

**ARCTIC ENVIRONMENT**

ROVANIEMI, FINLAND  
JUNE 1991

**ARCTIC  
ENVIRONMENTAL  
PROTECTION  
STRATEGY**

# ARCTIC ENVIRONMENT

## DECLARATION ON THE PROTECTION OF ARCTIC ENVIRONMENT

**ARCTIC ENVIRONMENTAL PROTECTION STRATEGY**  
**June 14, 1991**

## PREFACE

In September 1989, on the initiative of the government of Finland, officials from the eight Arctic countries met in Rovaniemi, Finland to discuss cooperative measures to protect the Arctic environment. They agreed to work towards a meeting of circumpolar Ministers responsible for Arctic environmental issues. The September 1989 meeting was followed by preparatory meetings in Yellowknife, Canada in April 1990; Kiruna, Sweden in January 1991; and, Rovaniemi, Finland in June 1991.

In addition to the numerous technical and scientific reports prepared under this initiative, the Arctic Environmental Protection Strategy was developed. This Strategy represents the culmination of the cooperative efforts of the eight Arctic countries:

Canada  
Denmark  
Finland  
Iceland  
Norway  
Sweden  
Union of Soviet Socialist Republics  
United States of America.

The eight Arctic countries were assisted in the preparation of the Strategy by the following observers:

Inuit Circumpolar Conference  
Nordic Saami Council  
USSR Association of Small Peoples of the North  
Federal Republic of Germany  
Poland  
United Kingdom  
United Nations Economic Commission for Europe  
United Nations Environment Program  
International Arctic Science Committee.

We commit ourselves to a joint Action Plan of the Arctic Environmental Protection Strategy which includes:

- Cooperation in scientific research to specify sources, pathways, sinks and effects of pollution, in particular, oil, acidification, persistent organic contaminants, radioactivity, noise and heavy metals as well as sharing of these data;
- Assessment of potential environmental impacts of development activities;
- Full implementation and consideration of further measures to control pollutants and reduce their adverse effects to the Arctic environment.

We intend to assess on a continuing basis the threats to the Arctic environment through the preparation and updating of reports on the state of the Arctic environment, in order to propose further cooperative action.

We also commit ourselves to implement the following measures of the Strategy:

- Arctic Monitoring and Assessment Programme (AMAP) to monitor the levels of, and assess the effects of, anthropogenic pollutants in all components of the Arctic environment. To this end, an Arctic Monitoring and Assessment Task Force will be established. Norway will provide for an AMAP secretariat.
- Protection of the Marine Environment in the Arctic, to take preventive and other measures directly or through competent international organizations regarding marine pollution in the Arctic irrespective of origin;

## **DECLARATION ON THE PROTECTION OF THE ARCTIC ENVIRONMENT**

We, the Representatives of the Governments of Canada, Denmark, Finland, Iceland, Norway, Sweden, the Union of Soviet Socialist Republics and the United States of America;

Meeting at Rovaniemi, Finland for the First Ministerial Conference on the Protection of the Arctic Environment;

Deeply concerned with threats to the Arctic environment and the impact of pollution on fragile Arctic ecosystems;

Acknowledging the growing national and international appreciation of the importance of Arctic ecosystems and an increasing knowledge of global pollution and resulting environmental threats;

Resolving to pursue together in other international environmental fora those issues affecting the Arctic environment which require broad international cooperation;

Emphasizing our responsibility to protect and preserve the Arctic environment and recognizing the special relationship of the indigenous peoples and local populations to the Arctic and their unique contribution to the protection of the Arctic Environment;

Hereby adopt the Arctic Environmental Protection Strategy and commit ourselves to take steps towards its implementation and consider its further elaboration.

- Emergency Prevention, Preparedness and Response in the Arctic, to provide a framework for future cooperation in responding to the threat of environmental emergencies.

- Conservation of Arctic Flora and Fauna, to facilitate the exchange of information and coordination of research on species and habitats of flora and fauna;

We agree to hold regular meetings to assess the progress made and to coordinate actions which will implement and further develop the Arctic Environmental Protection Strategy.

We agree to continue to promote cooperation with the Arctic indigenous peoples and to invite their organizations to future meetings as observers.

We agree to meet in 1993 and accept the kind invitation of . the Government of Denmark

and the Home Rule Government of Greenland to hold the next meeting in Greenland.

Wherefore, we, the undersigned Representatives of our respective Governments, recognizing its political significance and environmental importance, and intending to promote its results, have signed this Declaration.

For the Government of Canada

Thomas Siddon  
Minister of Indian Affairs  
and Northern Development

For the Government of Denmark

Bertel Haarder  
Minister for Education and Research

For the Government of Finland

Sirpa Pietikainen  
Minister of the Environment

For the Government of Iceland

Eidur Gudnason  
Minister for the Environment

For the Government of Norway

Jens Stoltenberg  
Deputy Minister of the Environment

For the Government of Sweden

Birgitta Dahl  
Minister of the Environment

For the Government of the  
Union of Soviet Socialist Republics

J. D. Masljukov  
Deputy Prime Minister  
Chairman of the Arctic and  
Antarctic Commission

For the Government of  
the United States of America

Joh Giffen Weinmann  
Ambassador

Done at Rovaniemi on the 14th of June, 1991

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## 1. INTRODUCTION

There is a growing national and international appreciation of the importance of Arctic ecosystems and an increasing knowledge of global pollution and resulting environmental threats. The Arctic is highly sensitive to pollution and much of its human population and culture is directly dependent on the health of the region's ecosystems. Limited sunlight, ice cover that inhibits energy penetration, low mean and extreme temperatures, low species diversity and biological productivity and long-lived organisms with high lipid levels all contribute to the sensitivity of the Arctic ecosystem and cause it to be easily damaged. This vulnerability of the Arctic to pollution requires that action be taken now, or degradation may become irreversible.

