



State of the Environment in Denmark 2005

Illustrated summary

What condition is our environment in? This is the question that the report "State of the Environment in Denmark 2005" addresses.

The report summarises current knowledge of the main trends with regard to the state of the environment and nature in Denmark. The report describes how these developments are connected with developments in society as a whole and the impacts that can be expected with regard to our health.

This illustrated summary shows the most important trends and provides an overall picture of the issues covered by the report. The main report is in Danish only.



State of the Environment 2005

Status and trends

State of the Environment in Denmark 2005 – Illustrated summary

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http://www2.dmu.dk/1_Viden/2_Publikationer/3_fagrapporter/rapporter/FR550.pdf

The Danish state of the environment report is published every four years, and the 2005 issue is the fourth in the series. The aim of the report is to provide an overall picture of the developments in the state of the environment and the nature, and describe the underlying reasons for these developments as well as the consequences for, amongst other things, human health.

In the mid-1980s, environmental issues were high on the political agenda and, at that time, Danes were more concerned about pollution than unemployment and foreign debt. Politicians recognised that it was necessary to increase efforts to safeguard the environment and nature. However, both a lack of knowledge and view of the overall picture meant that it was difficult for politicians to arrive at convincing solutions, which at the same time focused on larger problems before lesser problems. Environmental research and monitoring over the subsequent 20 years has provided a great deal of insight and knowledge which, in turn, can secure the scientific basis for efforts to protect the environment as well as the means to provide an overall picture, both of which were lacking 20 years ago.

The state of the environment report collects existing knowledge and presents this knowledge to provide politicians, citizens and other stakeholders with the information they require – for politicians to prioritise their policy efforts and enabling citizens and other interest groups to take part in the environmental debate.

The report provides a snapshot which, looking back, shows how the environment has developed up until the present. It is not possible to cover everything and the report, most of all, does not cover the day's breaking news items on the environmental agenda. These items are communicated in other ways. We have selected the issues which we consider to be the most important in order to be able to describe the state of the environment. Changes are occurring continuously, and it can be difficult to take everything into consideration. However, as far as possible, we have attempted to make assessments, which reflect the challenges of tomorrow. Throughout the report, many examples are provided where developments are proceeding in the right direction. Goals are being achieved, environmental impacts are decreasing – or, at least, are increasing more slowly than growth in society's activities. This is known as decoupling. However, there continue to be examples where we must note that goals are not being fulfilled, and decoupling is not taking place.

Therefore, there is every possible reason for research and monitoring to continue to develop so that society can be at the leading edge of not only today's challenges, but also of those of the future.



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Developments in society affect environment and nature



The influence of society on the state of the environment

Developments in society affect the state of the environment and nature. This relates to changes in both the size and the age distribution of the population, changes in production as well as consumption of goods.

From an economic point of view, industry and services are the most important sectors in society, whilst agriculture, energy and transport are the areas which exercise the greatest influence on nature and the environment. Agriculture affects the environment by means of use of fertilisers and pesticides, whilst the consumption of coal, oil and natural gas for energy and transport leads to a range of associated impacts on the environment.

The intensification of agriculture

Agriculture continues to specialise and intensify. The number of farms is falling; farms are becoming larger and the number of livestock on the individual farm is rising. The crop yield now is approximately the same as it was 15 years ago, but comes from a smaller area under cultivation. The agricultural sector's own estimates forecast that this trend will continue, with the area of land under cultivation falling by around 6.5% and the disappearance of 22,000 farming units (around 50% of the total) by 2015. Moreover, it is expected that more crops will be grown, not for food production, but for the production of bio-energy. Intensive farming practises result in reduced variation in landscapes and reduced wildlife in and around the fields. The continued inten-

sification and specialisation can also lead to pollution being more concentrated in certain areas – for example, in the vicinity of larger pig production units. Intensification can, on the other hand, mean that nutrients and pesticides can be utilised better, as farming units become more efficient.

The emission of ammonia from livestock production has fallen by around 30% from 1985 to 2003, but the livestock units continue to create problems for neighbours with regard to odour as well as for sensitive natural areas. The leaching of nitrogen to water has fallen around 48% from 1989 to 2003, which is close to the goal for the National Action Plan for the Aquatic Environment.

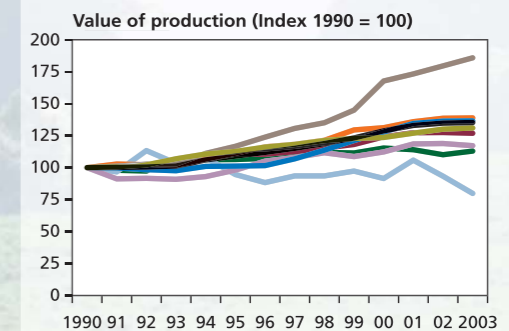
Consumption of pesticides in Denmark has decreased 58% since the beginning of the 1980s. Pesticides are mainly used in agriculture but also in horticulture and forestry, not to mention private gardens and public areas, e.g. along railway lines and roads. The authorities use application frequency as a measure for the impact on the environment. Application frequency is the number of times a field is sprayed with a pesticide in the recommended dosage. Application frequency has decreased 18% since the beginning of the 1980s and, in 2003, the frequency was 2.04. This figure varies from year to year, among other things, due to weather conditions as these affect the requirement to use pesticides. The latest Pesticides Plan (2004–2009) contains as one of the goals to reduce the application frequency to 1.7 before 2009.

