The purpose of this Nordic set of indicators is to inform the public and political decision makers whether the Nordic countries and self-governing areas are heading in the right direction towards sustainable development or not, both in general and in specific areas. The indicators also point out if there is a need to promote the development towards a more sustainable direction. The chosen indicators are monitoring the Nordic implementation of the goals and initiatives for 2005-2008, as they are set up in the revised Nordic Strategy “Sustainable development – New bearings for the Nordic countries”.

The set of indicators contains a number of overall key-indicators as well as indicators relevant to the specific sectors or cross-cutting areas pointed out in the revised strategy. New areas in the revised strategy are the social dimension as well as sustainable production and consumption.

The Nordic Council of Ministers has published Nordic sets of indicators in 2002 and 2003.
Focus on Sustainable Development
Nordic Indicators 2006
Nordic co-operation

Nordic co-operation, one of the oldest and most wide-ranging regional partnerships in the world, involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland. Co-operation reinforces the sense of Nordic community while respecting national differences and similarities, makes it possible to uphold Nordic interests in the world at large and promotes positive relations between neighbouring peoples.

Co-operation was formalised in 1952 when the Nordic Council was set up as a forum for parliamentarians and governments. The Helsinki Treaty of 1962 has formed the framework for Nordic partnership ever since. The Nordic Council of Ministers was set up in 1971 as the formal forum for co-operation between the governments of the Nordic countries and the political leadership of the autonomous areas, i.e. the Faroe Islands, Greenland and Åland.

The Nordic co-operation behind this publication:

**The expert group regarding sustainable development:**
Flemming Bo Petersen, Helga Grønnegaard, DK, Annika Lindblom, FI, Kate Sanderson, Jørgen Søndergaard, GRL, Danfridur Skarphedinsdottir, IS, Anne Kristin Fosli, NO, Lars Lundberg, SE, Niklas Karlman Aal

**The working group regarding indicators:**
Flemming Bo Petersen, Helga Grønnegaard, DK, Jesper Falck Hansen, DK, Mads Diness Jensen, Niels Ranholt Pedersen, Mads Trier, DK, Jon Dahl Engebretsen, NO, Kerstin Stendahl-Rechardt, FI, Bente Fabech, DK, Johannes Nielsen, DK, Peder Mandrup Knudsden, Ditte Maria Nielsen, DK, Lars Føyen, NO, Carl Lindberg, SE.

**Consultants:**
Peter Kristensen, Vibeke Hørlyck, Lennart Emborg og Henrik Gudmundsson, Danmarks Miljøundersøgelser DK

**Nordic Council of Ministers:**
Loa Bogason, Merete Bendiksen
Focus on Sustainable Development – Nordic Indicators 2006

The Nordic countries put great emphasis on the work to bring about sustainable development. As part of these efforts, we have adopted a strategy for sustainable development. And as an important tool to follow up on this strategy we are now, for the second time, issuing a set of indicators for sustainable development, which illustrate different aspects of developments within the Nordic countries. These indicators are meant as rough guides as to whether developments in society are moving in a sustainable direction.

In some areas the indicators show that we are on the right track. For example, in important areas we have succeeded in decoupling economic growth from environmental impact. Emissions contributing to acid rain, such as emissions of SO2 and NOX, have been reduced considerably. Emissions of heavy metals are also decreasing. In other areas, however, we are still facing great challenges. In the Programme for the Norwegian Presidency, we are continuing the work aimed at preserving biological diversity, combating man-made climate change, and reducing the use of hazardous chemicals and environmental toxins. Furthermore, the state of the environment in Nordic areas is of central concern to the entire Nordic region, and a challenge for the global community.

This set of indicators provides us with knowledge about important trends in the Nordic countries and is aimed at identifying and pinpointing trends that are potentially threatening to us in a long term perspective. Information and facts are prerequisites for efficient policy-making for sustainable development. It is important that we ensure that advances in our economic wealth and welfare are sustainable.

However, a limited number of indicators can only give us a rough indication of trends in society. Therefore this indicator set only takes us some of the way. The challenge is to use the information these indicators provide in the best possible way in the work to achieve the goal of sustainable development nationally, in the Nordic region, and globally.

We hope this publication is of great use and interest to you.

Heidi Grande Reys
# Contents

Preface .............................................. 3

Contents ........................................... 4

Introduction ....................................... 5

Key indicators ...................................... 6

Sustainable production and consumption ........ 21

The social dimension .............................. 29

Transport ........................................... 41

Energy .............................................. 48

The sea ............................................. 55

Chemicals .......................................... 60

Food safety and health ............................ 66

Climate and air quality. .......................... 72

Biological diversity in the natural and cultural landscape .... 80

Agriculture ........................................ 91

Forestry ............................................ 96

Fisheries and Aquaculture ...................... 102

Total list of indicators ........................... 111
Introduction

The indicator report “Focus on Sustainable Development, Nordic Indicators 2006” is linked to the Nordic Strategy “Sustainable Development - New Bearings for the Nordic Countries” which contains a number of goals and initiatives for 2005-2008. It is important to ensure that the Nordic countries and self-governing areas are heading in the right direction towards sustainable development. Therefore we need to monitor efforts on an ongoing basis and adjust our course whenever necessary.

The indicators presented in this report are tools which decision makers and citizens throughout the Nordic countries can use when assessing whether a certain trend in the Nordic region is sustainable, or when following up with concrete actions on the goals of the Nordic Strategy.

To choose the indicators which will be used to measure sustainable development is in itself a political process. You chose where to put your focus. It is therefore important that there is broad support for the indicators in the Nordic countries and self-governing areas. The indicators should reflect Nordic values and should inspire other international sets of indicators to make more use of the Nordic model.

The work to select indicators was carried out in a working group comprising representatives from the relevant policy areas in the Nordic Council of Ministers. A steering group consisting of national sustainability experts ensured a link to the national level. Both groups were set up by the Nordic Council of Ministers. The Nordic Ministers for Co-operation have approved the indicators.

It was important that all indicators were based on already existing data.

The current set of indicators in this report has been significantly expanded in comparison to the 2003 edition. This is due to the fact that the Nordic Strategy contains new goals for 2005-2008 and has been expanded with chapters on two new focus areas: a chapter on production and consumption and a chapter on the social dimension. The set of indicators is relatively fixed; however it will be improved when new and more accurate international indicators for the goals are developed. In particular improved data together with new goals and new focus areas will reinforce the set of indicators.

How are the indicators linked to the Strategy?


Not all of the goals of the Nordic Strategy can be included in this report. The indicators therefore focus on selected goals of the Strategy. Emphasis is on showing the trend for the most important goals and concentrating on data which are already being collected and are easy to find. It is not a static set of indicators. Improving the indicators will be part of the ongoing work in the sectors and in the Nordic Council of Ministers and will be based on the work going on in the individual Nordic countries and self-governing areas.

This indicator set is divided into the same chapters as the revised Nordic Strategy. Each chapter repeats the goal of the Strategy and the initiatives for 2005-2008, so that there is a clear linkage between the indicator set and the Strategy. Furthermore, the indicator set contains a set of key indicators which provide a quick overview of trends in the Nordic region in relation to our ambition of achieving sustainable development.

Why indicators?
Because we need the information

Indicators serve several functions. The authorities and decision makers need concise and precise knowledge before setting priorities. Those in charge of enterprises must know about the consequences of previous efforts before deciding on future measures. Citizens and voluntary organisations want to be kept informed about developments in society. This forms the basis for democracy.

Indicators are an important element in the work on strategies for sustainable development. They serve as tools for:
• letting the public know whether society is moving in the direction of sustainable development
• monitoring the implementation of specific goals and initiatives set out in the strategies
• making international comparisons, both mutually between the Nordic countries and in a broader context (benchmarking).

Indicators – a partial view of reality

Indicators should not be confused with reality. Many of the initiatives in the Nordic Strategy are difficult to measure and weigh, or to describe graphically. Therefore, the indicators in this report focus on only part of the Nordic goals and initiatives. Moreover, indicators are like binoculars. When you look through a pair of binoculars, you see things much more clearly than before, but your vision is at the same time restricted. Since a set of indicators in this way fixes your attention to a small part of the development in society, there is a risk of overlooking important development processes in other areas. It is therefore paramount that we keep alert to the needs for new indicators in specific areas. When we have the relevant data we can add these new indicators to future editions of this indicator report. At the same time it is important to keep to a manageable number of indicators relative to the knowledge you require. In this way the Nordic Council of Ministers is working continuously to improve the indicator set.
Sustainable development includes three interdependent dimensions: an economic, a social and an ecological dimension. Sustainable development requires establishing a better mutual integration of the three dimensions, a process ultimately defined and delimited by the ecology dimension. Integrating environmental considerations in the individual sectors continues to be a great challenge for the Nordic countries. The Declaration on a Sustainable Nordic Region, which was adopted by the Nordic Prime Ministers on 9 November 1998, therefore focuses on the environment. In addition, the Prime Ministers stress that sustainable development should be integrated into all sectors of society and across sectors.

The Nordic Strategy on Sustainable Development addresses the sectors: energy, transport, agriculture, fisheries and forestry. The aim is that the selected sectors will integrate environmental considerations as part of efforts to achieve sustainable development, so that present and future generations will be ensured a healthy and secure life. Environmental factors (e.g. air pollution and chemicals) must not lead to negative health effects.

The role of the authorities in the Nordic countries is to lead the way forward. They must include environmental and ethical considerations in activities and funding, and they must work to enhance the social responsibility of enterprises. The Nordic countries must increase the use of economic policy instruments and reinforce their collaborative efforts on such tools, including assessing possibilities for coordinating economic instruments in a Nordic context. Subsidies that are affecting the environment in a negative way must be assessed and should be reallocated or discontinued. At the same time, the Nordic countries must work together on methods to put a price on nature and the “service” it provides us with.

Land use in the Nordic region

Land use as a percentage of the total national land area, 2004.

Sweden and Finland have the largest forest area in the Nordic region with 51 % and 68 % respectively. In comparison, the forest area in Denmark and Iceland is only 12 % and 1.4 % respectively. Sweden and Finland are also the two countries in the Nordic region which have the largest area of lakes: 9 % and 10 % respectively.

Land use in the Nordic region reveals large differences among the Nordic countries. In densely populated Denmark, there is almost no original nature left. Most of the country’s forested area is planted forest, and 65 % of Denmark is arable land. In the other Nordic countries, this is the case for less than 10 % of the area. About 17 % of the area of Iceland is in permanent use for meadows or grazing. However, a large part of the land could be characterised as uninhabited highland areas, or wilderness areas.
Economic growth

Source: Nordic Statistical Yearbook 2005. GDP at constant prices. Index 1995=100

Gross domestic product (GDP) is a measure of the value creation in a country. Stated per capita, it can be considered an expression of a country’s general level of wealth.

On the basis of information from the OECD, GDP per capita of the Nordic countries expressed in purchasing power standards (PPS) is calculated at USD 31,000 for 2004. The figures for the USA, the UK and Japan are approx. USD 37,000, USD 28,000, and USD 27,000, respectively. The combined production and economy of the Nordic region are of the same order as Canada’s despite the fact that Canada has 31 million inhabitants whereas the Nordic region has only 24.7 million inhabitants.

In the period 1995 to 2004, economic growth was greater in the Nordic region than in other countries using the euro as currency (Euro-12 Member States). This trend also applies to 2005.

The Nordic countries have developed social systems and business models which have proven so competitive that this region today represents not only one of the most wealthy regions in the world but also scores high on several other lists; higher than many of the world’s most competitive nations.

One of the greatest challenges of our time is to establish a foundation for wealth without causing deterioration of the Earth’s climate, ecosystems and human health. The Nordic countries are investing increasingly in environmentally friendly growth and welfare in order to meet this challenge. Through consistent efforts in favour of sustainable growth, and by developing additional competences in this field, the Nordic region can gain a favourable position in new markets. These efforts could also lead to better workplaces.

Decoupling environmental impacts from economic growth

Source: Nordic Statistical Yearbook 2005

Emissions of greenhouse gases and acidifying substances relative to gross energy consumption (GEC) and trends within gross domestic product (GDP).

Energy consumption is a significant source of emissions of greenhouse gases (CO₂) and acidifying substances such as NOₓ and SO₂. Since 1990 the gross inland energy consumption (GEC) of the Nordic countries has increased slightly. Iceland differs from the other Nordic countries with somewhat greater energy consumption, a trend which has however stabilised and shows a slight downward trend from 2000.

Since 1990, total energy consumption in the Nordic countries has increased at a slower pace than economic activity. This also applies to emissions of CO₂, which have been falling since 1996. Emissions of SO₂ have dropped since 1990, whereas emissions of NOₓ have remained constant following a significant fall between 1990 and 1992.

In other words, we have been successful in achieving relative decoupling of energy consumption and CO₂ emissions from economic growth. Furthermore, we have succeeded in creating an absolute decoupling of energy consumption from the emissions of acidifying substances. The aim is to decouple negative environmental impacts from economic growth, including developing a sustainable energy sector and reducing environmental impacts from energy consumption in the Nordic region.
Number of licences to manufacture eco-labelled products

Source: Eco-labelling Denmark

The number of licences issued under the Nordic eco-label “The Swan”, and the number of licences issued under the European eco-label “The Flower” to Nordic manufacturers.

The number of product groups covered by the two eco-labels as per 1 January 2006 is 70. Sixteen of these are covered by both labelling schemes.

For both eco-labels, the licence must be renewed every 3-5 years as the criteria are adjusted continuously. The efforts manufacturers have to make on new documentation in relation to new requirements are time-consuming, and the number of licences therefore varies. The licences for printed matter and for printing paper were revised for 2002. A number of manufacturers did not make the requirements or chose not to reapply for a Swan-label licence. Products labelled with the Flower also enter the Nordic market from other countries, however the Swan label is indisputably the most widely spread eco-label. Consumer awareness studies of the labels in the Nordic countries reveal the same picture.

The aim is to have products within the best 25 % - 33 % of the market eco-labelled. This would contribute to a market underpinned by sustainable development.

Gross energy consumption per capita

Source: Nordic Statistical Yearbook 2005

Gross energy consumption shows how much energy is required to meet inland energy consumption (including transport).

Gross inland energy consumption per capita in the Nordic region includes relatively large differences from country to country. Some factors causing this include differences in climate and company structure.

Except from Iceland, this indicator remained at around the same level from 1990 to 2003. The steep increase in Iceland is related to the country’s major investments in the expansion of power-intensive industries. At the same time, an increasing share of the country’s electricity is generated from geothermal energy, which has an efficiency rate of only 10-15 %. Iceland’s net energy consumption per capita therefore does not show the same steep growth.

The Nordic countries share a goal of making substantial progress in energy efficiency and energy conservation. The Nordic countries do not use significantly more in gross energy per capita today than in 1990, with the exception of Iceland.
Renewables’ share of gross energy consumption

This indicator is the ratio between the energy produced from renewable energy sources and the gross inland energy consumption for a given calendar year. Renewable energy sources include hydropower, bioenergy (wood, waste, etc.), and wind and solar energy.

This indicator reveals major difference in the share of renewables in the Nordic countries. Iceland has the highest share. Since 1996 this share has been more than 70%, which is the highest in the OECD region. Denmark, which does not have any significant hydropower resources, has gained an increasing share of renewables through investments in new energy sources such as wind power.

The EU-15 Member States have an aim of increasing renewables’ share of the primary energy consumption to 12% by 2010, compared to 6% in 2003. The Nordic countries have a goal of increasing the use of renewables, and all the Nordic countries have a higher share of renewable energy generation relative to their gross energy consumption than the average for the EU-15 Member States.

Renewables etc. are responsible for an increasing share of gross energy consumption in the Nordic countries. In 2003 the generation of renewable energy etc. accounted for 13.6% of gross energy consumption, adjusted for climate differences. This figure was 6.4% in 1990. Since 1995 the share has increased by an average of 0.5 - 1 percentage point per year.

Fertility rate

Average number of births per 1,000 women of childbearing age in the Nordic region and in the EU-15 Member States in the period 1990 to 2003.

For a population to be in balance, the number of births per 1,000 women must be at least 2100. This means an average birth rate of 2.1 children per woman.

Denmark had the lowest birth rate in the Nordic countries in 1990 but today the level is more or less the same in Denmark, Finland and Norway. During the entire period, Iceland had the highest birth rate, apart from the two self-governing areas, the Faeroe Islands and Greenland. For Iceland, recent years have shown a fall, which means that the country is heading toward a level corresponding to that of the other Nordic countries. Sweden has had the lowest birth rate among the Nordic countries since 1996, although the rate has increased over the last two years. The birth rates in the Nordic region are significantly higher than the average birth rate among the EU-15 Member States.
Life expectancy at birth

Source: NOMESKO and Eurostat

The life expectancy at birth for men and women in the Nordic region and in the EU-15 Member States.

In all of the Nordic countries, women’s life expectancy is significantly longer than men’s. In 1990 Finnish men had the shortest life expectancy, while in 2003 Danish men had the shortest life expectancy. Throughout the period, Danish women had the shortest life expectancy compared to women in the other Nordic countries. However, the average expected life span has increased for both women and men in all the Nordic countries, except from Greenland which has a special status with significantly shorter life expectancy. Furthermore, life expectancy in Denmark is slightly lower than the average among the EU-15 Member States.

All Nordic countries have preventive programmes to encourage healthier lifestyles among their populations. The ongoing improvement and expansion of treatment options for diseases have also contributed significantly to people living longer. This trend is expected to continue in the future.
Unemployment

Source: Nordic Statistical Yearbook 2005

The share of people of working age (16-66 years old) who are not in employment, 1993-2003.

The figure includes people outside the labour force (i.e. students, early retired, non-working, etc.) as well as jobseekers.

Throughout the entire period, Finland had the greatest number of 16-66 year olds not active on the labour market, whereas Iceland had fewest. This is explained by differences in the labour force participation rate for women, but educational opportunities and retirement from the labour market also play a significant role. Other conditions apply to the labour market in Iceland than in the other Nordic countries. Because of a labour force that is too small, employers in Iceland have traditionally employed labour that would not be in employment to the same extent in the other Nordic countries. For example, it is common that students in Iceland work concurrently with their studies because they do not receive education grants but can only take out student loans. At the same time, many students choose to study abroad for a period of time.

The proportion of people of working age not active on the labour market also fell in the self-governing areas. However from around 2001 to 2004 unemployment went up slightly.

Due to the low birth rates and the longer average life expectancy, there is a general realisation throughout the Nordic countries of the need to boost and encourage the general labour force participation rate for the sake of the social welfare budgets. Thus, there are a number of initiatives to promote this, including efforts to reduce sickness absence and increase the labour market integration of marginalised groups (the physically disabled, immigrants and refugees, etc.), as well as encouraging people to stay longer in the labour market.

The participation rate and the employment rate will fall in future, partly because the next generation to withdraw from the labour market is relatively large and partly because the average life expectancy is increasing.
People killed in road accidents

Source: Sweden: SIKA - Swedish Institute for Transport and Communications Analysis; Norway: Statistics Norway; Denmark: Statistics Denmark; Iceland: Statistics Iceland

The trend in the number of road fatalities per 1,000 inhabitants in the Nordic countries in the period 1990 to 2004.

When stated per capita, the number of road fatalities is almost the same throughout the Nordic countries. For Norway, Sweden, Finland and Denmark the trend in the number of road fatalities per capita is falling. The apparent deviation seen for Iceland is because it is difficult to draw conclusions on the basis of the relatively few observations contained in the data. The relatively small number of accidents causes large year to year variation. All five Nordic countries have set goals and prepared and realised plans that have contributed positively to the trend in road safety.

The indicator therefore illustrates an aspect of the overall goal of the Strategy to ensure sustainable transport, including the efficient, flexible and safe transportation of people, goods and services. The indicators point to a positive trend with regard to the long-term strategy of building a sustainable transport system which makes it possible to cater for the need for mobility of individuals, businesses and society in a way that is safe and healthy for humans and ecosystems.

Energy consumption in the transport sector

Source: Nordic Statistical Yearbook 2005

The average amount of energy used for transport per inhabitant in each Nordic country. This includes energy for passenger and freight transport and all forms of transport (road, rail, sea and air).

Iceland has the largest energy consumption per inhabitant in the transport sector. The reason for this is the country’s comprehensive transatlantic air traffic. There is a significant drop in the curve from 2000 to 2002 which is due to a fall in air traffic activities during this period. Norway has the second highest consumption, while consumption is lower in Sweden, Finland and Denmark, which have about the same level of consumption. All the Nordic countries experience increasing energy consumption for transport per inhabitant - when examined over a longer period.

The main part of energy consumption is used for road transport. In 2003 for example, just over 90 % of the transport sector’s energy consumption in Denmark was used for road transport. In Norway, this figure was just under 70 %. Sea transport and air transport used approx. 16 % and 14 % of energy consumption in Norway respectively. So within the Nordic countries, consumption for the different transport forms is different, and this means that the Nordic countries face an array of different challenges.

The transport sector’s energy consumption is on the rise in the Nordic countries. This does not mean that the transport sector is polluting more, since fuels have become cleaner and technologies are being improved. Energy consumption is merely an indirect measurement of the sector’s environmental impacts.
Cases of infection with Campylobacter

Source: Denmark: Gastro-Enteritis Monitor, Statens Serum Institut; Sweden: Swedish Institute for Infectious Disease Control; Finland: Public Health Institute (www.ktl.fi); Iceland: Landspitali University Hospital (www.landspitali.is)

The development in the total number of Campylobacter infections per 100,000 inhabitants in the Nordic countries.

From June 1998 to March 2000, the number of human cases of Campylobacteriosis in Iceland reached epidemiologic heights. The cases could be almost unequivocally linked to cooking of fresh chicken. Until 1996, it was only possible to buy frozen chicken meat in Iceland, but that year, sale of fresh chicken was permitted, and sales went up significantly. Campaigns were carried out and, as the figure shows, Iceland soon gained control of the problem.

Several of the Nordic countries have implemented action plans against Campylobacter in food. Efforts aim at consumers as well as industry. Many factors influence the number of Campylobacter, e.g. drinking-water resources.

This indicator is related to the objective to “intensify efforts to promote animal health and welfare. Efforts to improve the knowledge of all players involved in the process from ‘field and fjord to fare’ combined with increased supervision will help strengthen measures in primary production aimed at preventing diseases, zoonoses or other conditions that could threaten animal health and food safety.”

Overweight

Source: OECD HEALTH DATA 2005, October 2005

Percentage of adult population with a Body Mass Index of over 30, measured from 1980 to 2003. For Denmark, Iceland, Norway and Sweden, some data have been projected to subsequent years.

“Body Mass Index” (BMI) is a method for measuring obesity. Obesity is an increasing problem in the entire western world - and thus also in the Nordic countries. The problem is not due to lack of information, as this negative trend is also seen in countries where populations are expected to have the required theoretical knowledge of the importance of a healthy diet and exercise.

This indicator is related to the objective of enhancing knowledge on the connection between diet, nutrition and health.
**Use of mercury**


Use of mercury in selected processes and products in Sweden, Norway and Denmark, namely as dental filling (amalgam), for batteries, in thermometers, and in lamps (e.g. neon lamps).

This indicator covers most uses because it contains the group “other uses” which includes industrial use for electrolysis, use in electrical components etc. For each country, the level in the first part of the 1990s is compared with the situation after 2000, based on national mass-flow analyses.

The trend shows a steep drop in consumption of mercury for all types of use and all countries, except mercury for lamps in Norway which has been slightly increasing. Thus, there are significant drops in consumption for dental filling (amalgam), batteries and thermometers.

Mercury is one of the single most dangerous environmental toxins and a threat to both the environment and human health. Therefore, there is a specific objective in the sustainability Strategy stating that the Nordic countries must “seek to bring about a sizable reduction in mercury use by being pro-active in developing the EU regulatory framework in this sphere and by leading the way with national initiatives”.

**Temperature trends**


Temperature trends for selected stations in Finland, Iceland, Denmark, Greenland and the Faroe Islands from 1873 to 2004.

This figure shows the trend in average temperatures, and there is an upward trend for the period. The curve shows a ten-year running average. The curves show that the average temperature has increased by approx. 1° C since 1873 in the Nordic countries.

This indicator is particularly relevant for the Strategy’s objective of reducing emissions of greenhouse gases.
Emissions of greenhouse gases in the period 1990 to 2003 in the Nordic countries in absolute figures and relative to gross domestic product (GDP) in constant 1995 prices and exchange rates.

The figure on the left shows the trend in emissions of the greenhouse gases CO₂, CH₄, N₂O, HFCs, PFCs and SF₆ in CO₂ equivalents for the Nordic countries in the period 1990-2003. The figure on the right shows emissions relative to each country’s GDP.

The figure on the right shows that all Nordic countries have achieved a relative decoupling of greenhouse gas emissions from GDP, except for some stagnation or a small increase in the period 2000 to 2003. However, the first figure shows that this relative decoupling does not cover a fall in absolute greenhouse gas emissions. The explanation of the relative decoupling is to be found in a continuous increase in GDP for all the Nordic countries.
Cod spawning stock biomass in Nordic waters

In the Baltic Sea, the cod spawning stock biomass is historically low, and there is nothing to indicate that the spawning stock biomass will rise. According to ICES, the stock is suffering from diminished reproductive capacities, and this means that fisheries are not sustainable.

Cod is the clearest example of a stock under severe pressure in the North Sea. The spawning stock biomass was at approx. 250,000 tonnes in the early 1970s, but now it is less than 50,000 tonnes.

In 2005, the cod spawning stock biomass around Iceland was 262,000 tonnes which is above the historic low (123,000 tonnes in 1993) but a little below the desired long-term average of 304,000 tonnes.

The most recent ICES assessment based on estimates of the spawning stock biomass indicates that the cod stock around the Faroe Islands is at risk of diminished reproduction capacity (not shown on graph). In 2005, the spawning stock biomass was at the same level as before the collapse in 1990.

On the basis of the spawning stock biomass (SSB), ICES estimates that the stock of Northeast Arctic cod has full reproductive capacity (not shown on graph).

Organic farms

Source: National statements of organic farmland

This indicator shows the trend in the size of organic farmland in the Nordic countries. In 2003, the total organic farmland in Iceland was estimated at 6,000 ha.

