

English
version
of **saldo** 2005



update 2005

PROGRESS TOWARDS SWEDEN'S ENVIRONMENTAL OBJECTIVES IN THE COUNTY OF STOCKHOLM

update 2005

Progress towards Sweden's environmental objectives in the County of Stockholm

This is an English translation of the Swedish report saldo 2005. Copies of both versions can be downloaded from the Stockholm County Administrative Board website: www.ab.lst.se

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Stockholm County Administrative Board and National Land Survey 2005, Geographical Sweden Data, 106-2004/188-AB

Printing and repro

Lenanders Grafiska AB, Kalmar

ISBN

XXXXXXXXXX

This English translation of the Swedish publication saldo 2005 is intended as an accessible source of information about the state of the environment in the county of Stockholm, for residents of the county, visitors and other interested readers. If you have any questions, please do not hesitate to contact Klara Tullback Rosenström: klara.rosenstrom@ab.lst.se.

Swan-labelled printed matter  Licence number 341 145

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Preface

Regular reviews of the state of the environment in our county can give us a picture of development in the county and how sustainable it is. We all have a part to play in achieving sustainable development, whatever our area of work and however we live our everyday lives.

This is the second report describing Stockholm county's environment in relation to the environmental quality objectives adopted for Sweden as a whole. update 2005 is aimed primarily at local and regional decision makers and officials.

With its growing population and economy, the county of Stockholm is one of the engines of national growth. That demands a great deal of everyone who lives and works here. If growth is to be beneficial, it has to be sustainable.

In an increasingly interdependent Mälardalen region, we have to make sure that we treat our environment in a way that will give future generations the same opportunities to live and work here that we enjoy today.

During 2005 the County Administrative Board of Stockholm will be adopting regional environmental goals for the county. They will be a valuable aid to local authorities, businesses, agencies, organizations and individuals as they seek to achieve a better environment.

This report, which is closely in line with the Government's Environmental Objectives Bill 2005, will I hope inspire further energetic efforts to safeguard our common environment.

Stockholm, June 2005

A handwritten signature in black ink, which appears to read "Mats Hellström".

Mats Hellström
County Governor of Stockholm

The county in brief

Population

	County 1995	County today	Sweden today
Population	1.7 million	1.9 million	9 million
Inhabitants per sq km	266	287 (in 2004)	22 (in 2004)

Geography

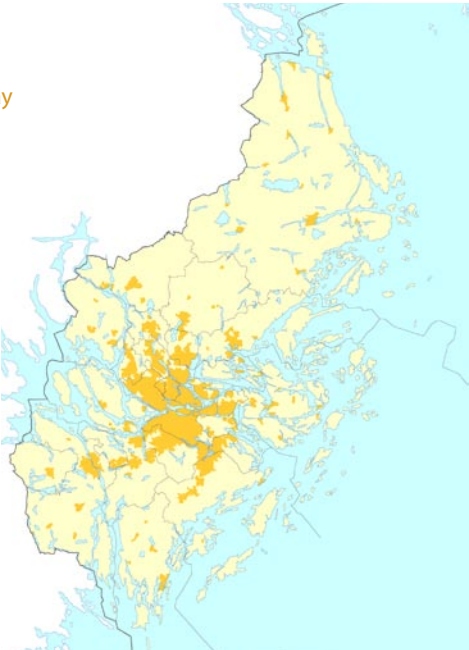
Built-up land (%)	14	15	3
Forest land (%)	47	41	52
Farmland (%)	17	17	8
Inland water (%)	4	4	9
Other land (%)	18	23	28

Companies

Total number	127,000	201,000	880,000
Number in chemical industry	166	174	842
Number with environmental certification		481 (in 2003)	3,180 (in 2003)

Resource use

Energy use (kWh/person/year)	28,000	30,000 (in 2002)	50,000 (in 2002)
Household waste (tonnes)	470,430	466,399 (in 2003)	4,211,290 (in 2003)
Cars per 1,000 inhabitants	344	403	457



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Environmental objectives – for a better future

The national environmental objectives which Sweden has adopted are about passing on to the next generation a society in which the major environmental problems now facing us have been solved. This report looks at the progress being made towards these objectives in the county of Stockholm.

We all have a part to play in making sure that our children and future generations have clean water to drink and clean air to breathe.

In 1999 Sweden's Parliament adopted fifteen environmental quality objectives, which are intended to promote human health, safeguard biodiversity and the natural environment, preserve our cultural heritage, maintain long-term ecosystem productivity and ensure wise management of natural resources. The ultimate goal is healthy people, animals and plants, which in turn calls for clean air, lakes and seas. The fifteen objectives represent the ecological dimension of sustainable development.

Our entire ecosystem, our society and our environment are built around biodiversity. It forms the hub of a sustainable system in which every part is needed to maintain the whole. The spider's web opposite illustrates how the ecosystem is interlinked. If one species disappears, it leaves a hole in the web. Too many holes, and the system collapses.

Environmental problems represent major costs to society. In Sweden, the bill for ill health due to air pollution is estimated at €1.25 billion a year (National Institute of Economic Research 2004). That can be

compared with total state spending on environmental protection of just €0.3 billion in 2003 (Ministry of Finance 2004). But investments in improving environmental performance can also lead to innovation and ultimately to export opportunities.

Stockholm county is the capital region of Sweden, with 21 per cent of the country's inhabitants in 2 per cent of its area. This high density of population entails heavy road traffic, which generates noise and emissions. On the other hand, it also brings environmental advantages, making it easier, for example, to develop district heating and public transport systems. At the same time, a large share of what we residents of the county consume is produced outside the county's boundaries, which means that our lifestyle choices affect the state of the environment in other parts of Sweden and in other countries.

If we want to achieve the environmental objectives and pass on a county offering good living conditions for our children and grandchildren, we need to do better. We need to think outside the box, whether we are involved in local and regional planning or making personal choices in our everyday lives.

About update 2005

In **update 2005** we review the state of Stockholm county's environment in the light of Sweden's national environmental objectives. We describe the rate of progress towards the goals in the county, the current environmental situation, the causes of existing problems, and what can be done about them. **update 2005** is aimed mainly at local and regional decision makers and officials, but will we hope also interest other readers.

The Swedish Parliament has adopted 15 national environmental quality objectives. This report looks at all but one of them (*A Magnificent Mountain Landscape*) from a regional point of view. Using the objectives as a benchmark is just one way of describing the state of the environment. It is important to bear in mind that conditions in the real world are far more complex than this report is able to describe. On p. 40 you can read more about what is being done to achieve the objectives.

Parliament intends the objectives to be met by 2020 (2050 in the case of *Reduced Climate Impact*). For the objective *Sustainable Forests*, goals have also been defined at the county level, with 2010 as the target year.

The prospects of meeting the objectives in the county have been assessed taking into account factors such as states, responses, driving forces and pressures, and above all whether it will be possible to reach the goals on time. These assessments have been made by representatives of local authorities, the County Council, the County Administrative Board, government agencies and universities. For each objective, they are summed up by a smiley, neutral or sad face, reflecting the prospects of attaining the goal in the county within the intended time-frame.

Each objective is covered by a two-page spread in the report. A section headed 'Ways we can make a difference', aimed at both local authorities and private individuals, gives examples of the kinds of action that could bring us closer to the objective. On p. 38 there is a brief summary of the prospects of achieving the objectives, and on p. 42 a glossary.

update 2005 is the County Administrative Board's second progress report on the national objectives. The 2000 edition also reviewed progress in the county. The methods of assessment used in the two reports differ somewhat, **update 2005** being based on the current national system. The appraisals in the two editions are therefore not entirely comparable.



This objective should be achieved in Stockholm county on the basis of current measures.



This objective can be achieved in Stockholm county if new measures are introduced.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

The national environmental quality objectives

Reduced Climate Impact

The UN Framework Convention on Climate Change provides for the stabilization of concentrations of greenhouse gases in the atmosphere at levels which ensure that human activities do not have a harmful impact on the climate system. This goal must be achieved in such a way and at such a pace that biological diversity is preserved, food production is assured and other goals of sustainable development are not jeopardized. Sweden, together with other countries, must assume responsibility for achieving this global objective.

Clean Air

The air must be clean enough not to represent a risk to human health or to animals, plants or cultural assets.

Natural Acidification Only

The acidifying effects of deposition and land use must not exceed the limits that can be tolerated by soil and water. In addition, deposition of acidifying substances must not increase the rate of corrosion of technical materials or cultural artefacts and buildings.

A Non-Toxic Environment

The environment must be free from man-made or extracted compounds and metals that represent a threat to human health or biological diversity.

A Protective Ozone Layer

The ozone layer must be replenished so as to provide long-term protection against harmful UV radiation.

A Safe Radiation Environment

Human health and biological diversity must be protected against the harmful effects of radiation in the external environment.

Zero Eutrophication

Nutrient levels in soil and water must not be such that they adversely affect human health, the conditions for biological diversity or the possibility of varied use of land and water.

Flourishing Lakes and Streams

Lakes and watercourses must be ecologically sustainable and their variety of habitats must be preserved. Natural productive capacity, biological diversity, cultural heritage assets and the ecological and water-conserving function of the landscape must be preserved, at the same time as recreational assets are safeguarded.

Good-Quality Groundwater

Groundwater must provide a safe and sustainable supply of drinking water and contribute to viable habitats for flora and fauna in lakes and watercourses.

king water and contribute to viable habitats for flora and fauna in lakes and watercourses.

A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos

The North Sea and the Baltic Sea must have a sustainable productive capacity, and biological diversity must be preserved. Coasts and archipelagos must be characterized by a high degree of biological diversity and a wealth of recreational, natural and cultural assets. Industry, recreation and other utilization of the seas, coasts and archipelagos must be compatible with the promotion of sustainable development. Particularly valuable areas must be protected against encroachment and other disturbance.

Thriving Wetlands

The ecological and water-conserving function of wetlands in the landscape must be maintained and valuable wetlands preserved for the future.

Sustainable Forests

The value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded.

A Varied Agricultural Landscape

The value of the farmed landscape and agricultural land for biological production and food production must be protected, at the same time as biological diversity and cultural heritage assets are preserved and strengthened.

A Magnificent Mountain Landscape

This objective is not relevant to Stockholm county.

