

## SUMMARY

### Piping-up the valley

The Mackenzie Valley in Canada is facing a natural gas pipeline development through huge regions of untouched wilderness. With some local opposition the two authors question if the pipeline can be done without causing serious damage to the environment.

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### Larger human footprints

Human infrastructure now covers more than 15 per cent of the Arctic and in 50 years mining, harbours, roads and tourism will affect more than half of the Arctic. Read about the consequences to nature.

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### Fewer mega ice cubes

The Arctic ice is melting caused by globally warmer temperatures. Polar bears and seals suffer and indigenous people of the North will have more difficulties surviving by traditional methods. Climate change is changing the Arctic as well.

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### Four different futures

A sustainable future or a future where security and market is first? In four articles the Global Environment Outlook report's four scenarios for the future of the Arctic is explored.

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### Lomborg, May, Martin and Stenlund

Four internationally renowned environmental experts are giving their predictions and thoughts on the future of the Arctic environment.

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Read also what the Global Environment Outlook Report states on issues like biodiversity, indigenous people, climate change and pollution.



Arctic eco-tourists kayaking in Kangerdlussuaq/Inglefield Fjord in NW Greenland.

Staffan Widstrand/Naturbild

# The uniqueness of the Arctic

*The Arctic has always gripped our imagination. The early explorers who came back from their journeys told the world about a barren land with ice, snow and darkness where they had to fight to survive.*

Their ships were often crushed from the force of the drifting ice; men died of starvation or scurvy, or for lack of equipment and clothing to protect them from the biting cold.

But could also tell of meetings with friendly people who had adapted to life in these harsh conditions, and who often helped them to survive. They copied the Inuit's fur clothes and their simple, ingenious modes of transport, such as the kayak and the dog-sledge – things that are still used.

Their diaries described a world of reindeer, seabirds, seals, walrus, whales – and encouraged new expeditions to exploit these riches of the High North. Myths flourished then. Stories were told that the interior of Greenland was warm and lush, that there was an unknown, unexploited continent at the North Pole. Early explorers wanted to open a sea route from the North Atlantic Ocean to the Bering Strait, the so-called North West Passage. Other attempts were made to sail the North East Passage from Europe along the Siberian coast to Asia.

The Arctic still fascinates, even though we now know that the interior of Greenland is a massive ice cap and there is only drifting sea ice on the North Pole. Ice-going vessels are now able to penetrate the Arctic seaways most of the year and tourist expeditions to the North Pole are regular (if expensive) features. Now there is no unknown land to discover and map, what is so special about the Arctic, other than its impressive scenery and stunning beauty?

The Arctic is of great interest to biologists. It has only about 10% of the plant and animal species found in temperate regions, and a fraction of those in the tropics. But the few species that live in the Arctic are extraordinarily well adapted to life under marginal conditions. The growing season for plants is very

**Thick blubber and greenhouse-like fur and skin system allow polar bears to stroll around on the ice in biting cold.**

short – and there is often no more than a few weeks to grow and set seeds. Little energy is wasted on unnecessary growth, so stems are short and tough. Some plants, such as the Arctic poppy, have adapted remarkably. Its white and yellow flower forms a parabola that collects the sunlight in the centre where the seeds are formed. Its flower faces the



A young Nenets woman herds reindeer past an industrial complex on traditional Nenets land on Yamal peninsula, Russia.

Bryan and Cherry Alexander

sun as it moves across the sky each day, using all available sunlight. Other plants grow in small balls where the little heat from the sun is concentrated, in the middle where the roots are. Some plants require two or more summers to set seeds.

Animals are also well adapted to the cold. Reindeer, seals and polar bears have thick layers of blubber under their skin that serves two main purposes. Five to ten centimetres of fat are very effective

insulation against cold. Seals that bask on the sea ice or dive in ice-cold water do not feel the cold. The reindeer's thick blubber layer is often combined with a long and dense fur that is an equally effective insulator. Polar bears have thick blubber and dense fur too. The white fur of these magnificent carnivores is almost transparent, so that sunlight can travel through the fur. But the skin is black, and so particularly effective in absorbing the heat from the sun. The combination of thick blubber and a greenhouse-like fur and skin system allows polar bears to stroll on the ice in biting cold. The polar bear's problem ...continued page 2



*continued from page 1...* comes during summer when it may get overheated and has to take to the sea to cool off.

Blubber is not just an effective insulator against cold. It is also an important reserve for nutrition and survival, not least for reindeer, who have little access to grazing during winter, and for polar bears, who must often live for weeks and even months without seals, their main prey. The blubber plays a particularly important role for denning females. A pregnant bear comes ashore in late autumn to dig a den in the snow. There she gives birth to two very small cubs around Christmas. The births are premature, as the cubs are naked and blind with a weight around 250 grams. The female bear stays in the den for six months, without anything to eat. When the cubs emerge from the den in March or April, each of them has gained 10 kilos. How is it possible for their mother to survive for so long without food and to raise two cubs that have drained 20 kilos from her body? The answer is that the bear's fat is transformed to rich, nourishing milk for her offspring, and she has no need to draw protein from her muscles. When the female bear leaves

Arctic species can often demonstrate a remarkable ability to adapt as living conditions change.

the den and heads for the sea ice with her cubs she is lean and her fat reserves are small. But she is still strong and fast, able to hunt seals for herself and her cubs.

Arctic ecosystems are commonly seen as particularly vulnerable because their species are few. Tropical ecosystems are considered more robust because of their species richness. This is only partly true; though plants and animals in the tropics are highly specialized, Arctic species can often demonstrate a remarkable ability to adapt as living conditions change.

The Svalbard archipelago is a good example. There are no indigenous lemmings or other small rodents on the islands. Hence, falcons, owls and other birds of prey are also absent. The large glaucous gull has taken on their role, and lives on chicks from eiders and seabirds – it is even able to catch the small, fast flying auk in the air. Because lemmings and other rodents are absent, the arctic fox, too, has to turn to other little prey. In Svalbard, the fox hunts ducks and waders on their nests and has become a scavenger that collects dead birds under bird cliffs. It builds depots for the winter and it follows the polar bear on its seal hunt onto the ice during wintertime. Arctic foxes can often travel miles away from any shore. Fox tracks have been observed on the middle of the sea ice between Greenland and Svalbard.

There are also unique ecological adaptations in the Arctic's marine environment. Scientists have found that algae can grow profusely under the sea ice, thereby establishing an upside-down sea-bottom system

that nourish plankton, that in turn is food for fish, seabirds, seals and whales. When the ice recedes in spring, the exposed, nutritious seawater is exposed to 24 hours of sunlight that leads to sudden, intense marine production. This, combined with upwelling of nutrients from the seafloor, are the main reasons why northern seas such as the Bering Sea and the Barents Sea are such important commercial fishing grounds.

Though there are few plant and animal species in the Arctic, some of them can appear in impressive numbers. Some flowers cover the ground as huge red, yellow and white carpets during summertime. Reindeer roam around in herds that can reach thousands of heads, and some seabird colonies have tens of thousands, sometimes even millions of inhabitants. But this richness is also a reason for environmental concern. The ice-edge and between the floes, where marine

life is so rich, are also the places where oil spills get trapped and stay because it is so difficult to clean them up.

On the flat tundra, permafrost prevents pollutants from sinking into the ground. Hazardous substances remain in ponds and wetlands important to water birds and reindeer, and low temperatures slow down their deterioration. This has far-reaching ecological effects that are often more serious than in more temperate regions. Vehicles can tear up the thin active layer above the permafrost, exposing the frozen ground to melting. Because regrowth is so slow in the Arctic, water and thawing can easily transform a vehicle track to a flowing river in a very short time.

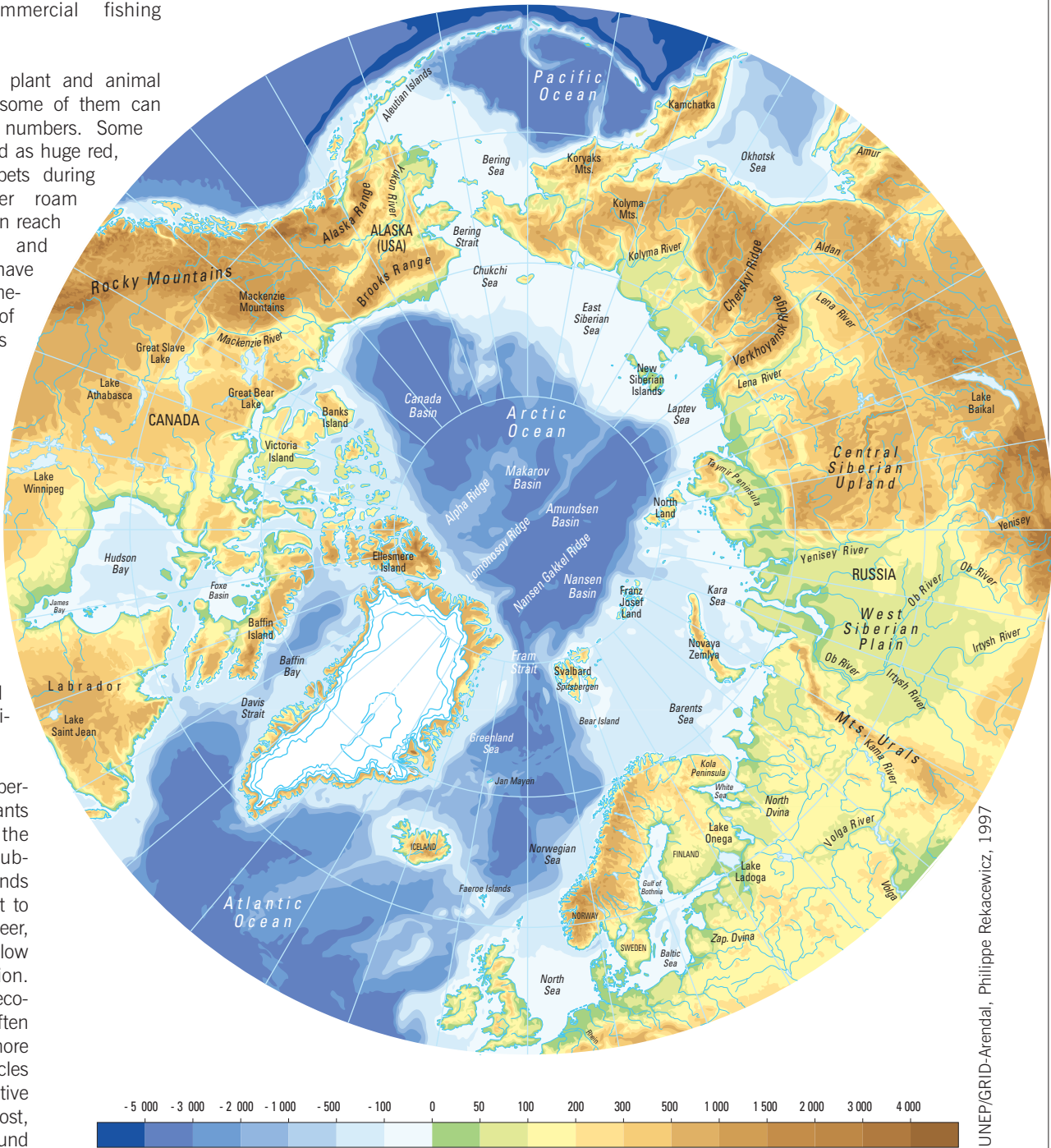
The Arctic provides opportunities for our modern world – but challenges too. What can we do about it? There are some things that everyone should agree upon. Indigenous people have made a living in the High North for hundreds, sometimes thousands of years. They have developed unique lifestyles in harmony with the land and the sea. But these societies are now threatened. Indigenous peoples' cultures and rights need to be respected, but should also be brought into line with the modern worlds' political agenda. This include their right to find their own way to the modern world. There is a need to expand our knowledge of the Arctic's ecosystems so that we are better able to manage its riches. There is also a need to enhance our awareness of the Arctic. And finally, we must foster political mechanisms and international agreements and instruments to secure the proper management and conservation of this very important part of our planet.

Thor S. Larsen  
UNEP/GRID-Arendal  
www.grida.no

*“The Arctic region is a global indicator of the impacts of pollution and climate change for the whole world”*

Arctic Council at the World Summit on Sustainable Development, August 2002.

THE TOPOGRAPHY OF THE ARCTIC



UNEP/GRID-Arendal, Philippe Rekacewicz, 1997

UNEP/GEO-3: CONFLICT OVER USE OF LAND

Extending 14 million square kilometres, twice the size of Australia, the Arctic lands are rich in resources with large potential for oil and gas drilling in particular. This is what the recently released United Nations Environment Programme (UNEP)'s Global Environment Outlook report (GEO3) states.

Not only have the Arctic states lately become a popular travel destination increasing tourism and a growing concern that tourists will put extra pressures on wildlife, water and other basic necessities. But the possibilities of exploitation of the huge deposits of oil, gas and minerals in the Arctic put serious pressures on the land.

The Arctic land consists of three main sub-systems, the high polar desert, the tundra and the forest-tundra. Under most of this land is a layer of permafrost, which is defined as ground that remains frozen for at least two summers in a row. This layer can reach depths of 1500 meters. When the upper level melts in the spring, the melt-water cannot sink below the remaining permafrost and flows rapidly over the frozen surface into streams and rivers.

The permafrost melts more easily with warmer temperatures and exacerbates an already widespread and increasing amount of erosion. In recent years approximately 70 million ha of tundra has been degraded through destruction of soil and vegetative cover resulting from prospecting, mineral development, cars, construction and, at certain location, overgrazing by reindeer.

Arctic governments have taken action to protect about 15 per cent of their land. However, that figure is misleading because nearly 50 per cent of the protected areas are classified as Arctic desert or glacier. These highly protected areas are also the least productive part of the Arctic. In Greenland most of the protected area is ice cap.

**For further reading:**  
GEO-3 [www.grida.no/geo](http://www.grida.no/geo)  
AMAP (1997) Arctic Pollution Issues: A State of the Arctic Environment Report [www.arcticpeoples.org/working-groups/various\\_reports.htm](http://www.arcticpeoples.org/working-groups/various_reports.htm)  
CAFF (2002) [www.arctic-council.org/pmeetings/oulu02/sao\\_docs/11\\_2\\_1\\_caffreport.pdf](http://www.arctic-council.org/pmeetings/oulu02/sao_docs/11_2_1_caffreport.pdf)

FACTS

Arctic land comprises of:

- Polar desert: bare soils and rocks with spares plant communities;
- The Tundra: vast, open plain with continuous plant cover;
- The forest-tundra: patches of continuous forest interspersed with tundra-like open areas.



# Mackenzie Valley: balancing nature, culture and natural gas



Foothills Pipe Lines Ltd.

The Mackenzie Valley natural gas pipeline will be the largest development project ever attempted in the circum-Arctic.

***A Mackenzie Valley natural gas pipeline is looking increasingly likely – but will Canada ensure that this mega-development project, affecting huge regions of unfragmented wilderness, balances natural and cultural values?***

WF, the conservation organisation, believes it can and will, and is working in partnership with the indigenous peoples organisations, First Nations, industry, and governments to ensure the simultaneous completion of a network of ecologically and culturally representative protected areas in the affected natural regions.

The Mackenzie is one of the world's great rivers – in good company with the Nile, Congo, Yangtze, Lena, Indus, Rhine and Amazon. But it is now almost unique in its natural state – no dams, diversions or major developments along its full course and valley. It also provides the largest single source of freshwater and nutrients to the Arctic Ocean. The Mackenzie Valley's biophysical features are undoubtedly of global significance, and will be major considerations as development plans and assessments proceed for the new energy corridor between the Mackenzie Delta north of Inuvik through the Northwest Territories (NWT) to existing gas pipeline networks in northern Alberta, 1,350km away (see map).

