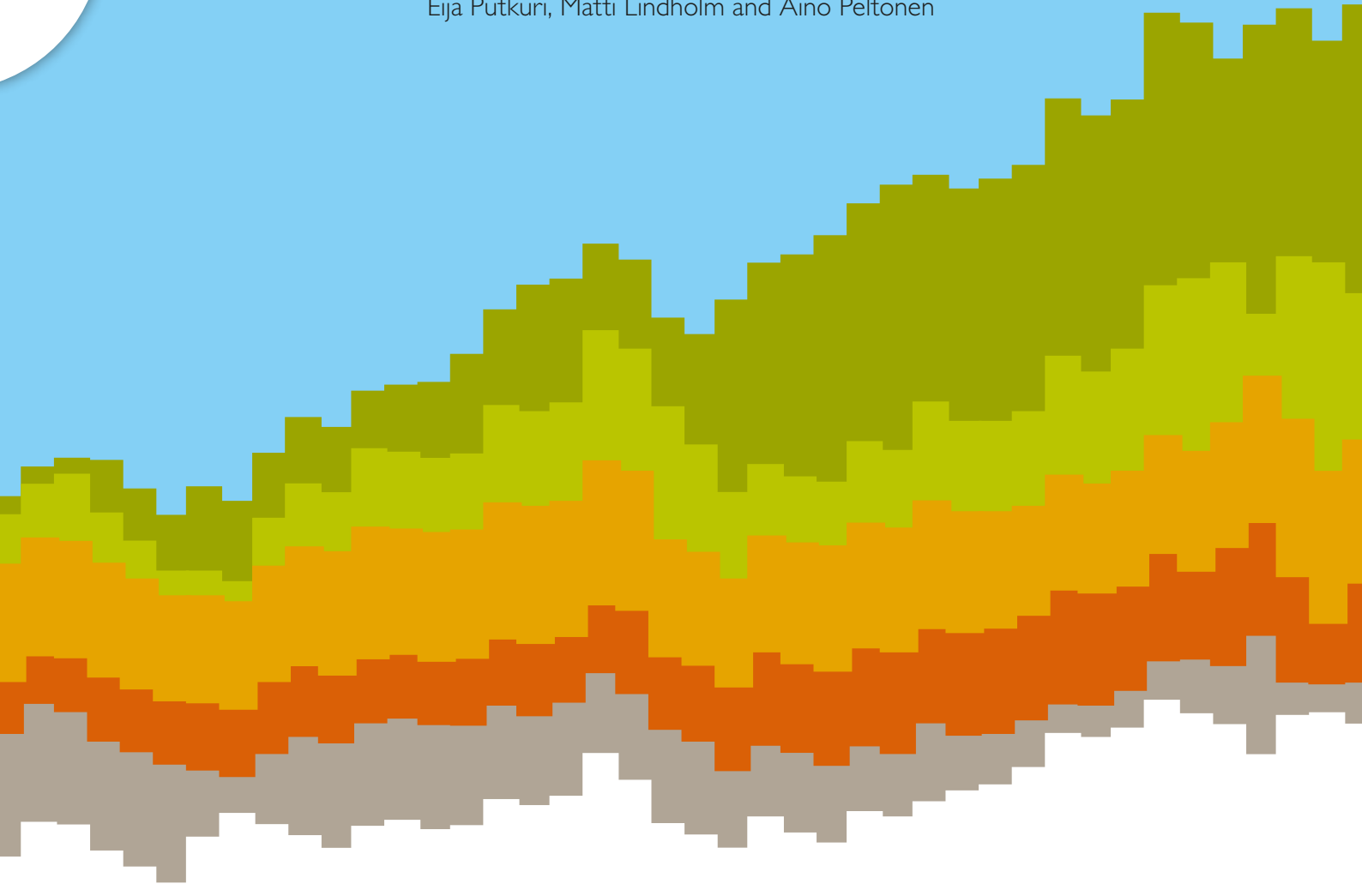
State of the environment in Finland 2013

Eija Putkuri, Matti Lindholm and Aino Peltonen



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SYKE

SYKE Publications 1, English
Finnish Environment Institute

Layout: Satu Turtiainen

Publication (PDF) is available on the internet:
www.syke.fi/publications and www.environment.fi/soer2013

Edita Prima Ltd., Helsinki 2014

ISBN 978-952-11-4261-1 (pbk.)
ISBN 978-952-11-4262-8 (PDF)
ISSN 2323-8895 (print)
ISSN 2323-8909 (online)

FOREWORD

This report presents key indicators for the assessment of the current state of the environment in Finland, future trends and the adequacy of the current conservation measures.

Although the causes of most environmental problems are global, the consequences are experienced locally. In parallel with this national report, the regional Centres for Economic Development, Transport and the Environment (ELY Centres) are publishing their own regional environment reviews. Both types of report are published at approximately 4-year intervals. Most up-to-date information is available in the environment.fi website.

The EU Directive on Public Access to Environmental Information calls for member states to provide their citizens with information on the state of the environment. This report is a response to that requirement.

The report was compiled and written in the Finnish Environment Institute. Indicators were selected and interpreted by Eija Putkuri, Matti Lindholm and Aino Peltonen, with Hanna Aho and Riina-Riikka Ahrelma helping with gathering of data. Data sources included environmental administration as well as other authorities and research institutes.

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AIR POLLUTANTS

FRESH WATER AND THE SEA

BIODIVERSITY

CHEMICALS AND HAZARDOUS SUBSTANCES

GREEN ECONOMY

The environment and the economy

Many of the indicators in this publication show that the state of the environment is improving in Finland. Emissions into the air and water have clearly reduced over the last few decades. There are also positive signals from the slowing in growth of energy consumption and of the use of motor vehicles.

Emissions are decreasing, mainly as a consequence of advances in fuel technology and improvements in industrial processes and treatment technologies. In addition, the fact that a considerable share of Finland's economic growth in recent decades has been based on natural resources from overseas has helped to lessen local impact as the environmental costs from the production of these goods remain mostly beyond Finland's borders.

But not all environmental status indicators are positive. The most severe problems – climate change and loss of biodiversity – remain unsolved. In these areas, things continue to get worse, and positive developments in other less critical environmental issues are not sufficient to reverse the overall negative trend.

When the previous State of the Environment review was published some five years ago, its introduction was entitled 'Climate change darkening the horizon'. This phrase captured the general atmosphere of the environmental debate ongoing at the time. The media frequently featured research reports and assessments of the impacts and costs of climate change. Each report and newsflash painted a more threatening picture of climate change than the last, and calls for action became louder. The general feeling was one of concerned anticipation but did give rise to some optimism.

This all changed on 18 December 2009.

On this day the closing statements were read out at a meeting in Copenhagen, Denmark at which a new international climate agreement had been sought. A declaration was issued and targets were set, but with no binding agreement on how emissions should be reduced.

PHOTO LASSE ANSAHARJU / VASTAVALO

After the Copenhagen meeting, public interest in climate change faded, due not only to disappointment with the results, but also to the continuing financial crisis that began in 2008. At least for the time being, the urgent impact of the financial crisis has made it the priority issue for the media.

The lack of public interest has not stopped the relentless march of climate change. In May 2013, the United States' National Oceanic and Atmospheric Administration (NOAA) announced that carbon dioxide concentrations in the atmosphere had exceeded the limit of 400 parts per million (ppm). Just prior to industrialisation, in the 17th century, atmospheric carbon dioxide concentrations were only 280 ppm. Millions of years have gone by since the atmosphere last contained as much carbon dioxide as it does now.

Economic problems have increased the tendency for conflict between environmental and economic objectives. The European Union's Sulphur Directive provides a good example of this. While it will considerably reduce sulphur emissions from shipping across the EU, thus sparing a large number of people from the suffering caused by pulmonary illnesses, the debate in Finland has focussed almost solely on the resulting costs for the export industry.

Another example is the Talvivaara mine. Intentional and unintentional wastewater discharges from the mine have been a grim reminder of the situation decades ago, when people had to contend with lye ponds and pollution from waste incineration plants.

In this case, the jobs that Talvivaara brought to an area blighted by unemployment have tipped the scales for decision-makers, despite the environmental consequences. Further economic gains can come from the ore preparation technology developed at Talvivaara which may provide the basis for mining operations in other parts of Finland. This is a highly tempting prospect in a country whose economy needs new stimuli.

Environmental experts have tackled this challenge by finding ways to combine the interests of the environment and the economy. In recent years, the concept of the green economy has replaced the somewhat outdated sustainable development in visions and speeches. However, the core issue is largely the same: securing sufficient economic wellbeing while reducing the environmental costs.

NATURAL RESOURCES

Natural resource use high in Finland

Material efficiency has improved – but not as fast as the economy has expanded

THE TOTAL MATERIAL REQUIREMENT OF FINLAND'S NATIONAL ECONOMY WAS 560 MILLION TONNES IN 2012, I.E. AROUND 100 TONNES OF NATURAL RESOURCES PER CAPITA.

The total material requirement of Finland's national economy was 560 million tonnes in 2012, i.e. around 100 tonnes of natural resources per capita.

In comparison with other countries, Finland uses a remarkably high quantity of natural resources. In terms of direct material input alone, Finland consumed 45 tonnes per capita in 2012, while the EU average is some 16 tonnes. This does not include material flows outside Finland related to imported goods nor extracted domestic natural resources that remain unused such as logging residue left in the forest and excavated waste rock left on mining sites.

Since 1970, Finland's total annual material requirement has almost doubled. Use of fossil fuels, metals and other minerals is nearly four times that of 1970.

Imports account for almost the entire increase in the use of natural resources. While the extraction and use of domestic resources has remained largely unchanged for the last 40 years, the quantity of imported raw materials and ready-made products has more than doubled. Hidden flows of imported products have increased even more, being approximately 3.5 times higher than in the 1970s. Such hidden flows cover resources associated with overseas production, which do not appear in the weight of the imported raw materials and products.

Nevertheless, material efficiency is improving which helps to curb growth in natural resource use. Today, significantly more services and products can be derived from of a given quantity of natural resources than

The total material requirement has almost doubled in the last four decades.

The total material requirement has remained fairly stable since 2006 except in the worst years of economic crisis 2008–2009.

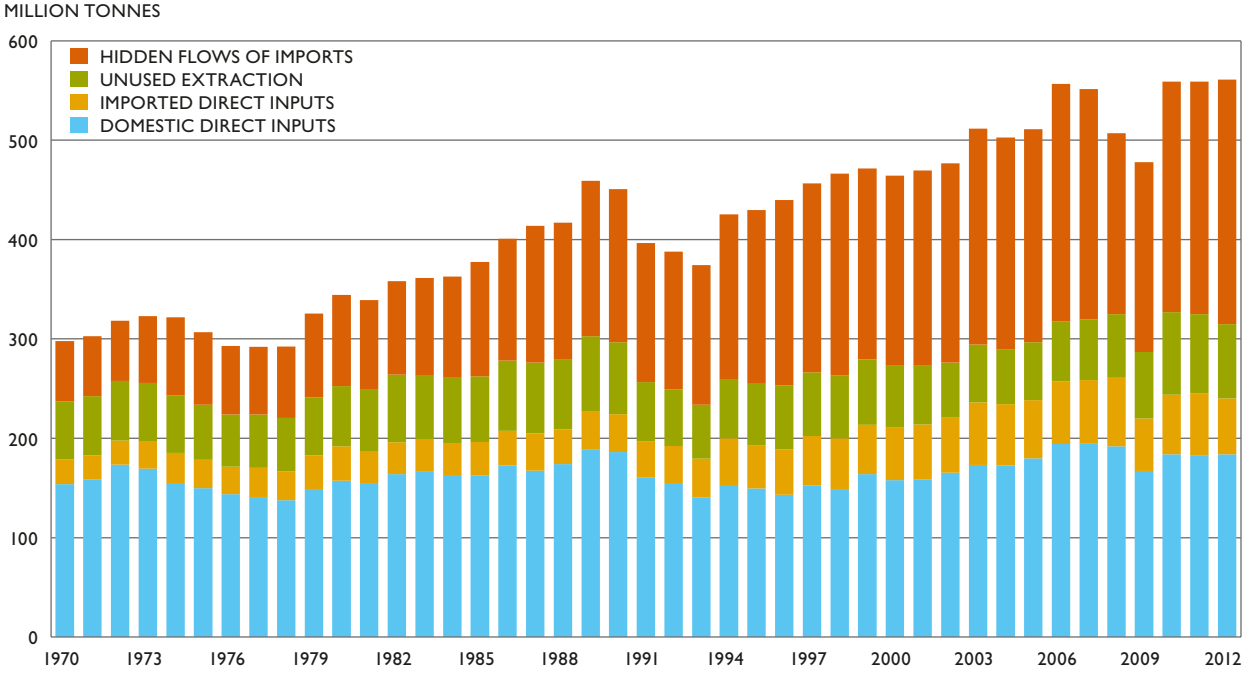
The EU Strategy on the Sustainable Use of Natural Resources aims to enhance the efficiency of natural resource use. This is achieved as the relation of total material requirement to gross domestic product decreases.

was the case a few decades ago. Finland's gross domestic product is almost ten times higher than in 1970, even though natural resource use has only doubled.

A permanent downturn in the use of natural resources can only be achieved when material efficiency grows faster than economy.

Sources:
- Environment Statistics Yearbook 2013. Statistics Finland. 2013.
- Annual national accounts. Official Statistics of Finland. Statistics Finland. 2013.
- Strategy on the sustainable use of natural resources.

Total material requirement of Finland in 1970–2012



Source: Economy-wide material flow accounts. Statistics Finland. 2013.

Rock crushing replacing gravel extraction

ALMOST 90 MILLION TONNES OF GRAVEL AND CRUSHED ROCK WAS CONSUMED IN FINLAND IN 2012, WHICH MAKES AROUND 17 TONNES PER CAPITA.

Eskers and rocky outcrops are valuable habitats

Almost 90 million tonnes of gravel and crushed rock was consumed in Finland in 2012, which makes around 17 tonnes per capita. This is almost as much as in 2009–2011, but clearly less than in 2007 and 2008 when economic problems had not yet reduced construction.

The most striking development of the past few decades has been the replacement of gravel and sand extracted from eskers with aggregate made from solid rock. Today, crushed rock aggregate accounts for almost two thirds of extracted soil and rock material while the share was only one third 20 years ago.

Behind this trend are both lack of gravel resources and measures to protect groundwater. More efficient and cheaper excavation and crushing techniques have also made crushed rock aggregate more competitive. In road building, mobile crushing stations and local blasting have enabled the efficient use of rock reserves on building sites.

Both eskers and rocky outcrops make valuable landscapes and habitats. Their species diversity can also be surprisingly high. Some 6% of all the species in Finland live in rocky areas, even though such areas account for less than 2% of the total land surface. 8% of threatened species in Finland occur primarily or solely on rocky outcrops and boulder fields.

Sources:
- Finnish Environment Institute and Infra ry. 2013.
- Rassi P., Hyvärinen E., Juslén A. & Mannerkoski I. (eds.): The 2010 Red List of Finnish Species. 2010.

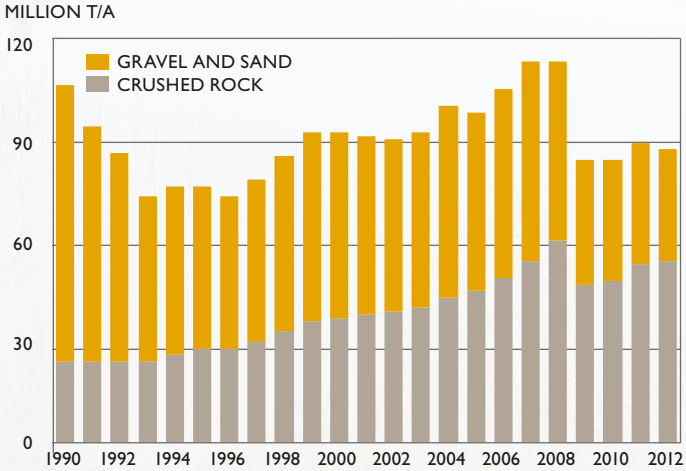
► Carefully landscaped gravel pits please the eye and support recreation in the area. A special project, which ended in 2012, surveyed the state of gravel extraction areas and environmental risks associated with them. Thousands of old gravel pits in need of restoration were identified. Photo Jari Rintala.

Large amounts of gravel and crushed rock are used: 17 tonnes per capita in 2012.

Use of soil and rock material varies, mainly in accordance with economic and construction volumes.

No reduction targets have been set for the extraction of gravel and crushed rock.

Extraction of gravel and rock in 1999–2012



Source: Finnish Environment Institute and Infra ry. 2013.

High hopes for mines as a sustainable and growing export sector

VISION FOR 2050: "FINLAND IS A GLOBAL LEADER IN THE SUSTAINABLE UTILISATION OF MINERAL RESOURCES."

Excavation of metallic minerals has increased almost exponentially in Finland in recent years. New mineral processing methods and increasing demand for metals have revived the mining industry, which had almost completely died out in this country.

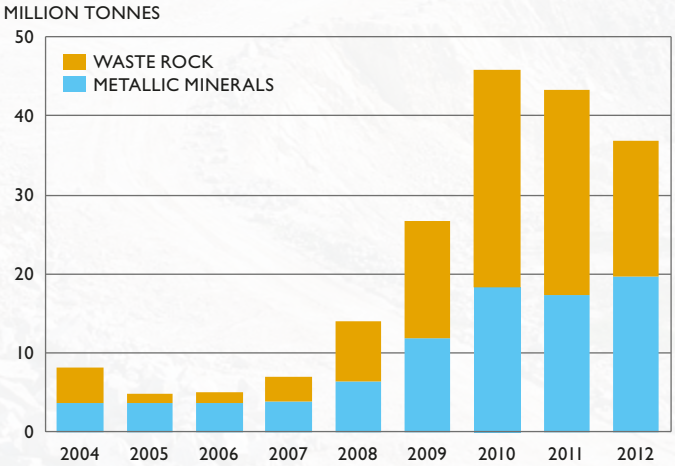
Completed in 2010, Finland's Minerals Strategy defines the vision for 2050 as follows: "Finland is a global leader in the sustainable utilisation of mineral resources and the minerals sector is one of the key foundations of the Finnish national economy."

The revival in mining has created environmental problems and conflict between the mining industry and local residents and livelihoods, such as tourism. The Minerals Strategy also includes proposals for action to reduce the environmental impact of mining and to improve the industry's legitimacy among local residents.

Sources:
- Finland's Minerals Strategy. Geological Survey of Finland. 2013.
- The Ministry of Employment and the Economy. 2013.

► Kinahmi quartz mine in Nilsiä, Northern Karelia. The pit is about 500 metres across, and the quartz obtained is used in glass industry. Photo Tapio Heikkilä (1999).

Excavation of metallic minerals and waste rock in 2004–2012



Source: Ministry of Employment and the Economy. 2013.

Peat production decreasing in Finland

IN 2011, A TOTAL OF 62,000 HECTARES OF LAND WAS USED FOR PEAT PRODUCTION, I.E. AROUND 0.7% OF THE TOTAL AREA OF MIRES AND PEATLANDS IN FINLAND.

Over 90% of extracted peat goes to energy production

Peat extraction is highly sensitive to weather conditions, excessive rain in particular, and this causes production volumes to vary greatly from one year to another. However, when trends are reviewed across periods of several years or full decades, the impact of changes in peat policy can be clearly seen in production volumes.

In the 1980s and 1990s, peat production increased due to efforts to encourage domestic energy production. But in recent years the trend has been reversed as a response to the climate impact of peat combustion and water pollution problems related to peat extraction. Over 90% of extracted peat is used as energy.

The Government's 2013 National Energy and Climate Strategy calls for a reduction in the use of peat for energy by a third from the present annual average of 23 TWh by 2025. With a view to the next 10–20 years, the strategy assumes that on each heating period still at least 11–13 TWh of heat energy will be produced with peat, since peat cannot always be replaced with woodchips or other renewables. According to the strategy, peat should not be replaced with coal, even though peat producers report that this is often what follows.

In 2011, a total of 62,000 hectares of land was used for peat production, i.e. around 0.7% of the total area of mires and peatlands in Finland.

Sources:
- Association of Finnish Peat Industries. 2013.
- National Energy and Climate strategy. The Ministry of Employment and the Economy. 2013.

► Peat production is a significant employer. According to an assessment by VTT, peat industry accounts for more than 12,000 man-years in Finland, which includes both direct and indirect employment. Photo Terhi Asumaniemi.

Peat production and use of peat for energy increased markedly in the 1980s and 1990s.

After the record year 2007 use of peat for energy has begun to decline.

The objective is to reduce the use of peat for energy by a third from the present average of 23 TWh, by 2025. This should be easily achieved.

Peat production in Finland 1980–2012

Source: Statistical Yearbook of Forestry 2011 and Statistical Yearbook of Finland 2012.

The statistics do not include the peat produced in 1980–2003 and 2007 by the members of Finnish Peat Producers' Association, which is used in gardens, as litter or for pollution control.

Less than one half of municipal waste ends up in landfills

IN 2011, 40% OF MUNICIPAL WASTE WAS TAKEN TO LANDFILLS, WHILE TEN YEARS EARLIER THE FIGURE WAS AS HIGH AS 60%.

Waste sorting increasingly popular

In 2011, 2,718 thousand tonnes of municipal waste were generated in Finland, about 510 kilos per capita. The quantity was slightly higher than in the previous year, but remained below the levels of the record year 2008.

Although waste volumes are still relatively high, the waste is no longer primarily processed in landfills. In 2011, 40% of municipal waste was taken to landfills, while ten years earlier the figure was as high as 60%.

Approved by the Government in 2008, the National Waste Plan provides the basis for steering waste management with the aim that only up to one fifth of municipal waste will end up in landfills in 2016. One half of municipal waste is to be recycled for materials and one third recovered for energy.

Achieving this recycling target may prove difficult because, in 2011, only 35% of municipal waste was recovered as material. The increasing popularity of sorting is making recycling easier. In a 2012 consumer survey by Statistics Finland, 80% of households reported that they regularly sorted packing board and 61% said they did the same with cartons. In 2006, the equivalent figures were 56% and 35%.