A Good Built Environment

Cities, towns and other built-up areas must provide a good, healthy living environment and contribute to a good regional and global environment. Natural and cultural assets must be protected and developed. Buildings and amenities must be located and designed in accordance with sound environmental principles and in such a way as to promote sustainable management of land, water and other resources.

New objective proposed

In spring 2005 the Government proposed a 16th environmental quality objective relating to biodiversity.

Exploit potential of public transport and district heating

Much remains to be done to reduce the greenhouse effect. Stockholm county has low per capita emissions of greenhouse gases, largely thanks to its well-developed district heating systems and limited heavy industry. Emissions are currently at a constant level, but could rise. Due to the county's large population, carbon dioxide emissions from road transport are high. To curb emissions of this gas, investments need to be made above all in public transport and district heating, basic conditions for which are good.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

Melting ice

To an increasing degree, human activities are reinforcing the greenhouse effect. This will have impacts on all forms of life, as climate will change faster than ecosystems are able to adjust. Agriculture and forestry will be affected, as will biodiversity. Another consequence will be accelerated melting of the large ice masses at the poles, increasing the risk of flooding and altering the balance between fresh and salt water. In the future, more dramatic shifts in weather are also likely, with heavier rainfall and more severe storms than we are used to today. Globally, dry regions will become drier and wet regions wetter.

Greenhouse effect

The natural greenhouse effect is crucial to all life on earth; without it, the average temperature would be



Photo: Stockholm Transport, Stefan Ideberg

–19 °C. The effect is the result of ‘greenhouse gases’ in the atmosphere absorbing some of the heat supplied by the sun and returning it to the earth’s surface – heat that would otherwise be lost into space. The key greenhouse gases are water vapour and carbon dioxide, but methane and nitrous oxide are also important.

The biggest sources of carbon dioxide emissions are electricity and heat production and road traffic. As far as nitrous oxide is concerned, the main emission sources are agriculture and production of electricity and heat. Landfills and livestock farming are the chief emitters of methane.

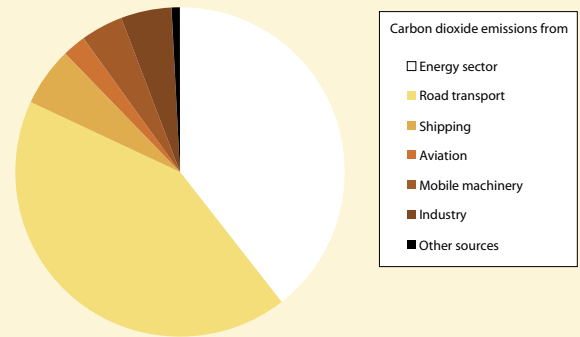
Situation in Stockholm county

Stockholm county has lower per capita emissions of greenhouse gases than the rest of the country. Metropolitan regions are in a position to make more effi-

cient use of resources. Every inhabitant in the county is responsible for a carbon dioxide emission of some 3.2 tonnes a year, roughly half the national average. However, this is not an entirely fair comparison, as we also consume resources supplied by emission-producing industries outside the county boundaries. Per capita emissions in the county have fallen by just over 7 per cent since 1990. But, given the county's favourable situation as a metropolitan region, the national objectives and Sweden's international undertakings, it is important that emissions continue to be rapidly reduced.

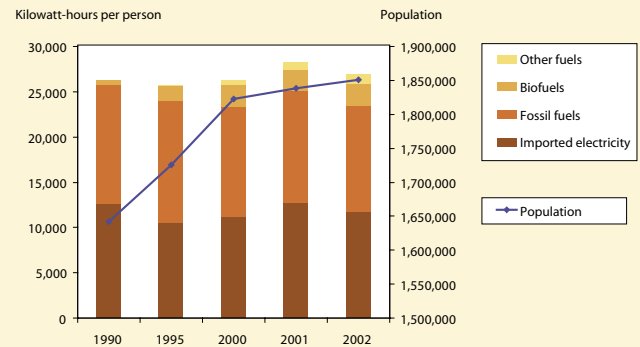
Ways we can make a difference

- Expand district heating systems.
- Upgrade insulation of buildings and introduce environment-friendlier heating systems.
- Car-share, use public transport, walk or cycle.



Carbon dioxide emissions in Stockholm county

CO₂ emissions are reinforcing the greenhouse effect. The biggest sources in the county are energy production and road transport. Emissions from road transport are rising, owing to growth in heavy goods vehicle traffic. In 2003 total CO₂ emissions came to 5,750,000 tonnes. A reduction of that figure will above all require investments in public transport and district heating.



Energy use in Stockholm county

This diagram shows that per capita energy use (bars) has not risen very much since 1990. But because the population (line) has grown, total energy use has also increased. In addition, we see that the share of energy produced from biofuels has increased since 1990.

Clean vehicles and suitable tyres for healthier air

With additional action, it should be possible to improve the quality of the air in Stockholm county. The main cause of unhealthy air in the county is pollution from road vehicles. In central, densely built-up areas, high levels of particulates and nitrogen dioxide are a problem. In outlying areas, air quality is generally good, apart from excessive concentrations of ground-level ozone.



This objective can be achieved in Stockholm county if new measures are introduced.

A hazard to health

Air pollutants are a health problem, in that they increase the risk of cancer and heart and lung disease. They can also cause irritation of the respiratory tract, making life more difficult for asthma and allergy sufferers in particular. In addition, air pollutants harm forest trees, crops and other living organisms, and accelerate corrosion of buildings and cultural artefacts.

Air pollutants

Major air pollutants include nitrogen dioxide, particulates, ground-level ozone, and volatile organic compounds (VOCs) such as benzene. In urban areas, such pollutants come mainly from road transport, mobile machinery and wood-fuelled heating. Large quantities also originate abroad. Excessively high concentrations of ground-level ozone occur throughout Europe, and this pollutant, too, is carried to Sweden by winds.

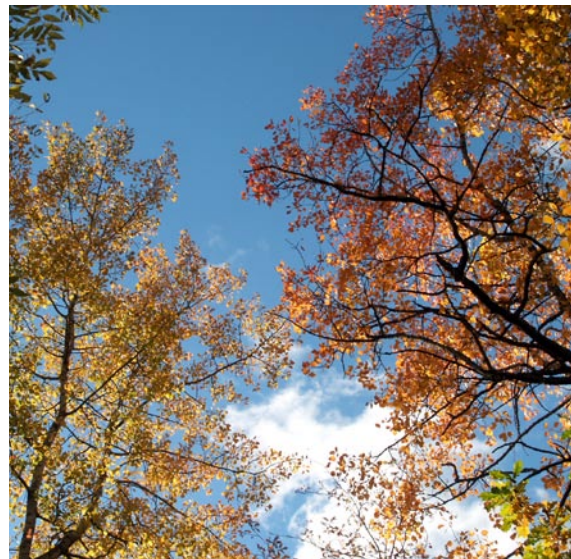


Photo: Lars-Gunnar Bråvander

Abrasion of road surfaces by studded snow tyres is an important factor in the formation of particles that are so small that they can be inhaled, endangering health. These particles consist of road dust and tiny fragments from brakes and tyres.

Nitrogen dioxide and VOCs are formed when fossil fuels are burned, e.g. in car engines.

Ground-level ozone, not to be confused with the ozone to be found higher up in the atmosphere, forms when VOCs and nitrogen oxides react under the influence of sunlight. Effects include asthma symptoms and irritation of the eyes.

Situation in Stockholm county

Overall, air quality in the county is acceptable, judged against current standards. Closer to busy roads and central, densely settled parts of the county, though, concentrations are higher, and in the most polluted

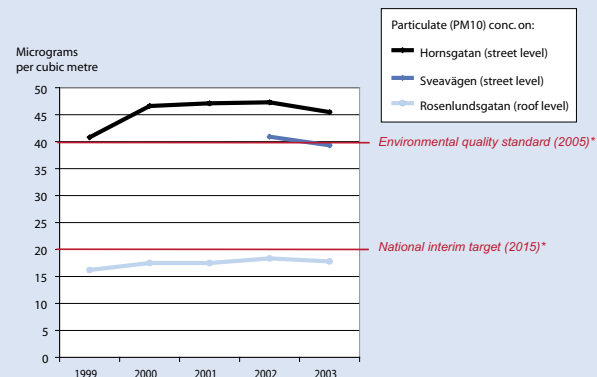
areas levels of some substances can exceed statutory air quality standards. Today, the most serious problem is high particulate concentrations. Levels of nitrogen dioxide are also too high in certain areas.

Concentrations of VOCs such as benzene in central Stockholm have been falling for several years, largely because most cars are now fitted with catalytic converters. Growth in traffic, however, is slowing this improvement.

Sulphur dioxide used to be a major air pollutant in Stockholm county, but since the 1960s concentrations have shown a continuous decline. This is due to a fall in the burning of fossil fuels, lower sulphur levels in fuel oil, and improved emission control at combustion plants in the county.

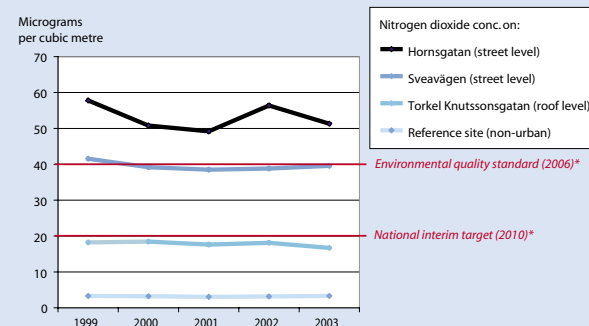
Ways we can make a difference

- Plan urban areas carefully to ensure adequate ventilation of streets and roads.
- Drive 'clean vehicles' with high fuel efficiency and good emission control.
- Replace studded tyres with non-studded snow tyres.



Particulates in air on three Stockholm streets

High particulate levels are a problem in most major cities. Concentrations are currently too high in central Stockholm and along busy through routes. Hornsgatan is the most polluted street in the county.



Nitrogen dioxide in air on three Stockholm streets

Although concentrations have fallen in recent years, they are still too high at the worst affected locations. The reference site is at Norra Malma, municipality of Norrtälje.

* The national interim targets – 'staging posts' on the way to the environmental quality objectives – apply throughout Sweden.