The governments of the Arctic countries have become increasingly aware of the need for, and their responsibility to combat these threats to the Arctic ecosystem. On the initiative of Finland, the eight Arctic countries of USSR, USA, Sweden, Norway, Iceland, Finland, Denmark and Canada have met to prepare a strategy to protect the Arctic environment. The Arctic countries realize that the pollution problems of today do not respect national boundaries and that no state alone will be able to act effectively against environmental threats to the Arctic. They have also been moved by the international call for action expressed by the World Commission on Environment and Development as well as the concerns of the indigenous peoples living in the Arctic region. The Arctic countries with the participation of Arctic indigenous peoples have prepared this environmental protection Strategy. The strategy builds on the initiatives already taken nationally and by indigenous peoples to protect the Arctic environment.

It is recognized that this Strategy, and its implementation, must incorporate the knowledge and culture of indigenous peoples. It is understood that the cultures and the continued existence of the indigenous peoples have been built on the sound stewardship of nature and its resources.

The use of natural resources is an important activity of Arctic nations. Therefore, this Strategy should allow for

sustainable economic development in the north so that such development does not have unacceptable ecological or cultural impacts. The Strategy must also rely on the best scientific and technological advice that countries are able to produce and share.

Arctic ecosystems are influenced and in some cases threatened by factors occurring also outside the Arctic. In turn, the Arctic also exerts an important influence on the global environment. The implementation of an Arctic Environmental Protection Strategy will therefore benefit both the Arctic countries and the world at large. The Strategy is also designed to guide development in a way that will safeguard the Arctic environment for future generations and in a manner that is compatible with nature.

The Arctic countries are committed to international cooperation to ensure the protection of the Arctic environment and its sustainable and equitable development, while protecting the cultures of indigenous peoples.

Only through careful stewardship by Arctic countries and Arctic peoples can environmental damage and degradation be prevented. These are the challenges which must be taken up in order to secure our common future.

The Strategy is comprised of a number of component parts, beginning with a statement of objectives. These objectives establish the broad direction in which the eight Arctic countries are intending to move. The objectives are accompanied by statements of principle which are designed to guide the actions of Arctic countries individually and collectively, as they move toward achievement of the objectives. The Strategy also describes the problems and priorities which the eight Arctic countries agree need to be addressed at this time.

Tools, whether legal, scientific or administrative, are also reviewed in order to define appropriate mechanisms for implementation of the Strategy. This is particularly relevant to that section of the Strategy which defines the specific actions that the eight countries will undertake jointly or individually to deal with priority issues and pollution problems. The implementation of the Strategy will be carried out through national legislation and in

accordance with international law, including customary international law as reflected in the 1982 United Nations Convention on the Law of the Sea.

Finally, the Strategy outlines plans for future cooperation towards the implementation of the Strategy.

## 2. OBJECTIVES AND PRINCIPLES

### 2.1 Objectives

The objectives of the Arctic Environmental Protection Strategy are:

- i) To protect the Arctic ecosystem including humans;
- ii) To provide for the protection, enhancement and restoration of environmental quality and the sustainable utilization of natural resources, including their use by local populations and indigenous peoples in the Arctic;
- iii) To recognize and, to the extent possible, seek to accommodate the traditional and cultural needs, values and practices of the indigenous peoples as determined by themselves, related to the protection of the Arctic environment;
- iv) To review regularly the state of the Arctic environment
- v) To identify, reduce, and, as a final goal, eliminate pollution

### 2.2 Principles:

The Arctic Environmental Protection Strategy and its implementation by the eight Arctic countries will be guided by the following principles:

- i) Management, planning and development activities shall provide for the conservation, sustainable utilization and protection of Arctic ecosystems and natural resources for the benefit and enjoyment of present and future generations, including indigenous

peoples;

- ii) Use and management of natural resources shall be based on an approach which considers the value and interdependent nature of ecosystem components;
- iii) Management, planning and development activities which may significantly affect the Arctic ecosystems shall:
  - a) be based on informed assessments of their possible impacts on the Arctic environment, including cumulative impacts;
  - b) provide for the maintenance of the regions' ecological, systems and biodiversity;
  - c) respect the Arctic's significance for and influence on the global climate;
  - d) be compatible with the sustainable utilization of Arctic ecosystems;
  - e) take into account the results of scientific investigations and the traditional knowledge of indigenous peoples;
- vi) Information and knowledge concerning Arctic ecosystems and resource use will be developed and shared to support planning and should precede, accompany and follow development activities;
- vii) Consideration of the health, social, economic and cultural needs and values of indigenous peoples shall be incorporated into management, planning and development activities;

- viii) Development of a network of protected areas shall be encouraged and promoted with due regard for the needs of indigenous peoples;
- ix) International cooperation to protect the Arctic environment shall be supported and promoted.
- x) Mutual cooperation in fulfilling national and international responsibilities in the Arctic consistent with this Strategy, including the use, transfer and/or trade, of the most effective and appropriate technology to protect the environment, shall be promoted and developed.

### 3. PROBLEMS AND PRIORITIES

At the first meeting in 1989 of the eight Arctic countries there was early recognition that many of the environmental problems that individual nations had been addressing, were in fact shared amongst the eight. To begin with, six specific pollution issues were identified as requiring attention. These issues were associated with persistent organic contaminants, oil, heavy metals, noise, radioactivity, and acidification.

State of the Environment Reports were prepared on each of these topics and have been published separately. It was also agreed that these will be updated as necessary

It was recognized that the ability to completely understand these issues was restricted by the lack of a comprehensive scientific data base and coordinated monitoring program on the state of Arctic ecosystems. Furthermore, the potential impact of these specific pollutants on Arctic flora and fauna underlined the need to consider establishing a mechanism to facilitate a cooperative approach to their conservation. Other environmental problems including the depletion of the ozone layer and global warming were not addressed because they were already being considered in other fora. It was also determined that since the Arctic environment is particularly vulnerable to accidental discharges and uncontrolled releases of pollutants, enhanced mechanisms to address environmental emergencies in the Arctic were needed.