Forestry is more than the production of wood

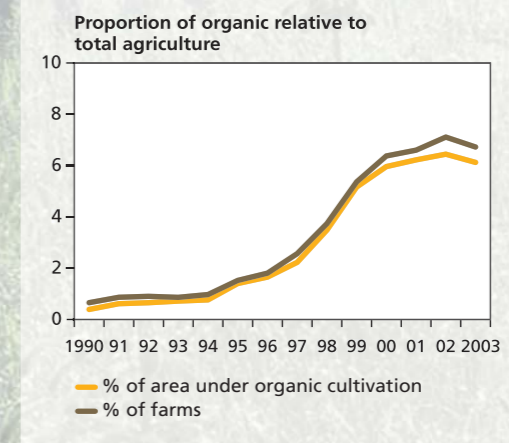
Forests are undergoing a process of change. The aim is to double Denmark's forest area over the course of 80–100 years, to change forestry towards more natural cultivation forms and to secure forests' natural values. The area of forest comprises approx. 11% of Denmark's total land area, and the forested area is rising by 2,500 hectares per year. On average, 4–5,000 hectares of forest need to be planted each year in order to achieve the goal of doubling the area. Current development trends of forestry emphasize biodiversity, groundwater protection, climate, hunting, recreation and preservation of sites of cultural heritage, rather than the production of wood alone.

Fishing encounters limits

The fishing industry is stagnating as a result of the quotas that the EU sets in order to protect declining fish populations. Especially cod is threatened by intensive fishing practices. The environmental impact of fishery also includes damage resulting from the methods used to catch the fish, e.g. bottom trawling, which destroys plant- and animal-life on the seabed. Production from aquaculture was valued at 1 billion DKK in 2003, which equates to the value of the Danish cod catch. Fish farming impacts the local water environment with nutrients from leftover food and with antibiotics used to combat disease. Aquaculture has significant potential for growth, if it is possible to reduce the impact on the environment associated with these activities.



The value of production has especially increased for transport and communication, while it has decreased for primary sectors, such as agriculture and fishery.



The number of organic farms and the area of land under organic cultivation as shares of the respective totals for farming as a whole. Demand for organic goods has risen during the 1990s but has levelled out in recent years. Around 6% of agricultural land is under organic cultivation today and 3% of the total income for agriculture as a whole is generated by organic farms.

Energy production and transport are

of great significance

Energy production is made more efficient

Denmark's energy production is increasing and a significant proportion is exported. The importance of oil as a source of energy has declined from 50% in 1985 to 40% in 2004, while especially natural gas and renewable energy have been on the increase. Renewable energy stems from biomass, waste, wind, the sun and energy from heat pumps, and this energy source now accounts for over 20% of the gross energy consumption.

The environmental impact from the production of energy has, in many areas, fallen. Sulphur emissions have fallen by approx. 98% and the emission of nitrogen oxides by 50% since 1985. However, since 2000, these emissions have increased in line with rising energy production. Energy production is the most important source of greenhouse gas emissions. The emission of greenhouse gases varies from year to year due to climatic variations and the annual energy trade balance. In 2003, emissions were approx. 10% higher than in 1990.

Renewable energy is not without negative environmental impact. The incineration of waste leads to the emission of polluting substances as well as ashes and slags which are sent to landfill. Windmills impact especially on the visual environment and noise can be a problem. The effect of sea windmills on birds, fish and sea mammals continues to be a focus of research.

Industrial energy consumption is falling

Industrial production impacts on the environment in various ways. Since the 1990s, industrial energy consumption has decreased at the same time as the value of production has risen. Today, industrial wastewater is treated, as a result of the National Action Plans for the Aquatic Environment, and the heavy metal content in industrial wastewater is, typically, no higher than that in household wastewater. However, industry is still a significant contributor of heavy metals to the air, and industry uses a range of chemical substances which are damaging to health and are undesirable in the environment. The authorities are increasingly focusing on the environmental impacts of industry, by limiting the effects of the products which industry produce. With regard to waste, industrial waste accounts for 15–20% of total waste produced.

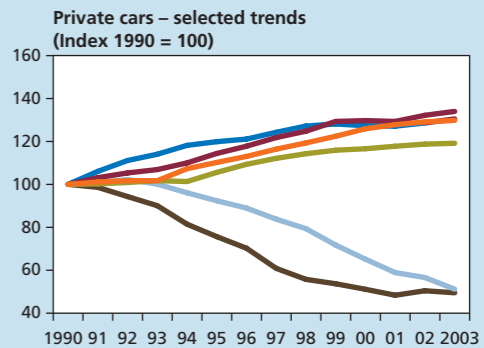
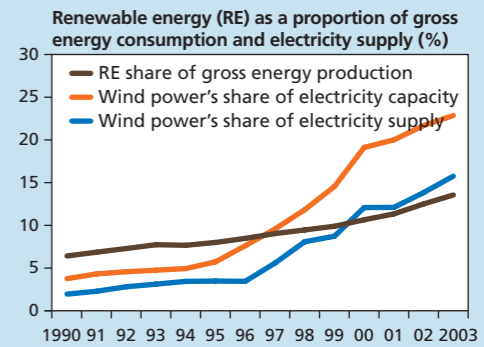
Transport is growing

Both personal and goods transportation is growing roughly in line with the economic growth. Traffic is associated with a broad spectrum of environmental impacts. This activity is responsible for 31% of the final energy consumption, over half of the consumption of oil products, and significant shares (a quarter or more) of the emissions of substances such as nitrogen oxides, hydrocarbons, greenhouse gases and particles.

Stricter requirements with regard to engines and the use of cleaner fuels have meant that the emission of nitrogen oxides and hydrocarbons from traffic has reduced markedly. The emission of greenhouse gases from traffic has, on the other hand, increased in step with the increasing levels of traffic, as no similar requirements exist in this area. The emission of particles has fallen a great deal since 1990. However, this trend has now stopped. The primary reason for this is the rise in the number of private diesel cars as these emit more particles than cars running on petrol.

Traffic represents the most widespread source of noise. Roads create barriers which can impact on the natural environment as well as amenity values and the mobility of people and animals. Approximately 60% of Denmark's special protection areas for birds are within 5 km of an important traffic route.

The government's strategy for sustainable development includes environmental goals for transport. For example, the rise in the emission of greenhouse gases from traffic is to be halted. Up until now, emissions have risen in line with economic growth. Further, the emission of nitrogen oxides and hydrocarbons is to be reduced by 60% from 1988 to 2010. A fall of around 50% has been achieved to date.