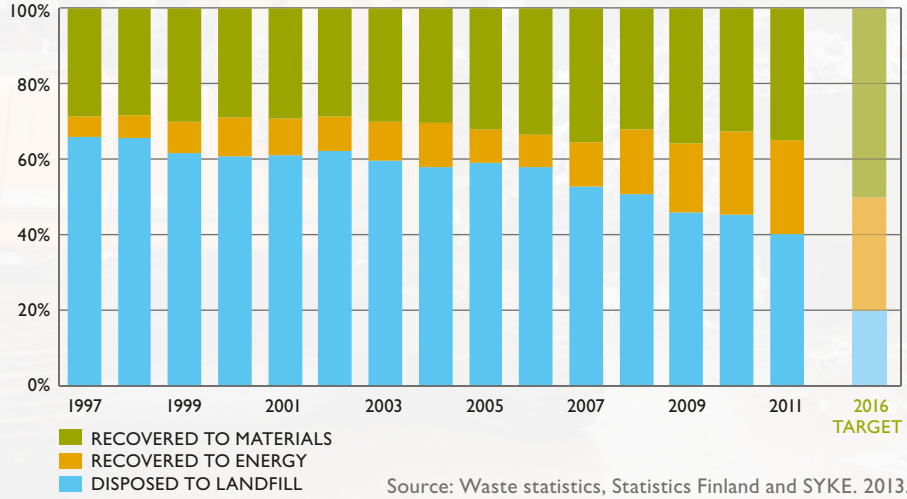
Sources:
- Waste statistics. Statistics Finland. 2013.
- Towards a recycling society: National waste plan until 2016. The Finnish Environment 32/2008. Ministry of Environment. 2008.

Recovery of municipal waste for materials or energy has more than doubled over the last 15 years. On the other hand, increasing waste volumes have offset part of this gain.

In the last five years, municipal waste placed in landfills has decreased fairly quickly, both in absolute terms and in relation to its share of all municipal waste.

Monitoring the National Waste Plan indicates that it is unlikely that the recycling target can be met unless additional measures are taken, but the energy goal will probably be reached in the next few years.

Recovery of municipal waste in 1997–2011 and the goal for 2016



Source: Waste statistics, Statistics Finland and SYKE. 2013.

PHOTO WILMA HURSKAINEN

Fish farming decreasing in Finland but increasing in Norway

Environmental costs have reduced more than actual production

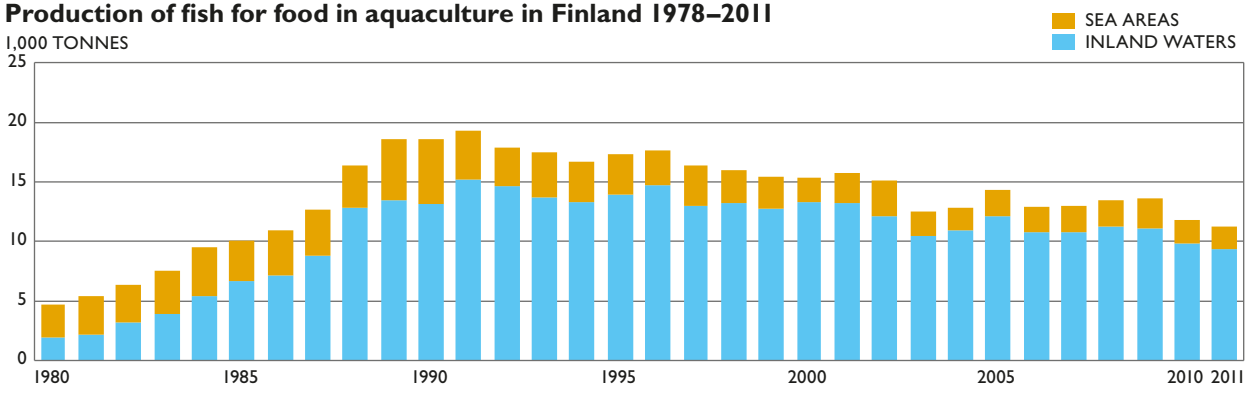
Farming of fish for food has decreased steadily in Finland since the early 1990s, and is now down by more than 40% from the record year 1991.

Domestic fish production has mainly been replaced by production in Norway, which has grown vigorously in recent years. In 2008, fish farming in Norway accounted for almost 40% of aquaculture production in Europe.

The environmental impact of fish farming in Finland has decreased in line with falling production figures. Moreover, improved feeding techniques and lower amounts of feed have markedly decreased pollution in relation to production. In the last 15 years, nutrient discharges from fish farms to the aquatic environment have been halved: in 2012, it was estimated that fish farming accounted for 2% of the total phosphorus load and 0.9% of the nitrogen load.

Sources:
- Aquaculture statistics.Official Statistics of Finland. Finnish Game and Fisheries Research Institute. 2013.
- EEA Indicators: Aquaculture production (CSI 033). 2013.
- The Compliance Monitoring Data system, VAHTI. 2013.

Production of fish for food in aquaculture in Finland 1978–2011



Source: Finnish Game and Fisheries Research Institute. Aquaculture. 2013.

Larger catches for fewer fishermen

Finns now catch slightly larger hauls of fish in the Baltic Sea than 30 years ago. Catch volumes have not grown steadily because changes in fish stocks, and in fishing quotas in particular, have caused steep downturns every now and again.

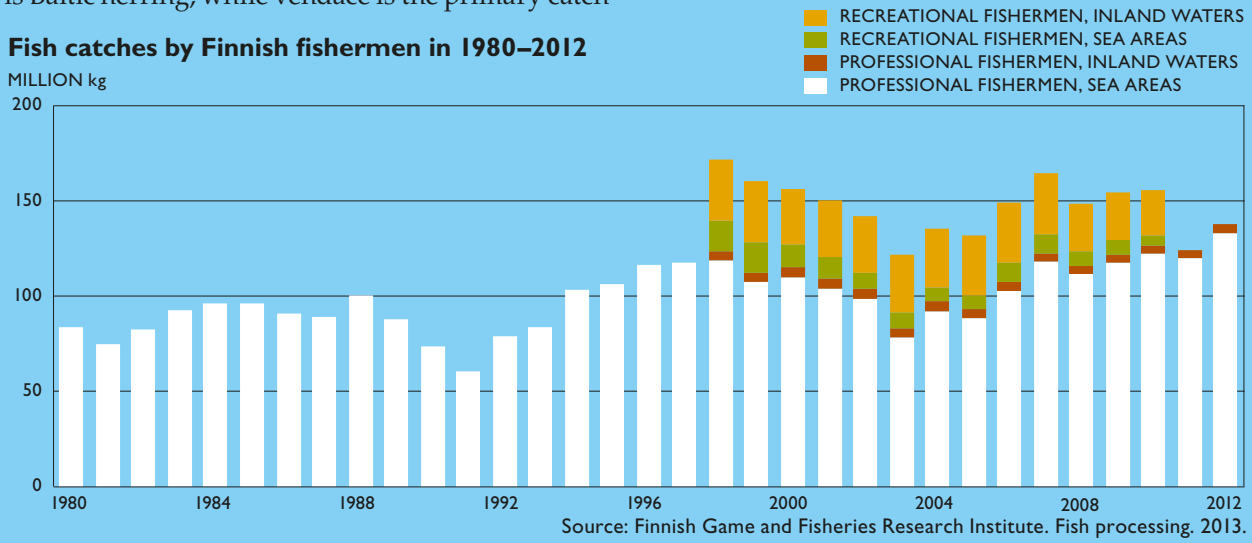
Although catches have grown on the whole, the number of professional fishermen has declined steadily since the mid-1980s, with only 535 fishermen left in the sea area in 2012. Fishing accounted for at least 30% of their income. In 2000, the number of such fishermen was 1,004. Professional fishing in inland waters has not seen such dramatic change.

At sea, the most important species of fish caught is Baltic herring, while vendace is the primary catch in inland waters. In 2012, Finns' total catch of Baltic herring was 117,000 tonnes. It has also increased in recent years despite the fact that, according to ICES standards, in many parts of the Baltic, herring stocks suffer from over-exploitation.

Finns caught some 330 tonnes of Baltic salmon, classified as threatened, in 2012. The share of naturally bred salmon has increased in the 2000s, totalling more than two thirds of the salmon catch at present.

Sources:
- Finnish Game and Fisheries Research Institute. 2013.
- Kansallinen ammattikalastusohjelma 2015. Ministry of Agriculture and Forestry. 2010.

Fish catches by Finnish fishermen in 1980–2012



Source: Finnish Game and Fisheries Research Institute. Fish processing. 2013.

The volume of fish caught by professional fishermen at sea includes all of those landed within the entire Baltic Sea. Catches by professional fishermen in inland waters, and those of recreational fishermen in inland waters and sea areas are shown from 1998, since earlier data is not fully comparable.

CLIMATE CHANGE AND ENERGY

Growth in greenhouse gas emissions ended

GREENHOUSE GAS EMISSIONS HAVE REACHED THEIR LOWEST LEVEL IN FINLAND IN TWENTY YEARS

Still some way from a carbon-neutral society

According to advance data for 2012 by Statistics Finland, greenhouse gas emissions have reached their lowest level in twenty years. Finland also achieved the Kyoto Protocol's goal of stabilising greenhouse gas emissions in the period 2008–2012 at the level of 1990. The average level of emissions in this period was almost 5% lower than in 1990.

Future targets will be stricter because, in terms of curbing climate change, the 1990 level of emissions is still far too high. In December 2009 in Copenhagen, Denmark, an attempt was made to agree new international emission reduction targets, but no binding agreement was made.

The EU has hitherto committed to a 20% reduction in greenhouse gas emissions from 1990 levels by 2020. By 2050, the EU aims to cut these emissions by as much as 80%. Even this may not be rapid enough.

In addition to reducing emissions, carbon sinks can be used to combat climate change. Forests are Finland's key carbon sinks; carbon is sequestered in them as long as the annual increase in growing stock exceeds removal. Since 1990, the volume of forests has grown steadily due to the high share of young forest, more sustainable forest management measures, and drainage work previously undertaken.

To avoid accelerating climate change, Finland must aim at carbon neutrality. In a carbon neutral society, emissions would be low enough to be fully neutralised by carbon sinks.

Sources:
- Greenhouse gas inventory. Statistics Finland. 2013.
- National Energy and Climate strategy. The Ministry of Employment and the Economy. 2013.
- Finland's Fifth National Communication under the UNFCCC. 2009. Ministry of the Environment and Statistics Finland, Helsinki.

LONG-TERM TREND

Due to global greenhouse gas emissions, carbon dioxide concentrations in the atmosphere have risen from pre-industrial 280 ppm to present 400 ppm.

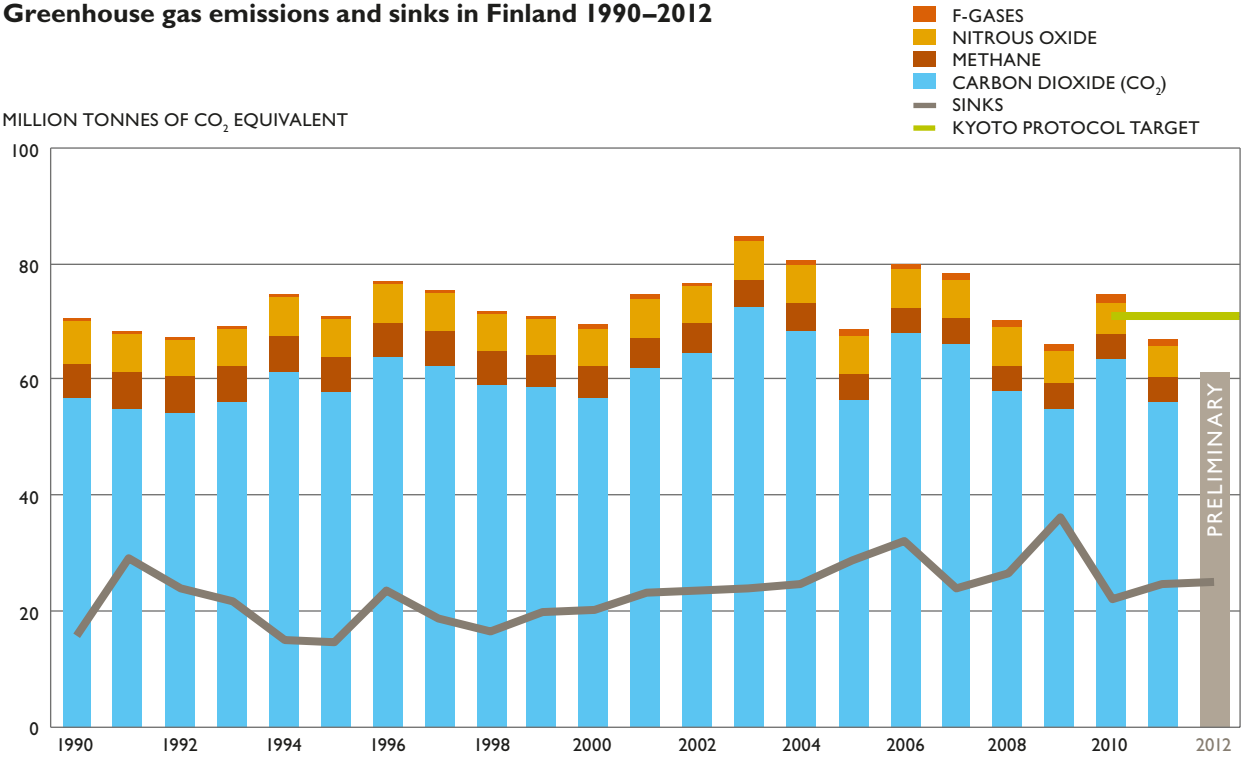
SHORT-TERM TREND

Growth in emissions seems to have ceased in Finland.

IN RELATION TO TARGETS

Finland's Kyoto Protocol target for 2008–2012 has been met. However, this will not be enough to halt climate change.

Greenhouse gas emissions and sinks in Finland 1990–2012



Source: Greenhouse gas inventory. Statistics Finland. 2013.

Energy consumption no longer increasing

THE AIM IS THAT, BY 2050, THE END-USE ENERGY EFFICIENCY WILL BE IMPROVED BY AT LEAST ONE THIRD FROM 2020 LEVELS.

Moderate energy saving goals

Finland's energy consumption per capita is the highest in the European Union. Reasons for this include energy-intensive industry, a high standard of living, a cold climate and long distances. Key energy sources in Finland are oil and other fossil fuels, wood-based fuels and nuclear energy.

Energy consumption has no longer increased in the 2000s mainly because of lower energy requirements for industry thanks to improved energy efficiency and the decline of heavy industry. In 2000–2010, industry's share of energy consumption in Finland fell from 52% to 45%.

New energy consumers include the data centres required by cloud services within data networks. Large international corporations in search of low electricity prices and stable conditions have established such centres in Finland in recent years. According to one assessment, electricity consumption by data centres doubled in 2005–2010 and they now account for some 0.5–1.5% of the country's total electricity consumption.

The 2008 National Energy and Climate Strategy set the target of saving 37 TWh in end-use energy by 2020. Achieving this target would mean that end-use energy consumption would be 310 TWh in 2020. The 2013 update of the strategy casts doubt on whether this will be achieved. The aim is that, by 2050, the end-use energy efficiency will be improved by at least one third from 2020 levels.

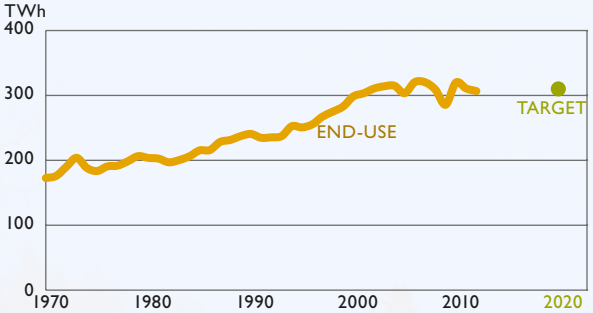
Sources:
- Statistics Finland. 2013.
- Energiatehokas konesali. Motiva. 2010.
- Energy supply and consumption. 2012, 4th quarter Official Statistics of Finland. Statistics Finland. 2012.
- National Energy and Climate strategy. The Ministry of Employment and the Economy. 2013.

Energy consumption has increased five-fold since 1950 and almost doubled since 1970.

The increase in energy consumption has halted in the 2000s.

Energy consumption is expected to increase further. It is uncertain whether the 2020 goal set in the National Energy and Climate Strategy, updated in 2013, will be achieved.

End-use of energy in Finland 1970–2012



Year 2012 preliminary. Final energy consumption target is 310 TWh in 2020. Source: Statistics Finland. 2013.

Aurora Bridge in Helsinki, which opened in 2012, allows pedestrians and cyclists to safely cross the busy Nordenskiöldinkatu street. The bridge is implemented with precisely targeted energy efficient LED lights. This saves energy and reduces light pollution. Photo Helsingin Energia..

Share of renewable energy increasing

THE SHARE OF NEW FORMS OF ENERGY HAS MORE THAN TRIPLED SINCE 2005.

Forests the key source of renewable energy

The share of renewable sources in Finnish energy production fell in the 1970s, but has grown again since 1990. The earlier drop was caused by an increase in total energy consumption partly stimulated by new nuclear power plants. In absolute terms, small-scale combustion of wood was the only renewable energy that decreased and this was due to oil and electric heating becoming more common in households.

Waste sludge from pulp mills has long been a key source of renewable energy in Finland. Use of solid wood fuels has also increased steadily in both industry and energy sectors since the 1970s. The share of some new forms of energy, such as heat pumps, wind power and solar thermal collectors, has more than tripled since 2005. Investments in these renewables are supported through feed-in tariffs and other financial measures.

The EU Directive on Renewable Energy aims to raise the share of renewable energy in Finland to 38% of end-use by 2020. End-use refers to consumption of electricity, heat and fuels by end consumers, not taking account of the loss in energy transfer and conversion. The share of renewable energy in Finland calculated in this manner, has been around 4–5 percentage points higher than if it were calculated on the basis of total energy consumption.

The latest statistics on renewable energy's share of end-use date back to 2010, when it was around 32%. In terms of total energy consumption, renewables increased their share by 3.7 percentage points in 2010–2012, meaning a likely rise to over 35% of end-use.

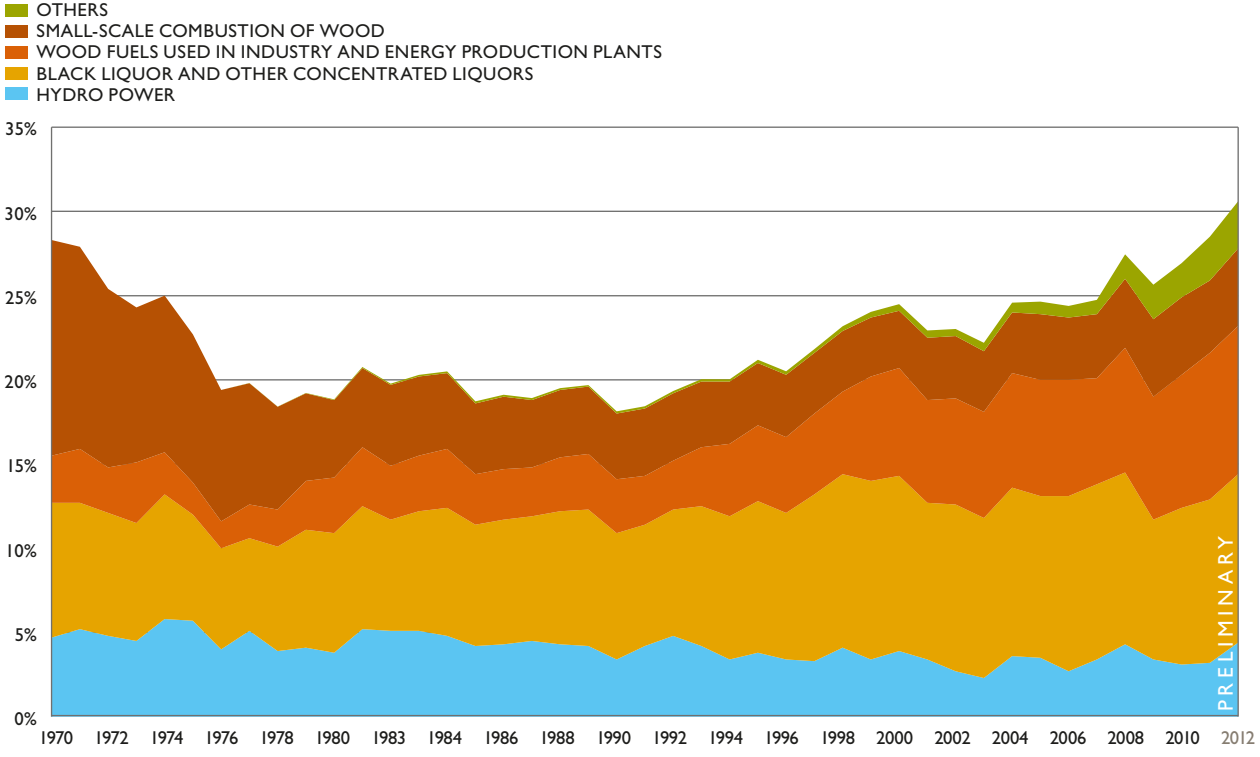
Sources:
- Statistics Finland. 2013.
- National Energy and Climate strategy. The Ministry of Employment and the Economy. 2013.

Non-renewable forms of energy account for two thirds of Finland's energy consumption.

The share of renewable energy has grown in recent years.

The target for 2020, with renewables accounting for 38% of end-use, is only a few percentage points away.

Share of renewable energy of the total energy consumption 1970–2012



Source: Statistics Finland. 2013.

The category "Other" includes recycled fuels, heat pumps, wind power and heat from industrial reaction. Energy from peat combustion and net imports of electricity are not included in renewables.

Rapid rise in using heat pumps

Over ten times more energy is now produced using heat pumps than ten years ago. Most of this increase comes from the rapid uptake of air source heat pumps.

The Finnish Heat Pump Association's statistics show that, in 2012, some 540,000 heat pumps were installed in Finland. More than 400,000 of these were air source heat pumps. The net energy production from all heat pumps totalled approximately 4.2 TWh. In this calculation, the electricity consumed by the pumps is deducted from their heat production figure.

The 2008 Climate and Energy Strategy aimed to raise this net production to 5 TWh by 2020. Two years later, in the 2010 Action Plan for Promoting Renewable Energy Sources, the target was raised to 8 TWh. At the current growth rate, even this higher target seems quite achievable.