Whether or not the Mackenzie natural gas reserves (an estimated 0.17 billion Sm<sup>3</sup> o.e) are hooked-up with gas piped from northern Alaska (estimated to be at least an order of magnitude larger than the Mackenzie reserves), this will be the largest development project financially ever attempted in the circum-Arctic (with an estimated \$US 3-4 billion price tag), and will result in the world's longest pipeline. Of course, this new energy corridor will foster other industrial developments across the adjacent landscape – oil and gas, mining, forestry, hydro ventures, increased road access, etc. All this

new development will undoubtedly have huge social, economic, cultural and environmental impacts across the entire region, affecting areas well beyond the relatively narrow corridor selected for the main gas pipeline.

Local Aboriginal organizations are now generally supportive of the mega-project, unlike previous attempts, which were postponed until Aboriginal land claims were settled and measures put in place to protect natural and cultural values. Today, three of the four Aboriginal land claims have been settled along the NWT portion of the potential pipeline route. Those groups (the Inuvialuit, Gwich'in and Sahtu) have signed a joint pipeline venture with the major group of Mackenzie operators – Imperial Oil Resources, Conoco Phillips, Shell Canada, and Exxon Mobil Canada. The Deh Cho First Nations in the western NWT are still negotiating for Treaty Rights and Self-Government Agreements.

Governments and the Canadian public also seek developments of this kind, for a secure energy supply, jobs, and revenue, though conservation of cultural and natural values are also top priorities in this huge nation of relatively pristine natural areas, where many northern communities still depend on hunting and trapping of wildlife for their livelihoods and cultural identity.

Canada was the first industrialized nation to sign the Biodiversity Convention (1992), which spawned widespread adoption of the principles of "sustainable development" as a core target and policy for decision-making. In the same year federal, provincial and territorial governments signed Canada's Tri-Council commitment to complete the network of protected areas in the 486 natural terrestrial regions of Canada by 2000. However, less than 1/3 of these natural regions are adequately protected

to-date. In the Mackenzie Valley, most natural regions contain no protected areas – in Alaska the coverage of protected areas is far better, and includes the areas adjacent to the trans-Alaskan oil pipeline (see map).

Canada embraced the attitude of developing natural resources in the Arctic in a sensitive way with "environmental protection" as a top priority. As a key player in the eight-nation Arctic Environmental Protection Strategy (AEPS) – now the Arctic Council – Canada also committed itself to the ongoing Circumpolar Protected Areas Network (CPAN) initiative, to complete a representative network of protected natural habitats to help balance future resource development with the conservation of nature and culture.

Although there is a recognized need to consider cumulative impacts of these developments, there is still a huge degree of uncertainty about this, as existing and subsequent developments will also impact the same areas and cultures. This is precisely why there must be a broad, landscape-level approach, reserving a network of ecologically and culturally representative protected areas almost as an insurance policy, safeguarding samples of the natural northern world, which will also serve as crucial benchmark reference areas, against which to assess development impacts.

Many remain fundamentally opposed to the very notion of creating major industrial corridors through what remains of the world's wilderness areas. Citizens, including northerners, are still very nervous about the long-term impacts of such mega-development on their culture, their economy, their environment and the wildlife that have sustained them for thousands of years, not to mention the climatic change and its striking impacts, which are now especially evident in the Arctic!

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## EDITORIAL

### Save Nivlheim

The Nordic Vikings had a name for the remote, outmost and inaccessible part of their world. They called it Nivlheim. This was a cold, barren and harsh land, with snow and ice all year round, and with complete darkness and howling winds – a place where no man could survive. The Vikings' mythical Nivlheim could well have been based upon the Arctic as it was thought to be at that time.



We now know of a different Arctic, with beautiful landscapes, massive glaciers pouring into ice-covered seas, tundras covered in carpets of many-coloured flowers, seabirds in their thousands breeding in cliffs that line the shores. Reindeer move in hundreds, seals bask in the sun and polar bears stroll over the drifting ice. The Arctic is one of the world's few remaining areas of pristine wilderness.

In the Global Environment Outlook 3 (GEO3) report, the United Nations Environment Programme (UNEP) has sketched a picture of the Arctic today. The region is changing fast and the Arctic sections of the GEO 3 report tell this story.

Indigenous people, who are adapted to the Arctic environment and who have maintained their traditional lifestyles for centuries, are now seriously affected by our modern world and have to adapt to our way of living and to our use of resources.

We have reason to be concerned that over-fishing is depleting Arctic fish stocks so that important fisheries will soon not be sustainable. In addition we have become aware of the consequences of the massive influx of pollutants to the area, often brought by winds from the south to marine and terrestrial ecosystems. Pollutants in fish, seals and reindeer affect local people's health.

Modern technology allows us to exploit the Arctic's gas and oil reserves as never before, but blow-outs and massive oil spills may have dire ecological consequences: we lack the technology to deal with these in ice-covered waters. Changing climate and weather patterns will also affect us. The sea ice is getting thinner and the borders between the drift ice and open seas retreat northwards every year. Ocean currents may change their course, or even cease to flow as before. The impact of all this on the rest of the world will be severe.

Today 85% of the Arctic is pristine wilderness, but our scenarios show that if development is left to market forces only, this might be reduced to less than 30% by the middle of the century due to development of infrastructure, exploration of oil and gas, mining, logging and tourism. Our modern world depends on the Arctic's resources, and dedicated and strong decision-making is needed to make the Arctic development sustainable.

We shall not give in to gloom: as the GEO3 report shows, this is an immediate challenge to us all. We must address the importance of the Arctic and its climate and people; and recognise scientists' discoveries, consider their recommendations and do something about them. We must respect indigenous people's traditions, needs and rights. International agreements and conventions provide us with the mechanisms we need. Politicians can give the marching orders and decision-makers in national and international institutions can set things in motion. But we must not wait. We must act now if we are to save Nivlheim.

Dr. Klaus Töpfer



### Global Environment Outlook 3

This report describes the state of global environmental conditions, trends, and policy responses over the past 3 years; evaluates human vulnerability to environmental change; and presents future visions of the environment and options for action for the next 3 years.

A UNEP-Earthscan publication  
[www.grida.no/geo/geo3/index.htm](http://www.grida.no/geo/geo3/index.htm)



*continued from page 3...*

Substantial investment is needed in the regulatory system, and in regional planning to prescribe appropriate land and resource use. Public and government statements and commitments reflect the need and philosophy behind this common sense “balanced approach”. Not surprisingly, the oil and gas industry and investors also seek this approach, which minimizes the likelihood of developmental delays, resulting in fewer costly battles in the courts or out on the tundra.

With this solid philosophy and universally accepted principle of balanced development, the major stakeholders are now conducting feasibility studies and initial socio-economic, engineering and environmental assessments of specific route options, prior to filing a formal development application in the next year or so. GIS-based mapping of all existing biophysical and natural resource information is required to identify priority areas, and then close collaboration with the communities to confirm and update these data is needed. WWF is currently conducting this work within the existing NWT Protected Areas Strategy (PAS) partnership of Aboriginal communities, industry and governments and environmental organizations. The resulting maps and data will be made widely available. This information will then be used in the PAS to help identify and reserve an adequate network of culturally and ecologically important areas for legal protection while finalizing and approving the pipeline route and its associated infrastructure.

This large-scale, high-profile and timely opportunity will position Canada as a lead nation in environmental and cultural protection, showcasing a major commitment to a truly balanced, “sustainable” approach. All the players involved hope and expect that Canada will seize this opportunity.

**Peter Ewins**

Director Arctic Conservation

**William Carpenter**

Regional Conservation Director

NWT, WWF-Canada

[www.wwf.ca](http://www.wwf.ca)

*The Arctic region has*

**lower life expectancy and higher mortality rates,**

*including higher infant mortality rates, than national averages of its constituent countries.*

**Speedy industrialisation in the northern wilderness areas poses a threat to animals, the environment and indigenous people. More than 15 per cent of the Arctic is currently affected by human infrastructure.**

If this level of development continues, more than half of the Arctic will be affected by mining, oil and gas drilling, harbours, roads, tourism and other service activities by 2050. These calculations have been done in the United Nations Environment Programme’s (UNEP) report Global Methodology for Mapping Human Impacts on the Biosphere (GLOBIO).

The report provides a new method of easily summing up the total human impact on nature. In many countries, calculating environmental consequences from e.g. water power plants and roads are subject to regulations. However, the total effects of such development projects have never been properly calculated. GLOBIO provides a new and relatively easy method to do so. The methods used in the GLOBIO report were developed by the Norwegian Directorate for Nature Management (NINA) and UNEP/GRID-Arendal, together with a number of international scientists.



Fishing station in Lofoten in Northern Norway.

Ragnar Vaga Pedersen / Svanhøvd Environmental Centre

# Human footprints growing bigger

More than 200 conclusions from scientific studies around the world are the foundation of GLOBIO. These studies show how human activity affects the environment. As more of the remaining wilderness areas decrease in size and number, many species will be concentrated in these areas, which will increase the pressure on ecosystems; webs of life that animals depend on for food, water and shelter.

GLOBIO is building on infrastructure as an indicator for human intervention. Roads, railways and pipelines are all signs of industrialisation. When these transportation gateways are established, a more uncontrollable development follows, such as increased immigration and larger cities. All those factors increase deforestation, over-grazing, water pollution, social conflicts, erosion and fragmentation of wilderness areas.

## Animal life

Most animals try to avoid human-built infrastructure. More than 100 studies of Arctic animal species show that some animals will have problems in the wake of industrialisation. Reindeer herds may be influenced by roads up to five kilo-

metres away. Larger predators, such as wolf and bear, are affected when the nearest road is closer than two kilometres away. Most birds only have to be one kilometre away from a road to feel its negative impact. Shrinking and fragmented pastures results in over-grazing which leads to erosion and affects animals reproduction abilities. Predators and prey animals may be forced to live closer to each other.

There will be losers but also winners in the Arctic wildlife in the future. A number of animals will take advantage of the fact that other species are disappearing. In 2050, the Arctic will have less migratory birds and mammals like the polar fox and the reindeer, but more gulls and red foxes. When humans interfere in the delicate ecological balance in the Arctic, opportunistic species may play more pronounced roles. More specialised animal species will be reduced in numbers that approach extinction.

## Vegetation and flora

Power and pipelines have limited short-term affect on the Arctic vegetation. Changes in snow cover and smaller disturbances in the soil can normally

## GEO-3 REPORT: LESS FISH IN THE SEA

The Arctic oceans and seas host a rich and diverse marine and freshwater fish species, with around 150 species of fish in the Barents, White and Kara Seas comprised of large numbers of cod, herring, capelin, and salmon. There are as many species in the Bering and Chukchi system, which also includes the heavily exploited pollock. In fact the Barents and the Bering systems are two of the most commercially productive fisheries in the world. The Bering Sea accounting for 2 to 5 per cent of the world’s fishery catches. Economically, the Arctic fisheries supply a significant part of the world’s fish supply. The Bering Sea fisheries alone comprise half the United States catches.

But there are growing pressures to the Arctic fisheries, according to the recently released United Nations Environment programme (UNEP)s Global Environment Outlook report, called the GEO3.

Over fishing is a serious problem. Since the 1950s, there have been some spectacular crashes of populations of commercially important species such as the cod and Atlantic salmon off the coasts of Canada and Greenland and herring in the Norwegian and Icelandic waters. Strict conservation measures including no-catch zones were put in place. However, even with those measures, some

recovery has been slow and not a certainty. Other populations such as the haddock stocks in the waters between northern Norway and Svalbard have seen a gradual but steady decline. The Icelandic fishing ban on Atlantic herring between 1972 and 1975 made a difference, with stocks gradually recovering and now considered to be within safe biological limits.

The declining stocks put pressure on the Arctic indigenous people who often depend on fish catches. Climate changes may also threaten species by reducing ice habitats.



be detected up to 500 metres from such power lines. On a broader scale however, these structures have an adverse affect on the ecosystem. Up to two kilometres away from the pipelines, effects can be measured in changes in permafrost and damage from off-road vehicles.

### Indigenous people

Hunting is the lifeline of many indigenous groups as Sami, Komi, and Chukchi in Euro-Asia and Dogrib, Cree, Innu and Yupit in North-America. These people have evolved in close relationship with their environment. Social networks, traditions and a lifestyle thousands of years old depends on the movements of the animals.

Northern Scandinavia and part of Russia are examples of areas where the current growth in infrastructure connected to transportation, oil, gas and mineral extracts, is incompatible with reindeer herding. Indigenous people are forced to leave their nomadic lifestyles in favour of a settled lifestyle. In Alaska, Canada and in Greenland many indigenous people will increasingly be affected when all their traditional food habits and activities disappear as a result of industrialisation.

**For further reading:**  
GLOBIO [www.globio.info/](http://www.globio.info/)

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**Lars Kullerud**, Director  
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[www.uarctic.org](http://www.uarctic.org)

In 1596, on his attempt to find a northern sea route from Europe to China, Willem Barentsz discovered an island in the high north. He named the island Spitsbergen (spiky mountains), today one of the islands in the archipelago known as Svalbard.

Willem Barentsz died on Novaya Zemlya in 1597 during this expedition, however the discovery of Spitsbergen was made public and very soon attracted the attention of Dutch and English entrepreneurs. Their main interest was the reported abundance of Greenland Right whales (also called Bowhead whales). The first whaling in the area started sometime around 1612. Initially, the whales were flensed (butchered) alongside the ships. The blubber was then cooked to render it into oil at primitive land stations. Often these stations were only used for one or two years. Later the land stations became much larger, multi-year settlements. The best-known station is probably Smeerenburg, on Amsterdam Island, Spitsbergen. Stations like Smeerenburg made it possible to process large numbers of whales. At the end of each whaling season, the barrels with train oil were shipped back to Europe. The remains of the blubber ovens and the whalers' huts are still found on the West coast of Spitsbergen.

The hunting had a devastating impact on the whales in the area. When the Greenland Right whale population started to decline dramatically

around Spitsbergen, the whale hunt shifted from Spitsbergen to Jan Mayen, and then to the Davis Straits between Greenland and Canada.

It is estimated that a total of approximately 120 thousand Greenland Right whales were caught between 1612 and 1800. The size of the population of Greenland Right whales before 1612 is estimated at 46 thousand. Currently almost no Greenland Right whales are left in the Northern Atlantic Ocean. In recent years, only some rare observations of Bowhead whales in Svalbard waters were reported.

This history provides a clear warning about the impact of ruthless exploitation of natural resources. In case of the Greenland Right whale, the reproduction rate is so low that the population does not seem to be capable of growing back to safe numbers. Even after a few hundred years, the Atlantic population is still barely clinging on.

Each year, in the Beaufort/Chuckchi Sea area, a few Bowhead whales are still taken as part of the traditional hunt by Arctic indigenous people. This subsistence hunting, which is subject to strict control and international agreement, provides traditional food that is an important part of the diet for these isolated communities. Recently, agreement on the traditional hunt has been used as a ploy in the wider international disagreements about the future of commercial whaling – with potentially damaging consequences for the physical and cultural health of the indigenous people concerned.

