), to develop a plan of action for the Initiative.

The aim of the Initiative is to facilitate and enhance effective actions to reduce adverse environmental impacts on human health. The Linkages Initiative hopes to accomplish this by assembling scientific, technical and socio-economic information on environment and health linkages, and transferring the knowledge gained to inform decision-making and enhance capacity at the local, regional and national levels. In practical terms, this will happen through the application of assessment methodologies, sharing experiences on policy interventions and the strengthening capacities to consider environment and health in decision-making.

A work plan that lays out all of the key aspects associated with the HELI, including objectives, scope, budget, deliverables and governance has been developed. The work plan was informed by an international needs assessment workshop in Cuernavaca, Mexico, April 2003. The workshop brought together 28 representatives from 14 developing and developed nation governments, non-governmental organisations and other international organisations that work in both the health and environment sectors.

The workshop produced a number of recommendations, one of which emphasized that the Initiative's efforts should focus on the decision-making process, and not on the generation of scientific knowledge. The information and tools to be produced by the Initiative should therefore be demand-driven (i.e. designed to fill specific requirements of policy makers, in order to improve the quality of their decisions). This is in contrast to a supply-driven approach that starts with an existing body of scientific knowledge (which is partly determined by academic interest and feasibility of investigation) and attempts to integrate it into the decision-making process.

The Initiative will provide policy makers with comprehensive and accessible guidelines on how to reach an evidence-based decision on issues with a potential health and environment linkage, and how to evaluate relevant outcomes. While these are the major goals of the Linkages Initiative, its success will depend on a global partnership of governments, non-governmental bodies and international organizations.

GEOFF BARRETT is a Policy Analyst at the Environment and Human Health Policy Division of Environment Canada, and is a Member of the International Steering Committee for the Health & Environment Linkages Initiative.

The Linkages Initiative has just established an operational secretariat in Geneva that can be contacted for more information on the Linkages Initiative. Please contact Mr. Diarmid Campbell-Lendrum (cambellendrum@who.int) or Pierre Quiblier (quiblier@un.org).

FAST FACTS

Health and environment

The highest Arctic exposures to Persistent Organic Pollutants (POPs) and mercury are faced by Inuit populations in Greenland and Canada. These exposures are linked mainly to consumption of marine species as part of traditional diets.

Exposure to mercury has increased in many Arctic regions while exposure to lead has declined.

Subtle health effects are occurring in certain areas of the Arctic due to exposure to contaminants in traditional food, particularly for mercury and Polychlorinated Biphenyls (PCBs). The evidence suggests that the greatest concern is for fetal and neonatal development.

Increasing human exposure to current-use chemicals has been documented, for example for brominated flame retardants.

In the Arctic, diet is the main source of exposure to most contaminants. Dietary intake of mercury and PCBs exceeds established national guidelines in a number of communities in some areas of the Arctic, and there is evidence of neurobehavioral effects in children in some areas.

In the Arctic region, a local public health intervention has successfully achieved a reduction of exposure to mercury by providing advice on the mercury content of available traditional foods.

Overall, a traditional/country food diet is healthier than a typical northern market food diet.

People over 40 years old tend to eat more traditional/country foods than younger people and men consume more than women.

More aboriginal northerners than before are becoming overweight and developing western style problems such as diabetes and heart disease.

Sources: AMAP human health report, Canadian Arctic Contaminants Assessment II report.

Lessons from the Svalbard ice

For seven days in August this year seven Ministers of the Environment, one US Assistant Secretary and one UN representative swam in the Arctic freezing water, traveled from Longyearbyen to Ny-Ålesund on board a research vessel, and slept in basic accommodation in northern Norway on the islands of Svalbard. They came from South Africa, China, Iceland, England, Russia, Sweden, Denmark and Canada to talk about polar environmental issues.

Børge Brende, the Norwegian Minister for the Environment and the host of the trip, wrote in his invitation to his colleagues: "After the Johannesburg Summit, we are all facing the task to find new and effective ways to tackle the world's growing environmental chal-

lenges. To get a thorough discussion on these issues, and in surroundings that will give us both new knowledge and a new perspective, I have the pleasure to invite you, together with a group of our colleagues, to a study tour to the Svalbard Archipelago."

The tour gave the Ministers an opportunity to study the consequences and combined effects of global emissions on the Arctic ecosystems and to informally discuss possible responses that could be made at the international level. The *Polar Environment Times* features some of the Ministers thoughts and ideas on these issues.

The ministers who went to Svalbard included Irina Osokina (Russia), Xie Zenhua (China), Mohammed Valli Moosa

(South Africa), David Anderson (Canada), Elliot Morley (the UK), Lena Sommestad

(Sweden), Hans Christian Schmidt (Denmark), Siv Friðleifsdóttir (Iceland), John

Turner (the USA), Klaus Töpfer (UNEP) and Børge Brende (Norway).



Memorable Svalbard

This summer's tour to Svalbard was an extremely enlightening experience. It offered a welcome opportunity for ministers from both the north and the south to discuss the global environmental agenda. Our discussions were greatly enhanced by outstanding excursions led by Arctic scientists. The truly fascinating nature and historical developments of the region were unforgettable.

Svalbard is the perfect setting for discussions about the important global and regional environmental challenges faced by all countries. With the Arctic

experiencing the effects of global change almost twice as fast as the rest of the world, it provides us with an early warning indicator. Here we see, for example, how climate change may affect

this seemingly clean environment is subjected to substantial environmental pressures

other parts of the world. Here we also begin to understand the importance of international cooperation in research and knowledge.

The natural environment of Svalbard

is almost indescribable. Even though humans have used this area for more than 400 years, its nature still captivates us with its large tracts of unspoiled wilderness. With an area of 62,700 km²,

Svalbard represents a significant part of Norway and Europe's last wilderness. At the same time the harsh climatic conditions here have played an important factor in preserving its cultural heritage.

Svalbard is truly an important part of our global heritage.

Svalbard, however, and indeed the entire Arctic, presents a paradox. This seemingly clean environment is subjected to substantial environmental pressures. A changing climate will have dire consequences for many species that already live under marginal conditions. Many environmental pollutants are transported here by wind and ocean currents from industries further south. These toxic substances threaten the health of Arctic wildlife and the humans

that rely on them.

We are utterly dependent on international cooperation to succeed in the protection of Arctic ecosystems. As Svalbard showed us, the Arctic is a memorable place. It is only through our actions today that we can ensure that future generations will have the same opportunities to build their own memories of this wild nature

KLAUS TÖPFER
Executive Director, UNEP

Why we need to protect the Arctic

The Arctic is a vulnerable region in an ecological respect and has become increasingly exposed to the effects of industrial and agricultural activities worldwide. Wind, precipitation and currents carry pollution to the Arctic region. Thus, protecting the environment of the Arctic is an international obligation.

Already, emissions of mercury from coal burning in other parts of the world affect flora and fauna in the Arctic. Specifically, Polychlorinated Biphenyls (PCBs), a mixture of industrial chemicals, are thought to have severe impact on the animals' immune and hormone systems and their reproductive abilities. In the Norwegian Arctic, polar bears with genital characteristics resembling both sexes have been found. We also see

negative effects from other contaminants on seals, seabirds and white whales.

The Arctic is of special interest as indications suggest that the effects of climate change will appear here first. Due to the fragility of the Arctic ecosystem, climate change may lead to profound negative

the Arctic can easily become a waste bucket, if we don't take action to counteract negative trends

consequences for the biological diversity. Many scientists warn that climate warming in the Arctic will have effects which extend far beyond the region, as changes in ice cover and deep water circulation may affect global climate patterns. The Arctic may serve as a window for future climate changes, as well as forewarning

of possible regional and global consequences of these changes.

Although large parts of the Arctic environment are relatively undisturbed, the threat it faces are intensifying and spreading within the area itself. Economic and other demands on the

Arctic and its resources are increasing. Petroleum and mineral development, tourism, shipping, hydroelectric dams and commercial fishing are among the activities with large potential and actual impact. The Arctic can easily become a waste bucket, if we don't take action to counteract negative trends.

What can we do to save the Arctic? First we need to monitor and understand the environmental changes that are taking place over time in the region. The precautionary principle must be the guiding principle. The global nature of these challenges calls for the widest possible co-operation by all countries.

The Kyoto Protocol is an important first step to address climate change, but ultimately we need a broader global and political response to combat the challenges of climate change. There is also a need to increase our understanding of the potential impacts of climate change in the Arctic. In this respect, Norway participates actively in the Arctic Climate Impact Assessment Cooperation (ACIA), which was started by the Arctic Council in 2000 and

will present its findings in 2004.

According to the Director of NASA, Mr Sean O'Keefe, Svalbard has become the world's most important monitoring and research station with regard to the environment. This assertion is due to the fact that early effects on the global eco-system can be detected at these islands, and in the Arctic. Norway has a specific obligation related to the Svalbard Treaty. Through tight regulations of the islands' wild and unspoiled nature, we try to keep this part of the Arctic as a window to better understanding of the global environment.

BØRGE BRENDE
Minister of the Environment, Norway

The world's eyes are on the Arctic

Canada's Arctic is a magnificent place. It has been my privilege to visit our far north on a number of occasions and witness the landscape of endless variety and unique beauty. This year I also travelled to many polar nations and saw first-hand the inspiring land we all share.

It is difficult to imagine how human-kind could possibly make an impression on a land of such seeming power, or do harm to any creature tough enough to survive an Arctic winter.

Yet aboriginal leaders tell me their people can no longer rely on the traditional knowledge of the land that has guided them for centuries – the sea ice is different, there is more run-off from snow pack and glaciers, winter comes

later and spring comes earlier.

More than 40 percent of Canada's landmass is in the Arctic. It accounts for 65 percent of our marine coastline, and holds 30 percent of our freshwater resources. Clearly, we have an interest in protecting it, but few of its environmental problems are native – they originate thousands of kilometers away. Thus, fostering global cooperation is a priority for Canada. It is especially important for Arctic states to work together, which we have been doing since 1996 in the Arctic Council.

aboriginal leaders tell me their people can no longer rely on the traditional knowledge of the land that has guided them for centuries – the sea ice is different

Declaring new national parks, conducting research and signing international agreements are an important part of protecting the delicate Arctic environment – and Canada is doing all of these – but they are only a beginning. If we do not respect the land the parks protect, if we do not act on the knowledge we have already gained, if we do not implement the treaties we have signed, we will have accomplished little.