Renewable energy comprises an increasing share of total energy supply, corresponding with political objectives. The goal for renewable energy to reach 20% of total electricity supply by the end of 2003 has been achieved. The extension of wind power continues and is now concentrated on sea windmills.

Car traffic is increasing in step with economic growth. Some of the impacts from cars are falling, e.g. emissions of nitrogen oxides and particles are decreasing, while emissions of CO₂, for example, are increasing.



Economic growth does not always lead to increased environmental impact

Consumption is rising

Consumption in Denmark rose 20% from 1990 to 2003 with knock-on effects in the fields of production, import, transport and waste generation. In some areas, the increase in consumption resulted in increased impact on the environment, while, in other areas, more environmentally-sound products and consumption behaviour have come into play.

Consumption has changed in step with rising standards of welfare. We use, for example, relatively less on our homes and food, but more on electronic equipment such as PCs and mobile phones. Food consumption has not changed a great deal, but demand for organic products, with lower impact than in conventional farming, has increased. Today, organic products comprise around 5% of food consumption in Denmark, a share which is among the highest in the world.

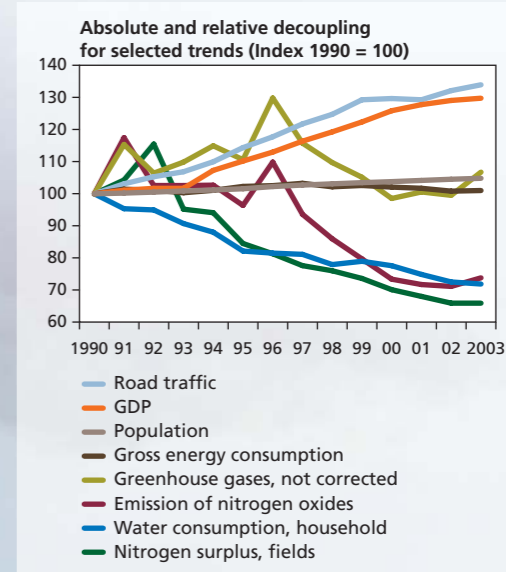
Energy consumption in households has risen by around 7% since 1990. Energy consumed for heating has fallen by around 25% since 1985, while consumption of electricity for electrical appliances, lighting, etc. has risen slightly. Appliances are becoming more efficient with regard to electricity consumption. However, the number of appliances in use has increased.

Households produce around a quarter of the total waste in Denmark. The amount produced increased for many years, but since levelled out and from 2002 to 2003, the amount of waste fell by 4%. The Danish Environmental Protection Agency estimates that the total waste amount will increase 27% from 2000 to 2020, which is a little lower than the expected rate of economic growth. The overall goal for the treatment of waste is that 65% of the waste is re-used, 26% is incinerated, with the remaining 9% being sent to landfill. This goal has been achieved.

Decoupling of growth and environmental impact

Denmark's strategy for sustainable development from 2002, "Our common future – balanced development" ("Fælles fremtid – udvikling i balance"), aims to consider both economic growth and environmental protection. Included in the strategy is that changes in behaviour and more environmentally effective technology are able to prevent economic growth necessarily leading to increased environmental impact. The phenomenon is termed "decoupling".

In a number of areas marked decoupling tendencies can be observed. For example, household water consumption has fallen despite an overall rise in household consumption. Similarly, nitrogen oxides and sulphur emission from energy production and traffic have fallen despite rising activity in these areas. In the industrial sector, production is increasing at the same time as energy consumption is falling, e.g. in the paper and in the cement industry. In a number of other areas, decoupling is less pronounced. Overall, energy consumption and the emission of greenhouse gases have risen by around 10% (without any corrections) whilst the economy has grown 30%. A fall in agricultural emissions has occurred while production has largely remained constant. In a range of other areas, e.g. greenhouse gas emissions resulting from private car use and household waste production, environmental decoupling is not evident.



Within some areas environmental impact is falling while the economy is growing. In other words, there is a decoupling of environmental impact from growth. In other areas, environmental impact is rising, but at a rate lower than economic growth, and, finally, there are areas where environmental impact is rising at the same pace or more rapidly than economic growth. Evidently, in these cases, one cannot speak of decoupling.

Human-induced climate change

is a major challenge



The greenhouse effect was first recognised in Denmark as a serious problem around 1990. Human-induced climate change will have consequences for almost all the Earth's natural ecosystems, for food production, the amount and the distribution of fresh water and for human health. The changes will affect the basis for socio-economic development in many countries.

Greenhouse gas emissions

Denmark has undertaken a duty to reduce, as an average over the period 2008–2012, the emission of greenhouse gases by 21% compared with the level in 1990. The calculation of the emission in the reference year, 1990, will be finally established in 2006, but estimates according to current methods put the emission at approx. 70 million tonnes. The emission in 2003 was approx. 74 million tonnes. The target represents an emission of 55–60 million tonnes, where the interval of 5 million tonnes reflects the discussions between Denmark and the EU on the calculation method for the emissions in the reference year.

Greenhouse gas emission projections are calculated on the basis of the latest energy forecasts. Projections have shown that the Danish emission, on average, will be approximately 72 million tonnes per year in the period 2008–12. This represents an improvement of 12 million tonnes in relation to the previous prediction of the emissions from 2003. The improvement is due, among other things, to the expected

fall in Danish electricity exports as a result of increased hydropower capacity in Sweden and Norway, extension of the production of renewable energy from offshore windmills and the effects of the CO₂ quota law, which is expected to lead to a fall in electricity production. Furthermore, it is expected that Denmark will offset an emission of approximately 4.5 million tonnes by purchasing CO₂ quotas and by investing in CO₂-curbing projects. Overall, this means that, according to current calculations, there will be a shortfall in relation to Denmark's target of between 8 and 13 million tonnes. The most important sources for greenhouse gas emissions are energy production (63%), transport (22%) and agriculture (15%).

