The Core Indicators for Sustainable Development in Helsinki

AGENDA 21

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Forewords

The development of meters and indicators for sustainable development is part of the production of an action plan for sustainable development i.e. Local Agenda 21 in Helsinki. When the City Council on the 26th of March 1997 decided on the principles and main targets of the Local Agenda, they accepted the development of the means of measurement and evaluation as one of the five main targets. This publication, *The Core Indicators for Sustainable Development in Helsinki,* has been compiled on the basis of this decision. The publication is the first one of its kind, and it has been compiled on the basis of vast cooperation. A number of experts from The City of Helsinki Environment Centre, City of Helsinki Urban Facts and City Planning Department have participated in the different phases of the work. In addition, several experts from other offices and institutions of the city, Helsinki Metropolitan Area Council and The Association of Finnish Local and Regional Authorities have been heard. Researches and contact persons of Local Agenda 21 have been consulted. National and international projects on the indicators for sustainable development have also been closely followed in the process.

In January 2000 a draft of this publication was sent out for comments from the offices and institutions of the city as well as other expert organizations and researches. There were plenty of responses, and we have tried to take into consideration as many as possible of their numerous suggestions for improvements. As this publication is the first collection of the indicators for sustainable development, it must be regarded as a beginning of a long-term development work. We hope that the discussion will continue, and the feedback will be taken into account in the next phase of the development process.

With these indicators for sustainable development, we have tried to cover different dimensions of sustainability. These include ecological, economic, social and cultural sustainability. The work is to a great extent based on the basic statistics of the city and on general urban indicators. As a principle, this secures the availability of data and enables chronological follow-up of developments without a separate collection of data. It also facilitates the compliance with the standard statistics.

The contents of the publication are divided into five main themes as follows: 1) Global Sustainability, 2) Local State and Pressure on The Environment, 3) Socio-Economic Factors, 4) Services and Pleasantness of the Neighbourhood, and 5) Participation and Civic Responsibility. The indicators in the A-group measure the sustainability of the city and its different functions as an entity and on a general level.

A working group has been in charge of the planning and writing of this publication. Kari Silfverberg from the City of Helsinki Environment Centre was the chair, Vesa Ilves from the City of Helsinki Urban Facts as a secretary was later followed by Auli Stark from the City of Helsinki Environment Centre. The members of the working group and the experts who have contributed to the writing are presented on the first pages of this publication. The experts who have helped us to find and interpret our data are presented in relation to each theme. Kari Silfverberg and Auli Starck from the City of Helsinki Environment Centre, and Asta Manninen and Ritva Jämsen from the City of Helsinki Urban Facts have edited the publication.

We wish to express our warm gratitude to all the people who have contributed to the development of the indicators for the sustainable development of Helsinki, and who have thus made possible the creation of this first publication.

August 2000, Helsinki.

Pekka Kansanen
Director General
City of Helsinki Environment Centre

Eero Holstila
Director General
City of Helsinki Urban Facts

Introduction

1. Sustainable development as an objective of good governance

In the 1990's the promotion of sustainable development was set as a target that should permeate all levels of public administration both on the state and local levels. Sustainable development is mentioned as the guiding line of the authorities in the Waste Act (1992), Local Governance Act (1995), Youth Work Act (1995), Sports Act (1998), Land Use and Building Act (1999) and Environmental Protection Act (2000). In addition, the new constitution introduced in 2000 and many of the laws introduced in the 1990's imply that the intention and target of the legislator is to promote environmental protection; to protect nature and its biodiversity of nature; to secure the health, living conditions and well-being of the citizens; and to maintain the communal structures, buildings, landscape, townscape, and cultural inheritance.

Public administration has produced programmes and platforms for sustainable development in 1995 (*Finnish action for sustainable development* by Finnish National Commission on Sustainable Development) and in 1998 (*Finnish Government Programme for Sustainable Development. Council of State Decision-in-Principle on the Promotion of Ecological Sustainability*). *Signs of Sustainability. Finlands' indicators for sustainable development 2000* was published in 2000.

Local governments have been working on action plans for sustainable development i.e. Local Agenda 21 programme for several years already. An important catalyst for the work was The European Sustainable Cities and Towns Conference organized in Aalborg, Denmark in 1994. As a result the Aalborg Charter i.e. the Charter on sustainable development of European Cities was accepted. The City Board of Helsinki signed the Charter in February 1995, and thus joined Helsinki in the on-going European Sustainable Cities and Towns Campaign.

2. Local Agenda 21 in Helsinki

The development of meters and indicators for sustainable development is part of the production of an action plan for sustainable development i.e. Local Agenda 21 (LA 21) programme in Helsinki. The basis, the principles and primary aims for the Agenda were defined in a decision taken by the City Council in March 1997.

The development of the means of measurement and evaluation of sustainable development was accepted as one of the five main targets. The four other targets are to

- Reduce of the emissions of greenhouse gases
- Conserve and foster biodiversity
- Increase interaction with and participation by the citizens
- Suburban renewal according to the principles of sustainable development

In Helsinki, the Local Agenda is carried out as an overall strategy that touches upon all the administration, and it is steered by a Local Agenda 21 management board which is chaired by the Lord Major of Helsinki. Early in 1998 a small coordinating unit, a Local Agenda 21 project was established within the Environment Centre. A network of contact persons in different offices and institutions supports this project.

The public participation and interaction began at the Finlandia House in April 1998 with a public forum, where 17 thematic working groups on sustainability were founded. These groups were open to the residents of Helsinki, and their task was to discuss topics related to sustainability and to out-

line the prospects of Helsinki in the 21st century.

The suggestions and ideas of these working groups were discussed and commented in the second public LA 21 forum in September 1998, and the results were published in the so-called thematic working group report.

The suggestions were next discussed in the thematic workshops in administration during the following spring. The third public forum on the Local Agenda 21 where offices and institutions expressed their comments and views on the suggestions of the thematic working groups took place in June 1999.

An action plan for sustainable development will be drafted on the basis of the material produced during this long interactive process and the plans and programmes of different administrative units. After the draft has been circulated for comments, the action plan will be discussed by the City Council early in 2002. The programme will function as a guideline for all the programmes and plans of the different departments and units of the city administration.

In addition to the LA 21 work covering the administration, there are projects and campaigns for sustainable development organized by the residents in different neighbourhoods. The City supports these projects providing expert and financial help. These projects also provide platforms for discussions on local indicators for sustainability and the criteria for sustainable development.

3. Definition of sustainability and the need for indicators

Since the 1980's there has been a wide international debate on the definition of sustainable development. In different contexts the definitions have had quite different emphasis.

On the global level the best-known definition seems to be the one developed by The World Commission on Environment and Development. In their report *Our Common Future*, this so called Brundtland Commission defines sustainable development as "*…development that meets the needs of the present without compromising the ability of the future generations to meet their own needs.*" As the understanding of needs is very different in the affluent and poor regions of the world, it is quite difficult to base any concrete targets on this definition.

The Finnish National Commission on Sustainable Development has defined the term as follows: *sustainable development is a continuous, guided process of societal change that takes place at global, national, regional and local levels and aims at securing opportunities to good life for the present and future generations.* The definition includes the four functional dimensions of ecological, economic, social and cultural sustainability.

The cooperation body of British local authorities, The Local Governmental Management Board (LGMB) has defined the general criteria for local sustainability. According to their definition, a sustainable community lives in harmony with its local environment without causing damage to other environments or communities in the present or the future. Quality of life and the needs of future generations are valued higher than material consumption and economic growth.

This concise definition includes the aims of ecological sustainability at the local and the global level. It also comprises the targets of local and general social justice, and quality of life.

Clear and measurable criteria for sustainability are needed for the evaluation of concrete projects and planning. In recent years, these have been studied for example in the field of environmental economics. The methods and tools of sustainability analysis have also been developed for the assessment of international development cooperation projects.

The sustainability of the actions of municipal organizations cannot be reliably measured without viable and valid indicators. The indicators need to rely on clear criteria and defined targets for sustainability. In local governance they support the planning, follow-up and decision making, and they should provide an answer to the following question: **Does the project, action or action plan at hand contribute to the targets of sustainability or not?** The indicators need to be applicable to the assessment of sustainability of the whole community and the actions taken in the community. Also, they are needed in the evaluation of specific functions, action plans, plans and projects.

In addition to the organizations of local government and political decision making, the indicators should serve NGOs, different interest groups and individual residents in independent evaluations and follow-ups. The characteristics required of the indicators thus vary depending on how and by whom they are used. The most important user groups of the indicators for sustainability are

- the central administration of the city and political decision makers (members of the City Council and City Board)
- offices and institutions, and members of municipal boards and committees

- NGOs, different interest groups, residential communities and individual residents
- Research and educational organizations

4. The measurement of local sustainability and problems related to it

The principle of sustainable development is fundamentally **global** and the requirement of **ecological sustainability** is its strongest element. The contemporary natural science and historical research and empirical experience have shown that the ability of global eco-systems, atmosphere and the seas to bear the total load produced by human communities is limited. The total load refers to the use of natural resources and the emissions of environmentally hazardous substances. Hereby, on the long run, all human communities' existence is based on their ability to adjust to the limits of global sustainability. Naturally, this requirement concerns both the affluent countries with a high rate of consumption and the poor countries with a low rate of consumption.

Even though the general principle of ecological sustainability is clear and easily understood, a number of problems is faced in defining the exact limits for sustainable consumption and emissions, and the responsibilities and duties between different nations and communities. These questions are currently debated as the UN Convention on Climate Change accepted at the Rio Earth Summit has been developed further (Kioto Convention 1997 and Protocol.) The size of the problem is revealed by the fact that the average emission of carbon dioxide per capita in Finland (approximately 14 tons per capita per year) is about eight times higher than the limit of global sustainability, which according to the current estimates is 1,7 tons per capita per year.

When developing the **indicators for the state of the local environment** from the viewpoint of sustainability, we need to take into consideration the means and measures whereby the improvements have been attained. This applies especially to situations where the hazardous emissions and loads are transferred outside the researched area for example by tall pipes or sewer system. The idea of sustainability entails the reduction of the actual emissions, it is not enough to transfer of environmental problems geographically or temporally (cf. the criteria for sustainability by LGBM). In order to obtain a sufficiently reliable perspective on sustainability, the indicators for state of the environment need to be complemented by indicators that adequately describe environmental load and stress.

Justice, equality and the fulfillment of basic needs are generally emphasized when the **social and economic dimensions** of sustainability are examined. They are related to ecological sustainability, as it is known from experience that when human communities suffer from extreme poverty and/or social injustice they lack the interest and chances to take into consideration the requirements for ecological sustainability.

Pleasantness and services of the neighbourhood are primarily dimensions of social sustainability, but they are also directly linked to ecological sustainability. For example an unpleasant environment encourages many kinds of disturbing behaviour, which in its turn causes further expenditures and unnecessary waste of energy and materials. Furthermore, an uninspiring and noisy living environment often increases people's need to travel and look for new ideas and/or peace of the countryside elsewhere in their spare-time.

Participation and civic responsibility of the residents is also closely related to both social and ecological sustainability as well as to the pleasantness of the living environment. Awareness of one's own patterns of consumption and changing them towards ecological sustainability, as well as participation in the planning and maintenance of one's own neighbourhood are ways in which the inhabitants can contribute to ecological sustainability in their everyday-life.

5. Properties and qualitative criteria for the meters of sustainability

The main criterion for the meters and indicators for sustainable development is their ability to measure phenomena that are essential to sustainability. They also have to cover the different dimensions of sustainable development. These are ecological, economic, social and cultural sustainability.

The development of the indicators has to be based on a clear and logical analysis of cause and effect. To start with, there has to be an agreement on the general definition of local sustainable development as the desired state or development scheme. There also needs to be a clear understanding of the major hindrances of the targets of sustainability in the background.

The next step is to analyze the causes and effects of different phenomena and processes, and to outline the main themes and topics. The main themes are often outlined on the basis of the definition of

the targets and desired states of the actions aiming at sustainable development.

It is important that the criteria for choosing the indicators is sufficiently agreed upon by the different groups and organizations that use them. Thereby the definition of the indicators is an interactive and slow process, as this requires a great deal of discussion, contemplation and comparisons of viewpoints.

Qualitative criteria for the indicators
- validity and relevance
- comprehensibility and acceptability
- reliability
- illustrativeness, clarity and usefulness
- availability of data
- periodical availability and comparability

6. The compilations of indicators on different levels

The compilations of indicators for sustainable development in Helsinki are divided into two main categories:

Group A:
Macro-level policy-oriented core-indicators
These indicators are used in the evaluation of the sustainability and its different functions of the city as an entity and on a general level. In this report, it is left for the readers to interpret and decide whether the development indicated by the sustainable development meter has been towards sustainability or not (the position of the arrow).

Group B:
Indicators related to specific activities
These indicators are more specifically designed to evaluate the sustainability of different functions of the city, especially the functions of departments and units.

The development work has first focussed on the macro-level indicators in the group A. This work has been carried out between 1996 and 2000, and it was first coordinated by the unit for environmental protection in the City of Helsinki Environment Centre and later by the Local Agenda 21 project. Several experts from the Environment Centre, City of Helsinki Urban Facts and the City Planning Department have participated in the project. Also, experts, researchers, and contact persons of Local Agenda 21 in other offices and institutions of the city, Helsinki Metropolitan Area Council, and The Association of Finnish Local and Regional Authorities have been consulted in the course of the process.

The macro-level indicators in the group A are used as models and examples in developing the indicators in the group B. This work is primarily carried out individually by the offices and institutions themselves. The goal is that each one of them should have their own indicators for sustainability in the group B. This work is also related to the elaboration of environmental programmes and sustainable development of specific lines of activities as well as to the development of environmental accountancy.

7. Connections of the indicator work

The indicator work in Helsinki has had connections to the following international development processes on indicators for sustainable development:
A project for the development of common set of indicators for local sustainability by Eurocities association and The European Environment Agency (EEA)
The large-scale indicator project Cities 21 of The International Council for Local Environmental Initiatives (ICLEI)
Indicator work of the City of Stockholm
Local Indicators to Monitor Urban Sustainability Project (LITMUS) of the London Borough of Southwark

Also the indicator collections of a number of other towns such as Birmingham, Gothenburg, Leicester, Seattle, Sundsvall and Södertälje have been useful in the process. We have also benefitted from research reports published by the Ministry of the Environment, The Finnish Environment Institute, The Association of Finnish Local and Regional Authorities, Eurostat, The UN Commission on Sustainable Development, The Habitat Centre of The United Nations, World Research Institute (WRI), and The Local Government Management Board in Britain.

The doctoral thesis by Maija Hakanen on the assessment, criteria and measurement of ecologically sustainable development of communities has also been an important source.

In developing the Ecological Footprint indicator Helsinki has cooperated with six other Finnish municipalities and The Association of Finnish Local and Regional Authorities.

Towards the end of the process we have benefited the report and its different drafts on Finland's Indicators for Sustainable Development

In defining the socio-economic factors of sustainable development and the themes of services and participation, we have been to a large extent able to resort to the general urban indicators and established basic statistics of the city. Since this basic data are collected regularly, they also enable chronological follow-up, which is an important characteristic for the indicators. As the compilation of data is based on the established standards based on national and international classification of statistics, it is also comparable with the statistics of other towns and the whole country.

A new statistical service for monitoring and evaluating urban development, Finland's city and urban area indicators, was completed in 2000. The urban indicator project was launched in the spring 1997 by the cooperative body for Urban Policies appointed by the national government. The first pilot publication was published the next year, and in the summer 1999 a proper proposal for the indicators for cities and urban areas was completed. They present information not only of the city itself, but also of a vaster area, i.e. the functional urban area. They also provide comparable data of the whole country. The next step in the project was to secure the regular collection of data for and flexible distribution of the indicators. Here, cooperation with the Statistics Finland produced an internet-based statistical service in July 2000. This service is at http://statfin2.stat.fi/statweb. Information for obtaining this service in the city of Helsinki is provided by the City of Helsinki Urban Facts, phone (09) 169 3180.