### Further reading:

Hacquebord, L., Environment and History 7 (2001): 169-185  
Hacquebord, L., 1999: Polar Research 18(2), 375-382

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### FACTS

#### Arctic animals and plants:

- About 130 species of land animals among which are the polar bears, muckox, reindeer and caribou,
- About 280 nesting bird species among which are geese, ducks and seabirds;
- 450 species of fish, such as cod, salmon, herring, capelin, pollock and halibut and several species of shellfish;
- Larger sea mammals such as walrus, seals and whales;
- 3000 species of insects;
- 3000 flowering plants;
- 3000 lichens and mosses;
- 5000 fungi.

# Reindeer husbandry and forestry



Running reindeer in captivity.

**About 2.5 million semi-domesticated reindeer roam throughout northernmost Eurasia along a belt running from Scandinavia to the Beringer Strait.**

Reindeer husbandry is an ancient livelihood common to more than 20 different ethnic or language groups. Most reindeer herders are nomads who migrate with their reindeer between summer pastures on the tundra and winter pastures in the taiga forests. These seasonal migrations frequently take place over hundreds of kilometres.

Despite the scale of these activities, in Siberia, for instance, the whole annual reindeer management cycle takes place north of the area used for commercial forestry. But in northernmost Fennoscandia, reindeer husbandry and forestry overlap, particularly in Finland and Sweden where 75–90 % of the reindeer population live in coniferous forests, at least during the winter. Sharing resources has sometimes created problems. Reindeer grazing is generally thought to hinder the natural regeneration of Scots pine and birch, and destroy birch cultivations if they are not fenced; but in fact there is little damage to young Scots pine stands.

There can also be conflicts of interest between reindeer husbandry and other use of land (roads, pipelines etc). In Norway there is considerable debate about an army rocket-testing site that is preventing reindeer herders from using much of their traditional land.

There was a general belief that any damage to reindeer husbandry from forestry would gradually disappear. But it is now clear that final cuttings affect reindeer's winter pastures: the animals prefer old forests, which provide an abundance of reindeer lichens, their main winter food. Final cuttings reduce the value of the pasture. The loss of arboreal lichens is even clearer. Reindeer feed on them in mid and late winter, when the deep snow limits access to reindeer lichens.

Discovering new ways to integrate reindeer husbandry and forestry is still a challenge. Planning the shared use of forests can help with technical solutions, especially if all the users have a greater say in making decisions about matters of concern to all.

**Timo Helle and Mikko Hyppönen**

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# Oil and Gas resources in the Barents Sea

*The Barents Sea, with its disputed border controlled by Russia and Norway, supports one of the world's major fisheries, and is as such, already economically very important. The Barents Sea may also become a major gas and oil supplier in the future.*

The sea is split by a natural geological border zone, following approximately along the mid-line between Norway and Russia. This border separates some enormous gas fields identified on Russian side from several modest discoveries on the Norwegian side. There is 0,3 billion Sm<sup>3</sup> o.e. (standard cubic meters of oil equivalents) of extractable oil identified on the Norwegian side; mainly as gas, with another estimated 1 billion m<sup>3</sup> unidentified. Unofficial sources indicate that the already discovered resources on the Russian side total about 8 billion Sm<sup>3</sup> o.e. The Russian resources are thus by far the largest, even before the Russian undiscovered resources are estimated (the undiscovered amount is speculated to be an exceptional 100 billion Sm<sup>3</sup> o.e.).

Oil and gas exploration in the Barents Sea has faced slow development, due to the costs and political risks involved. The new start for the "Snøhvit Field" and a new oil discovery not too far from the coast has boosted new development optimism on the Norwegian sector, in spite of strong opposition from green movements. High oil price and a more stable political situation has also inspired new investments and plans for development on the Russian side.

The Barents Sea shelf has a long geological history, where rock formations favourable for later oil and gas occurrences developed. A few million years ago, when the Atlantic Ocean opened all the way to the Arctic Ocean, land on the side of the new ocean raised while land further away from the rift were not lifted. Erosion of this new land lead to decreased pressure from the above rocks on the oil and gas already trapped there. The rocks cracked leading to leakage or expansion of the gas pressed oil out of the traps. This has been the case for discoveries in the Hammerfest Basin, including the Snøhvit field, where drill cores show that the field used to be filled with oil, but now has mainly gas. The Oil that once was there has leaked out to the sea over the last two million years; but some ...continued page 7



## UNEP/GEO-3: SURVIVORS IN THE COLD

Hunting ringed seal, the preferred diet for polar bears, has become a lot more difficult over the past decades for the large white bear. With warmer temperatures in the Arctic, the ice, where the ringed seal feed and give birth, melts earlier. When the polar bears come out of winter hibernation in early spring the ice may already be gone and so are the seals. The polar bear is left starving in a period when it should build up its body fat for the coming birthing period.

This is just one example of how the general increase in global temperatures has an immense effect on the Arctic environment, as described in the recently released United Nations Environment Programme (UNEP)'s Global Environment Outlook report (GEO3).

Measurements from 1979 to 1997 indicate an increase of 1°C per decade in the eastern Arctic and a decrease of -1°C in the western Arctic.

At the same time the protective stratospheric ozone layer has thinned. There have been sporadic episodes of severe stratospheric ozone depletion over the past 30 years and a 7.5 per cent decrease in Arctic ozone between the 1970s and 1990s. For each 1 per cent decrease in stratospheric ozone, there is about a 1 to 2 per cent increase in ultraviolet radiation. The impacts are serious and can affect the entire food chain of the Arctic. For example, reduced

ozone protection damages phytoplankton and other microbial organisms that power the life systems of the Arctic.

The warmer temperatures also reduce the snow and ice cover. This, together with increased levels of pollutants on the land surface, reduce the amount of reflection of sunlight adding to the overall warming effect.

The changes are a stark reminder of the interconnectedness between the earth's surface, its water masses and its atmospheric systems. According to scientists polluting human activities both in and outside the Arctic contributes to most of these changes.

Most Arctic states embrace the Kyoto Protocol and other climate change instruments, with the exception of the withdrawal of the USA.

### For further reading

GEO-3 <http://www.grida.no/gEO3>  
 AMAP (1977) Arctic Pollution Issues: A State of the Arctic Environment Report  
[http://nsidc.org/arcticmet/basics/primer\\_sources.html](http://nsidc.org/arcticmet/basics/primer_sources.html)  
 CAFF (1994) The State of Protected Areas in the Circumpolar Arctic  
[http://agdc.usgs.gov/caff/caff\\_maps.html](http://agdc.usgs.gov/caff/caff_maps.html)

## DISTRIBUTION OF POLAR BEAR POPULATIONS IN THE ARCTIC





*continued from page 6...* of it may have migrated to new locations, and the discovery made by Agip on the southern margin of the basin, just north of Hammerfest may be one such location.

While the Norwegian sector may have faced an unfavourable geological history over the last million years, this is not the case further east. The disputed area between Russia and Norway has several promising prospects including Centralnoye, and Severo Kildinsky just east the mid-line. A third gas discovery, Stockman, was first announced to western experts at a conference in Harstad in 1989. The resources reported at 3,2 billion Sm<sup>3</sup> o.e., led a western expert to insist that the Russians had made a decimal error, as this would be one of the largest gas fields in the world. Later, even larger discoveries have been proven in the Kara Sea further east. In spite this, there has been a very slow development of these resources, due to bureaucratic red tape; unknown consumer base; rough climate; problems with delivery, as well as the daunting cost of developing the extensive infrastructure required.

Future development of the huge Stockman field and the modest sized Snøhvit gas field together with new exploration licences in the Russian Arctic signal a possible growth in the oil and gas development industry in the Barents Sea. It may be time for a strengthened circumpolar cooperation to develop a means of safe production and to develop mechanisms for local job generation.

#### For further reading:

Ræstad, Nils, 2002; Barents Sea – geology and politics (in Norwegian, original title: "Barentshavet - geologi og politik"), Geo (periodical), No 2, 2002.

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University of the Arctic  
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Nils Ræstad  
PGS, [www.pgs.com](http://www.pgs.com)

# The UN issues an early warning about melting permafrost

The United Nations Environment Programme (UNEP) warns against the effects of global warming on permafrost, and recommends conducting more research into understanding the effects. Conclusions from such research should prepare the Arctic population for the dangers ahead as well as dangers they are already facing.

The polar areas are important in the climate debate, and the permafrost of Greenland and in Antarctica even more so. The creation of deep-sea water in the North Atlantic can affect sea currents and have severe climatic effects. The International Panel for Climate Change (IPCC) has predicted that earth's mean temperature will increase between 1,4 – 5,8 degrees Celsius in this century and the temperature in the Arctic will most likely rise the most.

## Permafrost areas will be reduced

Permafrost is a typical characteristic of the Arctic and can be from a few metres to one kilometre deep. Today's spread of permafrost in the northern hemisphere is shown on the map. The permafrost in the northern Siberia and North America is deep and continuous. Further south, permafrost is more spread out and is mostly found on mountains as far south as Sierra Nevada in Spain. In southern Norway, the elevation limit for permafrost on the highest mountains decreased by about 100 metres the last 2-300 years. An equal reduction has been observed in Alaska and in the Alps. Models developed by scientists from IPCC show a possible reduction of up to 16 per cent the next 50 years, especially in areas with discontinuous permafrost.

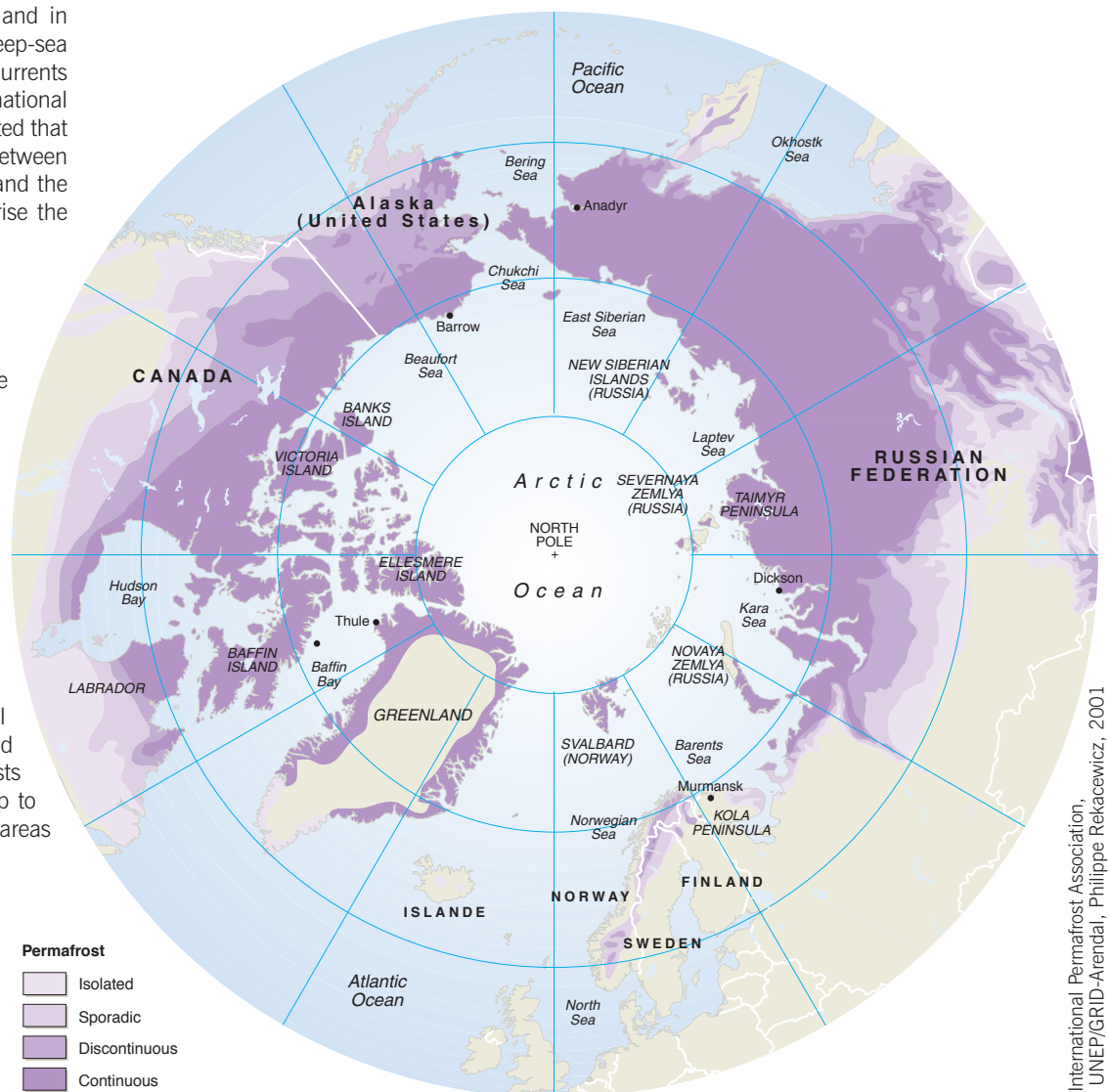
## Damages to the infrastructure

The ground in areas with permafrost is normally suitable for building, however scientists at the University of Alaska have found a tem-

perature increase in permafrost from -4 to -1 degree Celsius. Such a warm-up reduces the ability of the ground to support large structures by 70 per cent. In some stations like Fairbanks, Alaska, a change has been registered since 1955, and in Norris and Yakutsk in Russia, more than 500 tall buildings have been sig-

nificantly damaged. Similar damages are reported on roads and pipe lines. Damages to infrastructure are expected to increase in lieu with global warming. Erosion and the frequency of landslides are expected to increase once the permafrost decreases and the active layer gets deeper. ...continued page 8

## PERMAFROST IN THE ARCTIC



International Permafrost Association, UNEP/GRID-Arendal, Philippe Rekacewicz, 2001

## UNEP/GEO-3: THE WET REGULATOR OF GLOBAL TEMPERATURE

The Arctic seas are important in regulating the global climate, as well as providing great potential for oil and gas exploitation and for future transportation routes.

Two times the surface of the European continent, 20 million square kilometres, is the size of the entire Arctic marine environment. The enormity of these seas means a large shift of waters, which take part in regulating the global climate. This is what the United Nations Environment Programme (UNEP)'s recently released Global Environment Outlook report (GEO-3) states.

More fresh water is entering the oceans because the Arctic pack ice is melting. A decline of over 40 per cent has been measured from the 1960s to 1990s. Over 18 years, the ice season has lengthened in the western hemisphere, most strongly in the western Labrador Sea. However, in the eastern hemisphere, freeze-up is occurring later and thawing is occurring earlier, leaving large areas ice-free for several weeks.

These large waters also have considerable economic and strategic potential. For instance, shipping routes are opening up along the Arctic coast of Russia with a potential to directly link Asia with Western Europe.

There are vast oil and gas reserves along the continental shelves bordering the Arctic, as well as impor-

tant mineral deposits. Oil and gas development is already underway along the coast of Alaska and in the Barents, Kara and Pechora Seas. More sites are planned and there are growing concerns about the potential disturbances to the Arctic ecology from oil spills and loss of habitat.

The Arctic waters are under a potential risk of radioactive contamination from ocean dumping of radioactive waste, which was common until the London Dumping Convention came into effect. Six nuclear submarine reactors have been sunk off the coast of Russia.

To secure and protect the Arctic seas, the Arctic countries adopted a Regional Programme of Action for Protection of the Arctic Marine Environment against Land-based Activities, among other regulations. Given the current warming trend and interest in resource exploitation in the Arctic, the expectation is that there will be further exploitation of the Arctic marine environment and increased competition for strategic advantages.