Environmental quality standards are statutory concentration limits to be complied with by stipulated dates, here 2005 and 2006.

Stockholm county on track

The trend towards increasingly severe acidification in the county has been halted and a process of recovery has begun. This is made clear by several regional studies. To maintain this encouraging trend, however, the decrease in atmospheric deposition of acidifying pollutants must continue.



This objective should be achieved in Stockholm county on the basis of current measures.



Photo: Christina Fagegren

Acidification as an environmental problem

When acidifying compounds such as sulphur and nitrogen oxides reach the ground, they give rise to weathering of soil minerals, a process that counteracts acidification. Gradually, this weathering slows down, and the pH of the soil and the water in it falls. Toxic aluminium is released and finds its way into lakes and streams. Acidification adversely affects soils and the plants and animals they support. In addition, cultural heritage objects such as statues and architectural details are affected, as acid substances in air and rain accelerate corrosion. The damage this does to buildings, machinery and cultural artefacts costs society a great deal.

The problem of acidification did not attract attention in Sweden until the late 1960s. By then, it had probably been affecting lakes, streams and forest soils for decades or, in some areas, centuries.

Acid pollutants spread via atmosphere

Acidifying substances form during combustion, which means that road transport and heating contribute to the problem. These substances spread via the atmosphere and return to the earth's surface as gases, particles or acid rain or snow. They can be carried very long distances in rain clouds and by winds. Major sources of acid emissions also exist in other areas of Sweden, and above all in other countries. Some 30–40 per cent of sulphur deposition in Greater Stockholm comes from emissions within the county, but outside built-up areas almost all the sulphur deposited originates in other parts of Sweden or abroad. Over 50 per cent of nitrogen deposition in Greater Stockholm derives from sources inside the county.

Situation in Stockholm county

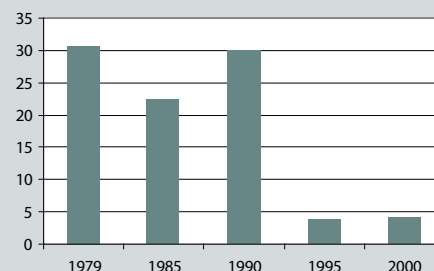
In the county, upper layers of soil are severely acidified, while deeper layers and groundwater are relatively little affected. Northern parts of the county especially have more calcareous (lime-rich) soils, which act as a buffer against acidification. Some 4 per cent of lakes in the county are currently estimated to be acidic, compared with 20 per cent in other areas of Sweden. This is because lakes in this region have a higher pH and a greater buffering capacity against acid substances; in addition, precipitation is relatively low. Another reason why more of the county's lakes are not acidified is that many of them have been limed since the late 1970s. Today, only 12 lakes in Stockholm county are still being treated in this way.

Thus, although deposition of both sulphur and nitrogen in the county exceeds the levels at which sensitive ecosystems suffer damage, the prospects for the region's lakes seem encouraging. The earlier trend towards increasingly severe acidification has been halted. However, it is not possible to say how quickly the situation is improving. Nitrogen deposition and nitrogen oxide emissions are falling, but not as clearly as deposition of sulphur. This is mainly due to growth in road traffic in recent years.

Ways we can make a difference

- Drive 'clean vehicles' with high fuel efficiency and good emission control.
- Use low-sulphur oil, e.g. for heating.
- Car-share, use public transport, walk or cycle.

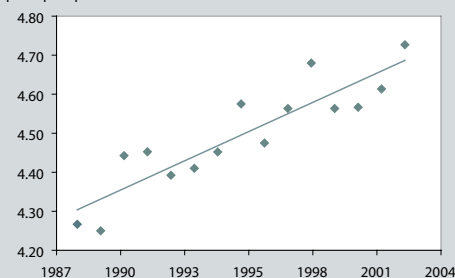
Percentage of lakes with pH below 6.3



Percentage of lakes with a pH below 6.3

The trend towards increasingly severe acidification of lakes has been broken in the county. Lakes with a pH below 6 are now far less common than in the 1980s. The break in the trend came in the early 1990s. Liming, carried out in some 30 lakes, has been an important factor in reducing the proportion of lakes acidified.

pH of precipitation



pH of precipitation in Stockholm county

Rain and snow have become less acidic in recent years.



Reduce our use of chemicals

We are using more and more products and foods that contain chemicals – chemicals which find their way into the environment. This is a particular problem in Stockholm county, with its high population density and industrial history. Many contaminated sites need to be cleaned up. To reverse the trend and achieve an environment free from toxic substances, we need more data on chemicals, stricter legislation and better inter-agency coordination.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

Chemicals affect us all . . .

Chemicals can give rise to allergies and cancer, have genetic or reproductive effects, or cause acute poisoning. Some substances are persistent, i.e. they are not readily broken down and can accumulate in living organisms. Persistent substances that damage the environment can spread via air and water and cause global problems over a very long period.

Possible health effects of exposure to chemicals include kidney damage (cadmium), a risk of cancer (PAHs) and reproductive problems (PCBs). Populations of cod and perch, for example, have declined in recent years as a result of reproductive difficulties. The incidence of allergies and hypersensitivity, which are due partly to chemicals, is also increasing. Another major concern is the effects of drug residues that enter the environment, mainly via sewage.



Photo: Lars-Gunnar Bråvander

. . . and are everywhere

A large proportion of the toxic chemicals in the environment today come from ‘diffuse’ emissions, e.g. from road traffic and household products. Many of them can be found in sewage sludge, lake and marine sediments and fish. High levels can also occur in contaminated areas such as old industrial sites. These sites may be close to streams, valuable natural habitats or residential areas, which may be affected by leaching of chemicals into water and soils.

20,000 chemicals in 60,000 products

Chemical substances are being manufactured and used on a growing scale in our society. In Sweden there are now some 20,000 different chemicals in over 60,000 products, which are in turn incorporated in a host of other products, such as building materials, cars, computers, mobile phones, personal care products, clothes

and food. A large population means a large flow of chemical and other products, which puts heavy pressure on the environment. Sludge from sewage treatment plants serves as an indicator of the flows of different persistent toxic substances in society. On the whole, though, little is known about the chemicals used, how they spread and how they affect health and the environment. It is difficult, therefore, to get an overall picture of the problem.

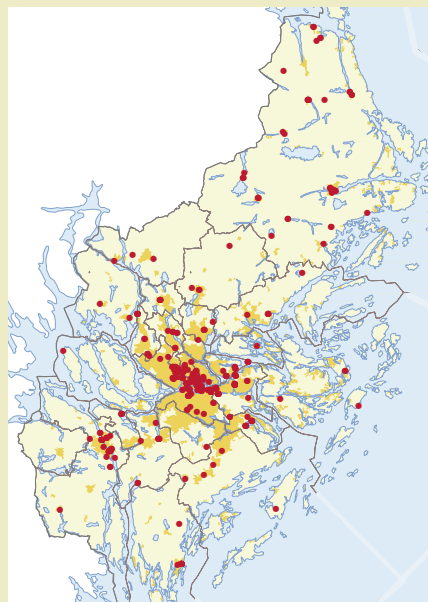
Situation in Stockholm county

Many of today's environmental problems are the result of 'past sins', i.e. activities that occurred several decades ago. Some 6,200 sites in the county are known or suspected to be contaminated. Of these, just over 190 have been surveyed and assigned to a risk category by the County Administrative Board.

Energetic efforts in many sectors to improve environmental performance have resulted in a gradual fall in levels of 'known' toxic substances in the environment. If further progress is to be achieved, we need to reduce our day-to-day use of such substances and to identify new substances that could emerge as problems in the future. To be able to do that, we need an understanding of chemicals' properties and effects.

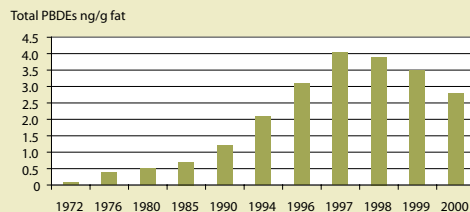
Ways we can make a difference

- Use ecolabelled products and services and replace environmentally hazardous chemicals with environmentally safer ones.
- Separate out hazardous waste and take it to a recycling centre.
- Return leftover medicines to a pharmacy.



Risk-classified contaminated sites in Stockholm county

Some 6,200 sites in the county are known or suspected to be contaminated. This map shows the 190 or so that have been surveyed and assigned to a risk category. Much remains to be done to complete this survey work and the time-consuming and costly process of site clean-up



Levels of brominated flame retardants (polybrominated diphenyl ethers) in breast milk from mothers in Stockholm

Levels seem to be falling, possibly owing to greater risk awareness and reduced use. This decrease is not representative of all brominated flame retardants, however; the trends for other types may be different



A global problem that calls for a global response

The last fifty years have seen appreciable thinning of the ozone layer, posing a major risk to humans and natural ecosystems. Active international efforts are under way to save the ozone layer, but concentrations of ozone-depleting chemicals in the upper atmosphere cannot be expected to be back at 1980 levels until around 2050. And that will only happen if all parties abide by the international agreements entered into.



This objective can be achieved in Stockholm county if new measures are introduced.

Ozone layer crucial to life

The ozone layer is located in the upper atmosphere. It acts as a filter, keeping out some of the sun's ultraviolet rays (UV radiation). Under natural conditions, this ozone forms at the same rate as it is destroyed. But in the last fifty years the rate of destruction has been higher than the rate of formation, causing thinning of the ozone layer. This thinning was first observed in the mid-1980s.

Ozone thinning is a serious threat to both people and the environment, as it allows larger amounts of harmful UV radiation from the sun to reach the earth's surface. This increases the risk of humans developing skin cancer and eye conditions such as cataracts. Ecosystems may also be affected, since certain species, such as the planktonic algae on which many animals feed, lack protection against higher levels of radiation. In addition, agricultural yields are reduced, as crops grow more slowly.