This service provides comparable statistics and indicators in the form of around 70 tables covering 13 different phenomena in Finland by municipality, urban areas or regions, by province, and in periods. The following phenomena are covered:

- population, households, families
- housing, housing conditions
- regional economy, commerce and industries
- labour market, employment rate
- income, subsistence/livelihood
- education
- culture, spare time
- social services, health care
- security
- municipal economy
- building
- traffic
- environment

In developing the Finnish indicators for cities and urban areas, the project group explored and tried to learn from international examples. The following list resulted from this work and it has also been used in the indicator project on the sustainable development program of the city.

Developers, producers and providers of internationally comparable urban statistics:
International Statistical Institute, especially its committee on urban statistics
SCORUS, Standing Committee on Regional and Urban Statistics
UNCHS, HABITAT: City Data Programme and Global Urban Observatory
LCSP Project: Large Cities Statistics Project. A cooperative project of five international organizations
N.U.R.E.C. Network on Urban Research in the European Union
NORDSTAT a network of 16 Nordic towns
EUROSTAT
EU/DGRRegio: Urban Audit Project
EUROCITIES
KOSIS A network of German towns
OECD, Urban Affairs Division
IULA, International Union of Local Authorities
WORLD BANK
National statistical offices
Yearbooks, periodicals, databases etc. of individual towns

Inquiries or other such special actions, especially surveys and projects that aimed at obtaining comparable information on towns.

For further information, please contact:

Kari Silfverberg
Coordinator of the Local Agenda 21 Project
City of Helsinki Environment Centre
Phone: (09) 7312 2678, Fax: (09) 7312 2798
E-mail: kari.silfverberg@hel.fi
Asta Manninen
Information manager
City of Helsinki Urban Facts
Phone: (09) 169 3190, Fax: (09) 169 3200
E-mail: asta.manninen@hel.fi

The home pages of the Local Agenda 21 Project:
http://www.hel.fi/ymk/agenda21.htm

Table A. The Core Indicators for Sustainable Development in Helsinki

1. Global Sustainability

1.1 The ecological footprint

1.2 Emissions of greenhouse gases
Total emissions of carbon dioxide
Carbon dioxide emissions per capita

2. The State of the Local Environment and Environmental Pressures

2.1 Air quality
Days of below average or poor air quality
Concentrations of inhalable particles and nitrogen dioxide

2.2 The effects of airborne pollution on nature
Sulphur concentrations of Scots Pine needles
Lead concentrations of mosses
Scots Pine surface lichens
Average needle losses of conifers

2.3 Eutrofying marine discharges
BHK_7-loads into the sea
Phosphorous discharges into the sea
Nitrogen discharges into the sea
Water *a*-chlorophyll levels
Sea water quality

2.4 Water consumption
Total water consumption
Specific water consumption

2.5 Energy consumption
Total energy consumption
Energy consumption per citizen
Electricity use
Specific heat consumption

2.6 Waste production and reuse
Amounts of waste deposited at refuse tips
Amounts of waste disposed at refuse tips
Domestic waste per capita
Sorted organic waste

2.7 Traffic
Traffic levels
Use of different transport methods
The number of cyclists
The density of private automobiles

2.8 Land use distribution
Population density
Green areas per inhabitant
Transport infrastructure's share of the land area
Land use distribution

2.9 Biodiversity
Plant species associated with herb-rich and spruce forests
Bird species
The surface area of protected areas and habitat types

2.10 A more chemical environment
Mercury levels in Baltic Herring
PCB levels in Baltic Herring
Concentrations of harmful substances

3. Socio-Economic Factors

3.1 Demography
Population changes
Population by age groups
Households
Share of single parent families
Economic dependency ratio

3.2 Level of education
Level of education of the 25–64-year-old population
Level of education of women and men
Gender differences in the level of education
Level of education by district

3.3 Economic activity
Jobs by industry
Job self-sufficiency rate
Income per income earner
Women's income relative to men's income
Employees in the information branches and other sectors

3.4 Threats to the welfare of children and the youth
Unemployment rate
Number of the unemployed
Number of the unemployed and vacancies
Recipients of living allowance
Offences involving narcotics

3.5 Health
Life expectancy
Mortality and the most common causes of death

3.6 Housing conditions
Living space in m^2
Share of households with cramped living conditions
Housing stock by tenure status
Applicants and recipients of municipal housing
Prices and rents
Households receiving housing allowance
Share of housing allowance of the total housing costs of the recipients
Number of single homeless people

4. Pleasantness and Service Level of the Neighbourhood

4.1 Neighbourhood comfort and safety
Share of people living in noisy areas
Traffic accidents among cyclists and pedestrians
Crime against life and health per 1,000 residents
Crimes against property per 1,000 residents

4.2 The municipal economy and services
Helsinki tax revenues
The status of municipal services
The share of children in municipal or private day-care
Visits to and loans from libraries
Joint index of basic services
Opinions on the management of municipal services

5. Participation and Responsibility

5.1 Attitudes towards environment

Opinions on environmental protection
Levels of glass waste sorting
Certificates of standardized environmental management systems in enterprises

5.2 Self-sufficiency

Area of allotments, allotment gardens and cultivated land owned by the city of Helsinki
Number of enterprises providing repair and maintenance services

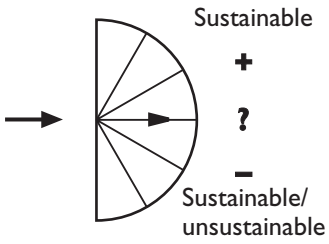
5.3 Participation

Voter turnout in municipal elections

I.
Global Sustainability

Theme 1.1 The ecological footprint

This meter describes the sustainable development of Helsinki measured by the theme indicator. In what position would you place the arrow? Has the development been towards sustainability or not?



Describes the total consumption of the residents of Helsinki

The theme and its key concepts

The concept of ecological footprint is used to measure and evaluate the impacts that the consumption of a certain community has on nature and natural resources. It also indicates the relationship between this consumption and ecologically sustainable development. The standard of measurement is the area of ecologically productive land. The method is based on the assumption that all use of energy and matter, as well as emissions and waste require a certain area of land.

The ecological footprint indicates the size of an ecologically productive area (i.e. arable land, pasture, forest, built-up land and energy) that people living in a certain area, for example in Helsinki, with today's technology require in order to:

a) produce the resources consumed by the community
b) recycle the emissions and waste produced by the community back to nature

Thus the area of land required by the consumption (the ecological footprint) can be compared to the ecological capacity (the biologically productive area of land).

Why the theme was chosen

The ecological footprint indicates our material dependence on nature, and helps us to understand the ecological limits of our society. It also demonstrates the dependence of different areas on each other on the global, national and local levels. By indicating the area of ecologically productive land required for example by the residents of Helsinki, it also brings forth issues such as global justice and our responsibility for future generations.

In regards to sustainable development, the ecological footprint reveals essential information about land area required for food production, and about land use in general.

What the theme describes and measures

The ecological footprint indicates the average area of ecologically productive land required by one resident, and by all the residents in Helsinki in 1995. It also demonstrates the actual ecological capacity of the city.

The categories of ecologically productive land are arable land, pasture, forest, built-up land, and land required for energy consumption. The last term refers to the land area needed for the binding of carbon produced by the use of fossil fuels, the forest area needed for the production of wood energy, and the land area needed for hydropower and nuclear power production.

Food production, housing, traffic, and the consumption of consumer goods and services are surveyed as the human activities requiring these categories of land-use. The ecological capacity includes the categories of arable land, pasture, forests and built-up land.

Calculation principles

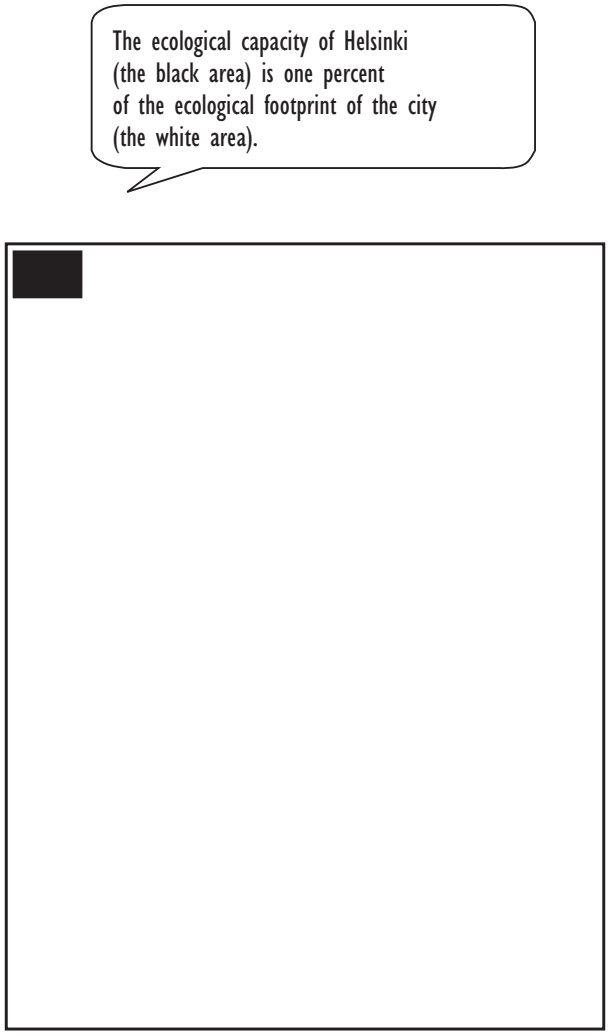
The figures indicating the use of energy related to some aspects of the ecological footprint (the consumption of arable land, pasture and forests, consumer goods and the production of food) represent the national average. The differences between municipalities were assumed so small that it was not regarded necessary to obtain information about individual municipalities. National averages are based

Table 1.1.1 Ecological Footprint and Ecological Capacity per capita in Helsinki in 1995 (ha).

Ecological Footprint Category of land-use	Human Activities/Types of Consumption Food	Housing	Traffic	Consumer goods	Services	Total (ha)	Ecological Capacity	
Energy	0.323	0.848	0.329	0.430	0.564	2.494		
Arable land	0.310			0.010		0.320	Arable land	0.002
Pasture	0.110			0.040		0.150	Pasture	0.000
Forest				0.470		0.470	Forest	0.011
Built-up land		0.008	0.006	0.002	0.006	0.022	Built-up land	0.022
Total (ha)	0.743	0.856	0.335	0.952	0.570	3.456	Total (ha)	0.035

3.456 ha	The ecological footprint per capita in Helsinki
0.035 ha	The ecological capacity per capita in Helsinki/Land area of Helsinki per capita
1,782,484 ha	The ecological footprint of Helsinki (515,765 residents)
18,520 ha	The ecological capacity of Helsinki / Land area of Helsinki
1	The proportion of ecological capacity of Helsinki of the footprint of Helsinki (%)
2.12	The ecological footprint per capita in Helsinki compared to the global ecological capacity (1.62 ha)
–1.84 ha	The global shortage per capita in Helsinki (3.456 ha–1.62 ha)

Figure 1.1.1 Ecological Footprint and Ecologically Productive Land Area of Helsinki.



on a survey conducted by the Association of Finnish Local and Regional Authorities. Their research aimed at the further development of the calculation method created by Wackernagel et.al (1997).

The figures indicating the built-up land area and the energy consumption required by housing, traffic and services, as well as those indicating the built-up area required for the production of consumer goods, and the ecological capacity of Helsinki, are based on the actual figures of Helsinki. However, the traffic and travels outside of Helsinki have not been taken into consideration. In other words, only the local consumption of residents is counted in the ecological footprint, i.e. export has been excluded and import included.

The ecological footprints of one resident of Helsinki and the whole of Helsinki are based on the national figures of yielding and production, i.e. the yields of food plants, productivity of animal products, growth of forests, carbon binding of forests etc. Thus the figures presented here cannot be compared with the figures presented by Wackernagel *et. al.* (1997). Their method would give 2.2 times higher figures for Finland.

Interpretation

The ecological footprint of one resident of Helsinki was 3.456 hectares in 1995. In other words, each resident of Helsinki requires 3.5 ha of ecologically productive land. The ecological footprint thus corresponds to a square with a side of 186 meters.

The shares of the different activities in the total ecological footprint are as follows: food production 21 %, housing 25 %, traffic 10 %, consumer goods 28% and services 16 %. The shares of the different classes of land use in the ecological footprint are: energy 72 %, arable land and pasture 13 %, forest 14 % and built-up land 1 %.

On global level, the average area of ecologically productive land is only 1.62 ha per capita. Thus each resident of Helsinki uses more than twice as much of the global ecological capacity than an average person on the Earth. The greatest potential for reducing the size of the ecological footprint of Helsinki lies in energy consumption. The actual energy consumption per capita in Helsinki is even higher than the figures here indicate, for the travels outside of Helsinki, i.e. those to the other parts of the country and abroad, have not been taken into consideration in the ecological footprint. The built-up land area (220 m^2 per capita) is very small in Helsinki.

The ecological footprint of Helsinki is 1,782,484 hectares. This corresponds to a square each side of which is 133.5 kilometers in length. This is about 100 times bigger than the total land area and ecological capacity of Helsinki, which indicates the dependence of Helsinki on the ecological capacity and production of other areas.

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Consults to the theme

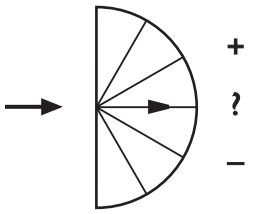
Maija Hakanen, Association of Finnish Local and Regional Authorities
Phone: (09) 771 2106
E-mail: maija.hakanen@kuntaliitto.fi

Kari Silfverberg, City of Helsinki Environment Centre
Phone: (09) 7312 2678,
E-mail: kari.silfverberg@hel.fi

Leila Lankinen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3185
E-mail: leila.lankinen@hel.fi

Theme 1.2 Emissions of greenhouse gases

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the greenhouse gas emissions related to human activities

The Theme and its key concepts

Emissions of greenhouse gases contribute to climate changes that result in the rise of the average temperature of the Earth. The rapid increase in the average temperature can cause significant changes in the environment such as the rise of the sea level, and changes in the flora and weather conditions.

The most important greenhouse gases are carbon dioxide (CO_2), water vapour, methane (CH_4), nitrous oxide (N_2O) and halogenized hydrocarbons.

The most significant antrophogenic sources of greenhouse gas emissions are traffic, industry and energy production based on the combustion of fossil fuels. They create especially carbon dioxide. The most important sources of methane are landfills and sewage treatment plants; the main sources of nitrous oxide are energy production and traffic. Respectively, nitrous oxide and methane contribute to the greenhouse effect at 310 and 21 times higher rate than carbon dioxide.

Why the theme was chosen

One of the most important global challenges for sustainable development is how to control climate changes. The reduction of greenhouse gas emissions is also one of the most important aims in the Local Agenda 21 in Helsinki.

According to the Kyoto protocol, greenhouse gas emissions should be reduced by an average of 8 % from the figures of 1990 by the years 2008–2012 in the EU countries. According to a decision by the EU, Finland should reduce the emissions of greenhouse gases back to the levels of 1990 by the years 2008–2012. In 1998, the total increase from the levels of the year 1990 was 2 %. The emissions of carbon dioxide had increased by 6–7 %.

What the theme describes and measures

The theme indicates the levels of carbon dioxide emissions generated by energy production and traffic in Helsinki. The theme is closely related to the themes 2.5 Energy Consumption, 2.6 Amount and Utilization of Waste, and 2.7 Traffic.

Calculation principles

This indicator refers to the total amount of carbon dioxide emissions and to the carbon dioxide emissions per capita. Only the carbon dioxide emissions resulting from human activities have been taken into account. The proportion of other greenhouse gases is small (about 5 %) in Helsinki. The influence of carbon sinks has not been taken into account.

The main sources of carbon dioxide are the production of electricity, district heating, heating of individual houses, and traffic (includes road traffic, and boat traffic in ports).

Railway traffic, aircraft, and other outward traffic from Helsinki have not been included in the indicator. Also the methane and carbon dioxide emissions produced by the landfills have been excluded, for it is difficult to obtain information about these annually.