All the Nordic countries have experienced a clear increase in the size of organic farmland in the past 15 years. In Sweden, where the increase has been greatest, the total area of organic farmland is 8 % of the total agricultural area, while in Denmark and Finland it is around 7 %. In Iceland and Norway, the organic area is 1 and 2 % respectively of the total agricultural area. In the old EU Member States (EU-15), the organic farmland constitutes 4 % of the total agricultural area.

At the Nordic Council of Ministers’ meeting in Greenland in August 2002, it was decided to enhance Nordic cooperation on organic farming. The Nordic ministers adopted a declaration that states that organic farming is an important contribution to sustainable agriculture, a good environment and better choices for consumers. The goal is to develop Nordic collaboration of organic agricultural production based on life-cycle analyses, where work is targeted at all links in the chain from primary production through processing to sales.
Forest trees damaged by defoliation


Defoliation as a percentage of trees studied in classes 2-4 (moderate to serious defoliation or death) during the period 1990-2001.

Note: The curve for Sweden only shows the trend for conifers.

Defoliation is one of the best indicators of the state of health of forests. On the one hand, the state of health reflects the impact of pollutants on forests, and on the other hand, it reflects forestry’s choice of tree species in relation to forest growth conditions. The state of health of forests in Sweden and Finland seems to be very constant, while in Norway defoliation increased slightly from 1990 to 2001.

The curve for Denmark shows a significant upward slope from 1990 which peaked in 1994-1995 and then fell to the lowest level in the most recent measurements in 2001. If there is a connection between air pollution and defoliation, it is positive that defoliation of forests in Denmark, Sweden and Finland now seems to have stabilised at a low level, while defoliation in the Norwegian forests seems to be at a slightly higher level.
Introduced species

Source: EEA SEBI2010 indicators
National databases maintained by Sweden, Norway, Denmark, Finland and Iceland. Data compilation by Melanie Josefsson, Sweden, and Inger Weidema, Denmark, both members of ‘Nordic/Baltic Network on Invasive Alien Species (NOBANIS)’ supported by the Nordic Council of Ministers, see http://www.sns.dk/nobanis/default.htm

Accumulated number of introduced species in the Nordic countries until 1999, analysed by freshwater, marine and terrestrial ecosystems.

This indicator shows that an ever-increasing number of new invasive species establish in the Nordic countries. This trend is particularly clear for the marine and terrestrial environments.

Introduced species are species of flora and fauna that are not native to the Nordic countries, but which have been brought to the Nordic countries by humans at some stage. For some species, this has been intentional, such as new crops. For other species, it has been unintentional, such as species that have arrived with imported goods, on ships or in ballast water. For some species, this introduction took place centuries ago, and for others it took place only a few years ago. Some of the species that are introduced will die immediately after introduction, others will live for a brief period or in protected locations, and a small number - the invasive species - will settle down and spread in the Nordic landscape and nature.

Examples of introduced species are the Iberian forest snail *Arion lusitanicus*, the signal crayfish, giant hogweed, the Eurasian minnow and the red king crab.

This indicator is relevant in relation to the Strategy’s objective that the Nordic countries “...will contribute to European efforts to improve follow-up and assess the potential risks before non-native species are introduced, in accordance with Nordic recommendations”.

Invertebrates
Vertebrates
Vascular plants, fungi
Macroalgaes, Phytoplankton
Vascular plants, fungi, Bryophytes
The Nordic right of public access to nature

In Finland, Iceland, Norway and Sweden, everyone has the right to be out in the countryside—visitors from abroad as well as citizens. We call this “the right of public access”. The right to move about and stay on uncultivated as well as cultivated land generally only applies when fields are frozen or covered by snow. The right of public access to nature does not apply to motor vehicle traffic.

The public is allowed to walk, ski and rest wherever they wish. Overnight stays in the open or in a tent are also permitted in natural areas, but no closer than 150 m from houses or cabins. If a person wishes to stay overnight more than two nights in the same place, he will need permission from the landowner. Overnight stays are permitted to stay overnight without the consent of the landowner when this is done far from houses and in mountains areas.

The right of public access to nature also implies obligations. People must act in a considerate and careful manner so as not to harm or disadvantage the owner, users or others. People must tidy up after themselves and take care of the environment. No matter where they go, people must be respectful and not harm or unnecessarily disturb domestic animals, nature or game.

Today, the right of public access to nature is threatened by various forms of commercialisation, privatisation and not least by illegally shut off areas in beach zones. Furthermore, a liberal practice of dispensations from planning and building legislation has led to increasing built-up areas in areas which used to be attractive for recreational activities.

The right of public access to nature is threatened by various forms of commercialisation, privatisation and not least by illegally shut off areas in beach zones. Furthermore, a liberal practice of dispensations from planning and building legislation has led to increasing built-up areas in areas which used to be attractive for recreational activities.

In the EU and in other international contexts, the Nordic countries will work for better access to nature.

Voter turnout

Source: National statistics and Nordic Statistical Yearbook 2005

The figure shows the turnout of voters in national elections in the Nordic countries and self-governing areas. The turnout is calculated as the number of valid votes cast in relation to the number of persons entitled to vote.

The Faroe Islands has the highest turnout - 92.3 % of the persons entitled to vote cast valid votes in the most recent national election. Iceland is second with a turnout of valid votes of 86.7 %. Åland and Finland have the lowest turnout of valid votes in national elections - 66-68 %.

It is a precondition for sustainable development that Nordic societies build upon democracy, openness and participation in local, regional and national cooperation. The Nordic countries also have an overall ambition to build a high degree of awareness of the challenges and processes that lead to sustainable development. The turnout of voters is an expression of the population’s commitment in relation to political decisions of general importance for society.
The Nordic Sami Parliaments

Today Norway, Sweden and Finland each have their own Sami Parliaments. This table shows an overview of the Sami Parliaments. Finland was the first country to establish a special organ for Sami issues in 1973. It was restructured in 1996 to an organisational model closer to the Swedish and Norwegian Sami Parliaments. The Norwegian Sami Parliament was inaugurated in 1989 and the Swedish one in 1993. The Russian Sami do no have a similar body.

<table>
<thead>
<tr>
<th>Sami Parliaments in the Nordic countries</th>
<th>Inauguration of Sami Parliament</th>
<th>Number of members</th>
<th>Number of parties</th>
<th>Number of voters</th>
<th>Voter turnout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>1989</td>
<td>39</td>
<td>6</td>
<td>12475</td>
<td>71 % (2005)</td>
</tr>
<tr>
<td>Sweden</td>
<td>1993</td>
<td>31</td>
<td>6</td>
<td>7180</td>
<td>66 % (2005)</td>
</tr>
</tbody>
</table>


The Norwegian constitution stipulates that the central government must organise society in such a manner that the Sami can safeguard their language, culture and society. The Norwegian Sami Parliament leads the way in this regard. The Norwegian state appropriates approx. NOK 200 million to the Sami Parliament and Sami culture. A Sami Parliament building in Kasjok was inaugurated in 2000. The Sami Parliament has more than 100 employees.

On 16 November 2005, a proposal for a Nordic Sami convention was submitted to the Nordic Sami Ministers and the Presidents of the Sami Parliaments. This was a milestone in Nordic Sami politics and in Nordic cooperation in general. The efforts to establish a Nordic Sami convention spanned a number of years, dating from the Nordic Sami Conference in 1986 to the initiation of a government initiative at the meeting of the Nordic Council in Reykjavik in February 1995. The Nordic Strategy on Sustainable Development pays special attention to the role of indigenous peoples in society’s sustainable development processes.
Challenges and long-term goals

A main conclusion at the UN World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 was that radical changes to our production and consumption patterns are needed if we are to achieve global sustainable development. All countries were encouraged to promote sustainability in their production and consumption, and it was commonly agreed that the industrialised countries should take the lead in this respect.

Between now and 2020 the Nordic countries will seek to achieve a transition to a more sustainable society, in which the connection between economic growth and greater environmental impact is not as strong as at present. At global level, the Nordic region intends to lead the way in meeting the WSSD goal of appreciably changing unsustainable production and consumption patterns.

Goals and initiatives for 2005–2008

The Nordic countries:

• intend to implement measures aimed at promoting and encouraging more sustainable production and consumption patterns. This cannot be achieved without effective cooperation between central and local government authorities, the business community and NGOs. Cooperation in turn presupposes active dialogue to develop the necessary climate,
• must make greater use of economic policy levers, continue to cooperate with regard to their application in environmental policy-making, and assess the potential for closer coordination of these instruments under Nordic Council auspices. They are to evaluate proposals for a further cutback in and restructuring of government support measures that have detrimental effects on the environment,
• must seek to ensure that Nordic authorities exercise their ownership function, take environmental and ethical considerations clearly into account in all activities and financing operations, and seek to promote a sense of social responsibility in the enterprise sector,
• must seek to ensure that general public measures aimed at promoting research and innovation support the development, application and spread of environmental technology,
• intend to strengthen the sectoral integration of environmental concerns within the various sectors. The Nordic Council of Ministers will continue to develop methods to facilitate the fulfilment of each sector’s responsibility for and contribution to sustainable development,
• intend to send out clear signals enjoining all central and local government entities to comply with sustainable consumption and production requirements. Green public procurement policies and environmental management systems are vital cooperation and action areas,
• will seek to develop the official eco-labels the Swan and the Flower so that there will be ever-more environmental products to choose from.
Domestic material consumption

Source: Eurostat - Sustainable Development Indicators

Trends in total material consumption in Denmark, Finland, Sweden and the EU-15 Member States, (DMC = domestic material consumption).

One method to assess a country’s total environmental impact is to state the weight of the goods and resources consumed by its population. DMC comprises the country’s consumption of materials extracted domestically, e.g. gravel, oil and timber, as well as materials that are imported from abroad. The indicator does not include an assessment of the environmental impact of a material when extracted abroad or of the material consumption for goods that are exported (the ecological rucksack).

There is no clear trend, but a slight increase can be discerned. DMC is higher for all the three Nordic countries in 2001 relative to the index year 1995. Both Denmark and Sweden had a DMC in 2001 corresponding roughly to that of the EU-15 Member States.

In relation to the Strategy’s goal of increased resource efficiency, the trend is not positive for all countries and there will be need for continued efforts to reduce the consumption of materials in the coming years.

Industrial waste

Source: Eurostat


The trend shows that industrial waste arisings relative to industrial production are falling in Denmark, Finland and Sweden, and that a relative decoupling has taken place in these countries. For Iceland and Norway, the trend is moving in the opposite direction, although waste generation in Iceland is still relatively low compared to the other Nordic countries. One of the reasons for the low level in Iceland is that some of the waste from the metals industry is not included in the statistics, since it never leaves the company’s premises.

The large variation among the Nordic countries could be due e.g. to differences in the industrial structure of each country.

In general, the development seems to be moving in the right direction with regard to the Strategy’s objectives of decoupling economic growth from severe environmental impact. However, further initiatives may be required to ensure that this development continues.
Household waste per capita

Source: Eurostat

Trends in collected household waste arisings per capita in Denmark, Finland, Iceland and Norway in 1995, 1999 and 2003, (however figures for Finland are for 1999 and 2002). Data on household waste for Sweden are unavailable, but from 1997 the amount of municipal waste collected in Sweden increased by 14%.

Household waste arisings have increased in all countries. The amount of household waste collected varied in 2003 from 190 kg to 560 kg per capita. Finland, in particular, collects significantly less household waste per capita than the other countries.

This trend emphasises the need for continued efforts in the coming years, in order to meet the Strategy’s goal of increased resource efficiency.
Consumption of food per capita

Source: Nordic Statistical Yearbook 2005

The trend in per capita consumption of meat and vegetables in the Nordic countries in the period 1990 to 2004.

Per capita consumption of meat has increased in all the Nordic countries. Danes have a significantly higher consumption of meat per capita than the other Nordic peoples, especially when it comes to pigmeat. A Dane on average eats twice as much pigmeat as a Swede or Norwegian, and more than three times as much as a Finn or an Icelander. Iceland in turn tops the list with a fish consumption per capita of 90.8 kg in 2002, followed by Norway with a fish consumption per capita of 54.4 kg.

The indicator therefore shows a change toward less sustainable consumption patterns, in that meat production draws more resources than e.g. vegetable farming: the production of 1 kg of pigmeat requires the same area of arable land as the production of 24 kg of vegetables. This comparison cannot be justified for Greenland however, since Greenland, also from a health perspective, needs to keep on consuming domestic products (e.g. seal meat).

At the same time, it also appears from the indicator that the consumption of vegetables has gone up in all the Nordic countries. In other words, vegetables are not being replaced by meat but consumption as a whole is increasing.
Household energy consumption per capita

Source: Eurostat, Nordic Statistical Yearbook 2005

Total household energy consumption per capita in gigajoules in the Nordic countries during the period 1990 to 2003.

Consumption of energy by households has been fairly constant over the last 15 years or so. For Denmark, Sweden and Norway there have been only minor variations in consumption. What is most striking is that household energy consumption per capita is approximately the same in Denmark, Sweden, Norway and partly also in Finland, whereas consumption per capita by Icelandic households is 2.5 times as great. One explanation is Iceland’s colder climate, which requires year-round heating of houses. The most important explanation, however, is that many households in Iceland have access to cheap geothermal energy. The utilisation rate for geothermal heating is low and the excess heat is included in calculations. Iceland’s greater energy consumption therefore does not indicate that Iceland has greater environmental impacts per capita than the other Nordic countries.

Number of Nordic enterprises with ISO 14000 certification or EMAS registration

Source: Statistical material from EMAS’ Helpdisk and The ISO Survey of ISO 9000 and ISO 14000 Certificates

Trends in the number of enterprises in the Nordic region that are ISO14000-certified (international standard) or EMAS-registered (European standard).

A growing number of enterprises in the Nordic region are becoming environmentally certified. Environmental certification is a standardised way of working with environmental management and requires enterprises to take structured and regular account of their environmental conditions. Furthermore, EMAS registration includes the obligation to publish an annual environmental report that gives the public access to information about the enterprise’s environmental conditions.

The number of enterprises in the two systems differs significantly. Thus, there were 7,522 ISO14000-certified and 308 EMAS-registered enterprises in the Nordic countries in 2005.

This indicator expresses a positive trend in the voluntary environmental work of enterprises.
Number of licenses to manufacture eco-labelled products

Source: Ecolabelling Denmark

The number of licences issued under the Nordic eco-label "The Swan", and the number of licences issued under the European eco-label "The Flower" to Nordic manufacturers.

The number of product groups covered by the two eco-labels as at 1 January 2006 is 70. Sixteen of these are covered by both labelling schemes.

For both eco-labels, the licence must be renewed every 3-5 years as the criteria are adjusted continuously. The efforts manufacturers have to make on new documentation in relation to new requirements are time-consuming, and the number of licences therefore varies. The licences for printed matter and for printing paper were revised for 2002. A number of manufacturers did not make the requirements or chose not to reapply for a Swan-label licence. Products labelled with the Flower also enter the Nordic market from other countries, however the Swan label is indisputably the most widely spread eco-label. Consumer awareness studies of the labels in the Nordic countries reveal the same picture.

The aim is to have products within the best 25 % - 33 % of the market eco-labelled. This would contribute to a market underpinned by sustainable development.

Fair trade

Source: Max Havelaar in Norway, Sweden, Finland and Denmark

Total sales of all Max Havelaar products stated in EUR million.

Denmark is not included in the figure, as sales of fair-trade products in Denmark are stated in kg or litres. In 2005, sales of fair-trade products in Denmark totalled EUR 13.4 million.

Over the last five years, sales of fair-trade products in Norway, Sweden and Finland have increased markedly. In Norway, for example, sales tripled in the period 2001 to 2005. In Denmark, the amount of fair-trade products sold increased more than ten times, from 123,000 kg/litres in 1995 to 1.5 million kg/litres in 2005.

The Max Havelaar label guarantees fair trade. This means that products with the Max Havelaar label fulfil certain minimum requirements to payment, working conditions, democratic development and environmental considerations. Most importantly, the label is a guarantee that small farmers and plantation workers receive a fair price for their goods and that the money goes directly to the farmers without the interference of middlemen. Furthermore, workers are ensured proper working conditions and the environment is included in considerations.
The share of green taxes in overall tax revenues

Source: Eurostat and OECD

Trends in green taxes’ share of overall tax revenues in the Nordic countries and in the old EU countries (EU-15) from 1990 to 2003. According to the current international definition, green taxes refer to tax revenues from energy, transport, pollution and resource consumption. Data for Iceland is OECD data, while the remaining data is from Eurostat. There may therefore be minor differences.

Green taxes constituted 6-10 % of overall tax revenues in the Nordic countries in 2002. Apart from Sweden, the Nordic countries have a somewhat greater share of green taxes than the old EU Member States (EU-15). In 2003, the share of revenues from green taxes was greatest in Denmark.

For Finland and Denmark, green taxes’ share of overall tax revenues increased by 2 % throughout the period, whereas Sweden has had a nearly constant share of green taxes. For Norway and Iceland, the share of green taxes has gone down. The drop in the share of green taxes in Iceland and Norway reflects a steep economic growth which has led to increased overall tax revenues. Thus, this drop in the share of green taxes does not reflect the general development in green taxes; it merely shows that their shares of overall tax revenues have dropped. Trends in this indicator can be difficult to interpret, as the indicator is influenced by the amount of pollution, changes in the green tax system, and changes in overall tax revenues.

This indicator is particularly relevant in relation to the following objective of the Nordic Strategy on Sustainable Development: The Nordic countries “must make greater use of economic policy levers, [and] continue to cooperate with regard to their application in environmental policy-making.”

Relationship with other chapters

Production and consumption patterns link to most of the other chapters. The chapters on energy and on climate change and air pollution also contain indicators on atmospheric emissions from production activities. Other chapters that link up to production and consumption patterns are the chapters on food, agriculture, forestry and fisheries.

Background and perspectives

“Sustainable production and consumption patterns” in the Nordic Strategy on Sustainable Development contains a number of goals and measures. These goals are the foundation for and are specified in the Nordic Environmental Action Plan 2005-2008. In this plan, sustainable consumption and production patterns is one of four main themes and under this theme are defined 39 activities which the Nordic Council of Ministers will focus its efforts on in the programme period. Three of the Council of Minister’s permanent working groups have primary responsibility for follow up on the following:

- The PA Group, the Nordic Council of Minister’s working group on products and waste, including representatives from the environmental authorities in the Nordic countries
- The NMIRPP Group, the Nordic Council of Minister’s working group on integrated product policy, including representatives from the environment, industry/trade and consumer affairs sectors
- The Environment and Finance Group including representatives from the two sectors.
Work of the groups has concentrated on e.g. green public procurement policy, eco-efficient technology, environmental communication, and sustainable life style. A number of projects on these topics have been completed or are in the design phase. Projects completed and published include:

- Measuring the Environmental Soundness of Public Procurement in Nordic Countries, (TemaNord 2005:505)
- Environmental Information in Instructions for Use of Consumer Products, (TemaNord 2005:513)
- A Nordic manual in environmental communication to consumers, (ANP 2005:721)

Furthermore, on the topic of green public procurement policy, two folders entitled “A good buy” have been published in 5 languages, containing guidelines for public procurement. One folder is aimed at local politicians and managers in the public sector, and the other folder is aimed at those working with public procurement. In 2005, a large project was launched to define and develop common Nordic criteria for green procurement. In addition to this project, the Nordic Council of Ministers will organise an international conference on green public procurement in autumn 2006.

On the topic of eco-efficient technology, a large project on green markets and cleaner technologies has been launched. A group of Nordic research institutions are participating in this project to create an overview of different innovation systems in the Nordic countries, and to define the most important criteria for success. Selected cases will be studied, including energy-efficient buildings, the pulp and paper industry and the electronics industry. The NMRIPP Group has had successful co-operations with the Nordic Innovation Centre (NICE) on eco-efficient technology which NICE recently selected to be among its primary areas of focus.

Co-operation among the Nordic countries on sustainable production and consumption patterns is also ranked high on the list of priorities with regard to international co-operation, within the EU and UN, on follow up to the World Summit on Sustainable Development in Johannesburg 2002 (WSSD). The Nordic ministers for the environment have set up an ad-hoc group to deal with this subject in international forums. This group has organised two international meetings or Round Tables on North/South co-operation on sustainable production and consumption patterns. Furthermore, the group arranged Nordic side events on the subject at the 13th Session and 14th Session of the UN Commission of Sustainable Development in 2005 and 2006. Read more here: www.norden.org/baeredygtig_udvikling.

Industry and trade plays a crucial role for the goal of achieving sustainable production and consumption patterns. If industry and trade in the Nordic region want to be able to maintain international competitiveness and contribute to economic growth, continuous product innovation is needed, and this includes environmental and social aspects as important competition parameters.

Traditionally, Nordic enterprises are strong players when the environment and social aspects are competition parameters. In 2004 and 2005, the Nordic Council had an analysis carried out of fifty of the most sustainable enterprises in the Nordic region (TemaNord 2005:534, see box). For more information, see the Industry/Trade co-operation section of the Council’s webpage.

---

**Nordic Sustainability Index II**

Previously many enterprises focussed exclusively on environmental reporting, a few focussed on ‘disadvantaged employees’, and others focussed on human rights. Today, the most sustainable enterprises make efforts to cover all aspects, that is, they implement business policies; control programmes and environmental reporting; as well as practice Corporate Governance and good relations to employees, customers, society and suppliers.

Fifty of the Nordic listed enterprises and that focus most on sustainability and Corporate Governance were surveyed and described. Actions by these enterprises include:

- 54 % of the fifty enterprises have business policies that reject all forms of bribery and corruption.
- 60 % perform regular employee satisfaction surveys.
- 76 % have committed to fulfilling the most important ILO Conventions on work and human rights.

In general, Nordic enterprises are the most advanced in terms of the environment and Corporate Governance, which are subject to greater regulation than the other areas. Today, social responsibility and sustainability are widely in focus among all types of enterprise and sectors, however more so in large enterprises and in sectors associated with grave potential risks in relation to the environment and human rights, such as the chemicals, energy and paper manufacturing industries.

The analysis did not find any significant differences between the fifty enterprises studied and other listed enterprises in terms of their economic and financial performance. Twelve per cent of the most sustainable enterprises thus had losses in 2003, whereas 18 % had very high returns of more than 20 % on their equity capital.
The social dimension

Challenges and long-term goals

The long-term objective of initiatives by the Nordic countries in the social area is to elaborate on the Nordic welfare model. A well-functioning labour market, increased availability of labour and a tax and benefits system that encourages people to find employment are crucial preconditions for the future funding of public welfare.

In order to develop sustainable working conditions for people, the Nordic countries must continue to initiate measures to strengthen gender equality in the labour market, as well as making it easier for men and women to balance their working life and their family life. In this regard, important intermediate goals include providing support for those who are having the most difficulties on the labour market and promoting increased accessibility at work for employees who are disabled.

Future demographic development places high requirements on the Nordic countries in terms of ensuring financially and socially sustainable pensions and welfare benefits of high quality. A social angle on sustainable development also requires the Nordic countries to set goals for creating proper social conditions for health on equal terms; promoting training and education for sustainable development; and increasing public involvement and participation in cultural activities in close dialogue with actors within the area of culture.

Goals and initiatives for 2005–2008

The Nordic countries

• will strengthen Nordic influence in the EU/EEA and the Lisbon process,
• intend to ensure that the results of the Nordic Welfare Research Programme are disseminated, discussed and applied both in the Nordic region and outside it,
• will give concrete form to the strategy for closer cooperation on Design for All, a universal design programme for the Nordic area,
• will actively follow up the declaration of the WHO ministerial conference, Children’s Environment and Health Action Plan for Europe, Budapest (June 2004), in cooperation with the Nordic Council of Ministers,
• aim to develop ongoing efforts in connection with the EU Northern Dimension Partnership in Public Health and Social Wellbeing,
• will promote the integration of education for sustainable development into Nordic education systems through lifelong learning.
Average number of births per 1,000 women of childbearing age in the Nordic region and in the EU-15 Member States in the period 1990 to 2003. For a population to be in balance, the number of births per 1,000 women must be at least 2100. This means an average birth rate of 2.1 children per woman.

Denmark had the lowest birth rate in the Nordic countries in 1990 but today the level is more or less the same in Denmark, Finland and Norway. During the entire period, Iceland had the highest birth rate, apart from the two self-governing areas, the Faeroe Islands and Greenland. For Iceland, recent years have shown a fall, which means that the country is heading toward a level corresponding to that of the other Nordic countries. Sweden has had the lowest birth rate among the Nordic countries since 1996, although the rate has increased over the last two years. The birth rates in the Nordic region are significantly higher than the average birth rate among the EU-15 Member States.

There are no direct political initiatives and goals aimed at gaining a higher birth rate in the Nordic region. However, a special characteristic of the Nordic region is that well-developed public childcare services exist and that families with children are provided a special allowance which is free of tax in all the Nordic countries.
Life expectancy at birth

Source: NOMESKO and Eurostat

The life expectancy at birth for men and women in the Nordic region and in the EU-15 Member States.

In all of the Nordic countries, women's life expectancy is significantly longer than men's. In 1990 Finnish men had the shortest life expectancy, while in 2003 Danish men had the shortest life expectancy. Throughout the period, Danish women had the shortest life expectancy compared to women in the other Nordic countries. However, the average expected life span has increased for both women and men in all the Nordic countries, except for Greenland which has a special status with significantly shorter life expectancy. Furthermore, life expectancy in Denmark is slightly lower than the average among the EU-15 Member States.

All Nordic countries have preventive programmes to encourage healthier lifestyles among their populations. The ongoing improvement and expansion of treatment options for diseases have also contributed significantly to people living longer. This trend is expected to continue in the future.
Gross domestic product per capita adjusted for purchasing power

Source: Eurostat

Trends in gross domestic product (GDP) per capita expressed in purchasing power standards (PPS) for the Nordic countries in the period 1990 to 2004. This indicator is a comparable measurement of trends in the wealth of the individual Nordic countries.