#### 3.1 Persistent Organic Contaminants

The use and production of persistent organic contaminants (e.g. polychlorinated biphenyls (PCBs), DDT, hexachlorocyclohexane (HCH), chlordane and toxaphene) has been stopped or restricted in some countries, however, many are still widely manufactured and used on a global basis. They are hazardous environmental contaminants due to their high stability and persistence in the environment, potential for bioaccumulation and high chronic toxicity, and the large quantities which have been released into the environment.

Although there are no major sources of these contaminants in the Arctic, they, nevertheless, reach the Arctic environment via long-range transport by rivers, the atmosphere and ocean currents from more industrialized centres, particularly Asia, Europe and North America. Due to the highly lipophilic nature of most chlorinated organic contaminants, they become concentrated in the fatty tissues of species in the Arctic food chain. The highest levels of contaminants are therefore detected in the blubber and fat tissue of animals at the top of the food chain (e.g. polar bears, whales and seals). This is of particular concern in the Arctic because of the high level of consumption of lipid-rich wildlife foods by residents, resulting in a pathway of these contaminants to humans.

The presence of chlorinated organic contaminants has been reported in human populations throughout the world. The level of PCBs in breast milk samples collected from Inuit women in northern Quebec, was approximately five times higher than that of Caucasian women living in southern Quebec, Canada.

The variable and generally sparse database on chlorinated organic contaminants in the Arctic prohibits for the most part, the determination of any spatial or temporal trends. In Canadian studies, chlordane compound residue levels in polar bear fat have been reported to be four times higher in 1984 than in 1969, while levels of DDT did not change and other chlorinated contaminants measures were twice as high.

Concentrations of chlorinated organic contaminants in the Arctic ecosystem are generally lower than in heavily polluted areas such as the Great Lakes, or the Baltic Sea. There are, however, some exceptions - the more volatile compounds (e.g. HCB, toxaphene) are often detected in the Arctic at concentrations similar to those in source regions.

Little is known about the potential effects of chlorinated organic contaminants on the ecosystem. However, there is evidence that a broad spectrum of contaminants is reaching the Arctic and there is sufficient toxicological data as well as field data to make reasonable extrapolations with regard to ecosystem consequences in the Arctic. Chronic effects of chlorinated organic contamination observed in other regions (e.g. reproductive failure, bill and foot abnormalities, cancer) are of the most significance. The lower concentrations detected in the Arctic do not diminish the potential significance of their effects on ecosystem health.



### 3.2 Oil Pollution

The Arctic is one of the areas most vulnerable to adverse impacts from chronic and acute oil pollution. This is due to physical environmental conditions such as low temperature, periods with little or no light, ice cover etc. Low temperatures lead to reduced evaporation of the more volatile, toxic oil components. Dark, cold winters in the Arctic lead to reduced ultraviolet radiation and biological decomposition of oil. In areas of drift ice, oil dispersal caused by wave action is also reduced. Oil in iced areas will be trapped between ice floes or under the ice, and only partly transported to the ice surface. These factors result in a generally slower decomposition of oil in the Arctic than in temperate regions. The period in which a particular oil spill can be harmful to wildlife is thus comparatively longer in the Arctic.

The marginal ice zone is particularly vulnerable to oil pollution. A large part of the primary production in the Arctic, is found in this zone, which makes it extremely important for the whole Arctic ecosystem. Although there is no evidence that an oil spill reduces primary productivity to a significant degree, direct effects on marine life can be devastating, especially in the marginal ice zones.

Feathers and fur contaminated by oil quickly lose their insulating properties, and the oil will often cause skin inflammation. Both will lead to a negative energy balance of the affected animal. Ingested oil, in particular unweathered oil with a high content of volatile substances, can cause serious intoxication of birds and mammals. No studies indicate that any of these species tend to avoid oil spills.

The amount of information available on oil spills in the Arctic, and probably the accuracy of the estimated quantities, varies considerably. Information on continuous discharges is scarce, and estimates of indirect oil transport (atmosphere, ocean currents, and rivers) have not been available. Order of magnitude calculations show that river transport is the main contribution of oil pollution to the Arctic (estimated at 200,000 metric tons per annum).

The highest risk of oil spills is connected with transportation activities and production of oil as well as to a lesser degree, exploration activities. Their occurrence will depend on the level of activity in the Arctic, the technical standards of the activity and the preventative measures taken.

The physical constraints caused by Arctic conditions imply particular technological challenges regarding oil spill clean up. Effective methods and techniques for containing and cleaning up oil spills from water and ice are currently limited.

The available information on ambient oil pollution in the Arctic is scarce. More information is needed, obtained with standardized methodologies in order to have comparable data for the whole region, with special emphasis on fluvial inputs and concentrations in surface marine waters.

### 3.3 Heavy Metals

Levels of heavy metals have been found in the air, precipitation, ocean waters, soils, rivers, lakes and bottom sediments of the Arctic as well as in marine, freshwater and terrestrial biota.

These levels occur as a result of natural phenomena as well as from regional sources and global transport.

Heavy metal concentrations in air and precipitation are mainly due to long-range atmospheric transport from industrial centers resulting in a deposition of heavy metals on vegetation, snow, and the sea which generally decreases from south to north. To a lesser extent discharges from local mining operations and the methylation of inorganic mercury often associated with large scale impoundments of water in previously vegetated areas (i.e. hydroelectric developments), also account for elevated heavy metal concentrations. Canadian and Finnish studies indicate methyl mercury levels in fish rise measurably after the flooding of new reservoirs, depending upon the amount of organic material present.

The temporal trends of long-range heavy metal pollution of the Arctic particularly mercury, cadmium, lead,

arsenic and nickel have been determined by analyzing ice cores from glaciers. There has been an increasing trend since the middle of the 19th century and a sharp increase in the 20th century. Recent analyses of vegetation seem to indicate that a decrease may now be occurring.

The concentrations of heavy metals in lakes and rivers are generally higher than in Arctic sea water. A decrease in pH caused by acid precipitation increases the dissolution rates of heavy metals which may increase the rate of accumulation in the biota.