The figures indicating emissions produced by traffic are based on the total annual kilometers driven and specific fuel consumption. The figures indicating emissions produced by industries, other enterprises and heating of individual houses are based on the sales, and not the actual consumption, of domestic heating oil. The emissions of the industries using industrial fuel oil have not been taken into account. Their proportion (less than 1 %) of the overall emissions is very small.

The Finnish municipalities are currently standardizing the calculation principles for greenhouse gas emissions.

Interpretation

The total emissions of carbon dioxide included in this study have increased by over 4 % since 1990. At the same time, the emissions per capita have decreased by about 6 %.

Most emissions of carbon dioxide are generated in the production of electricity and district heating. The total emissions have most significantly decreased in the traffic sector.

The increase in the total emissions caused by electricity production is due to the growth in the size of the population and the number of buildings, as well as the revival of businesses during the second half of the 1990's.

The relative increase of carbon dioxide emissions caused by the individually heated houses is high, 33.7 %, and based on the sale figures of domestic heating oil (table 1.2.1.). However, the sales of the domestic heating oil were exceptionally high in 1999. According to the statistics of 1998, the emissions produced by the individually heated houses decreased by about 7% between 1990 and 1998.

The reduction of carbon dioxide emissions per capita is due to the following factors:

– Coal has been partly replaced by natural gas in energy production
– Energy production has become more efficient
– Individual heating of houses has been reduced, and replaced by district heating
– The quality of fuel has improved

As for the other greenhouse gases, especially the emissions of methane have decreased as organic waste is now recycled in the Helsinki area. Also,

Table 1.2.1 Total emissions of carbon dioxide by source in Helsinki in 1990 and 1999. (Kilotons of CO_2).

	1990 kt CO_2	1999 kt CO_2	Change %
Electricity	1.233	1.415	14.8
District heating	2.145	2.122	–1.1
Individually heated houses	190	254	33.7
Traffic	654	620	–5.2
– Road traffic	573	549	–4.2
– Port traffic	81	71	–12.3
Total	4.222	4.411	4.5

Table 1.2.2 Carbon dioxide emissions per capita by source in Helsinki in 1990 and 1999. (Tons of CO_2).

	1990 tCO_2	1999 tCO_2	Change %
Electricity	2.51	2.59	3.2
District heating	4.37	3.88	–11.2
Individually heated houses	0.39	0.46	17.9
Traffic	1.33	1.13	–15.0
– Road traffic	1.17	1.00	–14.5
– Port traffic	0.17	0.13	–23.5

Figure 1.2.1 Total carbon dioxide emissions by source in Helsinki in 1990–1999.

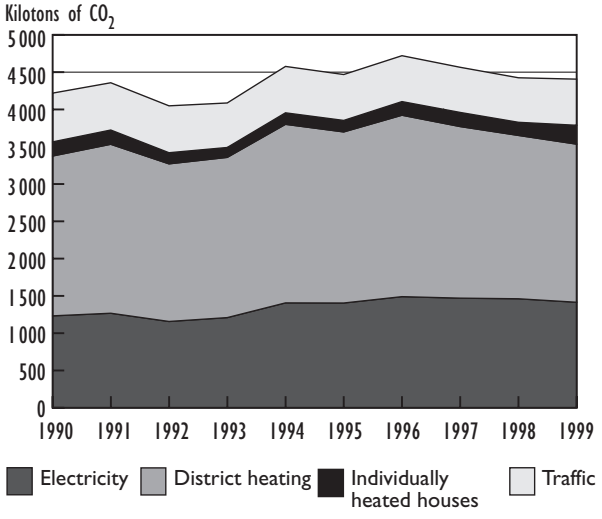
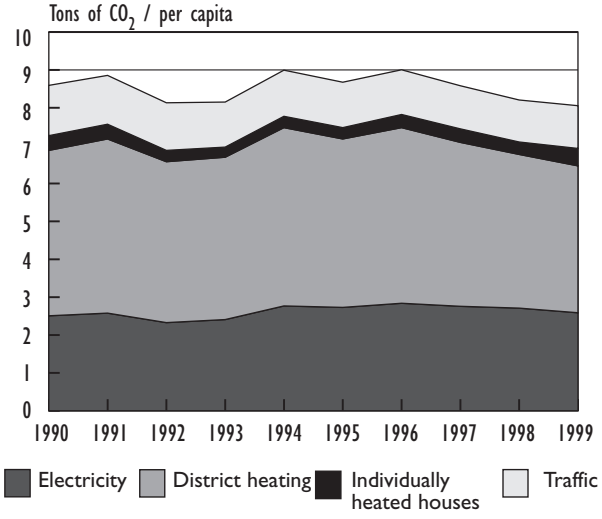


Figure 1.2.2 Carbon dioxide emissions per capita by source in Helsinki in 1990–1999.



methane is now combusted into carbon dioxide in the landfills (see chapter 2.6 The Amount and Utilization of Waste).

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VTT/Liikenteenlaskentajärjestelmä.

Päästötiedot: Helsingin Energia, Helsingin Satama, Helsingin kaupungin ympäristökeskus, Kaupunkisuunnitteluvirasto (liikennetiedot) ja YTV.

Consultants to the theme

Teemu Virtanen, Helsinki Metropolitan Area Council
Phone: (09) 156 1233
E-mail: teemu.virtanen@ytv.fi

Rauno Tolonen, Helsinki Energy
Phone: (09) 617 2830
E-mail: rauno.tolonen@helsinginenergia.fi

Helena Elsilä, City of Helsinki Environment Centre
Phone: (09) 7323 2755
E-mail: helena.elsila@hel.fi

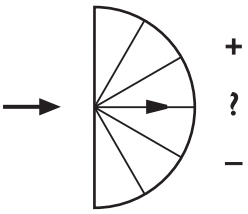
Olavi Lyly, City of Helsinki Environment Centre
Phone: (09) 7312 2757
E-mail: olavi.lyly@hel.fi

Kari Silfverberg, City of Helsinki Environment Centre
Phone: (09) 7312 2678
E-mail: kari.silfverberg@hel.fi

2.
The State of the Local Environment and Environmental Loads and Pressures

Theme 2.1
Air quality

In what position would you place the arrow in the sustainable development meter for this theme?



The indicator measures air quality and the effects of airborne pollutants in nature and on human health

The theme and its key concepts

The Helsinki Metropolitan Area Council (YTV) has developed an index that attempts to simplify daily reports on air quality. The index is a single number based on atmospheric measurements that describes the quality of air at a given time.

The index is calculated from measurements made in Töölö, which give air quality values for the centre of Helsinki. The measured values of sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3) and inhalable particles (PM 10) are each hour compared to the recommended maximums (1 h, 8 h and 24 h) for each component in the statutory norms. The highest value is then chosen as the air quality index. The highest index values are usually caused by nitrogen dioxide, but especially in spring sometimes also by inhalable particles.

Concentrations equivalent to the maximum recommended norm give an index value of 100. The norms are based chiefly on health factors.

If the index exceeds 100, air quality is classified as below average; if it exceeds 150, air quality is poor. Below average or poor air quality may cause health symptoms in sensitive individuals. Long-term effects show up as changes in vegetation and damage to materials. Recent trends in the Helsinki air quality index are available from the weather page of the newspaper daily Helsingin Sanomat, from national morning radio (YLE), from YTV's home pages, over the phone, and from a few electronic news screens in the Helsinki metropolitan area.

Why the theme was chosen

Helsinki's air quality is especially affected by winter traffic on windless days of sub-zero temperatures, which elevate concentrations of nitrogen dioxide

Figure 2.1.1 Days of below average or poor air quality in Helsinki city centre in 1994–1999 according to the YTV air quality index.

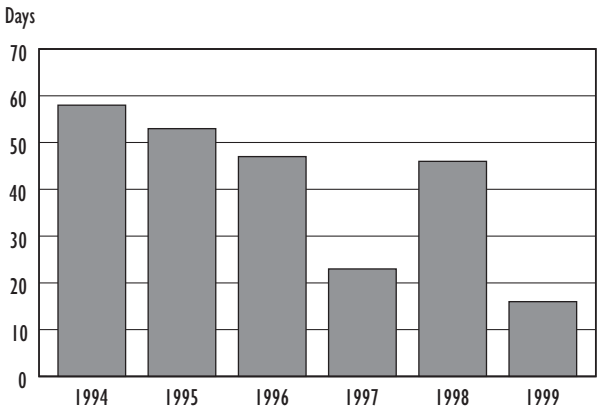
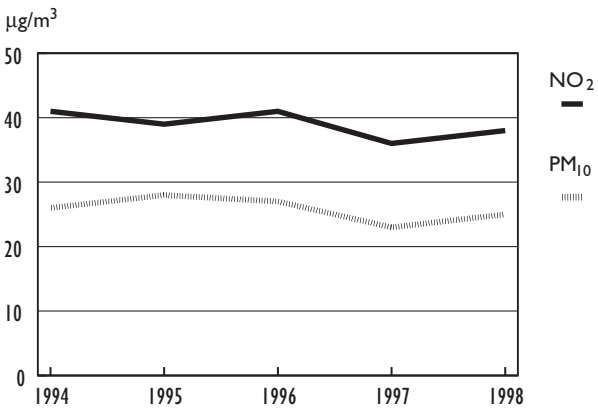


Figure 2.1.2 Average annual concentrations of inhalable particles (PM_{10}) and nitrogen dioxide (NO_2) in Töölö (Helsinki city centre) in 1994–1998.



and inhalable particles. Maximum recommended norms are sometimes also exceeded. Because air quality is dependent on such weather factors, annual averages have also been included.

What the theme describes and measures

The theme describes air quality and the health effects of airborne pollutants.

Calculation principles

The indicator is the number of days annually that the air quality index exceeds 100, i.e. the air is classified as either below average or poor in quality. Also calculated are the average annual concentrations of nitrogen dioxide and inhalable particles.

Interpretation

Air quality in the centre of Helsinki was mostly fair during 1995–1999. Days of below average or poor air quality were commonest during winter and spring. The winters 1997 and 1999 were milder than average, which explains the lower number of days of sub-standard air quality in those years. Annual average concentrations of nitrogen dioxide have diminished only slightly since 1994, while concentrations of inhalable particle have remained close to 1994 levels.

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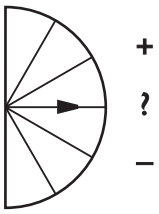
Consultants to the theme

Teemu Virtanen, YTV Ympäristötoimisto
Phone: (09) 15611
E-mail: teemu.virtanen@ytv.fi

Theme 2.2
The effects of airborne pollution on nature

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes airborne pollutants and their effects on nature

The theme and its key concepts

Airborne pollutants are the result of various human activities, in Helsinki mostly from traffic and energy production. The effects on vegetation of lead emissions from traffic, sulphur emissions from energy production, and various other pollutants are monitored using bioindicators such as lichens, mosses, and needles of conifers. Airborne pollutants cause changes in e.g. the chemical composition of mosses and conifer needles, weaken lichen and conifer needle health, and bring about changes in the species composition of lichens.

Why the theme was chosen

Bioindicator monitoring techniques are long established – measurements in the Helsinki Metropolitan area have been taken since 1980 from the same points around the city. Bioindicators will continue to be a part of air quality monitoring in the 21st century, with follow-up studies scheduled for repetition every three years.

Table 2.2.1 Sulphur concentration zones (% Helsinki surface area) estimated from sulphur concentrations in Scots Pine needles in 1990 and 1998.

Needle sulphur concentration µg/g	year 1990 %	year 1998 %
< 900	0	1
900–1,100	0	99
1,100–1,300	40	0
1,300–1,500	58	0
>1,500	2	0

Calculation principles

Field measurements help to estimate the range of the various concentrations of sulphur, lead, and the status of remaining lichens, which illustrate changes in these bioindicators. The results are presented as maps showing the surface areas of their different zones of concentration. Tree health is illustrated using a measure of the average needle losses of Scots Pine *Pinus sylvestris* and Norway Spruce *Picea abies.*

What the theme describes and measures

Bioindicators describe the temporal and spatial differences in air quality, and their trends.

Helsinki's chosen indicators:
– Sulphur concentrations of Scots Pine needles
– Lead concentrations of mosses
– Scots Pine surface lichens
– Average needle losses of conifers

Sulphur concentrations of Scots Pine needles
Sulphur concentrations of Scots Pine needles portray the airborne sulphur load

Interpretation

The reduction in Scots Pine needle sulphur concentrations indicates a reduction in the sulphur load around Helsinki. This is mainly due to the cut in sulphur emissions achieved by power plants.

Figure 2.2.1 Distribution of sulphur concentration zones as estimated from sulphur concentrations in Scots Pine needles in 1990 and 1998.

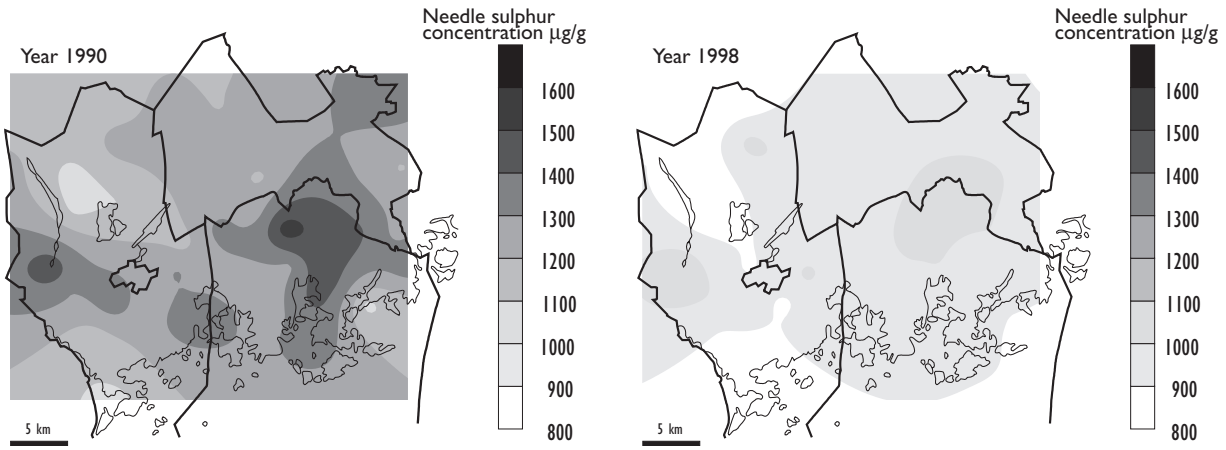


Figure 2.2.2 Distribution zones of moss lead concentrations (µg/g) around Helsinki in 1990 and 1998.

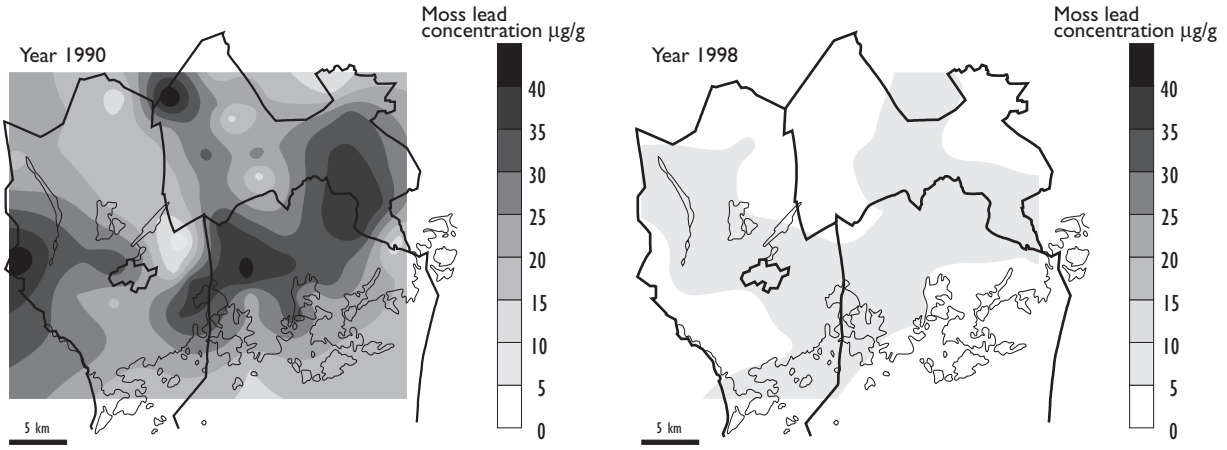


Figure 2.2.3 Distribution zones based on Scots Pine surface lichen species around Helsinki in 1990 and 1998.