#### For further reading:

GEO-3 [www.grida.no/geo/geo3/index.htm](http://www.grida.no/geo/geo3/index.htm)  
PAME (1997)  
[www.grida.no/prog/polar/aeps/pamestrp.htm](http://www.grida.no/prog/polar/aeps/pamestrp.htm)  
PAME (2001) [pame.arctic-council.org](http://pame.arctic-council.org)

## SURFACE CURRENTS IN THE ARCTIC



1 : West Spitsbergen Current

AMAP, UNEP/GRID-Arendal, Philippe Rekacewicz, 1997

continued from page 7...

## Danger to indigenous people and ecosystems

Climate changes can affect the vegetation on the tundra. In Arctic Russia alone, 200,000 indigenous people live partly as nomads, surviving by reindeer herding. Erosion and changes to the landscape are expected to have a negative effect on the traditional lifestyle of the indigenous people and threaten their livelihoods.

## Speeding up the greenhouse effect

For thousands of years the tundra has worked as a carbon sink, because dead vegetation does not rot but is stored in the ground. Thinning of the permafrost allows micro-organisms to break down the biological material. In this process, methane and carbon dioxide are released. In Alaska it is documented that the tundra has changed from being a carbon stock to becoming a source of carbon to the atmosphere. The carbon is mostly released as methane, because the rotting process is happening in wet soil with little or no supply of oxygen.

Water gathering on top of the permafrost will often lead to increased melting, ground erosion, and canals

and holes in the ice. Removal of the topsoil leads to further melting of permafrost. These processes contribute to the self-perpetuating mechanism of more releases of carbon dioxide and methane contributing to the greenhouse gas effect.

UNEP recommends continuous surveillance of areas with permafrost and the significant damages which the melting can do to infrastructure, ecology, indigenous people and to enhancing greenhouse effect.

### For further reading:

The EU project: Permafrost and Climate in Europe (PACE), [www.cf.ac.uk/earth/pace/](http://www.cf.ac.uk/earth/pace/)  
The Arctic Council, Arctic Climate Impact Assessment (ACIA), [www.acia.org](http://www.acia.org)  
International Permafrost Association (IPA), [www.geodata.soton.ac.uk/ipa/](http://www.geodata.soton.ac.uk/ipa/)  
IPCC, Special report on The Regional Impacts of Climate Change, An assessment of Vulnerability, Chapter 3: The Arctic and the Antarctic [www.ipcc.ch/pub/wg2SPMfinal.pdf](http://www.ipcc.ch/pub/wg2SPMfinal.pdf)  
Permafrost maps: [www.grida.no/prog/polar/ipa](http://www.grida.no/prog/polar/ipa)

Lars Kullerød, Director  
UARctic, [www.uarctic.org](http://www.uarctic.org)

Svein Tveitdal, Managing Director  
UNEP/GRID-Arendal  
[www.grida.no](http://www.grida.no)

## The UN Climate Panel on Permafrost

*Permafrost is sensitive to changes in temperature;*

*By 2050 more dispersed permafrost areas are expected;*

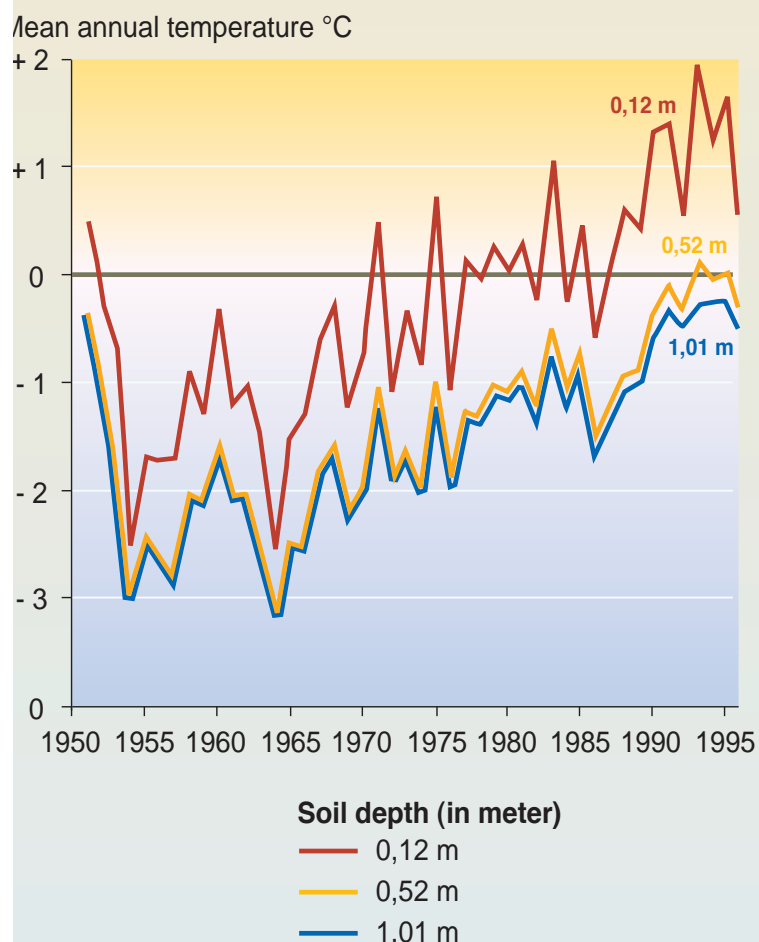
*Areas with a lot of permafrost are expected to stay relatively stable because of the large amounts of ice;*

*A visible increase in the thickness of the active permafrost layer is expected;*

*The result of a reduction of permafrost caused by global warming is expected to lead to:*

- Increased erosion and danger of landslides
- Break down of ice-rich landscapes
- Damage to vegetation
- Changes to ecosystems and animal life
- Damage to buildings, roads and pipelines
- Changes to agriculture
- Changes to building methods
- Additional emissions of greenhouse gases

## Change in permafrost temperatures at various depths in Fairbanks (Alaska)



Vital Graphics on Climate Change, UNEP/GRID-Arendal, Philippe Rekacewicz, 2000

## UNEP/GEO-3: POLAR BEARS AND SEALS SUFFER IN WARMER TEMPERATURES

Hunting ringed seal, the preferred diet for polar bears, has become a lot more difficult over the past decades for the large white bear. With warmer temperatures in the Arctic, the ice, where the ringed seal feed and give birth, melts earlier. When the polar bears come out of winter hibernation in early spring the ice may already be gone and so are the seals. The polar bear is left starving in a period when it should build up its body fat for the coming birthing period.

This is just one example of how the general increase in global temperatures have an immense effect on the Arctic environment, as described in the recently released United Nations Environment Programme (UNEP)'s Global Environment Outlook report (GEO3).

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in ultraviolet radiation. The impacts are serious and can affect the entire food chain of the Arctic. For example, reduced ozone protection damages phytoplankton and other microbial organisms that power the life systems of the Arctic.

The warmer temperatures also reduce the snow and ice cover. This, together with increased levels of pollutants on the land surface, reduce the amount of reflection of sunlight adding to the overall warming effect.

The changes are a stark reminder of the interconnectedness between the earth's surface, its water masses and its atmospheric systems. Polluting human activities both in and outside the Arctic according to scientists contributes to most of these changes.

Most Arctic states embrace the Kyoto Protocol and other climate change instruments with the exception of the withdrawal of the USA.

### For further reading:

GEO-3 [www.grida.no/gEO3](http://www.grida.no/gEO3)  
AMAP (1977) Arctic Pollution Issues: A State of the Arctic Environment Report [nsidc.org/arcticmet/basics/primer\\_sources.html](http://nsidc.org/arcticmet/basics/primer_sources.html)  
CAFF (1994) The State of Protected Areas in the Circumpolar Arctic [agdc.usgs.gov/caff/caff\\_maps.html](http://agdc.usgs.gov/caff/caff_maps.html)

# Arctic Sea Ice: A Vanishing Kingdom

The Intergovernmental Panel on Climate Change has confirmed that human-induced climate change is a reality. It can no longer be dismissed as a theoretical, academic, concept nor a politically motivated doomsday prophecy.

The Arctic is one of the regions on earth where climate change will be seen early, and most dramatically. Arctic indigenous communities are already noticing some of these changes: warmer winters, early spring breakup, and thinner than usual ice. This traditional knowledge echoes the scientific evidence:

- Air temperatures in the Arctic have on average increased by about 5°C over the last 100 years.
- Arctic sea ice extent decreased by approximately 3 per cent per decade between 1978 and 1996.

The results of climate modeling of vary in detail, but all show a clear trend towards an overall warming in the Arctic, and a resulting melting of the sea ice. The models suggest that by 2080, arctic sea ice will completely disappear during the summer months.

These are dramatic and rapid changes in an ecosystem defined by being frozen. A slight shift in temperature, bringing averages above freezing, will completely alter the character of this region, from one of ice covering the seas and permafrost stabilizing the ground, to one of open water and large tracts of land simply melted away. The consequences for humans and animal species, such as polar bears, that are adapted to the current Arctic ecosystem, will be severe.

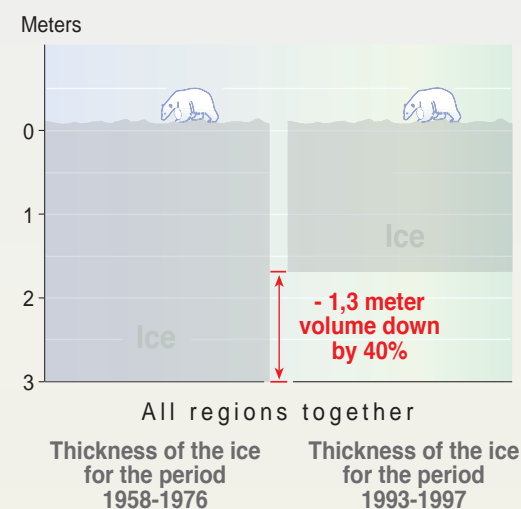
"New information indicates the greatest future challenges to the conservation of polar bears may be ecological change in the Arctic as a result of climate change..." (Polar Bear Specialist Group, 2001).

In the southern range of polar bears, for example the Hudson and James Bays of Canada, sea ice is already

melting earlier in the spring and forming later in the autumn. The time bears have on the ice, storing up energy for the summer and autumn when there is little available food, is becoming shorter. As the periods without food are extended, the overall body condition of these bears decline. This is particularly serious for pregnant or nursing females, and young cubs. In Hudson Bay, scientists have found the main cause of death for cubs to be either an absence of food or lack of fat on nursing mothers.

"For every week earlier that break-up occurs in the Hudson Bay, bears will come ashore roughly 10kg lighter and thus in poorer condition. With reproductive success tied closely to body condition, if temperatures continue to rise in response to increases in greenhouse gas emissions and the sea ice melts for longer periods, polar bear numbers will be ...continued page 9

## Thinning of the Arctic sea ice cover



Vital Graphics on Climate Change, UNEP/GRID-Arendal, P. Rekacewicz, 2000



*continued from page 8...* reduced in the southern portions of their range and may even become locally extinct" (Dr. Ian Stirling, Polar bear scientist).

The local and indigenous peoples of the Arctic are dependent upon a healthy and well-functioning ecosystem for survival – both physically, as much of their nutrition is derived locally from harvesting of natural resources; and culturally, as the traditions tied to living in a land that is frozen most of the year define their way of life. Any development that is to be culturally and ecologically sustainable in the Arctic is dependent upon maintaining a healthy ecosystem.

Large carnivores are sensitive indicators of ecosystem health and can be used to define the minimum area necessary to preserve intact ecosystems. WWF has identified the polar bear as a unique symbol of the complexities and inter-dependencies of the arctic marine ecosystem as it works toward its goal of preserving biodiversity for future generations.

**Stefan Norris**  
WWF Arctic Programme  
[www.ngo.grida.no/wwfap](http://www.ngo.grida.no/wwfap)

## UNEP/GEO-3: THE WORLD'S FUTURE WATER POND

The sources of global freshwater are steadily declining and with increasing demands from the south the Arctic could become the world's future supplier of freshwater to countries in the south. Freshwater as a saleable commodity might be the future, though so far this idea has been met with strong opposition.

This is what the recently released United Nations Environment programme (UNEP)'s Global Environment Outlook report, the GEO-3, states about Arctic freshwater.

Ice dominates parts of the Arctic and holds much of the world's freshwater in frozen state. For example, the ice pack of the Arctic Ocean is 8 million square kilometres and the Greenland Ice Pack covers 1.7 million square kilometres and stores 10 per cent of global freshwater only second in size to the Antarctic ice cap.

Fresh water is also stored in icebergs, which break off from glaciers and are released into open water, and in the Arctic permafrost. Permafrost is permanently frozen ground that extends throughout most of the Arctic.

The Arctic's major river systems are equally important sources of freshwater. The Arctic has several of the world's largest rivers; seven

of these are in Russia with the Lena, the Yenisey and the Ob being the largest. They pour 4,200 cubic kilometres of freshwater into the Arctic Ocean annually.

Since for most of the year the Arctic is in its frozen state, the massive spring outpouring of melting freshwater occurs in a short spurt of a few weeks. Melting snow also contributes to spring run-off. An increase in the flow of freshwater to the surface layer of the Arctic Ocean affects its salinity, and the currents, which in turn will affect the northern hemisphere and global climate. Changes in climate may interfere with the formation of the North Atlantic Deep Water (NADW) and the northward-flowing Gulf Stream. Some scientists believe that this may potentially stop altogether with subsequent dire consequences for Europe's climate.

Arctic countries have partially responded to threats to their freshwater systems by establishing protected areas. Nearly half the protected area in the Arctic is the Greenland ice cap and glaciers, which store freshwater.

### For further reading:

GEO-3: <http://www.grida.no/geo3>  
PAME (2001) <http://pame.arctic-council.org>

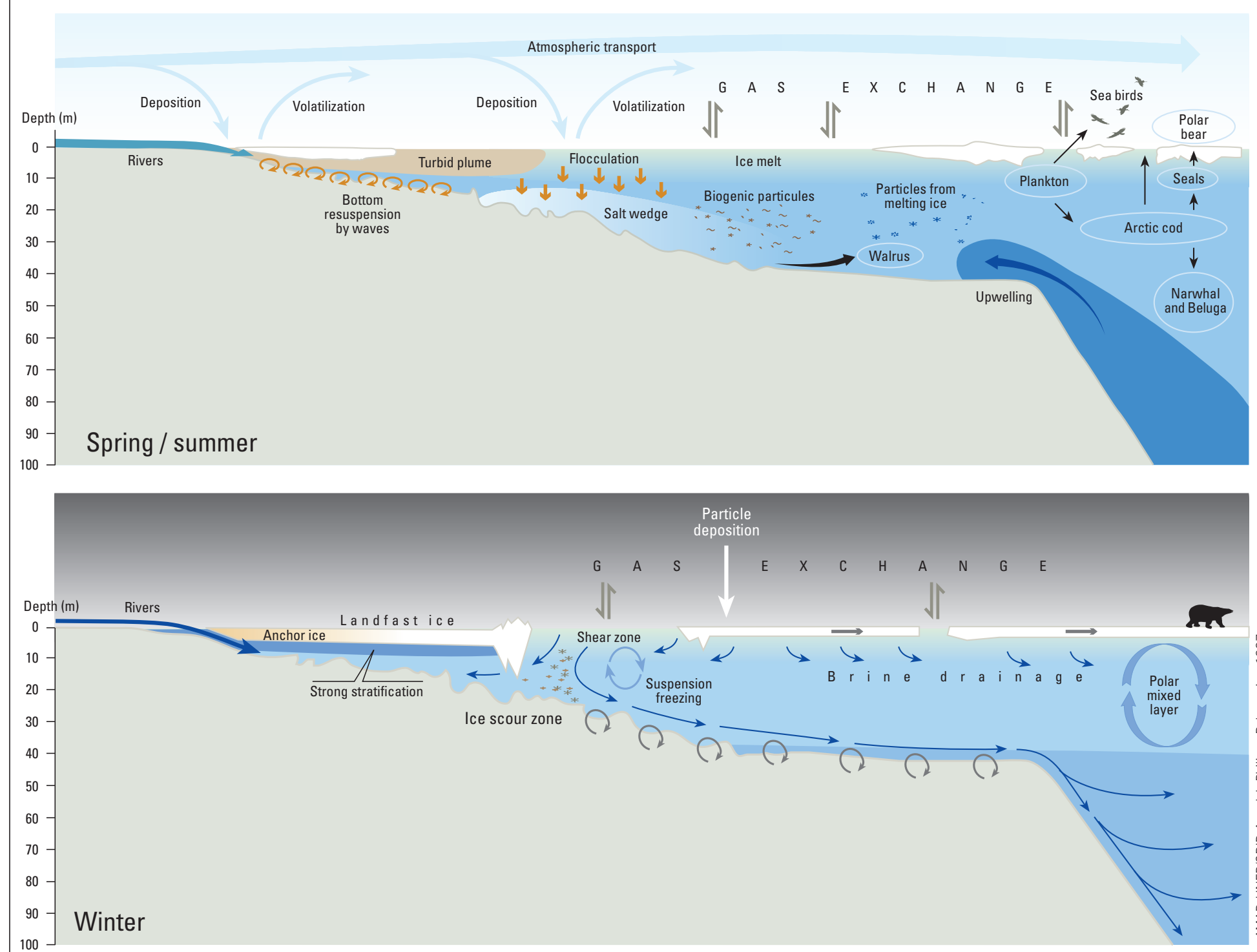
## Climate change adaptation in the Lena Basin

The Lena is one of the world's 10 largest rivers. Due to climate change, floods have become very severe in the Lena and its tributaries. In the last five years, there have been two floods of extreme severity, surpassing all floods of this river since records began. Sixty-two towns and villages were badly affected by flooding in 2001 and Lensk town was completely flooded. The direct economic loss was 250 million US dollar.