In the Arctic marine environment the concentrations of heavy metals in water are low compared to more southerly latitudes. However, the concentrations in biota increase in the food chain, and in the top level predators such as seals and whales the concentrations, especially of cadmium, increase to levels much higher than observed in other areas. For example, in some Canadian studies, cadmium levels in narwhal kidney were among the highest ever reported in marine mammals. This build-up is probably due to naturally occurring phenomena, but such occurrences make increases in the concentrations of heavy metals in the Arctic marine environment as a result of industrial sources more problematic than elsewhere.

The high concentrations of heavy metals in marine mammals and some bird species constitute a problem in districts where tissues from such animals constitute a significant part of the diet. Thus increased concentrations of mercury have been found in Greenlanders from hunting districts. Elevated levels of mercury have also been found in the Native populations of Northern Quebec, Canada.

### 3.4 Noise

The waters of the Arctic region are a unique noise environment mainly due to the presence of ice. The ambient noise is strongly influenced by the dynamic processes of ice formation, melt, deformation and movement. This situation is different from ice free waters. In periods where ice cracking and wind noise are absent, areas covered by shore-fast ice are among the quietest underwater environments.

Human activities create noise types and levels, which may disturb marine mammals, or mask the “natural” sounds of importance to those mammals. Some types of noise may affect fish as well as marine mammals. There are a number of serious gaps in our knowledge of the effects of underwater noise on marine mammals, including the inability to assess the effect of repeated noise exposure on stocks.

There is considerable evidence that most types of disturbance do not cause mortality. However, some noisy activities, including low level overflights by aircraft, near seals and walrus at haul out sites can cause mortality through stampedes or abandonment.

Many marine mammals seem able to adapt to or at least tolerate many types of disturbances or increased noise levels. However the scarcity of direct evidence of serious consequences from disturbances does not necessarily mean that marine mammals are not stressed or affected in some other way. Noise from human activities may cause short-term or long-term behavioral reactions and temporary displacement of various marine mammals. The biological significance of most of these reactions is unknown.

Moving sound sources, notably boats and aircraft, seem to be more disturbing than stationary sources, e.g. dredges and drillships. The effects on fish and wildlife of cumulative exposure to noise are largely unknown.

### 3.5 Radioactivity

There have been two major causes of radioactive contamination affecting the Arctic region: atmospheric nuclear-weapons testing during the 1950s and 1960s and the accident at the Chernobyl nuclear power plant in 1986. Of greatest concern are the long-lived radionuclides, including Strontium-90 (29 year half-life) and Cesium-137 (30 year half-life). Studies have shown that these fallout derived radionuclides are efficiently retained by surface vegetation, especially lichen, in this nutrient-poor environment and are biologically recycled in Arctic ecosystems. As a result, those indigenous peoples and local populations consuming as their main food

caribou or reindeer meat with elevated levels of radio-cesium, may have accumulated higher levels.

Other radioactive threats to the environment exist, e.g. accidental discharges which are of a biological significance associated with nuclear power sources and transport, storage and disposal of radioactive waste.

When considering the total radiation dose, attention should be given to the radiation from man-made sources and to natural radiation.

A number of bilateral and multilateral arrangements, including those with the International Atomic Energy Agency (IAEA), address issues related to exchange of information, early notification of radiation release, emergency preparedness and response to nuclear accidents and transboundary movement of radioactive materials.

### 3.6 Acidification

The most important acidifying substances are sulphur and nitrogen compounds emitted mainly by vehicles, industrial activities and coal and oil based power plants. Long-range transport is the most important factor influencing the air quality in the Arctic, especially in winter. The sulphur and nitrogen emission from industrial activities in the Arctic is also a considerable factor. Until now, little emphasis has been placed on the effects of acid deposition on Arctic ecosystems. Furthermore, knowledge derived from studies in temperate zones is not directly relevant to the Arctic.

One of the most well known examples of a problem associated with acidity in the Arctic is the Arctic haze phenomenon produced from acid pollutant aerosols. Arctic haze has been under intense study and much is known about its nature, distribution and composition. Acidification is evolving into a prominent environmental problem around certain northern industrial centers. In northern FennoScandia, in the northwestern parts of the

Soviet Union and in the eastern parts of Canada, natural factors increase the sensitivity to acidification and anthropogenic impacts have extended through the whole area.

The interaction between acidic deposition and the soils of different ecosystems is an important component of the acidification process. A continuous excessive acid load leads to the mobilization of aluminum and heavy metals.

The combined effects of acid deposition and the stresses already induced by the harsh climate increase the possibility of vegetation damage in the Arctic.

Critical loads, rates of acidification, and conditions influencing cold climate environments need more detailed regional monitoring and research. In general, northern ecosystems are under greater stress than temperate ecosystems.

#### 4. INTERNATIONAL MECHANISMS FOR THE PROTECTION OF THE ARCTIC ENVIRONMENT

Before determining the specific actions required to protect the Arctic environment, a review of existing and proposed international and bilateral agreements and policy declarations pertaining to the Arctic environment has been completed. This review has revealed the existence of a number of mechanisms that may be employed to protect the Arctic environment, and provides a useful tool for the implementation of the Strategy. The List of Major International Instruments and Policy Declarations Pertaining to the Arctic Environment has been distributed and will be periodically updated. Through the more specific studies of the six priority areas, some important gaps have been identified.

##### 4.1 Persistent Organic Contaminants

International legal instruments which currently control air pollution are not specifically directed at limiting the emission of persistent organic contaminants and related contaminants. Work is underway within the UN ECE Convention on Long-Range Transboundary Air Pollution (LRTAP) to review the problem and identify specific control actions. Any new international legal instrument would need to target contaminant reductions in the industrialized areas of Asia, Europe and North America. Consequently, proper management and protection of the Arctic ecosystem from the effects of these contaminants will require cooperation through effective bilateral and multilateral agreements among both circumpolar and non-circumpolar nations.