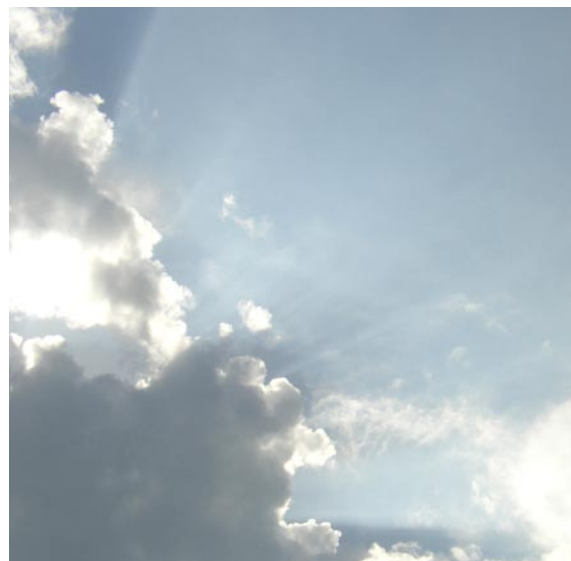


Photo: Christina Fagergren

Global problem

Destruction of the ozone layer is caused above all by chemicals containing chlorine and bromine. One major threat is the large, hidden stockpile of ozone-depleting substances in old refrigeration and air conditioning equipment, insulating materials such as plastic foams etc. The problem facing the ozone layer is largely a global one. And global action is needed to halt use of the substances that are depleting it.

Situation in Stockholm county

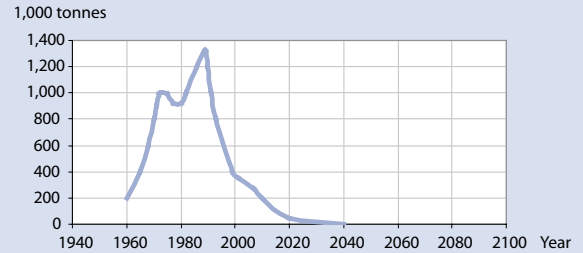
Sweden has a stringent timetable for the phase-out of ozone-depleting chemicals, and has also signed the Montreal Protocol on Substances that Deplete the Ozone Layer. In Stockholm county, as in the rest of the country, there are recycling centres for hazardous wastes, to which old fridges and freezers are to be taken. In some local authority areas, waste management

companies offer a home collection service to avoid ozone-depleting chemicals going astray.

Ways we can make a difference

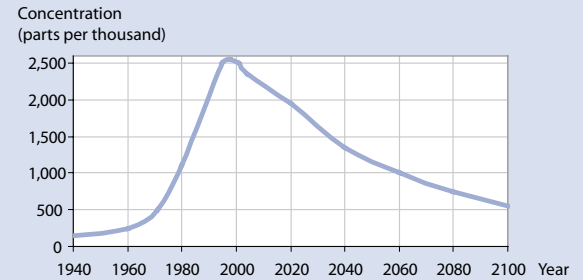
- Ensure that, when buildings are demolished, hazardous wastes are recovered and taken to a recycling centre.
- Dispose of products that could damage the ozone layer, such as old fridges and air conditioning systems, at recycling centres.

The environmental quality objectives *A Protective Ozone Layer* and *A Safe Radiation Environment* are closely linked, as a thinner ozone layer allows more ultraviolet radiation to reach the earth's surface. Read more under *A Safe Radiation Environment*.



Emissions of ozone-depleting substances in Sweden

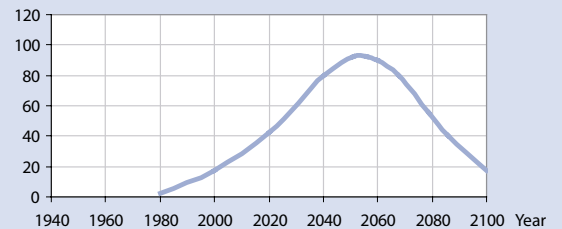
Total production of ozone-depleting chemicals peaked in the 1980s and has since fallen very sharply.



Ozone-depleting substances in the stratosphere

Most ozone-depleting substances have an atmospheric life-time of decades or even centuries. That is the main reason why concentrations went on rising until around 2000. Only then did ozone thinning reach its peak.

Annual excess incidence
per million people



Incidence of skin cancer in excess of normal in Sweden

Ozone thinning increases the risk of skin tumours and eye disorders. Often, such effects only emerge several decades after exposure. The incidence of skin cancer therefore cannot be expected to peak until around 2050



We need to know more

We are exposed on a daily basis to radiation from many different sources, and this can increase the risk of cancer and genetic damage. More research needs to be done on the effects of radiation, and we also need to change the way we expose ourselves to the sun. Major information campaigns are necessary to persuade people to alter their behaviour. Even when they have been launched, it will take a long time for the effects to feed through into a lower incidence of cancer.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.



Photo: Christina Fagergren

Radiation a risk factor

Radiation represents a risk both to people and to other living organisms, as it can cause cancer and genetic damage. Radiological protection has previously focused on protecting humans. Today there is a concern, both nationally and internationally, to extend protection to natural ecosystems as well. The earth is constantly exposed to natural radiation from the sun (ultraviolet radiation) and from space (cosmic radiation). Sometimes humans are also exposed to radiation from artificial sources, such as X-rays.

Sources of radiation

Nuclear power stations and medical X-ray examinations and radiotherapy are examples of sources of what is known as ionizing radiation. These sources have long been known risk factors for cancer and genetic effects. Electromagnetic fields from electrical

equipment, mobile phones, power transmission lines and computer screens are an example of non-ionizing radiation. We still have far too limited an understanding of how such fields affect our health.

Ultraviolet (UV) radiation is another form of non-ionizing radiation. Thinning of the ozone layer increases the amount of UV radiation from the sun reaching the earth.

Situation in Stockholm county

Solar UV radiation is the leading cause of skin cancer. Viewed over a longer period, the number of cases of this disease in the county shows a constant rise, as it does in the rest of Sweden. The milder forms of skin cancer, squamous cell and basal cell carcinoma, have increased markedly since 1980, presumably because we sunbathe more. Men generally have a higher incidence of skin cancer than women, probably owing

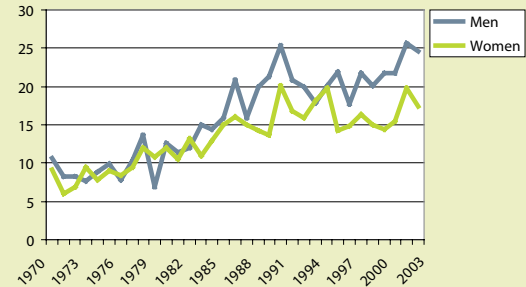
to differences in sun exposure behaviour. The rise in the more serious form malignant melanoma has slowed somewhat in the last ten years, but the situation remains very serious.

Ways we can make a difference

- Take care when sunbathing, and in particular protect children from UV radiation.
- Hand in old smoke detectors at a local authority recycling point for electronic scrap.
- Reduce your risk of exposure to radiation by using a hands-free kit with your mobile phone.

You can read more about the causes of thinning of the ozone layer, and about the effects of increased exposure to UV radiation, in the section on *A Protective Ozone Layer*.

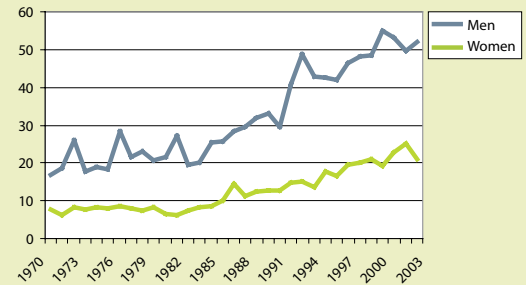
Incidence of malignant melanoma per 100,000 people



Malignant melanoma

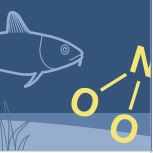
Number of new cases of malignant melanoma per 100,000 inhabitants in Stockholm county. Malignant melanoma is a serious form of skin cancer.

Incidence of skin cancer per 100,000 people



Skin cancer

Number of new cases of skin cancer (other than malignant melanoma) per 100,000 inhabitants in Stockholm county. These cases of skin cancer are less serious than malignant melanoma and are rarely fatal. Since 1980



Better sewage treatment needed

Eutrophication of lakes and rivers is a bigger problem in Stockholm county than in any other region of Sweden. High levels of phosphorus and nitrogen in soil and water alter the basic conditions for plants, animals and humans, and also for outdoor recreation. Much has been done to reduce nutrient discharges from sewage treatment plants and single-household sewage systems. But there is still a long way to go, especially in areas where second homes are being turned into permanent dwellings.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

Oxygen depletion and pollution

Plant nutrients occur naturally in the soil and are also supplied to it as a result of human activities. The surplus nutrients not used by plants are washed into lakes, rivers and seas.

When plants that benefit from high nutrient levels spread at the expense of other species, biodiversity is reduced. In addition, lakes and rivers can become choked with vegetation.

Eutrophication – nutrient over-enrichment – can also adversely affect lakes, rivers and seas by changing the mix of species present. Many lakes can become unsuitable for bathing and fishing. In addition, increased amounts of nutrients in the water may cause blooms of algae. When these algae are broken down, large quantities of oxygen are consumed, resulting in a shortage of this gas and leaving areas of the bottom devoid of life. In addition, nitrogen pollution



Photo: Mattias Jansson

may affect groundwater, increasing nitrate levels in public and private water supplies. Nitrate in drinking water can reduce the oxygen-carrying capacity of the blood.

A problem largely of our own making

Owing to the settlement structure and high population density of the county, waste water treatment plants and single-household sewage systems are the two dominant sources of nutrients. Deposition of air pollutants from the transport sector and from power stations and heating plants also contributes to eutrophication, as do nutrients released with storm water (surface runoff) and leached from farmland.

Effluents from sewage treatment plants account for almost half the phosphorus that enters lakes and rivers before finally ending up in the sea, and for a third of the nitrogen. Agriculture is responsible for the

largest share of nitrogen discharges, but also supplies significant amounts of phosphorus to the sea. The majority of nitrogen inputs to soils come from atmospheric deposition.

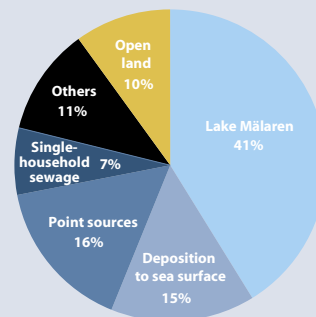
Situation in Stockholm county

Eutrophication is a major problem in the county. Despite measures to reduce point-source discharges from municipal sewage plants and factories and leaching from agriculture, lakes and rivers are not recovering as rapidly as we would like to see. Nutrients from past discharges have accumulated in soils and benthic sediments, from where they are now gradually being released. It may therefore be a long time before the action taken produces visible results.