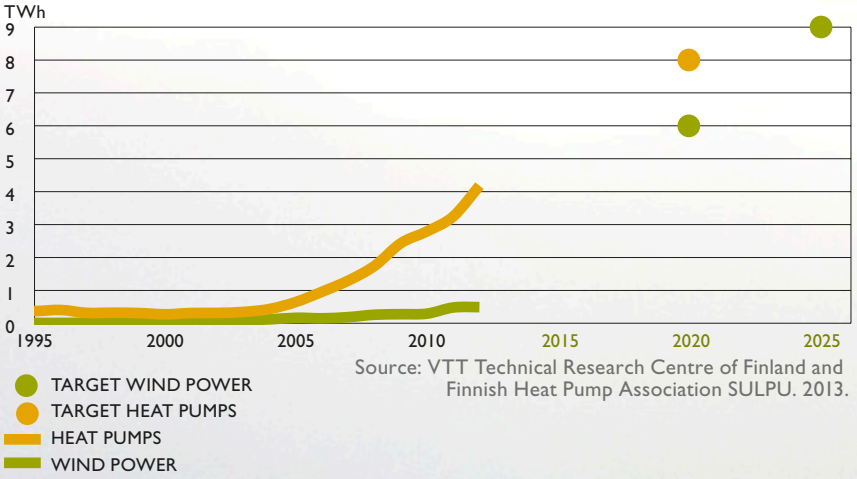
But at the same time, wind power has grown more slowly than expected. The 2020 production target for wind power is 6 TWh, and for 2025 it is 9 TWh. Both targets seem very ambitious against the present yearly production of circa 0.5 TWh.

Finland's National Climate and Energy Strategy produced in 2013 estimates that, in order to achieve the targets set, obstacles to wind power must be removed. These primarily relate to land use planning, not finances.

Sources:
- VTT Technical Research Centre of Finland. 2013.
- Finnish Heat Pump Association SULPU. 2013.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
In 2012, new sources of energy, such as solar and wind power accounted for less than 3% of Finland's energy consumption.	In particular, energy production using heat pumps has seen strong growth in recent years.	The targets set for energy produced by heat pumps can be met, but the situation looks grim for wind power.

Energy produced through wind power and heat pumps in Finland 1995–2012



Source: VTT Technical Research Centre of Finland and Finnish Heat Pump Association SULPU. 2013.

In 2012, around 0.5 TWh of net energy was produced with wind power in Finland, and more than 4 TWh by heat pumps. The electricity consumed by the pumps has been deducted in these figures. Heat pumps include ground source, air-to-air, air-to-water and exhaust heat pumps. In 2012, air-to-air heat pumps accounted for 56% of the net energy produced by all heat pumps, and ground source heat pumps for 39%. Large-scale industrial heat pumps of over 26 kW are not included.

PHOTO FEODOR GURVITS

Average temperature in Finland up by one degree in one hundred years

RISING TEMPERATURES ARE AFFECTING FINNISH NATURE IN VARIOUS WAYS; RIVER, LAKE AND SEA ICE BREAK UP EARLIER.

Effects already visible

Over the last one hundred years, the average temperature has increased by approximately one degree in Finland. Warming has been most intense in springtime: almost two degrees for the March–May period. Summers and autumns are less than one degree warmer, and winters less than half a degree. Observed variations in other climate features, such as precipitation, are not statistically significant enough to denote a long-term change.

Rising temperatures are affecting Finnish nature in various ways; river, lake and sea ice break up earlier, birds migrate to Finland earlier in the spring, and butterfly species spread farther north than before.

One of the longest series of climate records based on direct observations has been gathered from the Torne River in Finland. Records of the ice break up on the river date back to 1693 and they show that the ice now breaks up around two weeks earlier than in those days.

Finland's climate is warming, mainly due to global climate change. On average, the global temperature has risen by 0.74 degrees since the early 1900s. The European Union and the G8 countries aim to restrict global warming to two degrees, which is considered the threshold for dangerous changes.

At present, it seems almost impossible that this target will be achieved. Published in autumn 2013, the 5th assessment report of the IPCC states that if greenhouse gas emissions increase at their current pace, the result will be a 3 to 5 degree rise in the global average temperature from the already warmer levels of past decades, by 2100. If a rapid fall in emissions could be achieved around 2020, the temperature would rise about one degree from current levels.

Sources:
- Finnish Meteorological Institute. 2013.
- IPCC 2013 Fifth Assessment Report. Climate Change 2013.

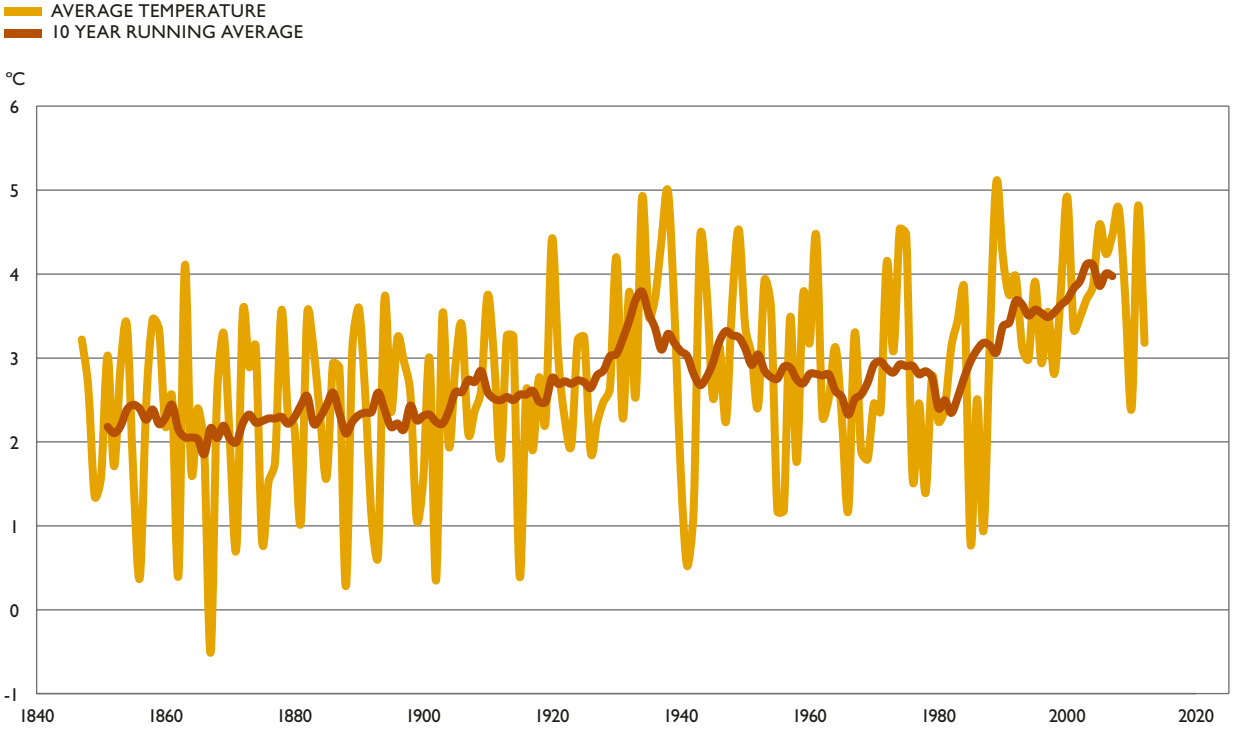
Within the last hundred years, the average temperature has risen by one degree in Finland.

The average temperature has risen particularly rapidly over the last 20 years.

A two-degree increase in global average temperature will be difficult to avoid. In Finland, the temperature is clearly rising at a faster pace.

Trend in average temperatures in Finland 1847–2012

Average temperatures for Finland are based on data from four observation stations: Kaisaniemi in Helsinki, Kuopio airport, Kajaani airport and Oulu airport.



Source: Finnish Meteorological Institute. 2013.

Intervention in climate change possible

TWO DEGREES IS REGARDED AS THE CRITICAL LIMIT FOR THE INCREASE IN THE GLOBAL MEAN TEMPERATURE.

Warming in Finland will be above the global average

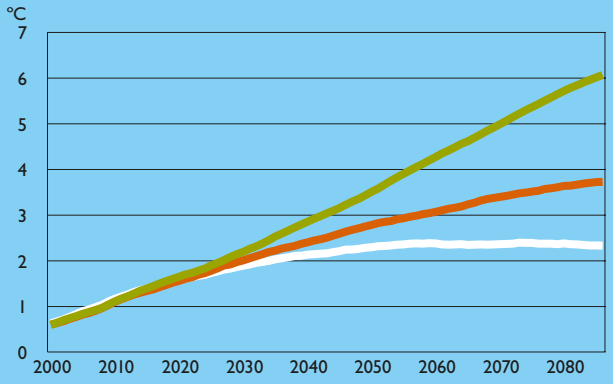
Two degrees is regarded as the critical limit for the increase in the global mean temperature. Remaining below that limit may keep the effects on nature, food production and the water supply at tolerable levels.

According to current climate models, the two-degree target will only be met if the most optimistic RCP2.6 scenario for emission reductions is realised. In this scenario, international environmental policy and technological development succeed in inducing a sharp decline in global greenhouse gas emissions soon after 2020.

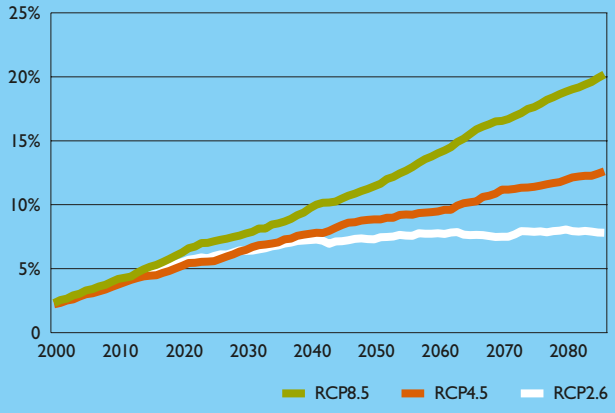
The average temperature in Finland will increase by more than two degrees even in this optimistic RCP2.6 scenario. Moreover, warming will probably be more intense in winter than in summer. If greenhouse gas emissions only begin to take a downturn around 2040, in accordance with the RCP4.5 scenario, January temperatures in Finland will rise by an average of 5 degrees and precipitation by over 20%.

Sources:
- Finnish Meteorological Institute. 2013.
- Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. Limiting global climate change to 2 degrees Celsius - The way ahead for 2020 and beyond. COM/2007/0002 final.
- van Vuuren, D.P., et al: RCP2.6: exploring the possibility to keep global mean temperature increase below 2°C. Climatic Change 109. 2011.

Change in average temperature in Finland according to different scenarios



Change in annual precipitation in Finland according to different scenarios



Source: Finnish Meteorological Institute. 2013.

Change in annual mean temperature and precipitation in Finland in 2000–2085 in comparison with the average for the period 1971–2000. The graphs show the average for the results derived from 28 global climate change models for three different RCP greenhouse gas scenarios.

Scenarios are alternative images of the future

Possible greenhouse gas concentration scenarios (Representative Concentration Pathways, RCP) are used by the Intergovernmental Panel on Climate Change (IPCC). In addition to greenhouse gas emission trends, they take account of issues such as land use.

- RCP2.6: Jackpot for climate policy. CO2 emissions take a sharp downturn after 2020 and are close to zero by the end of the century. CO2 concentrations in the atmosphere peak around 2050, at circa 440 ppm, and begin to decline thereafter.
- RCP4.5: Partial success for climate policy. CO2 emissions increase slightly at first, but begin to decline around 2040. By the end of the century, CO2 concentrations in the atmosphere stabilise at a level approximately double that prior to industrialisation.
- RCP8.5: Complete failure of climate policy. CO2 emissions increase rapidly. By 2100, they have tripled compared to the levels for the year 2000. Atmospheric CO2 concentrations rise to levels almost triple those prior to industrialisation and continue rising after 2100.

Sources:

- Finnish Meteorological Institute. 2013.
- van Vuuren, D.P., et al: The representative concentration pathways: an overview. Climatic Change 109 (1–2): 5–31. 2011.

Will the Arctic Ocean soon lose its summer ice cover?

THE ICE COVER IN SEPTEMBER HAS SHRUNK BY SOME 14% PER TEN YEARS.

Record melting of ice in 2012

In September 2012, the ice cover on the Arctic Ocean was historically small, at only 3.41 million square kilometres, 0.7 million km^2 less than in the previous record year of 2007. The next summer, that of 2013, was unusually cold and stormy in the northern polar region and less of the ice cover melted than in 2012.

The ice cover of the northern polar region has been monitored via satellites since 1979. During this period, the extent of ice has varied greatly from year to year and it is believed that this will continue. However, a longer-term trend is clear: during the measurement period, the ice cover in September has shrunk by some 14% per ten years. In winter, the decrease has been slower: 2.5% in ten years.

In the last few decades, the ice cover has shrunk faster than predicted by climate models. If this trend continues, the Arctic Ocean will lose its summer ice a few decades from now.

Shrinking of the ice cover is further accelerating warming in northern areas, because the dark ocean surface absorbs solar heat more efficiently than snow and ice. Many believe that an even more worrying consequence awaits as the ice disappears and the natural resources of the Arctic become available for large-scale exploitation. With consumption of the current oil and gas resources certain to lead to radical warming, the exploitation of more reserves would be anything but desirable.

Sources:
- Nasa. 2012.
- NSIDC. 2013.

LONG-TERM TREND

The northern ice cover has diminished clearly since 1978, when satellite monitoring began.

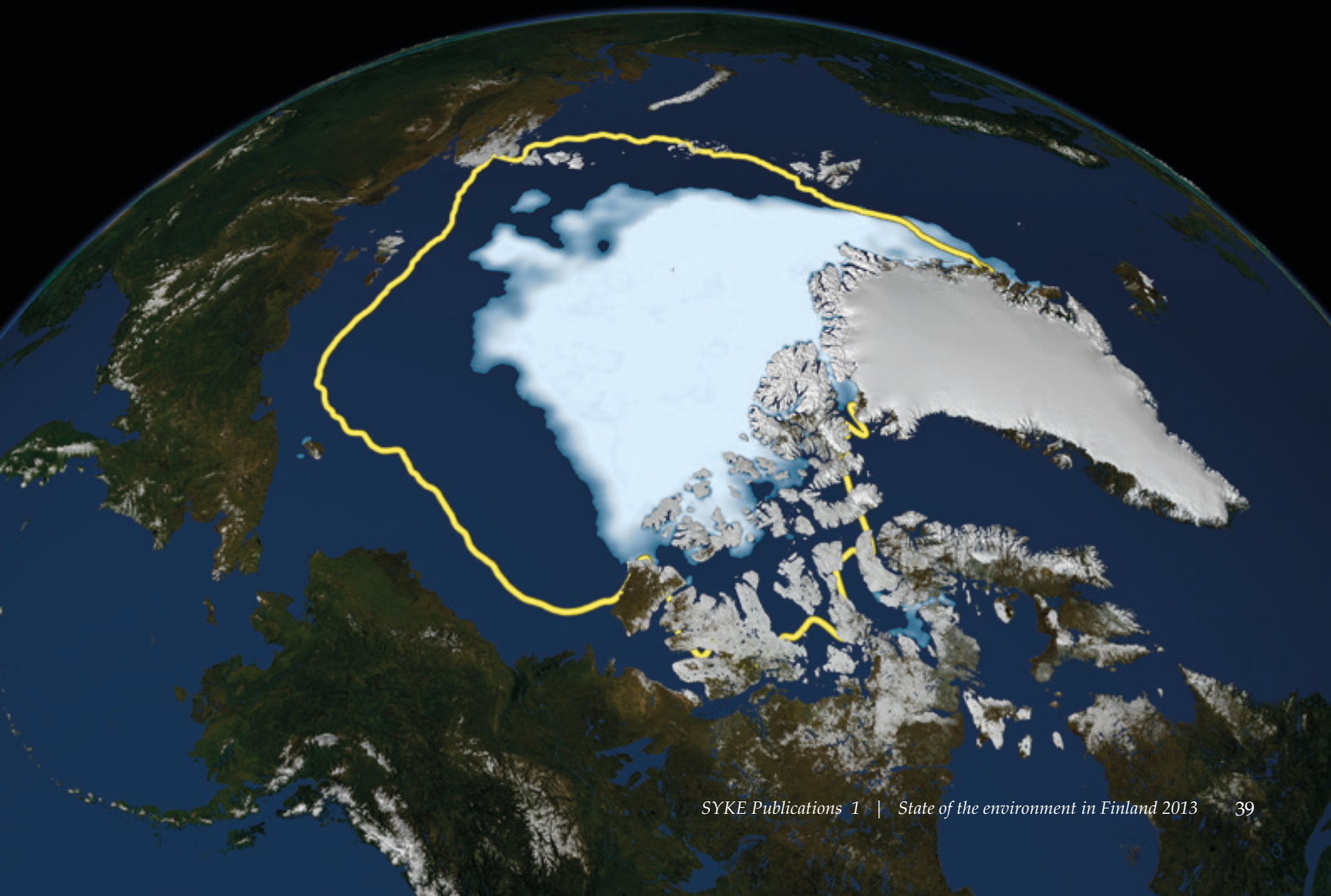
SHORT-TERM TREND

In 2012, the melt of ice cover was the largest since monitoring began. At the end of summer 2013, the ice cover was clearly larger, but still the sixth smallest in monitoring history.

IN RELATION TO TARGETS

No targets are set for the extent of ice cover in the Arctic Ocean.

A satellite image by NASA shows the extent of the ice cover on the Arctic Ocean on 16 September 2012. The yellow line shows the average for annual minimum cover over the last 30 years. Source: NASA/Goddard Scientific Visualization Studio.



COMMUNITIES AND TRANSPORT

Average commuted distance increased to 14 kilometres

ACCORDING TO A RECENT PASSENGER TRANSPORT STUDY BY THE FINNISH TRANSPORT AGENCY, 72% OF COMMUTED KILOMETRES ARE TRAVELLED BY PRIVATE CARS.

The longest commutes are from suburbs

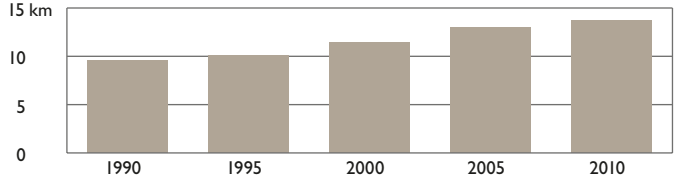
Finns are commuting longer distances: in 2010, the average distance from home to work was almost 14 kilometres as the crow flies, while ten years earlier, it was more than two kilometres less. Distances to work have doubled since 1985.

The main reasons for longer commuting distances are urban sprawl and specialisation in working life. Commuted distances are usually longest from the fringes of large urban areas. Thus, with more people living in these areas, the average commuted distance of the entire population becomes longer. Commuters living in city centres have the shortest journeys.

Fewer people can walk or cycle to work. Some can telecommute or use public transport, but an increasing number of people are forced to travel to work by car. Poor public transport services also increase the need to use cars. According to a recent passenger transport study by the Finnish Transport Agency, 72% of commuted kilometres are travelled by private cars, 22% by public transport and only 3% on foot or by bike.

Sources:
- Finnish Environment Institute. 2013.
- National Travel Survey. 2010–2011. Finnish Transport Agency. 2012.

Average one way distances commuted in 1980–2010



Source: YKR/SYKE and Statistics Finland. 2013.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
The average commuted distance has increased by one and a half times over the last two decades.	The average commuted distance has continued to grow in 2005–2010.	No targets are set for commuted distances.

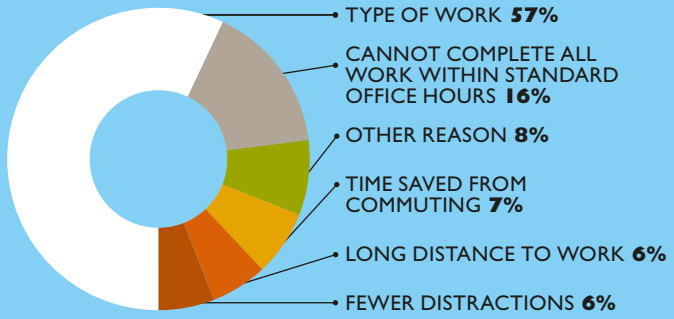
Distance-working and new working life

Longer commuted distances are one sign of the ongoing transformation in working life. However, improved telecommunication systems and more advanced tools facilitate working independent of time and place. Long distances from home to work are not a major problem when there is no need to attend the workplace every day. Work can be done at home, in the employer's branch office, on the customer's premises, or in libraries and cafés.

Flexible and mobile work particularly suits the IT sector, but almost all work involves tasks, such as data processing and reporting, that can be performed anywhere.

'Spatial Dispersion of Work' a research project of the Academy of Finland, estimates that up to 50% of employees in Europe are involved in distance-working. Benefits include higher productivity and better quality of working life, better integration between work and family life, a more flexible choice of workplace and place of residence, lower commuting costs, lower emissions from commuting and less time spent commuting. Disadvantages include blurring of the boundaries between work and home, and the risk of exclusion from the work community.

Key reason for distance-working



Source: Passenger transport study 2010–2011. Finnish Transport Agency. 2012.

Services move further away

A GROCERY STORE WAS THE MOST SOUGHT-AFTER SERVICE IN ANY RESIDENTIAL AREA.

Finns have begun travelling longer distances to shops in recent years. According to the Finnish Transport Agency's latest National Travel Survey for 2010–2011, the distance travelled to shops and on personal business averages 7.4 kilometres per person per day. Travel for these purposes has increased more than other types of travel, in comparison with the previous survey conducted six years ago.

The change is due to the concentration of retail businesses and larger retail units. As shopping centres, hypermarkets and shopping areas attract customers from a larger area than before, smaller local shops become less profitable.

Retail service levels are high in densely populated areas. In urban areas, the number and accessibility of grocery shops remained largely unchanged from 2008 to 2012. The fact that many small shops are now open almost 24 hours a day has improved service levels. However, the selection of goods they offer does not suffice for all, which means that customers opt for larger outlets, even in urban areas. In Finland's rural areas – both in villages and outside them – almost one hundred shops were lost between 2008 and 2012 which made the average distance to the closest shop longer. In 2012, there were around 3,200 shops selling daily consumer goods in Finland.