Consequences of climate change for the natural environment in Denmark

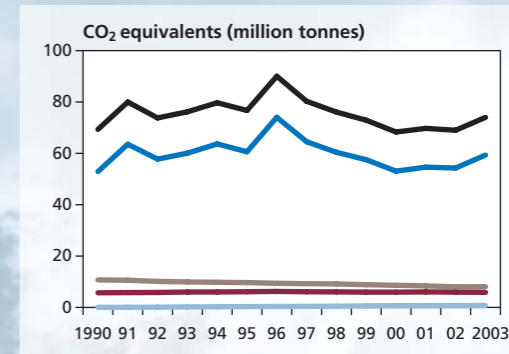
The Danish weather has become warmer. Scientists expect that climate in the future will generally become warmer still, and wetter and windier, with more storms and periods characterised by heavy rainfall. The temperature has risen, on average, by 1°C and precipitation has risen by 110 mm since 1870. The years 1990 and 2000 were the warmest ever registered in Denmark.

The change in climate will, among other areas, have consequences for agriculture. Crops will change, farmers will achieve higher yields, but there will also potentially be a need for increased fertiliser application as higher rainfall

leads to a higher nutrient loss. The increased rainfall will have implications for the ecological quality in lakes, watercourses and fjords due to the increased drainage and the leaching of nutrients from land.

It is expected that the temperature of seawater in Danish waters will rise 3–5 °C and that sea level in Denmark will rise approx. 0.5 m before 2100. The reasons behind this are that the Arctic ice is melting and that water expands when temperature increases. Sea level rise requires better coastal protection so that these areas can withstand storms and floods.

Biodiversity will also be affected by changes in climate. Some species will become extinct or disappear from Denmark, while others will move to the north, and new species will arrive in Denmark. Ecosystems, for example the Wadden Sea, can be seriously impacted by rising sea levels. Climate change also impacts on forest ecosystems. A number of tree species, for example, the Norway Spruce, prefer a colder climate than we already have in Denmark today. More frequent storms will present a challenge to forestry, and there will be an increasing need to move towards the use of mixed forest with a range of different species, at different ages, which can withstand storms better.



Development in Denmark's emission of greenhouse gases calculated as CO₂ equivalents for carbon dioxide, nitrous oxide, and methane as well as the three industrial gases, HFC, PFC and SF₆.

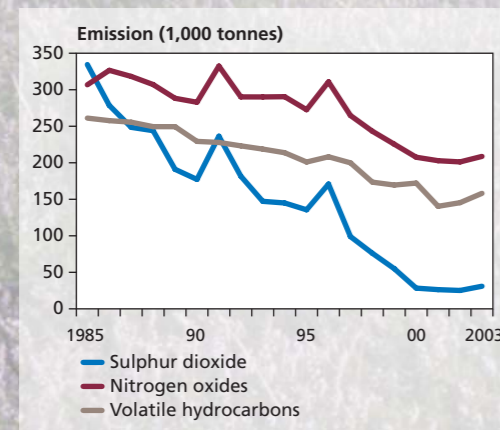
— Total
— Carbon dioxide
— Nitrous oxide
— Methane
— HFCs, PFCs, SF₆

Air pollution affects sensitive habitats

There is less air pollution

Efforts in Denmark directed at the reduction of air pollution go back more than 30 years. Health risk and environmental damage have been reduced over this period by limiting the emission of polluting substances such as sulphur dioxide, nitrogen oxides, hydrocarbons, lead and particles. However, all the problems with regards to air pollution have not been solved. There are still a number of direct impacts on both human health and on the natural environment.

The emission of sulphur dioxide has fallen by 93% since 1980 as a result of taxes, desulphurisation at larger power stations and the lower sulphur content in the oil products used. The emission of nitrogen oxides has fallen around



Development in Denmark's emission of sulphur dioxide, nitrogen oxides and volatile hydrocarbons. The emission of these substances is regulated by an EU directive, which sets a ceiling for Danish emissions. This ceiling is to be adhered to from 2010. Denmark has already achieved the limit for sulphur dioxide, but the emission of nitrogen oxides and volatile hydrocarbons needs to be reduced further, by about 40 and 46%, respectively.



85% since 1985. This is especially due to technological developments at power stations and heat and district heating plants as well as the introduction of catalytic converters on cars. The emission of hydrocarbons has decreased by 35% mainly due to the introduction of catalytic converters on cars and the fall in emissions associated with the use of solvents.

The natural environment is affected

The emission of sulphur dioxide, nitrogen oxides and ammonia contributes to acidification of the natural environment, but also to eutrophication (process of nutrient enrichment) of many natural areas as nitrogen oxides and ammonia act as fertilisers. The total emission

of acidifying substances has fallen by 40% since 1990. The emission of these substances has also decreased on a European scale, leading to a fall of around 70% in sulphur deposition in Denmark. All in all, this means that the problem of acidification of natural areas, e.g. forests, has largely been solved. The nutrient enrichment effect of nitrogen deposited from the air means that the critical level for almost 70% of Denmark's sensitive nature areas has been breached. The emission and deposition of nitrogen as a whole has been reduced by around 20% since 1990, but this has been far from sufficient to protect the sensitive areas in Denmark.

and human health

Air pollution impacts on human health

Nitrogen oxides also have a direct impact on our health. They can depress the function of our lungs and our ability to resist lung infection. The EU has set a maximum level for nitrogen oxides which has to be adhered to from 2010. At present, this level is sometimes exceeded in some areas. In one of the roads in Copenhagen with the most traffic (Jagtvej), the level is permanently above the limit value.

The emission of small particles has a great significance for human health, especially in urban areas where the largest part of the particles stems from road traffic. A study undertaken by Denmark's National Environmental Research Institute (NERI) reveals also that wood-burning stoves in private houses emit small particles and that these comprise almost 50% of the total emission of particles. Curbing the emission of particles has meant that the amount of particles in cities has almost halved in the past 10–15 years, even though traffic levels have risen. Particle pollution, however, is still associated with a significant health-damaging effect, and it is especially the very small particles which are considered dangerous, as these can penetrate far down into the lungs and into the blood. Particle pollution is controlled with help from limit values set by the EU. The current level in Danish cities is under, but close to, these limits.