The population of the county is constantly rising, putting increasing pressure on sewage treatment facilities. A growing problem in the region is that more second homes with limited water and sewage facilities are being used as permanent homes. In many cases, on-site sewage systems are not of a high enough standard or capacity to cope with the increased load, resulting in inadequate treatment. Such systems are therefore a significant factor behind eutrophication.

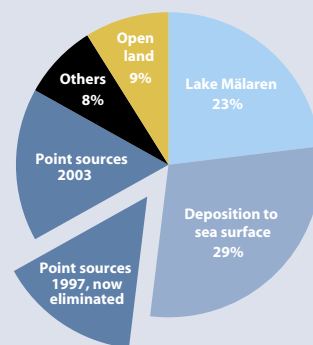
Ways we can make a difference

- Upgrade inefficient single-household sewage systems.
- Do not pour chemicals down the drain. They interfere with treatment processes at sewage works.
- Reduce nutrient leaching from farmland, e.g. by establishing buffer zones along streams and using farming methods that decrease leaching.



Sources of phosphorus inputs to sea in Stockholm county (1997)

The largest source is Lake Mälaren, which receives phosphorus from sewage treatment plants, single-household sewage systems and farmland. Most discharges from the county's sewage plants, however, occur into coastal waters, reducing the load on Mälaren. There are some 87,000 single-household sewage systems in the county. Phosphorus emissions have not fallen appreciably since 1997.



Sources of nitrogen inputs to sea in Stockholm county (1997)

In 1997, point sources accounted for about 31 per cent of the total. Since then their share has decreased, thanks to a halving of discharges from major municipal sewage treatment plants. Much remains to be done to reduce inputs to Lake Mälaren and nitrogen emissions to air, mainly from road transport.



Cooperation to improve and conserve fresh waters

The biggest obstacles to achieving the objective Flourishing Lakes and Streams today are physical disturbance and eutrophication. This goal is dependent on progress towards many of the other environmental quality objectives, and major efforts are therefore needed in several quarters to reverse the present trend.



This objective can be achieved in Stockholm county if new measures are introduced.

Waters affected by nutrients and other pollutants

These days, lakes and streams are mainly affected by losses of nutrients from single-household sewage systems, farm and forest land and other sources. Eutrophication is the environmental threat with the clearest impacts on surface water quality and biodiversity. Larger-scale pressures, such as persistent toxic pollutants and atmospheric deposition, also cause damage, since they interfere with the natural development of many aquatic animals and plants. Read more about eutrophication and toxic pollutants under *Zero Eutrophication* and *A Non-Toxic Environment*.

Lake lowering and other physical changes

Over the last 150 years human activities, especially lake lowering and land drainage, have resulted in significant changes to lakes and running waters. Of



Photo: Christina Fagergren

the roughly 850 lakes in Stockholm county, at least 390 have been lowered. In the past, lake levels were lowered to create more farm and forest land. Nowadays, physical interference – drainage or damming, for example – mainly occurs when new housing areas or roads are built. Such operations eliminate aquatic environments and create barriers to migrating animals associated with surface waters.

Benefits of lakes and streams

Lakes and streams, along with wetlands, even out run-off flows over the year, reducing the risk of extreme flooding or drought situations. They also provide a basis for commercial activities and opportunities for recreational pursuits such as fishing, swimming, birdwatching and skating. In addition, aquatic environments support a wealth of biodiversity.

Situation in Stockholm county

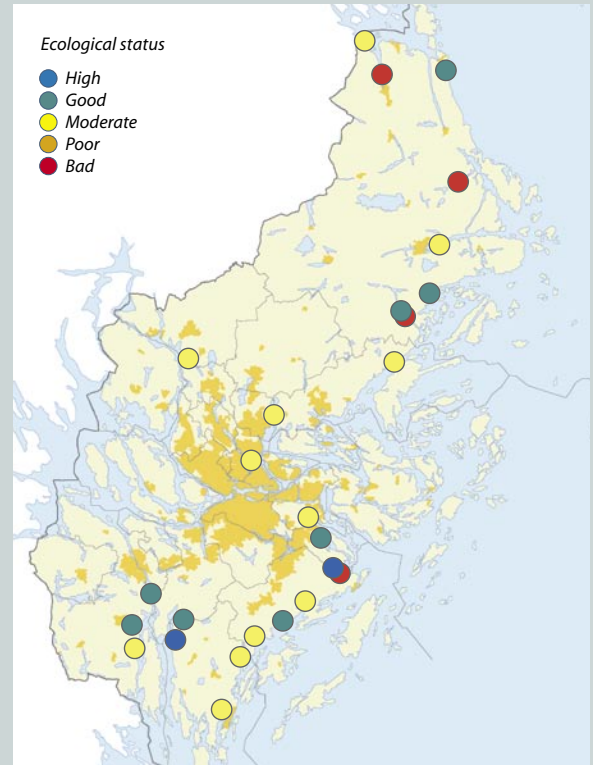
There are many types of aquatic environment in the county, offering great potential for biodiversity. However, the county's lakes and watercourses have been severely disturbed, chiefly by eutrophication and earlier lake lowering projects, and continued efforts are needed to repair such damage. Species sensitive to different pollutants have disappeared from many waters.

Almost half the shoreline of Lake Mälaren within the county boundary is affected by either boat- or settlement-related development. Some 20 per cent is severely affected. The most heavily developed shore areas are to be found in the city of Stockholm and neighbouring municipalities.

Several local authorities are involved in joint, catchment-wide initiatives to improve water quality and conserve biodiversity in lakes or running waters. Good examples of this are the Oxundaån and Tyresån catchment area projects.

Ways we can make a difference

- Different stakeholders should work together more closely within catchment areas.
- Road culverts should be designed to allow fish and other aquatic wildlife to pass easily.
- Upgrade inefficient sewage systems.



Ecological status

Fish that ascend rivers to spawn are often used as an indicator of freshwater biodiversity. Where such fish can survive, good living conditions exist for other species as well. The comparatively poor ecological status of many waters in the county is primarily due to physical interference of various kinds and in certain cases to pollution. To achieve good ecological status, water conservation measures need to be introduced throughout the catchments concerned.

Clean drinking water from taps and pumps

Do you have to think twice about turning on a tap? Yes, at least if you live in a coastal or archipelago area of Stockholm county, where pressure on groundwater is high. Overpumping of water is common, and often results in salt water getting into wells. Radon, pesticides, road salt and bacterial contamination are other factors affecting groundwater quality in the county.



This objective can be achieved in Stockholm county if new measures are introduced.

Groundwater for life

Clean groundwater is needed to maintain both habitats for plants and animals and our own drinking water supplies. Wide natural variations can be observed in the occurrence of groundwater, and in addition humans influence in various ways both its availability and its quality. Low groundwater levels, for example resulting from tunnel construction projects where water leaks into tunnels and underground chambers, can give rise to water shortages and subsidence damage to buildings and other structures. This results in major costs to society.

Salt and bacteria

The groundwater situation in coastal and archipelago areas of Stockholm gives cause for concern. If salt water finds its way into wells, the water can become



Photo: Christina Fagergren

unfit to drink. This is a difficult and costly problem to remedy. The commonest cause of groundwater shortages and salt-water intrusion is overpumping of wells.

In built-up areas of the county, groundwater is often contaminated as a result of various human activities, making it unfit for consumption. Use of de-icing salt on roads, for example, has affected several major groundwater sources. In some places, groundwater is also polluted by excessive use of fertilizers and pesticides. The commonest cause of poor drinking water quality is bacterial contamination from infiltrating surface water or other sources, such as leaking sewers. This is a particular risk in areas where holiday or weekend cottages are turned into permanent homes. Other problems include naturally high radon levels, especially in wells drilled into bedrock.

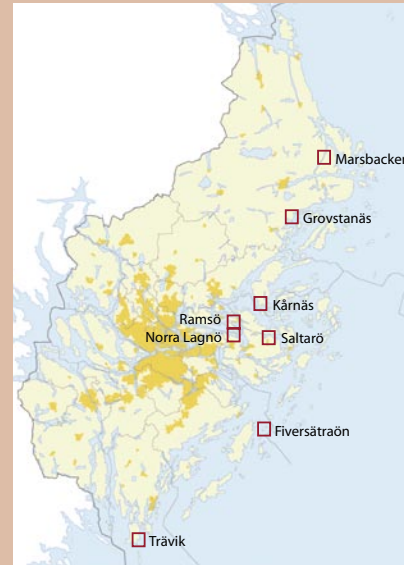
Situation in Stockholm county

A large proportion of the county's water supply comes from Lake Mälaren. Some local authorities, however, rely on groundwater, while others use groundwater as a reserve in the event of operational breakdowns or contamination of surface water sources.

Major groundwater resources in the county are only to be found in eskers (ridges of sand and gravel). For private supplies, drilled wells are the commonest option today. Salt-water contamination of such wells is a very significant problem, especially in coastal and archipelago areas. Both intrusion of salt water from the Baltic and upward movement of old (relict) salt water are common, and in most cases they render the water undrinkable. Bacteria in groundwater are another problem and are the commonest basis for action by local authority environment departments on private water supplies.

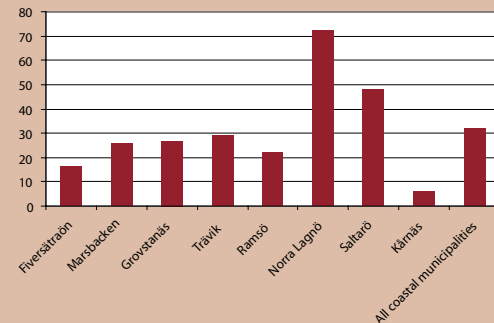
Ways we can make a difference

- Protect eskers and other groundwater-bearing formations.
- Ensure that groundwater sources are safeguarded in local government planning.
- Always use a certified well driller.