The tendency to build homes far from existing services is also increasing the average distance to shops. According to the Residents' Barometer 2010 survey, a grocery store was the most sought-after service in any residential area. As the population ages, genuine corner shops will become even more important than today.

Sources:
- Finnish Environment Institute. 2013.
- Strandell A.: Asukasbarometri 2010 - Asukaskysely suomalaisista asuinympäristöistä (Residents' barometer 2010 – Residents' Survey on Residential Environments in Finland). The Finnish Environment 31/2011. Finnish Environment Institute. 2011.
- National Travel Survey. 2010–2011. Finnish Transport Agency.2012.

Many types of grocery stores

A specialist food store is usually a small shop focusing on one or a few types of goods. For instance, market halls house a range of specialist food shops.

A corner shop is usually a relatively small grocery shop situated close to or in the middle of a settlement. In many cases, other services, such as post offices, are provided alongside groceries.

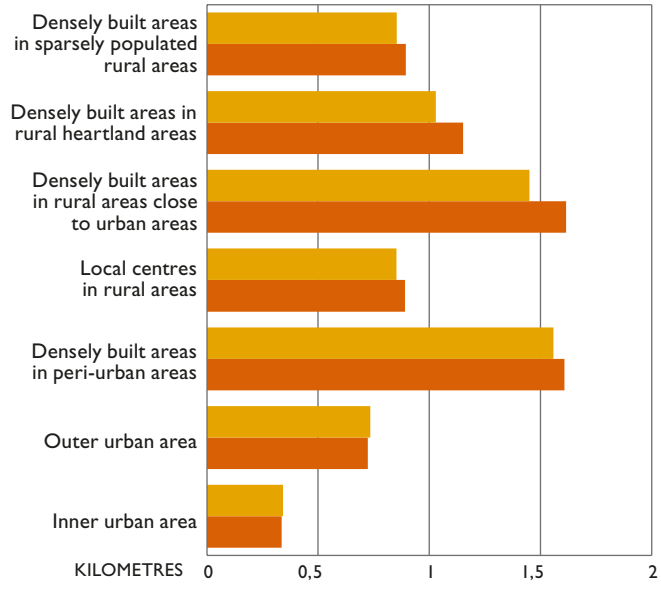
A supermarket is a large grocery store that may sell other products in addition to food.

A hypermarket's floor space is 2,500 m2 at a minimum and food products account for less than one half of the total area.

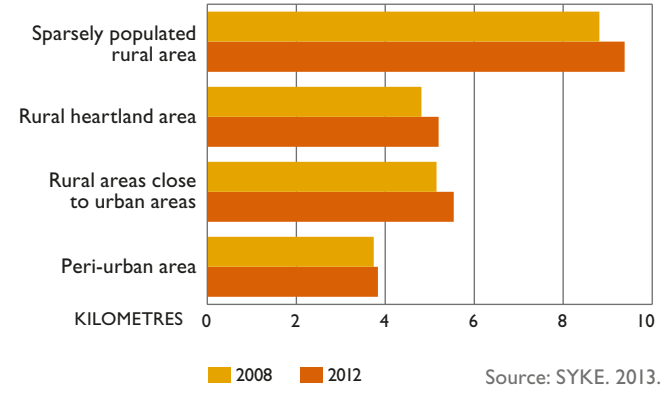
Not only has the number of shops decreased somewhat in recent years, but their size has changed. The number of large supermarkets in particular has grown and that of smaller shops has decreased. Almost 70% of residents living in high-rise urban areas have a large super or hypermarket less than one kilometre away.

PHOTO JANNE ULVINEN

Average distance to the closest grocery store in densely built areas

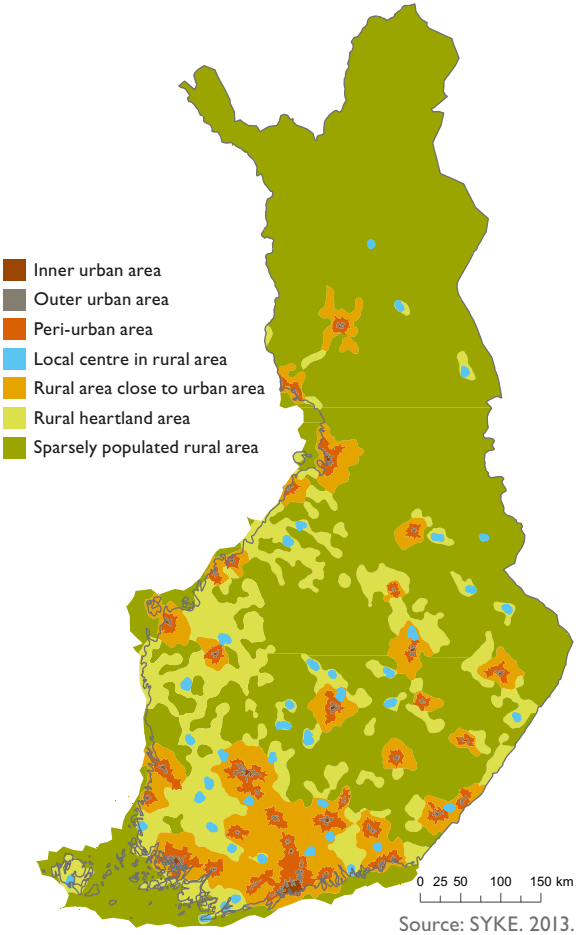


Average distance to the closest grocery store in sparsely populated areas



Source: SYKE. 2013.

Urban-rural classification



Source: SYKE. 2013.

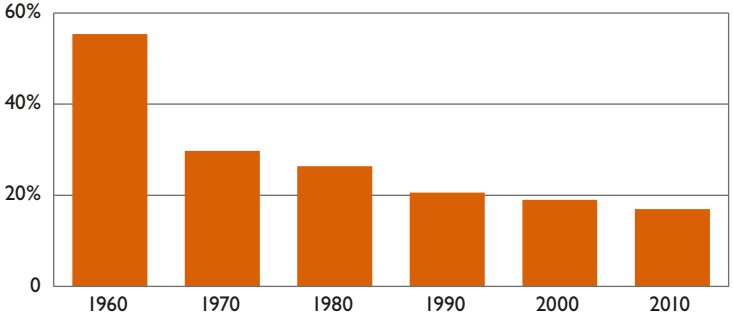
The urban-rural classification aims to present different categories on the scale of a map showing the whole country. This methodology enables a distinction between urban and rural areas and allows statistics to be drawn for different categories and combinations thereof. Source: SYKE. 2013.

Public transport's share of passenger traffic still declining

With increasing automobile traffic, the public transport's share is of all passenger transport is diminishing. In 2011, less than 17% of passenger traffic was based on public transport. Traffic emissions, congestion and the performance of the road network could be managed by increasing the volumes of public transport, but a contrary trend has prevailed.

Source:
• Transport and Communications Statistical Yearbook for Finland 2012.

Public transport's share of passenger traffic in 1960–2010



Source: Transport and Communications Statistical Yearbook for Finland 2012.

LONG-TERM TREND

In the last 50 years, public transport's passenger transport performance has remained fairly even or even improved a little. The intense growth in private car use has still caused the relative share of passengers using public transport to plummet.

SHORT-TERM TREND

Public transport's share of passenger traffic increased slightly in 2008, but since then it has resumed its slow but sure decline.

IN RELATION TO TARGETS

The Government Programme aims to increase public transport's share of traffic and its passenger numbers.

Has the peak of motoring been reached?

APPROXIMATELY 70% OF JOURNEYS IN FINLAND ARE MADE BY PRIVATE CAR.

Three million cars in Finland

With the exception of the deep recession in the 1990s, the number of automobiles has increased in Finland on an almost yearly basis, with over 3 million in the register of vehicles at the end of 2012. Of these, 2.6 million were in active use. The number of cars registered increased by 2.6% and those in active use by 1.1% from the previous year.

Although the number of cars is increasing, the distances driven in them has showed signs of tailing off in the 2000s. In 2012, the passenger transport performance of cars even fell slightly over the year 2011. This had previously only occurred during recessions.

Has motoring reached its peak in Finland? Could it begin to decline?

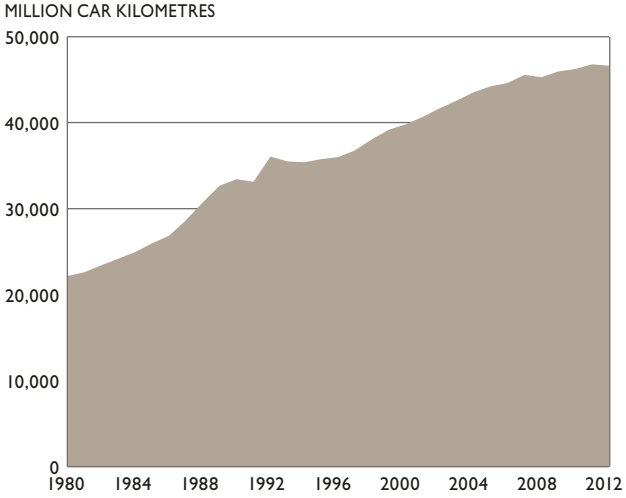
This is not the case according to the latest 2007 road traffic forecast by the Finnish Transport Agency, which forecasts that traffic on public roads will increase 34% by 2040 in comparison with 2006. In 2007–2012, however, transport performance increased at a much slower pace than forecast.

According to the Finnish Transport Agency's latest National Travel Survey, approximately 70% of journeys in Finland are made by private car. The number of journeys per capita is 2.9 per day, and their total distance is around 41 km. Of these journeys, 28% relate to work or studies, 37% to leisure activities and 35% to shopping or personal business.

Sources:
- Finnish Transport Safety Agency, Trafi and Ålands Motorfordonsbyrå. 2013.
- Liikenneviraston tieliikenne-ennuste, Tulevaisuuden näkymiä 3/2007. Finnish Transport Agency.
- Statistics of Finnish Transport Agency.2013.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
Transport performance of car traffic has increased dramatically.	In recent years, the transport performance of cars has grown only a little and began to decline in 2012.	–

Car transport performance in Finland 1980–2012



Source: Finnish Transport Agency. 2013.

Car transport performance refers to the total travel distance of all cars in one year. Passenger transport performance refers to the total distance travelled by all passengers in a year.

The Stockholm phenomenon reduces motoring in cities

Fewer 18-year-olds living in urban areas now obtain a driver's licence. This trend is known as 'the Stockholm phenomenon' after the city in which it began. Good public transport services in cities and environmental awareness are considered to be the reasons for this, though it could also relate to the high cost of gaining a driver's licence.

In Finland, the phenomenon has become increasingly common, particularly in the Helsinki metropolitan area. Young people may postpone the acquisition of a driver's licence to a later age, but the number of people who choose not to drive at all is also thought to be increasing.

These predictions are based on experiences gained in Stockholm, where only 9% of 18-year-olds obtain a driver's licence.

In Finland, 75% of 18-year-olds living in rural municipalities acquired a driver's licence for a private car. The figure for those living in densely populated municipalities was 67% and for those living in cities 56%. Helsinki residents are different from other urban youngsters: only 33% of 18-year-olds living in Helsinki acquired a driver's licence for a private car.

Source:
- Statistics of driving licences. Finnish Transport Safety Agency. 2013.

Downturn in traffic-related carbon dioxide emissions

IN 2050, EMISSIONS SHOULD BE 60% LOWER THAN IN 1990.

New increase predicted in the wake of the financial crisis

Most traffic-related emissions have clearly fallen since the early 1980s, even though traffic volumes have increased. Cleaner combustion of fuels and control of exhaust gas emissions by catalytic converters have contributed to curbing emissions. Catalytic converters were made compulsory in new cars at the beginning of 1992.

Although other traffic emissions declined thereafter, carbon dioxide emissions continued to grow until 2005. Since then, even carbon dioxide emissions have seen a downturn mainly thanks to increasing use of biofuels and lower emission levels of new cars.

According to a forecast by LIPASTO – a calculation system for traffic exhaust emissions and energy consumption in Finland – carbon dioxide emissions will rise again when the economy picks up. A moderate increase should continue until 2015, when new car stock and engines of greater energy efficiency would again induce a downturn in emission volumes.

The EU has set an ambitious goal for traffic-related carbon dioxide emissions: in 2050, emissions should be 60% lower than in 1990. This is still a distant goal because, in 2011, emissions remained some 4% higher than in 1990.

The Climate Policy Programme for the Ministry of Transport and Communication for 2009–2020 defines a road map for a 2.8 million tonnes cut in carbon dioxide emissions from transport, compared to presently estimated emission volumes for 2020. This would entail a reduction of almost 20% compared to 1990 emissions.

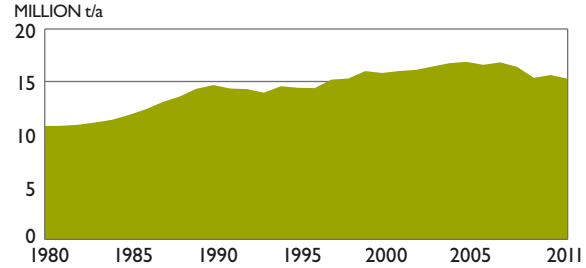
Sources:
- Climate Policy Programme
- for the Ministry of Transport and Communications'administrative sector for 2009–2020. Programmes and strategies 2/2009. Ministry of Transport and Communications. 2009.

With the exception of carbon dioxide emissions, most other traffic-related emissions have decreased markedly since the 1980s.

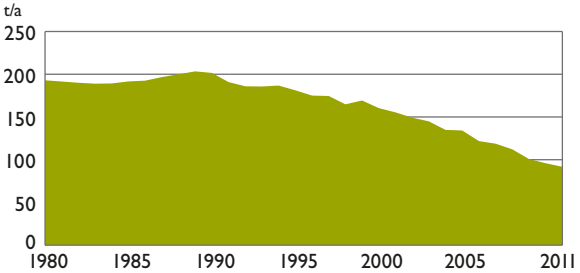
In the last five years, carbon dioxide emissions from transport have also taken a downturn.

Emission reduction targets set for traffic are tough, but they can be met. However, this will require a major effort and large investments.

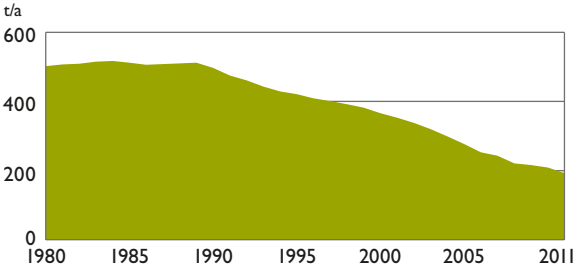
Traffic-related carbon dioxide emissions in Finland 1980–2011



Traffic-related nitrogen oxide emissions in Finland 1980–2011



Traffic-related carbon monoxide emissions in Finland 1980–2011



Source: LIPASTO. VTT Technical Research Centre of Finland. 2013.

PHOTO VJATSESLAV ROBTSENKOV / PLUGI

Disturbing noise almost everywhere

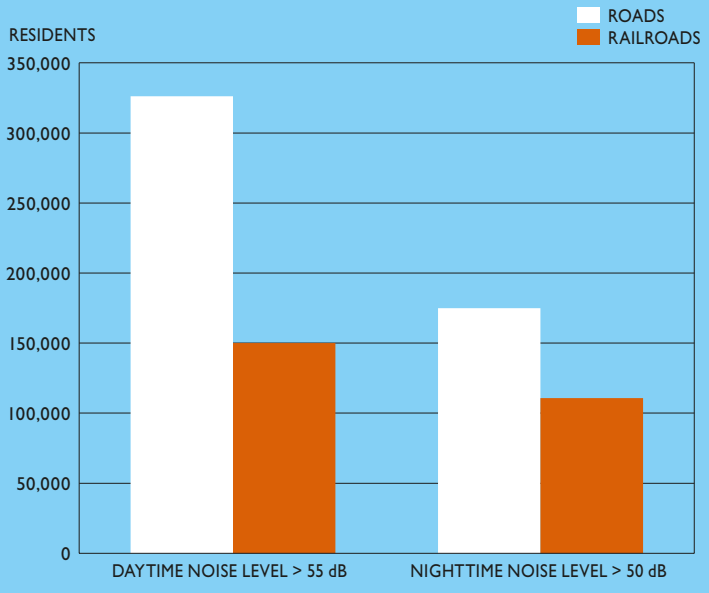
Noise is one of the most widespread pollution problems. In fact, it is so widespread that now we not only monitor areas affected by severe noise but also make an effort to find silent areas – tranquil places that are not necessarily completely free of noise from traffic and other human activity but have lower noise levels than surrounding areas.

A nationwide survey of exposure to environmental noise was last conducted in 2005. At that time, it was estimated that some 800,000–900,000 Finns lived in areas where daytime noise exceeded 55 decibels. Approximately 90% of residents of noisy areas were exposed to road and street noise.

In terms of the EU's Environmental Noise Directive, noise surveys have been conducted in recent years on population centres of over 100,000 inhabitants, main traffic routes and large airports. Completed in 2012, this survey concluded that, for example, 48% of Helsinki residents lived in an area where noise levels exceed 55 decibels. This figure was up by 6 percentage points from 2007.

Sources:
- Liikonen, L. & Leppänen, P.: Altistuminen ympäristömelulle Suomessa – tilannekatsaus 2005. Suomen ympäristö 809, ympäristönsuojelu. Ministry of Environment. 2005.
- Helsingin kaupungin meluselvitys 2012. Helsingin kaupungin ympäristökeskuksen julkaisuja 8/2012.

Numbers of people living in noisy areas along main traffic routes in 2011



Source: Finnish Transport Agency. 2012.

The numbers of people living in noisy areas along main traffic routes were assessed in a survey, in accordance with the EU's Environmental Noise Directive. The Directive defines roads on which the annual number of vehicles exceeds 3 million as main traffic routes. The survey included some 2,080 kilometres of such roads. In rail traffic, main routes are those which more than 30,000 trains pass through every year. In Finland, only 375 kilometres of railway qualified for inclusion in this category.

Plenty of urban green in Finnish cities

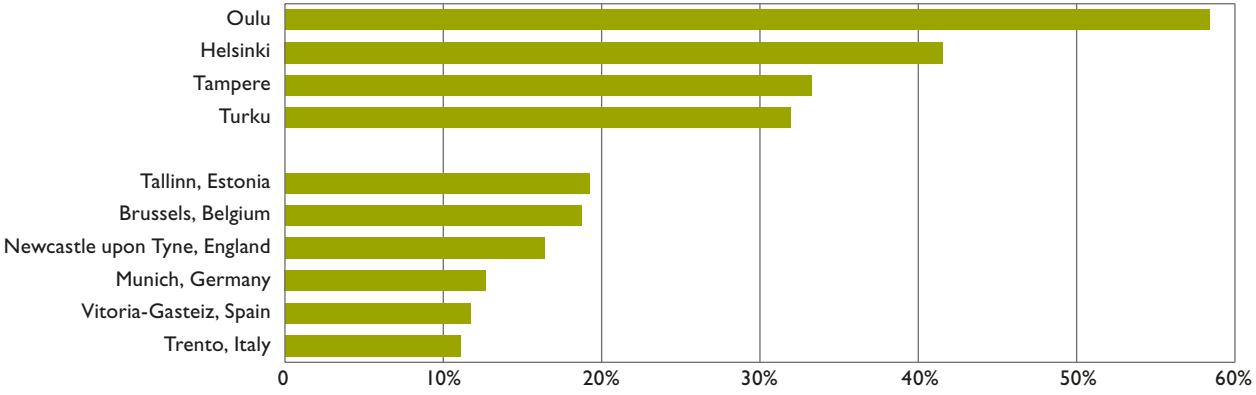
Finnish cities have considerably more green space than European cities in general. Information collected from Helsinki, Turku, Tampere and Oulu indicates that green space accounts for 31–48% of the urban surface area. Most of it is located on the outskirts of cities rather than close to city centres.

Parks and other green places make important recreation areas for urban residents. Moreover, they serve as noise insulation and absorb particle emissions.

Urban farming has gained popularity in recent years. In many cities, active associations organise courses on urban agriculture and lease cultivation boxes. Vegetables growing in the yard of a block of flats not only provide ecological local food, but also make a nice hobby and increase sense of community among city dwellers.

Source:
• Finnish Environment Institute. 2013.

Share of green spaces in some European cities



Source: SYKE. 2013.

In this study, the classification of urban regions and densely populated areas is based on the European Environmental Agency EEA's criteria. It is not, therefore, ideally suited to measuring urban regions in Finland.

AIR POLLUTANTS

Emission reduction targets met for sulphur and nitrogen oxides – but not for ammonia

New emission limits prepared for 2020

Control of sulphur and nitrogen oxides has succeeded well: nitrogen emissions have declined by almost one half and sulphur emissions by more than three quarters since 1990. Measures taken to reduce ammonia emissions have not, however, been as effective – the targets set for Finland in the EU's National Emission Ceilings Directive for 2010 were met for sulphur and nitrogen but not for ammonia. In 2010, Finland's ammonia emissions totalled approximately 38,000 tonnes, while the emission ceiling was set at 31,000 tonnes. The failure to meet this ceiling is attributed to the fact that no feasible technical solutions have been found for reducing emissions. Some 90% of ammonia emissions originate in agriculture, particularly in animal excretions.

The European Commission is currently preparing a proposal for a new Emission Ceilings Directive that defines emission limits for 2020. Reaching future targets looks difficult again with regard to ammonia, with Finland's ammonia emissions estimated to remain at around 35–37,000 tonnes until 2050.

The majority of sulphur and nitrogen oxide emissions into the air come from energy production. In Finland, the quantities of such emissions vary annually, depending on the amount of hydropower available and the quantity of heating energy required.

Atmospheric sulphur and nitrogen oxides and ammonia cause acidification in lakes and forests.

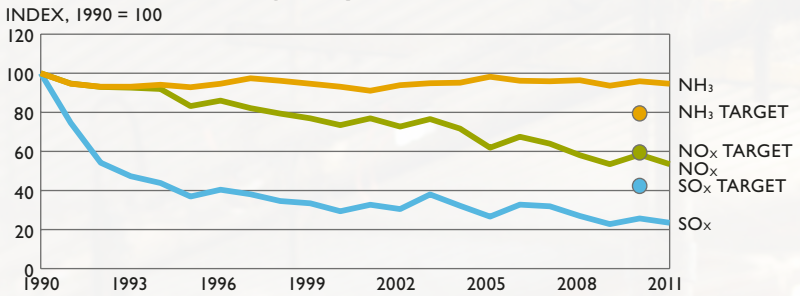
Source:
• Finnish air pollutant inventory to the CLRTAP. Finnish Environment Institute. 2013.