GDP per capita expressed in purchasing power standards (PPS) can be a measure for wealth and prosperity and can thus express the countries’ consumption possibilities and their economic basis for resource spending on social welfare and health. Throughout the period Norway had the highest GDP per capita, followed by Denmark and Iceland. Oil production is a significant explanation for the high per-capita GDP in Norway. Finland had the lowest GDP per capita throughout the period.

If we exclude cyclical fluctuations, the potential GDP of a country is defined by the supply of production factors, including labour, and productivity.

GDP does not in itself show how consumption possibilities are distributed among potential the areas for use, including health and social services. Nor does it say anything about the environmental impact.

Labour productivity

Source: Eurostat: Structural indicators

Gross domestic product per hour worked converted into purchasing power standards (PPS) and relative to the EU-15 Member States. This indicator is therefore a comparable measure for labour productivity.

Since in all of the Nordic countries the labour force is diminishing, the aim is to ensure a high degree of productivity in order to maintain solid economic growth. This is an especially relevant goal.

Throughout the period, productivity was greatest in Norway, followed by Iceland and with Sweden with the lowest productivity. The nature of the productivity however has to be taken into consideration (extensive oil extraction and high oil prices contribute to high labour productivity in Norway).
**Social and health-related expenditure**

**Social expenditure as percentages of gross domestic product (GDP)**

Source: NOSOSKO

Social expenditure initiatives in the broadest sense of the term refers to benefits to families and children in connection with unemployment and illness and to the elderly and functionally disabled people, and housing benefits and other social benefits and services (e.g. combating drug abuse). This indicator does not include user payment and investments.

Many factors have to be considered when interpreting this indicator. Levels and trends are linked e.g. to the overall trend in GDP and do not reflect the degree to which society’s needs for social expenditure initiatives have been met. At the same time, the curves in the graph are influenced by the degree of cost-effectiveness and initiatives which restrict the needs in the social area.

Throughout the period, Sweden spent the most on social expenditure measures and Iceland spent the least.

Several of the Nordic countries have completed reforms to ensure sustainable development in social expenditure, for example in the form of large reforms in the pensions area in order to boost employment. Furthermore, user payment is being applied increasingly, both with regard to childcare services and health services.

**Health care expenditure as a percentage of gross domestic product**

Source: NOMESKO

Health care expenditure’s share of GDP. Expenditure includes user payment and investments.

The Nordic countries have a fairly similar level of health care expenditure. Expenditure is somewhat higher in Iceland and Sweden and somewhat smaller in Finland.

Many factors have to be considered when interpreting this indicator. Levels and trends are linked e.g. to the overall trend in GDP and do not reflect the degree to which society’s needs in the area of health have been met. The curves in the graph are influenced by the degree of cost-effectiveness and initiatives which restrict or enhance the needs in the health area.

The increase in expenditure can be ascribed e.g. to political focus on reducing waiting lists etc. and to new and more costly treatment methods. An overall political aim to ensure sustainable development is to work for efficient and targeted use of funds in the health area.
Unemployment

Source: NOSOSKO

The share of people of working age (16-66 years old) who are not in employment. Trends are for the Nordic countries in the period 1993 to 2003.

The figure includes people outside the labour force (i.e. students, early retired, non-working, etc.) as well as jobseekers.

Throughout the entire period, Finland had the greatest number of 16-66 year olds not active on the labour market, whereas Iceland had fewest. This is explained by differences in the labour force participation rate for women, but educational opportunities and retirement from the labour market also play a significant role. Other conditions apply to the labour market in Iceland than in the other Nordic countries. Because of a labour force that is too small, employers in Iceland have traditionally employed labour that would not be in employment to the same extent in the other Nordic countries. For example, it is common that students in Iceland work concurrently with their studies because they do not receive education grants but can only take out student loans. At the same time, many students choose to study abroad for a period of time.

The proportion of people of working age not active on the labour market also fell in the self-governing areas. However from around 2001 to 2004 unemployment went up slightly.

Due to the low birth rates and the longer average life expectancy, there is a general realisation throughout the Nordic countries of the need to boost and encourage the general labour force participation rate for the sake of the social welfare budgets. Thus, there are a number of initiatives to promote this, including efforts to reduce sickness absence and increase the labour market integration of marginalised groups (the disabled, immigrants and refugees, etc.), as well as encouraging people to stay longer in the labour market.

The participation rate and the employment rate will fall in future, partly because the next generation to withdraw from the labour market is relatively large and partly because the average life expectancy is increasing.
The employment rate for the 50-66-year-olds

The proportion of people aged 50-66 who are in employment. Trends are shown for men and women in the Nordic countries in 2003. This indicator illustrates how the populations of the Nordic countries are withdrawing gradually from the labour market at around the age of 50. This plays a significant role in relation to the expenditure for the elderly and the disabled.

Men tend generally to have a higher rate of employment than women. For men and women alike, Iceland has the highest rate of employment and Finland the lowest.

In all the Nordic countries except for Iceland, people retire from the labour market gradually as early as around the age of 50. This early retirement from the labour market is most widespread in Finland and Denmark. These two countries have the most elaborate retirement schemes and unemployment rates have been relatively high for an extended period.

Early retirement is least widespread in Norway and Iceland. Iceland has no publicly-funded retirement schemes apart from health-related early retirement. Furthermore, unemployment is not a great problem in Iceland.

Politically, the overall focus is on getting people to stay longer in the labour market before retiring. The quite large number of retirements from the labour market as early as at 50 something results in a low labour market participation rate. Therefore, all Nordic countries have launched initiatives to encourage more people to stay in the labour market for a longer period.

![Graph showing employment rates for 50-66-year-olds in the Nordic countries](image)
Number of families with children living in relative poverty

The percentage of families with children (couples and single parents) with a household income that is less than half of the mean disposable income (less than 50% of the median of the equivalent disposable income) in 2001 and 2002.

Only very few families in the Nordic region have disposable incomes that are less than half of the mean income. Around 5-7% of single parents and 2-3% of couples with children have less than half of the mean income at their disposal.

The small share of relatively poor households with children is due to a high degree of social security. In the Nordic region, relatively high services and benefits levels within the social security systems contributes to ensuring this relatively small number of poor households with children.

Schools and kindergartens with the Eco-Schools flag

Eco-schools is a teaching programme for environmental education for sustainable development aimed at schools and day-care centres in the Nordic region. The Eco-Schools flag is a sign that the school has completed an extensive and high-quality educational programme on sustainable development and that the school has assigned high priority to environmental considerations in its daily operation. Each of the Nordic countries has a national Eco-Schools network, but they are all part of the international environmental teaching programme called Eco-Schools.

In 2005 a total of 1,976 schools and kindergartens had the Eco-Schools flag. In Sweden almost a thousand institutions had the Eco-Schools flag, and in Denmark, Norway and Finland 140-190 institutions had the flag, while for Iceland the number was 23. The number of institutions with Eco-School flags has increased significantly in all the Nordic countries since the introduction of the programme.
Research and development

Source: Nordic Statistical Yearbook 2005

Investments in research and development as a percentage of GDP.

Socio-economically viable investments in research and development may provide society better opportunities for economic growth. Such investments can enhance society’s opportunities for fulfilling specific targets, including targets for sustainable development.

The Nordic countries invest a considerably higher percentage of their GDP in research and education than other western European countries. Only Norway, which invested 1.9% of GDP in education and research in 2003, is at the same level as the average for the Euro-12 countries. Sweden, which lies at the top, spends close to 4% of GDP, followed by Finland with 3.5% and Iceland with 3%. Whereas investments in development and research for the Euro-12 countries have been more or less stable since the early 1990s, all the Nordic countries have seen a growth in their investments. In the Nordic region as a whole, a majority of investments, i.e. around 70%, are from private industry. However, the investments differ somewhat within the individual Nordic countries, from 57% in Iceland to 78% in Sweden.

The EU’s goal for research and development in the Lisbon Strategy is research and development intensity at minimum 3% in the EU as a whole by 2010. As described in the Nordic Strategy on Sustainable Development, research and development are crucial factors for sustainable development in the Nordic region. The Nordic region has a good foundation for leading the way in this area.
Education for sustainable development

The action plan from the World Summit on Sustainable Development in Johannesburg in 2002 stressed that education and training are crucial to achieving sustainable development. Sustainable development should therefore be integrated in educational systems, from pre-elementary school to university. As a direct consequence of the action plan, the UN General Assembly in December 2002 declared the decade 2005–2014 as the United Nations Decade of Education for Sustainable Development. UNESCO (the United Nations Educational, Scientific and Cultural Organization) is the responsible specialist body and in 2005, UNECE (United Nations Economic Commission for Europe), which includes the Nordic countries, adopted a strategy for education for sustainable development.

In the revised Nordic Sustainable Development Strategy, the Nordic Council of Ministers therefore encourages the Nordic countries and self-governing areas to promote “the integration of education for sustainable development into the Nordic education systems through lifelong learning”.

Furthermore, UNECE has established a group of experts with the task of preparing indicators for education for sustainable development. Work by the Nordic Council of Ministers was carried out in close association with work by the UNECE group of experts. Below is a brief summary of the “replies” by the Nordic countries to 12 indicators for education for sustainable development.

The Nordic ministers of education have accepted main responsibility for realising the strategy of the Nordic Council of Ministers in the area of education for sustainable development, however in collaboration with other ministries (in Denmark with no less than 10 other ministries).

National strategies

In Finland, a proposal for a national strategy for the UN Decade 2005-2014 was presented to the Minister of Education and Science in 2006. The proposal covers the entire education area and contains both a general policy and specific initiatives for the different educational sectors. In Norway, the Ministry of Education and Research has been commissioned to prepare a national document on education for sustainable development in spring 2006. In Sweden, the Riksdag (the Swedish Parliament), through an amendment to the act on higher education, has instructed Swedish universities and colleges to promote sustainable development in their activities from February 2006. In Iceland, the strategy document Future welfare - principal strategy areas 2006-2009 stresses that knowledge about environmental and socio-economic matters is an essential precondition for achieving sustainable development.

Elementary and upper-secondary schools

In Denmark, the concept of sustainable development has been implemented at elementary-school level in a series of step-by-step targets. In Norway, the most recent reading plans have incorporated sustainable development in a way that will make it central to teaching and will lead schools to more involvement in sustainable development. In Finland, experience from the implementation of the Baltic 21 Education plan in 2002 – 2005 has been applied in the Ministry of Education and Science’s strategic guidelines, in management and in results negotiations. In Sweden, the government decided in February 2006 that work in the future upper-secondary school is to be imbued with a sustainability perspective. This perspective will therefore be made central to program goals for all the approximately 40 programmes under the coming upper-secondary school reading plan (Gy07). In Iceland, teaching in environmental and sustainable development matters has been integrated into natural and social sciences at elementary school level. Furthermore, there is a council for environmental education that works to increase public awareness about the environment and promote environmental teaching at schools.

Higher education

Still more universities, vocational schools and business and technical colleges are taking responsibility for promoting sustainable development through their education programmes. Individual teachers and students are uniting in networks during and in between teaching periods, and the perspective of sustainability has been integrated into ordinary courses and programmes. There are cross-disciplinary programmes aimed at students from a host of different study areas. Furthermore, some universities have mandatory courses of at least 5 weeks’ duration on sustainable development. At some universities, the students themselves take charge of the content and execution of this type of course, and courses have also been developed at Master’s level. Finally, a network of Nordic researchers has been established within sustainable development teaching. General education

A considerable part of activities within the framework of Nordic folk high schools and adult education associations can be characterised as education for sustainable development. NGOs within for example the environment area contribute extensive work in support of Nordic general education within this field of teaching. Furthermore, in many large enterprises in the Nordic countries, the aspect of sustainability has had increased educational significance.

Teaching material

Teaching material for educational programmes in sustainable development is often produced by specialised publishing houses without special approval from the authorities. Some teaching material on sustainable development is however prepared with support from the authorities responsible for the promotion of sustainable development. An example of teaching material is the Swedish teaching material for the elementary-school level: “Hållbar utveckling i praktiken- så gjorde vi på vår skola” (sustainable development in practice - how we worked with sustainability at our school). This material is available in Swedish at: www.skolutveckling.se/utvecklingsteman/hallbarutveckling/material_stod/. Examples of Norwegian teaching material can be sought at: www.miljolare.no and examples of Danish material at: www.ubuportalen.dk or Icelandic at: www.umvelfur.is (none of the links are available in English).
Relationship with other chapters

The social dimension must be considered essential for the development within many of the areas that are dealt with in the other chapters. This chapter includes indicators that explain the changes to our lifestyle described in the chapter on production and consumption and indicators of relevance to the chapter on food safety.

Background and perspectives


Equality is an essential aspect of the Nordic values and should be reflected in the strategy and indicators for sustainable development. This is one of the challenges in future development work.

The integration of equality and gender mainstreaming

Gender mainstreaming is a strategy to integrate the concept of equality. Achieving gender mainstreaming involves an outlook on things that does not consider equality as a special matter but as an integral aspect.

Integration strategy

The integration of equality and gender mainstreaming presupposes evaluation, improvement, development and reorganisation of policy processes, so that equality and gender mainstreaming are taken into account in all policy areas, at all decision-making levels, and in all phases.

Definition

A gender perspective in this connection is to reveal men and women’s conditions in the specific area. Gender mainstreaming includes formal equality, i.e. equal rights, equal opportunities, and equal conditions for men and women.

A strategy on integrating the aspect of equality in Nordic Council of Minister activities was adopted in 1999 (not available in English). Since the adoption of the integration strategy, work on gender mainstreaming in the Nordic Council of Ministers has focussed on the distribution of men and women at different levels of the Council’s executive bodies and the integration of the equality aspect in the action programmes of the different sectors. Moreover, a procedure has been implemented after which all decisions made by the bodies of the Council must include an assessment from a gender equality perspective.

National knowledge on gender-related differences will first affect the choice of theme and priority discussions in connection with the preparation of cooperation programmes and action plans. Gender-specific public statistics are available in the Nordic countries. The first step of the gender mainstreaming process is to present statistics by gender in order to map the relationship between the sexes within the specific areas.

Social and health initiatives

The Lisbon Process

The Lisbon Process is the focal point for the social and health area, along with synergy effects to be achieved from innovation and sustainable development.

Welfare research programme

During the period 2002-2005 the welfare research programme engaged in research into the Nordic welfare model for a total budget of around DKK 35 million. The welfare research programme analysed the welfare models of the Nordic region from a European perspective and one of the main purposes was an attempt to specify in which areas the Nordic model needs to modernise and adapt. The programme is founded on the following five welfare-policy thematic research fields:

- Labour market conditions
- Social and health-related conditions
- Marginalisation and exclusion
- Consumers’ terms and strategy in a welfare perspective
- Equality and gender

Design for All - a sustainable strategy

Design for All is a highly prioritised area for the Nordic Council of Ministers. Through Design for All, work is being carried out to create greatest possible accessibility for disabled people. Design for All is based on the idea of finding solutions in production design, architecture and social planning that will create accessibility for the greatest number of people. This is done by incorporating consideration for human diversity; consideration for disabled as well as for people at different phases of life. “Design for all” is a follow-up on the UN Standards on rules concerning equal opportunities for people who are disabled and on recommendations from the EU. Efforts are aiming at creating a Nordic platform for the promotion of Design for All.

Children and young people

The Nordic Council of Ministers is following up on the WHO Conference of Ministers: "Children's Environment and Health Action Plan for Europe". A project has been launched which puts focus on the rights of children and young people to a healthy life - access to nature, a clean environment, space and outdoor recreation. Furthermore, in the social and health area there is work to prepare a Nordic action plan for improving the health and quality of life of children and adults through better diet and physical activity. This action plan will be presented at the meeting of the ministers on fisheries, agriculture, forestry and food in June 2006.

Sustainability is also a central focus area in the cooperation programme for disabled children and young people and their families in the three Baltic States and north-west Russia 2006-2008. In the Nordic region’s cooperation with its neighbouring countries and through the exchange of national information and experience, work is being carried out to create a sustainable environment for children and young people, in general, and for disabled children and young disabled people in north-west Russia in particular.

Northern Dimension Partnership in Public Health and Social Wellbeing

The Nordic Council of Ministers' social and health sector is following up on the north-west Russia cooperation work and on work within the framework of the EU Northern Dimension Partnership in Public Health and Social Wellbeing. The efforts are concentrated on vulnerable groups,
including children and young people and disabled people in north-west Russia. Cohesive and systemic project efforts are stressed in which the individual action areas support each other. Projects have been carried out to promote awareness about sustainable development and its importance with focus on "Public Health and Social Well-being" and, in particular, HIV and TB. Similarly, fundamental sustainability in general is being boosted in the north-west Russia cooperation work through efforts aimed at human trafficking, sexual health and narcotics.
Transport

Challenges and long-term goals

The long-term goal is to create a sustainable transport system. Such a system must allow the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health. It must also be affordable, operate fairly and efficiently, offer a choice of transport mode, and promote equality within and between generations. Furthermore, it must support a competitive economy and balanced regional development.

It must be capable of limiting emissions and waste and apply solutions which stress the use of renewable resources. Finally, it must use non-renewable resources at or below the rates of development of renewable substitutes while minimising land use and noise impacts.

Large parts of the Nordic countries are sparsely populated with long distances to major markets. The Nordic countries are therefore highly dependent on a long-term sustainable transport system. The biggest challenge facing the sector is to coordinate the economic, social and environmental demands on the transport system. Virtually all sections of society have an important role to play in the changeover to a transport system that is sustainable in the long term. Their efforts must be supported by consistent, long-term policies. All political decisions must take long-term economic, social and environmental impacts into consideration.

Goals and initiatives for 2005-2008

The Nordic countries

- will continue to promote efforts to increase the mobility of people without access to a car, disabled people and children. It is also important in this connection to adopt a gender equality approach so that the transport system meets both men's and women's transportation needs. The same applies to children, who must be able to travel safely on their own in the transport system. The quality of public transport needs to improve and become more customer-oriented. Efforts must be made to improve opportunities to walk or cycle. Programmes for Mobility Management should be supported and developed,
- recognise that to achieve long-term sustainable goods transport systems, the various modes of transport must become more efficient and better coordinated. The railway system must be revitalised and made more competitive,
- consider that the infrastructure must be adapted to meet the needs of a transport system which is sustainable over the long term. Investment in new infrastructure should always be tested against alternative measures,
- consider that the development of more environmentally sound and energy-efficient transport modes of all kinds must continue. The Nordic countries should continue to be proactive in international bodies, particularly in the EU, with a view to tightening technical requirements and standards. In addition, the Nordic countries can speed up development by creating a market for new technical solutions for example through financial incentives, public procurement, information campaigns, etc.,
- wish to continue their efforts to achieve global agreements on more stringent safety and environmental requirements for shipping. In the absence of global agreements, the Nordic countries should force the pace of development in regional forums. The Baltic Sea motorways concept should be developed,
- consider that a sustainable transport system presupposes fair and effective pricing that internalises the external costs that traffic gives rise to. The long-term aim is to ensure that transport policy taxes and charges are commensurate with marginal costs to the economy. In the short term, tax and charge differentiation may be an effective means of achieving a more sustainable transport system cost-effectively,
- should examine the possibilities and consequences of including the transport sector (all modes of transport) in CO2 trading systems from 2008,
- should step up cooperation in international bodies, in particular the EU, ECMT, OECD, ECE/WHO, IMO and ICAO, in order to stimulate Nordic interest in achieving a sustainable transport system and the integration of environmental and health aspects into transport policy,
- should promote research and development for a long-term sustainable transport system. Where appropriate, research efforts should be coordinated with the EU Framework Programme for Research and Technological Development.
Road accidents

Safer mobility is part of a sustainable transport sector. One of the overall goals of the Nordic Strategy on Sustainable Development is to ensure sustainable transport, including the efficient, flexible and safe transportation of people, goods and services.

People killed in road accidents, per year


The trend in the number of road fatalities per year in the Nordic countries in the period 1990 to 2004.

A large number of people are injured on the roads in the Nordic region each year. A common Nordic goal is to reduce the number of serious injuries and deaths on the Nordic roads.

Sweden, Finland, Norway, and Denmark achieved a reduction in the number of road fatalities from 1990-2004. This is partly due to efforts to promote road safety. The reduction in road fatalities in Norway is less than for the four other countries. Over the whole period 1990 to 2003, Iceland has not had a drop in the number of road fatalities. The number of fatalities in Iceland is so low that a few accidents can lead to large fluctuations in the number of fatalities.
People killed in road accidents, per 1,000 inhabitants


The trend in the number of road fatalities per 1,000 inhabitants in the Nordic countries.

The figure shows the same trend as the previous (number of road deaths), but here the trend is shown in relation to the number of inhabitants in the individual countries.

When stated per capita, the number of road fatalities is almost the same throughout the Nordic countries. For Norway, Sweden, Finland and Denmark the trend in the number of road fatalities per capita is falling. The trend in Iceland is different. It is difficult to reach any specific conclusions regarding Iceland due to the low number of accidents.

All five Nordic countries have set goals and prepared and realised plans that have contributed positively to the trend in road safety.

For example there have been changes in road layout. Sweden has laid a barrier in the middle of “2 plus 1 roads”. Furthermore, cars have become safer. New cars have safer shells and there is a better chance of surviving an accident with fewer injuries. The new ESP (Electronic Stability Program) automatically straightens a car if it swerves, and this is likely to prevent accidents. ESP has been fitted in some new cars throughout the Nordic region. The roads have also been made safer. Better traffic lights and roundabouts mean that motorists drive slower and road safety is improved.

In Denmark, the penalty for breaking the Road Traffic Act has been tightened with the introduction of a points system based on the Norwegian model.

Both indicators show a positive trend for road safety in most of the Nordic countries. The indicators therefore illustrate an aspect of the overall goal of the Strategy to ensure sustainable transport, including the efficient, flexible and safe transportation of people, goods and services. The indicators point to a positive trend with regard to the long-term strategy of building a sustainable transport system which makes it possible to cater for the need for mobility of individuals, businesses and society in a way that is safe and healthy for humans and ecosystems.
Resource consumption and eco-efficiency

The transport sector is one of the larger sources of atmospheric pollution, CO₂ emissions, and resource consumption. One of the objectives in the Nordic Strategy on Sustainable Development is to reduce resource pressure on the environment. The transport sector uses about 24% of total Nordic energy consumption. This is primarily energy from oil, i.e. non-renewable sources, which also causes a number of environmental impacts. Previously, there was a close correlation between economic growth, increasing traffic, and increasing environmental impacts. However, this correlation can be broken if, for example, technology becomes more eco-efficient or use of the transport system capacity is improved, i.e. growth and environmental impacts must be “decoupled”.

Energy consumption in the transport sector per 1,000 inhabitants

The amount of energy used on average by transport per inhabitant in the individual Nordic countries. This includes energy for passenger and freight transport and all forms of transport (road, rail, sea and air). The unit is ‘000 tonnes oil equivalents per capita.

Iceland has the largest energy consumption per inhabitant in the transport sector. The reason for this is primarily the country’s comprehensive transatlantic air traffic. There is a significant drop in the curve from 2000 to 2002 which is due to a fall in air traffic activity during this period. Norway has the next highest energy consumption, while Sweden, Finland and Denmark have about the same. All five Nordic countries are experiencing increasing energy consumption per capita - when examined over the period from 1990.

The main part of energy consumption is used for road transport. In 2003 for example, just over 90% of the transport sector’s energy consumption in Denmark was used for road transport, and in Norway about 70%. Sea transport and air transport used approx. 16% and 14% of energy consumption in Norway respectively. So within the Nordic countries, consumption for the different transport forms is different, and this means that the Nordic countries face an array of different challenges.

The transport sector’s energy consumption is rising in the Nordic countries. However, this does not necessarily mean that the transport sector is polluting more, since fuels have become cleaner and technologies are being improved. Energy consumption by the transport sector is merely an indirect measurement of the sector’s environmental impacts. As the transport sector is very dependent on oil, this indicator shows that the goal of reducing the pressure on resources is difficult to achieve.
**Traffic and air pollution**

Source: Statistics Denmark and NERI; Statistics Norway

This indicator shows the trend in road traffic compared with emissions of a number of different substances affecting air quality and CO\textsubscript{2} emissions which contribute to global climate changes. NO\textsubscript{x} can have a negative impact on both ecosystems and people. Particles attract special interest because of their potential negative health impacts (see the indicator on particles in the climate change and air pollution chapter chapter). Traffic is one of the most significant sources. The graphs below show the changes in traffic and atmospheric pollution in Denmark, Norway, and Iceland.

In Denmark, road traffic increased by about 40 % during the period 1990 to 2004. Particle emissions and NO\textsubscript{x} emissions fell by about 50 % over the same period, while CO\textsubscript{2} emissions grew by almost 30 %. The same trend can be seen for Iceland, where road traffic has increased by about 60 % since 1990, and NO\textsubscript{x} emissions have fallen by 30 %. Note that there are no national Icelandic figures for particle emissions. The chapter on climate and air quality includes data for particle emissions in Reykjavik. In Norway, traffic grew by about 25 % during the period 1990 to 2003. Particle emissions and NO\textsubscript{x} emissions fell by about 50 % over the period. CO\textsubscript{2} emissions increased on the other hand by about 20 %.

Therefore it is clear that there has been a decoupling between traffic and atmospheric pollution, as illustrated by falling particle and NO\textsubscript{x} emissions despite increasing traffic. On the other hand there has been no decoupling between traffic growth and CO\textsubscript{2} emissions. The trend for the three countries is more or less the same, and it is similar in the other Nordic countries. This indicator illustrates the progress with regard to the wish to limit emissions and resource consumption and thus help establish a sustainable transport system.

A decoupling can be observed between road traffic and emissions of particles and NO\textsubscript{x}, and this supports the goal. In recent years ever tougher requirements have been placed on car exhausts, and this is considered the main reason for the decoupling. On the other hand there has been no decoupling for CO\textsubscript{2}, despite improvements in vehicles’ fuel-consumption. Road transport is by far the largest source of CO\textsubscript{2} emissions from the transport sector. On the basis of developments so far, it is deemed that the growth in road transport will lead to continued increases in CO\textsubscript{2} emissions.
Eco-efficiency for new cars

The eco-efficiency of new cars improved from 1998-2003. This favourable development, has not, however, been sufficient to out-balance increased energy consumption resulting from the increase in traffic. Part of the reason for this development is that the EU countries have entered into an agreement with car manufactures that more energy-efficient cars are to be marketed. The goal of the agreement is to achieve a reduction in the average emissions of CO\textsubscript{2} from new cars from about 186 g/km in 1995 to 140 g/km in around 2008/9.