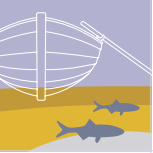
Eight areas where salinity of water in wells drilled into bedrock is monitored

Percentage of wells affected by salt water



Percentage of drilled wells affected by salt water

Percentages of affected wells in the eight monitoring areas, compared with the overall figure for coastal municipalities. A well is regarded as affected if its chloride level exceeds 50 mg/l. The figures are alarmingly high, especially on Norra Lagnö and Saltarö in Värmdö municipality.



In the archipelago on the archipelago's terms

Eutrophication is widespread in the archipelago areas of the county, and groundwater supplies are declining. With the population of the archipelago growing rapidly, new approaches are required to tackle these problems. The resources and values of our coast and archipelago need to be used in a more sustainable manner. That calls for an understanding of and respect for existing natural limits.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

Eutrophication and water shortages

Eutrophication and toxic pollutants have had serious impacts on marine biodiversity. With more and more people moving out to coastal and archipelago areas, pressure on these environments is mounting.

Stocks of several fish species have declined in recent years, partly owing to overfishing and reproductive disturbances. Eutrophication, due to nutrient inputs, gives rise to heavy plant growth on shallow areas of the seabed and more intense algal blooms, leading to oxygen depletion and death of benthic fauna. Increased boat use has impacts such as shore erosion, noise and leaching of toxic substances from anti-fouling paints. Overpumping of groundwater causes shortages of fresh water and salt-water intrusion into wells.

Progress towards the goals *Good-Quality Groundwater* and *Zero Eutrophication* is also important in meeting this objective.



Photo: County Administrative Board

A living archipelago

The diversity of habitats in Sweden's archipelagos supports a rich variety of plants and animals. Human use of these areas has changed since the mid-20th century. The number of farms has decreased, threatening the traditional cultural landscape – an important part of the beautiful archipelago environment.

Local fisheries have also suffered a sharp decline. In Stockholm county there are now only 36 licensed commercial fishermen left, mainly because it is difficult to make a living from fishing. This is due partly to overfishing, but also to the unfavourable state of the environment. The influx of new year-round residents to the archipelago creates a new basis for a living community, but also accentuates the need to use the area's natural resources in a sustainable manner.

Situation in Stockholm county

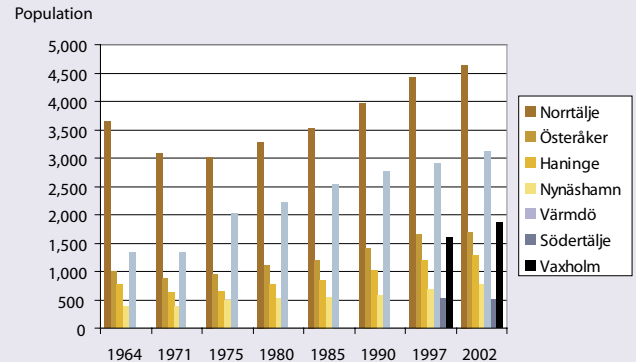
The county's archipelago, with its 30,000 islands and surrounding sea areas, is a unique asset. Since the 1970s, environmental problems have been reduced, for example by better treatment of sewage, but the Stockholm archipelago is still Sweden's most severely eutrophicated coastal area. Many people want to visit or live in the archipelago. Sustainable drinking water supplies and sewage systems are therefore essential. Salt-water intrusion into drilled wells is now a problem in many areas, as are nutrient discharges from homes with substandard sewage treatment.

Toxic pollutants such as DDT and PCBs reduce the reproductive success of seals and sea eagles, for example. Thanks to targeted measures since the 1970s, populations of these species have recovered. The porpoise, however, is very rare in the Baltic today, and entanglement in fishing gear poses a serious threat to its survival. No porpoises were seen in the Stockholm archipelago in 2004.

Achieving this goal on time will be difficult. One challenge is to work with a wide range of local stakeholders to improve water quality and ensure sustainable use of the archipelago's natural resources. A success story in this regard is the creation in 2004 of 17 areas in the archipelago closed to fishing during the spawning season.

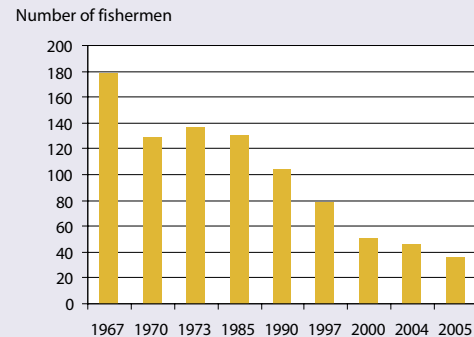
Ways we can make a difference

- Take account of coastal and archipelago environments, terrestrial and marine, in local planning.
- Find livestock for land that needs grazing through the pasture clearinghouse scheme.
- Replace your two-stroke engine with an environment-friendlier one and use a greener fuel.



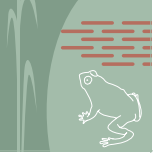
Population trends in the archipelago

The population of the Stockholm archipelago has grown steadily since the 1970s. This diagram shows trends for the islands in the county's coastal municipalities. For Södertälje and Vaxholm, comparable data prior to 1997 are not available.



Number of licensed commercial fishermen

Since the 1970s, the number of commercial fishermen in Stockholm county has shown a continuous decline, partly owing to the difficulty of obtaining a licence, greater efficiency and problems with fish stocks. Licences are issued by the Swedish Board of Fisheries.



More thriving wetlands needed

Wetlands are crucial to river flow and biodiversity, representing as they do the link between land and water. They are also important for outdoor recreation, since they generally provide habitats for a wealth of plant and animal life. The biggest obstacles to attaining the objective *Thriving Wetlands* in the county are housing and road construction and eutrophication. More wetlands need to be created to reduce nutrient inputs to lakes and the sea.



This objective can be achieved in Stockholm county if new measures are introduced.

Development and nutrients major threats to wetlands

Over the last 150 years, most of the wetlands that once existed have been drained, mainly for agricultural use. Today, development of roads and housing is the factor with the greatest adverse impact on wetlands in the county. Nutrients from single-household sewage systems and farmland are also putting significant pressure on the wetlands that remain. Excessive levels of nutrients result in more rapid scrub encroachment of wetland areas, reducing their ability to function as wetlands. Today, to improve water quality and conditions for biodiversity, new wetlands are being created and old ones restored.

Shores, wet woodlands and fens

Wetlands is a general term for various habitat types in which there is water close to (below, at or above)



Photo: Lars-Gunnar Bråvander

the ground surface for much of the year. Common wetland types in the county include shore areas, wet woodlands and fens. Wetlands, like lakes, act as storage reservoirs, evening out run-off over the year and reducing the risk of flooding and drought. They are also important as biological treatment works, stripping the water passing through of nutrients, chiefly nitrogen. Numerous plants, amphibians, reptiles and insects, including many threatened species, live in and around wetlands.

Situation in Stockholm county

Some 90 per cent of the county's natural wetlands have been modified or destroyed by human interference since the mid-19th century. There are many wetlands in the county, but they are small, covering just 3–4 per cent of the land surface. To date, the County Administrative Board has designated some 40 per cent of the

largest and most valuable wetlands as nature reserves (based on the wetland area included in the Environmental Protection Agency's Mire Protection Plan for Sweden).

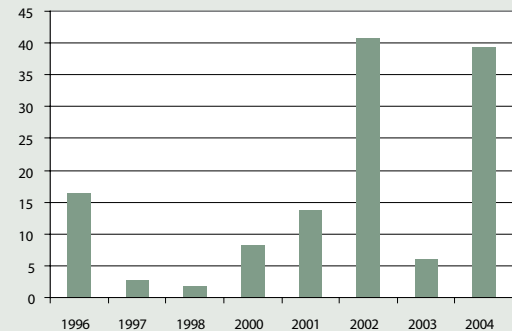
Landowners can receive payments, co-funded by the EU, to establish new wetlands in farming areas. Such projects enhance biodiversity, reduce nutrient leaching from farmland, and help to conserve and restore features of cultural heritage interest. In the last eight years, some 130 hectares of wetlands have been created in this way. The biggest areas are now to be found in the municipalities of Norrtälje, Upplands-Bro and Ekerö, while the largest numbers of such wetlands have been established in Norrtälje and Södertälje municipalities. In addition to these sites, wetlands are being created to treat storm water and sewage and as habitats for game and other wildlife.

One problem in the county is leaching of surplus nutrients into lakes and streams, and from there into the sea. Up to now, man-made wetlands in farming areas have been sited primarily with a view to promoting biodiversity, rather than retaining nutrients. Efforts should therefore be made to recreate wetlands that will intercept nutrients from farmland and thus improve water quality.

Ways we can make a difference

- Restore/recreate wetlands.
- Ensure that wetlands are preserved when houses and roads are built.
- Graze or cut wetlands in farming areas, to enhance their biodiversity and cultural heritage interest.

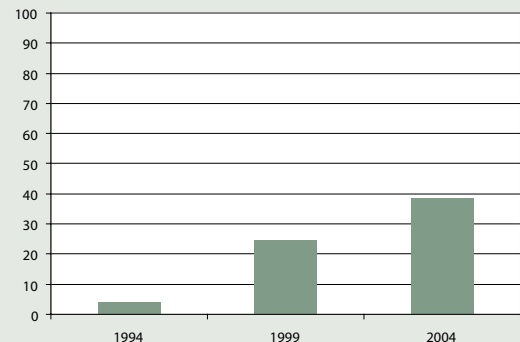
Hectares of wetlands and ponds established



Newly created wetlands and ponds

Number of hectares of wetlands and ponds established with co-funding from the EU in agricultural areas of Stockholm county, 1996–2004. In all, almost 130 hectares of wetlands have been created.

Percentage of wetlands protected



Percentage of wetlands protected

This diagram shows how the protected wetland area, as a share of the total included in the Mire Protection Plan, has increased since 1994. Bars show the cumulative percentage safeguarded. The total area to be protected in the county is 397 hectares

Nature near the city – a good investment

Forests are one of Sweden's most important renewable natural resources and a bank for the conservation of biodiversity. To preserve their various values, they need to be protected. At present, though, new areas are not being safeguarded sufficiently rapidly to meet the target, which calls for just over 16,000 hectares of productive forest land to be protected by 2010.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

More forests need to be protected

Too small a proportion of forest land is currently protected and, to conserve biodiversity in the long term, further areas must be set aside. This should be done by designating nature reserves and habitat protection areas, and on the basis of nature conservation agreements and voluntary undertakings. It is also important to consider the broader forest landscape. Species probably cannot be conserved simply by protecting forest areas; other approaches are also needed, e.g. ensuring that dead wood, on which many plants and animals depend, is retained on all forest land.