As I discussed with colleagues in Russia, Norway, Finland and Iceland this fall, the Arctic states are important

strategic allies for Canada. We face similar environmental threats and northern economic challenges and share similar northern values.

Collaboration among us is essential for the diagnosis and remedy of threats to the Arctic ecosystem. Just as the Arctic Council's work on long range transport of Persistent Organic Pollutants (POPs) provided the catalyst for international action, the Council's work on climate change, if positioned properly, could do the same.

Canada's priorities over the next several years include the completion of the Arctic Climate Impact Assessment, the Arctic Human Development Report and the Arctic Marine Strategic Plan. These three projects will be the foundation for

the collaborative work that will stimulate regional, and indeed, global action.

There is a sense of urgency among Arctic states to focus on climate change. We are the nations who are already experiencing it. It is up to us to lead response.

The world's eyes will turn northward in 2004 and remain so as we move towards the International Polar Year in 2007, when we will all celebrate the Arctic. Let us be resolved, throughout actions now to protect this harsh yet fragile environment, to ensure that generations to come may be so fortunate to celebrate the Arctic in the future.

DAVID ANDERSON, P.C., M.P.
Minister of the Environment, Canada



FAR LEFT The ministers tried glacier hiking on the Blomstrand Glacier at Ny-Ålesund. Pål Prestrud, Managing Director of Center for International Climate and Environmental Research (CICERO), led the team.

LEFT The ministers exploring the pack ice at 82°N. From left it is the Chinese translator Xiang Shigang; Einar Johansen, the Norwegian Polar Institute's manager of material's; Klaus Töpfer, Executive Director at UNEP; (sitting in front) Valli Moosa, Minister for the Environment, South Africa; Pål Prestrud, Managing Director of Center for International Climate and Environmental Research (CICERO); Olav Orheim, Managing Director at the Norwegian Polar Institute; (sitting in front) Assistant Secretary John Turner from the US Department of State; Børge Brende, Norwegian Minister for the Environment; Lena Sommestadt, Minister for the Environment from Sweden; David Anderson, Minister for the Environment, Canada; Sív Friðleifsdóttir, Minister for the Environment, Iceland; (sitting in front) Xie Zhenhua, Minister for the Environment from China; and Elliot Morley, Minister for the Environment from the UK. In the back: the research vessel Lance.

OLE MAGNUS RAPP

Conserving nature, creating wealth

The Arctic is in the grips of environmental change. Far-born pollutants, like Persistent Organic Pollutants (POPs) and heavy metals like mercury, are affecting its biota and people. Climate change appears to be happening much faster here than in more southern climes. In the next 100 years it is possible that the temperature may rise by 3–9°C in the Arctic, about double the average expected on the rest of the globe.

These truths were brought home to me in my visit to Svalbard at the August meeting for environment ministers and other high officials hosted by Børge Brende, Norway's Environment Minister. We have of course known many of the facts regarding environmental change in the Arctic for some time, but discussing them with experts and decision-makers in the magnificent setting of Svalbard made them very pertinent. The natural

environment of the Arctic is changing perhaps more rapidly than in any time before in human history, and the countries of the circumpolar region must try both to tackle the causes of our problems and adjust to the change.

Social change is also rapid in the Arctic. Powerful forces create stress on

the next decade looks likely to be a turbulent period for Arctic residents

ancient cultures and traditional ways of life. For these reasons, the next decade looks likely to be a turbulent period for Arctic residents.

Iceland shares many of the characteristics of the Arctic as a whole, such as a reliance on natural resources for economic growth and a desire to preserve its traditions and culture in an era of globalization. We must also work on

conserving our nature, which is both a provider of our livelihood and a big part of our identity.

The Icelandic government has in recent years attempted to diversify the economy, which is still very dependent on fisheries. A part of this strategy is the harnessing of Iceland's abundant

renewable energy to foster new industries. These efforts are also meant to strengthen employment in regions that have experienced population decline. They also help in our fight against climate change. A shift from fossil fuels to renewable energy is the one single policy measure that will do the most to halt the emission of greenhouse gases. Already, over 70 percent of Iceland's energy de-

mand is met by clean and renewable energy sources, and the government aims to increase this ratio still more. A new project introducing hydrogen vehicles to Iceland aims at starting a clean revolution in transport, the biggest remaining source of greenhouse emissions.

While harnessing Iceland's hydro and geothermal energy is positive from the viewpoint of halting climate change, it can clash with efforts for nature conservation. We have had a lively debate on new power projects in Iceland in recent years. We must strive to find a fair balance between economic and social development and nature conservation. In October 2003, as Minister for the Environment, I presented the first comprehensive nature conservation plan, which outlines the creation of more than a dozen new nature conservation areas in the next five years. We plan to

double the total area of protected areas in Iceland before the year 2009. The most ambitious project will be the creation of a new national park, centered around Europe's largest glacier, Vatnajökull. This will become Europe's largest national park, encompassing glaciers, volcanoes, hot springs and turbulent rivers – a unique showcase of Earth's creative forces in action.

The Arctic faces much the same dilemmas and choices as Iceland. The challenges of climate change and far-born pollutants must be faced. We must also ensure that we conserve the magnificent nature of the Arctic regions, while working on the economic and social developments of Arctic communities.

SIV FRÍÐLEIFSDÓTTIR
Minister of the Environment and Nordic Co-operation, Iceland

The Arctic region and climate change

The Arctic has one of the most extreme environments on the planet. But the pace of change here is accelerating. My visit to Svalbard this August brought home to me just how much this apparently remote and fragile environment is affected by our everyday actions here in the UK and around the world. I very much appreciated the organization of the tour by Norway and the opportunity to have in-depth discussions facilitated by Environment Minister Børge Brende. It was a wonderful opportunity to see some stunning scenes and the fragile wildlife.

In this article, I focus on one of the most pressing environmental issues facing the Arctic today – climate change. Already, average temperatures in the Arctic

have risen by almost 1°C over the last 30 years – considerably faster than the global average. Northern Hemisphere summer sea ice extent has already decreased by about 15 percent since the 1950s. In parts of the Arctic, glaciers are losing almost two meters of ice a year,

average temperatures in the Arctic have risen by almost 1°C over the last 30 years – considerably faster than the global average

contributing to rising sea levels around the world.

As concentrations of greenhouse gases continue to rise, the warming will continue. Scientists have predicted that global average temperatures could increase by as much as 6°C by the end

of the century. At the same time, the UK's Hadley Centre predicts that winters over the Arctic will warm by as much as 16°C under a high emissions scenario, and Arctic sea ice will disappear completely each summer.

We urgently need to tackle the emis-

sions causing climate change. The UK Government has already put in place an ambitious program of domestic action to cut greenhouse gas emissions and ensure that we meet our target under the Kyoto Protocol and move towards our domestic goal of a 20 percent cut in

carbon dioxide emissions by 2010.

But much greater cuts will be needed globally if we are to stabilize greenhouse gas concentrations and avoid the most serious impacts of climate change. This will require a fundamental shift towards increased energy efficiency and low carbon technologies. The UK is rising to the challenge and earlier this year the Government published an Energy White Paper, which puts us on a path towards a 60 percent cut in carbon dioxide emissions by 2050. We now need others to follow suit.

In addition, we need to focus our attention specifically on the threats posed by climate change for the Arctic region. The UK government is keen to continue its support to the Arctic Council

in addressing climate change and other sustainable development issues, and in particular effects on communities of the High North.

The Arctic is not an enclave. Many of the problems facing the region do not originate there, and cannot be solved in the Arctic alone. We now need to work hard to ensure that international cooperation through the Arctic Council can be further developed to help us tackle this problem. Understanding what climate change means to this region is not only critical in and of itself – it is an early warning system for the whole planet.

ELLIOT MORLEY
Minister of the Environment and Agri-Environment, UK

The Arctic and International Agreements

The Arctic is playing an increasingly important role in a global environmental context. The table below was recently prepared by UNEP in collaboration with the Multilateral Environmental Agreements (MEAs) listed here to highlight their relevance to the Arctic. **BY LAURA MESZAROS**

MEAs are basically internationally agreed upon measures to protect the environment and/or to promote sustainable development, and require the engagement of stakeholders at all levels to

make them truly effective. This new UNEP study highlights priority issues, ongoing activities and the need for future work for each MEA in the Arctic region.

Multilateral Environmental Agreements and their relevance to Arctic Ecosystems and Indigenous People

Area of work

Issues affecting Arctic ecosystems and indigenous peoples

Relevant activities

Need for future work

Stockholm Convention on Persistent Organic Pollutants (POPs) and UNEP Chemicals

The Stockholm Convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel. In implementing the Convention, Governments will take measures to eliminate or reduce the release of POPs into the environment.

The Stockholm Convention is strongly linked to Arctic issues and the concerns of the Inuit and other indigenous peoples of the Arctic since Arctic ecosystems and indigenous communities are particularly at risk because of the biomagnification of persistent organic pollutants and that contamination of their traditional foods is a public health issue • The Inuit Circumpolar Conference and other Arctic indigenous peoples' organizations participated throughout the treaty negotiations and contributed substantially to the final outcome, as did the Arctic Council member states • AMAP reports on Arctic pollution show that mercury pollution is an increasing concern for the Arctic environment. Mercury levels in the Arctic are already high, and are not declining despite significant emissions reductions in Europe and North America. Recent research shows that the Arctic may act as a global sink for atmospheric mercury. Human exposure to mercury is closely related to traditional food of marine origin in some parts of the Arctic.

UNEP's global assessment programme focusing on POPs and other Persistent Toxic Substances (PTS) as well as UNEP's country support programme on POPs • The first and 2nd reports of the Arctic Monitoring and Assessment Programme, clearly state that the Arctic environment and its people are severely threatened by the presence of high levels of POPs in air, water and traditional food • UNEP Chemicals has initiated a Global Network for Monitoring of Chemicals. The Arctic environment plays an important role as a sentinel for new pollutants, POPs, heavy metals or others • UNEP Global Mercury Assessment report and Global Mercury Programme.