Nutrient

discharges to the aquatic environment have fallen

Water resources are more limited than we realised

In Denmark, we use, almost exclusively, groundwater for drinking water, industrial usages and field irrigation - and we have sufficient amounts of water. For the country as a whole, water abstraction is less than the exploitable water resource, which is the amount of water we can pump up, at the same time taking ecosystems into consideration, and be sure that groundwater quality does not deteriorate. Exploitable water resources were reassessed in 2003. It was revealed that water resources were at half the level previously assumed. Moreover, large geographical differences were revealed. In some parts of the country, water abstraction is greater than the exploitable resource. Overall, the groundwater abstraction rate has fallen by around 40% since 1990, but in recent years both water abstraction and water consumption have remained almost constant. The effect of water taxation has reached a point where it will not lead to further reductions in consumption.

Groundwater quality is impacted

The quality of Denmark's groundwater is affected in various ways - primarily by the infiltration of nitrate and pesticides from agricultural land, and organic or metallic pollutants from contaminated land released from the soil when groundwater levels fall. Within the last 5 years, pesticides have been found in

26% of waterworks' wells, and in 6% of wells, the limit values for drinking water have been exceeded. In around 25% of drinking water wells, nitrate is found and the limit value is exceeded in 1% of wells.

Pesticides are the main reason when the authorities close drinking water wells. The number that has to be closed each year has halved since 1997. This is due, in particular, to the fact that wells in the most problematic areas have already been closed.

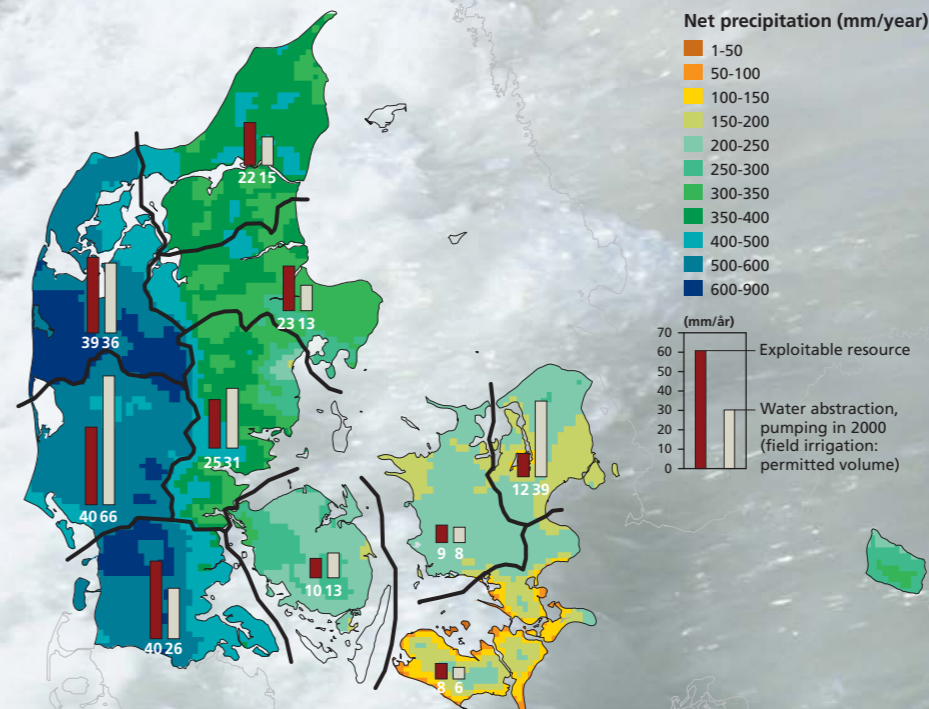
A new study of the population's attitude towards treatment which cleans drinking water versus groundwater protection reveals that Danes are willing to pay extra to protect groundwater and that we prefer to protect groundwater rather than clean it.

Nutrient discharges to the water environment have fallen

Nutrient discharges to the water environment have fallen markedly since the end of the 1980s, when the first plan for the aquatic environment came into force. The target set in the Plan for the Aquatic Environment I was to reduce the total discharge of nitrogen by 50% and that of phosphorous by 80%. Over 90% of our wastewater is cleaned very effectively. The discharge of nitrogen via wastewater has fallen by around 74%, while the corresponding figure for phosphorous is around 86%.

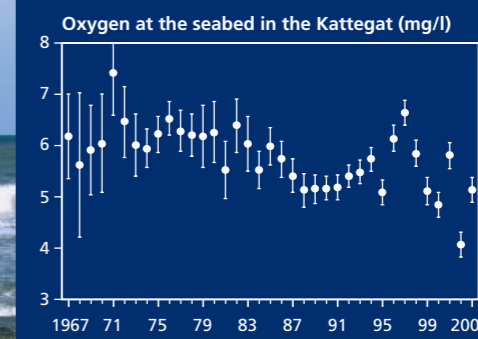
The goal, in the Plan for the Aquatic Environment I, to reduce the discharge of phosphorous was already achieved in the mid-1990s, but it has been more difficult to reach the goal for nitrogen, where agriculture is the dominant source. Therefore, in 1991, the Danish parliament adopted an action plan for sustainable development in agriculture ("Handlingsplan for en bæredygtig udvikling i landbruget") and the Plan for the Aquatic Environment II was put into action in 1998. The leaching of nitrogen from agricultural land fell by around 48% from 1989 to 2003 and the target in the National Action Plans for the Aquatic Environment was, therefore, considered achieved.

Nitrogen and phosphorous discharges to fjords and marine areas vary along with rainfall. Discharges are greatest in wet years and lower in dry years. When the differences in rainfall from one year to the next are corrected for, discharges of nitrogen and phosphorous from land have fallen around 43% and 81%, respectively, from 1989 to 2003. The major source of nitrogen discharges is agriculture, whereas for phosphorous, agriculture, wastewater treatment and sparsely built-up areas contribute with equal amounts.



Exploitable water resources are compared with water abstraction in 2000. For the country as a whole, there is sufficient water. However, the map shows that there are large geographical differences in the size of the water resource and the demand for water. In the capital city area, Funen as well as East and West Jutland, water abstraction is greater than the available water resource.