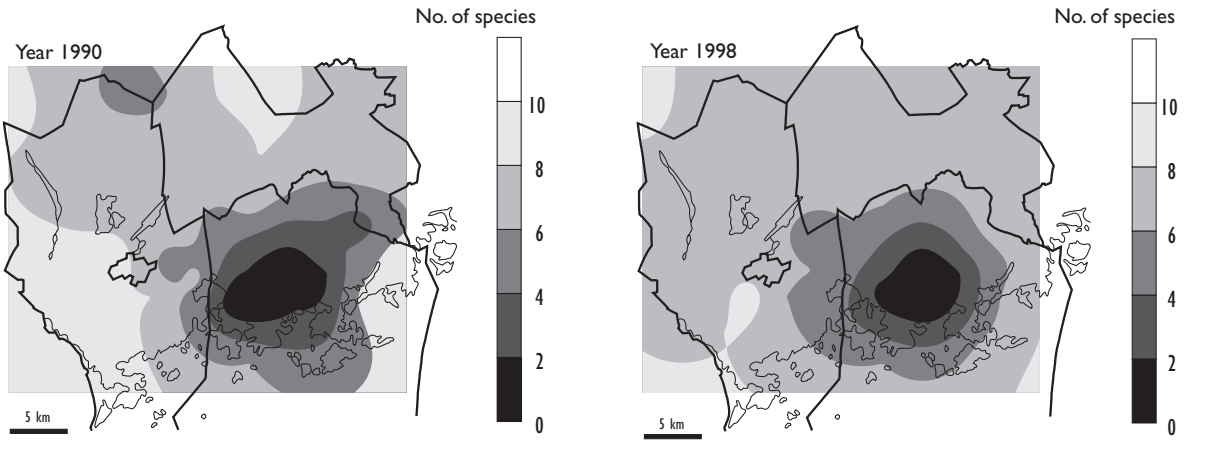


Table 2.2.2 Distribution of lead concentration zones (% Helsinki surface area) as estimated from moss lead concentrations in 1990 and 1998.

Moss lead concentrations mg/g	year 1990 %	year 1998 %
<5	0	38
5–15	0	62
15–25	31	0
25–35	48	0
>35	21	0

Lead concentrations of mosses

Moss lead concentrations indicate the presence of airborne lead precipitation

Interpretation

Moss lead concentrations around Helsinki have diminished with the phasing out of leaded gasoline in 1994.

Scots Pine surface lichens

The indicator illustrates the combined effects of several different pollutants. Most lichens suffer from airborne impurities, but a few species benefit from pollutant loads.

Table 2.2.3 Sulphur concentration zones (% Helsinki surface area) estimated from Scots Pine surface lichens in 1990 and 1998.

No. of lichen species/sample plot	year 1990	year 1998
<1	8	5
1–3	23	24
3–5	42	30
5–7	21	38
> 7	4	2

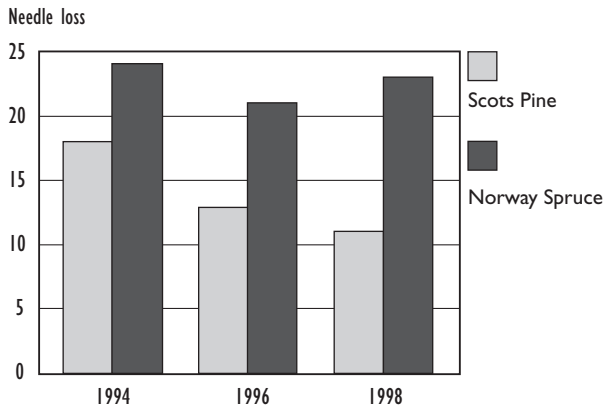
Interpretation

Airborne pollutants diminish the number of Scots Pine surface lichen species, and damage the remaining ones. Areas of high pollution have no Scots Pine surface lichens. The lichen species composition on pines around Helsinki has not changed significantly in the 1990s. Lichens are affected by many airborne pollutants in addition to sulphur, and these have not diminished much. Lichen recovery is also slowed by the damage to their growth surfaces sustained by decades of exposure to airborne impurities.

Average needle losses of conifers

Many urban factors affect conifer health: airborne impurities, forest fragmentation and wear, new settlements, and water table changes caused by construction works. Needle losses illustrate the cumulative effects of these factors.

Figure 2.2.4 Average needle losses around Helsinki in the 1990s of Scots Pines and Norway Spruces at bioindicator sample plots of the Helsinki metropolitan area air quality monitoring scheme.



Interpretation

Norway Spruces experience stronger and more frequent needle losses than do Scots Pines. Losses in Norway Spruces monitored around Helsinki have remained constant during the 1990s, but have diminished for Scots Pine. This may be due to the significant reduction in the region's sulphur load, but could also be natural needle density fluctuation. Both tree species experience slightly stronger needle losses on the coast than at other sample plots. Trees in the city's parks and forest islands are older than average, which may also explain higher needle losses. However, overall needle losses of the trees in the study were not significantly higher than the average for mature forests in southern Finland as a whole. The damage threshold is defined as 25 % needle loss.

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Consultants to the theme

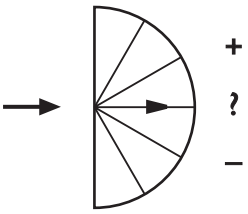
Päivi Aarnio, YTV
Phone: (09) 156 1222
E-mail: paivi.aarnio@ytv.fi

Ilkka Niskanen, Jyväskylän yliopisto,
Ympäristötutkimuskeskus
Phone: (014) 260 3877
E-mail: niskanen@ymtk.jyu.fi

Kaarina Heikkonen, Helsingin ympäristökeskus
Phone: (09) 7312 2671
E-mail: kaarina.heikkonen@hel.fi

Theme 2.3 Eutrophying marine discharges

In what position would you place the arrow in the sustainable development meter for this theme?



The indicator describes seawater quality and levels of eutrophying marine discharges

The theme and its key concepts

Waterway eutrophication is an increase of plant primary production and biomass in the aquatic ecosystem. To get broken down, this supplementary mass consumes extra oxygen in water layers near the sea bottom and in the sediment. Eutrophication is caused by increased nutrients, mostly nitrogen (N) and phosphorous (P), that find their way into waterways from catchment areas either from point sources (such as industrial plants and water purification plants) or scattered ones (e.g. agriculture and scattered settlements). The Biological Oxygen Consumption index (BHK_7) is a measure of the amount of oxygen-consuming organic matter present. Eutrophication can be assessed through e.g. monitoring levels of *a*-chlorophyll, which corresponds to the amount of algae in the water.

Why the theme was chosen

The sea is a key element of Helsinki, and a recreational facility of its citizens. The overall condition of the sea is therefore an important indicator of sustainable development. Around Helsinki, eutrophication and the corresponding rise in algae growth is the most significant cause of lowered seawater quality. Sources of eutrophying discharges around Helsinki are above all communal wastewaters, but the Gulf of Finland is also stressed by scattered discharges from the surrounding countryside which enter the sea through e.g. the River Vantaanjoki, and by effluent from St. Petersburg.

What the theme describes and measures

Using *a*-chlorophyll level measurements, the theme assesses the levels of eutrophying discharges from Helsinki water purification plants into the sea in the inner and outer Helsinki archipelago. Developments in seawater quality around Helsinki are illustrated using maps of water quality zones.

Calculation principles

The indicators = nitrogen, phosphorous and BHK_7 loads (in metric tons / year) from Helsinki water purification plants into the sea. The stress imposed by Helsinki citizens has been calculated by subtracting from the overall discharge figures those of the surrounding municipalities of Vantaa and Sipoo. *a*-chlorophyll levels were measured at Kruunuvuorenselkä and Katajaluoto at depths of 0–4 metres during the algal growth period in May–October. The water quality classes are based on the system issued by the Finnish Environment Institute. This classifies water by *a*-chlorophyll levels, total phosphorous, depth visibility, water cloudiness, oxygen saturation levels, and the levels of heat tolerant *E. coli* -type bacteria.

Interpretation

Eutrophying discharges have diminished since 1992 thanks to improved wastewater purification, especially those of oxygen-consuming organic substances and phosphorous. Nitrogen removal was initiated at Viikinmäki water purification plant at the beginning of 1998, after which the annual nitrogen load has been approximately halved.

Figure 2.3.1 BHK_7 loads into the sea from Helsinki city water purification plants in 1992–1999.

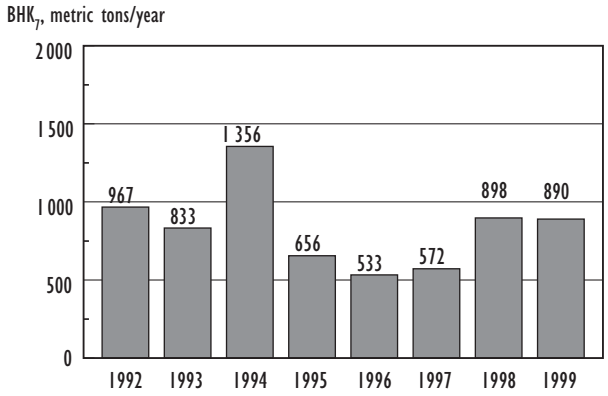


Figure 2.3.2 Phosphorous discharges into the sea from Helsinki city water purification plants in 1992–1999.

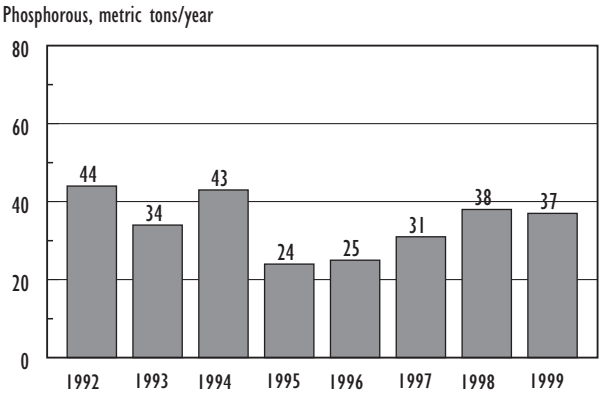


Figure 2.3.3 Nitrogen discharges into the sea from Helsinki city water purification plants in 1992–1999.

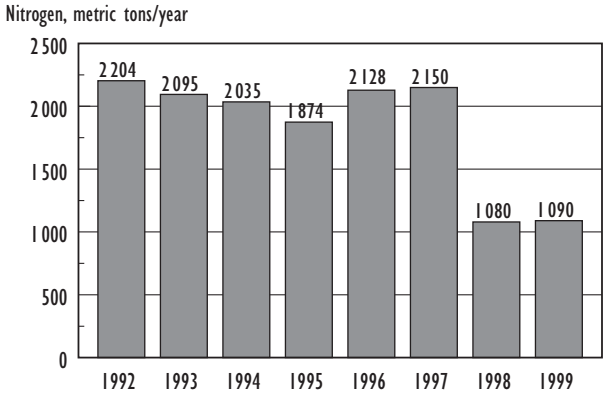


Figure 2.3.4 Water *a*-chlorophyll levels around Helsinki's inner archipelago (Kruunuvuorenselkä), at depths 0–4 metres, May-October 1980–1999.

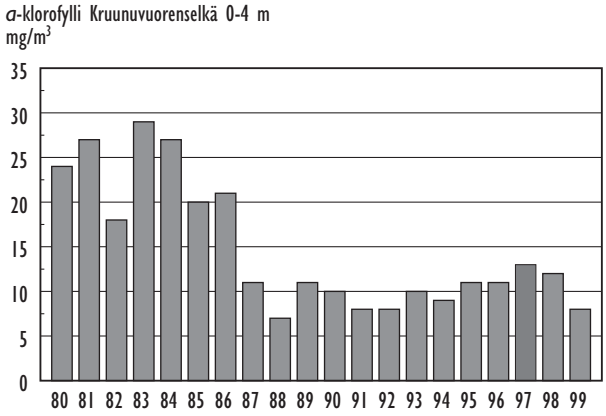
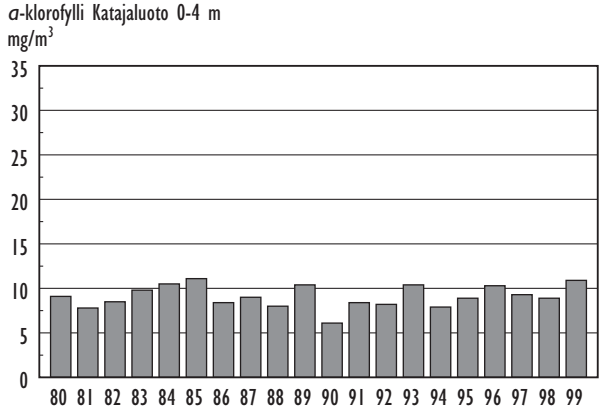


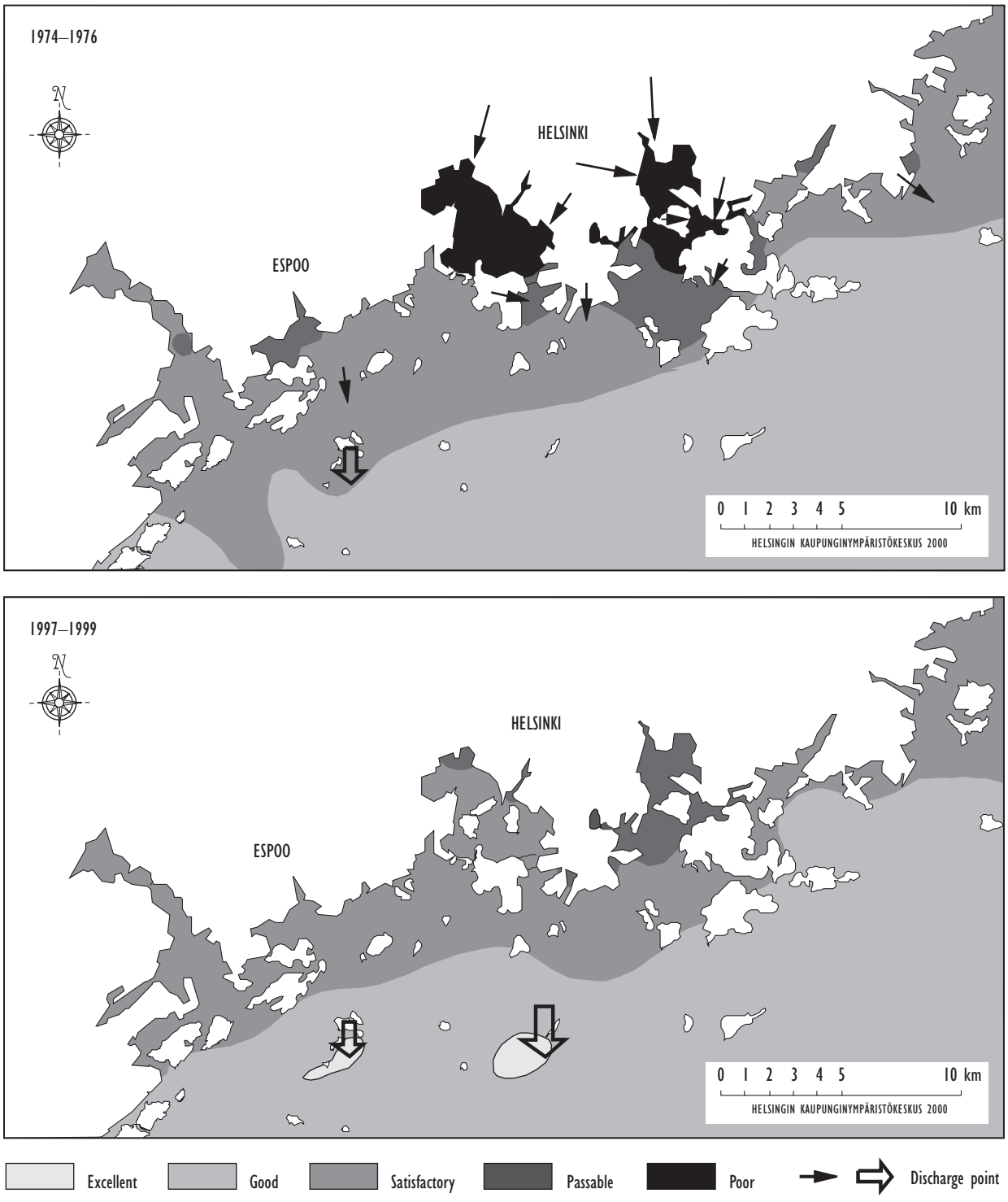
Figure 2.3.5 Water *a*-chlorophyll levels around Helsinki's outer archipelago (Katajaluoto) at depths.