All else being equal, better exploitation of energy can give more mobility for the same environmental impact, or less environmental impact for the same mobility. This is in line with the goal from the Nordic Strategy on Sustainability Development on reducing pressure on resources. Efforts so far have not, however, resulted in decoupling or stabilising energy consumption and CO\textsubscript{2} emissions by the transport sector.

The Stockholm experiment:
(1 January - 31 July 2006)

The main objective of the experiment was to try and reduce congestion, increase accessibility and improve the environment. It was an attempt to see whether green taxes/congestion charges and expanded public transport could contribute to a more efficient traffic system and a better environment.

Expanded public transport - in order to cope with the increase in motorists, the SL-trafikken public transport system was improved and the new direct buses offered alternative transport in rush hours from outlying municipalities to central Stockholm.

More car parks on the way to central Stockholm - in order to support combined forms of transport, new car parks were built in the Stockholm region.

Green taxes/congestion charges on week days from 06.30-18.29
The toll zone was set up around central Stockholm. Registration was made on crossing the zone border.

Green taxes/congestion charges were demanded both on entering and leaving the city on weekdays from 06.30-18.29, with higher charges in rush hours. Traffic passed unhindered - the technique applied meant traffic could pass freely over the zone border. Each crossing was recorded automatically without affecting the traffic flow.

Technical system and payment - registration was automatic by photographing the vehicle's registration plate. It was not possible to identify the driver or passengers in the car.

The relevant legislation and implementation of the experiment were approved by the Riksdagen on 16 June 2004. A referendum will be organised by Stockholm municipality in connection with the election on 17 September 2006. This will determine whether the green taxes and expanded public transport will be part of a more permanent solution to Stockholm’s traffic problems.

Source: www.stockholmsforsoket.se
Relationship with other chapters

The transport indicators should be read in the context of indicators for sustainable production and consumption patterns, and not least energy, climate change and atmospheric pollution.

Background and perspectives

The formal Nordic cooperation within Nordic Council of Ministers on transport, came to an end, from 2006 due to reorganisation. Cooperation in recent years has focussed on road safety, including a large conference in 2005 on intelligent transport systems and a conference on “best practice” in road safety in 2004. A project on alcohol and drug-related accidents has been completed. Exchange of experience has been a key part of the cooperation and has contributed to the good results by reducing traffic fatalities in the Nordic region in recent years. Experience and campaigns, introduction of new technologies, and peak-period systems are examples of this. Spreading Nordic experience to Russia and the Baltic States has also been part of the work of the thematic group for road safety in neighbouring countries.

Together with the environment sector, the thematic group for sustainable mobility has completed several projects and seminars, including eco-cars, bicycle infrastructure, noise from road traffic, toll roads in the Nordic region, mobility management, and emissions from air traffic.

Read more about the former transport cooperation here: www.norden.org/transport

Direct link to the conference on road safety in 2005: http://www.norden.org/transport/tskonferanse/uk/trafik0605.asp
Energy

Challenges and long-term goals

The long-term goal of energy cooperation within the Nordic region is to promote a more efficient, more competitive, more secure and a more sustainable energy supply. Energy resources should be utilised in an efficient manner which will enhance employment and the economy. At the same time, considerations for the environment should be incorporated in the management of energy resources and when preparing energy policy in line with sustainable development.

Our energy systems should contribute to reducing the emissions of greenhouse gases in a global context, as well as other air pollution, and to increasing the use of renewables.

Efforts should be made to facilitate better mutual integration of energy markets in the Nordic countries, as well as the neighbouring areas and the EU, with sustainable energy generation as an important competition parameter.

Goals and initiatives for 2005-2008

The Nordic countries

- will make greater use of cost-effective instruments and harmonise policy levers aimed at the further development of a sustainable energy sector and reduced environmental impact from Nordic energy consumption. Provided that the market framework is efficient and environmentally tenable, the implementation of a sustainable energy sector can largely be left to energy market players.
- will cooperate on energy trading, promote infrastructural expansion and determine what measures are required to ensure long-term security of supply in the region.
- will move regional cooperation forward and promote the rational, efficient and environmentally sound expansion of infrastructure in the Nordic and Baltic Sea regions. This will require regional cooperation between agencies and between agencies and energy producers. The countries are supporting this development within the framework of the Baltic Sea Region Energy Co-operation (BASREC).
- must effect a significant reduction in greenhouse gas emissions by 2020, using the Baltic Sea region as a model. The general framework for this cooperative endeavour has been provided by the Joint Testing Ground Agreement (TGA) within the Kyoto framework. A Testing Ground Facility (TGF) has been established as a source of funding for the promotion of Joint Implementation projects in the Baltic Sea region.
- will cooperate on the development of policies, policy instruments and technologies in order to achieve more efficient energy utilisation, encourage the development of hydrogen as an energy carrier and promote increased use of renewable energy sources in the region.
- want to work towards the establishment of framework conditions that make it possible to install CO$_2$ management facilities at fossil-based power plants and other major emission points.
- will continue to pursue research cooperation in the energy field handled by the Nordic Energy Research centre. The overall aim of the Nordic Energy Research programme is to help provide a long-term scientific basis for the cost-efficient reduction of energy consumption and the development of new renewable energy sources and environmentally sound energy technology.
- are to broaden cooperation with a view to strengthening global use of renewable energy sources and promoting more efficient energy utilisation, strengthen the coalition of like-minded countries formed at the World Summit on Sustainable Development in Johannesburg, and follow up the Bonn conference.

There is a close link between a country’s energy use and trends in prosperity and many environmental problems. Economic growth often goes hand in hand with pollution and impacts on nature. The Nordic countries are working to decouple this link. Most air pollution is caused by burning coal, oil and gas.

More than half (53 %) of the Nordic region’s energy supply comes from oil, gas and coal. In Denmark, around 88 % of energy comes from fossil fuels, whereas somewhat more than half of energy in Norway comes from fossil fuels. In Iceland, this figure is only 30 %. Finland and Sweden also base part of their energy supply on nuclear power. A relatively large share of the energy supply in the Nordic region is based on renewable energy sources such as hydropower in Norway, Iceland and Sweden, and geothermal energy in Iceland.
Gross energy consumption per capita

Source: Nordic Statistical Yearbook 2005

Gross energy consumption shows how much energy is required to meet inland energy consumption (including transport). Gross inland energy consumption per capita in the Nordic region includes relatively large differences from country to country. Some factors causing this include differences in climate and industrial structure.

For Norway, Sweden and Finland, energy consumption was at around the same level from 1990 to 2003, however with a slight increase in Finland. Throughout the period, Denmark and Greenland had the lowest energy consumption per capita in the Nordic region, whereas Iceland had the highest.

The steep increase in Iceland from 1995 is related to the country’s major investments in the expansion of power-intensive industries. At the same time, an increasing share of the country’s electricity is generated from geothermal energy, which has an efficiency rate of only 10-15 %. Iceland’s net energy consumption per capita therefore does not show the same steep growth.

The Nordic countries share a goal of making substantial progress in energy efficiency and energy conservation. The Nordic countries do not use significantly more in gross energy per capita today than in 1990, with the exception of Iceland.

Gross energy consumption relative to gross domestic product

Source: Nordic Statistical Yearbook 2005 and Eurostat

This indicator shows the gross energy consumption of the Nordic countries relative to their gross domestic product in constant 2004-prices. This indicator is an expression of the efficiency of energy consumption compared to the country’s economic value creation. It is often described as the “decoupling indicator” in international contexts. By breaking the link between economic growth and increased energy consumption, environmental impacts can be reduced.

This indicator shows that Iceland had the highest energy consumption per unit of GDP and steeper growth in energy consumption than in GDP. This is related to the fact that Iceland has had a strong growth in electricity consumption by its power-intensive industries up through the 1990s. All of the other Nordic countries have had increased energy efficiency since 1993. Denmark had the lowest energy consumption per GDP unit in the entire period. Another important factor in this regard is that energy taxes are highest in Denmark and lowest in Iceland. This provides greater incentive to save energy in Denmark than in Iceland.

The aim is to achieve significant progress with regard to energy efficiency and energy conservation. The trend shows that a majority of the Nordic countries have made positive progress with regard to this goal from 1993 till today.
Emissions of carbon dioxide (CO₂) relative to gross energy consumption

This indicator shows total emissions of carbon dioxide (CO₂) relative to gross energy consumption, measured in tonnes CO₂ per tonne of oil equivalents. Emissions of CO₂ include all emissions, also process emissions from metal manufacturing and transport. Energy consumption within these areas has also been included.

CO₂ emissions relative to gross energy consumption in the Nordic region include relatively large differences from country to country. Iceland has the lowest emissions per energy unit, while Denmark has the highest. Iceland and Denmark have had the greatest reduction in CO₂ emissions per energy unit since 1996, while trends for this indicator have been fairly constant in the other Nordic countries. The favourable development in Iceland is related to a steep increase in the use of geothermal energy and hydropower.

Explanations for the annual fluctuations in this indicator include fluctuations in the generation of hydropower and thus also in the coal-based generation of electricity, and other use of fossil fuels.

The Nordic countries have a goal of reducing the environmental impacts from energy generation and energy consumption and decoupling the link between increased energy consumption and environmental impacts. The indicators show to which extent the Nordic countries are being successful in reducing their CO₂ emissions per energy unit.

Emissions of sulphur dioxide (SO₂) relative to gross energy consumption

This indicator shows the total emissions of sulphur dioxide (SO₂) relative to gross energy consumption, measured in kg of SO₂ per tonne of oil equivalents. Emissions of SO₂ fell significantly in several of the Nordic countries during the 1980s; however this is not apparent from the figure.

The fall was particularly steep in Denmark and Finland in the 1990s. After 2000, Denmark does not have emissions of SO₂ per energy unit that are significantly higher than in Norway and Sweden. Emissions have reached a relatively low level in the Nordic countries as a consequence of strict requirements to the content of sulphur dioxide in fossil fuels and for cleaning SO₂ emissions from fossil-fuel power plants.

The aim is to reduce the environmental impact from energy generation and energy consumption in the Nordic countries. The indicator shows considerable reductions in SO₂ emissions per energy unit in Denmark and Finland since 1990. Emissions were lowest in Sweden and Norway throughout the period.
Emissions of nitrogen oxides (NO\textsubscript{X}) relative to gross energy consumption

Source: Nordic Statistical Yearbook 2005

This indicator shows total emissions of nitrogen oxides relative to gross energy consumption in the period 1990 to 2003, measured in kg of NO\textsubscript{X} per tonne of oil equivalents.

The differences in emissions of NO\textsubscript{X} per energy unit among the Nordic countries were reduced in 2003 compared to the early 1990s. NO\textsubscript{X} emissions per energy unit were lowest in Sweden throughout the period, while reductions have been most marked for Denmark and Iceland.

The aim is to reduce impacts from energy generation and consumption on the environment. This indicator shows that the Nordic countries have had a lower growth in NO\textsubscript{X} emissions than in energy consumption.

Net exports of electricity from the Nordic electricity market

Source: Nordel

This indicator shows net exports (exports minus imports) in the period 1990 to 2004 from the Nordic power market, calculated in TWh per year. Negative values indicate a net import of electricity.

The 1990s saw extensive changes to the electricity markets in the Nordic region and the EU. Electricity trading was changed from national electricity markets with requirements to cover internal costs, to international competition-driven markets. Today, all of the Nordic countries, except for Iceland, are trading on the Nordic electricity exchange Nord Pool. At the same time, the Nord Pool market is being integrated with other markets outside the Nordic region, firstly with Germany and Poland and then with Finland-Russia markets. Exports of electricity from Iceland are described in connection with the indicator on the degree of self-sufficiency in energy supply. The trade in electricity through the Nordic electricity exchange means that Nordic power systems can be utilised more efficiently and that there is no longer need to cover internal costs of electricity in the individual Nordic country. In the 1990s and early 2000, this meant smaller power expansion in the Nordic region and more efficient use of Nordic power resources on an overall basis. The power balance has tightened after 2000 compared to the 1990s. This includes increased net imports from countries outside the Nordic region. The increased exchange of power outside the Nordic power market is also thanks to a significant improvement of the links between the Nordic countries and abroad. The electricity market is a competitive market where supply and demand to a great extent are defined by the price of electricity in the Nordic power market and in relation to countries with which we exchange power. Net exports of power to countries outside Nordic power market also fluctuate with fluctuations in Nordic hydropower generation, which was particularly low in 2003.

The degree of self-sufficiency in the Nordic region was strengthened from 1990 and up till today, amongst other things through increased investments in local renewable energy sources and increased oil and gas production.
Degree of self-sufficiency in energy supply in the Nordic countries

Source: Nordic Statistical Yearbook 2005

With a self-sufficiency degree of one, a country’s primary energy generation equals its gross energy consumption. Primary energy generation is the energy generated without the use of other energy carriers as raw materials. This includes the generation of crude oil, natural gas and energy from different forms of renewables.

Through expansion of its oil industry, Norway generated 10 times as much energy as it consumed in 2003. Denmark became self-sufficient in energy from 1998, for the first time in recent history. Greenland has the lowest degree of self-sufficiency at around 8%.

One of the Nordic objectives is to strengthen the security of supply, amongst other things through investments in renewable energy. The security of supply, measured as the degree of self-sufficiency, is good in Norway and Denmark, but lowest in Finland and Greenland. Iceland does not have exports of energy except indirectly through the export of aluminium, the manufacture of which requires substantial amounts of electricity. The amount of energy that is exported from Iceland in the form of aluminium corresponds more or less to the amount of oil the country imports.

Renewables’ share of gross energy consumption

Source: Eurostat

Renewables, or renewable energy sources, means environmentally friendly energy which does not cease because new energy is supplied naturally and on a continuous basis from the energy sources even though they can become scarce. Renewable energy sources include hydropower, bioenergy, and wind and solar energy.

This indicator reveals major differences in the share of renewables in the Nordic countries. The highest share goes to Iceland, which since 1996 has had a rate of more than 70%, the highest rate in the OECD. Denmark, which naturally does not have any significant hydropower resources, has gained an increasing share of renewables through investments in new energy sources such as wind power and waste incineration.

The EU-15 Member States have an aim of increasing renewables’ share of the primary energy consumption to 12% by 2010, compared to 6% in 2003. The Nordic countries have a goal of increasing the use of renewables, and all the Nordic countries have a higher share of renewable energy generation relative to their gross energy consumption than the average for the EU-15 Member States.

Renewables are responsible for an increasing share of gross energy consumption in the Nordic countries. In 2003 the generation of renewable energy accounted for 13.6% of gross energy consumption, adjusted for climate differences. This figure was 6.4% in 1990. Since 1995 the share has increased by an average of 0.5 - 1% per year.
Renewables’ share of gross electricity consumption

Source: Eurostat

This indicator shows renewables’ share of gross electricity consumption, measured in per cent. Electricity generated from renewable energy sources includes electricity from hydro, wind, solar and geothermal power, and from biomass and waste. Gross electricity consumption includes total electricity generation; plus imports, less exports.

For Norway and Iceland, the share of renewable electricity generation is at around 100%. The reason why Norway in some years has a share which exceeds 100% is that Norwegian hydropower production was high these years, which results in exports of renewable electricity to the other Nordic countries. Renewables’ share of electricity generation is increasing at the greatest rate in Denmark, e.g. due considerable investments in windpower.

The EU goal is to increase renewable electricity generation to an average of 22% before 2010 for the EU-15 Member States. Indicative goals have also been set for each Member State. However, the share has remained relatively constant at around 13-14% since 1990. In 2000, a majority of the Nordic countries had surpassed the EU-15 average. The goal of the Nordic countries is to promote a policy in favour of increased use of renewable energy.

Relationship with other chapters

The chapters on climate change and atmospheric pollution also contain indicators on atmospheric emissions from energy production.

Background and perspectives

The Action Plan for Nordic Energy Cooperation 2006-2009 contains objectives for solving some of the most relevant challenges which the energy-policy is facing the Nordic region. The Action Plan contains three main themes, of which a sustainable energy system is one. The goal is to create the best possible framework for the development of the Nordic energy markets, the electricity market in particular. Hereby, the Nordic energy market can serve as a model for the rest of Europe. The objective is for the Nordic countries to participate in developing a sustainable energy system in the Nordic region, as well as internationally, aimed at securing such things as energy supply, economic growth and technological development, as well as reducing the negative effects of the energy sector on our climate and environment.

The Action Plan focuses especially on renewable energy, a field in which the Nordic countries should remain in front with regard to increased availability of renewable energy in the Nordic markets and internationally. Concurrently, the Plan focuses on energy efficiency, so that trends in energy consumption in the Nordic countries may be curbed through initiatives aimed at further developing market-oriented Nordic energy efficiency.

The climate is another focus area. Here, Nordic energy cooperation, in joint efforts with the environment sector, is contributing actively to efficient implementation of the objectives of reducing emissions of greenhouse gases which the Nordic countries have committed to, and to the development of commitments and policy instruments in a climate regime.

Finally, there is focus on sustainable energy in thinly populated areas. Here, Nordic energy cooperation should contribute to developing technologies and policy instruments that will ensure a sustainable energy system in those areas of the Nordic region which are not linked up to the overall distribution grid and where solutions are primarily local.

Some of the goals in the Strategy focus on increased Nordic cooperation on the expansion of the energy infrastructure, storage of CO₂, research collaboration in the energy area, initiatives for increased global use of renewables and increased energy efficiency. It is difficult to set up indicators directly which show cooperation efforts, but initiatives are being taken within:

- increased Nordic cooperation on the expansion of the energy infrastructure
- storage of CO₂
- research collaboration in the energy area
- Nordic influence to increase the use of renewables on a global scale, and to increase energy efficiency
Publications:
“Vedvarende energi i Norden - Et sammenlignende studie af de nordiske landes vedvarende energipolitikker og virkemidler” (Renewable energy in the Nordic region – A comparative study of the Nordic countries’ renewable energy policy and policy instruments; not available in English).
“Muligheter for fornybare energisystemer og hydrogen teknologi i Vest-Norden” (Opportunities for renewable energy systems and hydrogen technology in the West-Nordic region; not available in English).

Iceland’s vision is to be the world’s first hydrogen energy society, using hydropower and geothermal energy to generate hydrogen. See also Icelandic New Energy.

In Sweden, the establishment of a committee on oil independency was an important step in getting the country ready for sustainable development. This committee will be the Prime Minister’s forum for in-depth discussion and analysis of strategic questions with the intention that by 2020 Sweden will no longer be dependent on fossil fuels for transport or heating.
The sea

Challenges and long-term goals

The Nordic countries are linked together by the sea. The sea provides a livelihood for many coastal and island communities, and seas and beaches are also important recreation areas for the region's inhabitants. However, the marine environment and ocean productivity are being threatened by pollution.

But marine biotopes and ecosystems are also being damaged by other human activities. As the seas are a vital link in the global eco-systems, disturbances to or dislocations of the marine environment can have far-reaching consequences. Our understanding of the marine environment is in many ways deficient and must be improved. This is essential if we are to become more aware of the importance of the oceans to the global ecosystem and work effectively for the preservation and sustainable exploitation of the sea's riches.

Efforts must be made to ensure the preservation of the biodiversity, structure, functions and productivity of Nordic marine ecosystems, and ensure the sustainable utilisation of marine resources. Pollution of the oceans must cease. This will require measures to limit the runoff of natural substances likely to disturb the oceans’ chemical and nutritional equilibrium and steps to halt the discharge of chemically stable and hazardous substances altogether. To achieve this, the runoff of nutrients into areas where such flows are expected to cause eutrophication must be cut by half. Discharges of hazardous substances should be gradually reduced until their concentration in the marine environment approaches the background levels for naturally occurring substances, and is close to zero in the case of synthetic man-made substances. This should be achieved by 2020.

Goals and initiatives for 2005-2008

The Nordic countries:

• must help produce more and better information on the status of the marine environment at global level. They will support UN procedures for global assessment and reporting of the marine environment. They will also be a source of ideas for reporting on the state of marine ecosystems in their areas, and of cold-water coral communities.

• will develop their national action plans or similar initiatives for the protection of the marine environment by 2005, if they have not already done so. These must be based as far as possible on a marine ecosystems-oriented management approach.

• aim to be at the forefront of international efforts to promote and develop efficient and effective international tools to deal with mercury pollution. They will also seek to strengthen the Stockholm Convention and other instruments to combat heavy metal and POP pollution.

• will reaffirm their commitment to the establishment of a network of effectively managed marine protected areas. They will also be actively involved in laying the scientific groundwork for the establishment of marine protected areas and their role in the preservation of the biological diversity and productivity of the world’s seas and oceans and must have identified the first group of protected areas in their own waters in the period 2005–2008.

• want to step up regional efforts to protect marine areas.

• will support the development of the proposed Arctic Marine Strategic Plan and the ongoing dialogue within the North Atlantic Conference and the North Sea conferences. The Nordic countries support the development of the common European Marine Strategy.

• will actively seek to promote implementation of the IMO decision-in-principle, approved in April 2004, to designate the Baltic Sea area, with the exception of Russian waters, a particularly sensitive sea area (PSSA). They will also actively endorse the designation of the Baltic Sea as a SOx Emission Control Area under Annex VI, MARPOL 73/78, IMO.
Environmental toxins in cod

Source: Danish Ministry of Food, Agriculture and Fisheries; Indicators for sustainable development in Iceland 2005

PCB in cod liver

Concentrations of PCB in cod liver from waters around Denmark 1988 to 2003.

PCB (polychlorinated biphenyls) is a collective designation for organic pollutants that accumulate in fat tissue in e.g. fish and cause cancer in animals and humans. They are accumulated via the food chain, and humans are mainly exposed via their diet, primarily when eating animal fats or fish.

This indicator shows a significant drop in the content of PCB in cod liver. This drop is attributable to the environmental regulation of transport, trade, use and handling of PCB. The goal is complete discontinuation of discharges of hazardous substances to the Baltic Sea in 2020, cf. the Helsinki Convention revision 1992.

The development of hazardous substances in cod from Icelandic waters 1994 to 2004.

The three pollutants regarded as the most dangerous in relation to contamination of the sea are POPs (persistent organic pollutants), heavy metals and radioactive substances. This graph shows the trend in relation to selected pollutants from each of these groups, measured in cod from Icelandic marine areas. It is difficult to identify a clear trend from the data, although it seems that the extent of these pollutants in Icelandic marine areas is falling rather than increasing. Bear in mind that the volume of each of these pollutants is extremely small and well below the limit values for health and the environment.

This indicator for environmental toxins is relevant in relation to the Strategy’s goal that: ”Discharges of hazardous substances should be gradually reduced until their concentration in the marine environment approaches the background levels for naturally occurring substances, and is close to zero in the case of synthetic man-made substances. This should be achieved by 2020.”
Emissions of heavy metals to the air

The two diagrams to the right show the trend in total atmospheric deposition of heavy metals in the Baltic and North Seas respectively. The third figure shows emissions of heavy metals to the air from Denmark, Sweden and Finland 1990 to 2003.

Atmospheric deposition has fallen for all three heavy metals over the past 15 years. Denmark, Finland and Sweden represent approx. 5-6 per cent of depositions to the Baltic Sea. For the North Sea, only a small part of the depositions are due to emissions from the Nordic countries. The introduction of lead-free petrol contributed to the steep drop observed for lead at the beginning of the 1990s. The downward trends for cadmium and mercury are due to better flue gas cleaning from waste incineration plants and coal-fired combined heat and power stations. Moreover, decommissioning of older industrial plants for metal production, primarily in Eastern Europe, has also had a significant influence of the decreasing deposition.

This indicator is extremely relevant in relation to the Strategy's assessment that “This will require measures to limit the runoff of natural substances likely to disturb the oceans' chemical and nutritional equilibrium and steps to halt the discharge of chemically stable and hazardous substances altogether” and the objective that “Discharges of hazardous substances should be gradually reduced until their concentration in the marine environment approaches the background levels for naturally occurring substances, and is close to zero in the case of synthetic man-made substances. This should be achieved by 2020.”
Discharge of heavy metals with water

Source: HELCOM Indicator Fact Sheets 2004

Discharges to the Baltic Sea of lead, cadmium and mercury with wastewater and from watercourses from Sweden and Finland 1994 to 2003.

This indicator shows that for Finland and Sweden, there is a downward trend in discharges of heavy metals.

In general, it is important to limit discharges of heavy metals, as they constitute a threat for health and accumulate throughout the food chain. The special geographical, oceanographic and biological characteristics of the Baltic Sea, combined with intensive industrialisation, high population density, etc. mean that concentrations are much higher here than in e.g. the North Sea.

This indicator is extremely relevant in relation to the Strategy’s goal assessment that “This will require measures to limit the runoff of natural substances likely to disturb the oceans’ chemical and nutritional equilibrium and steps to halt the discharge of chemically stable and hazardous substances altogether” and the objective that “Discharges of hazardous substances should be gradually reduced until their concentration in the marine environment approaches the background levels for naturally occurring substances, and is close to zero in the case of synthetic man-made substances. This should be achieved by 2020.”

Discharge of nutrients

Source: HELCOM Indicator Fact Sheets 2005

Discharges of nitrogen and phosphorus to the Baltic Sea from Sweden, Finland and Denmark and total water runoffs from the three countries to the Baltic Sea 1994 to 2003.

The figure shows that the total discharges of nitrogen and phosphorus have fallen gradually since 2000, which may be due to increased wastewater treatment and initiatives to reduce agriculture’s discharges of nitrogen. The figure also shows that there are relatively large fluctuations between the individual years. If discharges of nitrogen and phosphorus are compared with runoffs, there is a clear trend because discharges are typically connected to variations in runoffs. Heavy precipitation will lead to increased leaching and run-off from agricultural land, which will again lead to an increased input of nutrients, concentration and impact.