##### 4.2 Oil Pollution

The main international instruments relevant inter alia to oil pollution in the Arctic are:

- i) the 1969 international Convention on Civil Liability for Oil Pollution Damage (Convention);

- ii) the 1969 International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Convention on Intervention);
- iii) the 1971 international Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention);
- iv) the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention);
- v) the 1974 Convention on the Prevention of Marine Pollution –from Land-Based Sources (Paris Convention);
- vi) the International Convention for the Prevention Of Pollution from Ships (MARPOL 1973/78); and
- vii) the 1982 United Nations Convention on the Law of the Sea (UNCLOS)(not yet in force);
- viii) the International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (not yet in force).

Certain issues with respect to oil pollution in the Arctic are insufficiently covered by the existing international agreements and conventions. For example, some instruments are limited in their application and only partially apply to the Arctic region. There is a need to consider the possibility of extending the geographic scope of these instruments. The provisions of the various instruments also need to be further assessed to determine their adequacy under Arctic conditions taking into account the particularly vulnerable nature of the region.

Strict standards in the transportation of oil in the Arctic are needed. Such standards should be developed under the framework of the International Maritime Organization (IMO). Arctic countries should consider becoming parties to or applying the relevant principles of the various existing conventions and agreements on oil pollution management.



#### 4.3 Heavy Metals

There are few multilateral conventions and bilateral agreements which deal with heavy metal inputs in the environment.

The UN ECE LRTAP Convention is one of the major international conventions which limits harmful atmospheric emissions. Work is currently underway within this forum to identify and decide upon specific control actions to deal with heavy metals.

Control of discharges of heavy metals to the marine environment are governed by both the 1972 Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (Oslo Convention) and the 1974 Convention on the Prevention of Marine Pollution from Land-based Sources (Paris Convention). The UNCLOS provides opportunities for controlling the discharge of harmful substances e.g. heavy metals. There are only a few bilateral arrangements between the Arctic countries controlling these substances.

#### 4.4 Noise

Existing legal instruments do not address the effects of noise on the Arctic ecosystem. There may be a need for Arctic countries to agree on the adoption of procedures to ensure that in the planning and conduct of activities in the Arctic, measures are taken to facilitate the adequate monitoring of the potential disturbance from noise including the verification of predicted effects

and the identification of any unforeseen effects. Such evaluations should ensure that environmental protection measures are given due consideration.

#### 4.5 Radioactivity

The 1986 international Atomic Energy Agency (IAEA) Convention on Early Notification of a Nuclear Accident, provides an adequate mechanism for cooperation and exchange of information applicable in the Arctic region. In addition, there are a number of bilateral and multilateral agreements in existence which provide for such events as the early notification of accidental radioactive discharges (e.g. between Finland and other Nordic countries, Finland and the USSR, 1987).

With respect to emergency preparedness and assistance, the IAEA Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency was established to facilitate prompt international assistance when requested in the event of a nuclear accident. Additionally, a number of bilateral and multilateral agreements have been concluded between the Arctic countries that both supplement and provide greater precision to the IAEA arrangements. These should be examined to ensure that the specific environmental conditions of the Arctic are addressed.

Furthermore, consideration should be given to practical mechanisms between national authorities to implement the coordination of emergency measures within the existing international legal framework of the IAEA.

#### 4.6 Acidification

The Arctic is exposed to the long range transport of acidifying substances from various sources. A number of control measures have been introduced at the United Nations Economic Commission for Europe (ECE) and bilaterally. Although, in general, these measures do not contain provisions relating specifically to the Arctic region, they do refer to emission sources that affect the Arctic.

Arctic acidification is a complex phenomenon resulting from a wide range of different types of activities also conducted outside the Arctic itself. The extent of acidification in the Arctic is still uncertain, although there is recognition of problems such as Arctic haze and forest devastation and other large-scale acidification effects and regional damage in certain Arctic areas. There is however, insufficient knowledge of the critical loads, to allow for agreement on common standards. The lack of comparable data also presents problems. Consequently, improved monitoring and research directed at the rate and nature of acidification processes under Arctic conditions are needed.

Under both the 1985 and 1988 protocols to the UN ECE LRTAP Convention for the Reduction of Sulphur and Nitrogen Oxide Emissions or their Transboundary Fluxes, the Cooperative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) is to report annually to the LRTAP Executive Body its calculations of budgets, transboundary fluxes and deposition of sulphur and nitrogen oxides. EMEPs geographical scope is currently limited to Europe but it is suggested that EMEP might be utilized for collecting data on Arctic acidification in cooperation with the Arctic Monitoring and Assessment Program (AMAP). Arctic countries should consider becoming parties to all the relevant agreements in this field. This is particularly relevant for those countries in the northern hemisphere where there are major sources of sulphur and nitrogen emissions.

## 5. ACTIONS

The eight Arctic countries agree to proceed cooperatively with the following action plan. These commitments will begin the process of addressing the serious environmental issues identified and assessed through the preparation of specific state of environment reports. These issues will require regular updates for evaluation by the eight Arctic countries on the progress being made, and to advise on possible new courses of action.

### 5.1 Persistent Organic Contaminants

- i) In order to further define the likely sources, pathways, sinks and effects of these pollutants, and to expand the data base to cover all the component parts of the Arctic environment, the eight Arctic countries will undertake cooperative monitoring (AMAP) and research related to the problem of persistent organic contaminants in the Arctic ecosystem.
- ii) The Arctic countries will consider the feasibility of developing national inventories on the production, use, and emissions of persistent organic contaminants (e.g. pesticides) to be collected, and made available and summarized in the state of the Arctic environment reports.
- iii) The Arctic countries will also address the problem of persistent organic contaminants under existing or proposed international agreements and will review other mechanisms to advance this issue in other international fora.
- iv) In order to achieve an early reduction in the movement of persistent organic contaminants into the Arctic environment, the eight Arctic countries will support the process now under way within the UN ECE LRTAP Convention to further define the

problem and to develop proposals for international action on the control of these substances under the Convention. Those Arctic countries which are partners to the Paris and Helsinki Conventions will actively support ongoing inventory and assessment work under those conventions.