Sulphur and nitrogen oxide emissions have both declined markedly since the early 1990s. The picture for ammonia emissions is not as positive, but ammonia is a less significant cause of acidification than sulphur and nitrogen oxides.

In recent years, sulphur and nitrogen oxide emissions have continued to decline irrespective of the effects of climate variations and economic fluctuations. Ammonia emissions have not declined to a significant extent.

The targets set for 2010 in the EU's National Emission Ceilings Directive were met for sulphur and nitrogen oxides, but not for ammonia. New targets are being prepared for 2020.

Emissions of acidifying compounds in Finland 1990–2011



Source: Finnish air pollutant inventory to the CLRTAP. SYKE. 2013.

In the index calculated for emissions, the year 1990 = 100. In 1990, ammonia emissions totalled 39,200 tonnes, those of nitrogen oxides 286,000 tonnes and those of sulphur oxides 260,000 tonnes.

PHOTO SINI YRJÄNÄ / PLUGI

Sulphur Directive aims to cut emissions drastically in the Baltic region

From 1 January 2015, ships navigating the Baltic Sea, the North Sea and the English Channel must use fuel oil with a maximum sulphur content of 0.1%. At present, the highest permitted sulphur content at the Baltic Sea is 1%. Alternatively, a sulphur dioxide scrubber can be installed in ships to achieve the same end result: a 90% reduction in emissions.

The related regulations are included in the EU's Sulphur Directive, adopted in 2012. In other parts of EU the maximum permitted sulphur content of marine fuel will be cut even more dramatically: from 4.5% to 0.5%, but not until 1 January 2020.

The Sulphur Directive will have a considerable impact on emissions. In the Baltic Sea, sulphur emissions from ships totalled around 130,000 tonnes in 2008. Of this quantity, a 90% decrease corresponds to two years of emissions from all of Finland's land-based sources.

The Sulphur Directive's burden on the export sector has been a hot topic of public discussion in Finland. On the whole, it is, nevertheless, sensible to cut emissions as, according to a study commissioned by the EU Commission, the health benefits will far exceed the costs of the Directive.

Cruise ship Viking Grace (left), built 2013, meets the requirements of the Sulphur Directive as it uses liquefied natural gas (LNG) with low sulphur emissions. Ships using residual fuel oil (above) need to be installed with sulphur dioxide scrubbers and catalytic converters or alternatively shift to using low sulphur fuel oil. Photos Seppo Knuuttila.

Sources:
- HELCOM. 2013.
- Cost benefit analysis to support the impact assessment accompanying the revision of Directive 1999/32/EC on the sulphur content of certain liquid fuels. 2009.

Ozone-forming emissions decreasing

EMISSIONS OF NMVOC DECLINED BY ALMOST ONE HALF IN FINLAND, AND THOSE OF CARBON MONOXIDE AND METHANE BY APPROXIMATELY ONE THIRD, FROM 1990 TO 2011.

Air currents bring ozone to Finland from other parts of Europe

When present in the troposphere, the lowest layer of the atmosphere, ozone is an air pollutant harmful to human health. It also impairs plant growth. Ozone is useful in the upper atmosphere, because it absorbs harmful ultraviolet radiation coming from the sun, but very little ozone passes from the troposphere to the stratosphere.

Ozone is formed by the reaction of nitrogen oxides and hydrocarbons present in the air with sunlight. Transport, energy production and industry are the main sources of these. The generation of ozone, and its quantity and location are influenced by relative concentrations of various compounds and the amount of sunlight. The highest ozone concentrations in the lower atmosphere are typically found on the outskirts of cities and in rural areas, far from major emission sources.

The only way of reducing the amounts of tropospheric ozone is to lower emissions of the compounds that form it. Emissions of nitrogen oxides and non-methane volatile organic compounds (NMVOC) declined by almost one half in Finland, and those of carbon monoxide and methane by approximately one third, from 1990 to 2011.

Emission reduction in this country will not result in an immediate improvement of air quality here, because ozone is carried to Finland from other parts of Europe.

Source:
• Finnish Environment Institute. 2013.

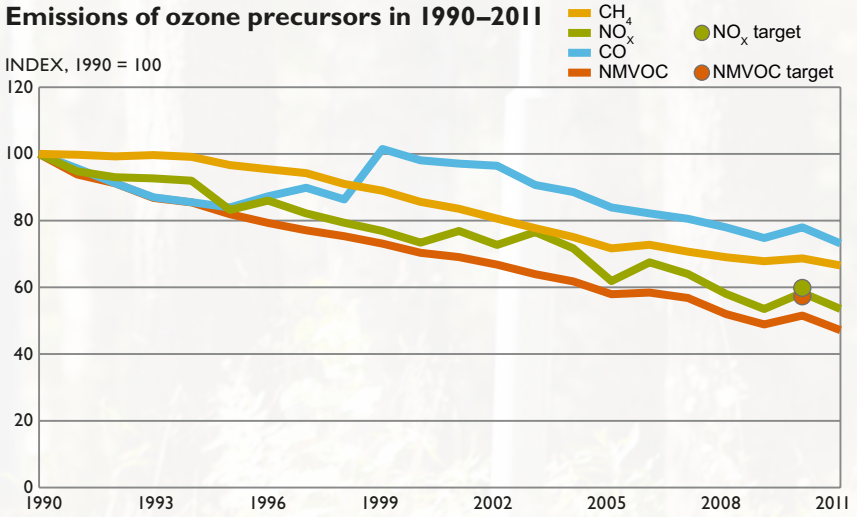
Emissions of all compounds that form ozone in the troposphere have declined since 1990.

The decline in emissions seems to be continuing, despite the temporary slight increase due to the cold winter in 2010.

EU Emission Ceilings Directive targets for 2010 were met for NMVOCs and nitrogen oxides.

PHOTO JANNE ULVINEN

Emissions of ozone precursors in 1990–2011



Source: SYKE (NMVOC, CO and NO_x) and Statistics Finland (CH_4). 2013.

In the index calculated for emissions, the year 1990 = 100. In 1990, NMVOC emissions totalled 227 kilotonnes, CO emissions 622 kilotonnes, NOx emissions 286 kilotonnes and CH_4 emissions 303 kilotonnes.

No decline in particle pollution

MOST PARTICLE EMISSIONS, ABOUT 60% OF THEM, ORIGINATE IN ENERGY PRODUCTION AND SOME 25% IN TRANSPORT.

Small-scale wood combustion the major source of fine particles

Comparable statistics on particle emissions have only been compiled since 2000, with respect to total emissions and the share of fine particles. During this period, no significant emission trends have been observed. In comparison to the 1980s, particulate emissions have decreased in line with those of other emissions.

Most particle emissions, about 60% of them, originate in energy production and some 25% in transport. The greatest source of traffic emissions is the wear and tear of road surface caused by car wheels and winter sanding. The resulting dust in the streets, especially in the spring, accounts for some 20% of total particle emissions in Finland.

As regards smaller particles, with a diameter of less than 2.5 micrometres ($PM_{2.5}$), small-scale wood combustion is the most significant source of emissions by far. The fireplaces of saunas, cottages and homes account for more than one half of $PM_{2.5}$ emissions in Finland today.

Fine particles are the most harmful of all, since they can penetrate the lungs all the way to the alveoli. Toxic heavy metals or hydrocarbons can bind to the particles. In the lungs, these are harmful to the health. It is estimated that such particles cause 1,300 premature deaths and more than 600 new cases of chronic bronchitis each year in Finland.

For the time being, no national or international emission targets or limits apply to particle emissions. The new EU National Emission Ceilings Directive, currently under preparation, will set emission limits for fine particles ($PM_{2.5}$) as of 2020.

Sources:
- Finnish air pollutant inventory to the CLRTAP. Finnish Environment Institute. 2013.
- CAFE. Ilmansuojelu (Air pollution control) 4/2005: 9–31.

Particle emissions have remained more or less unchanged throughout the 2000s.

Emission amounts vary year by year, primarily in accordance with winter weather conditions.

For the time being, no emission targets have been set for particles.

Particle emissions in Finland 2000–2011

Source: Finnish air pollutant inventory to the CLRTAP. SYKE. 2013

PHOTO NIINA SILVASTI

Days with poor air quality rare in Finland

HELSINKI HAS LED THE WAY IN REDUCING CITY AIR PARTICLE CONCENTRATIONS.

Limit values have been set for various air pollutants. Should these values be exceeded, the authorities must take action. The limit value most commonly broken in Finland is the 24-hour limit for inhalable particles (PM_{10}), 50 µg/m^3. The general public must be informed whenever the limits are exceeded, but for the actual threshold to be broken, the limit must be exceeded on more than 35 days per year. In recent years, we have remained well below this level.

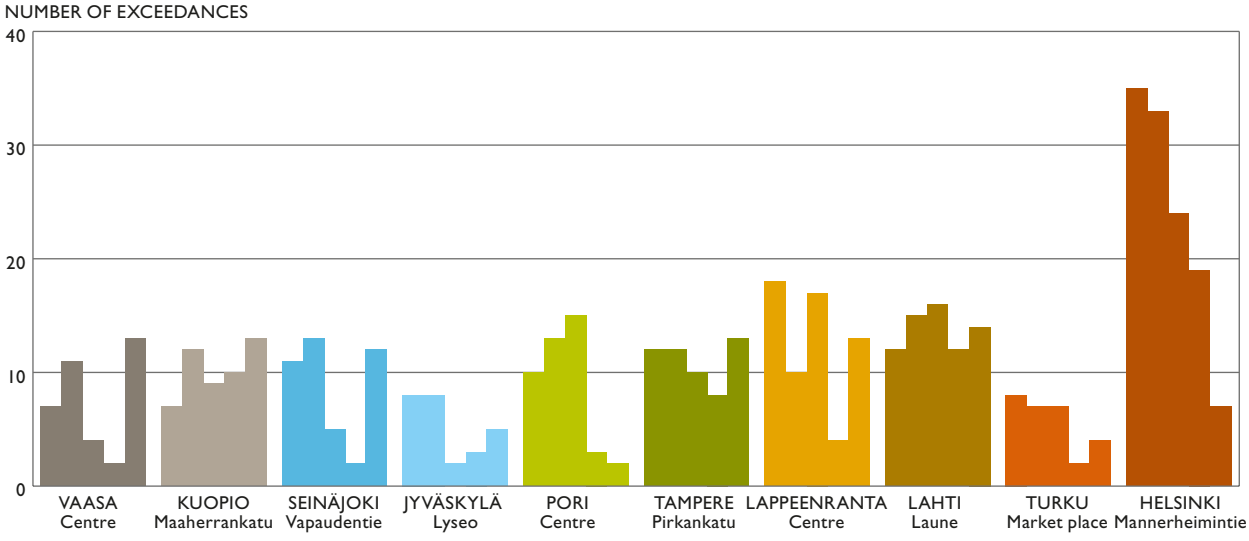
Helsinki has led the way in reducing city air particle concentrations. The daily limit value was exceeded at least 35 times in Helsinki in 2003, 2005 and 2006. In 2008 and 2009, the figure was still over 30. Although the current limit value was not in force before 2001, it would have been exceeded in the city centre, at the Mannerheimintie measuring station in 1995 and 1998 at least.

Since 2009, the number of times the daily limit value for inhalable particles was exceeded at measuring stations in Helsinki has plummeted. At the worst location, the Mannerheimintie measuring station, the figure for 2012 was only seven.

In 2008, Helsinki prepared an action plan for air pollution control for 2008–2016. The plan includes a total of 43 actions – from influencing legislation to organising snow transportation – aimed at reducing concentrations of nitrogen dioxide (NO_2), inhalable particles (PM_{10}) and fine particles ($PM_{2.5}$).

Sources:
- http://www.ilmanlaatu.fi. Air quality portal. 2013.
- Helsingin kaupungin ilmansuojelun toimintaohjelma 2008–2016. Helsingin kaupungin ympäristökeskuksen julkaisuja 10/2008.

Number of days on which 24-hour limit values 50 µg/m³ for inhalable particles (PM_{10}) were exceeded in 2008–2012



Source: Air quality portal. 2013.

FRESH WATER AND THE SEA

Rivers still carry high quantities of nutrients

MORE THAN HALF OF FINLAND'S COASTAL WATERS ARE IN MODERATE ECOLOGICAL CONDITION OR WORSE.

Finland accounts for around 10% of the nutrient loading in the Baltic Sea

In the 2000s, Finnish rivers have carried an annual average of 3,400 tonnes of phosphorus and 74,000 tonnes of nitrogen into the Baltic Sea, which accounts for approximately one tenth of the Baltic Sea's overall load of these nutrients. Nutrient run-off from natural areas of river basins and from human action builds up in rivers. Annual variation in river nutrient levels is high because the time and amount of rain affects run-off from forests and fields.

Quantities of river-borne nutrients have remained almost unchanged from the 1970s to the present day, despite the substantial reduction in pollution from point sources. High levels of nutrients in rivers are particularly related to agricultural activity. Despite the reduction in fertiliser quantities, the establishment of filter strips and the proliferation of erosion-reducing cultivation methods, there has been no significant reduction in nutrient run-off from croplands.

The Baltic Sea nutrient loading must be reduced because the sea is suffering from eutrophication. According to the 2008 ecological classification of surface waters, more than half of Finland's coastal waters are in moderate ecological condition or worse. The EU aims to achieve at least a good status for all surface waters by 2015. This target will not be met in Finland's coastal waters – the new 2013 survey of the ecological condition of surface waters indicates that the status of coastal waters has remained much the same since 2008.

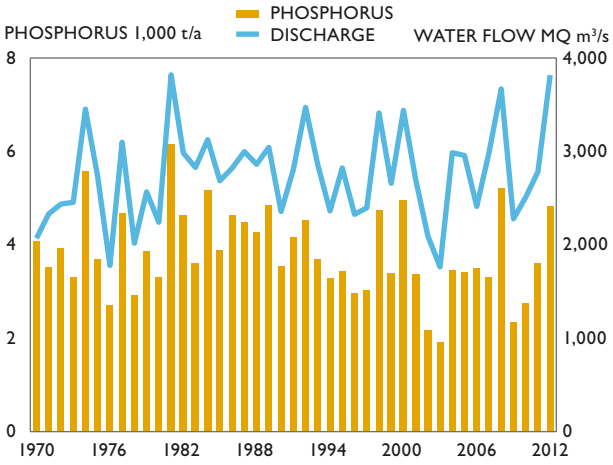
Sources:
- Ecological and chemical state of surface waters. Regional Environment Centres and Finnish Environment Institute. 2008.
- Ecological state of surface waters. ELY-Centres, Finnish Game and Fisheries Research Institute and Finnish Environment Institute. 2013.
- Vesiensuojelun suuntaviivat vuoteen 2015, Valtioneuvoston periaatepäätös (Finnish Government decision-in-principle on Water Protection Policy Outlines to 2015). The Finnish Environment 10/2007. Ministry of Environment. 2007.

More than half of Finland's coastal waters are in a moderate condition at best.

Short-term variations in the nutrient discharge from rivers is mainly explained by fluctuations in water flow.

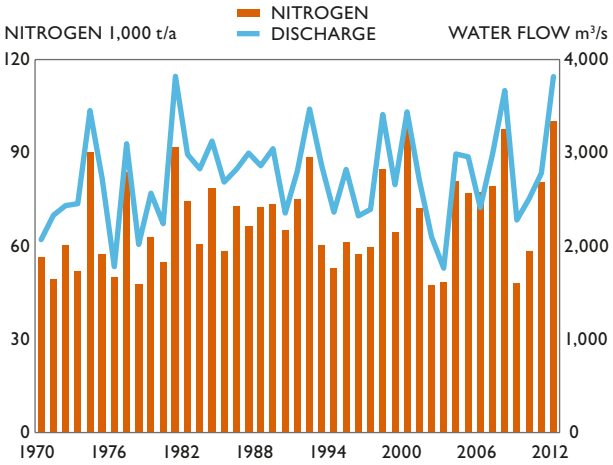
Based on the current loading, a good status for coastal waters cannot be achieved by 2015.

Phosphorus discharge from Finnish rivers into the Baltic Sea in 1970–2012



Source: SYKE. 2013.

Nitrogen discharge from Finnish rivers into the Baltic Sea in 1970–2012



Source: SYKE. 2013.

Phosphogypsum stacks in Police, Poland 3.7.2013.
Photo SYKE/Jarkko Koskela.

Phosphogypsum stacks and secret agents

Significant point sources of pollution are still discovered within the catchment area of the Baltic Sea, despite the fact that pollution control has for some time focused on non-point sources rather than point sources.

The most famous cases of recent years are the phosphorus leaches from waste phosphogypsum stacks adjacent to fertiliser factories in Kingisepp, Russia and Gdansk and Police in Poland, investigated not only by researchers but also by the Finnish daily newspaper Helsingin Sanomat and the Russian security service.

The discovery of an unexpected pollution source may be a politically and economically sensitive subject, but for the health of the Baltic Sea, it is a real bonus. It is fairly easy to stop phosphorus leaching from such stacks, and far less costly than reducing diffuse pollution.

Nutrient discharges from industry and communities reduced sharply since the 1980s

Agriculture is the most prominent polluter

Point sources, such as industry and municipal wastewater treatment plants, have succeeded in considerably reducing the flow of nutrients into water bodies since the 1980s. The development was particularly rapid in the 1990s when, for instance, phosphorus discharges from industry declined by 67% and nitrogen discharges by 30%. Although the pace has slowed slightly in the 2000s, reductions continue. In 2000–2010, the combined discharge of phosphorus from industry, communities and fish farming fell by 33% and nitrogen by 16% respectively.

This success has been achieved by improving industrial processes and by boosting industrial and communal wastewater treatment. Better feeding techniques and reduced fish production in Finnish fish farms have contributed to smaller nutrient leakage from fish farming.

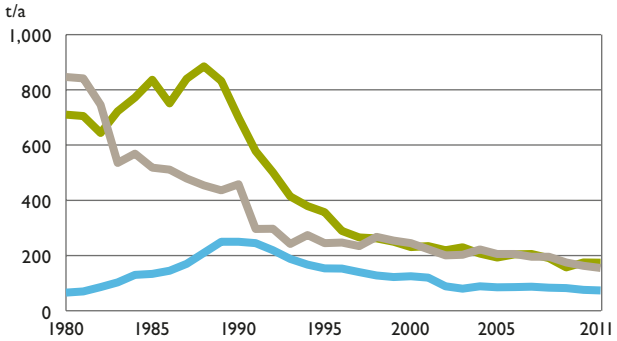
No such significant reductions have been achieved in relation to sources of diffuse pollution, and agriculture has become the most important source of nutrients in aquatic environments. According to an estimate by the Finnish Environment Institute, agriculture now accounts for some 70% of the phosphorus load of waters, and slightly less than 60% of the nitrogen load.

The key goal of the 2006 Government Decision in Principle on Water Protection Policy Guidelines until 2015 is to reduce the flow of eutrophication-inducing substances into water bodies. The programme does not define quantitative targets for point sources, but encourages the agricultural sector to decrease its nutrient run-off by at least one third from the average level of 2001–2005.

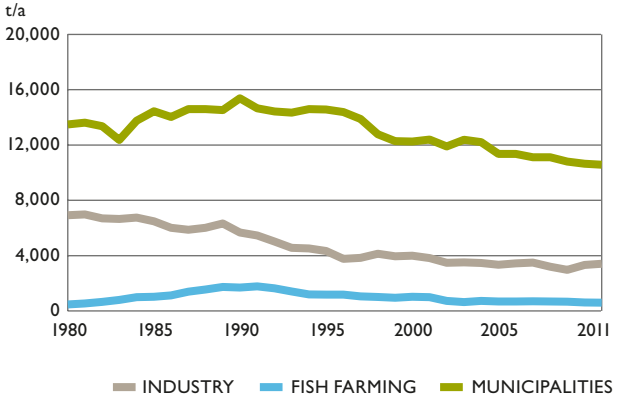
Sources:
- Finnish Environment Institute. 2013.
- The Compliance Monitoring Data system, VAHTI. 2013.
- Vesiensuojelun suuntaviivat vuoteen 2015, Valtioneuvoston periaatepäätös (Finnish Government decision-in-principle on Water Protection Policy Outlines to 2015). The Finnish Environment 10/2007. Ministry of Environment. 2007.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
Nutrient discharges from point sources have decreased to a fraction of those in the 1980s.	Nutrient discharges from point sources, particularly from communities, have continued to decline in recent years. Low figures for industry in 2009 are due to stoppages in pulp and paper mills.	No quantitative targets are set for point sources. The target set for agriculture of reducing nutrient run-off to one third of the 2001–2005 levels by 2015 will not be met.

Phosphorus discharges into surface waters from point sources 1980–2011



Nitrogen discharges into surface waters from point sources 1980–2011



Source: The Compliance Monitoring Data system, VAHTI. 2013.

PHOTO RIKU LUMIARO

Big lakes in good condition, coastal waters in poor condition

ALMOST ALL OF FINLAND'S MAJOR RIVERS FLOWING INTO THE BALTIC SEA HAVE BEEN ALTERED AND THEIR ORIGINAL MIGRANT FISH POPULATIONS ARE EXTINCT.

Eutrophication a major problem

The ecological status of lakes and rivers in Northern Finland, and big lakes throughout the country, is mainly good or high, whereas many small lakes in Southern Finland suffer from eutrophication.

High nutrient concentrations are also degrading the status of rivers. The state of rivers is further affected by hydropower systems and other constructions. Almost all of Finland's major rivers flowing into the Baltic Sea have been altered in this way and their original migrant fish populations are extinct. The aim of the first stage of the Fish Passage Strategy adopted in 2012 is to restore fish passages past 55 dams on 20 watercourses.

On the coast, not a single sea area is of high status. In particular, the status of the Archipelago Sea and the Gulf of Finland is alarming. However, the status of the easternmost part of the Gulf of Finland has improved in recent years, thanks to water protection measures and more efficient wastewater treatment in St. Petersburg in particular.

In October 2013, the Baltic Marine Environment Commission (HELCOM)'s ministerial meeting agreed on strict country-specific targets for reducing the quantities of nutrients into the Baltic Sea. These targets are to be met by 2021. Finland's targets for nitrogen and phosphorus reduction were approximately doubled from previous levels. In order to attain these targets, nutrient run-off must be reduced more efficiently, particularly in agriculture.

