**United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea. Fourth meeting, 2-6 June 2003**

**Panel on "Protecting Vulnerable marine ecosystems"**

# Protecting the environment of the Arctic ecosystem

**by**
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## Introduction

Thank you, Mr. Co-Chairman, for this opportunity to present my perspective - as director of the Norwegian Polar Institute - on issues related to the Arctic marine ecosystem. The Arctic is a wonderful place, with enormous contrasts both within the region and through the seasons. I have just come from Tromsø at 70ºN, where the 60 000 of us that live there now experience midnight

**The Arctic marine environment.**

The area of continental shelf under the Arctic Ocean is huge. Exploration for petroleum resources is underway in parts of the continental shelf, and the pace of exploration seems to be increasing.

Sea ice is the most striking feature in the Arctic Ocean. The perennial pack ice covers about 8 million square kilometres, while the total area covered by sea ice at its maximum in spring is nearly twice that area. The ice covers most of the continental shelves most of the year, and is in constant motion caused by wind and currents. The movement from one end of the Arctic Basin to the other can take up to six years, allowing the ice to grow as thick as three meters or more.

Most of the water in the Arctic Ocean comes from the Atlantic Ocean via the Fram Strait (between Greenland and Svalbard) and the Barents Sea. Rivers account for about two percent of the input; a high proportion compared with other oceans. Similar to its inflow, the main outflow from the Arctic Ocean is through the Fram Strait.

In the Arctic Ocean, the surface water temperature is close to the freezing point year-round(n)-1.5( Tw[iO Tca T

The fish stocks are sensitive to ocean temperatures, and small changes can result in major shifts in the geographic locations and productivity in the stocks with results that may be difficult to predict. Changes to the system may result in the need for modifications in fisheries management regimes.

Major commercial fisheries operate in the Barents Sea. Stocks that are shared between Norway and Russia are harvested according to international management agreements, and such international cooperation on the management of fish stocks is fundamental. While the Norwegian-Russian bilateral management regime is well functioning, we are concerned about the unregulated fishing in the areas that are not under national jurisdiction. In the European Arctic waters there are two such areas.

**Persistent organic pollutants and heavy metals**

Of particular concern for the Arctic environment are releases of persistent organic pollutants (POPs). As most of you will be familiar with, these chemicals are highly toxic, persistent, highly mobile in the environment, and they bioaccumulate up food chains. Examples of POPs are PCB, DDT and dioxins. POPs may persist for decades.

POPs accumulate in the Arctic environment even if their sources are scattered elsewhere around the globe. Volatile compounds, which also include mercury, are lifted by the atmosphere at lower latitudes and dumped as the air cools over the Arctic. POPs that are fat–soluble are concentrated in a disproportional manner in the fat and blubber of animals at the top of the food chain. This happens because Arctic animals have a highly seasonal intake of food and consequently build up fat reserves in order to survive the periods of low food abundance. When animals fast they use their body reserves to meet their metabolic and activity needs, thus mobilising an energy source that has concentrated contaminant levels. Thus these animals are much more exposed to pollutants than what is suggested by the general levels of these compounds in the environment.

New chemicals are making their way into the Arctic food chain, including brominated flame-retardants. These compounds are used extensively in computers and textiles, for obviously valuable reasons. The problem is that we do not know the long-term effects these chemicals and their breakdown compounds have on the environment. We are seeing lowered life expectancy and indications of hormonal disruption in polar bears on Svalbard.

It is also now clear that the Arctic acts as a global sink for mercury and that the levels are increasing within the region.

**Petroleum development**

Petroleum exploration has been going on for over 20 years in the Barents Sea. In Russia oil exploitation is now taking place offshore in the Timan-Pechora complex. On the Norwegian side only one gas field is under development thus far. Oil has been found in several wells but the companies involved seem uncertain whether explo

possible to have simultaneous industrial development and safeguard the environment. This is an issue of high political concern. As part of the decision making process the government has initiated the establishment of an integrated management plan for the Barents Sea. The concepts in this plan may have value for other marine areas, and so this is dealt with in more detail below.

**Shipping activities.**

There was little oil transport from the Eastern Barents Sea prior to late 2001. In 2002 it increased sharply to a total of 5.9 million tons, carried on altogether 190 tankers. This volume is expected to grow to more than 8 million tons in 2003. The oil is transported out of

**Climate change and an ice-free Arctic Ocean?**

With its high proportion of ice and snow, the Arctic is both sensitive to climate change and a driver and an amplifier for the global heat engine. Most climate models predict the largest changes in the Arctic, and in that sense the Arctic can be a “canary bird” for climate change. However, high climate variability may mask signals of persistent climate change, especially because observational records are short for many areas.

A major issue facing us is whether human-induced climate warming can lead to large reductions in the ice cover of the Arctic Ocean. This would have a profound influence on all life in the region, and may also have unforeseen effects on global climate, such as changing the global ocean circulation.

Both the extent and thickness of sea ice seem to have been reduced by 2-3% per decade over the last forty years. The seasonal extension of the sea ice exhibits large natural variations, but the southern limit of the ice is now probably at a minimum for the period of 400 years for which we have observations, i.e. that ships have sailed in the Arctic Ocean. A lack of well-distributed data means that there is still considerable uncertainty in the changes in thickness. However, despite the uncertainties, especially in the early data, most scientists agree that the Arctic Ocean is now showing major losses of sea ice. Climate modellers disagree on how fast a human-induced greenhouse reduction will take place, but some predict that in 50 years we will have an ice-free Arctic Ocean in the summer. This would open new shipping routes between Europe and Asia.

The issue of climate change is one example of the need for further knowledge on which to base decisions. The international science community is now discussing the establishment of an International Polar Year (IPY) in 2007/08, as a 50-year follow-on of the highly successful International Geophysical Year that among other things lead to the Antarctic Treaty. IPY has the potential to give a quantum jump in our knowledge of the polar regions.

**Norwegian management approaches**

With the above background in mind I will give two examples of how Norway has approached the management challenges brought about by these rapid changes, and by pote 4 Tcr17.11.1(D-0.0006 Tc0.0006 Tw