However, nitrogen removal has lowered the purification plants' capacity for biological water treatment, which has meant that during rainier times and the spring thaw some runoff waters have had to be discharged into the sea following mechanical purification only. This shows up in particular as an increased stress from organic matter (BHK_7). Reducing discharges continues to be a challenge to Helsinki wastewater treatment, as results have not always been up to the required standard.

In the inner archipelago at Kruunuvuorenselkä water was earlier classified as passable, but from the end of the 1980s has been either satisfactory or even good, depending on chlorophyll levels. The condition of Helsinki's eutrophied sea bays improved after wastewater discharging was moved to the outer archipelago in 1987. This has affected the latter's

Figure 2.3.6 Sea water quality around offshore Helsinki in 1974–1976 and 1997–1999.



water quality only slightly: outer archipelago waters are classified as good, or in some years as satisfactory. Helsinki wastewater discharges are still a significant eutrophication source in the Gulf of Finland, although the city's share of the overall load has diminished.

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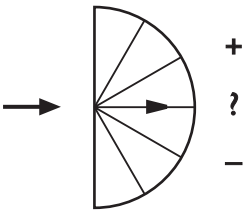
Päästö- ja pitoisuustiedot sekä laatuluokituskartat: Helsingin ympäristökeskus ja Helsingin vesi

Consultants to the theme

Lauri Pesonen, Helsingin ympäristökeskus
Phone: (09) 7312 2619
E-mail: lauri.pesonen@hel.fi
Ilkka Viitasalo, Helsingin ympäristökeskus
Phone: (09) 7312 2683
E-mail: ilkka.viitasalo@hel.fi
Seppo Kiiskinen, Helsingin Vesi
Phone: (09) 4734 5129
E-mail: seppo.kiiskinen@hel.fi

Theme 2.4
Water consumption

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes water consumption in Helsinki

The theme and its key concepts

Clean, salt free water is plentiful in Finland, so water saving measures are not often seen as a priority. However, particularly savings in the use of clean, warm water bring many benefits. Money is saved through reductions in water and wastewater charges. Also, the corresponding reductions in water extraction needs, in chemical and other purification requirements before and after use, and in the energy required to pump and heat the water all benefit the environment.

Why the theme was chosen

Monitoring and measuring water consumption is a commonly used means of assessing sustainable development worldwide, and is therefore significant for comparative studies.

What the theme describes and measures

The theme describes the overall water consumption in Helsinki by consumer group (Domestic users, The service sector, and Industry) and by specific water consumption, i.e. average water consumption per citizen per day.

Figure 2.4.1 Trends in Helsinki's water consumption by consumer group in 1975–1999 (millions of m^3).

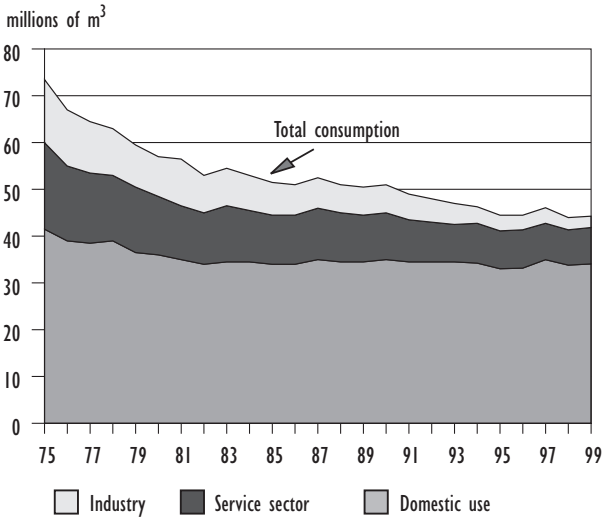
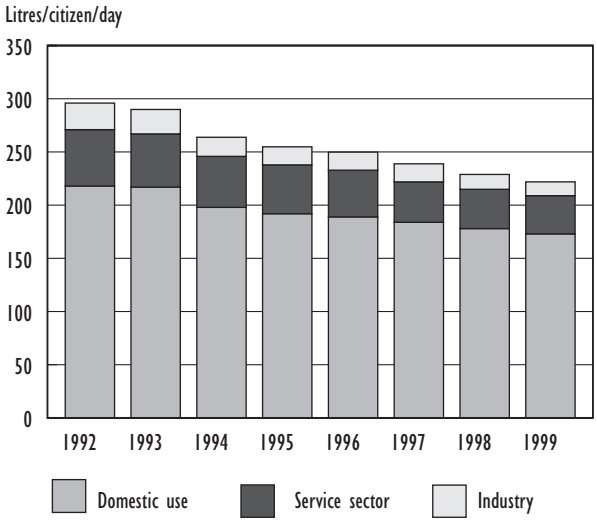


Figure 2.4.2 Trends in Helsinki's water consumption by consumer group in 1992–1999.



Calculation principles

The consumption calculations take account of the amount of water sold in Helsinki. Additional use, so-called dissipated water (8.1 million m^3 in 1999), is made up mostly of leaks (80 % of total dissipation), system flushing (15 %) and fire fighting (3 %). Specific consumption means the amount of water sold to Helsinki in a day divided by the number of people linked to the municipal water supply.

Interpretation

Overall water consumption in Helsinki decreased by 40% from 1976 to 1999. Between 1992 and 1999 consumption also decreased 25 % per inhabitant.

Domestic households are Helsinki's largest water users (76% of the total). Apartment buildings have a greater specific consumption than do semi-detached and other homes. Domestic water use is mostly for showers/baths, laundry and dishwashing, and toilet flushing.

Water consumption has decreased through the introduction of a wastewater charge, because of new technology, and because an increasing number of households are fitted with water use meters.

Community and housing estate water supply systems are designed to meet consumer water needs even during periods of peak use. The long-term drop in average water consumption is not without its problems, as the corresponding decrease in water volume and flow speed in water and drainage pipes can lower e.g. the quality of drinking water and cause blockages.

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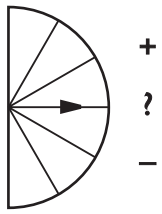
Consultants to the theme

Jussi Pirinen, Helsingin Vesi
Phone: (09) 4734 5129
E-mail: jussi.pirinen@hel.fi
Kari Silfverberg, Helsingin ympäristökeskus
Phone: (09) 7312 2678
E-mail: kari.silfverberg@hel.fi.

Theme 2.5
Energy consumption

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes energy use in Helsinki

The theme and its key concepts

Finland's energy production and consumption are large, partly due to the cold climate and long transport distances. Helsinki meets its energy needs using imported fossil fuels, mostly natural gas and coal. Combined heat and electricity production, and a district (municipal) heating network help improve the efficiency of the city's energy production.

Indirect energy consumption, that is the energy required for the production of goods and services, is a significant factor. Most domestic energy use is indirect, but statistics classify it under the industry or transport sectors.

Why the theme was chosen

Energy production and consumption is one of the most important environmental questions. Energy production is the most significant source (over 80 %) of Helsinki's greenhouse gas emissions. It also causes emissions of sulphur, nitrogen, and airborne particles that pollute the atmosphere and cause soil and aquatic acidification.

Traffic is also a source of greenhouse and acidifying gases, and of emissions that weaken air quality. Traffic's share of nitrogen oxide emissions is particularly large. Energy production and traffic also affect land use and the aesthetics of the surrounding landscape.

What the theme describes and measures

Energy consumption describes the use and use efficiency of natural resources, and indirectly also the stressful environmental effects of energy production. This theme is closely allied to themes 1.2. 'Greenhouse gas emissions', 2.1 'Air quality', 2.2 'The effects of airborne pollution on nature', and 2.7. 'Traffic'.

Calculation principles

The indicator = total energy consumption (GWh per year), and energy consumption per citizen (kWh/citizen/year). 1 GWh = 1 million kWh. Separate calculations are also presented on the overall electricity consumption of different consumer groups, and on specific district heating consumption (kWh/m^3).

The consumption of electricity and district heating has been calculated from the amount of energy sold to the Helsinki distribution network. Included are electricity transmitted by the Helsinki Energy Company, and district heating and electricity bought from outside the city. The internal energy needs of the Helsinki Energy Company and electricity transmission losses are not accounted for.

Traffic energy consumption calculations account for road and water transport figures. Journeys outside Helsinki City limits are not included. The energy consumption of road traffic has been calculated from estimates of annual kilometres driven allied to estimates of average gasoline consumption and fuel energy content.

Non-grid heating used by industry and other buildings has been estimated from sales of domestic heating oil. Heavier industrial oil consumption is not accounted for (it is proportionately small in Helsinki).

Electricity users are divided into domestic households, service sector businesses, the public sector (= the city administration and government offices situated in Helsinki), and the manufacturing industries. Specific heat consumptions have been

Figure 2.5.1 Total energy consumption in Helsinki by consumer category in 1990–1999 (GWh/year).

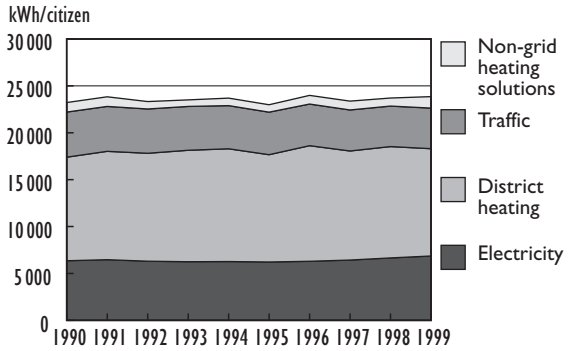


Figure 2.5.2 Energy consumption per citizen in Helsinki by consumer category in 1990–1999 (GWh/year).

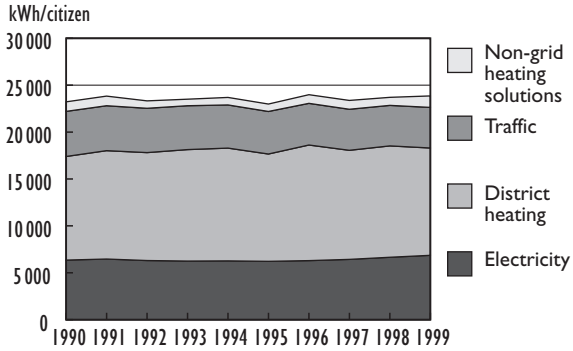


Figure 2.5.3 Electricity use by consumer category in 1990–1999 (GWh/year).

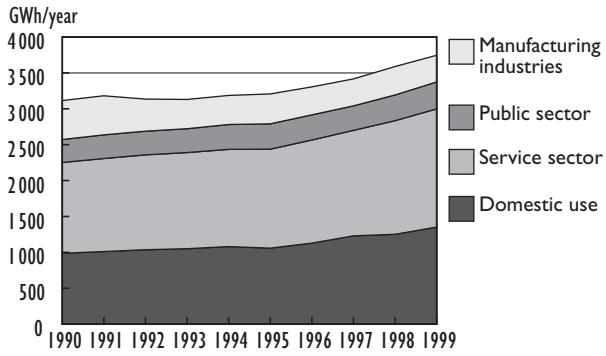
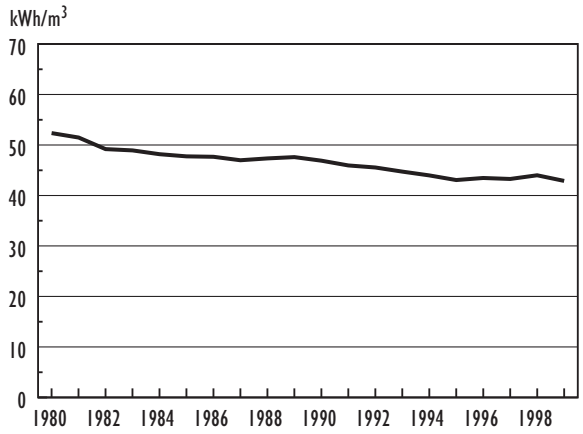


Figure 2.5.4 Specific heat consumption of Helsinki buildings joined to the district heating network in 1990–1997 (kWh/m³).



calculated by dividing the heat consumption of the buildings joined to the district heating network by their total volume.

The comparative annual figures take account of the effect of the outside ambient temperature. Energy consumption statistics kept by municipalities in Finland are currently being standardised.

Interpretation

The total consumption of energy in Helsinki grew ca. 14% between 1990 and 1999. Heating needs are the biggest single use item, while the service sector and private households are the largest clients for electricity. By category, overall energy consumption has changed as follows:

Electricity	+ 20 %
District heating	+ 15 %
Traffic	0 %
Non-grid heating	+ 34 %

The growth in non-grid heating solutions was affected by the exceptional sales of domestic heating oil in 1999. During 1990–1998 non-grid heating of buildings decreased by about 7 %.

Per capita energy consumption increased by about 3% during 1990–1999. This breaks down as follows

Electricity	+ 8 %
District heating	+ 4 %
Traffic	– 10 %
Non-grid heating of buildings	+ 20 %

Energy and electricity consumption has been increased by

- increases in the number of buildings
- increases in electronic equipment and private apartment saunas
- increases in commercial activity at the end of the 1990s

Energy consumption growth has been slowed by:

- the economic recession of the early 1990s
- improvements in energy production efficiency
- properties switching from non-grid heating to district heating networks
- reductions in building specific heat consumption due to e.g. better insulation.
- reductions in automobile fuel consumption

Energy savings will still be necessary in order to attain a reduction in natural resource use and in greenhouse gas emissions despite the rise in human populations and economic growth.

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VTT/Liikenteenlaskentajärjestelmä.

Energiankulutustiedot: Helsingin Energia, Kaupunkisuunnitteluvirasto (liikennetiedot) ja YTV.

Consultants to the theme

Rauno Tolonen, Helsingin Energia
Phone: (09) 617 2830
E-mail: rauno.tolonen@helsinginenergia.fi

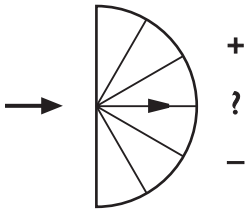
Helena Elsilä, Helsingin kaupungin ympäristökeskus
Phone: (09) 7312 2755
E-mail: helena.elsila@hel.fi

Kari Silfverberg, Helsingin kaupungin ympäristökeskus
Phone: (09) 7312 2678, kari.silfverberg@hel.fi

Mårten Lindholm
Helsingin kaupungin rakennusviraston energiayksikkö
Phone: (09) 166 2759
E-mail: marten.lindholm@hel.fi

Theme 2.6 Waste production and reuse

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the amount of waste ending up at refuse tips, and waste reutilization

The theme and its key concepts

About 40% of the waste generated by the city of Helsinki can be utilised as either raw materials or as a source of energy. The problem is the remainder, which is incarcerated at refuse tips.

The Helsinki Metropolitan Area Council (YTV) is charged with organising the waste disposal of Helsinki and its neighbouring municipalities. Domestic waste disposal treatment is concentrated at Ämmässuo refuse tip.