Source:
- The Assessment of the ecological status of Finland's surface waters 2013. Finnish Environment Institute, ELY Centers and Finnish Game and Fisheries Research Institute. 2013.

Human activity has modified most aquatic environments in Finland. Only around 30% of the lake surface area and 20% of rivers have a high ecological status.

No major change between the assessments of 2008 and 2013. The status of rivers has improved somewhat, whereas that of lakes and coastal waters has deteriorated. Changes in status are mainly due to changes in criteria.

The aim is to achieve good or high status for all waters. Originally, this target was supposed to be met as early as 2015.

PHOTO PENTTI SORMUNEN / PLUGI

A long way to go to achieve 'good' status in all water bodies

The 2013 ecological assessment of surface waters accords a good or high status to 85% of the surface area of Finnish lakes, and 65% of rivers. Only a quarter of coastal waters achieved the same status.

A similar status assessment is performed in all EU countries. The Water Framework Directive of the EU aims to achieve at least a good status for all waters by 2015. This goal has already been compromised for Finland and other countries. A new target is under preparation for a number of water bodies for either 2021 or 2027.

The previous survey, the first ever, was completed in 2008. Between the two surveys, the share of rivers achieving at least a good status has increased from 51% to 65%. This improvement is mainly due to changes in the criteria for various categories and, to a minor extent, the improved state of rivers.

Of the total surface area of lakes, 88% achieved a good or high status in 2008. In the 2013 survey, the proportion of such lakes slightly decreased to 85%. This change is mainly due to the inclusion in the 2013 survey of more small lakes than before, which are more susceptible to eutrophication than large lakes.

No coastal areas achieved a high status, while the proportion of those with a good status decreased from 36% to 25% between the two surveys. This change is due to changes in criteria, since the 2008 survey was based on preliminary criteria that have since been adjusted and integrated.

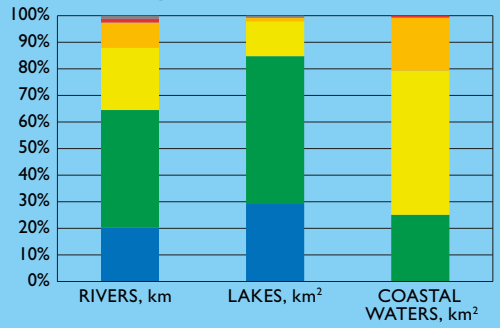
New water resources management plans

The ecological assessment of surface waters provides a basis for water resources management plans and helps to direct water protection measures.

Centres for Economic Development, Transport and the Environment are preparing new water resources management plans for 2016–2021. Draft plans will be published in October 2014 and left open for comments for six months. Final approval of the plans will occur at the end of 2015.

The aim of water resources management plans is to achieve at least good status for all waters.

Rivers, lakes and coastal waters in ecological status categories in 2013



	RIVERS, km	LAKES, km²	COASTAL WATERS, km²
UNCLASSIFIED	380	219	2
BAD	557	29	179
POOR	3,362	361	4,962
MODERATE	8,338	3,776	13,423
GOOD	15,733	16,004	6,216
HIGH	7,213	8,400	0

The calculation for rivers is based on river length and for lakes and coastal waters on surface area. Source: SYKE, ELY Centers and Finnish Game and Fisheries Research Institute. 2013.

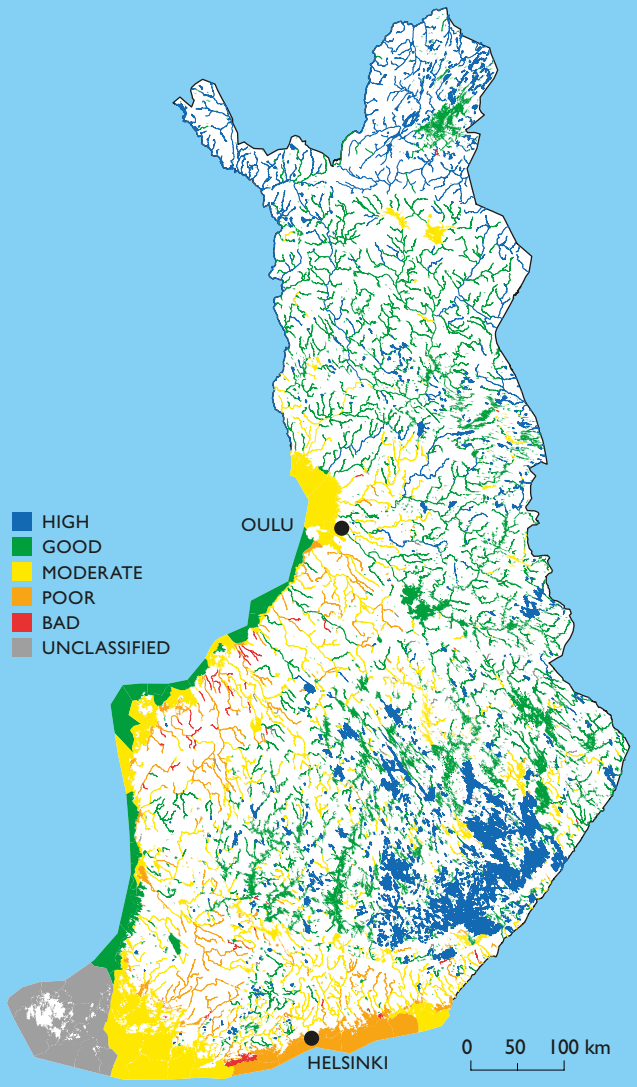
PHOTO PETRI JAUHIAINEN / PLUGI

Classification reveals human impact

The ecological condition of surface waters is assessed by classifying their status either as high, good, moderate, poor or bad. The classification is primarily based on biological qualities: the state of algae, flora and fauna is compared with conditions unaffected by human activity. Classification also takes account of chemical factors, such as nutrient content, acidity and visibility. River and lake regulation, obstructions to fish migration and other changes in aquatic habitats may also cause downgrading.

A high ecological status indicates that there has been no degradation at all due to human impact. The highest possible classification of man-made lakes and other artificial or heavily modified water bodies is 'good' instead of 'high'.

Surface waters by ecological status in Finland 2013



Source: The Assessment of the ecological status of Finland's surface waters 2013. SYKE, ELY Centers and Finnish Game and Fisheries Research Institute. 2013.
Map: National Land Survey of Finland, permit number 7/MML/12.

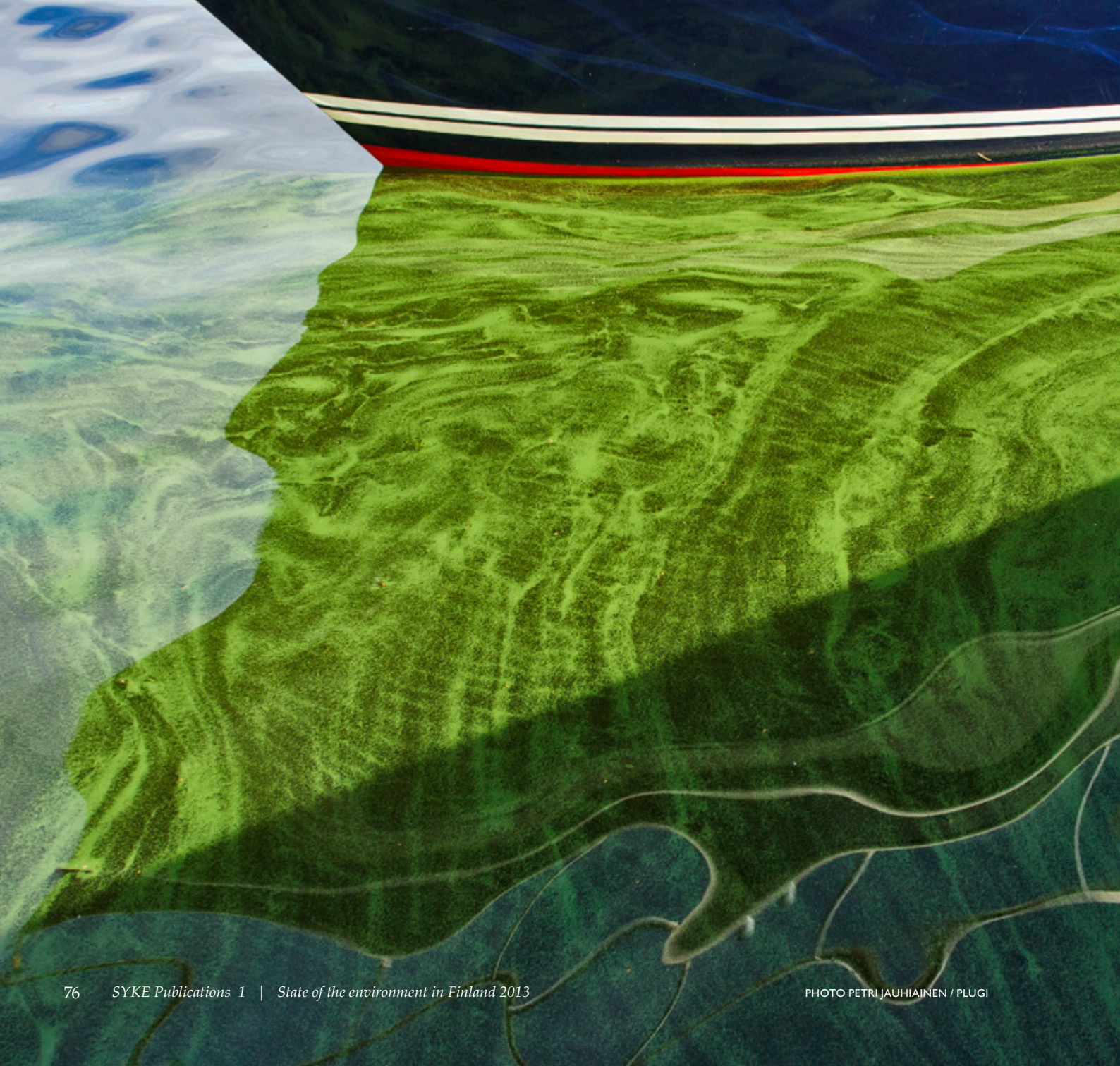


PHOTO PETRI JAUHIAINEN / PLUGI

Water quality in lakes improving – will algal blooms decrease?

It might be assumed that eutrophication in waters is slowing, since nutrient discharges from point sources have considerably decreased in recent decades. However, recovery can be slow if a high quantity of nutrients has accumulated in the sediment. These nutrients can return to the water in a process called internal loading thus maintaining levels of eutrophication.

Blue-green algal blooms in summer are among the most prominent problems caused by eutrophication. Their occurrence has been systematically monitored since 1998. The impetus for monitoring came from the record-breaking summer of 1997, with its disastrous algal situation and exceptional level of algal blooms in both the Baltic Sea and lakes. Large amounts of toxic algae drifted ashore and some people exhibited symptoms of poisoning.

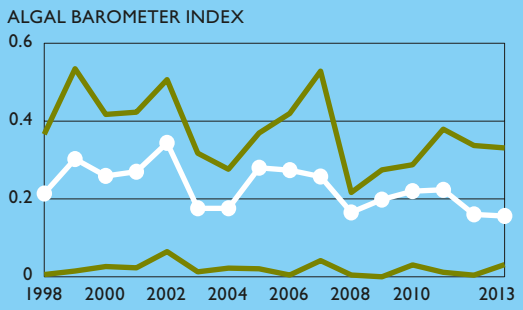
Algal bloom monitoring comprises visits to around 300 permanent observation sites once a week from June to September, in order to record the occurrence and amounts of blue-green algae. To facilitate assessment of the situation as a whole, an algal barometer index is calculated based on each week's observations. The level of the index depends on the number of observations of algae and the quantities observed.

Different years can be compared by examining the most typical values given by weekly algal barometer indices. In 2008–2012, most algal barometer readings were lower than in earlier years of algal monitoring.

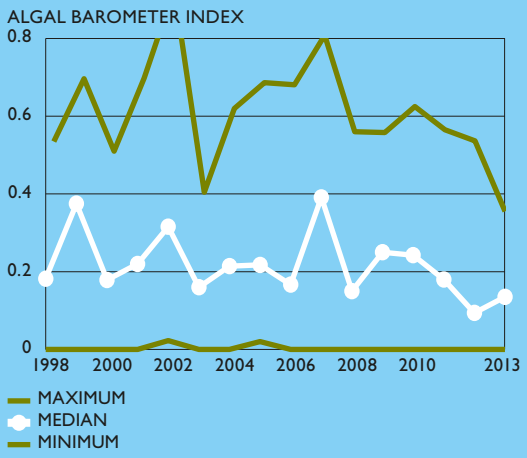
Annual variations in the algal situation are explained more by variations in summer weather than by changes in nutrient levels.

Source:
- National algal monitoring. Lakewiki. Finnish Environment Institute, ELY Centers and environmental authorities in municipalities. 2013.

Algal situation in inland waters in 1998–2013



Algal situation in sea areas in 1998–2013



Source: National algal monitoring, Järviwiki, SYKE and ELY Centres and environmental authorities in municipalities. 2013.

The illustration shows the range for each year's algal barometer, i.e. the highest and lowest rating and median for weeks 23–35, from early June to the end of August. The algal barometer is an index based on observations of national algal monitoring. It enables a weekly assessment of the overall algal situation in inland waters and sea areas

Lower nutrient surplus in croplands

EXCESS NUTRIENTS CAN BE WASHED INTO WATER BODIES OR SEEP TO GROUNDWATER.

Situation eased by more accurate estimates of fertiliser needs

Since the 1990s, the nutrient balance of cropland has declined in Finland, with the phosphorus balance in particular falling by up to one quarter from 1996 to 2011 and the nitrogen balance lowering by around a third.

The nutrient balance is derived by comparing the quantity of nutrients added to a field to the quantity removed in the crop. The lower the balance, the smaller the nutrient surplus remaining in the field. Excess nutrients can be washed into water bodies or seep to groundwater.

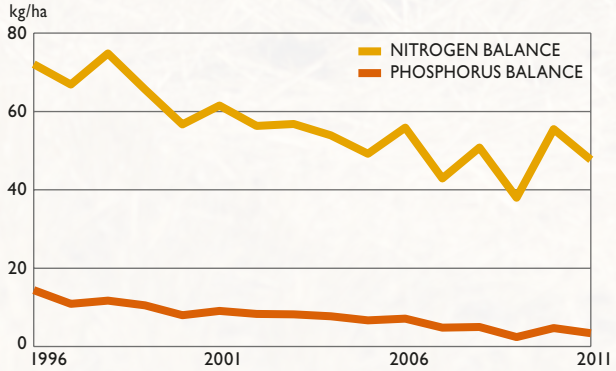
Nutrient balances have declined since more precise estimates of fertiliser needs have become available together with advanced soil fertility analysis services.

Monitoring of nutrient balances is an additional agri-environmental support measure in the current 2007–2013 support period. One of the conditions of agri-environmental support is that farmers commit themselves not only to mandatory basic measures, but also to a certain number of additional measures. Farmers who have chosen nutrient balance as an additional measure must calculate the annual nutrient balance of each field plot covered by support. This provides them with information on any excess use of fertiliser.

Source:
• Ministry of Agriculture and Forestry. 2013.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
The nutrient balance of agricultural land clearly fell in 1996–2011, both as regards nitrogen and phosphorus, particularly the latter.	During the current term of agri-environmental support, 2007–2013, the phosphorus balance was an average of 50% and the nitrogen balance an average of 15% lower than in 2000–2006.	–

Nitrogen and phosphorus balance in agriculture 1996–2011



Source: Ministry of Agriculture and Forestry. 2013.

PHOTO SAKARI ALASUUTARI / VASTAVALO

BIODIVERSITY

Every tenth species in Finland threatened

APPROXIMATELY ONE TENTH OF SPECIES, 2,247 IN ALL, WERE CLASSIFIED AS THREATENED ON THE 2010 RED LIST OF FINNISH SPECIES.

Approximately one tenth of species, 2,247 in all, were classified as threatened on the 2010 Red List of Finnish Species.

More than one third of these are forest species that are suffering from such things as decreasing numbers of old trees and forest fires, and lack of decaying wood. Almost one half of threatened forest species inhabit herb-rich forests, and one third old forests. 9% of Finland's forests are protected in various ways, but protected areas are unevenly distributed both geographically and by forest type. In Northern Finland (Kainuu, North Ostrobothnia, Lapland), 15.8% of forests are strictly protected, but the figure in Southern Finland is only 2.3%.

Various environments influenced by man also make important habitats. Almost one quarter of threatened species require meadows, wooded pastures or other semi-natural habitat. These habitats become easily overgrown with bushes and trees as the numbers of grazing animals decrease.

Overgrowth threatens shorelines as well. Reed and Japanese rose (*Rosa rugosa*) invade areas of low vegetation and open patches on which a number of species depend.

Mines and extraction of rock for building purposes threaten species living in rock outcrops, particularly lichens and mosses. Even those outcrops that house the largest array of species are not necessarily protected because there is no specific protection programme for rock outcrops.

Enough is known about just under one half of the approximately 45,000 species in Finland to facilitate an assessment of their threat status. Although the other half remain unassessed, the status of species in Finland is exceptionally well known in comparison to other countries.

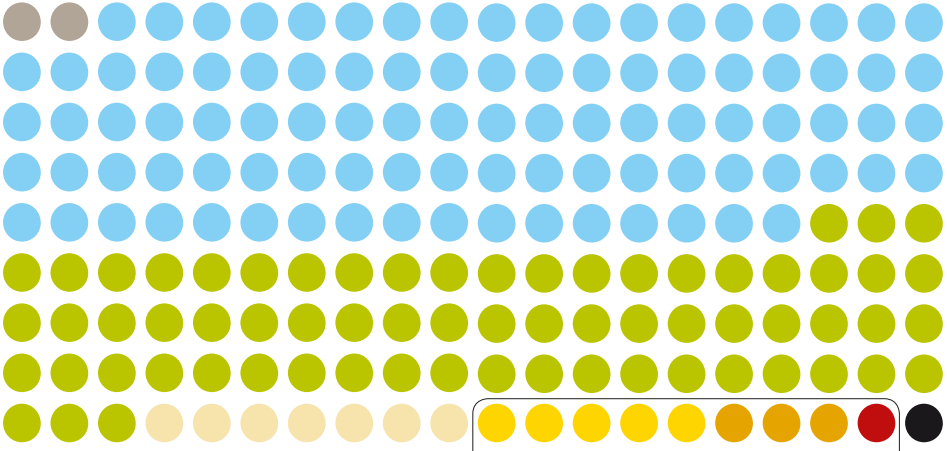
Sources:
- Rassi P., Hyvärinen E., Juslén A. & Mannerkoski I. (eds.): The 2010 Red List of Finnish Species. 2010.
- Finnish Environment Institute. 2013.

10.5% of the species well enough known to facilitate an assessment of their threat status are classified as threatened.

The number of threatened species increased by 742 compared to the 2000 assessment.

Halting the growth in the number of threatened species was not achieved by 2010. Even the new target of halting biodiversity loss in Finland by 2020 seems difficult to attain.

Finnish species by IUCN classification



Data Deficient DD	514
Not Evaluated NE	23,602
Least Concern LC	16,438
Near Threatened NT	1,867
Vulnerable VU	1,208
Endangered EN	726
Critically Endangered CR	313
Regionally Extinct RE	332

Classification of threatened species by main habitat

Forests	36,2%
Rural biotopes & cultural habitats	23,3%
Shores	12,9%
Rock outcrops	10,1%
Aquatic habitats	6,6%
Alpine heaths & meadows	5,7%
Mires	4,6%
Unknown	0,5%

Source: Rassi P., Hyvärinen E., Juslén A. & Mannerkoski I. (eds.): The 2010 Red List of Finnish Species. 2010.

The decline in species continues in almost all habitats

THE PRIMARY AIM OF THE STRATEGY IS TO HALT THE LOSS OF BIODIVERSITY BY 2020.

When comparing the 2000 and 2010 Red Lists of Finnish species, it becomes clear that more species have become threatened in all habitats, with the exception of built-up environments. The comparison shows that within ten years, the status of 356 species has been reclassified as more critical, and that of 186 as less critical. These figures only include genuine changes in classification where the category of a particular species has been changed due to changes in population size or distribution, not due to changes in assessment criteria.

The change for the worse has been most prominent on shores, with the status of 60 species being reclassified as more critical and that of only 14 species as less critical. The future looks particularly grim for species living on Baltic sand beaches and coastal meadows as well as on meadows on lake shores and river banks as these habitats are threatened by overgrowth. There is also a growing danger that mires, alpine heaths and rock outcrops will lose some of their species.

The status of beetles has improved most of all groups of organisms, and is now less critical for 76 species, and more critical for 54, all habitats included. Many beetles have become more widespread due to warmer summers, or have benefited from aspens and other trees left in clear-cut areas.

The national strategy and action plan for the conservation and sustainable use of biodiversity 2013–2020 was approved in December 2012. The primary aim of this strategy, entitled 'Saving Nature for People' is to halt the loss of biodiversity by 2020. The previous action plan for 2006–2016 set the same goal for 2010.

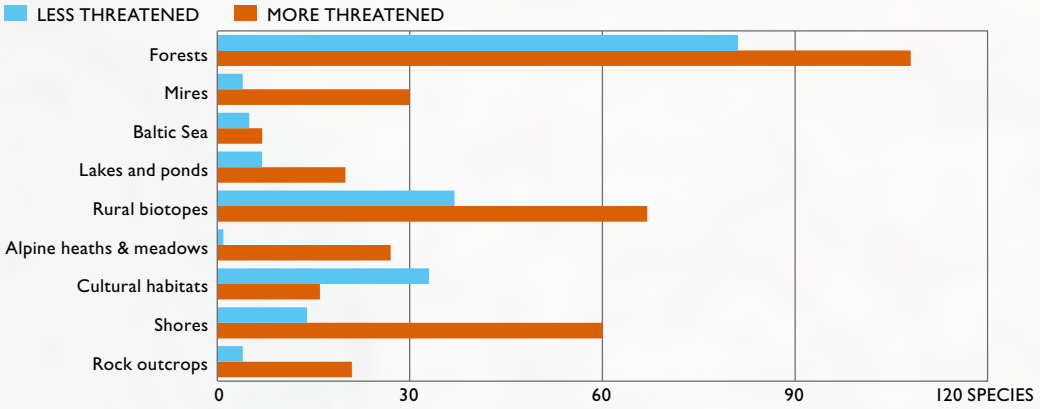
Sources:
- Rassi P., Hyvärinen E., Juslén A. & Mannerkoski I. (eds.): The 2010 Red List of Finnish Species. 2010.
- Finnish Environment Institute. 2013.