In order to raise awareness of climate change considerations in water management and policy decision-making, the Arctic Monitoring and Assessment Programme of the Arctic Council has initiated, within the framework of the Global Dialogue of Water and Climate, the project "Dialogue on Climate Change Adaptation Strategy in Water Management and Flood Preparedness at the Lena Basin". The Lena Basin Dialogue aims to establish a background to sustainable and climate change sound water management in the Lena basin.

**Vitaly Kimstach**  
AMAP Secretariat  
[www.amap.no](http://www.amap.no)

## SHELF PROCESSES INVOLVES TRANSPORT OF CONTAMINANTS AND SEA ICE







Local fishermen on the Lena river in Russia.

Lars Kullerud

## Indigenous people: the original ecologists?

**Indigenous peoples are commonly thought to be a window into Man's authentic and natural stages unspoiled by westernisation, industrialisation and environmental destruction.**

Inuit of the Arctic and other indigenous peoples of the world are often pointed out as living in harmony with the land and resources. Their traditional cultures are supposed to hold the key to sustainable use of nature. This has made some argue that Inuit are original ecologists. They may thus offer the needed alternatives to contemporary living and use of nature. Some Inuit support this view.

One way to get insight into their intrinsic sustainable worldview and way of life has been through the collection of traditional knowledge. Hundreds of projects on traditional knowledge have been pursued throughout the world, not least in the Arctic. These projects are often supported by Inuit as it is a way to break their marginalised position and to have their knowledge recognised as important.

However, a narrow focus on traditional knowledge in discussions about sustainability may in fact mar-

ginalise indigenous peoples even further. They become reduced to peoples with a long history and a short vision. This is an image fuelled by the understanding of them as peoples living from hand to mouth. In such an image traditional knowledge has value but political visions are not always welcome. This happens when political fora do not give proper attention to the indigenous peoples' contemporary visions and strategies for sustainable futures of their homelands. This unfortunate position is further intensified by the image of sustainability as embedded in the ecological and idyllic indigenous cultures – it has to be found rather than produced.

The President of the Inuit Circumpolar Conference, Aqqaq Lyng, criticises this perception and states that "we do not think of our past or our present as 'idyllic' ... We acknowledge that ... Inuit are human and make mistakes. But all ... Inuit – and the social, political and economic institutions through which we express ourselves – know that our living resources are the backbone of our existence. As such, we want to protect them and use them sustainably". The commitment and dedication of indigenous peoples to protect the resources of their

homelands are clear. In Canada, for example, the Inuit have gained a large amount of control over their territories and resources through the establishment of regional self-government in the 1.994 million square kilometres (one-fifth the size of Canada) area named Nunavut (Our Land) created in 1999.

The Inuit in Greenland formulates their own strategies for sustainable development through their Home Rule government established in 1979. Arctic indigenous peoples face different opportunities due to the variety of legislation. In Siberia, for example, many indigenous peoples lack proper influence and strategies at almost all levels due to the dominance of non-indigenous peoples. Despite differences they all have to fight many prevailing misconceptions in order to be able to present and qualify their contemporary strategies and visions for sustainability. Being noble and original ecologists is one of these misconceived images.

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### The future of children and youth

Children and youth in the circumpolar region are the future leaders and policy makers of the Arctic. The Arctic Council has recently completed the first stage of an assessment of the health status of these children and youth in order to identify issues that need to be addressed by government and community leaders to ensure their healthy development. With Canada taking the lead in this project, support was provided from the other seven circumpolar states and the WHO. While the availability of data at this point somewhat hampers comparisons between countries, some clear trends are evident.

Infant mortality rates have declined over time but are still highest among indigenous populations. Rates of preterm birth and lower birth weights are also higher in this group. While a very high proportion of children across all eight circumpolar states have been immunized against all major childhood diseases, indigenous youth are still at higher risk for Tuberculosis and Chlamydia.

Gender differences were also evident in the data collected to date. Rates of suicide and motor vehicle accidents are highest among males, particularly those males from indigenous populations. The highest risk age group identified was 20-24 year olds, followed by 15-19 year olds.

Future studies plan to collect additional data from the circumpolar states with a focus on temporal trends in health among children and youth, in order to assess changes in their health status over time. These results will be translated into policy actions by governments to improve adverse outcomes.

**Dr. Lynn Brodsky**, Senior Advisor  
**Dr. Andrew Gilman**, Director  
Office of Sustainable  
Development Health Canada  
www.hc-sc.gc.ca/susdevdur

### UNEP/GEO-3: PEOPLE ARE CHANGING TRADITIONAL LIFESTYLES

The indigenous people of the Arctic are moving away from their traditional lands and into the cities, leaving behind century-old traditions. Over grazing, pollution, bad health and sanitation, and expansion of industries and cities throughout the Arctic threaten their lifestyles.

This is what the United Nations Environment Programme (UNEP)'s Global Environment Outlook report, the GEO-3, points out about indigenous people in the north.

For millennia, humans have been an integral component of the Arctic ecosystems and have relied on the biological resources for their survival and more recently market economy, for their livelihood. Today, there are about 3.75 million people living in the Arctic, of which about 10 per cent are traditional indigenous peoples. For example, the Saami of

Scandinavia and north-western Russia have traditionally engaged in reindeer herding. In recent years, however, overgrazing and competition for land has become a serious problem. In North America, Greenland and Arctic Russia, indigenous peoples have relied on caribou, seals, and water birds, but over-hunting is putting several wildlife populations at risk.

In North America, there have been attempts to avoid creating permanent settlements around mines and oil fields by using shift workers rather than moving families north.

Throughout most of the Arctic, however, people continue to live in small settlements of a few hundred to a few thousand. During the 1950s and 1960s, government policies throughout the Arctic led to consolidation of small settlements into larger towns in

order to efficiently and cost-effectively deliver health care, education, electricity, and modern housing, and other administrative and social services.

Permafrost and the cold climate present serious challenges to waste disposal and sanitation in all Arctic communities and particularly to the indigenous dwellers, as the breakdown and recycling of nutrients is much slower at low temperatures. While larger cities have sewage systems, many smaller communities throughout the Arctic have yet to provide all their citizens with some form of sewage treatment or septic system. Many settlements throughout the Russian Arctic have no indoor plumbing.

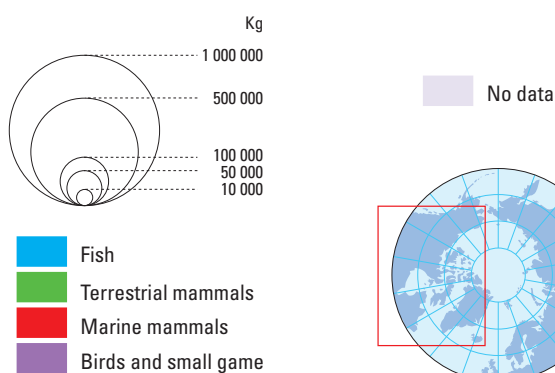
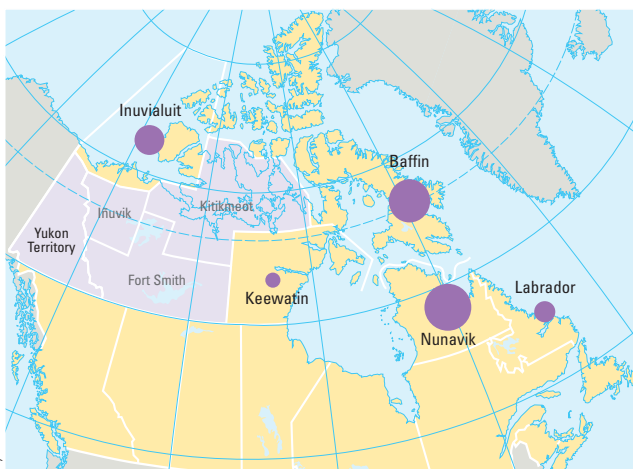
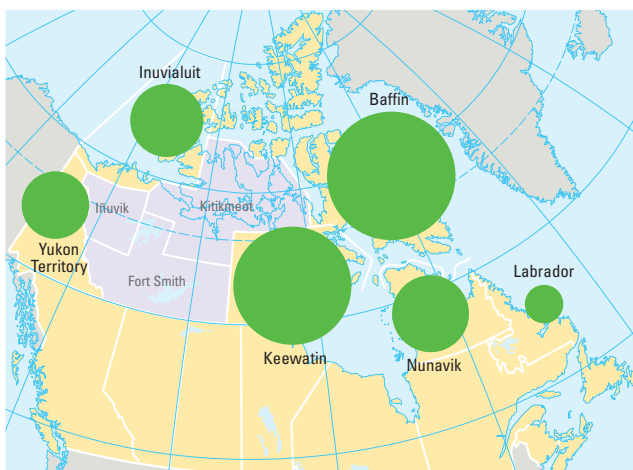
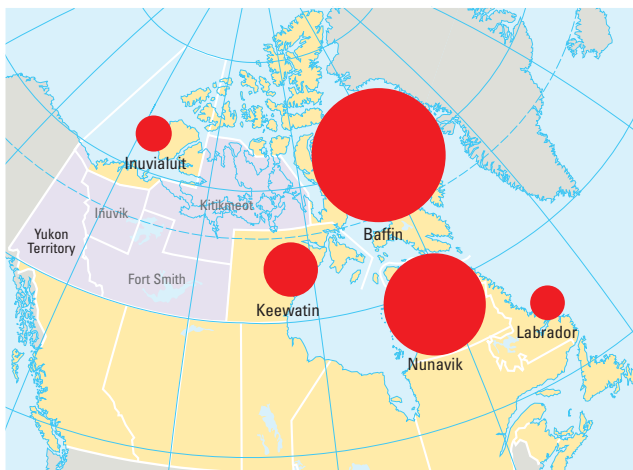
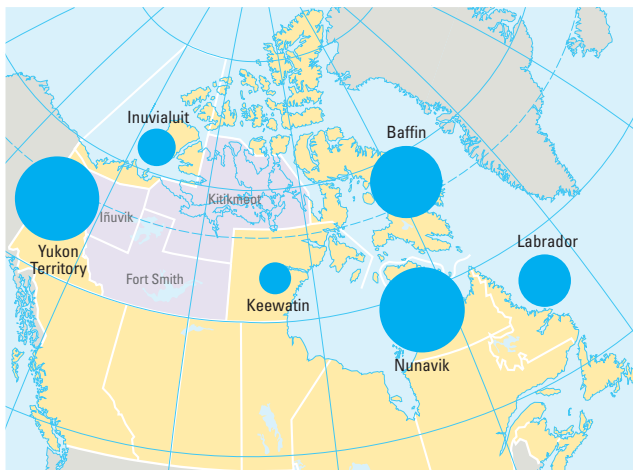
Pollutants generated by industries can affect people living further north. A study in Canada for example showed levels of Persistent Organic Pollutants (POPs) in maternal blood of indigenous peoples

were 3-10 times higher in northern Canada where marine mammals are consumed than in southern Canada. This raises concern over levels of marine pollution and accumulation of POPs in the food chain.

For further reading:  
GEO-3 <http://www.grida.no/geo3>  
The Northern Sea Route and Local Communities in Northwest Russia: Social Impact Assessment for the Murmansk Region. <http://www.dartmouth.edu/acad-inst/arctic/articles/searoute.html>  
GLOBIO Global Methodology for Mapping Human Impacts on the Biosphere, Environment Information and Assessment Technical Report <http://www.globio.info/>  
CAFF (2001) <http://www.intemat.environ.se/index.php3?main=/documents/press/2001/p010608b.htm>



## ANNUAL INDIGENOUS SUBSISTENCE PRODUCTION IN ARCTIC CANADA



# Food and animals dangerously contaminated

A study conducted by the Arctic Monitoring and Assessment Program's (AMAP) Human Health Expert Group shows that the traditional food of the Arctic indigenous people is severely exposed to environmental contaminants: people who eat meat and blubber from marine mammals are exposed to Persistent Organic Pollutants (POP) (dioxins, PCBs, pesticides) and heavy metals (mercury, cadmium, lead), often in excess of the levels reported in the industrialized countries where these chemicals are produced and released. Environmental contaminants reach the Arctic by means of air and water currents. These fat-soluble substances are then easily incorporated into the polar food web species with high levels of fatty tissue used to adapt to the cold. The effects of these contaminants are not fully understood, but there is concern about the effects on development, reproduction and the immune system.

The AMAP study (Phase 1) monitored POPs and heavy metal levels in pregnant women throughout the Arctic, since fetuses are especially sensitive to chemicals in the environmental. For the first time it was possible to compare circum-polar data, collected and analyzed to a single standard. Phase 2 studied other effects of contaminants; its results will be published in autumn 2002.