- v) The Arctic countries agree to implement measures to reduce and/or control the use of the following polluting substances: chlordane, DDT, toxaphene and PCBs. Those Arctic countries which have not already done so, also recognize that the elimination of the problem of persistent organic contaminants in the Arctic may also require controls on the production of these substances.
- vi) The Arctic countries will review the situation with regard to other persistent organic contaminants with a view to establishing priorities and timetables for a program of emission elimination or control in cooperation with other international fora.

## 5.2 Oil Pollution

- i) In order to achieve better documentation of the level of oil pollution in the Arctic environment, the initiation of monitoring of hydrocarbons as a part of the AMAP, will play an important role.
- ii) There is also a need to consider establishment of a reporting system on discharges and spills, with regard to provide adequate documentation on the pollution threat, in the Arctic.
- iii) The elements agreed upon in Section 8, Protection of the Arctic Marine Environment

and Section 9, Emergency Prevention, Preparedness and Response will comprise the basis for further cooperation in preventing and combatting oil pollution.

- iv) The Arctic countries agree to take measures as soon as possible to adhere to the strictest relevant international standards within the conventions, to which the countries are parties, regarding discharges irrespective of origin.
- v) The Arctic countries agree to undertake joint actions in relevant international fora to further strengthen recognition of the particularly sensitive character of icecovered parts of the Arctic Ocean.

### 5.3 Heavy Metals

- i) An improved understanding of the dynamics of heavy metals in the Arctic ecosystem is required. The countries will undertake a program of coordinated monitoring (AMAP) and research to identify sources, pathways and sinks of heavy metals; spatial and temporal trends; and, ecological effects with special emphasis on human health effects.
- ii) The eight Arctic countries agree to implement measures to control conditions that lead to the release of heavy metals by industrial activities including as appropriate the implementation of best available technology and other concerted actions in accordance with appropriate international agreements (e.g. UN ECE LRTAP Convention).

#### 5.4 Noise

- i) The effects of noise associated with Arctic marine and terrestrial projects should be evaluated as part of the project planning and approval processes, and if significant adverse noise effects on the specific components of Arctic ecosystems are predicted, then measures should be implemented to avoid or mitigate the impact.
- ii) Efforts should be made to improve the knowledge on marine mammal auditory function, communication and behavior and the current noise exposure assessment techniques. For specific project evaluations, site-specific data should be addressed before and during the evaluation. This includes determining how much exposure migrating stocks are encountering throughout the year.

#### 5.5 Radioactivity

- i) AMAP should address radioactivity. Common standards and techniques for monitoring and analysis, consistent with IAEA standards and technology should be developed.
- ii) Future monitoring and health assessments should consider the effects from exposure to radiation from man-made sources together with natural or background radiation.
- iii) Further consideration should be given to the development of more specific measures, consistent within the international legal framework of IAE procedures, for cooperation amongst Arctic countries to deal with emergencies caused

by the accidental release of radioactive substances and to provide mutual assistance in the harsh Arctic environment.

- iv) All relevant data concerning previous studies and measurements should be collated in the existing relevant data bases of which information should be exchanged between the governments and institutions concerned.

#### 5.6 Acidification

- i) Regional Arctic research programs should be developed to assess the current loadings and potential effects of acid deposition on representative sensitive Arctic ecosystems. Special attention should be given to those regions or ecosystems for which existing data or assessments suggest that there is or is likely to be an acidification problem.
- ii) Consideration should be given to expanding deposition monitoring programs, within the framework of AMAP and existing networks such as the ECE/EMEP deposition monitoring network, to encompass measurement of acid deposition in the Arctic. Emphasis should also be placed on measuring dry deposition.
- iii) Emphasis should be placed on defining critical loads and setting target loads for sensitive Arctic ecosystems. In the event that these target loads are being exceeded, steps should be taken to reduce those emissions contributing to the problem, in accordance with international agreements such as the ECE LRTAP Convention. Reduction of emissions of sulphur and nitrogen should be sought by, inter alia, implementing the use of the best available technology.



## **6. ARCTIC MONITORING AND ASSESSMENT PROGRAM**

The eight Arctic countries recognize that the Arctic region represents one of the relatively pristine areas on earth. It is therefore of great importance to preserve and to protect the Arctic.

Measurements in the Arctic indicate that pollutants originating from anthropogenic activities in the mid-latitudes are transported to the Arctic by atmospheric processes, ocean currents and rivers, and that pollutants are deposited and accumulated in the Arctic environment and its ecosystems.

Exploitation of natural resources, and concomitant urban and industrial expansion within the Arctic region, also contribute to the degradation of the Arctic environment and affect the living conditions for the people of the region.

Distinguishing human-induced changes from changes caused by natural phenomena in the Arctic will require monitoring of selected key indicators of the Arctic Environment. Therefore, the eight Arctic countries have agreed to promote development of an Arctic Monitoring and Assessment Program (AMAP) in order to understand and document these changes and so that the monitoring results may be used to anticipate adverse biological, chemical and physical changes to the ecosystem and to prevent, minimize and mitigate these adverse effects.

The primary objective of the AMAP is the measurement of the levels of anthropogenic pollutants and the assessment of their effects in relevant component parts of the Arctic environment. The assessments should be presented in status reports to relevant fora as a basis for necessary steps to be taken to reduce the pollution.

Two of the most significant threats to the present Arctic environment may come from climate change, induced by global warming, and the effects of stratospheric ozone depletion. Programs to detect and determine the causes and effects of climate change and ozone depletion are to a large extent being developed by other

international groupings and in other fora.

It is important for AMAP to be aware of these programs and to develop links with them from an Arctic perspective in order to encourage and facilitate an Arctic component in climate programs. Data obtained for assessing climate change will provide important inputs to the AMAP dataset. In turn, AMAP data will be relevant to climate change programs in the Arctic.