Forests can be seen both as a natural resource for society and as a bank for the conservation of biodiversity. How these two dimensions are to be balanced is difficult to say, as our understanding of the needs of different plant and animal species in terms of protection and management is inadequate.



Photo: Mattias Jansson

As a third dimension, forests, both close to and remote from urban areas, represent a recreational resource.

Forest land in a metropolitan region

Forest areas of high conservation value are now protected across the county. These areas need to be of a certain size or composition if they are to function satisfactorily in biological terms. With mounting pressure from a growing population, there is a danger of diverse tracts of forest becoming fragmented. This threatens the survival of species that can only live in forests. When the areas retained become too small, species have less chance of spreading, reducing the potential for genetic variation.

A large proportion of known features of natural and cultural heritage interest in the county are to be found in forest environments influenced by past ara-

ble and livestock farming practices. Many of the areas concerned are in danger of becoming overgrown or being used for housing. This will adversely affect species that are dependent on traditional management.

Situation in Stockholm county

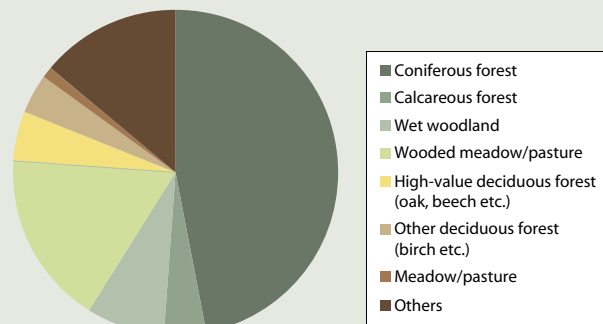
Today just over two per cent of forest land in the county is formally protected, a high figure compared with most other counties (montane forests excluded), but still well short of the target. The county has a total of some 300,000 hectares of forest. The Regional Forestry Board's inventory of particularly valuable environments, or 'key habitats', shows that forests in the county are of great conservation value and contain a very high proportion of biological resources meriting protection, compared with many other counties.

In recent years, forest owners have begun to manage their land on a smaller scale, taking greater account of site-specific constraints. There is also a growing awareness of the need to recreate and restore forest environments. However, forests and biodiversity are also threatened by the rapid growth of infrastructure in the region.

Under existing forestry policy, the basic responsibility for the natural resources and ecologically sensitive management of forests rests with the forestry sector itself. To a large extent, therefore, it will be necessary to rely on voluntary undertakings.

Ways we can make a difference

- Make key habitats the focus of conservation efforts.
- Protect more forest areas of conservation interest.
- Create a demand for eco-certified products from the forestry sector.



Key habitats in the county – small forest holdings

The diagram shows a breakdown by different habitat groups of a total area of 7,845 hectares. There is an immense diversity of key habitats in Stockholm county. Around 25 per cent of the area is dependent on management, i.e. wooded and open meadows and pastures. More areas need to be set aside to ensure that all key habitat types are conserved. The state funding available for this purpose is inadequate.



Five interim targets relating to Sustainable Forests, to be met by 2010, have been adopted for Stockholm county by the Regional Forestry Board. They are concerned with:

- setting aside a specific area of forest from production,
- maintaining and increasing the amount of dead wood and the areas of old forest and forest with a large deciduous element,
- avoiding damage to ancient remains in forests,
- launching action programmes for threatened species,
- viewing forests as a resource for outdoor recreation and contact with nature.

Grazing livestock needed to maintain an open landscape

Agriculture has a key part to play in maintaining an open landscape. The biggest threat to such a landscape is encroaching scrub and woodland. It is therefore important to manage remaining areas of farmland in ways that permit both food production and rich biodiversity. Swedish agriculture faces major changes following the recent reform of the EU's common agricultural policy, although it is too early to say how farming in the county will be affected.



This objective can be achieved in Stockholm county if new measures are introduced.



Photo: Mattias Jansson

Scrub encroachment

As profit margins in agriculture have been squeezed, the area of open land farmed has dwindled. As a result, farmland has become overgrown with scrub and woodland. The remaining area is often intensively cultivated, with small numbers of larger fields. In metropolitan regions, development pressures are high and can pose a threat to open country on the urban fringe. The recent reform of the EU common agricultural policy could have major repercussions for the farmed landscape of the future. How it will affect conditions in the county is not yet clear.

Many valuable assets lost

When the area of farmland decreases, land of less value for production becomes overgrown or is planted with trees or put to other uses. Farming can promote biodiversity by creating space for more species. A

varied agricultural landscape consists of a patchwork of fields, meadows, semi-natural pastures and small-scale features such as ditches and mid-field patches of rocky ground, providing a home for species with widely differing habitat requirements. Many insects are completely dependent on meadow flowers, and themselves support a rich bird fauna. Pastures need to be grazed if they are to remain rich in species. When such land is no longer managed, woody vegetation takes over. The many flowers and other plants favoured by management die. The landscape becomes more uniform and an important aspect of our cultural heritage is lost. Similarly, intensive farming, based on larger fields, leaves less room for biodiversity.

Nature on the urban fringe

An open farmed landscape is also needed to provide opportunities for recreation and contact with nature

for people living in and around towns and cities. Although open countryside on the urban fringe has values that cannot always be measured in monetary terms, there are indirect financial benefits. The many positive effects of outdoor recreation and enjoyment of nature are important for people's mental and physical well-being. For a local authority, conserving natural areas and living agricultural landscapes on the urban fringe can also be a way of attracting visitors and new residents.

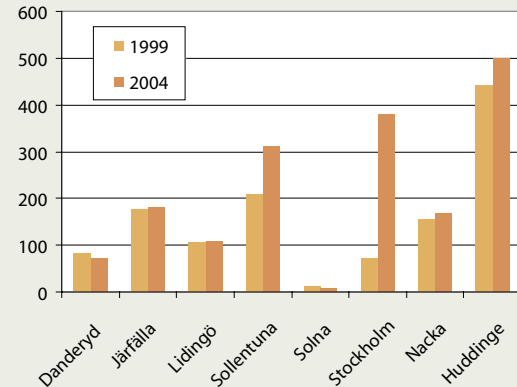
Situation in Stockholm county

Profit margins in agriculture today are generally low, and the average age of farmers is high. Land previously used for crops is becoming overgrown. Hopefully, the comparatively large number of small farms in the county can help to keep land grazed that would otherwise become overgrown. In many cases, EU payments are crucial in this context, but more support is needed if a varied agricultural landscape is to survive. Today, farmers are offered courses on pasture land management, for example. But to ensure that land continues to be managed, there also have to be markets for what they produce. The additional work which pasture land demands has to be worth farmers' while.

Ways we can make a difference

- Graze livestock primarily on semi-natural pastures.
- Use horses and sheep to help keep the landscape open.
- Make Swedish beef more competitive, to increase its market share.

Hectares of farmland on urban fringe



Farmland on the urban fringe

Total area of farmland receiving EU payments in the municipalities of Greater Stockholm in 1999 and 2004 (hectares of arable + pasture + hay meadows). The increase from 1999 to 2004 is mainly a result of EU payments being sought for more land than before, due to greater awareness of the support schemes. Local authorities are showing a greater interest in farmland on the urban fringe

Planning a good environment

The built environment forms the basis for our everyday lives, and this objective covers both urban and rural areas and wise use of resources. Attaining it is a challenge, especially in a metropolitan region with a large population concentrated in such a small area. To achieve A Good Built Environment, a wide range of action needs to be taken.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

Indoors and outdoors

The last 40 years have seen marked growth in urban populations and areas. In parallel with this, distances and transport needs have increased. To mitigate the adverse effects, investments need to be made in environment-friendly, safe, convenient and modern forms of transport.

Transport noise is a major health problem, especially in large cities. Too much of it can cause stress and illness. Some two million Swedes are exposed to excessive outdoor noise from transport in the vicinity of their homes. Air pollutants and indoor environment problems such as radon, damp, mould and chemicals also adversely affect health.

Planning information important

Under this objective, a large number of interim targets have been adopted that are intended to make the built



Photo: Albin Dahlström

environment healthier and more stimulating to live in, while reducing its impacts on the natural environment. These targets are partially conflicting, and one challenge is therefore to strike a balance between them.

An important factor in achieving this and other environmental goals is good information on which to base planning. Noise, sustainable travel, waste, reduced energy use and nature on the urban fringe are five key issues that need to be addressed early on when planning new areas and developing existing ones. This can avoid major costs at a later stage.

Situation in Stockholm county

Internationally, the county is a unique metropolitan region, in that its built-up areas rub shoulders with natural green space and water. Competition for land is fierce. In the last three decades, the county's population has grown by 25 per cent. Meanwhile, car

numbers have risen by 65 per cent, road traffic by 80 per cent, and public transport use by 35 per cent. Housing has become far more widely scattered than places of work.

The dominant source of *noise* in the county is transport. Road traffic, but in certain cases rail, air and boat traffic too, is responsible for high noise levels both indoors and outdoors.

Only a fraction of built environments of *cultural heritage* value in the county are formally protected. Older (pre-1920) buildings have already been surveyed and assessed, but most buildings date from the second half of the 20th century and have yet to be comprehensively reviewed.