Based on these findings, it was proposed that local health authorities work with exceptionally exposed Arctic populations – such as in Greenland, eastern Arctic Canada and the Arctic part of Russia – and give dietary advice to minimize

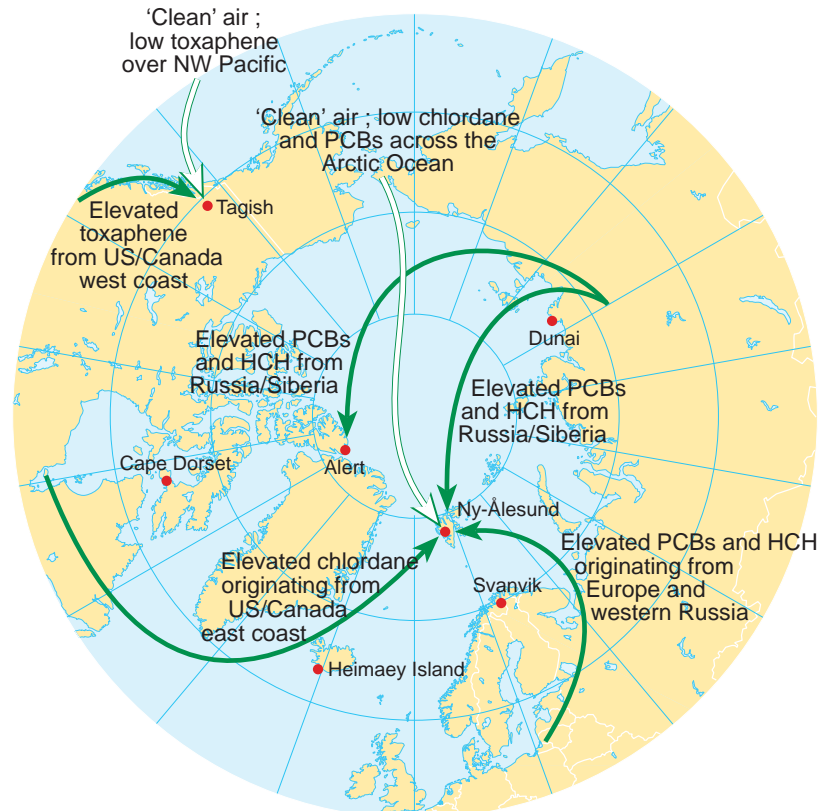
future risk of contamination, yet maintain the nutritional benefits of traditional diets. Swift action and global awareness is needed to restrict emissions, especially of the most dangerous chemicals, which affect even the most remote areas on earth. Early ratification of the Stockholm Convention on POPs will be an essential step in reducing sources of these pollutants.

## For further reading:

AMAP Assessment Report: Arctic Pollution Issues, Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway, 1998. Global Environmental Outlook – 2000, United Nations Environmental Programme, Earthscan Publications Ltd., London, United Kingdom, 1999.

Jens C. Hansen, Chair  
Andrew Gilman, Vice-chair  
AMAP Human Health Expert Group  
www.amap.no

## SOURCES OF POPs IN THE ARCTIC



# Indigenous people depend on nature

**According to Russian practice, indigenous peoples of the north, Siberia and the far east of the Russian Federation are addressed in administrative and juridical contexts. Indigenous peoples' own organisations follow this pattern. In the Russian north, 260,000 indigenous people form 0.5% of the entire Russian population, belonging to 40 federally recognised ethnic groups, a percentage which is increasing due to emigration of non-indigenous people. Rural areas have more indigenous people than they have people of other origins; and in many scarcely populated areas of the Arctic they form the majority.**

Most of the indigenous peoples live in small villages close to their subsistence areas where (in addition to more modern occupations) they pursue traditional subsistence activities like reindeer-herding, hunting, fishing and gathering. But they face severe problems. Since the colonisation of the North, large expanses have been converted into areas for alien settlement, transportation routes, industry, forestry, mining and oil production, and have been devastated by pollution, irresponsible managed oil and mineral prospecting, and military activity.

As in other parts of the world such as Russia, indigenous peoples have strong ties to their environment. Spirituality and subsistence keep them closely attached to nature: their cultural identity is directly dependent on intact ecosystems within their areas. This explains the great difficulties many

indigenous peoples have in adopting modern ways of life, and the social disaster that resulted from the state's attempt to settle nomads, reverse social structures, reorganise subsistence into commercial economies, etc.

The recent socio-economic crises in Russia with the transition to a market economy have led to a breakdown of most of the supply and transportation system in remote areas. Their inhabitants were first incorporated into the alien Soviet economic system, then made dependent on modern infrastructure and product distribution; now they have been left without supplies, medical care or the economic means and legal expertise to deal with this situation. Many would like to return to the old ways of life but this is now difficult because their natural environment, culture and traditions has been degraded or destroyed.

The indigenous people of Russia have since 1990 organised themselves in the Russian Association of Indigenous Minorities of the North, Siberia and the Far East, RAIPON. Its main concerns are environment, health, legal issues and economy, but it lacks the financial means to succeed. In most areas, there is a shortage of even basic things like food, equipment and firewood. So the need for continuous support from outside is crucial.

Winfried K. Dallmann  
Norwegian Polar Institute  
www.npolar.no



# Arctic future at crossroads

## A tale of four futures

*Decisions taken today and tomorrow will define the kind of environment this and future generations will enjoy. Four different policy scenarios have sketched out different futures possible over the next 30 years in the Global Environment Outlook 2002 report.*

TROMSØ, AUGUST 2032 - The Arctic indigenous people have more or less adopted western lifestyles. They have moved away from the north, to the southern part of the Arctic in the most radical scenario from the Global Environment Outlook 2002 reports, Market First.

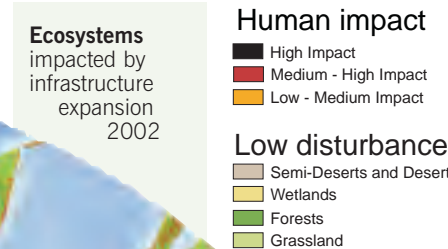
Not all the scenarios see such a bleak future for the diversity of the north. The scenarios set four different scenes in which the world will develop over the next 30 years. Each depends on which policy tool governments choose to adopt. The four scenarios discussed are the market oriented, Market First scenario; the strong government oriented, Policy First scenario; the security and market oriented, Security First scenario, and finally, the most environmentally friendly option, the Sustainability First scenario.

### Market First

Market First is the scenario, which tells of a world that adopts the values and expectations prevalent in today's industrialised countries. Globalisation and liberalisation are the two main driving forces in this market economy. It will enhance corporate wealth and create new businesses, which will enable people to insure against - and pay to fix- social and environmental problems. Expanding demands overwhelm the powers of state officials, planners and lawmakers in regulating society, the economy and the environment. Barriers to trade and movement of capital gradually vanish and international organisations like the United Nations see themselves operating in a more reactive than proactive mode. By 2032, environmental standards will have fallen and pressures on resources remain severe.

### Policy First

In the second scenario, Policy First, governments try to reach specific social and environmental goals. A co-ordinated pro-environment and anti-poverty drive balances



focus of governments. The global poor are excluded from the new economy and traditional livelihoods and communities erode as global markets penetrate peripheral regions. In 2032, the dream of a better world remains.

### Sustainability First

In interacting with each other and the world around them, people under the Sustainability First scenario stimulate and support sustainable policies measures and hold corporate behaviour accountable. People's wallets, feet and voices become decisive for the global markets. A fuller collaboration between governments, citizens and other groups exists in decision-making on most issues. A new environment and development paradigm emerges, in response to the challenge of sustainability. This paradigm combines a powerful personal and philosophical dimension with concern over economic growth, technological potential and political eventualities. The more individuals and groups get involved in practical initiatives, the more general hope grows that significant change is possible, and the media serves to help make these efforts more visible.

All these scenarios are based on seven so-called driving forces, which evolve and interact and decide human actions. These driving forces are; demography, economic development, human development, science and technology, governance, culture and environment.

## THE PRACTITIONERS PREDICTIONS

Arctic Environment Times asked four internationally recognised environmental experts and practitioners about their predictions and expectations for the future of the Arctic environment. Bjørn Lomborg, director of Denmark's national Environmental Assessment Institute and author of The Sceptical Environmentalist, Elizabeth May, Executive Director of the Sierra Club Canada, Peter Stenlund, chair of the senior Arctic Officials in Finland and Dr. Claude Martin, Director General of World Wide Fund for nature, WWF, all gave their invaluable contributions.

### They answered the following five questions:

**Question 1.** Based on the four scenarios and your experience what role do you expect the Arctic (the Arctic Sea, the northern territories of North America, Greenland, Iceland, the northern part of Scandinavia and the northern part of the Russian Federation) to play 30 years from now in the global environment?

**Question 2.** The climate is changing and the effects are evident in the Arctic. In 30 years the world climate will have changed which will

have an immense effect on people and nature. What do you see as the most important steps the world can take to hinder too damaging effects of climate change?

**Question 3.** Persistent Organic Pollutants (POPs) are a severe threat to people, animals and plants in the Arctic environment. They are mainly transported by air from more southern and densely industrialised countries and remain in the cold and harsh Arctic climate where they spread diseases. What do you believe to be important to tackle such a pollution filled future for the Arctic?

**Question 4.** Over-fishing of the Arctic fish stock is a problem of concern. What steps should be taken to ensure a sustainable harvest of the fish stocks?

**Question 5.** What are your concrete ideas about how the world should tackle the growing environmental problems in the Arctic?

Read their answers and comments on the following pages.

the economic development. Environmental and social costs and gains are incorporated into policy measures, regulatory frameworks and planning processes. Tax levers are the incentive to keep them, as well as international treaties, which are now upgraded into law status. Regional and international organisations get a more direct role in resolving conflicts within and between nations. The private sector has accepted a major responsibility and more money has been invested in research, development and technology transfers to developing countries.

### Security First

Conflict and striking disparities arise in the Security First scenario. Inequality and conflict prevail, and socio-economic and environmental stresses raise the number of protests and counteractions. The powerful and wealthy groups create a focus on self-protection, but they exclude the disadvantaged. Negotiations on climate change and other multilateral environmental agreements drag on with minimal progress. Government efforts to tackle environmental and social problems are generally ineffective: instead, governmental powers are stirred towards protecting the economic interests of business. Short-term crisis and lifeboat ethics, rather than long-term development is the





**Bjørn Lomborg**  
Director of Denmark's national  
Environmental Assessment  
Institute

**Question 1.** I expect that the Arctic's importance as a source for energy extraction will have diminished thirty years from now as technological advances have introduced other economically competitive sources for energy. The Arctic biodiversity will still be considerable. Some species (polar bears, walrus's etc.) will suffer from rising temperatures while others – incl. humans – will benefit from the increasing amount of productive land and forests.

**Question 2.** This is a somewhat loaded question as it is indeed questionable just how immense the effect of climate change will be on people and nature. One does know that the change in temperature will not be directly responsible for human deaths in the region, which is sadly not the case for many other problems currently facing the world: the lack of access to food, water and sanitation.

The rise in temperature for the next thirty years will have an impact on the Arctic environment and while there are some impacts we would rather have been without, we also have to be careful not to go overboard. First, these impacts are not the most important

problems in the world – even in the Arctic alcohol abuse poses a much greater threat to the human welfare. Second, it has to be acknowledged that some effects of global warming could prove to be an advantage. Third, the really important issue is to improve the adaptation capacity of the region to ensure that the negative aspects of the climate change can be handled.

**Question 3.** Again this is an unreasonable loaded question. There is nothing to indicate that the future facing the Arctic is 'pollution filled'. In fact, it is tempting to predict that in 2032 the Arctic will be less contaminated by POP's compared to today. Empirical evidence suggests that as countries grow wealthier, pollutants that are a threat to human health will be effectively combated. More specifically, a treaty to regulate and phase out POPs is already in place (the Stockholm Convention). The concentration of the POPs in the Arctic will therefore go down as it has in rest of the developed world.

**Question 4.** Technological advances have created a situation where humankind is capable of catching fish

far beyond their rate of reproduction. Over-fishing is due to market failures in particular the tragedy of the commons where individual rationality (catching as many fish as possible) is suboptimal from a societal perspective (maintaining a minimum stock of fish for all to enjoy). Therefore, state intervention is necessary. This could be in the form of – enforceable – fishing regulations to keep the stock sustainable, international agreements that in time could transfer fishing rights from the developed world to developing countries, and an out phasing of perverse fishing subsidies.

**Question 5.** Here I would question the relative importance of the environmental problem in the Arctic. To rationally prioritise the world's resources, it is necessary to put the problems in perspective: the Arctic has 3.75 million permanent residents (UNEP, p 266). It is evident that the larger part of our environmental efforts must be placed elsewhere where they would improve the welfare of many more people. Especially when it comes to the adverse effects of global warming, the Third World should be in much greater focus.

# Survival of the fittest

**A major increase in sport and commercial hunting and fishing in the north is a reality in 2032. This has happened as a reaction to the World Trade Organisation's (WTO) ruling stating that restrictions in trade of Arctic animals are a violation of the principles of free trade.**

Under the Market First future from the Global Environment Outlook 2002 report, free trade is pivotal to the existence of society. Economic arguments have consistently won over ecological arguments and trade powers the system.

Alaska's National Wildlife Refuge has been ruled open to oil and gas drilling by the United States court, despite opposition. The Arctic becomes the raw-resource pool for other populations. Networks of oil fields, production plants and pipelines are common in regions of Europe and North America. Many rivers have been damned or diverted to supply an increasingly water and energy-hungry world.

Periodic collapse of fish stocks occurs in Arctic waters and large trawlers out-number the local fisheries. The polar bear has slowly disappeared in some areas of the Arctic. Living areas of the caribou, reindeer, grizzly bear and musk oxen have been severely fragmented and extensive

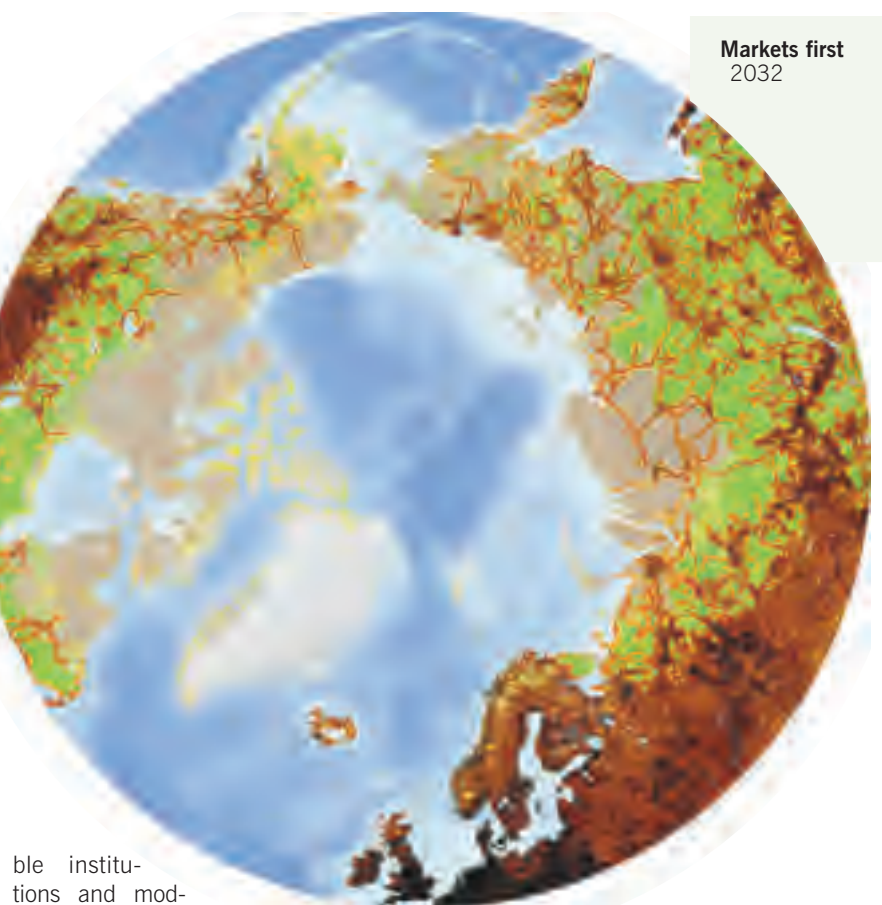
hunting has driven some species to biologically unsustainable levels. International agreements are inefficient in dealing with this situation.