The pollution data available from the Arctic region are with a few exceptions based on research programs performed within limited subject areas by national programs and not supported by bilateral or international cooperation. There is an urgent need for cooperation among local and regional efforts and global programs in order to obtain better documentation on the environmental situation in the Arctic especially with regard to long-range air and marine pollution.

From the outset, the AMAP should as far as possible be based on existing programs. The program should be initiated in a step by step fashion as indicated in the proposal for the AMAP.

## 6.1 Actions

- i) Distinguishing human-induced changes from changes caused by natural phenomena in the Arctic will require estimates and regular reporting by the Arctic countries of contaminant emissions and discharges, including accidental discharges, as well as transport and deposition. In addition monitoring of deposition and selected key indicators of the Arctic biological environment, are required. The eight Arctic countries should therefore agree to establish an Arctic Monitoring and Assessment Program (AMAP) to fulfill these monitoring objectives.
- ii) The AMAP should be implemented through the establishment of an Arctic Monitoring and Assessment Task Force and a small secretariat, established by the

Government of Norway.

- iii) AMAP should as far as possible build upon existing programs. Thus, one of the important tasks of the AMAP will be to review and coordinate existing national programs, establish a data directory, and to develop these programs when appropriate in an international framework.
- iv) As an initial priority, the AMAP should focus on persistent organic contaminants and on selected heavy metals and radionuclides, and ultimately to monitor ecological indicators to provide a basis for assessments of the status of Arctic ecosystems.
- v) The eight Arctic countries will receive regular State of the Arctic Environment Reports summarizing the results of the AMAP.

As a result of these actions, the Arctic Monitoring and Assessment Program will provide information for:

- i) integrated assessment reports on status and trends in the condition of Arctic ecosystem;
- ii) identifying possible causes for changing conditions;
- iii) detecting emerging problems, their possible causes, and the potential risk to Arctic ecosystems including indigenous peoples and other Arctic residents; and
- iv) recommending actions required to reduce risks to Arctic ecosystem

## 7. PROTECTION OF THE ARCTIC MARINE ENVIRONMENT

The eight Arctic Countries recognize their particular interests and responsibilities as neighbouring countries in the Arctic, and emphasize the need to take preventive measures directly or through competent international organizations, consistent in particular with the 1982 United Nations Convention on the Law of the Sea regarding marine pollution in the Arctic, irrespective of origin.

To this end the Arctic countries agree to:

- i) Apply the principles concerning the protection and preservation of the Marine Environment as reflected in the 1982 United Nations Convention on the Law of the Sea, and, in accordance with the continuing development of international environmental law, to further strengthen rules in order to protect the Arctic;
- ii) Take measures as soon as possible to adhere to the strictest relevant international standards within the conventions, to which the countries are parties, regarding discharges irrespective of origin;
- iii) Undertake joint actions in relevant international fora to further strengthen recognition of the particularly sensitive character of ice-covered parts of the Arctic Ocean;
- iv) Review, in accordance with the general aims of this environmental Strategy, the relevance to the Arctic of international instruments connected with the protection of the marine environment, with the aim that all Arctic countries accede, where appropriate, to the instruments, or apply the principles and regulations embodied therein;

- v) Jointly support the appropriate initiatives of international organizations in developing mandatory standards in order to improve the protection against accidental pollution affecting the marine environment, and actively ensure application of such standards;
  
- vi) Carry out studies of pollution in the monitoring activities within AMAP.

## 8. EMERGENCY PREVENTION, PREPAREDNESS AND RESPONSE

At the same time as the Arctic is exhibiting signs of serious contamination from pollutants carried via long range transport from mid latitudes, there has been an increase in development activities and shipping within the Arctic. These activities can have serious environmental consequences in the Arctic as a result of accidents leading, inter alia, to spills and discharges of oil and other harmful substances. The vulnerability of the Arctic ecosystem to these sudden intrusions will be variable. Some limited mapping of areas sensitive to oil spills has been conducted but more remains to be done. The relative hazard/risk associated with different activities is also not well documented, nor is the geographic distribution of high risk activities.

There are a number of bilateral, regional and global arrangements which presently exist to deal with accidental pollution, such as the 1983 Canada-Denmark Agreement for Cooperating relating to the Marine Environment, the 1971 Agreement between Denmark, Finland, Norway and Sweden on Cooperation on Oil Pollution and the 1990 International Convention on Oil Pollution Preparedness, Response and Cooperation. There are other multilateral conventions related to nuclear accidents or radiological emergencies supplemented by bilateral agreements on the exchange of information and reporting relative to nuclear plants and events.

The UN ECE has started work on an international convention, on the prevention and control of the transboundary effects of industrial accidents. A part of the work is the establishment or reinforcement of regional and subregional mechanisms for response, assistance and exchange of information on environmental emergencies.

### 8.1 Actions

The Arctic countries agree to the following framework for taking early cooperative action on emergency prevention, preparedness and response in the Arctic. They will take steps to review existing bilateral and multilateral arrangements in order to evaluate the adequacy of the geographical coverage of the Arctic regions

by cooperative agreements. They will also take steps to convene a meeting of experts to consider and recommend the necessary system of cooperation, which could include, inter alia, the following elements:

- i) Actions to respond to significant accidental pollution from any source;
- ii) Coordination and harmonization of preventive policies, strategies and measures;
- iii) Establishment of a system for early notification in the event of significant accidental pollution or an imminent threat of such pollution;
- iv) Assessment of the risks for significant accidental pollution and of the adverse effects in such cases so as to enable the parties to take the necessary preventive, preparedness and response measures;
- v) Inclusion of studies on effects of accidental pollution in conjunction with the monitoring activities of AMAP;
- vi) Cooperation in the conduct of research into and development of methods and technologies for prevention of, preparedness for and response to significant accidental pollution in the Arctic;
- vii) Cooperation in developing a system for exchange of information on research and new developments regarding methods and technologies on response in the Arctic;
- viii) Exchange of information on legislative and administrative measures as well as policies;

- ix) Measures for providing information to the public and public participation; and
  
- x) Further enhance regional bilateral and multilateral cooperation in the Arctic regarding prevention, preparedness and response by developing, as appropriate, contingency plans, training programs, as well as other measures to facilitate assistance to the parties, in particular mutual assistance for efficient emergency response in the event of significant accidental pollution, or the imminent threat of such pollution.