Marine areas are affected by nutrients (nitrogen and phosphorus) discharged into the aquatic environment through wastewater and run-off from agricultural areas and through atmospheric deposition and water exchange from the surrounding marine areas. Eutrophication of the aquatic environment with nutrients (nitrogen and phosphorus) contributes to increased algae growth and macrophytes. This could lead to an undesirable disruption of the balance between organisms present in the water. An essential prerequisite for limitation of eutrophication and thus the extent of oxygen depletion is that reduced nutrient concentrations.
Phosphorus and nitrogen discharges during 1985 to 2004 from Norway to the North Sea (coastal area from the Swedish border to Lindesnes).

Phosphorus and nitrogen discharges from Norway to the North Sea have been reduced by 65% and 34 per cent respectively from 1985 to 2004. This has been achieved primarily through expansion of the treatment plants, but initiatives have also been taken in agriculture to reduce discharges from aquaculture. In 1997, open marine aquaculture was banned in the North Sea area, and this meant that additions from fish farming were significantly reduced.

These two indicators are relevant in relation to the Strategy’s objective for the marine environment: “reduced impact from nitrates and phosphorus, no further impact from hazardous substances and heavy metals.” Moreover, eutrophication is one of the main themes of the Nordic Environmental Action Plan 2005-2008.

Relationship with other chapters

The chapter on chemicals also contains indicators on hazardous substances in the environment, while the chapter on agriculture includes indicators of diffuse pollution of nutrients. See also to the chapters on fisheries and on food safety and health.

Background and perspectives

The activities of the Nordic Council of Ministers within marine areas are aimed at the objectives in the Nordic Environmental Action Plan 2005-2008 in the section on the Sea. Four areas are in focus:
- environmentally hazardous substances,
- eutrophication,
- eco-system-based management, and
- impacts on the marine environment by climate change.

With the existing data basis, it has been possible to link indicators to environmentally hazardous substances and eutrophication. The data basis for environmentally hazardous substances is primarily based on the status reports prepared by the regional conventions. The various measuring methods, parameters, matrices, etc. vary in the Nordic countries’ national monitoring programmes, and therefore the data basis has been limited in this case.

Various projects are being carried out for the sea that, to different extents, are related to “stepping up regional efforts to protect sea areas,” and developing “their national action plans or similar initiatives for the protection of the marine environment,” as mentioned in the Nordic Strategy on Sustainable Development. A few of the projects contribute to the indicator work (some to reference conditions and classification related to the Water Framework Directive, others indirectly to a strengthening of the data basis). The majority of the activities will not be completed until 2007/2008, which is why there are only a limited number of reports available now.

Environmentally hazardous substances:
- Monitoring of organic pollutants in air and deposition in the Nordic countries and the Arctic areas
- A comparative assessment of POPs and their metabolism in the western Nordic region and the Baltic Sea environment.

Eutrophication
- Intercalibration of phytoplankton and macrophytes in the Skagerrak
- Definition of reference conditions for coastal areas in the Baltic Sea and the North Sea (DEFINN)
- Cost-effective limitation of nitrogen impact on the Baltic Sea sub-basin

The objective of the EU Marine Strategy is to protect and restore Europe’s oceans and seas and ensure that human activities are carried out in a sustainable manner. In connection with the EU Marine Strategy, work is being done to produce a cross-sectoral Nordic contribution, where tools will be developed for a socio-economic analysis of the effects of the European Commission’s Thematic Strategy on the Protection and Conservation of the Marine Environment. Areas like environmentally hazardous substances, eutrophication, fisheries, biodiversity, oil pollution, noise and maritime transport are covered, and proposals are made for indicators for environmental impacts as well as for methods to identify cost-effective measures.
Chemicals

Challenges and long-term goals

The long-term goals are a society in which the use of chemicals does not involve a risk of damage to people’s health and/or the environment, the elimination of all chemical discharges that constitute a threat to health and/or the environment within a generation, increased producer responsibility, and the application of the precautionary-substitution principle in chemicals policy. Goods introduced into the market in 10-15 years’ time must therefore be largely free of man-made organic substances that are slow to degrade (persistent) and/or accumulate in living organisms (bioaccumulative).

Goods must also be free of man-made substances that can cause cancer (carcinogenic) or inheritable genetic damage (mutagenic), affect reproduction, or disrupt the endocrine system. Goods must also be free of heavy metals like cadmium, mercury and lead. Provisions requiring the dissemination of knowledge and information about all chemicals used in the production and processing of goods must be drawn up.

The rise in the volume and number of substances in chemicals is linked to health and environmental problems and constitutes one of biggest global challenges to sustainable development. While the discharge of chemical pollutants from point sources is decreasing, their dissemination via products and diffuse sources is on the rise.

It is estimated that there are around 50,000 chemical substances in the European market. In most cases, very little or nothing is known about the environmental and health risks involved. While new substances are subject to testing and approval requirements, no tests are carried out on substances already in the market. Not enough is known about chemicals in products. Coherent international regulatory frameworks and regular assessment criteria based on the precautionary principle will be needed to reduce the spread of and exposure to hazardous substances via products. In the Nordic countries, data on chemical products are collected in national product registers, which serve as an important basis for work on chemicals.

The Nordic countries have made considerable progress in this area by international standards and have high common aspirations. A central aim is to follow up a generational goal – the elimination of chemicals having particularly problematic health and/or environmental effects from products and production processes by 2020. (The term ‘generational goal’ was first used at the North Sea Conference in Esbjerg in 1995). Further progress will call for vigorous, coordinated action at international level. Actions to strengthen EU/EEA regulations are crucial, and businesses should be subject to stiffer requirements. Prospects of success here and at international level are enhanced by Nordic cooperation, which should therefore be given priority.

Goals and initiatives for 2005–2008

The Nordic countries

- will seek to bring about a sizable reduction in mercury use by being pro-active in developing the EU regulatory framework in this sphere and by leading the way with national initiatives and play a proactive role in the establishment of a global UNEP agreement on mercury.
- intend to ensure that the environmental and health effects of pharmaceutical residues收到 attention, that further efforts are made to chart their extent and distribution, and that regulations are developed at national and international level and in the EU.
- will help ensure that the new EU chemicals legislation (REACH) contains provisions requiring the dissemination of knowledge and information on all chemicals used in the production and processing of goods.
- will seek to ensure that REACH places the onus for investigating and assessing the risks presented by chemicals and for ensuring that chemical use does not endanger people’s health or the environment squarely and clearly on the manufacturer.
- intend to press for the adoption of uniform requirements on testing and risk assessment of substances, whether regarded as existing or new and whether present in toys, cosmetics, pesticides or used in industrial processes.
- are anxious a) to contribute to the further development of ongoing work in the chemical sphere, specifically in connection with product-oriented environmental initiatives, through its concrete integration in production and consumption processes, and b) to ensure that the life cycle perspective is taken into account.
- will continue efforts to reduce the use of pesticides in public spaces and private gardens.
- intend to help give concrete form to the generational goal agreed to under the OSPAR Convention and by the Helsinki Commission (HELCOM) – and now the object of international cooperation – and continue to play an active part in designing criteria for the selection of chemicals to be prioritised under OSPAR.
Focus on Sustainable Development – Nordic Indicators 2006

Hazardous waste

Source: Eurostat, and Nordic Statistical Yearbook 2005

Production of hazardous waste per capita in the Nordic countries 1997 to 2003 (kg/capita).

Hazardous waste includes the waste fractions covered by the Basel Convention, such as medical waste, waste from production and use of pesticides, organic solvents, waste oil, etc.

There does not seem to be a clear trend for the Nordic countries as a whole. There is a slight upward trend for Denmark, Finland and Norway. Total hazardous waste generation in Denmark was 164,000 tonnes higher in 2003 than in 1997 - an increase of 65%. This increase in hazardous waste volumes is mainly due to an increase in the volume of waste containing oil and an increase in hazardous waste from industry. Norway’s increase in the same period was 33 per cent, corresponding to 198,000 tonnes. Norway’s higher level of hazardous waste is related to the country’s oil industry. Moreover, there are relatively large differences between the countries. Whilst Iceland only generates around 25 kg hazardous waste per capita, Norway generates around 150 kg per capita.

This indicator does not analyse the properties of the substances or whether they are harmful to human health, but the upward trend does not tally with the Strategy’s long-term objective of “the elimination of all chemical discharges that constitute a threat to health and/or the environment within a generation.”

Harzardous substances


The PCB curve (read from the left Y-axis) is calculated as the sum of 10 PCB types in blubber. The PFOS curve (read from the right Y-axis) shows the concentration in liver. Both substances were measured in young ringed seals from Scoresbysund in central East Greenland, and stated as the median concentrations on a wet weight basis.

The curve shows a downward trend in PCB concentration, and this is the result of intensive efforts to ban the substance and find alternatives. PCB is covered by the Stockholm Convention. Perfluorooctane sulfonate (PFOS) is a substance used in many industrial and consumer products because of its high resistance to soiling. The substance is not yet covered by the Stockholm Convention, but is nominated to become included. The concentration of the substance in seals in Greenland is on the rise, which shows a negative trend that requires initiatives.

The Stockholm Convention is about combating the most toxic and persistent substances (the POPs or “the dirty dozen”). The Convention entered into force in 2004 after having been ratified by more than 50 countries, and it covers e.g. DDT, PCBs and dioxins. The substances are persistent. Therefore, most of us have them in our bodies and they stay there for decades. The environmental toxins travel widely in the atmosphere and in animals, which is why humans and animals in Arctic regions far from all discharges of the substances have accumulated the substances in their bodies. Particularly predators are badly hit. This means birds of prey, predatory fish and not least mammals. The substances are absorbed in fat where they accumulate. Fortunately, today there are usually alternatives to the toxic substances.
Harzardous substances in breast milk


The trend in contents of environmental toxins in breast milk for Denmark, Finland, Norway and Sweden respectively.

For all four countries, we see the trend in dioxin and PCB contents, and for Sweden, we also see the trend in PBDE (brominated flame retardants) contents. For all the countries, we see a downward trend for dioxin and PCB. Sources of dioxin contamination include incineration processes, such as waste incineration. From the late 1980s, work has been done internationally to reduce dioxin emissions. The figures show that these efforts seem to have reduced human impacts. The same trend can be seen for PCB, where work has been done to phase out use since the 1980s (see also the preceding indicator on environmental toxins).

However, it is worth noting that the Swedish data for content of PBDE (polybrominated diphenyl ethers) - used as flame retardants - do not show the same positive situation. In 2005, the PBDE content was almost the same as in 1996. The Swedish data are based on relatively few measurements in selected areas and thus do not reflect a national trend.

This indicator is relevant in relation to the Strategy’s long-term objective that “the use of chemicals does not involve a risk of damage to people’s health and/or the environment.” This indicator seems to suggest that the trend is generally going in the right direction, but that the trend is not unambiguously positive for all substances. POPs still represent a health impact.
The trend in the number of classified substances on the EU's list of hazardous substances 1993 to 2004.

In the 1980s, the EU registered about 100,000 chemical substances (the EINECS list) and these substances are now being classified for their harmful effects. The classification means that the substances are being assessed for possible effects on humans and the environment, including whether they are carcinogenic. Up until now, the EU has classified approximately 3,800 chemical substances and substance groups as dangerous. Each substance group may contain several substances, and thus approx. 8,000 substances have been classified as dangerous in the EU. A substance classified as dangerous must be danger labelled, and information must be provided for safe use. The same applies to the products containing the substance.

This indicator is assessed to be relevant in relation to objectives for “Greater knowledge concerning all substances used” and “Information on the properties of all chemicals produced and marketed should be easily available.” The trend shows a favourable development toward the objective of the Strategy.

Classification of substances is being updated continuously - the final decisions regarding EU classification of substances may, however, take a very long time. Two subgroups under the Nordic chemicals working group, ‘environmental classification’ and ‘health classification’, are attempting to correlate joint Nordic views and exchange ideas before EU classification meetings. Through its project groups, the chemicals groups has also supported knowledge on classification significantly by preparing publicly available databases, N-Class (http://apps.kemi.se/nclass/default.asp) and H-Class.

Moreover, these project groups cooperate on environmental and health classification to summarise insights, and a project for the classification work in REACH and GHS (Global Harmonised System).
Use of mercury

The use of mercury in selected processes and products in Sweden, Norway and Denmark, i.e. use as dental fillings (amalgam), in batteries, thermometers and lamps (e.g. neon lamps). Note differences in Y-axis.

This indicator includes a cumulative group for “other uses” which includes industrial use for electrolysis, use in electrical components as well as other less common uses. In principle, the indicator thus includes all intended uses, although the data basis in some cases is quite uncertain.

For each country, the level in the first part of the 1990s is compared with the situation after 2000, based on national mass-flow analyses. Some figures are averages for two years, and a number of uses have not been included in the indicator. The selected uses cover by far the major part of total consumption today. Previously, some countries also had other significant uses, including in industry. No figures are included for the presence of mercury as an impurity in certain materials, e.g. artificial fertilizer and coal.

The trend shows a steep drop in consumption of mercury for all types of use in the three countries, except mercury for lamps in Norway which has been slightly increasing. Thus, there are significant drops in consumption for dental filling (amalgam), batteries and thermometers. In Denmark, total mercury consumption has fallen by 60 % from 1992/1993, and the trend is still downward. A similar trend can be seen for Sweden. A proposal has been made for a general mercury ban in Sweden. Some uses have been terminated completely.

Mercury is one of the single most dangerous environmental toxins and a threat to both the environment and human health. Mercury occurs naturally in nature, but the largest source is human activities such as burning of fossil fuels, processing of e.g. metals, and burning of waste containing mercury. Gaseous elemental mercury stays longer in the atmosphere (up to two years), and it is easily transportable to Arctic areas, for example. However, discharges to the environment have fallen over the past 20 years, but particularly for the Arctic, increased levels of mercury have been observed. Global initiatives are necessary to turn this trend round.

The Nordic Strategy on Sustainable Development thus has a specific objective that the Nordic countries must “...seek to bring about a sizable reduction in mercury use by being pro-active in developing the EU regulatory framework in this sphere and by leading the way with national initiatives.” The indicator is linked to this objective.
**Sales of pesticides to the general public**

Sources: Denmark: Danish EPA; Norway: Norwegian Food Safety Authority; Sweden: Swedish Chemicals Inspectorate

The volume of pesticides sold to private individuals in Sweden, Norway and Denmark 1996 to 2004, measured as active substances (tonnes).

Pesticides are used in private gardens and in public areas in the same way as in agriculture against weeds, pests and growth disorders. Certain types (toxic to very toxic) may not, however, be sold to private consumers.

Statistics show that the use of pesticides in private gardens has fallen in Denmark, Norway and Sweden. The trend has been clearest in Denmark, where there has been a campaign for non-chemical alternatives in private gardens.

This indicator is valuable for the Strategy’s objective to reduce the use of pesticides in public areas and private gardens.

**Relationship with other chapters**

Problems and goals regarding chemicals are also dealt with in other chapters, including the chapters on the sea, food safety and agriculture.

**Background and perspectives**

The Strategy specifies 13 sub-goals and initiatives for the Nordic countries in the period 2005-2008. Some of those sub-goals are qualitative and hard to measure with indicators. Other sub-goals refer to goals for initiatives that are still being negotiated or implemented. It has only been possible to set up indicators linked more or less directly to four of the sub-goals. Enhanced efforts to develop Nordic indicators for the Strategy’s sub-goals for chemicals are required if we are to see the results of the Strategy.

Further information on Nordic efforts within chemicals can be found on the Nordic Council of Ministers website under the Chemicals Group at: [http://www.norden.org/miljoe/uk/index.asp?lang=6](http://www.norden.org/miljoe/uk/index.asp?lang=6). A number of activities have been carried out, and several reports in the area have been published.
Food safety and health

Challenges and long-term goals

Consumers should be offered safe food, information and the opportunity to put together a healthy diet. This requires sufficient and comprehensible labelling of food products. The content of environmental contaminants and micro-organisms in food products should primarily be reduced through limiting pollution at the source, i.e. either at the polluter or in primary production and in the processing industry. Producers and importers have a responsibility to ensure that food is in good condition and does not comprise a health risk when handled properly. The public authorities are responsible for inspection, and ensure openness and transparency in risk management (set rules and control) and assess risk.

In the Nordic countries, political decisions have been made on food safety and an action plan has been adopted to enhance consumer influence in the food area. It has been determined that the Nordic countries want a higher level of protection. Nordic policy is to only accept as low a content of chemical substances and harmful micro-organisms in food as possible through preventive initiatives. Diet and nutrition are pivotal to the health of consumers. New knowledge about food safety is being acquired all the time. New and better food technology as well as manufacturing processes can solve old problems, but they can also give rise to new ones.

Simple and unambiguous regulations, which are comprehensible to food enterprises, producers, consumers and the inspection authorities are important for high food safety, as well as advice on the composition and preparation of a healthy diet. Consumers must be assured a real and informative choice. The division of roles in work for high food safety is clear. Producers and importers are responsible for ensuring safe food is offered to consumers. Here, it is important that agriculture and fisheries are not influenced negatively by external factors such as soil, air and sea pollution, and that pollution is stopped at source.

Assessment of food safety is increasingly based on risk assessments in international forums, especially in EU and FAO/WHO expert committees. With regard to international trade, it is important that the same standards for food safety prevail throughout the world.

Goals and initiatives for 2005–2008

The Nordic countries:
- will intensify efforts to promote animal health and welfare. Efforts to improve the knowledge of all players involved in the process from ‘field and fjord to fare’ combined with increased supervision will help strengthen measures in primary production aimed at preventing diseases, zoonoses or other conditions that could threaten animal health and food safety,
- will promote safer food handling and production by enterprises and consumers,
- intend to encourage further training for personnel in primary production, industrial production and the distribution chain to ensure that all those involved are fully informed of the potential risks involved. Consumers will be supplied with specifically targeted information about safe handling, storage and preparation of food,
- are anxious to limit the presence of chemical substances in food as much as possible. The use of additives and flavourings, production agents such as pesticides, veterinary pharmaceuticals, and detergents and disinfectants must be limited to what is technically necessary. Risk assessments of substances used e.g. in packaging or as flavouring, are still lacking, and have high priority. Consumers must be offered advice and guidance aimed at minimising the intake of problematic substances such as dioxins and mercury in fish,
- intend to promote wider knowledge of natural toxic components and to limit health risks,
- will seek to limit food-induced allergic reactions through the adoption of preventive measures, inter alia by supplying information to businesses and consumers about problematic food ingredients. Other measures include adequate food labelling and the inclusion in producers’ own quality control programmes,
- will promote the dissemination of information on the connection between diet, nutrition and health. Citizens must be motivated to adopt healthy food and exercise habits, and in particular be informed about the importance of reducing sugar and fat in their diet and increasing their intake of fruit and vegetables. Basic knowledge in this field should form part of school education and be supplemented by easily accessible information from the relevant authorities,
- aim to ensure greater traceability and access to information about potential risks. The number of food products that do not comply with existing regulations must be minimal,
- will seek to support companies’ own control systems, inter alia by defining the prerequisites for an efficient control programme, and by ensuring that the analytical methods required are available,
- will seek to reinforce research-based knowledge on food safety and develop better risk assessment models, coordinate Nordic research efforts and implement common Nordic risk assessments and thereby influence priority setting in international forums,
- will intensify the dialogue with consumers, promote open risk communication, and ensure that correct information is incorporated in schoolbooks, other textbooks, cookery books, cookery programmes/articles in the media, etc.,
- are anxious to improve dissemination of information about traditional food in and between their countries.
Cases of Campylobacter in humans

Source: Denmark: Gastro-Enteritis Monitor, Statens Serum Institut; Sweden: Swedish Institute for Infectious Disease Control; Finland: Public Health Institute (www.ktl.fi); Iceland: Landspitali University Hospital (www.landspitali.is).

The development in the total number of Campylobacter infections per 100,000 inhabitants in the Nordic countries.

From June 1998 to March 2000, the number of human cases of Campylobacteriosis in Iceland reached epidemiologic heights. The cases could be almost unequivocally linked to home cocking chicken. Until 1996, it was only possible to buy frozen chicken in Iceland, but that year, sale of fresh chicken was permitted, and sales went up significantly. Campaigns were carried out and, as the figure shows, Iceland soon gained control of the problem.

Several of the Nordic countries have implemented action plans against Campylobacter in food. Efforts aim at consumers as well as industry. Many factors influence the number of Campylobacter, e.g. drinking-water resources.

The graphs below show cases of infection according to whether the people were infected at home or abroad. By distinguishing between cases of infection originating domestically and from abroad, measures against the causes of infection can be directed more precisely. For example this could include food products and hygiene abroad, in regards to which travellers should be advised about taking appropriate precautions.

This indicator is related to the objective to “intensify efforts to promote animal health and welfare. Efforts to improve the knowledge of all players involved in the process from 'field and fjord to fare' combined with increased supervision will help strengthen measures in primary production aimed at preventing diseases, zoonoses or other conditions that could threaten animal health and food safety.”
Human cases of salmonella

Source: Denmark: Gastro-Enteritis Monitor, Statens Serum Institut; Sweden: Swedish Institute for Infectious Disease Control; Finland: Public Health Institute (www.ktl.fi); Iceland: Landspitali University Hospital (www.landspitali.is).

The development in the number of Salmonella infections per 100,000 inhabitants in the Nordic countries.

From June 1998 to March 2000, the number of human cases of Salmonella in Iceland reached epidemiologic heights. As in the case of Campylobacter, the cases could be almost unequivocally linked to cooking fresh chicken. Until 1996, it was only possible to buy frozen chicken meat in Iceland, but that year, sale of fresh chicken was permitted, and sales went up significantly. The figure shows that Iceland soon gained control of the problem.

Several of the Nordic countries have implemented action plans against Salmonella in food. Efforts aim at consumers as well as industry.

The figures below illustrate Salmonella infections by source, domestic and foreign. By distinguishing between cases of infection originating domestically and from abroad, measures against the causes of infection can be directed more precisely. For example this could include food products and hygiene abroad, in regards to which travellers should be advised about taking appropriate precautions.

This indicator is related to the objective of enhancing measures against zoonoses and pathogenic micro-organisms.
Risk assessment of chemical substances

Number of chemical flavorings assessed/to be assessed

Source: EFSA’s Scientific Panel on Flavorings; The Danish Institute for Food and Veterinary Research

Number of chemical flavorings used in food that have been risk assessed, as well as the number of chemical flavorings that still need to be assessed in 2005 to 2006.

In addition to chemical flavorings there are also complex flavorings such as smoke flavorings, thermal process flavorings and other flavorings, and these are not included in the indicator.

The indicator shows the development in the work on risk assessment in the European Food Safety Authority, EFSA. The graph adds the totals year on year so that both the annual development and total number of assessed substances can be seen for each year. The risk assessment is carried out by expert committees under the United Nations organisations the FAO and WHO. The Nordic countries participate in the work which is the basis for EU harmonised legislation on the area for all of the countries. The assessments are not expected to be completed until 2007.

This indicator is related to the objective of limiting the amount of chemical contaminants in food. The goal aims at the risk assessment of all chemical substances that are used in food, as well as ensuring that harmonisation of EU regulation of the area is carried out in accordance with the overall goal of limiting chemical substances in food.

Number of substances in food packaging etc. which have been assessed for risk

Source: The EU Scientific Committee on Food  http://europa.eu.int/comm/food/fs/sc/scf/outcome_en.html

Accumulated totals of chemical substances used in food packaging which have been assessed for risk in the EU.

The graph adds the totals year on year so that both the annual development and total number of assessed substances can be seen for each year. The risk assessment is carried out by expert committees under the European Food Safety Authority, EFSA. The Nordic countries participate in the work which is the basis for EU harmonised legislation on the area for all of the countries.

Chemical substances that are used in packaging etc. that comes into contact with food must not be harmful to human health if/when they migrate into the food. It is estimated that almost 3,500 substances are used in plastic, and other substances are used in materials such as surface treatments, in paper, silicone, rubber etc. The Nordic countries’ experts participate in this work, but many substances remain to be assessed. At the same time several of the Nordic countries have prioritised information for manufacturers, importers and consumers. Control projects in this area contribute to developing specification of requirements for food safety in all parts of the chain.

This indicator is related to the objective of limiting the amount of chemical contaminants in food.
Pesticide residues in food

Source: Data from EU monitoring reports 1998-2003

Pesticide residues in food

Percentage of samples that on inspection have exceeded the Maximum Residue Level (MRL) for pesticides in food.

Chemical substances such as pesticides are used directly in food production and can be found as residues in food. A general requirement placed on food is that it must be safe and that the content of pesticide residues may not exceed maximum limits that are set by legislation.

Organisations responsible for control of this area notify the EU of their results each year, and nationally the results are used for planning control that is more focused.

There is no one clear explanation for the developments in this indicator. The variation from year to year may be due to a difference in the crops that are tested, the weather during the growth season, old pesticides can be substituted with combinations of new substances etc.

This indicator is related to the objective of limiting the amount of chemical contaminants in food.

Overweight

Source: OECD HEALTH DATA 2005, October 2005

Overweight

Percentage of adult population with a Body Mass Index of over 30 (1980 to 2003).

For Denmark, Iceland, Norway and Sweden, some data have been projected to subsequent years.

“Body Mass Index” (BMI) is a method for measuring obesity. Obesity is an increasing problem in the entire western world - and thus also in the Nordic countries. The problem is not due to lack of information, as this negative trend is also seen in countries where populations are expected to have the required theoretical knowledge of the importance of a healthy diet and exercise.

This indicator is related to the objective of enhancing knowledge on the connection between diet, nutrition and health.
Relationship with other chapters

The chapter on chemicals also includes information which has a bearing on health, while the chapter on the social dimension also contains information related to health. Food is also covered by the chapter on sustainable production and consumption.

Background and perspectives


Eleven goals and initiatives are defined in the strategy for 2005-2008. The 11 goals form the basis of and are specified more comprehensively in the action plan for the Nordic food cooperation, see the action plan “Nordic Fisheries, Agriculture, Forestry and Food Co-operation 2005–2008. Enhancing Value and the Quality of Life in the Nordic Region”. In the report there are indicators that are directly associated with three of the goals in this chapter. There are many indicators in the report mentioned above, however only those for which comparable data could be collected are included here. Further work is being carried out on the creation of updated Nordic indicators in a number of areas, including obesity.