Pollutant concentrations in Arctic fauna have only been studied in a number of limited species. There is a need to study the effect (including long-term effects) of different levels of concentration and consequent health effects on different biota • Data from the Arctic will continue to play a crucial role as the Convention moves towards its first effectiveness evaluation four years after entry into force, as required by Article 16 of the Convention • Existing monitoring stations in the Arctic should be maintained, and, resources permitting, extended • The risk due to exposure from persistent organic pollutants, mercury and possible other heavy metals for sensitive indigenous populations and animal species at the end of the food chain in the Arctic should be assessed regularly • Data from the Antarctic should be used to inform the hazard and risk assessment for the Arctic • Models for long-term transport by air and water should be further refined • The effects of climate change on the ecosystem should be closely followed, including possible re-distribution of pollutants within the ecosystem.

Convention on Biological Diversity (CBD)

The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the use of genetic resources. The Convention translates its objectives in a series of binding commitments and key provisions on measures and incentives for the conservation and sustainable use of biodiversity, research and training; public awareness and education; assessing the impacts of projects upon biological diversity; regulating access to genetic resources and sharing of benefits from their utilization; access and transfer to technology; and the provision of financial resources. The Convention has developed a series of programmes covering all ecosystems.

There is no specific focus on Arctic issues. However, pursuant to article 4 of the Convention, all the relevant provisions of the Convention apply to all areas within the limits of national jurisdiction, including the Arctic. In addition, all cross-cutting issues, in particular the ecosystem approach, guidelines for the incorporation of biodiversity considerations in EIA and SEA procedures, are applicable to arctic ecosystems • It should also be noted that Article 8(j) of the Convention and related provisions of the convention are of direct relevance and concern to indigenous and local populations in the Arctic region, Under Article 8 (j) of the Convention Parties are committed to respect, preserve maintenance and promote traditional knowledge, innovations and practices, as well as the participation and involvement of indigenous and local communities • Indigenous and local communities concerns are treated as a cross-cutting issue within all the thematic programmes on agricultural biodiversity, forests, marine and coastal ecosystems, inland waters, mountain ecosystem and dry and sub-humid lands established under the Convention • Indigenous and local populations of the Arctic also have an interest in other work programs under the CBD such as the sustainable use of biological diversity and marine and coastal areas.

Within the programme of work on traditional knowledge a series of activities are being carried out and will be considered by the third meeting of the Ad-Hoc Open-Ended Working Group on Article 8(j) and related provisions (December 2003), including: **1.** The first phase of a composite report on the status and trends regarding the knowledge, innovations and practices of indigenous and local communities relevant to the conservation and sustainable use of biodiversity. **2.** The development of guidelines for the conduct of cultural, environmental and social impact assessment regarding developments proposed to take place on, or which are likely to impact on, sacred sites and on lands and waters traditionally occupied or used by indigenous and local communities **3.** Mechanisms to promote the effective participation of indigenous and local communities in matters related to the objectives of Article 8(j) and related provisions. **4.** An assessment of the effectiveness of existing subnational, national and international instruments, particularly intellectual property rights instruments, that may have implications for the protection of the knowledge, innovation and practices of indigenous and local communities, with a view to developing elements for a sui generis system for the protection of traditional knowledge.

The Working Group will have to complete phase 1 and initiate phase two of the programme of work. Relevant tasks include the development of: **1.** Guidelines for the development of mechanisms, legislation or other appropriate initiatives to ensure an equitable share of benefit sharing from the use and application of their knowledge; **2.** Guidelines for the development of legislation or other mechanisms to implement Article 8(j) and related provisions; **4.** Guidelines for the respect, preservation and maintenance of traditional knowledge, innovations and practices and their wider application; **5.** A set of guiding principles and standards to strengthen the use of traditional knowledge and other forms of knowledge for the conservation and sustainable use of biological diversity; **6.** Guidelines and proposals for the establishment of national incentive schemes for indigenous and local communities to preserve and maintain their traditional knowledge, innovations and practices; **7.** Guidelines that would facilitate repatriation of information, including cultural property, in order to facilitate the recovery of traditional knowledge of biological diversity; **8.** Standards and guidelines for the reporting and prevention of unlawful appropriation of traditional knowledge and related genetic resources.

Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range • Parties to CMS work together to conserve migratory species and their habitats by providing strict protection for the endangered migratory species listed in Appendix I of the Convention; by concluding multilateral Agreements for the conservation and management of migratory species listed in Appendix II and by undertaking co-operative research activities.

CMS has no specific focus on the Arctic region or Arctic issues. However, the range of many species of CMS interest includes Arctic areas, and these species depend on Arctic habitats/ ecosystems for at least part of their life cycle • Many of the animals of the Arctic region are migratory. While some species, e.g. polar bears and seals are mostly remaining in the Arctic, many others spend there only part of the annual cycle, as for instance a number of species of birds having in the Arctic their breeding grounds and migrating southwards to winter at lower latitudes • Of relevance for indigenous peoples, the Convention provides for the possibility of exceptions with respect to the prohibition of taking of species listed in Appendix I to accommodate the needs of traditional subsistence users of such species • Two multilateral agreements concluded under the auspices of CMS include Arctic Areas in their area of application: the African-Eurasian Migratory Waterbirds Agreement (AEWA) (see next section for details) and the Memorandum of Understanding concerning Conservation Measures for the Siberian Crane.

The Convention and its related agreements promote and support conservation and research activities on several migratory species spending part of their life cycle in the Arctic area • In connection with the conservation of migratory species, the Convention works on several cross-cutting issues of relevance to the Arctic region, such as by-catch, oil pollution, EIA and SEA.

Arctic Range States to join CMS and relevant Agreements (in particular: AEWA for Waterbirds); use the CMS instruments in cooperation with other Range States authorities, scientists and NGO; e.g. carry out regular research and monitoring over the whole migration range to assess the conservation status, habitat use and migration routes of respective species (in collaboration with non-Arctic Range states); draw the relevant conclusions for conservation and sustainable use in the Arctic part of the migration range; study the inter-relationship of migratory species with other components of biodiversity in the respective habitats/ecosystems Consequences of climate change on the migratory behavior of species appear of particular importance for polar regions, and deserves to be studied in detail.

Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)

Although the AEWA was concluded under the auspices of CMS it is currently an independent international treaty • AEWA is a regional Agreement aiming the conservation of migratory waterbird that occur in the so-called Western Palearctic Flyway. The Agreement area encompasses Africa, Europe, Central Asia, Middle East and small part of Northern Canada.

The Arctic region is extremely important to AEWA because the Arctic region provides the breeding habitat for numerous AEWA species (e.g. Geese, Swans, Ducks, Waders and Cranes) • Subsistence hunting takes place on several AEWA species by indigenous people. The main aim of the Agreement is to restore of the maintain populations of migratory Waterbirds at a favorable conservation status. In the preamble of the Agreement text is stated that the Contracting Parties are aware of the economic, social, cultural and recreational benefits accruing from the taking of certain species of migratory Waterbirds • Currently only Sweden and Finland are Contracting Party to the Agreement. Norway and Iceland are in the process to join.

The Agreement promotes and directly and or indirectly supports conservation and research activities • The conclusion of an International Action Plan for the Dark-bellied Brent Goose (Branta bernicla ber-nicla) is underway. Again this Action Plans aims the conservation of the species.

The Arctic ecosystem might be threatened by impact of climate change. These future changes could have an impact on the suitability of the Arctic as breeding ground for many AEWA species and possible changes in migration routes. All this might lead to loss of biodiversity. Further research is needed to assess these possible impacts • World Population Estimate III, published by Wetlands International shows that most of the Wader populations breeding in the Arctic are in decline. More research is needed to identify the reasons for this decline.

Ramsar Convention on Wetlands

The Ramsar Convention deals with international cooperation for the conservation and wise use of wetlands.

All Arctic range states are contracting parties to the Ramsar Convention. Concerning Arctic wetlands, most of the Arctic region could be considered a wetland in its own right.

Guidelines on indigenous people for national level use. CBD and CCD are encouraging the use of these guides • Special group within the convention working on the participatory approach and are in the process of establishing a foundation.

Coordinated international action, to avoid duplication of efforts, increase awareness of existing activities including information on available funding sources • The nomination of more arctic sites is encouraged.

Coordination on Arctic issues, as for other environmental issues, hinges on the building of partnerships between MEAs, UNEP, inter-governmental and national organizations and NGOs in the implementation and “operationalization” of the *four Cs*: coordination, coherence, compliance and capacity-building. Under this vision, coordination is a process rather than a

one-time event and requires continuous dialogue between the partners. It is expected that this study will facilitate the identification of synergies and interlinkages between MEAs and relevant partners on Arctic issues, and encourage partners to develop joint programmes and help identify funding opportunities. Enhanced cooperation will

speed our progress towards our goals of protecting the environment and achieving sustainable development.

LAURA MESZAROS is a Programme Officer in the Division of Environmental Conventions at UNEP headquarters in Nairobi, and works closely with GRID-Arendal on polar issues.



BARBARA WILLARD/UNEP/OPHAM PICTUREPOINT

Area of work

Issues affecting Arctic ecosystems and indigenous peoples

Relevant activities

Need for future work

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES works towards ensuring that international trade in specimens of wild animals and plants does not threaten their survival. Because the trade in wild animals and plants crosses international borders, the effort to regulate it requires international cooperation. The convention provides a framework for the implementation of national legislation.

Not a geographic focus on the arctic region, but on CITES listed species. The role of indigenous communities in the management and regulation of trade in CITED-listed fauna and flora is recognized by the parties and reflected in a number of CITES activities and decisions. CITES resolution 8.3 recognizes that unless conservation programmes take into account the needs of the local people, and provide incentives for the sustainable use of wild flora and fauna, conversion to alternative forms of land use may occur. The parties recognized that commercial trade may be beneficial to the conservation of species and ecosystems and/or to the development of local people when carried out at levels that are not detrimental to the survival of the species in question. CTIES resolution 12.30 on compliance and enforcement, recommends that parties promote incentives to secure the support and cooperation of local and rural communities in managing wildlife resources and therefore combating illegal trade.