The environmental condition



Development in the average concentration of oxygen at the seabed, in the open sea, for the period of July to November, 1989–2003. The concentration of oxygen increased during the 1990s, with the highest values in 1996–1997. Since then, there has been a fall in concentrations to the lowest value recorded in the period in 2002.

in watercourses, lakes and fjords is not good enough

Water quality has improved

The reduction in the discharges of nutrients to the aquatic environment has meant that the concentration of nitrogen in watercourses has, on average, fallen by around 30% since 1989 and, for phosphorous, by around 28%.

There are signs that water quality in lakes is improving. The concentration of phosphorous has nearly halved from 1990 to 2003, and the water in lakes has become clearer. However, this has not been sufficient to improve water quality significantly. This is mainly due to phosphorous excess in lakes. This stems primarily from the existing supply routes or phosphorous being released from the bottom of the lakes, where large amounts of phosphorous are stored. Among other reasons, this is why the Plan for Aquatic Environment III contains targets which are also aimed at reducing phosphorous discharges from agriculture.

The decrease in nutrient run-off has led to a fall in the concentration of nitrogen and phosphorous in fjords and in the open sea. As a result, the amount of algae in the water has fallen and the water has become clearer. Despite these positive tendencies, oxygen conditions have not yet improved. The low oxygen conditions of 2002 were the worst ever. One has to go back to 1996/1997, which was a period with very little rainfall and, thereby, little nutrient leaching, to find periods where deoxygenation in the open sea was of limited nature.

Concern about environmentally damaging substances

Pesticides in watercourses and lakes stem from agriculture, horticulture and forestry. Limit values are established for a range of pesticides in watercourses. In 2003, limit values were exceeded in around 10% of the samples in which pesticides were found. A range of potentially environmentally-damaging substances are discharged into our watercourses and lakes in wastewater and from sparsely-populated areas. These substances can include, for example, hormones, which are suspected of affecting the reproductive system in fish. In situations where wastewater is not treated effectively enough, oestrogens can be discharged in such high concentrations that they can affect fish.

Toxins which are found in marine paints, are released and spread when, among other activities, harbours and shipping channels are deepened and the material, which can contain large amounts of environmental toxins, is deposited in other locations. The toxins are taken up by mussels and other shellfish, and in the sediments of coastal waters, in concentrations which present a considerable risk for long-term effects in ecosystems. In 2003, five species of sea snail studied displayed widespread signs of reproductive disruption.

Targets have not been met

Local authorities set targets for ecological conditions in individual areas and assess each year whether the targets have been met. The biological quality in watercourses has improved between 1999 and 2003 and, therefore, fulfilment of the authorities' goals has also improved. In the mid-1990s, targets were met in less than 40% of watercourses, whereas almost 50% were met in 2003. For lakes, a similar improvement is not evident. Here, in 2003, targets were met in around 34% of lakes, which, by and large, does not represent a change over previous years.

Only a few of the marine areas and fjords studied in 2003 fulfilled the local authority targets. The reason was mostly that too many nutrients were discharged to the areas, but also pollution with environmental toxins, played an important role. In the period from 1989 to 2003, the situation with regard to targets has not improved. Significant improvements were registered only in dry years, such as 1996 and 1997, where nutrient discharges were low. This indicates that nutrient discharges should be reduced further before the hopes for a better environment can be fulfilled.

Future efforts to secure a better aquatic environment

The framework for regulation of the aquatic environment will change in the coming years, when the EU's Water Framework Directive and the Habitat Directive are implemented. Focus will be moved from only talking about limiting the discharge of nutrients to waters to speaking about the achievement of specific ecological goals in the aquatic environment. Nutrient discharges are, of course, an important element in reaching these targets, but there is a need to take a more differentiated position on how the targets are to be achieved for the individual catchments.

The natural environment is under pressure

Nature protection and conservation of biodiversity

Seen in the perspective of the last hundred years, significant changes have taken place in the way in which we use Danish land area. The built-up area and the road network have expanded, and land under cultivation has increased. The latter has occurred by means of land reclamation projects and dewatering and draining of wetland areas. These activities have occurred at the expense of natural or semi-natural habitat areas.

The Danish strategy for protecting nature and biodiversity is summarised in the "Action plan for biodiversity and nature protection for 2004–2009". One of the main items on the agenda is to establish National Park areas. Another important item is protection of the so-called Natura 2000 areas, where Denmark has a duty, imposed by the EU, to secure or reinstate a favourable conservation status. Denmark, just like the other EU countries, has to adhere to the UN goal to stop the decline in biodiversity before 2010 – a very specific goal, which, however, yet remains to be interpreted and "fleshed out" at the national level.

A large portion of the species which Denmark has placed on the national Red List of threatened species is not covered by Natura 2000. "Ordinary" nature is not included either. However, this can be considered under so-called Paragraph 3 protection, which protects freshwater meadows, marshes, heathland, commons, salt marsh, watercourses and lakes.



Natura 2000

Natura 2000 areas are comprised of EU habitat areas, EU special protection areas for birds and the so-called Ramsar sites (wetland areas which are to be protected according to the Ramsar Convention). Together, they cover an area of 6,638 km², of which around 30% is on land and almost 70% is marine. The regulations to protect Natura 2000 areas concern only species and habitats of European importance.

Selection of international protection areas in Denmark covers, for example, watercourses with special water plants and the so-called Lobelia lakes, which are lime- and nutrient-poor water bodies. Nature restoration and conservation management are direct ways to improve the ecological content of watercourses and lakes, but it is necessary to reduce the impact in order to succeed in these areas.

Approximately 13,000 km², or 12%, of Danish marine areas are designated as habitat areas or special protection areas for birds. Certain species of birds, fish and sea mammals are protected in this way, for example, seals and porpoises, among others.