Nordic cooperation on foodstuffs includes a number of completed projects, which to differing degrees relate to the Strategy on Sustainable Development. Examples of publications are listed here:

Interventions aimed at reducing the risk of acquiring Campylobacter from poultry products
Risk Assessment and Risk Management of novel Plant Foods
Ethical Labelling of Food

Furthermore, for the period 2005-2008 several major projects have been started which are to help ensure sustainable development:

- creation of a Nordic action plan for improved health and quality of life through food and exercise
- Strategy for Nordic veterinary contingency cooperation on outbreaks of contagious animal diseases (e.g. avian flu)
- Animal transport - cooperation on the implementation of EU Regulation and Nordic strategy for the future
- Principles for risk communication of food control
- Investigation of consumer demands and wishes for food labelling.

Follow this link to the website on Nordic foodstuffs cooperation www.norden.org/livsm/sk
Climate and air quality

Challenges and long-term goals

The ultimate objective of international climate cooperation is to achieve a stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The long-term goal with regard to long-range atmospheric pollutants is to reduce emissions of sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia to a point where the impact on the natural environment can be kept within critical load limits (nature’s ‘pain threshold’), and damage to people’s health and the environment is avoided.

Goals and measures 2005-2008

The Nordic countries

- will seek to ensure that the Kyoto Protocol, as a vital first political step towards a reduction in greenhouse gas emissions, comes into force at the earliest possible opportunity.
- consider that launching negotiations on a more ambitious future global climate strategy after 2012 is the most important long-term challenge in the climate policy sphere. They will therefore actively promote the establishment of a broad-based process involving as many countries as possible in a global cooperative endeavour to limit greenhouse gas emissions after 2012. With regard to the world’s developing countries, there is an urgent need to build confidence and open the way to commitments of various kinds which can contribute to global emission reductions without jeopardising the countries’ economic and social development. Bringing the USA back into the Kyoto process is also a vital priority.
- regard the decision to establish the Baltic Sea region as a testing ground for the flexible mechanisms in the Kyoto Protocol (Testing Ground Agreement – TGA) as settled. In the course of cooperation on the testing ground project, the Nordic countries will i) continue to work for successful implementation of the TGA and seek cooperation with other countries, ii) support the environmentally and economically efficient development and use of the Testing Ground Facility (TGF), iii) urge other/future parties to the Kyoto Protocol and private operations to take an active part in the testing ground project, and iv) promote the development and implementation of environmentally sound, cost-effective Joint Implementation projects.
- will continue their expertise and capacity-building efforts in the Baltic Sea region, with particular focus on Russia.
- intend to lead the way in reducing consumption of industrial greenhouse gases (HFCs, PFCs, and SF$_6$) and to promote a climate conducive to such a reduction.
- will seek to ensure that the follow-up of the Kyoto process with respect to greenhouse gas absorption as a means of reducing emission effects is environmentally effective.
- will assess and evaluate the possibility of wider intra-Nordic cooperation on climate research.
- want to take a closer look, in the context of Nordic cooperation on climate research, at the consequences of climate change in the region inter alia in the light of the findings of the Arctic Climate Impact Assessment (ACIA) project. There is considerable evidence to suggest that most of the effects of climate change will show up there first, and the ecological impact is likely to be particularly severe in that part of the world. Climate change in the polar regions can lead to changes in the ice-cap and ocean currents, which in turn can affect the global climate.
- will be adopting policy levers and initiating measures aimed at ensuring fulfilment of the emission targets laid down in the Gutenberg Protocol and the EU directive on national emission ceilings for certain atmospheric pollutants. During the revision of the protocol, the Nordic countries will be attaching particular importance i) to the fact that limit values for acidification will have been exceeded in large areas of the Nordic region after 2010, and ii) to new findings on the health effects of ground-level ozone. The Nordic countries will be helping to identify the health effects of particulate pollution in the Nordic region with a view to strengthening their common knowledge base, and cooperating on a joint Nordic effort in support of EU initiatives in this area.
Climate change

Climate change is regarded as the most important environmental problem facing the world today and perhaps the most serious threat to sustainable development. Many regard it as the pivotal global challenge of the present century. Moreover, according to the third assessment report from 2001 by the Intergovernmental Panel on Climate Change (IPCC), the changes observed have already impacted many physical and biological systems around the world. In recent years, many regions of the globe have experienced heat waves, floods, drought and storms; as world temperatures rise over the next hundred years, these extreme weather phenomena are expected to increase in strength and frequency. Climate change can have consequences for individual plant and animal species and entire ecosystems. Industries such as agriculture, forestry, energy and fisheries are vulnerable to climate change. The Arctic regions are particularly vulnerable to climatic change and there is much evidence to suggest that the changes in the global climate will have their biggest effect in these regions.

Emissions of greenhouse gases

Source: UNFCCC

Emissions of greenhouse gases (CO₂, CH₄, N₂O, HFCs, PFCs and SF₆) in CO₂ equivalents for the period 1990 to 2003 in the Nordic countries in absolute figures and relative to gross domestic product (GDP) in constant 1995 prices and exchange rates.

The figure for GDP shows that all Nordic countries have achieved a relative decoupling of greenhouse gas emissions from the trend in GDP, except from some stagnation or a small increase in the period 2000-2002. However, the other figure on the left shows that this relative decoupling does not cover a fall in actual emissions. The explanation for the relative decoupling is to be found in a continuous increase in GDP for all the Nordic countries.
Emissions of greenhouse gases relative to the Kyoto targets

Source: Nordic Statistical Yearbook 2005

The figure shows how close the Nordic countries are to reaching their respective reduction targets in relation to the Kyoto Protocol. The figure only includes the development in national emissions and thus does not include reductions achieved by the flexible mechanisms: Joint Implementation, international trade in allowances and the Clean Development Mechanism.

In connection with the EU’s burden sharing of the Kyoto Protocol, Denmark, Finland and Sweden have committed themselves to the following reductions: Denmark –21 %, Finland 0 %, Sweden +4 %. Under the Kyoto Protocol, Iceland and Norway have committed themselves to the following: Iceland +10 %, Norway +1 %.

The figure does not show a clear trend in developments this area, and emissions have increased for several countries during recent years. Therefore there is still a major need for increased focus and initiatives so that all the Nordic countries can meet their reduction targets, either through further national reductions or through the use of the flexible mechanisms.

This indicator is relevant in relation to the Strategy’s general focus on the Kyoto Protocol. The figure shows that the Nordic countries are faced with a major task if they are to reach the Kyoto targets.

Changes in the length of the growth season

Source: Norut IT - www.itek.norut.no

Changes in the length of the growth season in Scandinavia from 1982 to 1999.

It is notable that in southern Scandinavia the growth season has lengthened by four or more weeks. This part of Scandinavia has the largest share of the Nordic region’s population and the largest area used for agricultural production. The longer growth season provides better growth conditions for plants which have previously been hindered from growing by lower temperatures. This means that the competitive balance between species can be altered and that the distribution of species will be affected in the long run. Furthermore changes in the climate can supply favourable growth conditions for new species that have formerly been hindered from growing by temperatures in the given region. For example, climate changes are one of the significant causes of the fall in the population of Arctic foxes in northern Scandinavia since the 1900s. An Indicator for the status of the Arctic fox is included in the chapter on biodiversity.

The fact that some areas have had a shorter growth season can be because milder winters often lead to increased precipitation (more snow) in the winter season which in turn leads to a longer thaw period. The trend towards a longer growth season is supported by the fact that temperatures have been rising since the mid 1980s in several of the Nordic countries (see the previous indicator).

1) Denmark’s commitment to a 21 % reduction is on the condition that emissions in 1990 are adjusted for trading in electricity.
2) Sweden’s national goal is a 6 % reduction.
Temperature trends

Source: DMI Annual Climate Data Collection 1873-2004, Denmark, the Faroe Islands and Greenland, John Cappelen, Copenhagen 2005. Iceland: Icelandic Meteorological Institute. Finland: Finland’s sustainable development indicators

Temperature trends for selected stations in Finland, Iceland, Denmark, Greenland and the Faroe Islands from 1873 to 2004. The curve shows a ten-year running average.

There is an upward trend in average temperatures for the period. The curves show that the average temperature has increased by approx. 1 °C since 1873 in the Nordic countries. In comparison, global temperature has risen by 0.8 °C, in the northern hemisphere by 1.1 °C, and in the Arctic by 2 °C (1880-2005). The figure also shows that there was a warm period in Greenland and the North Atlantic from 1930-60.

This indicator is particularly relevant for the Strategy’s objective of reducing emissions of greenhouse gases.

Climate change in the Arctic


The Artic has seen a general increase in temperature from before 1900 to the mid 1940s. Following this, temperatures fell until the mid 1960s after which they rose again. During this period, a statistically significant increase of 0.09 °C per 10 years can be demonstrated. The trend towards temperature increases is bigger in the Arctic than for the total northern hemisphere, where the increase is 0.06 °C per 10 years. Since 1975 the temperature in the Artic has risen by 0.5 °C per 10 years compared to 0.3 °C per 10 years for the total northern hemisphere and 0.2 °C per 10 years for the earth as a whole. The temperature in the Artic is now 0.6-0.7 °C warmer than in the warm period of 1930-1960. (Source: GISS/NASA 2006)

The development in sea ice cover in the northern polar region. The extent of sea ice is shown for the month of September each year from 1979 to 2005 and is shown in million km².

The figure shows a marked fall in the extent of sea ice cover during the last 25 years. Sea ice cover has decreased by 8% per 10 years (the straight curve). Sea ice cover is measured by satellite and is shown by the total area of quadrants which have more than 15% sea ice cover. The areas around the North Pole which cannot be seen by satellite are assumed to be totally covered by ice.

This indicator is relevant for the goal of the Nordic countries “to take a closer look, in the context of Nordic cooperation on climate research, at the consequences of climate change in the region in particular in the light of the findings of the Arctic Climate Impact Assessment (ACIA) project. There is considerable evidence to suggest that most of the effects of climate change will show up there first, and the ecological impact is likely to be particularly severe in that part of the world. Climate change in the polar regions can lead to changes in the ice-cap and ocean currents, which in turn can affect the global climate.”
**Emissions of industrial greenhouse gases**

*Source: Nordic Statistical Yearbook 2005*

Emissions of industrial greenhouse gases, HFCs, PFCs and SF	extsubscript{6} from 1990 to 2003.

Emissions of PFCs and SF	extsubscript{6} have fallen in general since 1990, while emissions of HFCs increased dramatically until 2001 after which they stabilised. In 2003 industrial greenhouse gases accounted for 1.2 % of the Nordic region's total greenhouse gas emissions measured in CO	extsubscript{2} equivalents. In 1990 industrial gases accounted for 2.4 %.

HFC gases are used in industry as a replacement for CFC gases which are ozone depleting and were phased out via the Montreal Protocol. HFC gases are much more potent greenhouse gases than CO	extsubscript{2}.

This indicator relates to the Strategy’s goal stating that “the Nordic countries intend to lead the way in reducing consumption of industrial greenhouse gases (HFCs, PFCs, and SF	extsubscript{6}) and to promote a climate conducive to such a reduction.” Thus the indicator shows that especially for HFCs and PFCs initiatives still need to be strengthened.

---

**Net uptake of CO	extsubscript{2} by forests**

*Source: CO	extsubscript{2} uptake: UNFCCC; Total emissions of greenhouse gases: Nordic Statistical Yearbook 2005*

The development in the net uptake of CO	extsubscript{2} in forestry and by changes in forest area as a percentage of total greenhouse gas emissions (deducted for uptake) for the Nordic countries in the period 1990 to 2003.

There is no one clear trend for uptake of CO	extsubscript{2}. The most marked trend is the continuous increase in CO	extsubscript{2} removals in Norway, and a significant fall in uptake in Finland up to 1998. There is also a big difference in the significance of the uptake. In 2002 uptake accounted for approx. 5 % of total emissions for Denmark and Iceland respectively, while it was between 20 % and 40 % for the other countries.

The indicator is interesting in relation to the Strategy’s goal about CO	extsubscript{2} Absorption as a means of reducing the effects of CO	extsubscript{2} emissions. At the same time it is also important to be aware of the focus in the Strategy whereby “the Nordic countries will seek to ensure that the follow-up of the Kyoto process with respect to greenhouse gas absorption as a means of reducing emission effects is environmentally effective.”
Acidification and acid precipitation

Emissions of substances such as sulphur dioxide (SO₂), nitrous oxides (NOₓ), and ammonia (NH₃) cause acidification and have environmental impacts, for example through acid rain. Exceeding the thresholds of what nature can cope with in relation to acidification means that animal and plant life are affected. During the last 50 years a large number of lakes in southern Scandinavia have been subject to serious acidification. For example it has been assessed that acid precipitation has killed the salmon in all major salmon grounds in southern Norway and that 18 salmon populations have disappeared because of acid precipitation, while a further series of populations are under threat. During the last 15 years precipitation of acidifying substances has fallen dramatically and there has been a general improvement in the acid levels of lakes suffering from acidification.

This contributes to highlighting the need for this measure, which is pointed out in the Strategy - “The long-term goal with regard to long-range atmospheric pollutants is to reduce emissions of sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia to a point where the impact on the natural environment can be kept within critical load limits (nature's ‘pain threshold’), and damage to people's health and the environment is avoided.”

Emissions of air pollutants

Source: Eurostat

Total Nordic emissions of sulphur dioxide (SO₂), nitrogen oxides (NOₓ), ammonia (NH₃) and volatile organic compounds (VOC) from 1990 to 2003, the data is indexed with a starting point in 1990.

In total for this period there has been a significant fall in emissions of the three acidifying gases (SO₂, NOₓ and NH₃) as well as in emissions of VOC. Emissions of SO₂, which is the most significant acidifying substance, have fallen most, with a total decrease in emissions of over 60% for the Nordic countries. The fall in emissions is amongst other things due to the installation of desulphurisation plants at large power plants, regulation of sulphur content in fuel oil and an increase in renewable energy sources.

Emissions of NOₓ in the Nordic countries have shown a total reduction of over 20% in the period illustrated. NOₓ emissions and VOC are very important for the formation and break-down of tropospheric ozone, which is the most important component in photochemical atmospheric pollution, and which causes health problems. The reduction in NOₓ emissions is primarily due to catalytic converters in cars, installation of low-NOₓ boilers and de-NOₓ plant at power stations and increased use of alternative forms of energy.

The total Nordic emissions of ammonia have fallen by 13% over the period. Ammonia originates from evaporation from agriculture. The reduction in the emissions is primarily due to improved fertilizer management and covering manure/sludge tanks and storage. Emissions of volatile organic compounds (VOC) over the period fell by more than 12%, in particular because of the higher percentage of cars with catalytic converters in the Nordic region as well as reduced emissions from the use of organic solvents.

This indicator is relevant for the objective in the Strategy that “during the period 2005-2008 the Nordic countries will be adopting policy levers and initiating measures aimed at ensuring fulfilment of the emission targets laid down in the Göteborg Protocol and the EU directive on national emission ceilings for certain atmospheric pollutants”. It is important to note that the total Nordic reduction in emissions is not enough. This is a transboundary environmental problem where joint international efforts are required. Transboundary atmospheric pollution is regulated through a number of protocols adopted under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP). The Gothenburg Protocol sets binding targets in the form of maximum permitted emissions of SO₂, NOₓ, NH₃ and VOC to be met by 2010, corresponding to the binding targets in the EU directive on national emissions ceilings.
Air quality in cities

Finland

Source: Finnish Sustainable Development Indicators 2004

The change in air quality from 1994 to 2003 in five Finnish cities measured as number of days with poor air quality.

The figure shows a positive trend in air quality in Finnish cities with the number of days with poor air quality falling.

Air quality in built-up areas is not as good as expected, despite drops in emissions from traffic. An important problem is particles. The particle content in the air can be reduced, if emissions are reduced from traffic and industry, energy production, and small-scale incineration, and if the streets are cleaned more effectively in the spring.

Iceland

Source: Environment and Food Agency of Iceland 2006

The change in the air quality in Reykjavik from 1995 to 2004. The concentration of ozone, NO₂, SO₂, and particles (PM10) is shown as an annual average in μg/m³.

The figure shows no clear trend in air quality, although NO₂ and PM10 have fallen over the period. The number of days exceeding the limit value of 50 μg/m³ for PM10 has fallen from 44 days in 1995 to 20 days in 2005. The same trend is apparent for NO₂, where the limit value of 30 μg/m³ has not been exceeded since 2001.
Particles

Source: Nordiske Byers Miljøindikatorer (Nordic city environmental indicators). A joint project between seven cities in the Nordic region, CASA, August 2003

The number of days in 2000, 2001 and 2002, in which the EU limit value of 50 µg/m³ for PM10 was exceeded in a number of Nordic cities.

Atmospheric pollution from particles is one of the anthropogenic environmental problems with most impact on our health. According to a WHO report, particle air pollution is a global health problem because this type of pollution is behind cardiovascular disease and respiratory disorders, including allergies and cancer. Many population studies in both the US and Europe have shown that hospital admissions and deaths from respiratory and cardiovascular disorders increase on days with high outdoor particle air pollution. In particular the fine and ultra-fine particles (PM10 or PM 2.5) from different combustion processes, such as soot particles from diesel exhausts and stoves, comprise a danger to health. Children, especially those under two years, are especially vulnerable and so far we only have limited knowledge on the health effects of high particle pollution.

In order to acquire more knowledge on this particle pollution and its consequences, the Nordic countries are charting the level of particles in several Nordic cities. The study from which the figure above was taken provides an indication of the extent of the problem (this study does not state a 90 % percentile, and therefore it is not directly comparable with the EU limit value of 50 µg/m³ for a maximum of 35 days per year), but currently there is no comparable data from the Nordic countries which can identify trends in PM10 or PM2.5 levels.

Relationship with other chapters

The chapters on energy, production and consumption, as well as transport also contain indicators on climate change and atmospheric pollution.

Background and perspectives

Eight goals have been set for efforts in the climate area in the Strategy on Sustainable Development for 2005-2008. The first goal has been met, the Kyoto Protocol entered into force on 16 February 2005. This means that the industrialised countries of the world, except the US and Australia, are committed to reducing emissions of climate-gas by 5 % compared with the 1990 level in the period 2008-2012. In 1990, the 36 countries under the Protocol accounted for 41 % of total world emissions of climate gases, while the US and Australia accounted for 22 %. The great challenge in the negotiations on the climate regime after 2012 is to get the US and Australia into the future climate agreement and to include countries such as China, India and Brazil.

Some of the goals in the Strategy focus on cooperation globally, in the Baltic region, and with Russia on initiatives to reduce emissions of greenhouse gases. It is difficult to design indicators which show cooperation within, e.g.

- Nordic influence/efforts in cooperation globally
- Cooperation in the Baltic region
- Cooperation with Russia

Since 2005, 11 climate projects have commenced which, to varying degrees support sustainable development.

Projects directly related to the goals in the Strategy include:

- A training programme was completed in spring 2006 in north-west Russia to increase local competence to develop and implement Joint Implementation projects (KP115).
- An analysis of methods and tools to limit emissions of industrial greenhouse gases (KP116).
- Removals of CO₂ by plants (KP117).
- Ways to reduce emissions of climate gases in the Nordic region by 60-80 % (KP121)

Not only climate-gas emissions, but also atmospheric pollution affects the climate. For example, a 20-30 % warming of the Arctic over the past 100 years has been attributed to long-distance transport of smog (mountain ozone). From a sustainability perspective, this means that in future there is a need to combine ideas about reducing emissions of greenhouse gases and atmospheric pollution.
Focus on Sustainable Development – Nordic Indicators 2006

Challenges and long-term goals

The Nordic countries are working to protect and ensure sustainable use of biodiversity, and to protect the natural resources and the natural and cultural landscape arising as a result of human activity.

The Nordic countries must also ensure sustainable use of and access to genetic resources, and work for just and equal distribution of the benefits arising from use of genetic resources. Moreover the countries must ensure that preservation of the natural and cultural landscape is guaranteed.

Biological diversity in the natural and cultural landscape

Goals and initiatives 2005-2008

The Nordic countries

- will continue to play a proactive role in international processes and negotiations forming part of the follow-up of the UN Convention on Biological Diversity.
- will work for the achievement of the WSSD 2010 target and the complete fulfilment of European commitments to biodiversity.
- will present national strategies and action plans for the protection of biological diversity, the preservation of genetic assets, the sustainable use of natural resources, intensive exchange of experience and the integration of environmental concerns in sectoral policies for agriculture, forestry, fishing and traffic/transport by 2005.
- intend to work i) for efficient implementation of the Cartagena Protocol on Biosafety, which is concerned with the transboundary utilisation of living modified organisms, ii) ensure that products are satisfactorily labelled at international as well as national level, and iii) ensure that consumers are informed when gene technology has been used in food production.
- will contribute to European efforts to improve follow-up and assess the potential risks before non-native species are introduced, in accordance with Nordic recommendations.
- will continue to cooperate on the development of methods for and exchange information on monitoring biodiversity in the Nordic region.
- intend to continue efforts to develop new tools with which to assess the effects of changes in the way areas are used on biodiversity and the cultural environment.
- will take landscape-related issues into account in all relevant sectoral plans and identify conditions under which sectoral integration can heighten concern for these issues.
- will attach particular importance to the natural environment and biodiversity of the Arctic region and take account of the Arctic Council’s assessment of climatic effects in the region.
- will develop the Nordic action plans for the preservation of natural and cultural environments in the Arctic region into an action plan which also covers Nordic environmental initiatives in the region, particularly with regard to climate change, persistent organic pollutants (POPs) and mercury.
- will promote environmentally sound agricultural and forestry sectors in the Nordic region in order to maintain and strengthen biodiversity, and ensure the preservation of a representative and sufficiently large proportion of Nordic species and habitat types.
- intend to further develop cooperation with national and Nordic programmes for the preservation and sustainable use of genetic resources.
- will seek to ensure that implementation of an ecosystem approach will also serve as a framework for Nordic management of the marine environment, and lead to greater knowledge of marine biodiversity, the functioning of marine ecosystems and the individual and combined effects of different interventions. Marine surveys, research and monitoring are vital in this connection.
- will promote the right of common access in the countryside and inform citizens of their rights.
- will strengthen cooperation between public bodies responsible for the management and administration of the region’s natural and cultural assets, acknowledge their interdependence and see them as mutually enriching resources.
**Wilderness areas**


The percentage wilderness-like area in Norway, with wilderness-like meaning more than 5 kilometres away from major infrastructure developments.

Nationally, wilderness areas have fallen by more than 1,710 km², or more than 4.3 % from 1988-2003. At the turn of the 20th century half of the area of Norway could be described as wilderness. As at January 2003 only about 11.7 % of the wilderness area remained. The reduction and break-up of the areas free of interference is taking place bit-by-bit throughout the country, but the greatest reduction has been in southern Norway.

A total of 40,000 km² of Iceland is wilderness. Of this, 5,340 km², or 13 %, are located in protected areas.

**Protected natural areas**

Source: Nordic Statistical Yearbook. For Denmark, data is only for 2000 and 2003

The change in protected areas, stated as a percentage of the total area of the individual Nordic country, for the period 1997 to 2003/04.

Protected natural areas are areas designated for protection of their ecosystems or special characteristics, for research, or because active intervention is required to, for example, maintain special habitats.

The figure shows no clear development, although there seems to be a slight upward trend for most countries. Note that, at the moment, there are nine listed areas in Greenland - including the world’s largest national park - and that an additional handful of areas will be listed over the next two years.

The Danish figures include some uncertainty. Therefore the curve should only be viewed as an attempt to describe the level and trends immediately after 2000. There is data for prior to 2000, but some areas in this data have been included several times because they were protected in several contexts so that the total was therefore meaningless. The Danish figures in the graph cover only Natura 2000 areas and therefore they are less than the actual figures for protected areas in Denmark.

The graph does not show the actual size of protected areas in Iceland, and the trend for Iceland also includes some uncertainty. This is because classification and information from the IUCN does not include all the areas listed in 1997 and the IUCN has not updated their data with the areas listed by Iceland in the most recent years. On the other hand, the graph does show a reduction in the area of IUCN-classified areas between 2003 and 2004. This is because the area at Mývant and Laxá in northern Iceland was reduced by a 2004 revision of the legislation protecting the area.

This indicator is deemed to be especially relevant for the Strategy’s overarching goal of protecting and ensuring a sustainable development for biodiversity and safeguarding the access to nature. Designation of areas for special protection could be a tool in relation to this goal.
Birds in cultivated areas

There is currently no specific bird index describing trends for the whole Nordic region. However, most countries have reliable data back to 1975-80. The figures below show trends in the bird population in cultivated areas for Denmark and Finland.

The indicator is relevant for the Strategy goal to “promote environmentally sound agricultural and forestry sectors in the Nordic region in order to maintain and strengthen biodiversity.” The link to this goal is because cultivating agricultural land less intensively can protect bird populations.

**Denmark**

Source: Danish Ornithological Society - BirdLife Denmark

Population index for birds on agricultural land in Denmark (1976 = 100)

Population index for lapwing (Vanellus vanellus), skylark (Alauda arvensis, and swallow (Hirundo rustica) in Denmark from 1976 to 2005. Also the total change for the three species and corn bunting (Miliaria calandra) and partridge (Perdix perdix).

Populations of birds living on Danish cultivated areas have fallen significantly since the mid 1970s. An overall statement for four typical species shows a drop of about 60 % from 1976-2004.

There are large fluctuations in the population of swallows, and this is partly because the annual population is affected by weather conditions during migration. However the population has generally fallen since the 1970s. This fall applies for almost all of Europe and is partly because swallows are finding it increasingly difficult to find nesting sites.
The population index for four species of bird on cultivated land in Finland from 1983-2004. Curlew (Numenius arquata), skylark (Alauda arvensis), swallow (Hirundo rustica) and starling (Sturnus vulgaris).

The figure shows a clear negative trend for populations of birds on cultivated areas since the 1980s.