There are threatened species in all habitats.

With the exception of one habitat, the number of threatened species has increased from the 2000 Red List to the 2010 List.

Halting biodiversity loss in Finland was not achieved by 2010, and it will be difficult to meet the target by 2020.

Genuine changes of category for threatened species 2000–2010



Source: Rassi P., Hyvärinen E., Juslén A. & Mannerkoski I. (eds.): The 2010 Red List of Finnish Species. 2010.

Grass snakes (*Natrix natrix*) have become more common on the shores of the Baltic Sea. The classification of the species was changed from 'vulnerable' to 'near threatened' in the 2010 Red List. Photo Petri Shemeikka.

Intensive agriculture threatens farmland birds

SINCE THE 1950s, BOTH EUROPE'S AND FINLAND'S FARMLAND BIRD POPULATIONS HAVE DECREASED BY ONE HALF.

Urban birds thriving

Since the 1950s, Europe's farmland bird populations have decreased by one half. This has also happened in Finland.

The change in agriculture from diversified traditional cultivation dominated by dairy cattle to specialised and regionally concentrated intensive farming, has made the rural landscape more monotonous and less suitable for birds. Subsurface draining has reduced nesting sites and hiding places for birds, and nesting birds are more often disturbed by heavy farming machinery. Increased use of mineral fertilisers and pesticides have an indirect effect through the food chain while the retreat of semi-natural grasslands has diminished the number of food insects for birds.

The decrease in farmland bird populations is partly explained by conditions in wintering grounds and along migration routes. Farmland birds include resident species and short-distance migrants as well as long-distance migrants which overwinter in Sub-Saharan Africa or in Asia. Regardless of their migrant behaviour, the populations of various farmland birds have seen a similar decline.

Populations of urban birds, for instance birds nesting in parks and buildings, have increased in the last three decades. Many urban and suburban birds, such as greenfinch, great tit, and blue tit, have increased thanks to winter feeding which has lowered their wintertime mortality.

Sources:
- Finnish Museum of Natural History. 2013.
- Website biodiversity.fi

LONG-TERM TREND

Farmland bird populations are decreasing at a much faster pace than the numbers of urban birds are increasing.

SHORT-TERM TREND

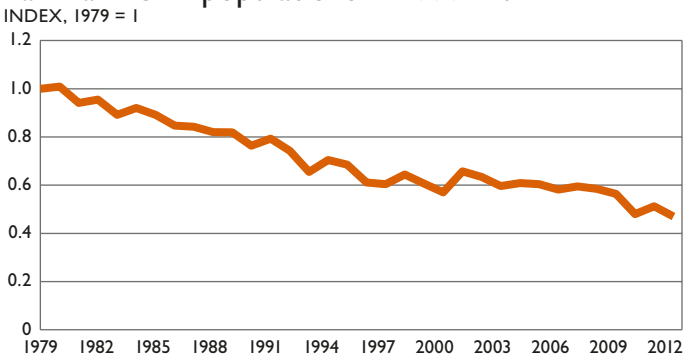
After a more balanced period in the early 2000s, farmland bird populations have again decreased over the last five years. Urban and suburban birds have also declined in recent years, mainly due to lower numbers of pheasants and a disease affecting greenfinches.

IN RELATION TO TARGETS

Halting the loss of biodiversity would require continuing viability in the populations of all species.

Only 1% of the ortolan bunting (*Emberiza hortulana*) population remains compared to 30 years ago. The primary reasons for this decline include more intensive farming and a less diverse rural environment. Photo Esa Nikunen.

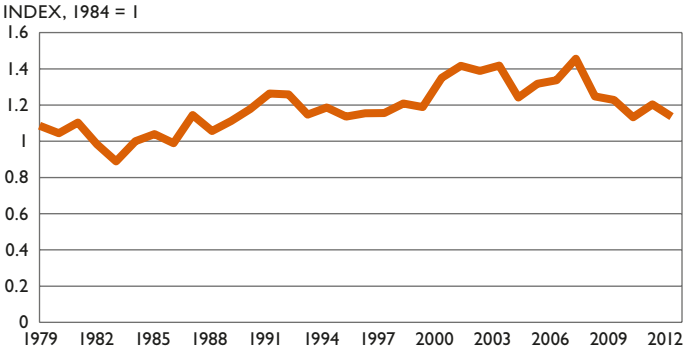
Farmland bird populations in 1979–2012



Source: Finnish Museum of Natural History

The farmland bird indicator describes the populations of 11 farmland birds. Birds included in the indicator are lapwing, curlew, skylark, barn swallow, whinchat, greater whitethroat, red-backed shrike, starling, common rosefinch, yellowhammer and ortolan bunting.

Urban and suburban bird populations in 1979–2012



Source: Finnish Museum of Natural History

The urban bird indicator describes the populations of 14 bird species. Birds included in the indicator are common pheasant, stock dove, wood pigeon, common swift, house martin, white wagtail, fieldfare, blue tit, great tit, magpie, jackdaw, hooded crow, greenfinch and house sparrow. The recent decline in urban and suburban bird populations is due to declining numbers of pheasants, and avian trichomoniasis affecting greenfinches.

Draining of mires reflected in butterfly populations

Eight of Finland's butterfly species occur predominantly on mires. Their populations have plummeted, particularly in Southern Finland where, in recent years, mire butterflies have been found in less than half of the sites in which they were observed in the 1990s. A similar trend can be seen in the central and northern parts of the country.

More than 80% of mires in Southern and Central Finland have been drained whereas the figure for the southern parts of Northern Finland is between 60 and 80%. In general, the farther north you go, the bigger the proportion of mires that have not been drained.

A decline has been observed in other mire species as well as butterfly populations. Among well-known groups of species, the decline in numbers of mire birds is causing concern.

Sources:
- National Butterfly Recording Scheme/South Karelia Allergy and Environment Institute. 2013.
- Website biodiversity.fi

► On the right the cranberry fritillary (*Boloria aquilonaris*). It is still quite common also in the mires of Central and Southern Finland. The small photo above shows the northern grizzled skipper (*Pyrgus centaureae*) which is clearly the rarest of Finland's eight butterfly species found solely on mires. Photos Pekka Malinen.

LONG-TERM TREND

The occurrence of mire butterflies has clearly declined since the 1990s.

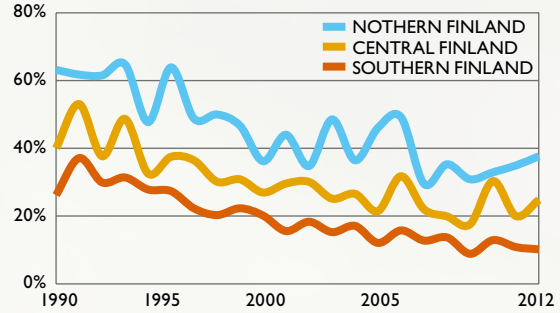
SHORT-TERM TREND

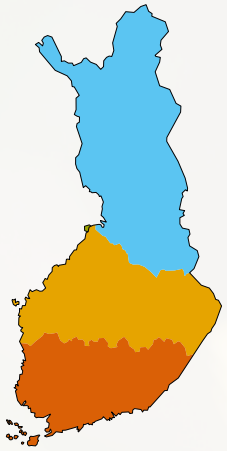
The decrease in mire butterflies seems to have come to a halt in recent years.

IN RELATION TO TARGETS

Halting the loss of biodiversity would require continuing viability in the populations of all species.

Occurrence of mire butterflies in 1990–2012





Source: National Butterfly Recording Scheme/South Karelia Allergy and Environment Institute and website biodiversity.fi. 2013.

The mire butterfly species surveyed are the northern grizzled skipper, Lapland ringlet, Baltic grayling and large heath as well as cranberry, bog, zig-zag and willow-bog fritillaries.

One fifth of Europe's surface area is protected

FINLAND'S FIRST NATURE CONSERVATION AREA WAS ESTABLISHED ON THE MALLA FELL IN THE FAR NORTH AS LONG AGO AS 1916.

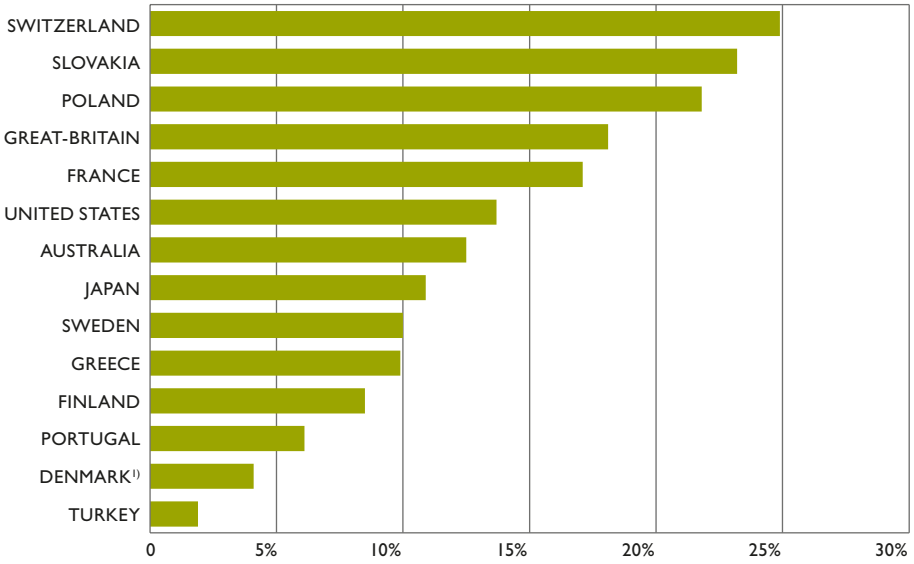
In an international comparison of protected areas, Finland is close to the average with nature reserves and wilderness areas covering some 9% of the country's surface area. International comparisons are, however, difficult to make because the criteria of protection vary. In some countries, industrial activity or large-scale agriculture may be permitted in a protected area. This is not the case in Finland, but even here one can find many types of protected areas, though most of them are relatively strictly protected.

Finland has a long tradition of maintaining biodiversity through designating areas for protection. The first nature conservation area was established on the Malla fell in the far north as long ago as 1916 while the first national parks and strict nature reserves were founded in 1938. In early 2012, the total number of various protected areas came close to 9,000. Small nature reserves on private land account for the majority of these. The number of national parks is 37, of which the newest, those of Sipoonkorpi and the Bothnian Sea, were established in 2011. As far as habitats are concerned, the fell regions of Lapland have the best coverage by national parks. The situation is distinctly weaker on rivers and lakes, which are underrepresented in the national park network compared to their prevalence in Finnish nature.

The primary aim of the national strategy for the conservation and sustainable use of biodiversity is to halt the loss of biodiversity in Finland. The action plan for the strategy's implementation seeks not only to secure biodiversity by means of traditional nature conservation methods, such as nature reserves, but to make environmental values an integral part of all decision-making. Even areas used for forestry and agriculture are vital to pursuing this goal. In such areas, the aim is to promote biodiversity through a number of voluntary methods, in addition to legislation, such as forest certification and agri-environmental support measures.

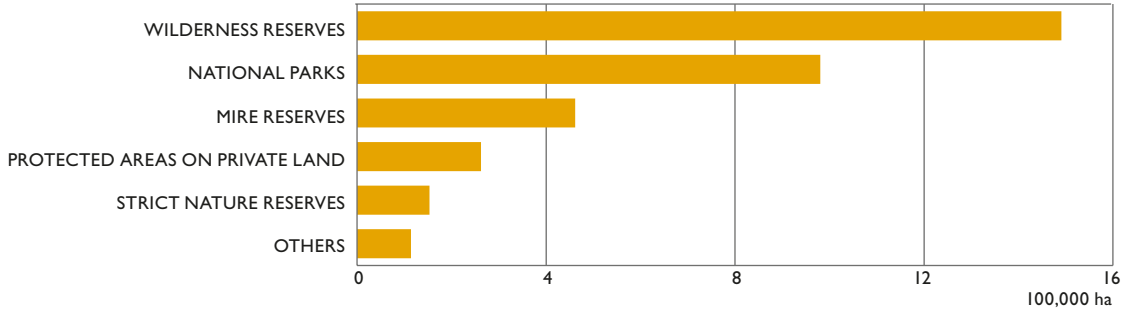
Sources:
- Protected areas in Europe - an overview. EEA Report No 5/2012.
- Ministry of Environment and Metsähallitus. 2013.
- Anna-Liisa Ahokumpu: Kotomaamme koko kuva? Suomen kansallispuistoverkoston pinta-alan ja maanpeitteen kehitys 1938–2012. Master's thesis, University of Helsinki. 2013.

The share of key protected areas of total land area in some countries in 2010



1) Excluding Greenland. Source: Environment statistics, Yearbook 2013. Statistics Finland. 2013.

Nature conservation areas and wilderness areas in Finland in early 2012



Sources: Ministry of Environment and Metsähallitus. 2013.

"Others" includes herb-rich forest reserves, old-growth forest reserves and seal protection areas as well as conservation areas on Åland, those established by Metsähallitus, and other state-owned conservation areas.

CHEMICALS AND HAZARDOUS SUBSTANCES

Sales of pesticides increasing again

USE OF PESTICIDES IN FINNISH AGRICULTURE CLEARLY DECREASED IN THE EARLY 1990s, BUT HAS INCREASED SINCE.

Precise application and control reduce risks

Use of pesticides in Finnish agriculture clearly decreased in the early 1990s, but has increased since. It is, however, difficult to assess the environmental impact of pesticides solely on the basis of amounts applied, as there are different active ingredients involved and their characteristics and ecological effects vary.

To facilitate impact assessment, the Finnish Environment Institute has developed a risk indicator for pesticides, taking account not only of sales figures but also of the key detrimental characteristics of each substance, such as toxicity and accumulation in organisms.

The risk indicator was calculated for the years 1985–2006. Results indicate that the environmental impact of pesticides increased because a greater proportion of fungicides sold now include substances that are more hazardous.

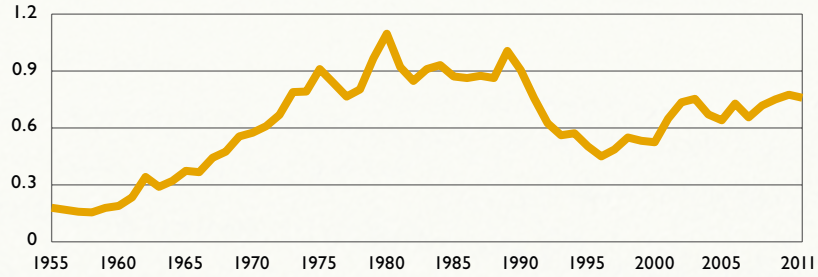
In early 2012, the total number of active ingredients approved for crop protection in Finland was 153. Sales figures for herbicides are clearly highest, accounting for more than 80% of active ingredients sold in 2011. Quantities of forestry pesticides increased in the 2000s, as substances for preventing *Heterobasidion fungi* became available.

The Ministry of Agriculture and Forestry has prepared a National Action Plan on the Sustainable Use of Plant Protection Products. Its main objective is to reduce the risks posed by pesticides to human health and the environment.

Sources:
- National Action Plan on Sustainable Use of Plant Protection Products.
- Finnish Safety and Chemicals Agency. 2013.
- Tike, Information Centre of the Ministry of Agriculture and Forestry. 2012.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
Sales figures are lower today than in the 1970s and 1980s, and many of the active ingredients used then are now prohibited. Since 1995, sales of pesticides have increased by approximately 50%.	Use of pesticides has increased in recent years, particularly in forestry.	The aim of the national action plan is to reduce risks from pesticides. This may prove difficult if climate change makes it easier for plant pests to survive the Finnish winter, increasing the need for pest control.

Use of pesticides in agriculture in Finland in 1955–2011



Source: Finnish Safety and Chemicals Agency (Tukes) and Tike, Information Centre of the Ministry of Agriculture and Forestry. 2012.

Annual sales of agricultural pesticides in relation to arable land under cultivation at the time.

PHOTO TIMO MELANTIE / VASTAVALO

Number of oil spills reduced by 50% in six years

HELCOM AIMS TO COMPLETELY ELIMINATE OIL SPILLS IN THE BALTIC SEA BY 2021.

Control and legislation prevent spills

The number of oil spills detected at sea by the Finnish authorities has reduced by 50% in six years. In 2012, only 54 oil spills were recorded, while in 2007, there were over a hundred. The volume of spilled oil has also reduced markedly. In 2012, the average volume of an oil spill was 25 litres, whereas in 2007 it was 170 litres. Fewer spills are also being detected elsewhere in the Baltic Sea.

Oil spills have been prevented by efficient surveillance flight operations and a new law, which entered into force in 2006, enabling faster imposition of an oil pollution payment. In 2012, the Finnish Border Guard initiated the investigation of only two oil pollution payment incidents, while in 2007, the corresponding figure was 13.

Large archipelagos and intricate coastlines make the coasts of the Baltic Sea particularly vulnerable to oil spills. The Baltic Marine Environment Protection Commission HELCOM aims to completely eliminate oil spills in the Baltic Sea by 2021.

Sources:
• Finnish Environment Institute. 2013.

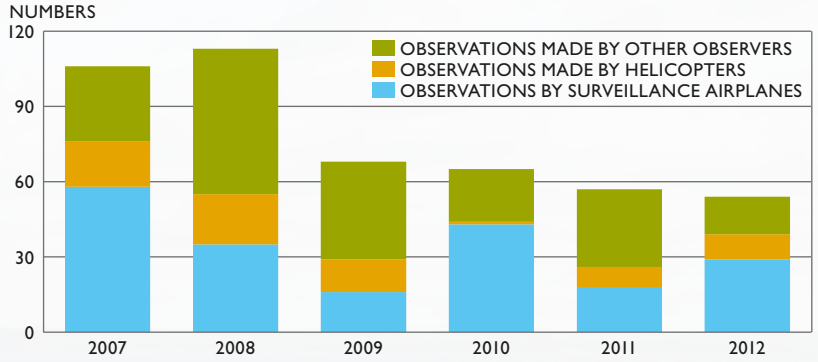
► The multipurpose pollution control vessel Louhi, acquired for the Finnish Navy by the Finnish Environment Institute, provides the basis for oil and chemical spill preparedness and response. The vessel can safely navigate in toxic gas clouds, and the crew is also protected from blast pressure in chemical explosions. Photo: The Finnish Border Guard.

The number of intentional oil spills has reduced remarkably over the decades. Previously, bilge water and other oil-containing wastewater were carelessly dumped into the sea.

The number of oil spills has decreased particularly rapidly since the entry into force of a new Act in 2006 that enables faster imposition of oil pollution payments.

HELCOM has set the goal of completely eliminating oil spills in the Baltic Sea by the year 2021. There is a long way to go before this goal can be achieved.

Number of oil spills detected by Finland in 2007–2012



Source: SYKE. 2013.

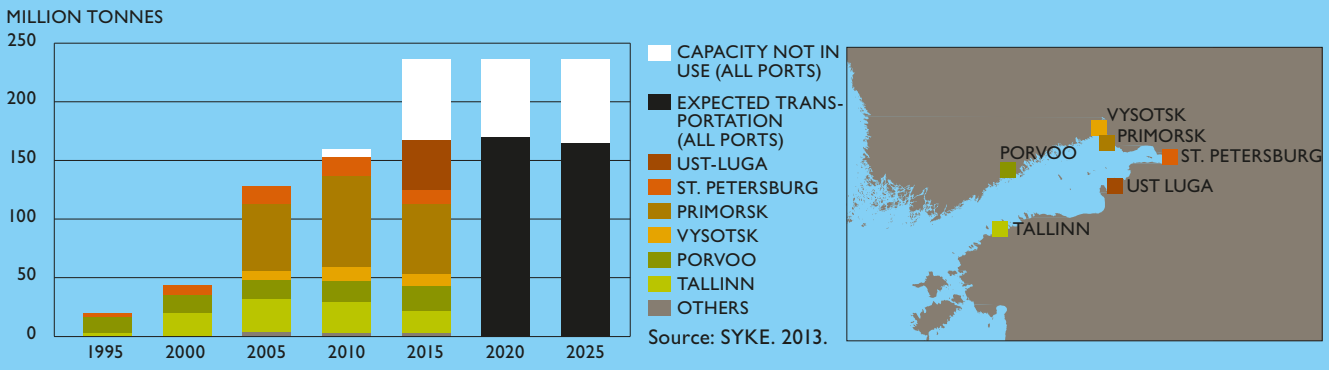
Increasing risk of an oil accident in the Gulf of Finland

Oil transports have become increasingly common in the Gulf of Finland since the mid-1990s. In 1995, the quantity of oil transported was less than 20 million tonnes and in 2012 more than 150 million tonnes. In 2013, oil transports will probably exceed 160 million tonnes.

The majority of oil transported in the Gulf of Finland comes from the new ports of Primorsk and Ust-Luga constructed in Russia in the 2000s. The port of Ust-Luga is being expanded further. At present, one third of all oil transports from Russia travel via the Gulf of Finland.

Some 20 tankers sail through the Gulf of Finland every day. Other marine traffic, container traffic in particular, is also growing in the area, mainly heading to and coming from Russian ports. The risk of an oil accident is estimated to be highest in the open sea off the coast of Helsinki, with busy passenger traffic routes between Tallinn and Helsinki crossing tanker routes.

Oil transports of the key oil terminals in the Gulf of Finland 1995–2013 and forecast up to 2025



The total annual oil transport capacity of terminals in the Gulf of Finland will rise to 230 million tonnes over the next few years, provided that Russia implements all of the terminal projects it has planned. Additional capacity is likely to alter various oil terminals' share of transports in the Gulf of Finland, while some terminal capacity will remain unused. Annual oil transport quantities will probably settle at around 170 million tonnes.

► Oil soaked common goldeneye (*Bucephala clangula*). Birds are major victims of oil drifting to coasts from oil spills, and they need quick help. WWF Finland trains voluntary oil spill response teams to help birds and other animals affected by oil spills. Photo Anu Valing, DivingClubMaremark, WWF.