The impacts of climate change mean major scarring over the landscape, due to construction of roads.

## Not many people left

The Arctic Council stands back with little impact on the decisions affecting the Arctic region and the Council has not lived up to its goals of promoting co-operation among the Arctic states. With a growing set of agreements, most indigenous groups have varying degrees of ownership of the Arctic resources. Multinational companies have arrived to explore and produce in the Arctic. Initially, they created jobs and money for local people. But with production in full swing and quite mechanised, long-term employment becomes impossible. Many Arctic people turn to the south and the old-traditional ways of culture and living die out – largely due to decisions made by the Arctic people themselves.

As the local people disappear, tourism flourishes, especially cruise tourism; but environmental degradation and pollution are visible. However, improved education, more professional and capa-



Markets first  
2032

ble institutions and modern information technology provide the people of the north with new and competitive advantages.



**Elizabeth May**  
has worked over thirty years for the protection of the environment and wild places of Nova Scotia, Canada and the world. Ms. May is executive director of the Sierra Club of Canada, [www.sierraclub.ca/](http://www.sierraclub.ca/). She is also a member of the board of Institute for International Sustainable Development (IISD).

**Question 1.** The Arctic has played an extremely important role in global ecosystems, although it has often been an invisible one. Now, the impact of practices in the industrialized world thousands of miles to the south poses an unprecedented threat to ecosystems and to a way of life in the far north. Thirty years from now, unless current "Markets First" policies are reversed, we are likely to see a very different Arctic. Its role in global environment terms could prove critical in the menace of what is so benignly known as "positive feed-back loops." If the permafrost melts at accelerating rates, the release of millennia's worth of stored methane could spur even faster rates of warming. Melting glaciers and ice could impact northern cities with rising sea levels. Although a run-away-greenhouse effect is not likely, it is a possible outcome of our current reliance on fossil fuels. The projections for 2-times carbon dioxide atmospheric concentrations are not worse case scenarios. Unfortunately, we are playing a deadly game of Russian roulette with the climate globally, in which the Arctic ecosystem may shift from being a net victim of climate change impacts to a net source of further emissions.

**Question 2.** To effectively avoid the most catastrophic impacts of global climate change, the Kyoto Protocol must be ratified and implemented by all the Annex 1 nations and steps to move beyond it negotiated more aggressively. The tools and levers of multilateral agreements, such as those protecting intellectu-

al property rights (Trade Related Intellectual Property Rights Agreements), should be in the hands of climate negotiators. There should be no "opting out" allowed for any nation that wishes to benefit more generally from globalization. If the political leaders of the world cared as much about climate change as they do about intellectual property rights, we would have reversed the dangerous trends of climate change a decade ago. Immediate steps to reduce greenhouse gas emissions include reducing reliance on coal for electricity production, shifting transportation policies in industrialized urban centres to mass transit and moving toward maximizing energy efficiency while shifting to renewable and sustainable energy sources.

**Question 3.** The recently negotiated Convention on Persistent Organic Pollutants is an important first step. Nations must ratify it so it may enter into force as soon as possible. It is critical that we work to de-toxify our world. The wombs of Arctic mothers must no longer be contaminated areas. We must all globally address the inequity of the disproportionate poisoning of Arctic residents.

**Question 4.** Every major fishery in the world is under stress. It is clear that modern fishing technology exceeds the management tools of even the most advanced nations. Canada, with wealth and vast scientific expertise, oversaw the destruction of one of the world's richest fisheries, the Northern Cod Stocks of

the Grand Banks of Newfoundland. The culprit is the technology that allows the hunting down of every fish. We need to recognize the importance of the ocean floor habitat and prevents its destruction by dragging fleets. It is time to develop binding global agreements to ban the use of high seas draggers and maintain in-shore fishing fleets with community based fishery conservation plans.

**Question 5.** Arctic nations must speak with one voice. The Inuit Circumpolar Conference and the Arctic Council are important institutions in working on an ecosystem basis across national lines. Urban residents of the over-consuming industrialized nations must learn of the damage being wrought to Arctic residents and ecosystems. The connection between driving an SUV to a supermarket to buy products made with the use of POPs and the devastation of Arctic environments can help change behaviour in the wasteful southern cities. One strong example of reaching non-northerners with a powerful message is the video "Inuit Observations of Climate Change." The documentary, a project of the International Institute for Sustainable Development, is based on a process of appreciative inquiry in the community of Sachs Harbour on Banks Island. The Inuit residents speak very powerfully of the rapidly changing environment as the impacts of increasing greenhouse gas concentrations hit the Arctic.



# A new world of walls

**Exploitation of wildlife and land drives the Arctic and its elite core of economic and government leaders. The harsh climate, combined with great distances from the markets, provides the only limiting factors for industrial development.**

Such is the reality in 2032, under the Security First scenario from the Global Environment Outlook 2002 report. It is a new world of wars and of greater inequality between rich and poor. Anarchy threatens the rule of law and democratic institutions in large parts of the world.

Multinational companies have the control of the oil, natural gas and water in the Arctic. International rulings demand that Arctic countries open their gates to competitive trade, and previous global commitments by the Arctic are set aside. One bright spot is the mining of methane crystals from the ocean. This is providing an expensive but alternate energy supply.

Market demand drives the exploitation of wildlife, including coveted endangered species. Fishing rights have been unilaterally suspended to all but the Arctic states, but over-fishing has taken its toll. Many populations of resident fish, bird and mammal species are still threatened by (among other things) persistent organic pollutants and can no longer be eaten by humans. Unplanned urban clustering fragments the areas where wildlife lives.

The Global Climate Treaty has collapsed and greenhouse gases have been released globally at unprecedented rates. There has been massive permafrost thawing; glacial retreat; extensive shore

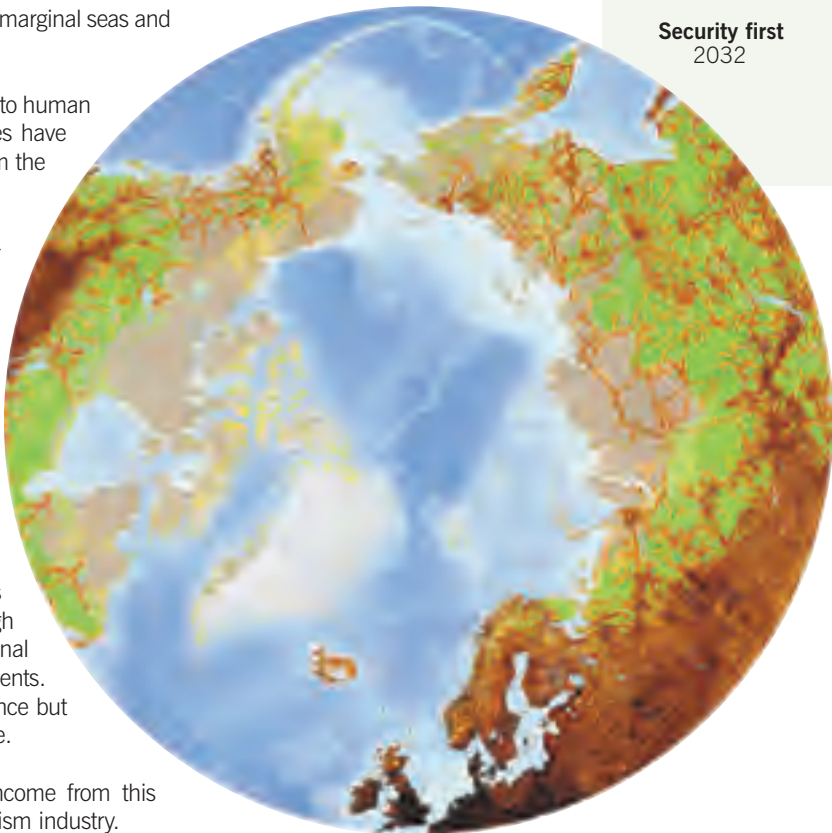
erosion, and a historic retreat of Arctic ice and all marginal seas and the central Arctic Ocean.

Some sites in the Arctic have become dangerous to human health, due to chemical contamination. Diseases have spread with the introduction of new workers from the south.

The Arctic Council has failed to promote circumpolar well-being and co-operation. Instead, Council members concentrate on their own countries. Ultimately, an elite group of commercial stakeholders rules the Arctic scene, and some geographical regions are subjected to ruthless exploitation.

Local indigenous people have become increasingly marginalized, due to industrialised nations influx. Capital is filtered south to the centres of power and into the pockets of wealthy Arctic nationals. Some indigenous communities join forces with multinational companies, although they have been displaced from their traditional homelands due to extreme environmental events. Many people have gained economic independence but their existence has nonetheless become unstable.

Tourism continues to grow but most of the income from this industry stays in the hands of multinational tourism industry.



GLOBIO, UNEP/GRID-Arendal, Hugo Ahlenius, 2002

# Strong government and strict laws

**Thirty years from now, a modest but stable sport and trophy hunting enterprise will thrive in the Arctic. The sport is allowed to go on as a result of a World Trade Organisation (WTO) ruling. This ruling states that any trade must be based on solid, scientifically proven wildlife population data and statistics.**

A limited but sustained hunting practice in the Arctic, as an example of growing environmental laws and regimes, is one of the results of the Policy First scenario from the Global Environment Outlook 2002 report. More political power will be transferred to the Arctic people, and environmental pressures on the Arctic's plants and animals will have decreased significantly in this future.

The controversial case today about Alaska's National Wildlife Refuge and the attempts to drill for oil and gas will not be much of an issue in 2032. The United States court will rule out any drilling for oil or gas in protected areas, until scientifically irrefutable evidence has been brought forward, showing that there will be no important wildlife and habitat loss.

In the cold seas of the Arctic, commercial fishing is still going on. But a total collapse of any fish stock has been avoided by employing stringent harvesting quotas, limited entry schemes and by enforcing bilateral regimes. And the Arctic still serves as a key indicator of global climate change. Visible effects of decades of warming, on land and sea, are seen all over the Arctic, though there has been a significant reduction of long-range transport of pollution to the Arctic. Responsible planning decisions have prevailed and wildlife areas have remained more or less intact because of improved effectiveness in protected areas management.

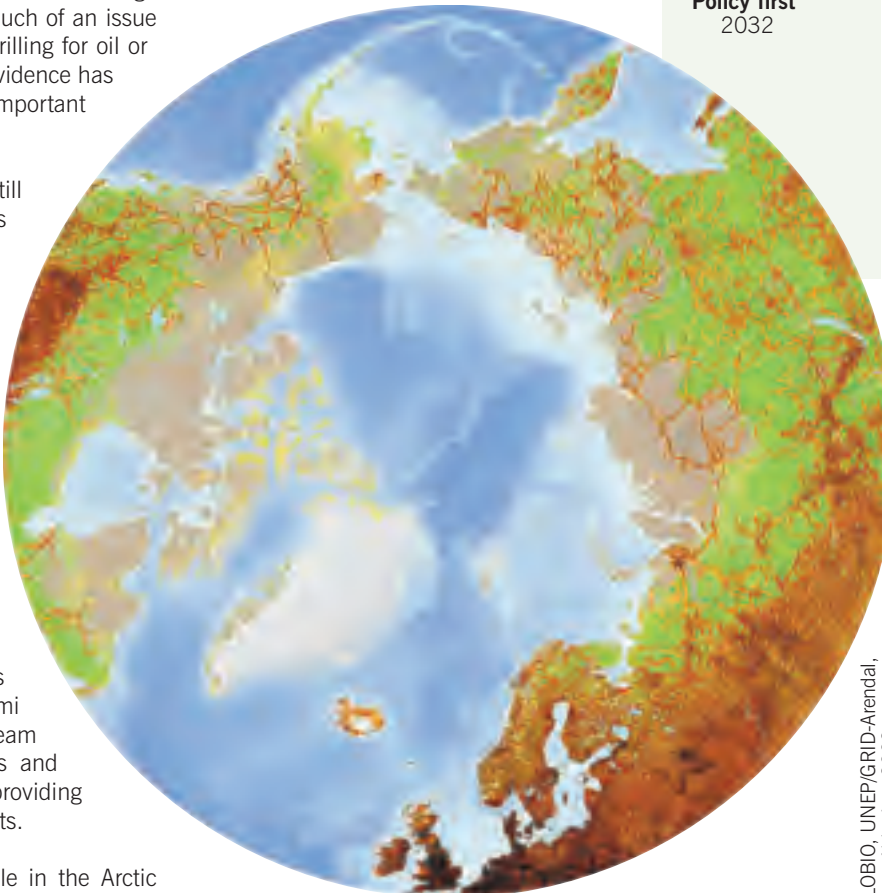
### More power to the people of the north

The Arctic Council, which was established in 1996, will have significant impact on policy decisions and will co-operate strongly with several NGO's - such as the Inuit Circumpolar Conference, RAIPON, the Saami Council and the World Wide Fund for nature. This team effort will result in strong educational opportunities and raise awareness of several business associations, providing local enterprises with an opening to the global markets.

A David-and-Goliath fight between indigenous people in the Arctic and multinational entrepreneurs will be a two-way bonus deal.

Multinationals will reach agreements with local people, about not only cash outlays and the promise of long-term local employment in exchange for exploration and production claims, but also result in part ownership and sharing rights. This means that although production becomes mechanised, the Arctic people are now fully employed because of the diverse Arctic economy. Sectors like transpolar transportation, communications, tourism and higher education and health are employing local people now.

Modernity has washed over the Arctic too, and the pre-2002 cultural and visual traditional lifestyles will be increasingly multicultural and wired to the global community.



GLOBIO, UNEP/GRID-Arendal, Hugo Ahlenius, 2002



**Dr. Claude Martin**  
has been the Director General of WWF International since 1993

**Question 1.** Market First and Policy First have clearly proven to be ineffective. The trade-offs do not guarantee the kind of sustainability that scenario four (Sustainability First) would offer. Sustainability will have to become the paradigm of the future integrating economic, social and environmental concerns. I am personally convinced that the next decades will demonstrate that the sustainability paradigm is the only way we can guarantee a future for the Arctic environment and its people, and indeed, stability for the planet as a whole.

**Question 2.** The most obvious and urgent response is to reduce CO2 emissions as quickly as somehow possible. WWF's most urgent "ask" at WSSD is for governments to establish a global target of 10% of primary energy supply from new renewable sources by 2010. This, as well as ensuring sufficient ratifications for entry into force of the Kyoto Protocol will go a long way as first steps to reversing the already disastrous effects of climate change. However, given the long lag time between reduction of emissions and reversal of deleterious effects, these measures will not prevent the devastating effects already occurring in the Arctic. We must concentrate efforts on mitigation strategies that focus particularly on securing the livelihoods of indigenous communities.

**Question 3.** The problem of POPs must be addressed at its root cause dispersion. Therefore, another priority for WWF at WSSD



is to ensure enough ratifications of the Stockholm POPs convention for entry into force in 2002. However, due to the resilience of POPs and the high levels already existing in the Arctic, the primary objective must be to protect Arctic communities from further exposure, even if this comes at the cost of some of their traditional customs with regard to nutrition.

**Question 4.** Of primary importance with regard to overfishing of Arctic fish stocks is to redress harmful fishing subsidies and ensure the reduction of over-capitalized fishing fleets. Secondly, stricter regulation of pernicious fishing methods such as bottom trawling must be introduced and enforced. Thirdly, Marine Protected Areas must become a priority for the governments of coastal nations. Fishing no-take zones must be established in order for stocks to recover.