A number of species relevant to the arctic area are listed in the three CITES Appendices, and trade in these species and their parts and derivatives are subject to the provisions of the Convention.

Under the CITES Action Plan, Parties to the convention are encouraged to develop and implement appropriate economic, education and awareness programs that lead to local involvement in wildlife management and stimulate participation in combating illegal trade within and from producing countries.

World Heritage Convention (WHC)

The WHC provides one of the most widely accepted universal international legal instruments for the protection of the cultural and natural heritage. The World Conservation Union (IUCN) is an international, non-governmental organization that provides the World Heritage Committee with technical evaluations of natural heritage sites and, through its worldwide network of specialists, reports on the state of conservation of listed properties.

The World Heritage Convention is concerned with the need to fill critical gaps for new nominations of arctic ecosystems, since only one Arctic World Heritage site has been inscribed.

Denmark has nominated a natural site in Greenland this year. IUCN is currently evaluating the Greenland site (evaluation will be ready in May 2004).

Only one Arctic World Heritage site has been inscribed so far.

United Nations Convention Framework Convention on Climate Change (UNFCCC) and the International Panel on Climate Change (IPCC)

The UNFCCC has the ultimate objective of stabilizing the greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level is to be achieved a timeframe sufficient to allow eco-systems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Sea level rise, warming sea surface temperatures and any changes in sea-surface temperature and intensity. Further temperature warming would increase stress on the arctic ecosystem and result in an increased frequency of diseases for all life forms. Changes in ocean chemistry resulting from higher CO₂ levels may also have a negative impact on the health of the arctic ecosystem • Regarding assessments, there are many polar climate change (Arctic and Antarctic) topics that are likely to be key issues in the 4th Assessment Report of the IPCC. Among these are observed and projected changes in sea ice and ice sheets, which influence not only the climate of the polar regions but also lower latitudes. Sea level rise is clearly another topic with important connections to polar climate, particularly for future projections over long time scales.

Links to the Arctic through participation in GCOS, etc. and to indigenous people through their participation in the UNFCCC process as a special group • The IPCC conducts periodic, independent scientific assessments of various issues on climate change. (Note: IPCC is an independent body, but also responds to the needs of the UNFCCC for scientific information on climate change related issues.)

Further research on the impacts of climate change in polar areas. Continuation of the assessment of latest information, including on the impacts of climate change on Arctic regions. To develop policies/projects/activities, to sustainably manage the Arctic ecosystem, as part of adaptation strategies.

Vienna Convention on the Protection of the Ozone Layer and the Montreal Protocol on substances that deplete the Ozone Layer

The objective of the Vienna Convention is to protect human health and the environment against the adverse effects resulting from modifications of the ozone layer. The Montreal Protocol, which operates under the framework of the convention, has the objective to protect the ozone layer by taking precautionary measures to control global emissions of substances that deplete it.

Under the Montreal Protocol's assessment process, the Scientific Assessment Panels look at the ozone layer depletion in the stratosphere including over Antarctic and Arctic.

The environmental effects have also looked at the effects of ozone layer depletion on various ecosystems including in the polar regions.

Continued monitoring of the ozone layer.

Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)

Land-based activities affect the quality and quantify of water flowing into rivers, streams and eventually the coastal and marine environment. More than half of the world's population lives within 200 km from the sea. Healthy coastal environments are essential to human health, the development of human activities as well as to the survival of the marine environment. The GPA addresses threats to coral reefs; the GPA principles can be incorporated into national legislation and management schemes.

The *Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities*, (RPA) is a regional non-binding action plan without convention. The RPA follows UNEP's GPA methodology with POPs as the number one priority pollutant to be addressed. The RPA illustrates the efforts of the Arctic countries to implement the GPA on a regional level • The Arctic Council's working group addressing protection of the Arctic Marine Environment (PAME) is currently developing an Arctic Marine strategic Plan (AMSP) through integrated approaches, including the ecosystem approach, in addressing the challenges of coastal and marine environments. New or innovative approaches, including large marine ecosystems and integrated coastal zone management will be considered. The indigenous peoples groups that are partners to the Arctic Council are fully and actively involved in the development of the AMSP.

Examples of developments in addressing sources of pollution from land-based activities include the Russian NPA-Arctic, which even though not an Arctic Council project, has been supported by the Council through the PAME working group. The Russian NPA-Arctic comprises, among other issues, three demonstration projects that will provide a basis for wider application of approaches and techniques for environmental restoration and damage prevention within Russia, within the arctic community of states and globally. One of these demonstration projects involves the establishment of a demonstration of indigenous peoples community organization on three fronts: enhanced involvement in governance; enhanced public health and sanitary services; and the creation of protected buffer zones under native jurisdiction in areas of intense natural resource development.

All efforts will be made to ensure that emerging issues, such as links with the climate change issues of the Arctic as addressed by the Arctic Climate Impact Assessment (ACIA) and concerns of indigenous peoples be addressed in the AMSP • PAME has proposed to review current threats, new information, and adequacy of existing measures related to land-based activities with a view towards expanding the RPA to additional source categories.

Further information:

Stockholm Convention on Persistent Organic Pollutants (POPs) and UNEP Chemicals
www.chem.unep.ch; www.pops.int
Bo Wahlstrom: BoW@unep.ch
Convention on Biological Diversity (CBD)
www.biodiv.org
Olivier Jalbert: olivier.jalbert@biodiv.org

Convention on the Conservation of Migratory Species of Wild Animals (CMS)
www.wcmc.org.uk/cms
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)
www.unep-aewa.org
Ramsar Convention on Wetlands
http://www.ramsar.org
Tobias Salathe: salathe@ramsar.org

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
www.cites.Org
Stephen Nash: stephen.nash@unep.ch
World Heritage Convention (WHC)
whc.unesco.org
Rossler, Mechtild: M.Rossler@unesco.org
United Nations Convention Framework Convention on Climate Change (UNFCCC)

and the International Panel on Climate Change (IPCC)
unfccc.int
Kevin Grose: kgrose@unfccc.int
www.ipcc.ch
Renate Christ: Christ_R@gateway.wmo.ch
Vienna Convention on the Protection of the Ozone Layer and the Montreal Protocol on substances that deplete the Ozone Layer

www.unep.org/ozone
Megumi Seki: Meg.seki@unep.org
Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)
www.gpa.unep.org; www.pame.ispame@pame.is; www.arctic-council.org; Veerle.rs@unep.nl

The oil adventure and indigenous people in the Nenets Autonomous Okrug

A story of exploitation of hydrocarbons, federal laws and reindeers in northwest Russia. **BY WINFRIED K. DALLMANN AND VLADISLAV V. PESKOV**



In the Nenets Autonomous Okrug (NAO) - (Northwestern Russia) live approximately 6500 Nenets and 5000 Komi indigenous people, most of them somehow related to reindeer husbandry. Large portions of Nenets reindeer pastures, especially in the neighbouring Yamal area, were devastated by reckless oil prospecting in the 1960s to 1980s. Recent years have witnessed an increasing interest in the hydrocarbon occurrences in the NAO. Naturally, people are worried about their future. How have conditions, policies and attitudes changed in modern Russia?

Bad preconditions
In addition to the high unemployment among indigenous peoples, the situation in the reindeer husbandry sector is deteriorating: decreasing numbers of reindeer, misappropriation, absence of appropriate marketing schemes for products. These and other factors provoke a general degradation of indigenous society. A Federal law on land use rights for indigenous communities has been in force since 2000, but new political policies are developing, which try to remove

certain rights from the law. Legal norms for implementation are still absent, and a regional legislation on this issue does almost not exist in the NAO. In 2002, the Okrug administration developed regional regulations for the establishment of so-called Territories of Traditional Nature Use, and a few of such territories for reindeer farms were created. But this was mainly done on paper, and the regulations are not applied in reality. Land can be allotted for industrial and resource-extraction purposes, while users receive miserly financial compensations. Until recent, the NAO administration was in charge of representing the interests of the indigenous peoples in these allotment processes. Participation of the indigenous peoples' organisations and representatives of the concerned communities and farms is a fairly new achievement. Processes result in agreements, where the amount of financial compensation is regulated.

Continuous violations
In an open letter of October 2002 to President Putin, the Association of Nenets People Yasavey complained about an uncontrolled situation, which has developed around the exploitation of hydrocarbons in the NAO, accusing oil companies for grave violations of ecological standards and Russian legislation. The letter expresses the impression that many companies, in particular Russian ones, have not changed their attitudes since the 1970s, especially in the southeastern part of the NAO,

where there seems to be no control whatsoever. Numerous oil spillages and other degradations of the upper soil layers occur periodically in the tundra during the summer season, inflicting irreparable damage to the Arctic natural environment. Oil companies are not the only ones to be blamed for this situation, but the Okrug administration as well, which fails to fulfill their functions when it comes to surveying and monitoring. Nenets and Komi in this region have for many centuries maintained a traditional way of life rooted firmly in reindeer husbandry in the area. These are the people who mainly suffer as a result of the attitudes of newcomers to the Arctic natural environment, in spite of all legal guarantees.

Transparent relations
The most effective means to achieve positive interactions between indigenous peoples, government and companies is the establishment of transparent contractual relations. Roundtable fora were held. Several oil companies participated in a constructive dialog, while others – including foreign ones – refused to attend. The Yasavey Association and the Union of Geologists and Oil Workers of the North have established a work group to assess the overall problems of the NAO concerned with hydrocarbon exploitation. Oil companies are financing this group, but do not sufficiently participate in problem solving.

FAST FACTS

Polar pollution

Canadian scientists have recently made significant advances in the knowledge of atmospheric mercury in the Arctic. Each year, just after the sun reappears after the long polar night (polar sunrise), mercury is converted to a different form. This new form of mercury is much more easily deposited onto the surface (usually snow or ice at this time of year) than the original form of mercury. The transformation and removal of this new form of mercury from the atmosphere onto the surface is called a Mercury Depletion Event (MDE). Measurements show that more mercury is found in the snow after an MDE, although some may be released back into the air from the surface.