Why the theme was chosen

Refuse tips receive waste for which reutilization has not proved possible. Waste deposited at refuse tips is lost raw material. Inorganic decomposition or rotting of organic compounds at refuse tips produces methane that leaks from the tip into the atmosphere. Methane is particularly prevalent when organic waste is mixed for collection with other refuse. By mass, over one third of Helsinki domestic waste is organic. Pre-sorted organic waste is composted at Ämmässuo refuse tip.

Composting organic waste produces carbon dioxide. Both methane and carbon dioxide are greenhouse gases that cause climate change. However, methane's effects on climate change are 21 times greater than that of carbon dioxide (see chapter 1.2, 'Greenhouse gas emissions').

Other environmental problems of refuse tips include nutrients and harmful substances in tip drainage waters, and tip fires with their accompanying emissions of dangerous compounds such as dioxins, phurans, and PAH compounds. Refuse tips spread litter and attract gulls and rats. Increases in the amount of waste adds to the need for more refuse tip space.

What the theme describes and measures

The amount of waste received at refuse tips correlates with the amount of waste generated overall. The amount of different waste types and (mixed) domestic waste disposed of at refuse tips relative to the number of inhabitants reflects the use of natural resources and the accumulation of unrecycled waste. The amount of pre-sorted organic waste measures how actively people are sorting and recycling waste, and the development of waste reuse overall.

Calculation principles

Since 1994, YTV has not kept statistics on waste received from each municipality separately, so the chosen indicator is the overall amount of waste received from within the region handled by YTV waste management.

The figures for waste delivered to refuse tips includes consignments to Ämmässuo refuse tip and waste deposited at YTV collection points. Sewage is not included. The 'Other waste' category includes special categories of domestic waste, hazardous waste etc. substances brought to the refuse tip. Wood and plant waste were moved from 'construction waste' to the 'others' category in 1995. Also given are the amount of waste actually disposed of at refuse tips, and the amount of mixed waste per inhabitant.

The term organic waste refers to the total amount of such pre-sorted waste delivered to Ämmässuo refuse tip. In 1997, the scheme encompassed 556,362 citizens in the Helsinki metropolitan area, rising to 698,600 in 1999.

Figure 2.6.1 Amounts of waste by type deposited at refuse tips in the YTV area in 1988–1999.

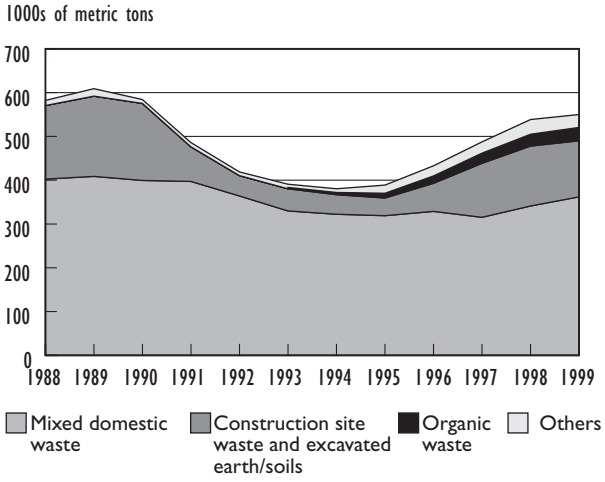


Figure 2.6.2 Amounts of waste disposed of at Ämmässuo refuse tip (not including excavated soils and earth) in 1995–1999 (metric tons/year).

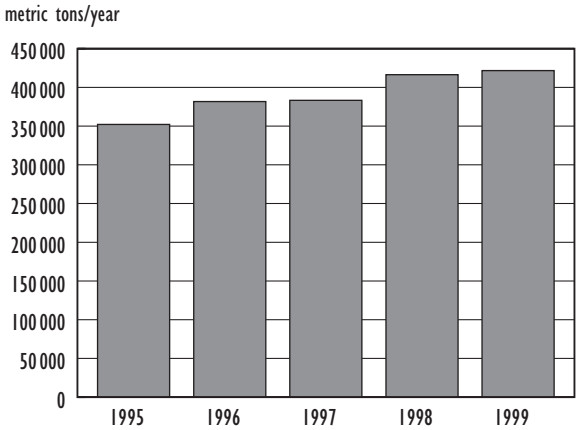


Figure 2.6.3 Per capita mixed, i.e. domestic, waste disposed of at refuse tips in 1995–1999 (Helsinki metropolitan area and Kirkkonummi municipality).

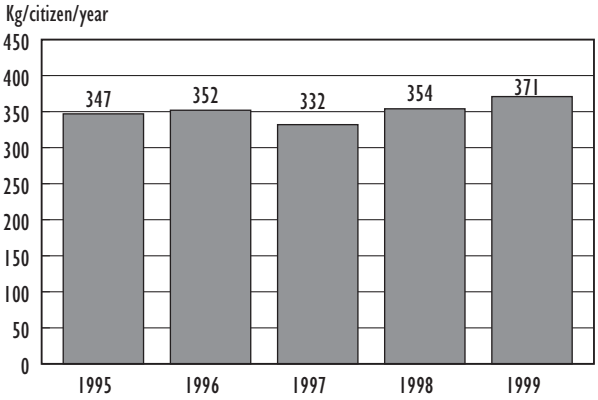
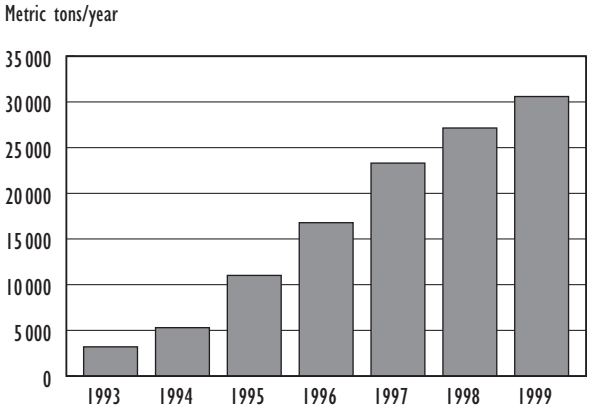


Figure 2.6.4 Sorted organic waste received at Ämmässuo refuse tip in 1993–1999 (metric tons/year).



Interpretation

In the early 1990s, economic recession and increased reuse diminished the amount of waste received and disposed of at refuse tips in the Helsinki metropolitan area. In recent years, both the absolute amount of waste as well as the per capita amount have started to again increase in tandem with the better economy and new building projects.

The percentage of waste ending up at refuse tips has diminished thanks e.g. to the increase and spread of separate collections of organic and other reusable waste. This process is slowed by the low reuse rate of consumer good packages, and the heterogeneous composition of packaging materials.

The challenge to waste management is still to prevent the generation of new waste, and to increase recycling. In the near future, improvements in recycling of building site and energy production wastes may reduce the overall amount permanently disposed of at refuse tips.

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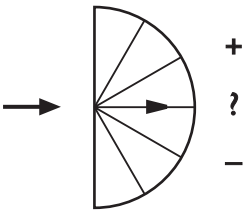
Consultants to the theme

Hannu Arovaara, Helsingin ympäristökeskus
Phone: (09) 7312 2769
E-mail: hannu.arovaara@hel.fi
Seppo Kajaste, Helsingin ympäristökeskus
Phone: (09) 7312 2754
E-mail: seppo.kajaste@hel.fi
Juha Uuksulainen, YTV
Phone: (09) 156 1316
E-mail: juha.uuksulainen@ytv.fi

Theme 2.7
Traffic

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes mobility and traffic in Helsinki and its current trends

The theme and its key concepts

City traffic is both a daily necessity and an urban policy question. Traffic in cities comprises of pedestrian, bicycle, public, and automobile traffic. All are needed as people, goods, and services are transported from one place to another.

Environmentally friendly urban traffic has low fuel consumption, is non-polluting and quiet, needs limited space, is safe and pleasant for both users and pedestrians, and offers efficient transport equitably to all citizens.

Why the theme was chosen

Traffic uses energy, causing emissions of greenhouse gases, acidifying compounds, and inhalable particles that pollute air and are hazardous to human health. Nitrogen oxide emissions in particular are largely traffic-induced. The vehicular source of exhaust gases is close to the ground, so emissions carry directly to breathing height. Traffic also increases noise, takes up space, and causes accidents.

What the theme describes and measures

The success of urban traffic policy is reflected in the means of transport citizens favour and are able to favour on a daily basis.

Figure 2.7.1 Sampling routes for estimating vehicle traffic trends.

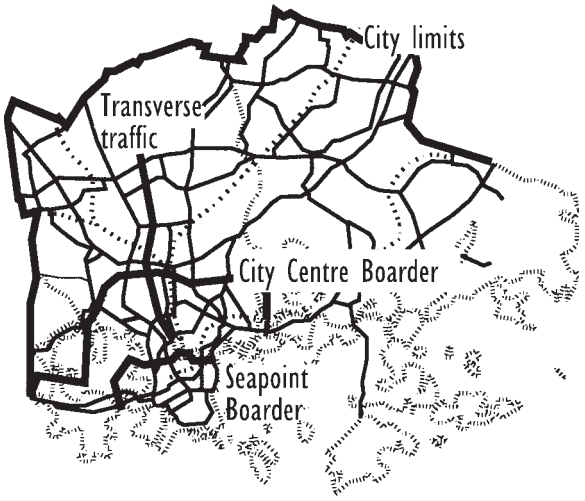


Figure 2.7.2 Vehicle traffic trends from 1970 along the Seapoint Boarder, the City Centre Boarder, and at the City limits.

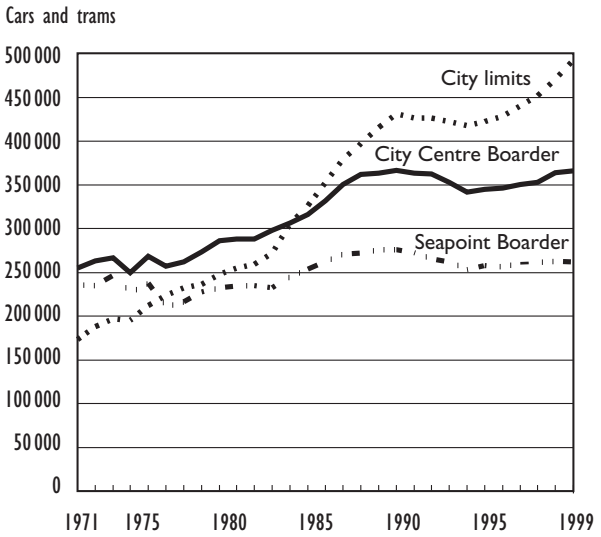


Table 2.7.1 Traffic growth in 1989–1999, 1994–1999 and 1998–1999.

Changes in traffic levels (days)						
	Years 1989–1999		Years 1994–1999		Years 1998–1999	
	No. of vehicles	%	No. of vehicles	%	No. of vehicles	%
Seapoint Border	–14,000	0	4,000	+1.5	0	–0
City Centre Border	–1,000	–0	21,000	+6	+1,800	+0.5
City limits	62,000	+14	71,000	+17	+22,500	+5
Transverse traffic	16,000	+7	26,000	+13	+5,800	+2.5

Figure 2.7.3 Trends in total traffic volume and the share of public transport in 1979–1999. All-day figures to and from the Seapoint Boarder area sampling route.

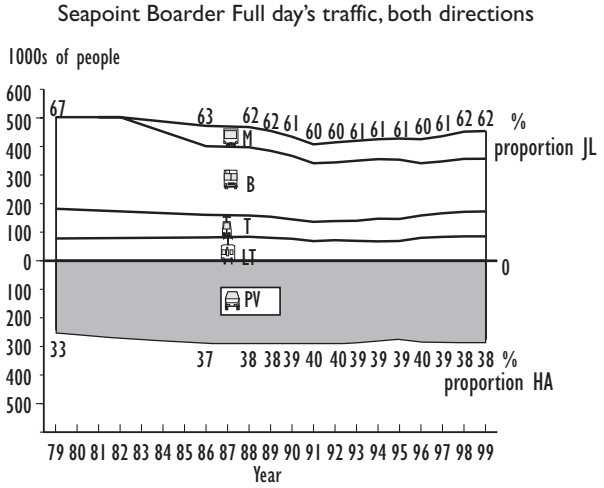


Figure 2.7.4 Trends in total traffic volume and the share of public transport in 1986–1999. All-day figures to and from the City Centre Boarder sampling area.

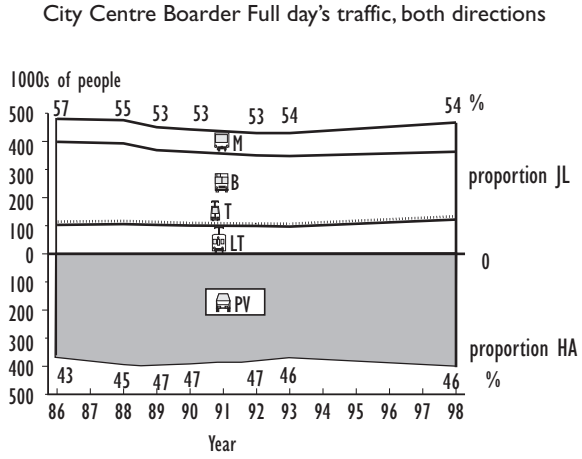


Figure 2.7.5 Trends in total traffic volume and the share of public transport per day in 1979–1999 for the Seapoint Boarder in the city centre direction, rush hours 06.00–09.00.

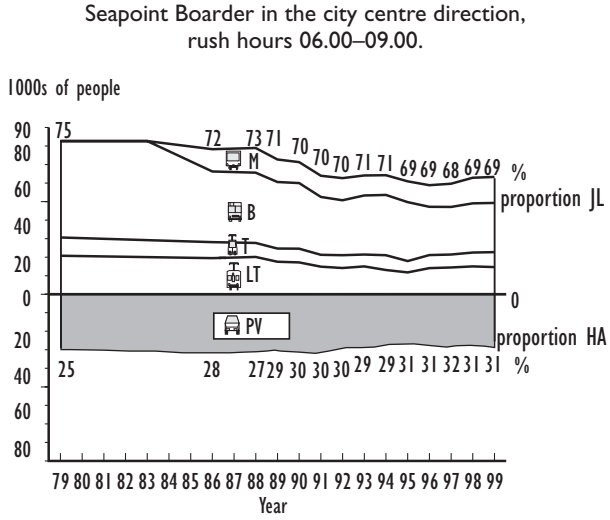
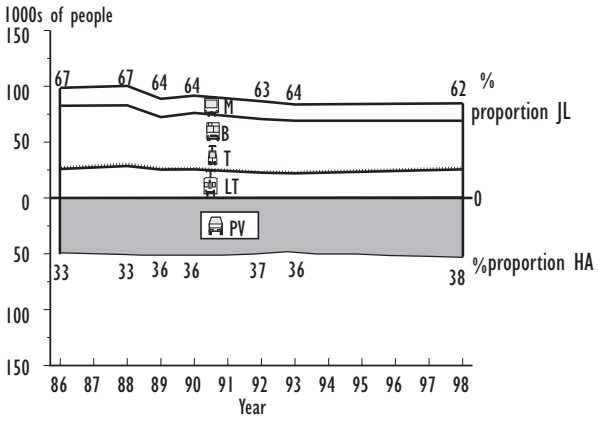


Figure 2.7.6 Trends in total traffic volume and the share of public transport per day in 1986–1999 for the City Centre Boarder in the city centre direction, rush hours 06.00–09.00.



M = metro (underground), B = bus, T = tram, LT = local train, PB = public transport, PV = private vehicle

The indicators:
Traffic levels
Use of different transport modes
The number of cyclists
The density of private automobiles

This theme is closely related to themes 1.1 'Greenhouse gas emissions', 2.1 'Air quality', 2.2 'The effects of airborne pollution on nature', 2.5 'Energy consumption', 2.8 Land use distribution', and 4.1 'Neighbourhood comfort and safety'.

Traffic levels

The indicator reflects the overall amount of traffic. Trends in traffic figures aid in estimating whether policy measures can diminish the damaging environmental effects of traffic. The indicator does not include travel beyond Helsinki City limits.