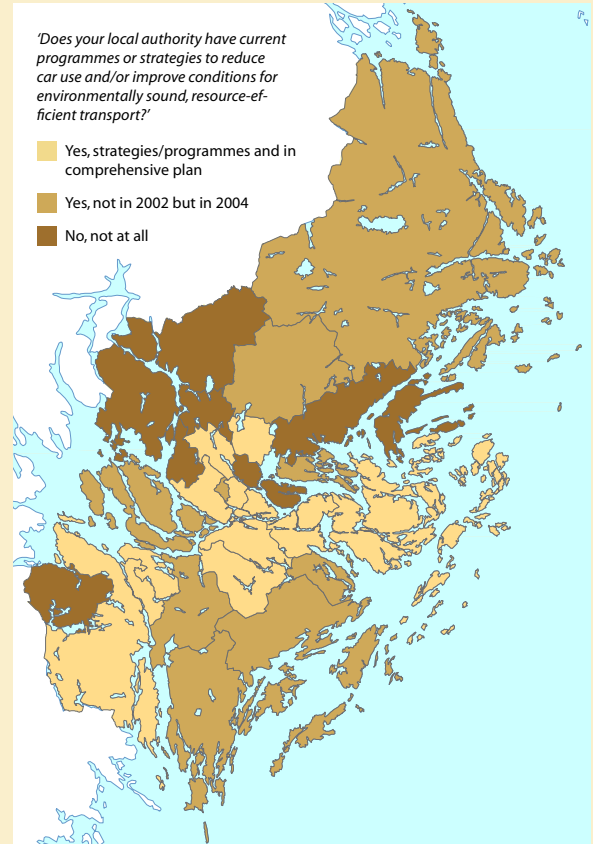
Extraction of *natural gravel* in the county has declined, but not rapidly enough. In 2003, gravel made up 28 per cent of all aggregates used.

Thanks to increased separation of waste, the amount of unsorted *household waste* per capita has fallen since the 1990s. In 2003, only 6 per cent of food waste from households, restaurants etc. was recovered by means of biological treatment. That figure has not risen in the last few years.

Elevated *radon levels* in homes are a common problem. Every year over 100 people are believed to develop cancer as a result of radon in indoor air or drinking water. Eleven per cent of schools and pre-schools in the county, 15 per cent of apartment buildings and 40 per cent of houses have radon levels exceeding the limit of 200 Bq/m³.

Ways we can make a difference

- Give long-term protection to valuable green space.
- Plan with a view to reducing noise and car use.
- Separate waste at source.



Programmes for environmentally sound transport

The number of local authorities with programmes or strategies to promote environmentally sound transport has increased in recent years. Reduced use of cars will support progress towards several of the environmental objectives. It is therefore important to develop programmes and strategies and to ensure that they guide all local authority activities.



Will the objectives be achieved in Stockholm county?

The environmental quality objectives are to be met by 2020 (2050 in the case of *Reduced Climate Impact* and 2010 for the regional targets relating to *Sustainable Forests*). They are intended as tools for achieving a better environment, and the assessments presented in this report are based on the wordings of the national objectives. Each assessment indicates how far there is still to go to reach the goal in question. It takes into account factors such as states, responses, driving forces and pressures, and above all whether it will be possible to achieve the goal on time. You can read more on p. 8 about how our assessments were arrived at.

The table opposite shows the situation as of 2005. Much has been done to improve the environment in the county since 2000, when the last review appeared. But in many cases the progress being made is far too slow to meet the objectives by the target dates.

Stockholm county and Sweden

In many respects, the situation in the county is similar to that in Sweden as a whole. National assessments can be found in *de Facto*, the annual progress report of the Swedish Environmental Objectives Council. Regarding some objectives, however, this region differs from the rest of the country. This is mainly the case where the particular circumstances and population pressures of a major city mean that Stockholm county faces an even greater challenge than other parts of Sweden.



This objective should be achieved in Stockholm county on the basis of current measures.



This objective can be achieved in Stockholm county if new measures are introduced.



This objective will be very difficult to achieve in Stockholm county, even if additional measures are introduced.

Objective (target year)	Will it be achieved?
1. Reduced Climate Impact (2050)	
2. Clean Air (2020)	
3. Natural Acidification Only (2020)	
4. A Non-Toxic Environment (2020)	
5. A Protective Ozone Layer (2020)	
6. A Safe Radiation Environment (2020)	
7. Zero Eutrophication (2020)	
8. Flourishing Lakes and Streams (2020)	
9. Good-Quality Groundwater (2020)	
10. A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos (2020)	
11. Thriving Wetlands (2020)	
12. Sustainable Forests (2010)	
13. A Varied Agricultural Landscape (2020)	
14. A Good Built Environment (2020)	

Working to meet the objectives

update 2005 is published as part of our effort to monitor progress towards the national environmental objectives, and is the second report of its kind for Stockholm county. The first was published in 2000.

An environment programme adopted in 2000 included regional goals for the county. In 2005 these goals are being revised and brought into line with the national interim targets. A key concern here is to define measurable goals, progress towards which can be tracked using indicators. The proposed new objectives for the county will be posted on the County Administrative Board's website, www.ab.lst.se.

A regional environmental action programme has been drawn up in consultation with stakeholders in the county, focusing on two areas: water and waste water, and travel and transport. The aim is to work with stakeholders to develop measures that reflect their respective goals and activities, and thus secure their commitment to implementing them. This is intended to complement existing environmental efforts in the county.

Find out more

Information about Sweden's environmental objectives and efforts to meet them can be found on the Environmental Objectives Portal, www.miljomal.nu. This site (some of it in English) provides an overview of the information available and the different agencies responsible. It also presents the indicators being used to monitor progress at the national and regional levels, and describes regional and local activities. County administrative boards across the country are involved in a joint project (RUS – Regional Monitoring System) to track progress towards the goals.

The Stockholm County Administrative Board website includes information (in Swedish) on what we are doing to implement the objectives at the regional level, and to improve the environment generally.

The Regional Forestry Board has adopted interim targets relating to the objective *Sustainable Forests*. For further information in Swedish, go to www.svo.se and click on Mälardalen.

Under the EU's Water Framework Directive, all European fresh, ground and coastal waters are to achieve and maintain good ecological and chemical status by 2015. The directive calls for a stronger water management structure, based on river basins. It is closely linked to several of Sweden's environmental goals. Five county administrative boards have been designated as water authorities. For more information on the directive, go to www.europa.eu.int and click on Environment and Water.





Glossary

Algal bloom	Large quantity of phytoplankton, imparting a distinct colour and cloudiness to the water.	Key habitat	Natural area of high conservation value, in which threatened or rare species are, or are expected to be, found.
Benthic	Located or living at or near the bottom of a lake or sea.	Methane	Hydrocarbon formed by the decomposition of organic matter in environments with little oxygen. One of several greenhouse gases.
Benzene	Organic compound chiefly used in petrol (gasoline) to increase its octane rating. Toxic and can cause cancer.	Mire Protection Plan	National plan for the protection of mires (peat-forming wetlands), drawn up by the Swedish Environmental Protection Agency and county administrative boards. Lists the country's most valuable mires.
Bq	Becquerel, unit of radioactivity.	Nature conservation agreement	Contract entered into between the state or a local authority and a landowner to preserve and develop the natural features of a site.
Brominated flame retardants	Chemical compounds used to make electronic equipment, textiles and other products fire resistant.	Nitrous oxide	Greenhouse gas which also contributes to thinning of the ozone layer. Forms during almost all forms of combustion.
Cadmium	Heavy metal that readily accumulates in ecosystems.	Non-ionizing radiation	Electromagnetic waves emitted e.g. by power transmission lines, the sun, mobile phones and domestic appliances.
Carbon dioxide	One of several greenhouse gases. Forms for example when fossil fuels are burned.	PAHs	Group of aromatic compounds (hydrocarbons) formed when a fuel burns incompletely, e.g. when a car is started from cold. Can cause cancer.
Catchment area	Area whose topography is such that rain falling on it drains into a given stream or river.	Particulates (PM10)	Inhalable particles which in urban areas chiefly arise from human activities, e.g. emissions of sulphates and nitrates, burning of biofuels and oil products, and abrasion of road surfaces.
County administrative board	Central government body serving a particular county.	PCBs	Group of organic compounds that are toxic and persistent in the environment. Affect the nervous system and reproductive capacity, and can cause cancer. Now to be found in air, water, soil, sediments, flora and fauna.
Diffuse emissions	Emissions from pollution sources that are widely scattered and not individually identified.	Persistent	Stable and resistant to degradation in the environment.
Ecosystem	A number of species interacting in a shared environment, all of them mutually dependent in one way or another.	pH	pH (hydrogen ion concentration) is a measure of acidity. A pH of 7 is neutral, while lower values indicate an acidic solution and higher values a basic (alkaline) one.
Fossil fuels	Coal, oil and natural gas.	Point source	Pollution source that is individually identified.
Genetic damage	Damage to genes that can result in humans, animals or plants failing to develop normally or suffering from disease.		
Ground-level ozone	Ozone occurring near the earth's surface. A toxic gas even at low concentrations. Formed by the action of sunlight on nitrogen oxides and hydrocarbons in air.		
Incidence	Number of new cases of a disease arising in a population over a given period.		
Ionizing radiation	High-energy radiation that can break up the molecules of a substance exposed to it. Is produced e.g. by radioactive substances and X-ray equipment. Damages cells and can result in the development of cancer.		

Sources of diagrams

The county in brief

Stockholm Region Energy Advisory Service
County Administrative Board of Stockholm
Statistics Sweden, Statistical Database and Companies Register
Swedish Energy Agency
Swedish Institute for Transport and Communications Analysis
Swedish Association of Waste Management
SWETIC, certifiering.nu

Reduced Climate Impact

Top: Stockholm–Uppsala Air Quality Management Association, SLB-Analys 2005:5
Bottom: Statistics Sweden

Clean Air

City of Stockholm, Environment and Health Administration, SLB-Analys

Natural Acidification Only

County Administrative Board of Stockholm

A Non-Toxic Environment

Map: County Administrative Board of Stockholm
Diagram: Norén and Meironyté 2000, Chemosphere 40, and Swedish Chemicals Inspectorate

A Protective Ozone Layer

Swedish Environmental Protection Agency, Monitor 17

A Safe Radiation Environment

National Board of Health and Welfare, Folkhälsan i siffror

Zero Eutrophication

County Administrative Board of Stockholm

Flourishing Lakes and Streams

County Administrative Board of Stockholm

Good-Quality Groundwater

County Administrative Board of Stockholm

A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos

County Administrative Board of Stockholm

Thriving Wetlands

County Administrative Board of Stockholm

Sustainable Forests

Regional Forestry Board Mälardalen

A Varied Agricultural Landscape

Swedish Board of Agriculture

A Good Built Environment

County Administrative Board of Stockholm, Housing Market Surveys 2002 and 2004

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