Open habitats are threatened

Open habitats (freshwater meadows, marshes, bogs, heathland, commons and salt marshes) comprise 80% of the Danish nature areas, and approximately half of this area lies in Natura 2000 areas. It is especially deposition of nitrogen from the air which threatens these areas. A study reveals that it would cost 500 million DKK per year to implement a sufficient level of conservation, including environmentally sensitive management, for Paragraph 3 areas. Around 63% of Denmark's threatened plant species occur in open habitats.

Natural forest is on the increase

The natural vegetation type in Denmark is mixed broadleaf forest and many of the original Danish wild animals and plants are, therefore, associated with this forest-type. Forests are of great significance for biodiversity, and more natural cultivation forms and management practices and varied selection of tree species promotes biodiversity. Developments in the so-termed "natural" forest area are, therefore, of great significance for the biodiversity of Danish plant and animal species. "Natural" forest now comprises around 10% of the total forest area. About 20% of the Danish habitat areas are forest.

National parks

One of the latest initiatives in the area of environmental management is the suggestion to establish national parks in Denmark. There has previously been a certain reluctance to introduce national parks in Denmark. One reason among others has been that it could lead to the conservation and protection of areas outside the parks being lesser cared for. After recommendations from the OECD in 1999 and the Wilhjelms Committee in 2001, the government decided to implement seven pilot projects, which will later form the basis for a decision on the establishment of national parks in Denmark. The pilot projects involve dialogue with local inhabitants and stakeholders and it is expected that the initiative will be based on principles of voluntary participation and local support. The plan is that in 2006, based on the work carried out within the pilot projects, a law will be proposed on the establishment of national parks.

Environmental impact and health are connected



The state of the environment affects our health

It has long been known that environmental impacts can lead to people developing diseases or to worsening of existing diseases. However, pollution has reduced so much that the impact of the environment on health is not so obvious as earlier. Effects, moreover, are often a result of a combination of environmental impact and lifestyle factors, such as smoking, diet and fitness habits. We are all affected by our environment. The impacts can come from chemical

substances in the air, soil, water and products as well as noise, UV radiation from the sun and radon from the ground underneath us.

Denmark's National Board of Health suggests that around 10% of all cases of cancer are caused by environmental effects. The OECD estimates that 2–6% of all diseases in Western Europe are environment-related.

Air pollution and health

Air pollution, especially air pollution from particles, is one of the most serious environmental impacts on health. It can worsen symptoms for people with asthma, allergic respiratory diseases and cardiovascular diseases.

Particles are comprised of a complex mix of chemical substances and can be of different sizes. The smallest particles contain typically PAHs and metals and they are regarded as being the most damaging to our health. A direct relationship between mortality in urban areas and the concentration of fine particles has been demonstrated. In Denmark, it is estimated that particle pollution contributes to about 3,400 cases of premature death each year and over 180,000 cases of respiratory pathway and cardiovascular disease.

A large part of particle pollution can be reduced by fitting particle filters to lorries. According to a Ministry of Transport estimate, the fitting of particle filters to cars could reduce the number of premature deaths by 450 per year. A scheme has been introduced which gives financial support for this. Moreover, the traffic law has established the opportunity for special

zones in towns and cities where heightened environmental requirements exist, e.g. a requirement that lorries are to be fitted with particle filters to be allowed to drive inside the zone. A plan of this type is being considered in Copenhagen, but has not been implemented so far.

Hormone-disturbing substances

Around 15,000 different chemical substances are used in products in Denmark. This is almost three times as many as in the mid-1990s. Part of the chemical substances is dispersed in the environment and decay only very slowly. This is the case for, for example, DDT and PCBs, which can be measured today in breast milk, even though they were banned many years ago. PCBs have, to a certain extent, been replaced by brominated flame retardants. These substances can also now be measured in people, and are also revealed to have impacts on health. In 2004, Denmark introduced a ban on two of the most problematic brominated flame retardants and new EU rules will limit the use of two further substances in this category.

The effects of hormone-disrupting substances have received a great deal of attention in recent years. These hormone-disrupting substances include, for example, certain phthalates, dioxins, PCBs, DDT and certain types of human and veterinary medicines. Hormone-related health effects have risen markedly over the last 30–40 years, and it cannot be ruled out that hormone-disrupting substances contribute to this development. Breast cancer, prostate cancer, an increasing number of male babies born with deformed sex organs, as well as



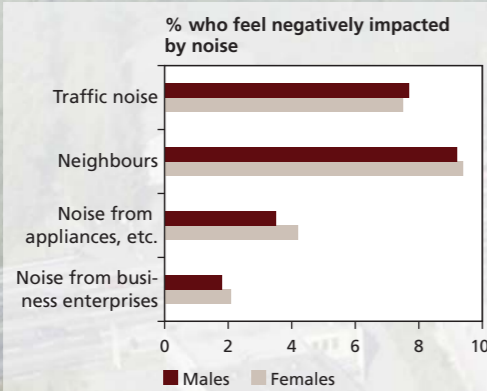
the fact that Danish men have the worst sperm quality measured in the world. Sperm quality in Danish men fell 50% from 1938 to 1990.

A relationship, which has been confirmed by laboratory analyses, has been revealed between the occurrence of hormone-disturbing substances in the environment and effects occurring in animals. It is possible that the effects correspond with those found in humans. New studies involving people indicate that the hormone-related health effects are caused by incidents taking place already at the foetal stage.

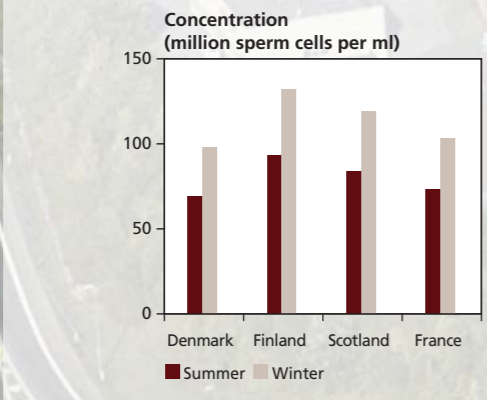
Protecting health

In 2003, the government approved the strategy, "Environment and health are linked" ("Miljø og sundhed hænger sammen"). The strategy focuses on allergies and respiratory diseases, hormone disturbance, as well as the impact on health from noise. The aim is to reduce the impact from hazardous chemical substances, reduce air pollution and noise, as well as to secure clean drinking water and foodstuffs free from pollution. The Danish efforts are supported by the EU's strategy for the environment and health.