Interpretation

Currently Helsinki's main traffic arteries carry 5 % more vehicles than a decade ago, although the Seapoint Boarder area sees 5 % less traffic. Following the recession of the early 1990s, traffic growth has been steady since 1993. Growth has concentrated around the City limits and transverse routes between suburbs. In 1999, traffic along main roads was 2 % greater than the year before; Seapoint Boarder and city centre traffic remained the same, but elsewhere growth was 3–5 %. As the total traffic volume grows, its environmental problems are hard to contain even with rapidly developing technologies.

Use of different transport modes

The percentage of the total traffic volume held by each mode of transport is a commonly used indicator of how public and lighter transport is faring compared to the use of private cars. Realised figures for public transport can also be compared with targets set by the municipal council (64 % share per day in the Seapoint Boarder area and 26 % for transverse traffic; this was amended for 2002 to 64 % at the Seapoint Boarder and 23 % for transverse traffic). Rail traffic trends can also be censused.

Interpretation

In 1999, 62 % of those crossing the Seapoint Boarder used public transport. This share has slightly increased during the 1990s. Public transport's share of traffic into Helsinki from the west was 43 %, 52 % from the north, and 69 % from the east.

In 1998 54 % of passengers at the City Centre Boarder were using public transport.

The corresponding figures were 35 % for the west, 42 % for the north, and 59 % for the east. The opening of the Vuosaari metro line increased passenger traffic on the metro.

In 1999, 69 % of rush hour traffic was on public transport, as was 62 % at the City Centre Boarder in 1998. As for the entire day, the highest percentage of public transport users was from the east side. Public transport's share of the transverse traffic sampling route is currently about 20 %; there public t.'s share has continued to fall slowly.

Figure 2.7.7 No. of cyclists passing sampling points at Eläintarhanlahti and Kulosaarensilta in June-August 1992–1999.

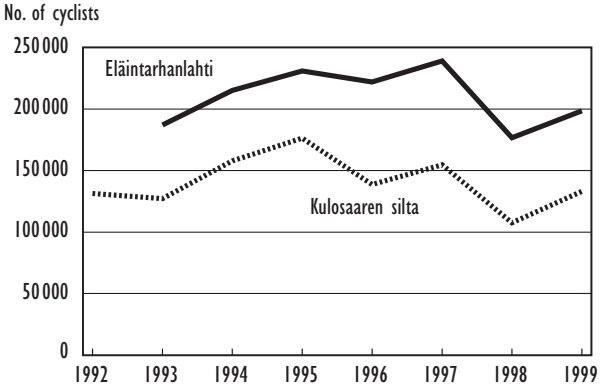
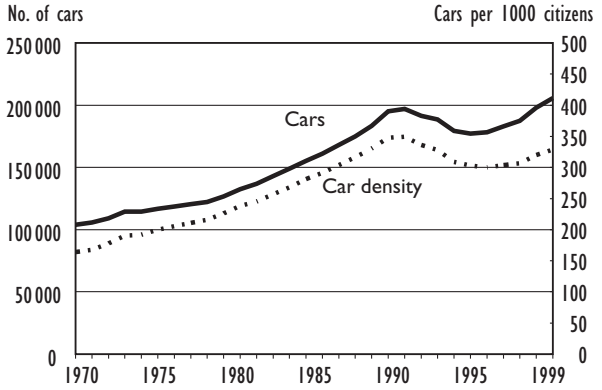


Figure 2.7.8 No of cars registered in Helsinki, and car density in Helsinki in 1970–1999.



Cyclists

Cyclists are counted both automatically and by hand. There are 12 automatic counters, the oldest at Kulosaarensilta and at Eläintarhanlahti.

Interpretation

The number of cyclists is greatly affected by the weather. For example, during the rainy summer of 1998 the proportion of light transport crossing the sampling point at the Seapoint Boarder peaked in July at 10.5 %, and at 5.5 % at the City Centre Boarder. In 1999 the summer was warm, which caused a rise in light transport. Cyclists at the Seapoint Boarder were counted by hand at a total of seven points in June 1999. On weekdays, the border was crossed by 16,100 cyclists, nearly 20 % more than the previous summer.

In 1995, the share of light transport (pedestrians and cyclists) of all journeys was nearly a third in the city centre and around one fourth in the suburbs. The proportions are of course larger for shorter journeys.

Density of private cars

The density of private cars (cars per 1,000 inhabitants) is a commonly used parameter in national and international comparative studies. It is affected by many factors, such as the average prices of cars, the wealth of the populace, population structure, and the efficiency of the local public transport system.

Interpretation

The number of cars in Helsinki has increased with the return of economic growth, with about 16 % more cars since 1994. In 1999 car numbers grew about 4%. Currently there is one car for every three Helsinki inhabitants; due to the growth in the city's population, the relative growth in car density is less than that of car numbers.

According to a study based on interviews commissioned by YTV (Kaartokallio 1997), 58 % of city centre households were without a car, with a corresponding figure of 40 % for Helsinki suburbs. This example shows that a rise in income level does not automatically mean a rise in the car density.

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Helsingissä rekisteröidyt moottoriajoneuvot: Tilastokeskus, Liikenne ja matkailu, Moottoriajoneuvot.

Consultants to the theme

Heidi Hyvärinen, Helsingin liikennelaitos (HKL)
Phone: (09) 472 2310

Irene Lilleberg, Helsingin kaupunkisuunnitteluvirasto
Phone: (09) 169 3480
E-mail: irene.lilleberg@hel.fi

Tuija Hellman, Helsingin kaupunkisuunnitteluvirasto
Phone: (09) 169 3633

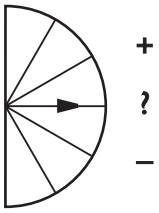
Antero Naskila, Helsingin kaupunkisuunnitteluvirasto
Phone: (09) 169 3515

Johanna Vilkuna, Helsingin ympäristökeskus
Phone: (09) 7312 2674
E-mail: johanna.vilkuna@hel.fi

Timo Vuolanto, Helsingin kaupunkisuunnitteluvirasto
Phone: (09) 169 3363

Theme 2.8
Land use distribution

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes land use and its intensity in Helsinki

The theme and its key concepts

The use of land for different purposes changes only slowly. Perceiving significant changes usually means monitoring periods of at least several decades.

The choice of construction site is extremely significant, both locally and in the development of the community. Areas picked for construction works are subject to large changes and their greener zones usually supplanted. Land area can be increased through reclamation from the sea, geological uplift, or as watercourses become overgrown.

Why the theme was chosen

Developments in land use and community structure affect people's lives and nature's well-being in many ways: these include traffic levels, living quality, organising services, and preserving natural environments. The number of citizens per hectare of city land, and the amount of parkland per citizen are urban indicators of traditional land use measures. They are still suitable and useful for national and international comparisons.

What the theme describes and measures

The theme describes the division of land for different purposes, use efficiency, and trends.

Land use is monitored by calculating respectively the relative share of built up areas, parks, and other areas. Construction lowers the share of parks and other areas important to inhabitants' recreation and enjoyment. Simultaneously, transport infrastructure's share of the available land increases proportionately faster than that of other built up areas. For this reason, transport infrastructure growth is presented separately.

This theme is closely related to themes 2.7 'Traffic', 2.9 'Biodiversity', 3.1 'Population structure', and 4.1 'Neighbourhood comfort and safety'.

Calculation principles

Population density = No. of citizens per hectare of land. Apart from parks proper, included in this category are graveyards, sports and recreational facilities, forest parks, and agricultural lands. Transport infrastructure comprises roads, parking facilities, and petrol stations. City streets and market squares are counted separately. Built up areas include domestic households, business quarters, and industrial and warehouse centres.

Exact monitoring of changes in land use will not be possible before all locations have been transferred to digital maps, a facility not due for at least a couple of years. Monitoring quality can be gradually improved by e.g. including data on greener areas such as plants and trees around buildings, and changes in roadside vegetation.

Table 2.8.1 Distribution of land for different purposes in 1993 and 1998.

	1993	1998
Domestic housing	3,951	3,978
Other buildings	2,581	2,506
Traffic	2,923	3,070
Parks	7,674	7,516
Others	1,389	1,455

Figure 2.8.1 Population density in the years 1993–1999 (inhabitants/hectare).

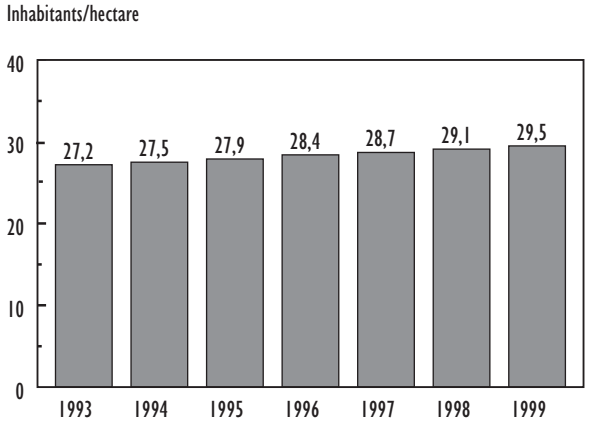


Figure 2.8.2 Green areas (parks) per inhabitant in 1993–1998.

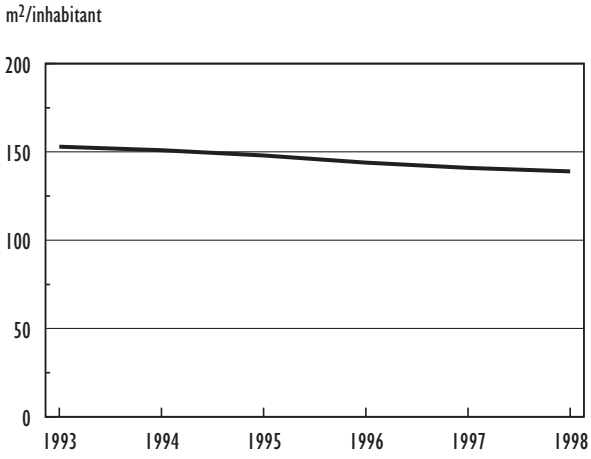


Figure 2.8.3 Transport infrastructure's share of the land area in 1993–1998.

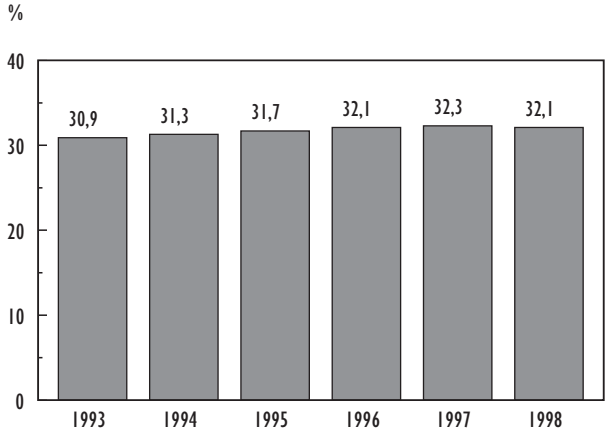
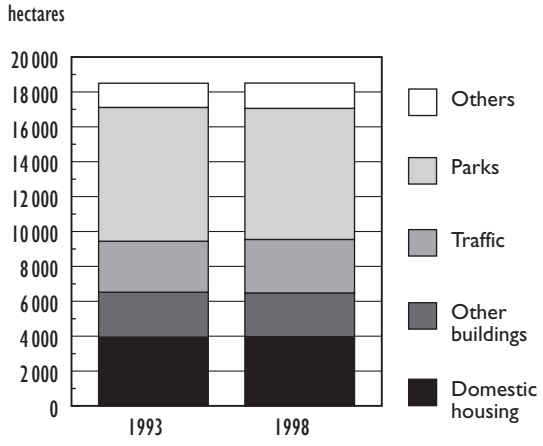


Figure 2.8.4 Distribution of land for different purposes in 1993 and 1998.



Interpretation

The amount of parkland per Helsinki citizen has decreased throughout the 1990s as the population density has grown and the proportion of built-upon land has increased. This is caused by e.g. immigrant pressure and the resulting greater density of buildings. The relative growth in transport infrastructure is explained by the fragmentation of different society functions, such as the separation of workplaces and residential areas. This lowers land use efficiency and increases transport needs. A lowering of rail traffic's share relative to motor vehicles also increases transport figures overall.

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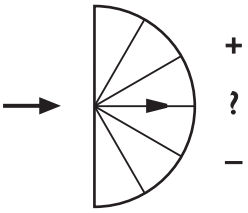
Consultants to the theme

Timo Vuolanto, Helsingin Kaupunkisuunnitteluvirasto
Phone: (09) 169 3363
E-mail: timo.vuolanto@hel.fi

Kari Silfverberg, Helsingin kaupungin ympäristökeskus
Phone: (09) 7312 2678
E-mail: kari.silfverberg@hel.fi

Theme 2.9
Biodiversity

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes biodiversity using the number and area of nature reserves, and key plant and bird species

The theme and its key concepts

Biodiversity refers to the diversity inherent in different communities of species and their inanimate environment, as well as to the number of species themselves and the genetic variation within each species. Nature conservation aims at sustaining biodiversity. The Finnish Nature Conservation Act allows for the creation of nature reserves, including sites that
– are habitat to some endangered or rare species
– contain an unusual or rare natural formation
– are particularly beautiful

The Nature Conservation Act also allows for the protection of biologically valuable habitat types.

Why the theme was chosen

Loss of biodiversity is one of the worst worldwide environmental problems: species go extinct and habitats disappear, weakening nature's capacity to function. Safeguarding and preserving biodiversity has been chosen as one of the main goals of Helsinki's Agenda 21 programme.

What the theme describes and measures

Biodiversity is a measure of nature's well-being. Biodiversity losses occur through many kinds of human activities, including forest logging, building, polluting emissions, and consumption. Biodiversity trends can be measured by monitoring endangered and rare species as well as indicator species associated with different habitat and nature types.

Helsinki's chosen indicators:
– Ranges of key plant species associated with herb-rich mixed and spruce forests
– Bird species indicative of undisturbed, unspoilt habitats
– The surface area of protected areas and habitat types

The next indicator report is set to include also the percentage of old growth within Helsinki City's forest holdings.

Ranges of herb-rich mixed and spruce forest plant species

Richer deciduous/mixed and rich spruce forests differ botanically. Suitable indicator species for both forest types were those with ranges known well enough to facilitate monitoring.

The occurrence of each indicator species reflects changes in the number and quality of suitable sites in Helsinki. Common Twayblade *Listera ovata,* Lesser Butterfly Orchid *Platanthera bifolia,* and Lungwort *Pulmonaria (officinalis) obscura* are threatened species protected in Helsinki under the Nature Conservation Act. Information on plant ranges has been assembled using the city's current borders, i.e. also from areas previously belonging to neighbouring municipalities. Monitoring extends over the whole city limits, but is concentrated on ca. 80 locations known to contain one of the indicator species. Assessments are to be revised every ten years.

Interpretation

The decline during 1900–1990 in the number of localities holding flora indicative of rich deciduous/

Table 2.9.1 No. of pairs of archipelago indicator bird species on Helsinki offshore islands in 1989, 1997 and 1999.

		1989	1997	1999
Larus fuscus	Lesser Black-backed Gull	83	47	58
Sterna hirundo and *S. paradisaea*	Common & Arctic Terns	305	693	758
Arenaria interpres	Turnstone	21	18	19
Charadrius hiaticula	Ringed Plover	2	6	5

Figure 2.9.1 Sites of plant species indicating rich deciduous/mixed forest in Helsinki1900–1990.