Some of the new form of mercury in the surface snow dissolves in water, and may be converted into methylmercury – the most toxic form of mercury for wildlife and humans. This happens at the time of year when plants and animals are starting to prepare for peak summertime activity and when they are more vulnerable to picking up the toxic form of mercury.

Although first discovered in Canada, the same phenomenon has been seen at other northern locations e.g., Ny-Ålesund on Svalbard, northern Norway; Barrow, Alaska; and Amderma, Russia. It has even been found to occur in Antarctica.

Very few radionuclides being released from European nuclear plants are reaching the Canadian Arctic Ocean.

New Persistent Organic Pollutants (POPs) are being detected and are rising in ringed seal, beluga and narwhal blubber.

Scientists are more concerned about the effects of the POPs on polar bears than any other wildlife species.

Arctic foxes feed at various levels in the food web but this does not appear to affect their levels of POPs. Most levels are quite low and, overall, Canadian foxes contain lower levels of POPs than Arctic foxes from Svalbard, the Norwegian mainland or Iceland.

Mercury levels have almost doubled in eggs of thick-billed murres since 1975, and has increased in northern fulmars by 50 percent. The higher levels are found in predatory birds such as glaucous gulls.

The levels of POPs are decreasing in eggs.

Plants in northern Canada contain only low levels of POPs and heavy metals. However, some plants near local contaminant sources e.g. goldmines may contain higher levels of certain contaminants such as arsenic.

Source: Canadian Arctic Contaminants Assessment II report

The choice is there

Up-to-date technology with clean production, however, is largely being employed by other companies such as Polyarnoe Siyanie (Russian-American) at Ardalinskoye, TotalFinaElf (French-Belgian) at Haryaginskoe. So, the choice is there. But time is short, and appropriate attitudes towards environmental problems have still to be developed, both in the companies and throughout the authorities in post-Soviet Russia.

WINFRIED K. DALLMANN holds a position as a research scientist at the Norwegian Polar Institute in Tromsø. He is also running the secretariat of the Arctic Network for the Support of the Indigenous Peoples of the Russian Arctic, <http://npolar.no/ansipra>. VLADISLAV V. PESKOV has been elected for President of the Association of Nenets People Yasavey, www.raipon.net/yasavey, in Naryan-Mar. He works also as Counselor for the Russian Association of Indigenous Peoples of the North, RAIPON, www.raipon.org, in Moscow.

Bringing sustainable development into better focus

The work of the Arctic Council has traditionally drawn its inspiration from the need to protect the sensitive Arctic environment. Our results in this area demonstrate some of the Council's best work. **BY GUNNAR PÁLSSON**

The work of the Arctic Monitoring and Assessment Programme's (AMAP) working group, dealing with Arctic

pollution, is one example of how the Arctic Council is working to protect the Arctic environment. The report of

the Conservation of Arctic Flora and Fauna's (CAFF) working group, of Arctic biodiversity and conservation issues, is another. Increasingly, we are devoting more attention to ways and means of eliminating pollution, through the Arctic Council Action Plan (ACAP), which has developed specific action programmes to phase-out harmful substances. However, one environmental project commanding the greatest attention at this moment is probably the so-called Arctic Climate Impact Assessment (ACIA), a regionally based study of climate change. There can be little doubt that environmental issues will remain at the core of the Arctic Council. They are also likely to attract growing attention by the world at large, if only because the Arctic is increasingly being seen as an early warning area for other regions, in terms of both long-range transboundary pollu-

tion and climate change. But we must never forget that the Arctic is not just environment. It is home to almost four million people, including more than numerous different groups of indigenous peoples. As it happens, many of the processes documented in the Arctic Council's environmental reports have begun to work their effects through the lives and livelihoods of the people of the region. This is not a cause for alarm. The Arctic remains a clean environment, as AMAP's findings make clear. At the same time, some pollutants and changes in climate give reason for concern in certain ecosystems and for some human populations in the Arctic. Pressures are building in areas of the Arctic as a result of economic activities, including shipping, dumping and exploitation of oil and gas, aspects of which have been studied by our working groups on Emergency Prevention, Preparedness and Response (EPPR) and on the Protection of the Arctic Marine Environment (PAME).

All of those pose serious challenges to the inhabitants of the Arctic region. However, many of the diverse Arctic communities have demonstrated exceptional resourcefulness in adapting to the demanding circumstances of life in the Arctic. In addition, not all of the changes affecting the region will necessarily be negative.

Whether we look upon the Arctic in terms of peril and risk or promise and opportunity, there can be little doubt that the time has come to devote more attention to the social, economic and cultural life of the region. We need to address both sides of the equation, society and nature, to arrive at a balanced notion of sustainable development. Responding to this need, the Arctic Council has launched several initiatives focusing on the people of the Arctic, their living conditions and the factors that affect these conditions. The Arctic Human Development Report (AHDR) and the Survey of Living Conditions in the Arctic (SLICA) are among the projects that come to mind in this context. Taken together, such efforts should not detract from the Arctic Council's work on the environment. On the contrary, they should reinforce that work and bring sustainable development in the Arctic region into better focus.

Ambassador GUNNAR PÁLSSON from Iceland is the Chair of Senior Arctic Officials. Iceland serves as Chair of the Arctic Council 2002-2004 and hosts the secretariat. The Arctic Council cooperates with international organisations. One example is the United Nations Environment Programme (UNEP), where the AC had a role in placing the problem of mercury pollution on the agenda. For more information about the Arctic Council visit www.arctic-council.org.



Western science and traditional knowledge – no gap to bridge

How do indigenous peoples participate more effectively in decisions which influence their lives? The similarities between western science and traditional knowledge suggests an answer. **BY JACK DOWIE**

A widespread belief remains that there is a gap between traditional knowledge and western scientific knowledge. A gap that – at least to those who do not wish to privilege certain groups completely – has to be bridged in some way. The suggested treatments usually involve more and better communication and exchanges based on greater mutual respect, coupled with a greater presence on decision-making bodies.

These people and organisational therapies are based on a misdiagnosis. There is no gap. What we have are two activities with fundamentally different objectives, as distinct as farming and cooking. We need to sort out our ideas, not our organisational acronyms. Western science is a truth-focused, certainty-seeking Knowledge Technology (KT). Traditional knowledge is a decision-focused, uncertainty-respecting and value-based Decision Technology (DT). The KT-DT distinction can be simply illustrated if we ask a key question:

Observations can guide

How many observations does one need

when studying the relationship between a particular ecological sign and the presence of a prey or a predator or a source of pollution?

Western science demands a very large number of observations – hundreds, perhaps thousands – in order to provide the statistical power to detect a relationship of a given magnitude. This demand is completely legitimate, because western science is a Knowledge Technology, gate-keeping the truth for its own sake, i.e. without any weakening of standards for utilitarian reasons such as decision making.

Traditional knowledge – and we can extend this to include much of the tacit knowledge *know-how* that non-indigenous peoples and professionals possess – suggests that a very much smaller number of observations may be optimal.

How many observations do we then need? Possibly as little as seven, the number of bits of information plus or minus two that George A. Miller, professor of psychology at Princeton University, suggested most human beings can hold

in their short term memory.

Israeli psychologist Yaakov Kareev has been exploring the evolutionary origins of this number and concluded that it may indeed have arisen as the optimal number of observations for a hunting group to take into account.

Why might the last seven observations be better than the last 17, the last 70, or the last 700? One obvious reason is that if a larger number of observations takes more time to accumulate, the earlier observations may become out of date and irrelevant if the situation is dynamically changing, as it will be in many indigenous societies.

The other reason is more interesting, because it establishes the key difference between the two technologies. If we use small unrepresentative samples we are more likely to detect a correlation e.g. between a sign and a predator or a prey or a source of pollution that may not actually be present.

How could this possibly be a good thing?

We will – whether we are indigenous people of the Arctic or non-indigenous

people of the urban west – accept lots of false leads in order to maximise our chance of detecting a true lead such as we accept we have to do when e.g. screening for cancer. This is because often it is more important to avoid failing to detect something when it is there (a False Negative) than to wrongly detect something when it is not (a False Positive).

Based on real world consequences

In the real world the criteria for optimal information search must be based on the real world consequences of decisions. These criteria must reflect the actual lived and asymmetric trade-off between False Positive and False Negative errors. In certainty-seeking science, on the other hand, we rightly want to avoid detecting something which is not there at almost any cost.

We have here then a clear and simple illustration of the difference – not gap – between the Knowledge Technology that is a western science and the Decision Technology which is a traditional knowledge. We can also confirm the necessity of a Valuation Technology – a way of establishing the necessary error tradeoffs – for supplying the inputs needed by all types of decisions.

Any type of traditional knowledge must be an amalgam of traditional beliefs. These beliefs are based on the probabilities of things happening or being the case and of traditional values concerning the desirability and worth of particular states, outcomes and processes. The amalgam may be implicit, deep and holistic. It may appear impossible to decompose this whole into its compo-

nents. Possibly it will be against its very spirit and spiritual basis to do so.

New decision processes must be non-traditional

Unfortunately, the number and complexity of decisions affecting indigenous lives are now changing at historically unparalleled speed. These decisions increasingly impact on and involve both indigenous and non-indigenous groups. In order that these decisions be taken coherently and transparently, as well as equitably, they almost certainly require a non-traditional decision process such as Decision Analysis. This is a rigorous way of evaluating options in which the beliefs and values of all stakeholders can be incorporated and their implications explored.

A clear separation of beliefs and values is the price indigenous people will have to pay to participate effectively in decision-making crucial to their lives. If indigenous peoples are to have their own interests fully represented in these analyses and decision-making processes they will need to disentangle the belief and value components of their traditional knowledge and build their capacities in these alternative decision processes. That, rather than simply getting a seat at the table, is the true route to empowerment for indigenous peoples.