Proportion of the population in the age-group 25–44 years, who feel they are affected negatively by different types of noise, when they are at home. Noise can result in raised blood pressure levels and can worsen cardiovascular diseases. Over 705,000 homes are exposed to noise over the limit values set and, of these, around 150,000 are severely affected.



Comparison of men's sperm quality in four European towns. Danish men, for unknown reasons, have the worst sperm quality and Finnish men the best.



Denmark



Denmark compared with other countries

Denmark has come a long way in solving a range of environmental problems, e.g. wastewater treatment, installing filters on chimneys and using fewer toxic pesticides in agriculture. But, at the same time, Denmark is one of the countries in the world with the highest consumption of goods, resources and energy, all of which impact on the environment, not just in Denmark but also outside of the country's borders.

Measured per inhabitant, Denmark has one of the highest emissions of greenhouse gases, exceeded only by the USA, Canada and the oil-producing countries in the Middle East. This is due to our energy production being based mainly on oil, natural gas and coal. On top of this, we have a relatively high energy consumption and we export electricity. This has implications for the likelihood of achieving our Kyoto targets. Currently, Denmark looks to be one of the European countries which have the most difficulty in reaching their targets. But Denmark is also one of the countries which has committed itself to achieving a large reduction.

A comparison between the environmental conditions in the European countries within 15 different areas reveals that Denmark is doing better than average in five of the 15 areas, and worse than average in six areas. Denmark, overall, lies under the EU average.

Danes have a high consumption of resources. Looking at environmental indicators such as "ecological footprints" Denmark lies ninth last out of 147 countries. Denmark is doing better according to the Environmental Sustainability



Index (ESI), an international index for sustainable development, where Denmark is no. 26 out of 146 countries. This is because the ESI also puts weights to environmental regulation, scientific knowledge and economic welfare – three areas where Denmark is doing relatively well.

Globalisation of the environment

Goods, services and labour are increasingly being exchanged over country borders. World trade has increased 270% since 1980. Global trade means that the environmental impact from many goods and industries is of a global character. Goods are produced somewhere else than they are consumed. This is also the case for the environmental impact. Many environmentally damaging industries are no longer found in Denmark. This is true for example for ship-building, tanneries, paper mills and factories producing fertilisers. Instead, production takes place in countries where wage and production costs are lower. We are not aware of the consequences this has for the environment and the impact on the global environment caused by Danish consumption. We do know, however, that goods produced in

and the global environment

the EU are subject to the same environmental regulation as those produced in Denmark, whereas goods from developing and low-income countries are generally produced under less stringent environmental regulation.

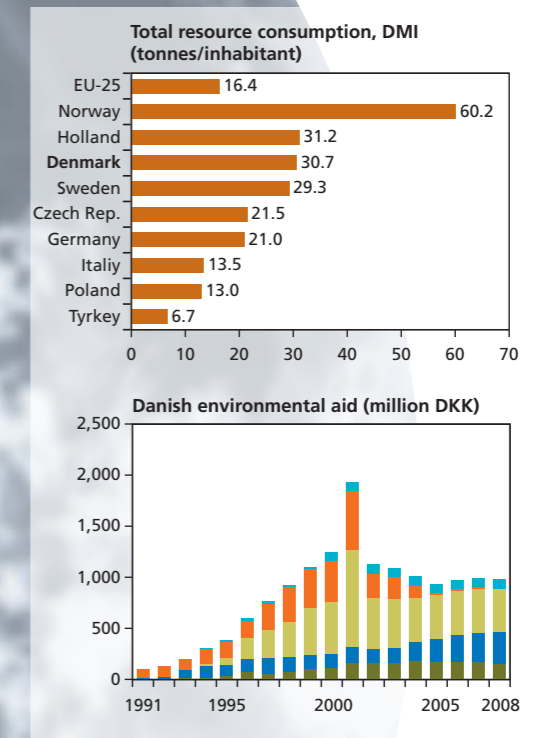
Denmark in an international context

Environmental policy is, today, widely a matter of international concern. After the UN's Earth Summit on environment and development in Rio de Janeiro in 1992, which was followed up by the Johannesburg World Summit in 2002, the international society adopted a range of conventions relating to chemicals. Denmark's international profile in the environmental area is partly a result of the active policy that Denmark leads and partly a consequence of Denmark being a country where high levels of welfare are combined with effective environmental regulation.

Denmark's position as a role model is clear when it comes to effective environmental regulation and the development and promotion of environmental technologies, such as wastewater treatment plants and windmills. But there is another side to this. Our consumer society with its high consumption of material goods leads to high consumption of energy and raw materials which, in turn, leads to environmental impact despite effective environmental technologies.

Developing countries seek economic welfare. Development and transfer of environmental technology can contribute to preventing the pressure on the environment reaching unacceptable levels. The purpose of Danish environmental aid is to help developing coun-

tries acquire environmental knowledge and integrate environmental considerations into the economic development process. Denmark, from 1994, raised environmental aid from the 100 million DKK figure of the beginning of the 1990s to almost 2 billion DKK in 2001. Since then, environmental aid has been reduced to less than half.



Compared with other countries, Denmark has one of the highest levels of resource consumption – almost double the average for the EU as a whole. Norway's high consumption is due to the country's oil production. DMI stands for "Direct Material Input", which is the weight of materials we extract in Denmark and the weight of the materials we import.

Environmental aid is extended to a range of countries in South-East Asia and southern Africa. Denmark supports developing countries via contributions to e.g. the UN's environmental programme, UNEP. Development aid can, moreover, relate to the environment in certain countries. Environmental support to Eastern Europe is about to end with the expansion of the EU in place. Aid to the Arctic regions goes primarily to environmental projects in Greenland to monitoring transboundary pollution.