GREEN ECONOMY

Economic growth without increasing environmental pressures

THERE HAS BEEN A PARTICULARLY CLEAR INCREASE IN ECO-EFFICIENCY SINCE THE MID-1990s.

There is a strong connection between gross domestic product and human-induced pressures on the environment. Energy consumption, transport and use of natural resources, in particular, are closely linked to economic trends. GDP forecasts are also used as the most important basis for predictions on future traffic volumes and energy requirements.

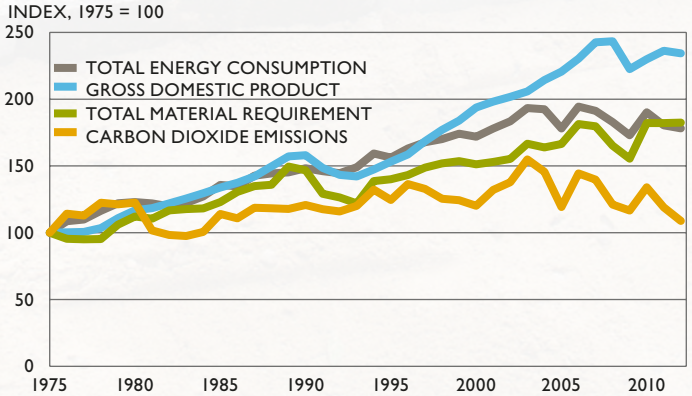
Enhancing eco-efficiency has long been an environmental policy objective. To achieve this would involve decoupling natural resource use from gross domestic product. Eco-efficiency means producing more goods and services while using smaller amounts of natural resources and creating less emissions.

Finland's gross domestic product has increased at a faster rate than energy consumption, use of natural resources, and the generation of carbon dioxide emissions. There has been a particularly clear increase in eco-efficiency since the mid-1990s. In fact, the environmental impact has in some respects even decreased, despite almost continuous economic growth.

The question of whether or not economic growth actually enhances wellbeing has also been debated in recent years, and several indicators have been proposed to supplement GDP. They would take account of issues such as changes in environmental impact and in economic inequality.

Sources:
- Statistics Finland. 2013.
- Lyytimäki J., Rinne J. & Ahrelma R-R. (eds.). Ympäristönsuojelun vaikuttavuus: Indikaattorit 2012. Finnish Environment Institute. 2012.

Trends in gross domestic product, total energy consumption, carbon dioxide emissions and total material requirement in 1975–2012



Source: Statistics Finland. 2013.

PHOTO SAKARI ALASUUTARI / VASTAVALO

Taxation slowly becoming greener

AT PRESENT, ALMOST ONE HALF OF ENVIRONMENTAL TAXES ARE GENERATED FROM TAXATION ON TRANSPORT FUELS.

In 2011, environmental taxes accounted for 7.4% of Finland's total tax revenue. This is clearly more than over the previous few years, but 1998–1999 and 2003–2005 saw similar figures.

The present Government's programme states that the focus of taxation will move away from labour and entrepreneurship, towards environmentally and health motivated taxation. The aim is that lower taxation of labour will generate economic growth and employment, while taxes relating to environmental damage will reduce the environmental impact.

At present, almost one half of environmental taxes are generated from taxation on transport fuels, and one third from vehicles. The tax burden on energy production, electricity consumption and waste has tightened over the last few years.

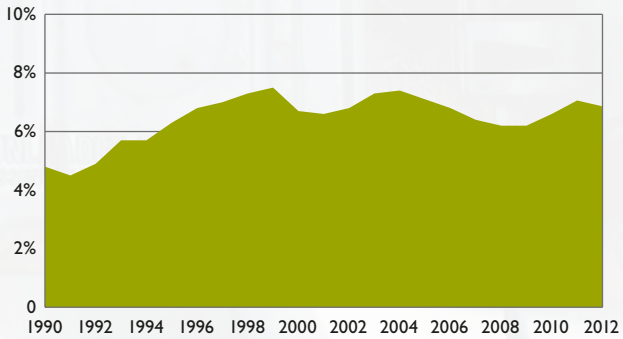
Sources:
- Statistics Finland. 2013.
- Strategic plan for the implementation. Finnish Gorvernment. 2011.

Environmental taxes' share of tax revenues remains moderate.

Environmental taxes' share of tax revenues has increased from 2009.

So far, there has been no major shifting away from the taxation of labour towards environmental taxation. Taxation of labour has also increased in recent years.

Environmental taxes as a share of state tax revenues in 1990–2012



Source: Statistics Finland. 2013.

Environmental taxes include energy taxes, transport taxes, emission taxes and resource taxes. In 2011, households paid more than one third of all environmental taxes.

PHOTO MARK FINBORK / PLUGI

Upturn in organic production

THE GOAL IS FOR ORGANIC FARMING TO OCCUPY 20% OF CULTIVATED ARABLE LAND IN 2020.

Organic farming accounts for 9% of agricultural land use in Finland. In the early 2000s, the share of organic farming remained fairly stable, but an upturn has occurred in recent years. The primary reason for this growth lies in higher demand for organic products.

One of the agricultural policy goals set in the Government Programme is a more significant increase in the share of local and organic food. In May 2013, the Government approved a programme for the development of the organic sector, aimed at improving the efficiency of the organic food chain and increasing organic production to meet demand, while increasing Finland's exports of organic products.

The goal is for organic farming to occupy 20% of cultivated arable land in 2020. This will require a minimum of 10% annual increase in the area under organic cultivation. Organic farming needs naturally occurring organic fertilizers, such as manure, and this restricts its growth potential as not all farms can keep livestock.

Sources:
- Finnish Food Safety Authority Evira. 2013.
- Lisää luomua! Hallituksen luomualan kehittämisohjelma ja luomualan kehittämisen tavoitteet vuoteen 2020. Valtioneuvoston periaatepäätös 16.5.2013.
  (More organic farming! Finnish Government's resolution on action plan 16.5.2013.)

LONG-TERM TREND

Only some 9% of crop cultivation is organic.

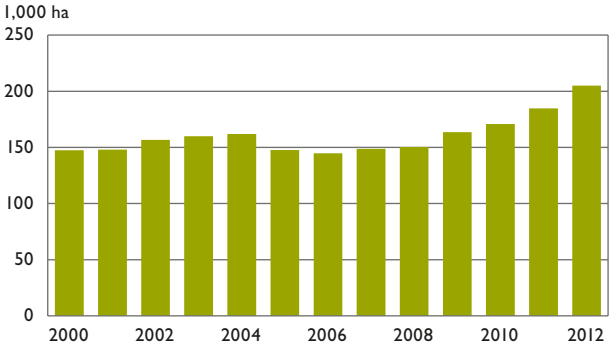
SHORT-TERM TREND

In the last five years, the organic farming area has increased faster than before.

IN RELATION TO TARGETS

Around 10% annual growth in area is required to meet the target set under the development programme for the organic sector. This growth target was met in 2012, with an increase of 11%.

Organic farming area in Finland 2000–2012



Source: Finnish Food Safety Authority Evira. 2013.

The statistics include areas under conversion for organic farming. This means that the land is being cultivated organically, but the related crops cannot yet be marketed as organic products.

PHOTO EINO ERVASTI / VASTAVALO

Finland the eighth most sustainable society

IN THE CATEGORY OF PERSONAL AND SOCIAL DEVELOPMENT, FINLAND IS THE BEST IN THE WORLD.

Finland was placed eighth in the 2012 Sustainable Society Index, three places down from 2010.

Finland's index score has been around six since the index was first published in 2006. The score of the number one nation, Switzerland, is seven. Even that is some distance from the score of ten that would deliver a society fulfilling all three dimensions of sustainability – human, environmental and economic wellbeing.

Since many environmental problems are global in nature, achieving sustainability in any single country would not suffice. The mean of the indices for all 151 countries included in the exercise remains at 4.7.

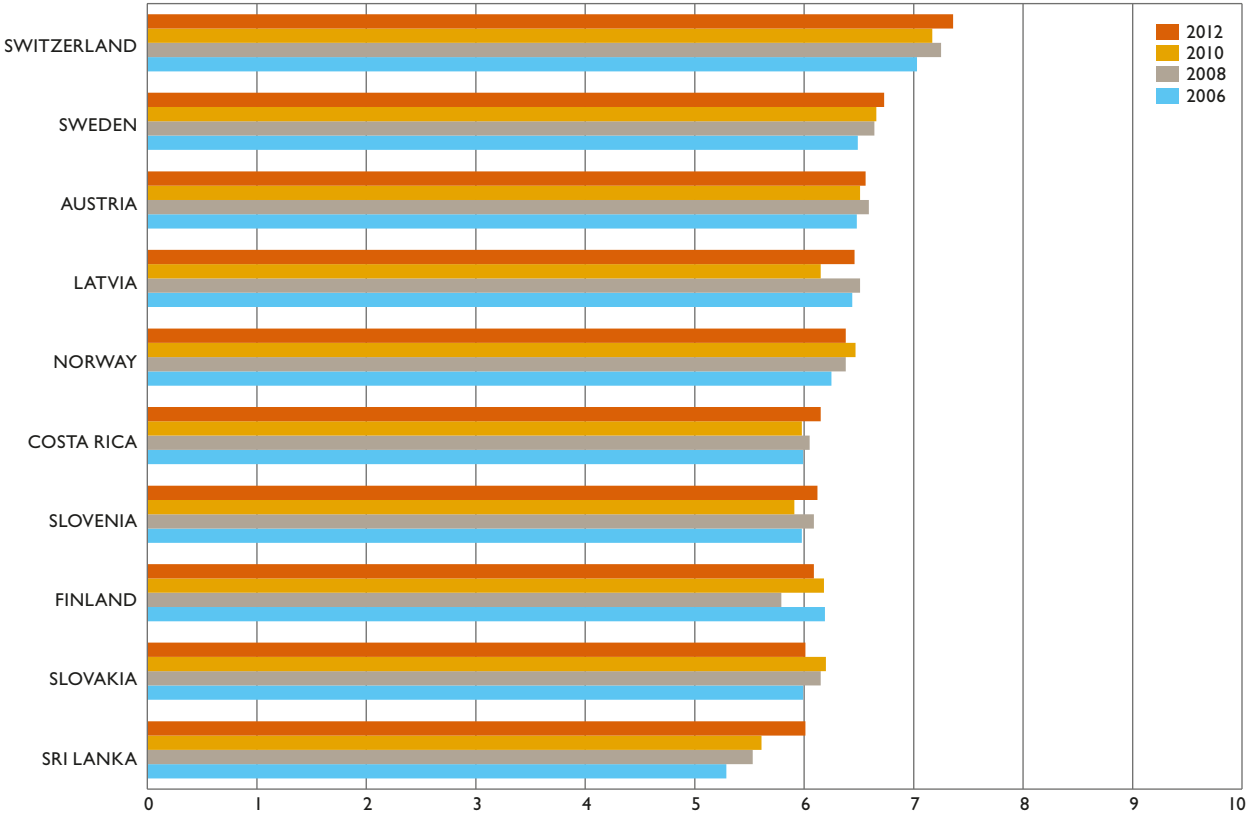
Finland is among the top nations under most indicators measuring human and economic wellbeing. For instance, in the category of personal and social development, Finland is the best in the world – thanks to its educational opportunities, equality, good governance and small income differences.

However, with respect to indicators evaluating environmental wellbeing, Finland ranks 103. Many countries are ahead in the use of renewable energy, while our high standard of living and northern location result in high levels of consumption and of greenhouse gas emissions. Countries that do well in environmental wellbeing categories often rank low in terms of human and economic wellbeing.

Source:
• Sustainable Society Index 2012. Sustainable Society Foundation.

LONG-TERM TREND	SHORT-TERM TREND	IN RELATION TO TARGETS
Finland's Sustainable Society Index score is only six on a scale of one to ten.	Finland's score fell slightly between 2010 and 2012, and its ranking among other countries is down from five to eight.	–

Sustainable Society index



Source: Sustainable Society Foundation. Sustainable Society index. 2013.

DOCUMENTATION PAGE

AUTHOR(S)	Eija Putkuri, Matti Lindholm and Aino Peltonen
TITLE OF PUBLICATION	**The state of the environment in Finland 2013**
DATE	December 2013
SERIES AND NUMBER	SYKE Publications 1, English
KEYWORDS	state of the environment, natural resources, climate change, energy, urban form, air pollutans, surface water, biodiversity, hazardous substances, green economy
NUMBER OF PAGES	112
LANGUAGE	Finnish and English
PUBLISHER	Finnish Environment Institute
COMMISSIONER	Ministry of the Environment, Finnish Environment Institute
DISTRIBUTION	Finnish Environment Institute Email: neuvonta.syke@ymparisto.fi
FINANCIER OF PUBLICATION	Finnish Environment Institute P.O.Box 140, FI-00251 Helsinki, Finland www.syke.fi
PRINTING PLACE AND YEAR	Edita Prima Ltd. Helsinki, Finland 2014
MORE INFORMATION	www.environment.fi/soer2013 Publication is available on the internet: www.syke.fi/publications (PDF)
IDENTIFIERS	ISBN 978-952-11-4261-1 (pbk.) ISBN 978-952-11-4262-8 (PDF) ISSN 2323-8895 (print) ISSN 2323-8909 (online)

ABSTRACT

This publication is a compact review of the state of the environment in Finland in 2013. It brings together the most important indicators which can be used to assess the state of the Finnish environment, to reveal trends and to evaluate the effectiveness of actions taken. The indicators represent eight different themes: Natural resources, Climate change and energy, Communities and transport, Air pollutants, Fresh water and the sea, Biodiversity, Chemicals and hazardous substances and Green economy.

Many of the indicators presented here show that the state of the environment is improving in Finland. Emissions into the air and water have clearly reduced over the last few decades. Several goals set for reducing pressure on the environment have either been met or are likely to be met by the year set in each target.

But not all environmental status indicators are positive. The most severe problems – climate change and loss of biodiversity – remain unsolved. The goals set in these areas also appear to be the most difficult to achieve. Halting the loss of biodiversity has been a set target in Finland for quite a while, but it has proved necessary to postpone meeting this target ever further. As regards climate change, the worldwide aim is to restrict global warming to a maximum of two degrees by 2100. With existing policies, it seems almost impossible that this target will be achieved.

The ongoing financial crises, which began in 2008, have affected the state of the environment in recent years. The effects have been both positive and negative. On one hand the recession has reduced the use of natural resources and other pressures on the environment on the other hand it has also slowed down a number of environmental policy processes such as international climate protection schemes.

The EU Directive on Public Access to Environmental Information calls for member states to provide their citizens with information on the state of the environment. This publication is a response to that requirement.

KUVAILULEHTI

TEKIJÄ(T) Eija Putkuri, Matti Lindholm ja Aino Peltonen

JULKAISUN NIMI **The state of the environment in Finland 2013**
(Ympäristön tila Suomessa 2013)

JULKAISUAIKA Joulukuu 2013

SARJA JA NUMERO SYKEn julkaisuja 1, englanti

ASIASANAT ympäristön tila, luonnonvarat, ilmastonmuutos, energia, yhdyskuntarakenne. ilman epäpuhtaudet, pintavesi, luonnon monimuotoisuus, haitalliset aineet, vihreä talous

SIVUMÄÄRÄ 112

JULKAISUKIELI suomi ja englanti

JULKAISIJA Suomen ympäristökeskus

RAHOITTAJA Ympäristöministeriö, Suomen ympäristökeskus

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PAINOPAIKKA JA -AIKA Edita Prima Oy
Helsinki 2014

LISÄTIEDOT www.ymparisto.fi/ymparistontila2013
Verkkojulkaisu internetissä:
www.syke.fi/julkaisut (PDF)

TUNNISTEET ISBN 978-952-11-4261-1 (nid.)
ISBN 978-952-11-4262-8 (PDF)
ISSN 2323-8895 (painettu)
ISSN 2323-8909 (verkkojulkaisu)

TIIVISTELMÄ

Tämä julkaisu on tiivis yleistajuinen katsaus Suomen ympäristön tilaan vuonna 2013. Siihen on koottu tärkeimpiä indikaattoreita, joiden perusteella voi arvioida Suomen ympäristön tilaa, sen kehityssuuntia ja suojelutoimien riittävyyttä. Indikaattorit edustavat kahdeksaa eri teemaa: Luonnonvarat, Ilmastonmuutos ja energia, Yhdyskuntarakenne, Ilman epäpuhtaudet, Makea vesi ja meri, Luonnon monimuotoisuus, Kemikaalit ja haitalliset aineet sekä Vihreä talous.

Moni julkaisun indikaattoreista osoittaa, että Suomen ympäristön tila on menossa parempaan suuntaan. Esimerkiksi päästöt ilmaan ja vesiin ovat vähentyneet selvästi viime vuosikymmeninä. Monet kuormitukselle asetetuista tavoitteista on joko jo saavutettu tai saavuttaminen vaikuttaa mahdolliselta tavoitevuoteen mennessä.

Myönteistä kuvaa synkentää se, että kaikkein vakavimmat ongelmat – ilmastonmuutos ja luonnon monimuotoisuuden väheneminen – ovat yhä ratkaisematta. Näiden osalta on myös suurimmat ongelmat tavoitteiden saavuttamisessa. Suomen luonnon köyhtymisen pysäyttäminen on ollut pyrkimyksenä jo useana vuotena, mutta toistaiseksi tavoitetta on aina jouduttu siirtämään eteenpäin. Ilmastonmuutokseen liittyen tavoitteena on ollut, että maapallon keskilämpötila nousisi korkeintaan kaksi astetta vuoteen 2100 mennessä. Nykyisillä toimilla tämän tavoitteen saavuttaminen vaikuttaa mahdottomalta.

Viime vuosina ympäristön tilaan on vaikuttanut vuonna 2008 alkanut talouskriisien jatkumo. Vaikutukset ovat olleet sekä myönteisiä että kielteisiä; samalla kun taantuma on vähentänyt luonnonvarojen käyttöä ja muuta ympäristön kuormitusta, se on myös hidastanut monia ympäristöpolitiikan prosesseja, kuten kansainvälistä ilmastonsuojelua.

Euroopan unionin ympäristötietodirektiivi velvoittaa jäsenmaat tarjoamaan kansalaisille tietoa ympäristön tilasta. Tämä julkaisu on osa tuon velvoitteen täyttämistä.

PRESENTATIONSBLAD

FÖRFATTARE Eija Putkuri, Matti Lindholm och Aino Peltonen

PUBLIKATIONENS TITEL **The state of the environment in Finland 2013**
Miljöns tillstånd i Finland 2013

DATUM December 2013

SERIE OCH NUMMER SYKE Publikationer 1, engelska

NYCKELORD miljöns tillstånd, naturresurser, klimatförändring, energi, samhällsstruktur, luftföroreningar, ytvatten, biologisk mångfald, skadliga ämnen, grön ekonomi

SIDANTAL 112

SPRÅK finska och engelska

UTGIVARE Finlands miljöcentral

FINANSIÄR Miljöministeriet och Finlands miljöcentral

FÖRLÄGGARE Finlands miljöcentral
PB 140, 00251 Helsingfors
www.syke.fi

DISTRIBUTION Finlands miljöcentral
neuvonta.syke@ymparisto.fi

TRYCKERI, TRYCKORT OCH ÅR Edita Prima Ab
Helsingfors 2014

TILLÄGGSUPPGIFTER www.ymparisto.fi/ymparistontila2013
Publikationen finns också på internet:
www.syke.fi/publikationer (PDF)

STANDARDNUMMER ISBN 978-952-11-4261-1 (hft.)
ISBN 978-952-11-4262-8 (PDF)
ISSN 2323-8895 (print)
ISSN 2323-8909 (online)

SAMMANDRAG

Den här publikationen är en kompakt översikt över miljöns tillstånd i Finland 2013. Den består av en mängd indikatorer, med hjälp av vilka var och en kan bedöma miljöns tillstånd, trender och effekten av miljöskyddsåtgärder. Indikatorerna representerar åtta olika teman: Naturresurser, Klimatförändring och energi, Samhällsstruktur, Luftföroreningar, Sötvatten och havet, Naturens mångfald, Kemikalier och skadliga ämnen samt Grön ekonomi.

Flera av indikatorerna visar, att miljöns tillstånd i Finland är på väg mot en positiv riktning. Till exempel utsläppen i luft och vatten har minskat betydligt under de senaste årtionden. Många mål som man ställt till förminskningar av miljöbelastningar har antingen redan nåtts eller det verkar fullt möjligt att nå dem vid de målsatta åren.

Den positiva bilden skyms av det faktum att de allvarligaste problemen – klimatförändringen och förlusten av biologisk mångfald – är fortfarande olösta. Med dem har man också de största svårigheterna att nå tillsätta miljömål. I flera år har man strävat efter att stoppa utarmningen av den finska naturen, men tillsvidare har man varit tvungen att alltid skjuta upp på den målsättningen. Angående klimatförändringen har man fastställt som ett globalt mål, att jordens medeltemperatur inte borde få stiga mer än två grader fram till år 2100. Den målsättningen verkar omöjlig att nå med nuvarande insatser.

Under de senaste åren har miljöns tillstånd påverkats av den ekonomiska krisen. Effekterna har varit både positiva och negativa. Å ena sidan har lågkonjunkturen minskat användningen av naturresurser och annan belastning av miljön. Å andra sidan har den bromsat på ett antal miljöpolitiska processer, såsom det internationella klimatskyddet.

EU:s medlemsstater är enligt miljödirektiven förpliktade att erbjuda sina medborgare information om miljöns tillstånd. Den här publikationen är en del av denna uppgörelse.

SYKE.FI/PUBLICATIONS

ISBN 978-952-11-4261-1 (pbk.)
ISBN 978-952-11-4262-8 (PDF)
ISSN 2323-8895 (print)
ISSN 2323-8909 (online)

The state of the environment is not a snapshot at any given point of time but rather a concept which aggregates the various changes, trends and interactions in the natural world. It is not always unambiguous: these developments may be interpreted in a variety of ways and whether the situation is construed as good or bad largely depends on the point of view and values of the interpreter.

The indicators selected for this report allow you to assess the state of the environment from your own perspective. The report covers not only emissions and waste volumes, but also a wide range of current topics from organic farming to mines and phosphogypsum stacks.

We have used three types of smiley faces in our assessment of the various indicator trends. A happy, sad or neutral expression indicates the long and short term direction of the indicators as well as performance against set targets.

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