JACK DOWIE is Professor of Health Impact Analysis at the London School of Hygiene and Tropical Medicine, where he runs a postgraduate course on Health Impact and Decision Analysis. He spent much of his previous career at The Open University, where he produced multi-media distance learning courses on Risk and Professional Judgment and Decision Making.

The media on the poles

During the last year the focus of the world media has again turned to both poles. The stories, like the polar lands, are dramatic: collapsing ice sheets, growing ozone holes affecting climate, contaminants in the food and peoples of the north, oil and gas interests squaring off against caribou. They fascinate us, they can frighten us, but they are remote to most of us. Or are they? After the record-breaking summer in Europe and devastating wild fires in both hemispheres, climate change is very much on our minds. The contaminants found in indigenous peoples are not from local sources but from thousands of kilometres distant. And regional conflicts have forced us again to consider the riches of these vast lands. The stories have been featured from England to Ethiopia and from Iceland to India.

Below is a selection of 2003 media stories on the poles. You will be able to find a larger collection of media stories on the poles on our web site www.grida.no/environenttimes and we are happy to accept contributions of other stories to include in our online archive.



Guide to drilling for oil in the Arctic
The Guardian, UK. January.

An interactive tour of the debate about drilling for oil in the Arctic National Wildlife Refuge in Alaska and an account of the various interests at stake. The guide provides links to relevant stakeholders. www.guardian.co.uk/flash/0,5860,534962,00.html

Warming warning for Antarctica

The Guardian, UK. September.

This story tells how the face of Antarctica will change in the next 100 years as ice melts, glaciers retreat, penguins move south and green plants begin to colonise bare rocks of the Antarctic peninsula. www.guardian.co.uk/climatechange/story/0,12374,1038161,00.html



Bear facts

The Guardian, UK. March.

This story is a close-up on polar bears and talks about how a polar bear cub that was rescued after its mother was killed by hunters has made headlines across Canada, but global warming means that other members of his species may not be so lucky. www.guardian.co.uk/climatechange/story/0,12374,911315,00.html

White House persists in Alaska oil fight

The Associated Press, US. March.

A story on the political play behind the debate on drilling in the Arctic. The story talks about how the Bush administration, rebuffed by the Senate, will not give up the fight this year to open an Alaska wildlife refuge to oil drilling.

Canada's climate change close up

BBC News Online, UK. July.

A story and video talking about beaches turning to mud and changes in wildlife which are among the signs of a warming climate recorded by an Inuit community in Canada.

<http://news.bbc.co.uk/1/hi/sci/tech/3103111.stm>

The UK's Arctic graveyard

BBC News Online, UK. October.

In this story the BBC tells how they visited Murmansk to look at an old graveyard in the midst of what they thought would be a chilly, muddy mess, gritting its teeth against the Arctic gales and the worst that centralised planners could do to scorch and scar the forests and the tundra.

http://news.bbc.co.uk/1/hi/world/from_our_own_correspondent/3175866.stm

Arctic ice shelf splits

BBC News Online, UK. September.

The news story about the breaking of the Ward Hunt Ice Shelf. The story talks about how the largest ice shelf in the Arctic has fractured, releasing all the water from the freshwater lake it dammed.

<http://news.bbc.co.uk/1/hi/sci/tech/3132074.stm>

Malaysia treads on ice

The Antarctic. January.

This story reveals how Malaysia is moving to become the first Muslim nation to join the Antarctic Treaty, in what would mark a big change of heart for its Prime Minister, Mahathir Mohammed.

www.antarctican.com/pages/news/newsfr.htm

Antarctic ozone hole grows to record size

CBC, Canada. September.

In contrast to 2002, the hole in the ozone layer over the Antarctic reached a record size this year, the United Nations' weather organization says. Measurements over and near the southern-most continent suggest the ozone declined more quickly this year than in 2002.

www.cbc.ca/storyview/CBC/2003/09/17/ozone_hole030917

Antarctic ozone hole brings stronger winds: study

CBC, Canada. October.

New studies from a Canadian scientist show how the ozone hole over Antarctica is likely changing wind patterns and ocean currents in the southern hemisphere.

www.cbc.ca/stories/2003/10/10/ozone031010

Look for Hepatitis C warning signs

Juneau Empire, Canada. October.

Alaska Epidemiology estimates that as many as 6,000 Alaskans are infected with Hepatitis C virus, yet only a small fraction of them are aware of it, as it can take as long as 20 years to manifest itself. Warning signs include: yellowing of the skin or eyes, nausea and vomiting, extreme fatigue, loss of appetite, dark urine and abdominal pain.

www.arctichealth.org/recentnews.php

Antarctic group sets up asset management

Computerworld, UK. August.

This series of stories focuses on the Australian Antarctic Division (AAD), which conducts research and conservation for the protection of the Antarctic environment, and how the division implements asset management software at its Tasmanian headquarters and offshore bases which are inaccessible most of the year.

<http://antarctica.computerworld.com/index.php?id=104967114&fp=16&fpid=0>

New directions for managing Russia's Arctic

In a collaborative project GRID-Arendal works to implement integrated ecosystem management in north-western Russia. **BY TIINA KURVITS**

In a rapidly industrializing world, the Arctic is still one of the least impacted areas on the globe. We know that this region faces serious and growing pressures from human activities. We know too that the list is long: habitat fragmentation and destruction, biodiversity decline and loss, over-harvesting, contamination and pollution, climate change. Worrisome issues at any level but to local people, they can quickly become matters of survival.

Of all the regions in the Arctic, these problems are particularly keenly felt in Russia's north. Here, the societal upheaval experienced after the collapse of the Soviet Union has only magnified the challenges of environmental protection. The threats to the environment here arise from shifting political and administrative systems, weak institutional and enforcement mechanisms, poorly controlled local economic development activities, declining funding for environmental protection, and national and international demands on natural resources.

New ways of managing nature

Traditionally, most environmental issues have been approached on a sectoral basis. The end has often been a patchwork of legislation, policies, and programs, each attempting to address an issue in isolation of others. While not without its successes, managing complex and intertwined issues requires a more coordinated and collaborative approach, one that looks at the ecosystem as a whole, including the people who live there. The situation in modern Russia in particular demands an approach that is adaptive and sensitive to rapidly changing needs. Integrated ecosystem management, or IEM, is an attempt to move in this direction.

IEM is a dynamic process aimed at managing human activities and relationships for the purpose of achieving specific conservation and development goals. By definition, it signifies a shift away from sectoral management toward one involving multiple stakeholders working together in an open and transparent environment. Although not a panacea, it does represent a more sound approach to environmental protection. It includes participatory planning, conflict resolution, community-based management, local institution building, sustainable use, and the equitable sharing of resources.

Conserving biodiversity in Northern Russia

Although IEM is used in many other regions of the world, there is little experience of it in Russia. In response to the challenges faced in Arctic Russia,

the Russian Federation, the Arctic Council program on Conservation of Arctic Flora and Fauna (CAFF), and the United Nations Environment Programme's (UNEP) key polar centre at GRID-Arendal have initiated an IEM project named ECORA: An integrated ecosystem management approach to conserving biodiversity and minimising habitat fragmentation in the Russian Arctic. Funded by the Global Environment Facility and a number of Arctic nations, ECORA is aimed at the conservation and sustainable use of biodiversity in the Russian Arctic. In addition to benefiting Russia, the project is aimed at making a substantial contribution to addressing these issues on a circumpolar basis.

In the ECORA project, IEM strategies and action plans will be developed and implemented in three model areas representing different ecosystems and anthropogenic pressures in the Russian Arctic. The areas selected are: Kolguev Island in the Nenets Autonomous Okrug, Kolyma River Basin in Yakutia, and Beringovsky in the Chukotka Autonomous Okrug. The model areas represent a cross-section of the Russian Arctic, reflecting different habitat types, indigenous peoples, and environmental issues.

A number of activities will be undertaken to support the development of the IEM plans. Among other things inventories on biodiversity and socio-economic assessments, and targeted training programs. GRID-Arendal will also facilitate legislative, administrative, and institutional capacity building and look at specific conservation measures. Finally, the project will provide demonstration activities for the sustainable use of natural resources and their genetic richness. The results and lessons learned are intended to be transferable and so benefit the entire Russian Arctic, as well as the broader circumpolar Arctic region. Using IEM, ECORA will help to secure the integrity of some of the world's last remaining pristine wilderness areas and support the livelihoods of the people that live there.

TIINA KURVITS is an Associate with the Polar Program of GRID-Arendal in GRID's Ottawa, Canada office. She has worked on a variety of Arctic issues including protected areas, biodiversity conservation, and tourism. At GRID, she manages the ECORA project and is responsible for North American networking in polar issues.



ABOVE Habitat fragmentation at Narjan Mar, Nenets.



ABOVE Reindeer herders discuss the RAIPON journal at the opening of the Red Chum project in Kanin Peninsula in June 2002.

Capacity building in the Russian Arctic

In March 1998, leaders from 28 indigenous groups residing in Arctic Russia met to discuss common problems related to their threatened environment and natural resources. **BY KATHRINE I. JOHNSEN AND VALENTIN YEMELIN**

The main output of the 1998 seminar was an assessment report of indigenous peoples' environmental problems, proposed actions and request for help from international fora. This led to the development of the UNEP/Nordic Saami program for capacity building and participation of Russia's Indigenous Peoples in the sustainable development of the Arctic. The program supports the Russian Association of Indigenous Peoples of the North (RAIPON) and is based on the experience and competence of Nordic Saami organizations in environment and development issues from an indigenous perspective. The program develops links to RAIPON and the United Nations through GRID-Arendal – the Key Polar Centre of UNEP.

The program is unique. It is designed to develop the capacity of the regional and central organisations of the indigenous peoples of Arctic Russia in the fields of environmental knowledge, networking, information, and awareness-raising. The program further supports sustainable development in Arctic Russia through focus on indigenous knowledge and strengthening of the capacity of the indigenous peoples to participate in the process. All program activities are defined from indigenous standpoints and priorities. The project consists of four main activities: Program management and RAIPON capacity building; networking and public relations; local reporting on health, environment and living conditions; and training courses in impact assessment.