**Question 5.** First and foremost, the insidious threats to the Arctic environment caused by climate change and toxic pollutants must become better known to the world. Awareness building through targeted campaigns is one tool to be used. That said, communications should not only focus on melting ice but more importantly on the direct threats to the livelihoods of the Arctic peoples. The Arctic Council must be reinforced in order to be able to tackle these needs as well.



**Peter Stenlund**  
Chair of the Senior Arctic Officials, Finland

**Question 1-2:** During the next thirty years the Arctic is forced to struggle with impacts caused by climate change. The Outlook rightly emphasizes, that the positive effects of even immediate decelerating actions by the international community, such as the implementation of the Kyoto protocol, will be apparent much later. There will be a need in the Arctic for adaptation to new climate conditions, including emergency prevention and preparedness.

Unfortunately, the Kyoto accord has led to a split among the Arctic States. The Nordic countries together with the European Union and Japan have ratified the protocol in a concerted effort to lessen the effects of climate change. In Finland we hope that Canada and the Russian Federation will be able to ratify the protocol in the near future. The U.S. Climate Action Report 2002 is hopefully an important step forward in narrowing the differences of views among Arctic partners.

The Arctic Climate Impact Assessment (ACIA), the most important single project of the Arctic Council,

is expected to result in recommendations for actions among Arctic states, regional authorities, indigenous communities and other Arctic stakeholders, with a focus on capacity building.

The Outlook indicates that exploitation of Arctic resources such as oil, gas and minerals is speeding up. It is realistic to recognize the strong demand for these resources and focus the efforts on the need to develop regulations, which safeguard indispensable habitats and minimize the harmful effects on the environment and traditional industries in the Arctic regions. International and regional cooperation may assist Arctic states in developing such regulations as well as benefit sharing mechanisms for indigenous and other local people.

**Question 3:** The global Stockholm Convention on Persistent Organic Pollutants (POPs) is one of the major achievements at the international level. All eight Arctic states have signed the convention and are cooperating with the aim to facilitate its implementation in the Arctic regions. Arctic states have also committed themselves to support the developing countries in actions aimed at the abandoning of the use of these harmful substances, in cooperation with the

Global Environment Facility.

AMAP will deliver its second report on the state of the Arctic environment to the Arctic Council ministerial meeting in October, in Inari, in the northernmost part of Finland. This report is expected to confirm the urgent need for further global and regional actions to eliminate pollutants, such as POPs and mercury. The report will include data on some POPs not covered by the Stockholm Convention, such as the brominated flame-retardants. In the coming years we will see a need to include new POPs in the convention and develop an international regulation on mercury.

**Question 4:** Sustainable use of natural resources, among them the Arctic fish-stock, has a crucial significance in many Arctic regional economies and serves as the basis for the traditional way of life of many Arctic indigenous communities. Overexploitation is a problem in many areas. Strong measures should be adapted to eliminate IUU (illegal, unreported, unregulated) fishing. The application of the ecosystem approach should be one of the key elements in fisheries management. Participation of all stakeholders should be further encouraged and enhanced.

**Question 5:** The Outlook is discussing the future role of the Arctic Council within the four scenarios. It should be kept in mind the Council is taking action only on the basis of unanimous decision-making. This means that the Council reflects the combined political will of the Member States, which certainly will be influenced by the indigenous Arctic organisations, regional authorities, NGOs, international organisations etc. In many areas, such as trade, the Arctic Council may have only a consultative role, keeping in mind the competence of the World Trade Organization and the role of the European Commission as the actor on behalf of the European Union, including its Arctic Member States. For commercially important species such as fish and marine mammals, there are international protection regimes in place outside the Arctic Council. As the environmental future of the Arctic is largely determined outside the region, by global developments, the role of the Arctic Council as a circumpolar voice at the international arena should not be underestimated. Coordination and exchange of information among Arctic states at international forums have evolved during the Finnish chairmanship and should take place also in the future.

# A sustainable Arctic future

**Hunting is widely restricted and mostly limited to indigenous people's needs. The public does not tolerate poaching.**

This is a fact under the nature-friendly scenario, Sustainability First from the Global Environment Outlook 3 report. The world has embraced international co-operation rather than competition, which also characterises Arctic development.

Several species of whales have been protected from any kind of harvest. Sustainable fishing, forestry, mining and domestic reindeer and caribou herding are being done with minimum environmental damage. Strong environmental ethics and legislation prohibit over-exploitation of Arctic animals, plants and soil. Penalties for abuse are severe and enforced and practices such as trawling are outlawed in most communities. A much cleaner and ecologically friendly environment is the result of global treaties, which are in place and abided by.

The Northern Sea Route and the Northwest Passage are open longer because of melting ice, which again has been attributed to climate change. Many strategies help the Arctic to adapt to thinner permafrost layers; an elevated sea level, and longer seasons with open water. Climate change remains a management challenge.

On the business side, no company is allowed to exploit the Arctic resources without a license and the regulatory regime is strong and accepted. Some companies even agree to voluntarily abandon their old-fashioned enterprises.

## Local people have the power

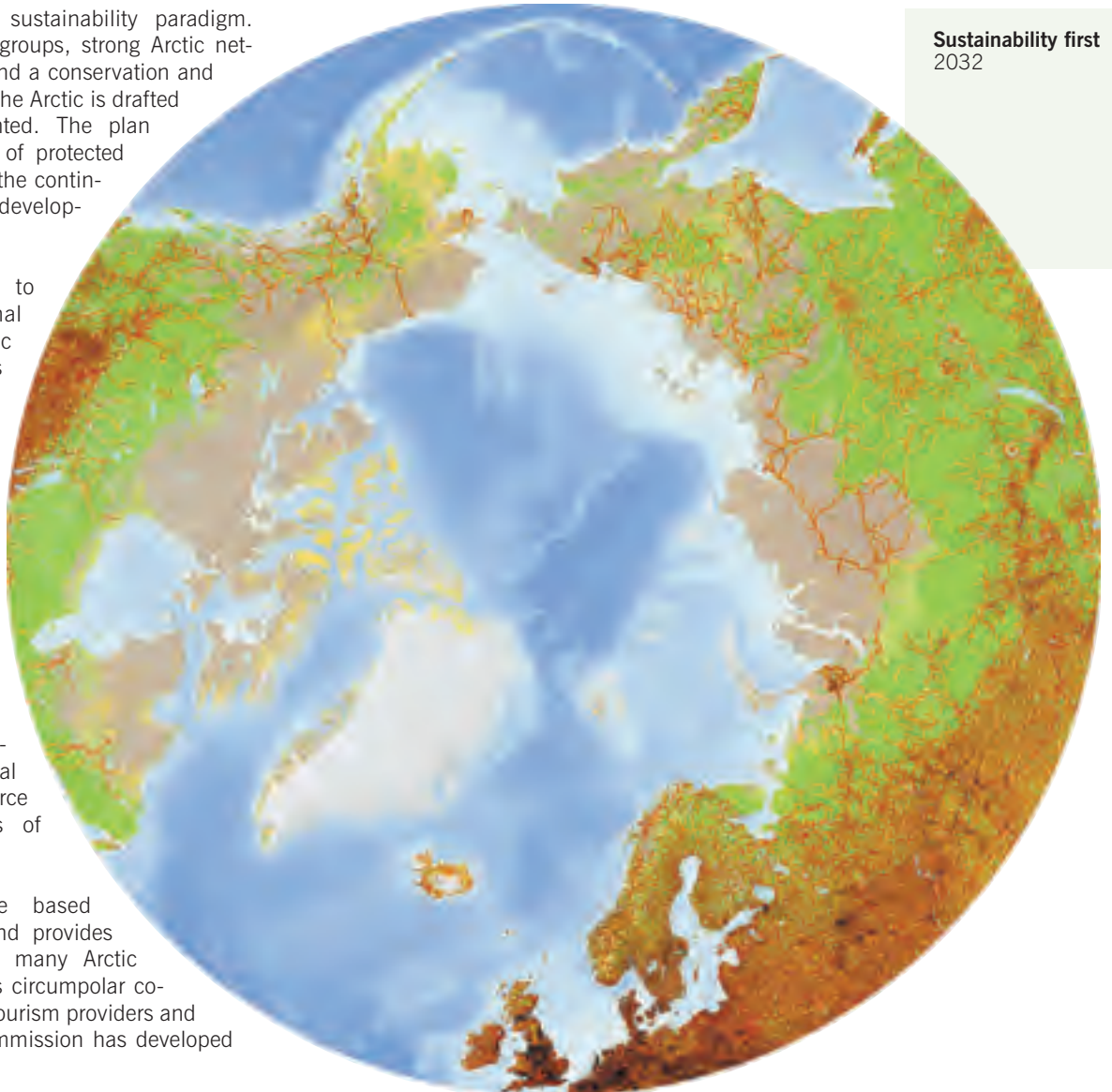
The Arctic Council is a strong player in promot-

ing the new global sustainability paradigm. Through its observer groups, strong Arctic networks exist in 2032, and a conservation and development plan for the Arctic is drafted and partly implemented. The plan consists of a system of protected areas-, which ensure the continuing survival, and development of biodiversity.

Government efforts to preserve traditional lifestyles of the Arctic people are strong. It is recognised that local communities are closest to the resources, and therefore environmental management cannot be done without the involvement of these communities. Education is considered a priority and the Arctic is now the centre of several specialised environmental indigenous and resource economics programs of study.

Nature and culture based tourism is thriving and provides jobs and income for many Arctic communities. There is circumpolar co-operation among the tourism providers and an Arctic Tourism Commission has developed guidelines.

**Sustainability first  
2032**





# An Inuit Vision for WSSD

**In August 2002, Canadian Inuit hosted the Inuit Circumpolar Conference General Assembly in Kuujuaq a small town in northern Quebec, Canada.**

This Assembly is held every four years in one of the four countries Inuit occupy namely; Canada, the United States (Alaska), Greenland and Russia. The theme of this year's Assembly is "Inuit Voice Enlightening the world", which is timely, considering that one-week later Inuit leaders will be in Johannesburg bringing an Inuit vision of sustainability to the global community.

Indigenous peoples everywhere face many challenges in finding their place in the new world order of globalization. A place that affords our peoples self-respect and security, and one in which we contribute to the well being of others. Our voices have not always been heard; our contribution and value not always recognized nor appreciated. We have had to fight hard to be heard.

When indigenous peoples work in isolation, many challenges are insurmountable and many common goals unattainable. But through partnerships and accepting differentiated responsibilities I believe sustainable development is achievable at the local, region-

al and global scale. New and meaningful partnerships are at the heart of moving sustainable development forward in our homelands and elsewhere.

The Arctic was virtually ignored in the debate leading up to and culminating at Rio de Janeiro in 1992. The Arctic is not mentioned in Agenda 21. Yet, in the last 10 years Arctic issues have climbed up the political agenda, in part, as the South seeks our energy and mineral resources, contemplates Arctic shipping to link western Europe, eastern Asia, and North America, and as human health and environmental concerns such as persistent organic pollutants and climate change are framed in a global context. We welcome the attention to these issues of crucial importance to us in the Arctic as it allows us to ensure our traditional knowledge, perspectives, expectations, and recommendations on economic, cultural, social, and environmental issues are clear.

The Arctic is a barometer of the global effects of climate change, ozone depletion, and long-range transboundary contaminants – an indicator global health. A wake up call for many.

We must not, however, portray the Arctic and its residents nor any indigenous peoples as powerless victims of global forces. Quite the

contrary. We must show that we are resilient, in the case of the Arctic; we are a culturally diverse region, home to numerous Indigenous peoples, and an emerging geopolitical region of growing importance to the world. We adapted to monumental change in the past and we will again.

The World Summit on Sustainable Development is an important opportunity for us all. Inuit and all indigenous peoples have much to give the global community and also much to learn from experiences elsewhere.

**The face of sustainable development for the next decade is an indigenous face**

Let us use the WSSD process to ensure that Indigenous peoples concerns from the Arctic Circle to the tip of Tierra del Fuego, are included in the eventual outcomes endorsed by ministers in Johannesburg. Let us ensure the face of Johannesburg; the face of sustainable development for the next decade is an indigenous face.



**Sheila Watt-Cloutier** is from Kuujuaq and now resides in Iqaluit, Nunavut. Ms. Watt-Cloutier is the President of the Inuit Circumpolar Conference Canada.

## UNEP and the Arctic

**The mission of UNEP is to provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and people to improve quality of life without compromising that of future generations. An important part of this work is to keep under review the state of the global environment, to assess global and regional environmental trends in order to provide early warning information on environmental threats, and to report to decision-makers and other stakeholders in formats that are easily accessible and easy to understand.**

Arctic ecosystems, be it on land or in water, are vulnerable for disturbances and for exploitation of their renewable and non-renewable resources. Airborne pollution from countries far away into the Arctic affects living organisms ranging from lichens to polar bears, and global warming and depletion of the ozone layer may have serious negative impacts for future generations. These threats are a result of a range of global activities, and the small population of the Arctic's indigenous people can do very little, if anything, about it. The fact that the resources of the Arctic are of extreme importance and value for the outside world, but also that the Arctic's small population, numbering less than 4 million people, cannot reap the economic and social benefits from resource use, represent political and moral dilemmas.

Many chemicals released to air or water by activities in Europe and North-America accumulate in the High North. Hazardous substances may lead to genetic defects, and may result in metabolic changes, reduced fertility, and cancer. Nervous systems and muscle functions may also be affected. All in all, such pollutants may seriously affect the health and welfare of entire Arctic communities. The Stockholm Convention on Persistent Organic Pollutants (POPs), negotiated under the auspices of UNEP, and expected to come into force in 2004, sets out control measures that address the production, import, export, disposal, and use of POPs.

The health and well being of the Arctic's indigenous peoples is probably one of the best indicators on sustainable development in the Arctic. UNEP's support and co-operation with indigenous peoples is an important part of our Arctic agenda. In Arctic Russia, life expectancy for the indigenous peoples are 20 years lower than for the average Russian, and among the Mansi there are no known people of retirement age. This should call for serious concerns, and is an example why it is important for UNEP to prioritise its work on indigenous people of the North.

Deterioration of the Arctic environment as a result of climatic changes may have severe consequences for us all. Possible changes in the paths and flows of major ocean currents is but one example. A non-sustainable development in the Arctic may furthermore disrupt important renewable resources such as fish stocks in the Arctic seas, and may affect unique biodiversity and wilderness areas that are of benefits to the

Arctic's people as well as for the global community at large. For these obvious reasons UNEP is increasing its focus on environmental conservation linked to sustainable development in the Arctic.

Our strategy is to cooperate closely with key stakeholders such as the Arctic Council, the Arctic Indigenous Peoples' organisations, Arctic Parliamentarians, the Arctic research communities, and the NGOs. Many of the articles in this newspaper are based upon the Arctic part of UNEP's latest Global Environment Outlook GEO 3 and our contribution on the Arctic in GEO 3 is a result of close cooperation with all our stakeholders. This win-win collaboration gives UNEP access to the best available and most credible data and assessments of the Arctic environment and opens a UN channel for our collaborators where sustainable environment in the Arctic is put into a global context.

As a partner in the GEF, UNEP may provide financial resources to cover incremental costs of environmental projects in the Arctic. We have currently under development and implementation several projects in Arctic Russia addressing POP's, biodiversity, climate change and protection of the marine and terrestrial environments, amounting to a total of 40 million USD, and where the GEF contribution is close to 50%.

GRID-Arendal has been UNEP's key polar centre since 1999, with a particular focus on environmental assessment and early warning in the Arctic. Together with our strategic partners we will strive to convey the importance of Arctic environmental protection into decision-making processes, ranging from the local to the global levels. An important part of this is to provide updated and reliable information. This Arctic Environmental News is a part of this effort.

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