Populations of both skylark and lapwing have fallen drastically since 1983. A possible contributory factor is that increased use of pesticides by agriculture exterminates the plants and insects on which these species feed. The positive, upward trend in population growth of the skylark from the mid 1980s, however, has reversed. This species is also in decline throughout most of Europe, and mostly so in west-European countries.
**Trends for selected species**

**The Icelandic white-tailed eagle**

Source: Icelandic Institute of Natural History.

The population of white-tailed eagle in Iceland for 1959-2005, stated as number of breeding pairs.

The change in the number of Icelandic white-tailed eagles is an example of successful environmental measures. The white-tailed eagle was protected in Iceland by legislation in 1914, but the bird remained under threat for many years after. The effect of protection did not become clear until after 1964, when a ban on putting down poison against foxes was introduced. Since then the population has tripled in forty years and now totals 65 pairs, most of which are in western and north-western Iceland.

**Breeding success for Swedish white-tailed eagles**

Source B: Helander, Naturhistoriska riksmuseet, Box 50007, SE-104 05 Stockholm.

Trends in the breeding success of pairs of white-tailed eagle along the eastern coast of Sweden from 1964 to 2004.

Breeding success for the white-tailed eagle (Haliaeetus albicilla) can say something about human influence on ecosystems. Back in the 1950s it was estimated that about 72% of white-tailed eagle pairs bred successfully. This reference value is shown on the figure as the dotted line. From the mid-1950s breeding success fell drastically up to the mid-1970s. The fall is partly attributable to pollution of the Baltic Sea with DDT and PCB. These two toxins accumulate in the fat tissue and therefore build up in the food-chain in high concentrations in predators such as the white-tailed eagle.

The ban on use of DDT and PCB has helped the white-tailed eagle, and the figure shows that breeding success has increased since 1980. Today breeding success is almost as high as in the 1950s, but has stagnated at a level slightly lower than the reference value.
Brown bears and wolves

Range of Brown Bear (Ursus arctos) and Wolf (Canis lupus) from 1850 to 1998.

The trend is the same for both species, range falling over time and then increasing somewhat in recent decades. The increased range is most prominent for the bear. Both species are predators and their presence usually indicates that ecosystems are relatively healthy and not significantly burdened by environmental toxins etc. Their presence also requires that their populations are not over-exploited through non-sustainable hunting.

Arctic fox

Number of Arctic fox cubs in Norway and Sweden as well as observations of adult Arctic foxes in Finland in 2005.

In 2005 there were 21 Arctic fox cubs in Norway and 26 in Sweden. No cubs were found in Finland, but the blue dots indicate observations of adult Arctic foxes in Finland.

The map shows that the Arctic fox is close to extinction in Norway, Sweden and Finland. It is also designated as directly in danger of extinction. About 1900 the population fell dramatically throughout Fennoscandinavia. The Arctic fox was protected in Sweden in 1928, in Norway in 1930, and in Finland in 1940. There is broad agreement that hunting and trapping were behind this sudden and dramatic fall in numbers of the Arctic fox in the early 1900s. Despite almost 80 years’ protection, numbers have yet to restore themselves, and in fact continue to fall. Today there are an estimated 120 adult Arctic foxes left in Fennoscandinavia. Extensive changes in the high-mountain landscape in Fennoscandinavia since the mid-1950s could be part of the reason for the drop in Arctic fox numbers.

Increasing competition from the red fox, changes in access to food, division of the mountain landscape, and temperature changes could together explain the continuing critically low population of Arctic fox.
Introduced species

Source: National databases maintained by Sweden, Norway, Denmark, Finland & Iceland. Nordic/Baltic Network on Invasive Alien Species (NOBANIS) http://www.sns.dk/nobanis/default.htm Indicator produced by the EEA for SEBI 2010 project

Accumulated number of introduced species in the Nordic countries until 1999, analysed by freshwater, marine and terrestrial ecosystems.

This indicator shows that an ever-increasing number of new invasive species are establishing themselves in the Nordic countries. This trend is particularly clear for the marine and terrestrial environments.

Introduced species are species of flora and fauna that are not native to the Nordic countries, but which have been brought to the Nordic countries by humans at some stage. For some species, this has been intentional, such as new crops. For other species, it has been unintentional, such as species that have arrived with imported goods, on ships or in ballast water. For some species, this introduction took place centuries ago, and for others it took place only a few years ago. Some of the species that are introduced will die immediately after introduction, others will live for a brief period or in protected locations, while a small number - the invasive species - will settle down and spread in the Nordic landscape and nature.

Examples of introduced species are the Iberian forest snail (Arion lusitanicus), the signal crayfish (Pacifastacus leniusculus), giant hogweed (Heracleum pubescent), the Eurasian minnow (Phoxinus phoxinus) and the red king crab (Paralithodes camtschaticus).

This indicator is relevant in relation to the Strategy’s objective that the Nordic countries “...will contribute to European efforts to improve follow-up and assess the potential risks before non-native species are introduced, in accordance with Nordic recommendations.”
Red king crab in the Barents Sea

The range of the red king crab (Paralithodes camtschaticus) since its introduction to the eastern Barents Sea in 1961 up to 2003.

The red king crab (Paralithodes camtschaticus) is one of the largest species of crab in the world. It was introduced by Russian researchers into the Murmansk fjord from the northern Pacific in the 1960s. Since then, the crab has spread along the coast and can now be found in large numbers in north-western Norway. New studies also show that the crab can be found as far as 100 nautical miles north-west of the North Cape and increasingly further west and south.

The red king crab has a great influence on the benthic fauna as it eats everything from worms and snails to sea urchins and starfish. Therefore, it has an indirect influence on fish stocks as it eats other fishes’ food and a direct influence as it eats fish roe.

Number of nature guides

Changes in the number of nature guides in Denmark from 1994 to 2004.

This indicator illustrates dissemination of knowledge about sustainable development. Nature guides are individuals who carry out activities in nature with a view to creating greater awareness of nature. The nature guides are associated with the Nature Guide Scheme, a network scheme that comprises nature guides employed by central and local authorities and organisations. The nature guides work on the basis of common goals and have all completed special training on how to communicate nature issues.

The number of nature guides has increased significantly from 128 in 1994 to 295 in 2004. This is a sign that there is a strongly increasing demand to experience the countryside. Nature guides carry out approximately 30,000 activities a year for a total of approximately 880,000 participants. Greenland is of special note as seven new guides will be employed in Greenland in 2006.

Access to nature is the foundation for sustainable behaviour and outdoor recreational activities in the Nordic region. Nature guidance facilitates greater appreciation of nature and better awareness of environmental issues. Consequently, nature guidance constitutes an important instrument in promoting sustainable development. Besides furthering awareness of nature, the activities carried out by nature guides also promote the health and quality of life of people in general, and engage them in nature management.
The number of man-weeks worked by nature guides each year, 2002 to 2006. The two curves cover employed and volunteer (usually students) nature guides, respectively.

There has been an increase in both areas in recent years. Number of man-weeks rather than number of people is stated because of the tourist season and most natural areas only have personnel in the summer months of June, July and August. However, national parks employ full-time directors. In Iceland it is also normal that many young people offer their labour voluntarily during the busy season.

The reason for the increase in employment of nature guides is that the Icelandic countryside is attracting increasing interest from both domestic and foreign tourists. Such interest can put pressure on nature and in the long term may damage sensitive nature. Nature guides play a key role in communicating information and enhancing people’s awareness of natural assets. As well as ensuring people’s access to and enjoyment of nature, the foundation of the work of nature guides is to impress upon people the importance of treating nature with respect and care. Therefore, initiatives involve both improving tourists’ experience of nature as well as protecting nature.

The Nordic right of public access to nature

In Finland, Iceland, Norway and Sweden, everyone has the right to be out in the countryside - visitors from abroad as well as nationals. The right to move about and stay on uncultivated as well as cultivated land generally only applies when fields are frozen or covered by snow. The right of public access to nature does not apply for motor vehicles.

The public is allowed to walk, ski and rest wherever they wish. Overnight stays in the open or in a tent are also permitted in natural areas, but no closer than 150 m from houses or cabins. If a person wishes to stay overnight more than two nights in the same place, he will need permission from the landowner. Overnight stays are permitted without the consent of the landowner when this is done far from houses and in mountains areas.

The right of public access to nature also implies obligations. People must act in a considerate and careful manner so as not to harm or disadvantage the owner, users or others. People must tidy up after themselves and take care of the environment. No matter where they go, people must be respectful and not harm or unnecessarily disturb domestic animals, nature or game.

Today, the right of public access to nature is threatened by various forms of commercialisation, privatisation and not least by illegally shut-off areas in beach zones. Furthermore, a liberal practice of exemptions from planning and building legislation has led to increased building in areas which used to be attractive for recreational activities.

The right of public access to nature applies in Finland, Iceland, Norway and Sweden. In the EU and in other international contexts, the Nordic countries will work for better access to nature.
Implementation of international biodiversity agreements

Initiatives in the Nordic Strategy on Sustainable Development focus on Nordic participation in global collaboration on the Convention on Biological Diversity and implementation of the Cartagena Protocol on transboundary use of genetically modified organisms. There are no indicators for this collaboration. In connection with the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, the Nordic council of Ministers published indicators in "10 years after the convention on biological diversity" (ANP 2002:739).

Other initiatives focus on more extensive Nordic collaboration on introduced protected species and on development of Nordic action plans on protection of nature and the natural and cultural landscape in the Arctic.

Greenland is currently preparing a strategy and action plan for biodiversity and nature protection, and in the coming years, management plans will be prepared for the Ramsar area.

The table shows the date for ratification of the Convention on Biological Diversity and the Cartagena Protocol for each of the Nordic countries. It also states whether the respective Nordic countries have introduced national legislation to implement international agreements relevant to biodiversity.

<table>
<thead>
<tr>
<th>Ratification date/ status</th>
<th>Convention on Biological Diversity</th>
<th>Cartagena Protocol</th>
<th>National biodiversity strategies/ action plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>July 1994</td>
<td>October 2004</td>
<td>1997-2005</td>
</tr>
<tr>
<td>Iceland</td>
<td>September 1994</td>
<td>Non-party, but signed June 2001</td>
<td>-</td>
</tr>
<tr>
<td>Norway</td>
<td>July 1993</td>
<td>September 2003</td>
<td>-</td>
</tr>
<tr>
<td>Sweden</td>
<td>December 1993</td>
<td>September 2003</td>
<td>1994</td>
</tr>
</tbody>
</table>

Source: Secretariat for the Convention on Biological Diversity.
Relationship with other chapters

The chapters on chemicals, agriculture, fisheries and forestry also contain indicators on emissions into nature and biodiversity.

Background and perspectives

The environment action programme for 2005-08 contains 23 goals and initiatives for biodiversity (including genetic resources) as well as further goals which are vital for conservation of nature and the landscape (including the cultural landscape), for recreation, and for the effects of climate change on nature. Emphasis is on providing input for international forums (conventions, EU) as well as on involving the public and improving public information.

A number of projects have been implemented or completed to ensure that goals are achieved. Projects already completed and published include:

- Vernekriterier for geologiske elementer og kulturminner i Arktis (protection criteria for geological elements and cultural monuments in the Arctic) (TemaNord 2005:541)
- Assessing Options for Nordic-Baltic Co-operation in Biosafety (TemaNord 2005:565)
- Nordisk Fjellrevseminar (ANP 2005:720)
- Nordic and Baltic Workshop on Visitor Information Needs and Monitoring Methods (ANP 2005:728)
- Implementering av den europeiske landskapskonvensjonen i lokal og regional planlegging i Norden (implementation of the European landscape convention in local and regional planning in the Nordic region) (2005:771)

During 2006-08 further projects will be completed, including publication of a database for occurrences of marine birds and an analysis of the effects of bottom trawling in Arctic marine areas. Furthermore, a database has been established with information on invasive species of flora and fauna in the Nordic region (www.nobanis.org), and data is being gathered on Red List species in different taxonomic groups in Nordic and Baltic countries. Initiatives are also under preparation regarding possibilities to achieve the goal of stopping loss of biodiversity by 2010, including through involvement of local communities.
Agriculture

Challenges and long-term goals

The Nordic countries want a leading role in agricultural production, with emphasis on healthy and safe food and other products of high quality, animal welfare, and protection of the environment and nature. The goal is sustainable agriculture, which can produce without depleting the resource basis or negatively affecting nature’s ecosystems. Agriculture should provide a framework for recreation and conservation, and it should secure biodiversity, the landscape and cultural and natural heritage. It should form and maintain the cultural landscape as a valuable part of the natural and cultural heritage.

One of the greatest challenges in achieving sustainable agriculture is to develop agricultural techniques which are more environmentally friendly and efficient, but yet which secure social and economic sustainability under the various nature and climate conditions prevailing in the Nordic region.

In the southern part of the Nordic region, conditions for agriculture are amongst the best in Europe. Agricultural production here is very intensive and agriculture uses nutrients and pesticides which can be flow into the surface and ground water and be transported on to lakes and the sea. Biological diversity can also be affected. In the most northern parts of the Nordic region profitable agricultural production is very difficult. The Nordic countries will work to preserve agriculture in these areas. It is important to maintain decentralised agriculture in the Nordic region with varied farming structure.

Goals and initiatives 2005-2008

The Nordic countries

- will step up their efforts in connection with international negotiations, regulatory activities and agreements to ensure that joint Nordic views and standpoints on sustainable agricultural production have an impact on international rules and agreements.
- will strengthen cooperation on research and development into sustainable production systems in agriculture. Cooperation on research and higher education in agriculture and on environmental issues will be developed with a view to achieving potential synergies and thus greater impact, and to contributing to concrete improvements in terms of added environmental value in agriculture.
- will continue to promote the development of sustainable production systems in agriculture. This will include reduced environmental and health risks from the use of pesticides, reduction targets set out in the North Sea Declaration, HELCOM, OSPAR, the EU Water Framework Directive and efforts to ensure the safe use of organic waste on farmland.
- will place greater emphasis on innovative measures aimed at strengthening increases in value. There will be a need for continual restructuring in the agricultural industry in response to new knowledge and technology and changes in the market and in agricultural policy. The biggest challenges lie in the northern reaches of the Nordic region, where the special climate conditions make food production more difficult.

- are anxious to promote organic farming and move Nordic efforts in this area forward by actively targeting all the stages along the food chain from primary production through processing to consumption.
- will facilitate the long-term protection and maintenance of the rich variety of agricultural landscapes in the Nordic countries with their natural and cultural-historical values, as a resource for society. Efforts to preserve cultural landscapes in the Nordic countries should be more closely linked to work on the implementation of the European Landscape Convention.
- will focus greater attention on and actively support the multi-functional role of agriculture, including the production of collective values.
- will actively seek to promote and maintain animal health, wellbeing and ethical standards in agriculture and thereby ensure that the region as a whole continues to set an international example in this area.
- will play a prominent role in the international development of methods for assessing the potential health and environmental risks associated with use of genetically modified organisms, based on the precautionary principle.
- will broaden the basis, in terms of technical expertise, for Nordic cooperation in the reindeer herding policy sphere, and adopt specific measures aimed at making herding more sustainable. It is important to build on the cooperation already developed by the Sami in the Nordic region.
Nitrogen balance

Source: OECD 2006: OECD nutrient balances. OECD Agri-environmental indicators Volume 4

Nitrogen surplus per hectare of agricultural land is stated as the difference between nitrogen added, primarily with artificial fertilizer and manure, and nitrogen removed with crops in 1990 and 2002.

Not all of the nutrients added in agricultural production are fully utilised. The difference between the inputs and outputs of nutrients constitutes a surplus which may be regarded as a potential loss. The surplus arises when nutrients added in artificial fertilizers and manure are not taken up by crops and removed during harvesting. Emissions of nitrogen and phosphorus into the aquatic environment can lead to increased algae growth and oxygen depletion. Nitrogen losses as nitrates may also cause contamination of drinking water.

In Denmark, Sweden and Finland, the nitrogen surplus in agriculture fell from 1990 to 2002, while the surplus increased in Norway. As a result of intensive farming, the problem of nutrient runoff is greatest in Denmark. Here, a number of action plans have contributed to the significant reduction of nutrient discharges to the aquatic environment since the mid 1980s. Denmark remains among the countries in Europe with the largest nitrogen surplus per hectare.

The Nordic Strategy on Sustainable Development aims at reducing the loss of nutrients by agriculture in the short term.
Consumption of artificial fertilizers

Source: Nordic Statistical Yearbook 2005

This indicator shows the trend in the use of artificial fertilizers (nitrogen and phosphorus) in respective Nordic countries from 1989 to 2004. For crop production, manure as well as artificial fertilizer is used. The nutrients which are not taken up by the crops and removed during harvesting are lost to the surroundings (see next indicator).

Denmark has the largest consumption of nitrogen fertilizer of all Nordic countries due to the very intensive agricultural production. Finland consumes the most phosphorus. Norway and Iceland have lower consumption of both nitrogen and phosphorus, due to less intensive agricultural production and less agricultural area. All the Nordic countries have reduced consumption of phosphorus fertilizer. Finland has reduced consumption of phosphorus to less than a third, while Denmark has more than halved consumption.

Over the past 15 years, consumption of nitrogen fertilizer has halved in Denmark, while the drop in other Nordic countries has been smaller. In Finland and Sweden the drop was 20-30%, and in Iceland and Norway about 5%. The sharp drop in Denmark is due to action plans which have increased rates of exploitation of nutrients in manure and thus reduced the need for artificial fertilizers.

In the short term, the Nordic Strategy on Sustainable Development aims at reducing the loss of nutrients from agriculture. Initiatives include more efficient use of nutrients, including initiatives aimed at reducing nitrogen consumption through commercial fertilizers, requirements for better exploitation of nitrogen in manure, and introduction of nitrogen standards for crops.

Consumption of pesticides

Source: Nordic Statistical Yearbook 2005

This indicator shows the sales of pesticides stated as tonnes of active substances for the period 1985 to 2004 for the respective Nordic countries. Consumption of pesticides in Iceland is not included in the figure, but this is very low at about 4 tonnes active substance.

Pesticides are chemical substances, used primarily by agriculture to combat weeds, fungi and insects. Pesticides can harm, animals, plants and insects, but they are not harmful to the crops they are to protect. Pesticides can pollute the groundwater, lakes and water courses. There are large differences in the annual use of pesticides, depending on weather conditions and the choice of crops. Sales of pesticides in the Nordic countries have almost halved since 1985. This reduction is partly because pesticides used today are more effective at lower doses. This reduces consumption, but not necessarily the impact on the environment.

With its intensive agricultural production, Denmark had the highest consumption of pesticides of all Nordic countries in 1985. Since then, pesticides consumption in Denmark has experienced the greatest relative reduction in the Nordic region, but it remained the highest in absolute terms in the Nordic countries in 2003. Since 2000, consumption of pesticides has increased slightly in all countries.

The Nordic agriculture, forestry, fisheries and food ministers adopted a declaration in 2002 to reduce the use of pesticides. The goal is to develop a Nordic action plan to reduce the use of pesticides to the lowest level possible without significant economic consequences for society, and by using traditional methods to prevent weeds and combat disease and insects.
This indicator shows the trend in the area of organic farms in the Nordic countries. In 2003, the total organic farmland in Iceland was estimated at 6,000 ha.

All the Nordic countries have experienced a clear increase in the size of organic farmland in the past 15 years. In Sweden, where the increase has been greatest, the total area of organic farmland is 8% of the total agricultural area, while in Denmark and Finland it is around 7%. In Iceland and Norway, the organic area is 1 and 2% respectively of the total agricultural area. In the old EU Member States (EU-15), the organic farmland constitutes 4% of the total agricultural area.

At the Nordic Council of Ministers’ meeting in Greenland in August 2002, it was decided to enhance Nordic cooperation on organic farming. The Nordic agriculture ministers adopted a declaration that states that organic farming is an important contribution to sustainable agriculture, a good environment and better choices for consumers. The goal is to develop Nordic collaboration of organic agricultural production based on lifecycle analyses, where work is targeted at all links in the chain from primary production through processing to sales.
Relationship with other chapters

The chapters on consumption and food also contain indicators for pesticides, and the chapter on the sea contains an indicator on nutrient discharges to the sea.

Background and perspectives

The Nordic agriculture collaboration is based on the action programme “Nordic Fisheries, Agriculture, Forestry and Food Co-operation. Enhancing Value and the Quality of Life in the Nordic Region 2005–2008”. The Nordic countries are concentrating on projects within the following areas in order to develop and enhance sustainable agriculture:

- Organic farming
- Biodiversity/conservation of genetic resources
- Development of rural areas and the cultural landscape (see Nordfram www.norden.org/nordfram/sk/index.asp)
- Alternative types of production
- Improved exploitation of resources
- Implementation of EU regulations

For more information, see the Nordic Council of Ministers website on agriculture and forestry www.norden.org/jord_skog.

The Nordic countries benefit greatly from cooperation on mapping, conserving and exploiting their genetic resources and biological diversity. Genetic diversity is necessary for sustainable agriculture and food safety in the Nordic region and the rest of the world. See the Strategy for Genetic Resources in the Fisheries, Agriculture, Forestry, and Food Sectors in the Nordic Region 2005–2008 and the Ministerial Declaration on Access and Rights to Genetic Resources 2003.

The Nordic Gene Bank, the Nordic Gene Bank Farm Animals, and the Nordic Genetic Resources Council are important players in this field.

The Nordic agriculture cooperation intends to follow up on the Ministerial Declaration on New Nordic Food, partly by promoting Nordic ingredients, food traditions, as well as regionally and locally produced goods, both within the region and internationally.

Specific examples of activities by the secretariat of the Nordic Council of Ministers include recognising the FAO World Food Day in 2005 with the theme “Agriculture and intercultural dialogue”. The Nordic Council of Ministers opened its doors and invited 750 children to a harvest day. The idea behind the project was to promote intercultural dialogue between towns and the country by showing examples of harvests from the Nordic region, how food is processed, and how it ends as the well-known finished products in the supermarket. Through physical contact with animals and plants, tasting, and play, the children were shown the diversity and wealth of Nordic ingredients and food. Also as part of the World Food Day celebrations, the Nordic Council of Ministers opened its doors in the evening to focus on new Nordic food. More than 2,000 people came by and sampled food based on Nordic basic ingredients in a new way.

References organic farms


Forestry

Challenges and long-term goals

The goal is sustainable forestry which involves use and management of forests and forested areas so that forests can fulfill ecological, economic and social functions. Forestry should be a competitive business ensuring revenues and work places and a supply of high-quality forest products. Forestry should at the same time ensure and maintain healthy and viable forest resources and ensure and maintain biological diversity and other such environmental values. Finally, forests should be available for outdoor recreational activities.

The Nordic countries have very large forest areas and forestry has great commercial significance in the Nordic region, however there are also great differences among the individual countries. Forests are of great importance to outdoor recreation and people’s feeling of wellbeing. Forestry puts focus on biological diversity, contributes to the protection of groundwater, hinders soil erosion and absorbs and binds CO₂. Environmental considerations are gaining greater importance as a competition parameter within forestry. In large areas of forest in the Nordic region forestry is environmentally certified and the demand for eco-labelled wood products is increasing. The challenge is to develop environmentally sound and nature friendly forestry production, which at the same time are efficient and economically and socially sustainable.

Goals and initiatives for 2005-2008

The Nordic countries

- will intensify their participation in European and international cooperation on forestry matters in an effort to ensure that Nordic views on and approaches to sustainable forestry are taken into account in international agreements,
- consider that organised Nordic cooperation must be based on a joint Nordic strategy founded on national and international goals and guidelines for sustainable forestry,
- take the view that Nordic forestry research should continue, be coordinated and made more focused and will in future focus on sustainable forestry,
- will further develop nature-friendly and environmentally sound production practices. This undertaking will be coordinated between the Nordic countries. The goals must be in line with those of the pan-European forestry cooperation process,
- will contribute to the preservation of a representative and technically sufficient proportion of different Nordic forest types. It is important to promote environmentally sound forestry products inter alia by requiring that suppliers provide documentary evidence of the legal and sustainable origin of timber and wood products. Wood products can replace other materials and new products can be developed. Measures to further develop the wood processing industry, including research and the development of information systems, should be introduced,
- will emphasise and promote the social role and functions of forests. Increased access to forests and woodland is vital to open-air pursuits. Attention should also be focused on the cultural-historical dimension and on forests as plant and animal habitats. Efforts in this connection should be implemented in close cooperation with organisations representing outdoor recreation, forest owner and environment protection interests. Specific initiatives could include courses, instruction, pilot projects and intensified research,
- will continue to promote joint Nordic efforts aimed primarily at compiling existing knowledge, generating new knowledge through research and development, and stimulating development by building on joint bioenergy programmes already under way.
**Forest area**


The total area of forest in the Nordic countries, stated in million hectares.

Sweden and Finland have the largest forest area in the Nordic region with 51 % and 68 % respectively. In comparison, the forest area in Denmark and Iceland is only about 12 % and 1.4 % respectively.

In most of the Nordic countries, there are ongoing efforts to raise more forest and expand the forest area. Raising and expanding forest is however a slow process and the figure therefore shows a “snapshot” reflecting the size of forested area in the different Nordic countries.

Iceland has 30,000 ha of forest. The relatively greatest increase in forest area is taking place in Iceland where afforestation is extensive. This is a continuing trend. In Iceland, a large proportion of the country’s land area can be categorised as unsettled highland areas or wilderness areas.

Denmark’s goal is to double its forest area in the cause of one tree generation.

**Distribution of forest types**


The distribution of coniferous, deciduous and mixed forests in the Nordic region (as a percentage of total national forest area).

Natural forests with different indigenous tree species have a richer biodiversity than areas with only a single introduced tree species. In large parts of the Nordic region, natural forests are coniferous, whereas in other many places, coniferous forests may consist of introduced tree species which are deemed to provide greater financial yield. Also deciduous forests may consist of introduced tree species or tree species that are less beneficial to biodiversity, such as beech in Denmark or Southern Sweden. However, typically the scope of deciduous and, in particular, mixed forests will provide an impression of the forest’s variation and diversity.