Program management and RAIPON capacity building

This involves training of RAIPON staff in program and project development and management as well as training and seminars on institutional development.

This activity consists of coordination with other existing or planned donor supported RAIPON projects, feeding into annual reports and fund raising.

Networking and Public Relations

The purpose of this project is to enhance RAIPON's capacity to inform and communicate externally on the situation of the indigenous peoples of the north, Siberia and the Far east. The long-term capacity of the regional chapters of RAIPON to inform and communicate externally and internally is the goal. This includes supporting of RAIPON's journal and website. Production of a documentary on the living conditions of indigenous peoples of Arctic Russia is in the pipeline.

Local reporting on health, environment and living conditions

The third project is focused on producing indigenous knowledge based reports on health, environment and living conditions of indigenous peoples in Arctic Russia. These reports enable local communities to make their state of environment and living known both within Russia and internationally (including documentation of traditional land use). This involves regional structures and provides input to national, circumpolar and global assessments. Finally, this task also involves training RAIPON members in environmental reporting.

Training course in impact assessments

Ultimately, the program partners are developing a course that will train members of indigenous communities to conduct independent environmental impact assessments and to use other tools to assess projects influencing the

rights and interests of the indigenous peoples in Russia. This will include assessments of existing and planned industrial, communication and conservation developments that may have impact on indigenous peoples and their environment. During the summer of 2002, two surveys on indigenous peoples health, environment and living conditions were conducted in Arctic Russia. Data from the survey is in the process of being analysed. The results will be published late 2003 or early 2004. However, one of the main messages from the individuals in the survey is the lack of access to information. This is connected to the lack of infrastructure, outlined in Tamara Semenova's article *There and back again: accessibility is the key*.

Another important output from the survey is that people in general feel they have very little access to the federal authorities that take decisions with a direct impact on the environment, health and living conditions of indigenous communities and individuals.

There is a continuing need to ensure a reliable flow of information and to focus on awareness-raising amongst the Russian Arctic indigenous communities. Further, there is a need to continue developing the ability of indigenous communities to express and report on their state of environment and living.

Each year four issues of RAIPON's journal *Mir korennykh narodov – Zhivaya Arktika* (Indigenous World – Living Arctic) are published and disseminated to over 700 indigenous settlements in the Arctic Russia. A set of selected articles from the journal are translated into English and published on the RAIPON website. According to RAIPON, the journal is the most important channel for communication of regional and national information relevant to indigenous peoples in Russia. The regular publication of the journal is one of the printing issues of the program.

KATHRINE I. JOHNSEN is project manager at GRID-Arendal, responsible for the Arctic Indigenous Peoples Program. **VALENTIN YEMELIN** is project manager at GRID-Arendal, working on issues of environmental information in Russia, Belarus, Ukraine and Moldova.

For more information: kathrine.johnsen@grida.no. See also the partners' websites: www.grida.no, www.raipon.org and www.saamicouncil.net

Reindeer and Saamis on the run

The proposed opening of the Barents Sea for full oil exploration will accelerate coastal development and conflicts. The chosen lifestyle of the Saami indigenous people in the Barents region is already being destroyed by massive and piecemeal development. Over one-third of their traditional lands that have been used by grazing reindeer through thousands of years may already be lost. There is a range of exploration projects in the Barents Sea region with possible detrimental impacts to the Saami people. **BY CHRISTIAN NELLEMAN**

The proposed opening of the Barents Sea for full oil exploration will accelerate coastal development and conflicts, so will proposed bombing ranges. So far, however, no policy action has been taken to secure land rights of reindeer herders, unlike many regions in Russia, Greenland, Canada or Alaska. Lack of control of piecemeal development may be one of the greatest environmental policy deficits of the Arctic. By 2050, as much as 78 percent of the vital coastal summer grounds may be lost, representing the fastest growing development rate anywhere in the Arctic. A broad range of old and emerging threats presented from oil companies, tourists and the North Atlantic Treaty Organisation (NATO) is slowly but consistently reducing the land area available to reindeer herders by developing infrastructure or claiming land for non-traditional purposes.

Development moving in next door

Twenty years ago, in February 1983, the National Geographic reported that the Saamis were fighting a losing battle against development in their lands by corporate interests. Since then, the situation has worsened. Oil development, hydro power, windmill parks, mining, cabin resorts, logging and military bombing ranges are rapidly encroaching on the last remaining traditional lands used for thousands of years by the Saamii people and reindeer in the Barents Sea region.

Effects on reindeer

While a few reindeer, typically bulls, may be observed close to roads or construction facilities, extensive research has consistently documented that maternal reindeer with calves simply avoid disturbance around these sites by moving several kilometres away. With the amount of development taking place, reindeer and their predators such as wolverines, are increasingly confined to smaller and smaller areas, where grazing conflicts, overgrazing and predator conflicts increase. Currently, government policies, like those in Norway, respond to the development regime by reducing

the number of reindeer herders and their livestock, while limiting the land debate to individual construction projects. The result of this piecemeal development policy has been dramatic. Over 35 percent of traditional critical grazing lands are now considered unavailable due to development of roads, power lines, cabins and dammed lakes and rivers, most of it the low lying most productive areas. In northern Norway alone 300–500 recreational cabins are built every year, most of them in grazing lands. Scientific investigations in, for example, the Reparfjord Valley, have shown that traditional calving grounds were gradually lost and finally abandoned by reindeer and their herders due to consecutive disturbance from the resorts. But other threats are emerging.

Future exploration plans

On October 7, 2003, the oil company STATOIL announced “that oil reserves in the region including the Barents Sea may hold oil and gas for over 150 billion

USD”. Exploration is already taking place in the Pechora further east, while the route along the northern coast is of particular interest for the Russian oil fleet. Increasing risk of oil spills combined with intensive commercial fishing by trawlers also interferes with the coastal Saami’s traditional small-scale coastal fisheries. Investigations have shown that while the land-based oil installations are limited in extent, the associated secondary development may have detrimental effects to the Saami’s ability to continue reindeer herding. On Kvaløya, an island home to the first opening of an industrial gas complex related to the Barents Sea gas reserves, the proposed associated development may cut off access to an important calving ground and old sacred sites. But the development doesn’t stop there.

Windmill power parks are being proposed along the coast, adding to the network of roads and power lines constructed across the last decades. New mineral exploration legislations are made to facilitate exploration by mining

companies, and logging companies are active in Swedish and Finnish forests used for winter grazing.

New policies can change their fate

The current policy of dealing with the land use issue and future of the Saami reindeer herders by limiting discussions and legal rights to each individual development project locally is taking its toll. Few Saami herders can afford to confront large companies in a lawsuit, and for some the results can be depressing. On Seiland Island in northern Norway, a small dam project was revived by a regional power company. The increased regulation of the dam resulted in over 9,600 metres with deep-ice crevasses, rendering the small narrow lake impassable for its traditional use as a central spring migration route. After several years of lawsuits, the local Saami herder won in Supreme Court, which acknowledged the loss of close to 5 km² of spring grazing land. The price he received was however ironic: Apart

from covering the expenses, he received around 100,000 Norwegian kroner, the price of an older used car in Norway, for the loss of parts of his calving grounds for future generations.

Loosing one of Europe's last remaining wilderness areas

The situation on the loss of traditional grazing lands is an issue that goes even beyond indigenous rights and reindeer livestock: it is also a discussion on the future of Europe’s last remaining continental wilderness areas and their biodiversity, that have co-existed with reindeer and Saami people through thousand of years. Scenarios now show that if no action is taken to control and define the land area to be protected from piecemeal development, as much as 78 percent of a 20 km deep coastal belt – critical spring, calving and summer pastures – may be inaccessible to herders in 2050. This may become detrimental to the last reindeer husbandry in the region. Policy action to address the long term cumulative impacts of piecemeal development – recognized also in other parts of the Arctic and globally – will be imperative for the future of biodiversity and indigenous rights to their own chosen lifestyles. For the Saami, the situation is becoming acute.

CHRISTIAN NELLEMAN is a Senior Associate and the Global Coordinator for the GLOBIO project at GRID-Arendal, www.globio.info. He has done extensive research in the Arctic and globally on impacts of industrial, military and recreational development on indigenous peoples and wildlife.



BRYAN AND CHERRY ALEXANDER

Awaiting the 2007 International Polar Year

Science topics and outreach workshops are some of the many preparations that need to be in place in four years to mark the Third International Polar Year. **BY HANNE PETERSEN**

2007 might sound like a long way ahead, however, it is already a challenge to get all plans developed and inhabitants and participants engaged for the coming International Polar Year.

In spite of the substantial investment of effort in polar exploration and research over the years, both by individual nations and through internationally coordinated programmes, the relative inaccessibil-

ity and challenging environment of these zones have left the poles less well explored and studied than other key regions of the planet.

A new polar year opens to further understand the polar regions and polar processes and highlight the crucial role that the polar regions play in global systems. The poles are a key part of the global system, and drive changes

globally. The changes in the poles are occurring rapidly and changes are amplified here, too.

The 2007 International Polar Year is multidisciplinary in scope, and envisioned to be an intense, international campaign of co-ordinated polar observations and analysis. It is planned to be bipolar in focus, and with broad international participation. Nations are expected to work together to gain holistic insights into planetary processes, targeted at exploring and increasing our understanding of the poles and their roles in the global system.

Two times before

2007 is the 125th anniversary of the First International Polar Year (IPY 1882), the 75th anniversary of the Second Polar Year (IPY 1932), and the 50th anniversary of the International Geophysical Year (IGY 1957). These years resulted in significant new insights into global processes, and

led to decades of invaluable polar research.

The International Council for Science (ICSU) formed an International Polar Year planning group. The task of the group is to identify the objectives and activities of a new polar year, and to propose a mechanism for the design, development and implementation of the activities. One mechanism is to encourage countries to establish National Committees or contact points. Another mechanism is to create initiatives focusing on polar issues among international organisations.

The planning group will develop a Science Plan for the polar year, that will initiate scientific programs that would not otherwise occur and at the same time attract the next generation of polar scientists. Themes of such programs will include: exploring the earth’s icy domains; decoding the role of the poles in global change; understanding polar processes; and others.