## 9. CONSERVATION OF ARCTIC FLORA AND FAUNA

The health of Arctic flora and fauna is a key concern of the Arctic countries. These flora and fauna assume special significance in this region since they are an essential factor helping to define the culture and survival of the people living there. Although isolated geographically from the industrialized temperate regions of the globe, it has now been amply demonstrated that this has not excluded Arctic flora and fauna from the negative consequences of human activities in mid latitudes. The impacts on the Arctic have escalated over the past several decades and both scientific and traditional knowledge have been pointing to the danger signals. Many of these concerns are enumerated in the six Arctic State of the Environment reports. They confirm that Arctic flora, fauna and their habitats are being threatened by large scale economic development projects; long range transport of pollutants; and degradation of habitats.

The problems facing Arctic flora, fauna and habitats are not confined to any one country but are circumpolar in nature. Furthermore, because of the uniqueness of Arctic ecosystems, strategies to deal with these problems will differ from those of other regions.

Several multilateral and bilateral agreements which pertain to the conservation of Arctic flora and fauna and their habitats are currently in existence. Most however, have been designed to be universally applicable to, or to apply to, a wider geographical area than the Arctic. Only the Agreement on Conservation of Polar Bears and some individual provisions in other agreements provide a specific Arctic focus.

The eight Arctic countries should therefore seek to create a distinct forum for scientists, indigenous peoples and conservation managers engaged in Arctic flora, fauna and habitat related activities to exchange data and information on issues such as shared species and habitats and to collaborate, as appropriate, for more effective research, sustainable utilization and conservation.

## 9.1 Actions

The eight Arctic countries are mindful of the need to conserve Arctic flora and fauna and their habitats in their natural diversity, and protect these resources from the pollution threats I described in this Arctic Environmental Protection Strategy. They recognize the special relationship and importance of Arctic flora and fauna and their habitats to indigenous peoples. The countries also recognize the benefits to be gained from sharing scientific and management information, traditional knowledge, and other data with respect to Arctic flora and fauna and their habitats. With due regard to existing international cooperation, and in an effort to improve research and information aimed at protecting these resources and their habitats from pollution and environmental degradation, they have reached the following understanding:

- i) The eight Arctic countries will cooperate for the conservation of Arctic flora and fauna, their diversity, and their habitats. Such cooperation shall include, inter alia, exchanges of research and management information and data, and coordination of research, on the following:
  - a) Arctic species, their health and habitats;
  - b) the laws, regulations and practices of the parties with respect to the conservation and management of such species; and
  - c) the importance and relationship to, and use of, such species by indigenous peoples and the unique contribution of indigenous peoples to the stewardship of nature and its resources;
- ii) Each country will provide to the other countries, as appropriate, such information, publications, and/or documents as may be agreed under the terms of the Strategy;
- iii) The eight Arctic countries will seek to develop other forms of cooperation, including exchanges of experts, of traditional knowledge, and of other data, as well

as engaging in joint projects, bilateral or multilateral meetings, symposia and joint publications, to meet the intent of this Strategy;

- iv) The eight Arctic countries will each seek to develop more effective laws, regulations and practices for the conservation of Arctic flora and fauna, their diversity, and their habitats in close cooperation with Arctic indigenous peoples;
  
- v) The eight Arctic countries agree to establish a mechanism for furthering the following aims in close cooperation with Arctic indigenous peoples:
  - a) Promoting and facilitating exchanges of information and personnel as provided for in this Strategy;
  - b) Making recommendations with respect to the priorities, the orientation and the nature of research and monitoring programs of the Arctic Countries;
  - c) Proposing strategies for enhanced conservation of Arctic species and their habitats; and
  - d) Regularly compiling and disseminating information on activities regarding the conservation of Arctic flora and fauna.
  
- vi) The eight Arctic countries will consult, as deemed appropriate with the International Arctic Science Committee and other bodies on any matter that falls within the scope of this Strategy;
  
- vii) By October 1991 each Country will identify to the others its national agency designated to Coordinate the cooperation envisaged by this section;

- viii) The Countries agree that the terms and conditions of the cooperation and exchanges provided for in this section will be subject to the laws and regulations of the Countries;
  
- ix) Each country will make its best efforts to provide resources adequate to carry out its responsibilities under this section. It is understood that the ability of each country to carry out activities is subject to the availability of funds, and that countries will seek to ensure long-term funding for necessary projects.

## **10. FURTHER COOPERATION**

Continuity and further cooperation are essential for increasing the protection of the Arctic environment. In order to ensure, this continuity and cooperation, the eight Arctic countries agree to hold regular Meetings on the Arctic Environment.

The date and venue of the next meeting will be agreed upon at the preceding meeting. Decisions on the agenda and participation of observers will be made and communicated to interested parties in advance of the meeting.

The decision to invite observers should be based on a pragmatic and functional evaluation of their involvement in and contribution to Arctic environmental questions.

In order to facilitate the participation of Arctic indigenous peoples the following organizations will be invited as observers: the Inuit Circumpolar Conference, the Nordic Saami Council and the U.S.S.R. Association of Small Peoples of the North.

The Meetings on the Arctic Environment shall serve to:

- i) identify and coordinate actions to implement and further develop the Arctic Environmental Protection Strategy;
- ii) initiate cooperation in new fields relevant to the environmental protection of the Arctic;
- iii) make necessary recommendations in order to protect the Arctic environment;
- iv) improve existing environmental regimes relevant to the Arctic; and
- v) assess and report on progress on actions agreed upon.