Finland (22 million ha of forest) and Sweden (27.3 million ha of forest) have about the same distribution of coniferous, deciduous and mixed forests. These two forest-rich countries have a clear predominance of coniferous forests, which make up 80 % of the total forest area.

For Iceland, deciduous trees are predominant in the ongoing afforestation taking place.
Sustainable Development – Nordic Indicators 2006

**Stem volume**

*Source: MCPFE 2003. State of Europe’s Forests 2003*

**Average stem volume in one hectare of wood in each of the Nordic countries.**

The stem volume per hectare of forest is greatest in Denmark, and slightly smaller in Sweden, Finland and Norway. The fact that the stem volume is smallest in Iceland is because here the forests are still young.

The stem volume per hectare reflects the production intensity in the individual countries, but also indicates how old a stand is since the stem volume in a stand increases with age until the trees are ready for felling. In the majority of wooded regions where forests are managed according to traditional forestry principles concerning sustainability, the distribution of age classes will be so that the average age overall of trees will be more or less constant.

**Forest trees damaged by defoliation**

*Source: MCPFE 2003. State of Europe’s Forests 2003*

**Defoliation as a percentage of trees studied in classes 2-4 (moderate to serious defoliation or death) during the period 1990-2001. Note: The curve for Sweden only shows the trend for conifers.**

Defoliation is one of the best indicators of the state of health of forests. On the one hand, the state of health reflects the impact of external pollutants on forests, and on the other hand, it reflects forestry’s choice of tree species in relation to forest growth conditions. The state of health of forests in Sweden and Finland seems to be very constant, while in Norway defoliation increased slightly in the period 1990 to 2001.

The curve for Denmark shows a significant upward slope from 1990 which peaked in 1994-1995 and then fell to the lowest level in the most recent measurements in 2001. If there is a connection between air pollution and defoliation, it is positive that defoliation of forests in Denmark, Sweden and Finland now seems to have stabilised at a low level, while defoliation in the Norwegian forests seems to be at a slightly higher level.
Annual fellings and increment

Annual fellings and increment in forests in the Nordic countries in million m³ (measurements including bark) in the period 1991 to 2001 (varying from country to country).

Forests serve many purposes in the Nordic region. Both with regard to the public’s need for recreation and forest products, including wood. A significant prerequisite for sustainable forestry and the wish to ensure resources and opportunities for future generations is that the growth of forests is in balance with fellings. The figure shows that the total number of fellings in Nordic forests is below the increment, and that overall utilisation of the stem volume of forest resources therefore lies inside the framework of sustainable development.

The gap is greatest in Sweden. This is explained e.g. by large areas of untouched forest area (see figure further down).

Area and distribution of protected forest

Total area of protected forest in Sweden, Finland and Denmark, and by MCPFE protection classes. No data available for Norway and Iceland.

Class 1.1: No active intervention
Class 1.2: Minimum intervention
Class 1.3: Conservation Through Active Management
Class 2: Protection of Landscape and Specific Natural Elements
Class 3.1: Protective Functions - soil, water and other ecosystem functions
Class 3.2: Protective Functions – infrastructure and managed natural resources

Protected forests are forests subject to restricted use. The purpose of protection for example can be to enhance the biological diversity of the forest, preserve the landscape, or protect waters, soil or unique forest types.

This figure does not show any clear trends. There is a substantial difference between Class 1 protected forests which are subject to considerable restrictions on intervention thus making forestry limited; Class 2 protected forest which allows for more traditional forestry however with special consideration for landscape and nature; and finally Class 3 protected forest which still leaves good opportunities for traditional forestry operations.

Sweden contains large areas with untouched forest. Here, biodiversity can develop freely without human intervention. Sweden also contains large areas of Class 3.1 protected forest where restrictions on use of the forest are fairly limited. Finland contains large areas where interventions are limited to a minimum and where biodiversity has substantially better conditions than in traditional forests.

This indicator can be difficult to interpret since all the Nordic countries contain forest areas where such protective considerations are taken but which are not included in the statistics. However, it is the best indicator for MCPFE-protected forests.
Deadwood

Data from FAO

The amount of deadwood in forests in Finland, Norway and Sweden.

An important indicator in terms of safeguarding biological diversity in forests is proper foundation for the many food chains sustained by forests, from the smallest organisms to large predators. Many food chains start with the decomposition of deadwood by microorganisms and continue with insects which e.g. serve as the food base for a number of birds. In all the Nordic countries ensuring deadwood to enhance biodiversity is a great priority.

This is an indicator which the Nordic Council of Ministers’ Committee of Senior Officials on forestry ascribes great importance, however it is a fairly new indicator based on what limited knowledge is available at the moment. We expect the data basis to improve and expand in the coming years.

The financial significance of the forestry sector and wood industry


Value creation in the forestry sector and wood-processing industries in percent in the year 2000.

Contributing more than 7 % to GDP, forestry plays an important financial role in Finland. In Sweden the share is around 4 %, and in Denmark it is around 2 %. There are no figures available for Norway and Iceland.

The socio-economic significance of the industry is reflected in its significant contribution to employment. The significance of the industry among the different Nordic countries varies, but from an overall perspective forests and related processing industries constitute an important sector for the Nordic region.

In relation to sustainability, the aim is that forestry caters to society’s social, environmental as well as financial needs.
Relationship with other chapters

This chapter relates to the chapter on energy, which also includes biomass, and to the chapter on biological diversity.

Background and perspectives

As part of the MCPFE (Ministerial Conference on the Protection of Forests in Europe) process, a total of 35 indicators for sustainable forest management have been adopted in a pan-European context. Seven of these indicators with special significance for the Nordic countries and the Nordic Strategy on Sustainable Development have been selected for this chapter. However, the complete set of MCPFE indicators should be consulted for a complete picture of Nordic trends within the forest area. The indicators selected for this chapter more or less reflect the international priorities set for the area, but they have also been chosen because they illustrate trends in forestry in the Nordic countries in relation to the Nordic Strategy on Sustainable Development; i.e. the Strategy’s long-term and short-term goals and initiatives. However, this indicator set as a whole only provides limited insight into the significance of forestry and could be far broader in scope. For example, indicators to describe the sector’s significance in terms of outdoor recreation and employment are particularly needed.

Many indicators were proposed which could describe trends in Nordic forestry with regard to sustainable development far better than the ones chosen here. However, since it had been decided to select indicators exclusively from among indicators under MCPFE, other proposed indicators which are used by some of or all of the Nordic countries, but which are not part of the pan-European cooperation could not be selected for this report.

The Nordic cooperation within forestry is based on the action plan “Nordic Fisheries, Agriculture, Forestry and Food Co-operation - Enhancing Value and the Quality of Life in the Nordic Region”. Projects within the following action areas have been launched and are given priority with the purpose of of developing and enhancing sustainable forest management:

- bioenergy
- refining and processing wood
- nature friendly and environmentally sound forestry production
- forests’ potential in a climate context

Nordic cooperation on forestry also gives priority to following up on the ministerial conference on forests that was held in August 2005. A number of initiatives were recommended, all of which are to contribute to boosting the local significance and value of forests and promoting the economic, ecological and social values of forests. For more information, see the Agriculture and Forestry section of the Nordic Council of Ministers’ website.

For a number of years, forestry cooperation efforts have aimed at optimising and making research and education activities within this ministerial area more efficient. Forestry research managed by SNS - Nordic Forest Research Co-operation Committee has been deemed of international standard and of extraordinary use to the Nordic region. At their meetings in 2004 and 2005, the Ministers decided to enhance forestry research further and increase collaboration with NordForsk. SNS will therefore work to increase its cooperation with NordForsk by applying for the establishment of Centres of Excellence under NordForsk within one of the SNS priority research fields.

Cooperation efforts by the Nordic countries on mapping, preserving and utilising genetic resources and biodiversity in the Nordic region are of great use. Genetic diversity is a precondition for sustainable forest management in the Nordic region and in the world at large. See Strategy for Genetic Resources in the Fisheries, Agriculture, Forestry, and Food Sectors in the Nordic Region 2005–2008 and Nordic Ministerial Declaration - Access and Rights to Genetic Resources 2003.

The Nordic Forestry, Seed and Plant Council (NSFP), network for forest genetic resources, and the Nordic Genetic Resources Council are taking active part in this work. Finally, Nordic forestry indicators can be studied in the publication “Forest biodiversity indicators in the Nordic countries. Status based on forest inventories, which were published in 2003 in the series Agriculture and Forestry” (Tema Nord 2003:514). The publication is available at: www.norden.org.
Fisheries and Aquaculture

Challenges and long-term goals

The living resources of the sea represent both a source of wealth and an important area of common responsibility for the Nordic countries. Fish and fisheries are a vital means of support for coastal communities throughout the region – from the North Atlantic in the west to Arctic areas in the north and the Baltic Sea in the east. For many peoples and local communities in the Nordic area, marine living resources are essential to life itself.

The Nordic fisheries policy must develop the utilisation of the marine living resources to the benefit of present and future fisheries communities. This development must be based on sustainability, ensuring the renewal of resources, a clean and biologically diverse sea and healthy fish products for consumers. Nordic fisheries policy covers fisheries, catches of marine mammals and sea birds, as well as other utilisation of the marine living resources. Freshwater fishing is also covered.

The overall goal within the next 20 years is to develop the Nordic fisheries policy in line with the principle of long-term sustainable use of marine living resources through ecosystem management as described in the Convention on Biological Diversity.

Goals and initiatives for 2005-2008

The Nordic countries

• should lead the way, particularly in relation to the EU and other international forums, in adjusting capacity to the resource base, thereby demonstrating the benefits of such a move. Here, there is a need for closer regional cooperation in line with the Johannesburg targets and for better coordination of the implementation of integrated, ecosystem-based management. This calls in particular for improved coordination by the Nordic countries at national level,
• have drawn up the following education and research goals: i) maximal utilisation of all harvested resources, including by-catches, gutting residues and other matter presently thrown back into the sea. The development of (by-)products through utilisation of residual fractions, non-commercial target species and new opportunities to increase product value,
• consider it necessary to step up education and research on economic and social factors and the relationship between management systems and sustainability in the utilisation of marine living resources,
• support research aimed at providing a basis for scientific, balanced dietary advice to consumers, with regard to ingredients that benefit consumer health and to environmental toxins that accumulate in the marine food chain and which may represent a health hazard,
• consider that there is a widespread need for sectoral players to join forces with the education and research sector, with a view to coordinating the development of a joint Nordic training programme that offers skills at all levels of relevance for the future sustainable development and competitiveness of the sector,
• consider that dialogue and active cooperation between administrative authorities and enterprises are essential to the task of introducing effective measures that benefit sustainable development based on marine living resources. Cooperation in this area is to be given additional resources and improved,
• urge Nordic organisations in the fisheries sector to become actively involved in the shaping of strategies and priorities in cooperation with public authorities and the research community,
• aim to survey and reduce energy consumption and waste disposal on the part of fishing fleets, in close cooperation with enterprises,
• support the further development of fishing techniques that help reduce adverse effects on the natural environment, including the harmful impact of deep trawling equipment on the seabed and its biodiversity. Consideration must be given to the working environment of professional fishermen and its effect on their health,
• will seek to promote broad international endorsement of the sustainable management of marine mammals. The International Whaling Commission (IWC) must be restored to its position as a conservation, research and management body.
The majority of fish stocks are common stocks fished by several nations. This means that these nations have to negotiate the allocation of fishing quotas. How much can be fished is decided on the basis of expert scientific advice about the state of the individual fish stock and its marine habitat. The International Council for the Exploration of the Sea (ICES) is charged with the task of providing scientific advice about the state of fish stocks and where the individual stock can be fished.

Sustainable fisheries of marine living resources require well-functioning marine ecosystems. It also requires continuous adequate recruitment within the stocks being fished. Recruitment is dependent on the amount of fish able to spawn (the spawning stock biomass). Historically, there has been both weak and strong year classes observed and this has had to do less with the size of the spawning stock biomass than with the survival rate of the fish during their first critical period as spawn and larvae.

Ecosystem-based management advice requires high professional standards. Amongst other things, it is important to know how fisheries affect other steps in the food chain, and how these changes in turn affect the catch potential for the individual stock. Furthermore, there are external factors which significantly influence marine ecosystems, both manmade factors, such as pollution, and natural factors, such as wind and currents. In the practical management of fish stocks, it is necessary to establish points of reference that consider the uncertainty of individual statements of stocks and impacts on the dynamics of the ecosystem.

Founded on the concept of sustainability and the precautionary principle, models for the specific assessment of the sustainable exploitation of marine living resources are being developed within the framework of ICES. Historical observations of the relationship between spawning stock biomass and recruitment are the basis for these models. On the basis of the historical data, researchers are attempting to define the level of spawning stock biomass which leads to reduced recruitment. This threshold value is called Blim. Attempts are also being made to find the level for fishing mortality on the basis of the historical data. In order to provide advice that will make sure Blim is not exceeded, a precautionary reference point (Bpa) is calculated for each fish stock. These two reference points take account of the uncertainty of stock assessments and catch statements and are set so that for a stock with the lowest Bpa and a fishing mortality of the highest Fpa, there is a great probability that the stock will remain above Blim.

In the following are indicators for the trend in the spawning stock biomass of major fish species in the Nordic seas. Where reference values for Blim and Bpa exist, these are shown in the figures. Data and text are from the latest assessments of fish stocks from ICES. ICES updates these assessments regularly, for some of the stocks 1-2 times annually. The most recent assessments of the fish stocks are available on the ICES website at: http://www.ices.dk/advice/icesadvice.asp.
The Baltic Sea

Total fish catches have increased tenfold since the early 20th century as a result of more effective open sea fishing, a smaller loss due to predating seals and increased fish production due to eutrophication. Eutrophication is a double-edged sword, however, as it also has negative impacts, particularly in spawning areas, leading to reductions in the reproduction success of many fish species. Another man-made problem affecting natural reproduction is the widespread damming of the spawning rivers of fish species like salmon, trout, etc. This has led to considerable reductions in stocks. About 90% of catches in the Baltic Sea consists of herring, sprat and cod. Even though salmon only accounts for about 1% of the total catch by weight, it is still a commercially important species.

Cod


The cod stock in the Baltic Sea is at a historical low level and there are no signs of an increase in the spawning stock biomass. Based on estimates of SSB and fishing mortality, ICES classifies the stock as suffering reduced reproduction capacity and as being harvested unsustainably.

Cod can only spawn successfully in oxygenated waters with salinity levels of at least 12 PSU. A lack of oxygen combined with overfishing has drastically reduced cod catches in the Baltic Sea since the mid-1980s.

Herring


There is a lack of reference points for SSB of herring in the Baltic Sea and the state of the stock can therefore not be assessed. The SSB has decreased steadily since the mid-1970s. In 1999, the stock reached a low point but is now on the rise again. According to ICES’ assessment the stock is at risk of being managed unsustainably. In the central Baltic Sea, SSB is low, whereas it is doing better in the Bothnian Sea and in the Gulf of Riga.
The North Sea

For the last three to four years, recruitment has been poor for stocks of sand eel, Norway pout, cod and, partly also, for herring in the North Sea. This is primarily due to changes in the physical and biological conditions, while cod and sand eel stocks have been subject to overfishing. Fishing for cod in the North Sea should have been stopped several years ago. Furthermore, illegal landings and dumping of catches make it difficult to calculate the size of some individual stocks, particularly mackerel and cod stocks.

Cod


Assessment of the stock is based on the trend in SSB and survey results. Recent estimates of fishing mortality are uncertain. On the basis of this, ICES assesses the stock to have reduced reproduction capacity.

Cod is the most prominent example of a stock under severe pressure in the North Sea. SSB was around 250,000 tonnes in the early 1970s but is now less than 50,000 tonnes. While SSB has dropped, fishing intensity has increased steadily.

Herring


Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproduction capacity and as being harvested sustainably. However, monitoring of the year classes from 2002, 2003 and 2004 is required as these are very small.
The Faroe Islands

Economically fishing is the most crucial activity in the Faroe Islands. Fish products account for more than 90% of the export value, and fisheries and fish farming account for about 40% of GDP. The demersal main species are pollack, cod, redfish and haddock, while the most important pelagic species is blue whiting. The catch of demersal fish species is somewhere between 80,000 and 120,000 tonnes annually, and the catch of pelagic species is up to 500,000 tonnes. The Faroese management system is unique. It consists of two main components: a system for fishing efforts and a network of closed areas. One of the advantages of this system is that discarding and upgrading of catches are avoided.

Cod

Trends in SSB of cod around the Faroe Islands from 1961 to 2005.

ICES’ most recent assessment based on estimates of SSB indicates that the stock is at risk of reduced reproduction capacity. SSB in 2005 was at the same level as before the collapse in 1990. Furthermore, the latest estimates of fishing mortality suggest that the stock is being fished unsustainably. SSB has been higher than Bpa in recent years; however since 2004 it has been below Bpa.
Iceland

Fishing has been an important activity in Iceland since people first settled, and up through the last century, development of fisheries has been the basis for the country’s progress and financial growth. The fisheries sector in Iceland accounts for more than 60 % of income from exported goods and up to 40 % of the country’s total exports. The fisheries sector does not receive any economic support from the state.

Within Iceland’s exclusive fishing zone of 758,000 km² are some of the richest fishing grounds in the world. The most productive cod banks are off the southwest coast during winter and off the West Fjords in the north-west all year round. Redfish is mostly found off coasts in the south, the west and the southeast. Herring is largely confined to the East Fjords and southeast coast, while capelin feeding grounds are to the north and spawning grounds are off the south and west coasts. Greenland halibut is found on deep banks off the West Fjords as well as elsewhere off the north, west and east coasts. Oceanic redfish is harvested along the Reykjanes Ridge, inside and outside the 200-mile limit south-west of Iceland. Other stocks such as inshore shrimp, scallop, nephrops and deep-sea shrimp are fairly localised.

Icelandic ships catch almost 2 million tonnes of marine species annually, of which the major part is exported.

Cod

Trends in SSB of cod around Iceland from 1955 to 2005.

The fishing mortality (0.6) is above the desired level (0.4). In 2005, SSB was 262,000 tonnes, which is 123,000 tonnes above the historically lowest level, however, somewhat below the desired long-term average of 304,000 tonnes. The year classes 1997, 2000 and 2002 were of average size, whereas the 2001, 2003 and 2004 classes were small. The year classes 2001 and 2004 seem to be close to a historical low point.

Herring

The stock of herring is difficult to assess, due to a lack of reliable estimates of SSB. Icelandic surveys show that SSB has increased continuously since 1987 and that the stock has full reproduction capacity.
**The Norwegian Sea**

The large pelagic fish stocks: herring, mackerel and blue whiting, which forage in the Norwegian Sea, are all in good health. A total of 10 million tonnes of pelagic fish migrate through and forage in this area.

**Herring**


The most recent estimates for SSB and fishing mortality mean that ICES classifies the stock as being utilised sustainably and as having full reproduction capacity. The most recent year classes are strong.

**Blue whiting**


The most recent estimates of fishing mortality and SSB mean that ICES classifies the stock as having full reproduction capacity, however it is not being fished sustainably. SSB was historically high in 2003 but was lower in 2004 and 2005.
The Barents Sea

The warm climate of the Barents Sea promotes the production of cod, haddock and herring, but also creates difficulties for capelin. The greatest management-related problem is the extensive unrecorded fishing of cod. The stock of northeast Arctic cod has been increasing since 2000 and SSB is currently at a good level. However, cod is still being fished more than can be considered sustainable. According to information from the Norwegian directorate of fisheries, extensive non-reported fishing took place in the period 2002-2004, which has led to considerable overfishing of quotas. If this problem is not addressed, it will have negative consequences for the stock.

Cod

Trends in SSB of cod in the northeast Arctic area from 1946 to 2005.

On the basis of SSB, ICES assesses that the stock has full reproduction capacity. However, estimates of fishing mortality indicate that the stock is being exploited with a fishing mortality above the desired level set out in the management plan.
Relationship with other chapters

Chapters about the sea contain indicators on hazardous substances in fish.

Background and perspectives

Nordic fisheries cooperation is based on the action plan “Nordic Fisheries, Agriculture, Forestry and Food Co-operation - Enhancing Value and the Quality of Life in the Nordic Region”.

Fisheries cooperation includes about 25 current projects which to differing degrees relate to the Strategy on Sustainable Development. Cooperation in this area is continuously developing essential aspects of the sustainability in the Nordic fisheries sectors. Areas in which activities have been set in play include:

- the development of indicators for sustainable fisheries
- genetic issues related to fisheries and fish farming
- discussions on the resource problematic in fisheries
- training and education in fisheries (at academic and non-academic levels)
- protection of marine habitats.

Work on indicators in the fisheries sector will result in a report to be made available at the Fisheries section of the Nordic Council of Ministers’ website at a later stage.

During 2006, a series of workshops will be held within the areas mentioned above, as independent activities or as part of a large research project.

The largest single event will be the Norwegian Chairmanship’s conference in Bergen in September 2006: “Implementing ecosystem approach to Fisheries”

Relevant publications in the TemaNord series (from May 2005 to May 2006) include:

- Håndtering av avfall ombord på fiskebåter og mindre fartøy (Waste management on board large and small fishing boats; not available in English)
- Beste tilgiengelige teknikker for fiskeoppdrett i Norden (Best available techniques in fishfarming in the Nordic region; not available in English)
- Discrepancies in Fishing legislation (DVD)
- Fast avfall från fiskefartyg (Solid waste from fishing boats; not available in English)
- Risks and Management of Dioxins and Dioxin-like Compounds in Baltic Sea Fish: An Integrated Assessment
- Workshop on the Development and Management of Marine Protected Areas

Marine aquaculture

Several of the working groups of the Nordic Council of Ministers support a project which has the overarching goal of establishing the basis for developing production methods within marine fish farming that are sound as regard both the environment and health. This project is the expression of a wish to support environmentally friendly production in a Nordic context and the realisation of the EU action plan for aquaculture in a Nordic perspective.
Total list of indicators

Key indicators

- Land use in the Nordic Region
- Economic growth
- Decoupling environmental impacts from economic growth
- Number of licenses to manufacture eco-labelled products
- Gross energy consumption per capita
- Renewables' share of gross energy consumption
- Fertility rate
- Life expectancy at birth
- Unemployment
- People killed in road accidents
- Energy consumption in the transport sector
- Cases of infection with Campylobacter
- Overweight
- Use of mercury
- Temperature trends
- Emissions of greenhouse gases
- Cod spawning stock biomass in Nordic waters
- Organic farms
- Forest trees damaged by defoliation
- Introduced species
- The Nordic right of public access to nature
- Voter turnout
- The Nordic Sami Parliaments

Sustainable production and consumption

- Domestic material consumption (DMC)
- Industrial waste
- Household waste per capita
- Consumption of food per capita
- Household energy consumption per capita
- Number of Nordic enterprises with ISO 14000 certification or EMAS registration
- Number of licenses to manufacture eco-labelled products
- Fair trade
- The share of green taxes in overall tax revenues

Transport

- People killed in road accidents, per year
- People killed in road accidents, per 1000 inhabitants
- Energy consumption in the transport sector per 1000 inhabitants
- Traffic and air pollution

Energy

- Gross energy consumption per capita
- Gross energy consumption relative to gross domestic product
- Emissions of carbon dioxide relative to gross energy consumption
- Emissions of sulfur dioxide relative to gross energy consumption
- Emissions of nitrogen oxides relative to gross energy consumption
- Net exports of electricity from the Nordic electricity market
- Degree of self-sufficiency in energy supply in the Nordic countries
- Renewables’ share of gross energy consumption
- Renewables’ share of gross electricity consumption

The Sea

- Environmental toxins in cod
- Emissions of heavy metals to the air
- Discharge of heavy metals with water
- Discharge of nutrients

Chemicals

- Hazardous waste
- Hazardous substances
- Hazardous substances in breast milk
- Number of classified substances on the EU’s list of hazardous substances
- Use of mercury
- Sales of pesticides to the general public

Food safety and health

- Cases of Campylobacter in humans
- Human cases of Salmonella
- Number of chemical flavorings assessed/to be assessed
- Number of food packaging etc. which have to be assessed for risk
- Pesticide residues in food
- Overweight
Climate and air quality

- Emissions of greenhouse gases
- Emissions of greenhouse gases relative to the Kyoto targets
- Changes in length of the growth season
- Temperature trends
- Climate change in the Arctic
- Emissions of industrial greenhouse gases
- Net uptake of carbon dioxide by forests
- Emissions of air pollutants
- Air quality in Nordic cities
- Particles

Biological biodiversity in the natural and cultural landscape

- Wilderness areas
- Protected natural areas
- Birds in cultivated areas
- The Icelandic white tailed eagle
- Breeding success for Swedish white-tailed eagles
- Brown bears and wolves
- Arctic fox
- Introduced species
- Red king crab in the Barents Sea
- Number of nature guides
- Nature guides in Iceland
- The Nordic right of public access to nature
- Implementation of international biodiversity agreements

Agriculture

- Consumption of pesticides
- Consumption of artificial fertilizers
- Nitrogen balance
- Organic farms

Forestry

- Forest areas
- Distribution of forest types
- Stem volume
- Forest trees damaged by defoliation
- Annual felling and increment
- Area and distribution of protected forest
- Deadwood
- The financial significance of the forest sector and wood industry

Fisheries and aquaculture

- The Baltic Sea (cod and heering)
- The North Sea (cod and heering)
- The Faroe Islands (cod)
- Iceland (cod and heering)
- The Norwegian Sea (heering and blue whiting)
- The Barents Sea (cod)
The purpose of this Nordic set of indicators is to inform the public and political decision makers whether the Nordic countries and self-governing areas are heading in the right direction towards sustainable development or not; both in general and in specific areas. The indicators also point out if there is a need to promote the development towards a more sustainable direction. The chosen indicators are monitoring the Nordic implementation of the goals and initiatives for 2005-2008, as they are set up in the revised Nordic Strategy “Sustainable development – New bearings for the Nordic countries”.

The set of indicators contains a number of overall key-indicators as well as indicators relevant to the specific sectors or cross-cutting areas pointed out in the revised strategy. New areas in the revised strategy are the social dimension as well as sustainable production and consumption.

The Nordic Council of Ministers has published Nordic sets of indicators in 2002 and 2003.