The first draft Science Plan will be reviewed at the ICSU meeting in February 2004.

Telling the world about the poles

Another goal of the Polar Year is to educate and create public interest and awareness about the polar regions. An education outreach workshop will take place in 2004 and will bring together experienced people from polar communications offices in existing science organisations, a variety of educators (museums, schools, etc), high profile media people, and UNESCO’s education program representative.

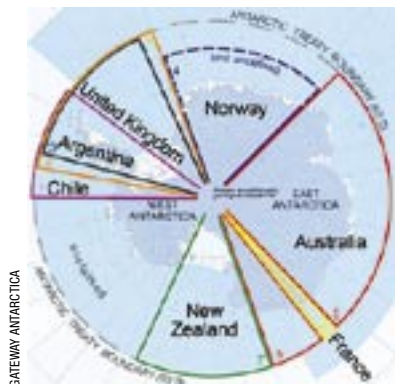
HANNE PETERSEN is the Managing Director of the Danish Polar Center and a member of the International Scientific Union. Previously she held the position of Chairman of AMAP and Manager of the Department for Arctic Environment under Denmark’s Environmental Surveys. She was also a member of the GRID-Arendal Board.



ERNESTO E. MARTINO/UNEP/TOPIAM PICTUREPOINT



GATEWAY ANTARCTICA



GATEWAY ANTARCTICA

ABOVE Research station.
FAR LEFT Penguin.
LEFT Map of territorial claims.
BELOW Map of Antarctica with 60°S boundary & Convergence.

Poles apart: the uniqueness of Antarctica

The Antarctic, like the Arctic, provides opportunities and challenges for our modern world. Opportunities are framed in the context of science, where the next big discovery might lead to the cure for cancer or to answers from climate change messages. Challenges are those of environmental protection, the continuance of the largest nuclear free zone in the world, and the recognition of the importance of both polar regions to the health of the global environment. **BY MICHELLE FINNEMORE**

Like the Arctic, the Antarctic region has gripped the human imagination for centuries. Early Antarctic explorers did not even see the great southern land mass until the 19th century, and even when they did, the sightings provided little clue as to what was hidden beneath the masses of ice. Today scientists are the great explorers of the Antarctic and results from their research are helping us to develop a truly global picture of the Earth's environment.

While the geographic north is water surrounded by land, the south polar region is a large landmass surrounded completely by water. This circum-polar ocean, the Southern Ocean, was the barrier to continental exploration and even today acts as the guardian of the Antarctic continent.

Legally, the Antarctic is defined as the area south of 60 degrees south latitude. However, the region's biological boundary can be found at the Antarctic Convergence. The Convergence is a constantly shifting boundary that marks the division between cold Antarctic water, and warmer sub-Antarctic water. A distinct temperature change can be recorded as this boundary is crossed and the Convergence represents a sort of "fence line" which distinguishes the Antarctic ecosystem and its related species from those to the north.

Putting Antarctica in international fora

The treaty that defines Antarctica's boundaries is known simply as The Antarctic Treaty. It is the core of the Antarctic Treaty System (ATS), the bundle of international laws which govern the Antarctic region. The ATS has become a powerful set of legal instruments. With regular yearly meetings and consensus voting as the only way to develop recommendations and rules on Antarctic governance, the Treaty meetings bring together representatives from forty-five nations and various NGOs to discuss common concerns and protection mechanisms for Antarctica. The Treaty has been hailed as a legal success story, in that it has lasted, without amendment, for more than 40 years. This is no simple feat, as the Treaty

is responsible for governance of an area that occupies 1/10th of the entire earth's surface. When the Antarctic Treaty was negotiated and signed in 1959, there were only twelve original signatory states. These twelve in themselves are a diverse group of states: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, United Kingdom, United States of America, and the Russian Federation. Because the Antarctic has no permanent or indigenous human population, these twelve nations established the Antarctic

Antarctica contains 90 percent of the world's fresh water, locked up as ice which covers 98 percent of the continent

Treaty to govern the Antarctic in the interest of all mankind.

Of the twelve original signatory nations, seven make claims to territory in Antarctica. Although these claims are disputed, the Antarctic Treaty froze the operation of these claims thereby stopping any arguments amongst claimants, or between claimants and non-claimants, over the legitimacy of the claims. All seven territorial claims therefore remain as they were as at 1 December 1959, and to date, no military action of any kind has taken place on the Antarctic continent. The area remains devoted to peace and science.

Being part of small science communities

The International Polar Year of 1957, which is now known as the International Geophysical Year, saw dedicated science teams lead year-round research expeditions in Antarctica. After this year, the twelve nations that had participated in Antarctic research negotiated and signed the Antarctic Treaty in Washington, DC. Science remains the currency in Antarctica with over forty-five nations now conducting small and large-scale scientific operations there, some year round. With no indigenous or permanent human population, these scientific research stations are the only areas on the continent to support human populations. In the austral summer over 2,500

people live on the continent, with up to 14,000 ship-based visitors also arriving for short (maximum two weeks) visits, primarily in the Peninsula region. In the winter, as darkness closes in, many of the scientists depart and the continent is left with only about 250 human inhabitants.

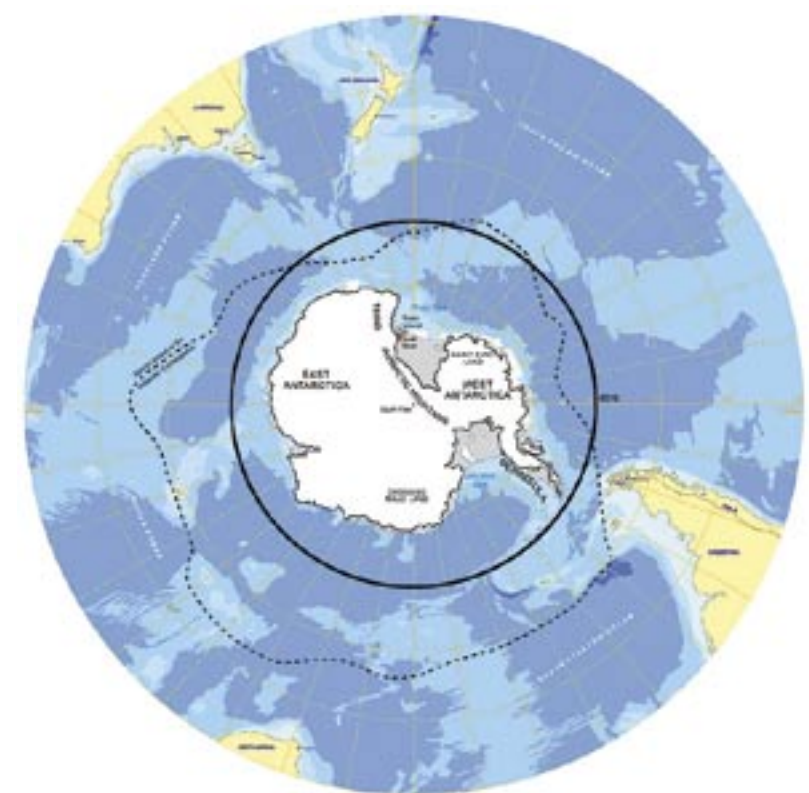
Extreme similarities

The polar regions share common concerns primarily due to their special resource characteristics that are not found anywhere else in the world. The

ecosystems are so fragile that substantial resource exploitation of either living or mineral resources could cause devastating environmental impacts. Both polar regions are dominated by extreme temperatures. At the South Pole, winter temperatures have been measured as low as -89.6°C (-129.9°F). Added to this is the high average wind speed which makes the Antarctic colder than

to contrast with the north polar region, where the largest land animal is the polar bear, the largest land creature in Antarctica is the flightless midge, an invertebrate that measures less than 12 mm in length

the Arctic. Of course, as with the Arctic, daylight hours in winter are extremely short with the sun staying below the horizon for many months during the height of the Antarctic winter. These conditions blanket the Antarctic continent in ice and also surround the continent in sea-ice which more than doubles the area of Antarctic ice in the winter (20 million km^2 in winter, receding to 4 million km^2 in summer). Antarctica contains 90 percent of the world's fresh water, locked up as ice which covers 98 percent of the continent. The Antarctic receives little to no precipitation each year making it a polar desert. On average only 2–5 cm of snow accumulate at the South Pole each year. Lack of free water, limited sunlight and the extreme temperatures have resulted in few plants on the continent itself with



GATEWAY ANTARCTICA

no vascular plants or trees except those found on the Sub Antarctic Islands.

Rise in temperatures and the ozone layer

The ice, ice shelves especially, are being carefully studied by scientists as they are known to be sensitive indicators of global climate change. Subtle rises in global temperatures may be the cause of the sudden collapse of some large ice shelves in the Antarctic Peninsula region.

Although the ecosystems of both polar regions are complex, the Antarctic eco-

Hidden resources

In the early 1980s, the oil crisis and the possibility that Antarctica contained some of the world's greatest mineral resources led the Antarctic Treaty nations to discuss the possibility of mining and minerals activities. A comprehensive mining Convention was negotiated that would have allowed mining activities to operate in and around the Antarctic continent. Opposition to that Convention, primarily from environmental groups, was fierce and the Convention was ultimately shelved. Now there is a new Convention in place the Environmental Protocol which bans all mining in Antarctica for at least 50 years. The Protocol also lays down rules to comprehensively protect the fragile Antarctic environment.

To protect the Antarctic and to respond to these challenges we must educate ourselves so that we are aware of our place in the world and the importance of harmonizing human action with that of the global ecosystem, of which we are an intricate part. We must develop and maintain strong political relationships which will lead to international legal instruments which recognise that even though we are poles apart we still share the common ecosystem of one Earth.

MICHELLE FINNEMORE is the Manager of Gateway Antarctica at the University of Canterbury, Christchurch, New Zealand. Gateway Antarctica is also the GRID-Christchurch node.

Additional Information on Antarctica is available at www.gateway.canterbury.ac.nz and in UNEP GEO-3. GRID-Christchurch can be found at www.gridc.canterbury.ac.nz.