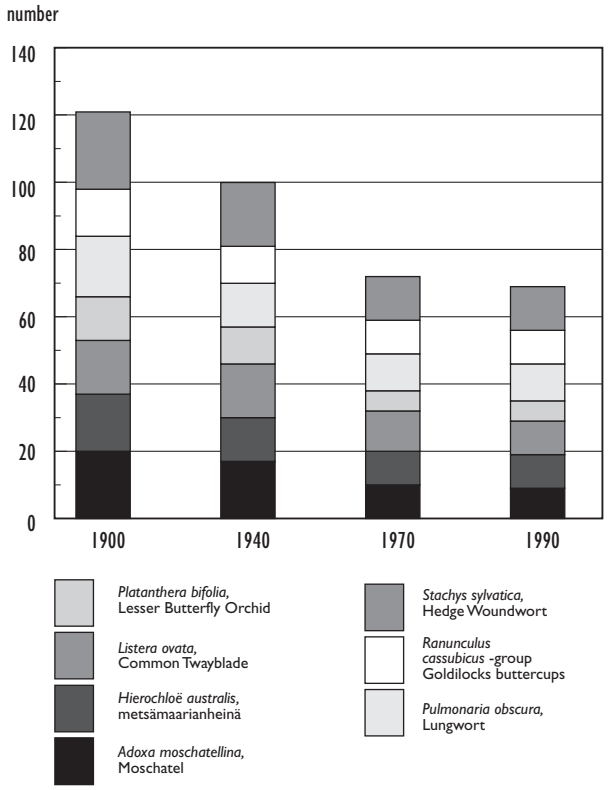
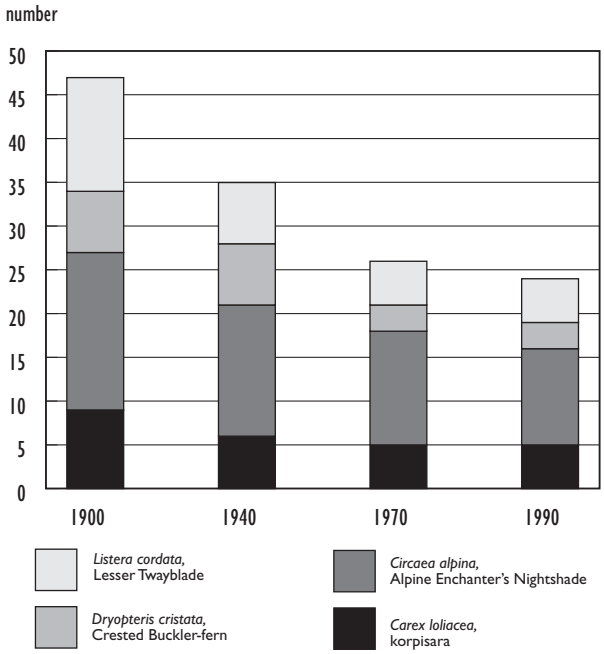


Figure 2.9.2 Sites of plant species indicating rich spruce forest in Helsinki 1900–1990.



mixed or rich spruce forests illustrates a decline in biodiversity. The most important reason for the decline is construction work (housing, industrial sites, roads, parking places, parks etc). Other causes such as consumption or changes to wetlands (e.g. dredging of streams) have played a much smaller role.

Birds as indicators of undisturbed and unspoilt habitats

Archipelago, heritage landscape, and forest habitats each have their own chosen indicator bird species that characterise particular traits, as well as developments in the number and quality of their respective environments. The monitoring process will also gather in population data on the selected species. The monitoring localities have been selected to represent the different habitats where the species are likely to be present; they differ in the degree of preservation of their natural state, their urbanisation, and levels of disturbance. Monitoring work will endeavour to take account of both the changes to the city environment and other factors possibly influencing avian populations.

Archipelago indicator species

Changes in archipelago indicator bird species mostly reflect changes in disturbance due to recreational use: the species chosen for monitoring are

Figure 2.9.3 Breeding status of the Lesser Black-backed Gull on Helsinki islands in 1989, 1997 and 1999.

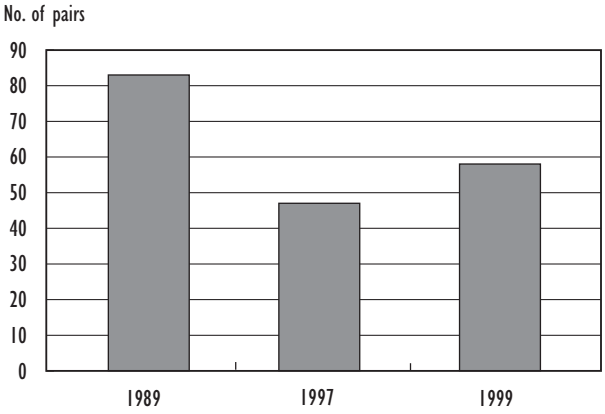


Figure 2.9.4 Breeding status of Common and Arctic Terns on Helsinki islands in 1989, 1997 and 1999.

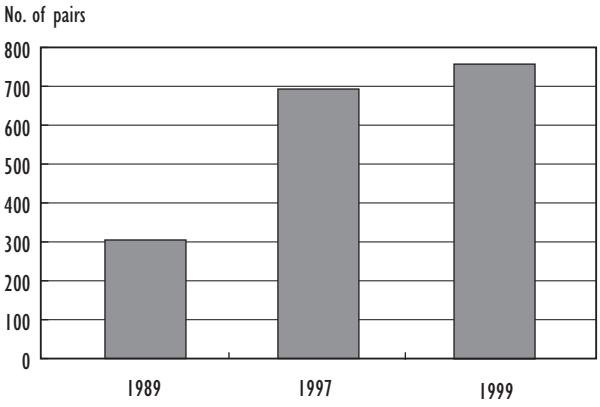


Figure 2.9.5 Breeding status of the Turnstone on Helsinki islands in 1989, 1997 and 1999.

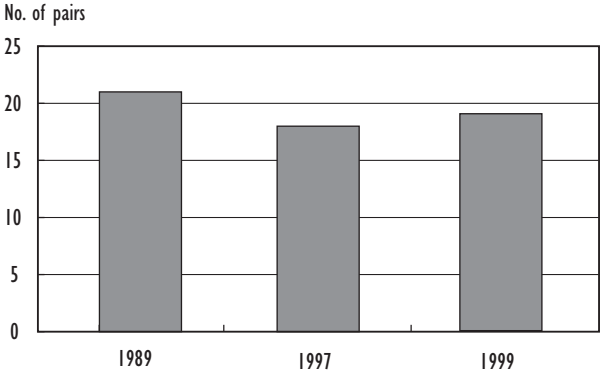
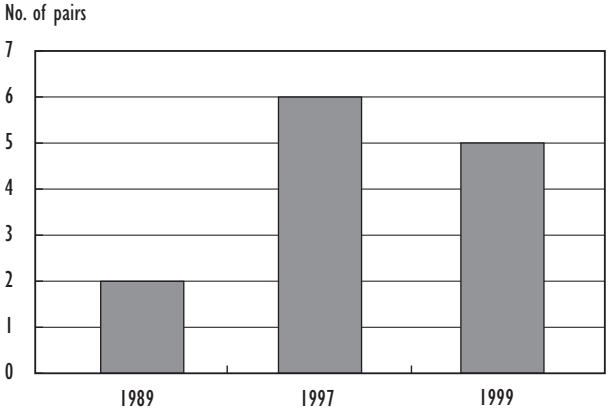


Figure 2.9.6 Breeding status of the Ringed Plover on Helsinki islands in 1989, 1997 and 1999.



Turnstone *Arenaria interpres*, Ringed Plover *Charadrius hiaticula*, Lesser Black-backed Gull *Larus fuscus*, Common Tern *Sterna hirundo,* and Arctic Tern *S. paradisaea*. Ringed Plovers and Lesser Black-backed Gulls are threatened species, and all the species are protected under the Nature Conservation Act. Changes in the number of breeding pairs of each species are being monitored on ca. 40 offshore islands and islets belonging to the city of Helsinki. The locations chosen all held at least some of the five indicator bird species in 1999. Some of the islands are in recreational use, others are nature reserves, and still others belong to the Finnish armed forces. Bird counts are to be made twice a summer every five years.

Interpretation

Disturbance cannot be gauged directly from the number of indicator species' breeding pairs. Annually fluctuating factors such as the weather and food supply also affect pair numbers. However, poor reproductive success has been noted within the monitoring area even though the number of pairs attempting breeding has remained approximately the same.

Numbers of Lesser Black-backed Gulls are down, a nationwide trend for this species. Terns have significantly increased in number, but this may be partly natural annual variation. Turnstone numbers are down, but not significantly. The Ringed Plover population has increased, but the small number of pairs overall makes the data statistically somewhat unreliable.

Indicator species for heritage landscapes

Indicator species of heritage landscapes reflect general environmental changes in man-made environments such as parks, former country estates, gardens, housing estates, and old industrial grounds. Population changes will be monitored in the chosen indicator species – Woodpigeon *Columba palumba*, Stock Dove *Columba oenas,* Wheatear *Oenanthe oenanthe*, Starling *Sturnus vulgaris,* Linnet *Carduelis cannabina,* Goldfinch *Carduelis carduelis,* House Sparrow *Passer domesticus,* and Tree Sparrow *Passer montanus* – using 1 x 1 kilometre squares chosen from around Helsinki. Counts of the squares' indicator species are to be made twice in early summer every five years. The squares represent heritage landscapes of different degrees of urbanisation from the city centre to its periphery.

Figures and tables

From 2002 onward (environment centre).

Interpretation

Changes in pair numbers of heritage landscape birds reflect general changes in habitats created largely by Man.

Forest indicator species

Forest indicator species reflect the presence of undisturbed forest. Ca. ten forest bird species have been chosen for monitoring: Tree Pipit *Anthus trivialis*, Wren *Troglodytes troglodytes,* Hedge-sparrow *Prunella modularis,* Song Thrush *Turdus*

Table 2.9.2 Surface area of Helsinki nature reserves created under the Nature Conservation Act.

Reserve type	Mainland (no. of sites)	Archipelago (no of sites)	Mainland Area (ha)	Archipelago Area (ha)	Total Area (ha)
Vegetation					
forest	7	1	70.0	0.5	70.5
meadow	1	1	5.4	2.1	7.5
bog	4	13.2	13.2		
threatened species	1	3	0.1	0.8	0.9
Fauna					
birds	2	15	275.4	33.5	308.9
Geology and geomorphology					
esker	1	1	3.7	0.7	4.4
lagoon	1	14.4	14.4		

Table 2.9.3 Total area of Helsinki's nature reserves with land and water areas in relation to the city's overall area. Helsinki surface areas updated 19. June 1997.

Area of nature reserves	% of total Helsinki ha	% of total Helsinki area (68,620 ha)	% of total Helsinki land area (18,700 ha)	water area (49,920 ha)
Overall surface area	420	0.6		
Land area	280		1.5	
Water area	140			0.3

Table 2.9.4 Habitats and their areas protected under the Nature Conservation Act (As of May 2000).

Habitats protected under the Nature Conservation Act	No. of sites	Area (ha)
Unspoilt sandy beaches	1	0.2
Seashore meadows	5	0.95
Total	6	1.2

philomelos, Wood Warbler *Phylloscopus sibilatrix*, Chiffchaff *Phylloscopus collybita*, Goldcrest *Regulus regulus,* Willow Tit *Parus montanus*, Crested Tit *Parus cristatus*, and Treecreeper *Certhia familiaris*.

Population changes in the chosen species will be monitored using 1 x 1 kilometre squares around Helsinki. Around 10–20 monitoring squares are planned. The breeding populations of each square are to be estimated twice in early summer every five years.

Monitoring sites: the sites are 1x1 km squares containing different types of undisturbed forest from relatively isolated patches of urbanised areas to the more extensive forests near the citx ¨imits.

Figures and tables

Will be available from 2002 onward (environment centre).

Interpretation

Changes in forest bird populations reflect general environmental changes in unspoilt forests.

Surface area of protected areas and habitat types

The indicator measures the extent of Helsinki's conservation network, i.e. the variety and number of nature reserves and protected habitat types. Nature reserves are classified according to the main basis originally cited for their protection. Reserve borders are currently being checked and remapped, the data tabled here is from May 2000.

Interpretation

The indicator gives an overview of Helsinki's most valuable natural environments. The first site in Helsinki to be protected under the Nature Conservation Act was Tiiraluoto, an islet off Lauttasaari. Tiiraluoto received protection in 1948. The first part of Vanhankaupunginlahti Bay nature reserve was set aside in 1959, and Kallahti esker received protection in 1973.

Five more sites were protected in the 1980s, followed by a score of others in the 1990s, most of them islands and islets. Six new sites containing valuable habitat types were set aside at the beginning of 2000, and proposals for a number of others have been circulated. Around 0.6 % of Helsinki's total surface area is protected compared with 8.3 % for all Finland (including national parks, scientific reserves, and wilderness areas). Helsinki's large water area affects the result: the municipality's area is 73 % water, compared with an average of 10 % for the whole country.

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Vanhat kasvillisuustiedot: Helsingin yliopiston Luonnontieteellisen keskusmuseon Kasvimuseon kokoelmat (H) ja kasvistoarkisto (H-ark.).

Consultants to the theme

Kaarina Heikkonen, Helsingin ympäristökeskus
Phone: (09) 7312 2671
E-mail: kaarina.heikkonen@hel.fi

Arto Kurtto, Helsingin yliopisto
E-mail: arto.kurtto@helsinki.fi

Matti Luostarinen
E-mail: matti.luostarinen@kolumbus.fi

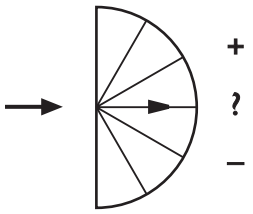
Matti Nieminen, Helsingin ympäristökeskus
Phone: (09) 7312 2237
E-mail: matti.nieminen@hel.fi

Timo Pakkala, Helsingin yliopisto
E-mail: timo.pakkala@helsinki.fi

Sanna Pekuri, Helsingin ympäristökeskus
E-mail: sanna.pekuri@hel.fi

Theme 2.10 Chemicalization of the environment

In what position would you place the arrow in the sustainable development meter for this theme?



The theme describes the accumulation in the environment of man-made harmful chemical compounds

The theme and its key concepts

Industrial processes and consumption cause a build-up in the environment of compounds that decompose only slowly. Some are harmful to humans and other organisms, and their long-term and cumulative effects are still insufficiently understood. Especially harmful environmental substances include the heavy metals lead (Pb), cadmium (Cd), and mercury (Hg), halogenated hydrocarbons such as DDT (dichlorodiphenyltrichloroethane), and PCB compounds (polychlorinated biphenyls).

Why the theme was chosen

The number of chemicals both produced and applied in society has grown rapidly in Finland. Our increasingly chemical environment poses a serious threat to our environment and health. These factors are further increased by many compounds' poor detectability and slow rate of decomposition. Monitoring the build-up of chemicals is to anticipate future risks.

What the theme describes and measures

The theme describes the concentrations in the environment of harmful heavy metals and organic compounds, as represented by heavy metal and PCB concentrations in the soil and in Baltic Herrings. This theme is closely related to theme 2.2 'The effects of airborne pollution on nature'.

Calculation principles

Long-term data on the accumulation of harmful chemicals in the Helsinki environment is scarce. One indicator used here is based on measurements of mercury and PCB levels in Baltic Herrings caught at sea near the cities of Helsinki and Kotka (a port in the SE corner of Finland). The other indicator represents measurements of background levels of mercury, cadmium, lead and PCB taken from natural soils and from Helsinki Central Park. In the study by the Helsinki City Environment Centre (Salla 1999), the average concentrations of these substances were higher relative to recommended levels than for others. Concentrations are given as median figures. 'Background levels' can be taken as

Table 2.10.1 Median background concentrations in soil of harmful substances in Helsinki, as well as the recommended maximums and extreme values of samples.

	Mercury (Hg)		Cadmium (Cd)		Lead (Pb)	PCB		
	mg/kg		mg/kg		mg/kg			
	Parks	Natural soils	Parks	Natural soils	Parks	Natural soils	Parks	Natural soils
Organic surface layer	0.33	0.20	0.26	0.22	57	59	0.03	0.04
Inorganic layers	0.11	0.03	0.14	0.05	29	5.3		0.04
Recommended max.	0.2		0.5		60		0.05	
Max. measured	5		10		300		0.5	

Figure 2.10.1 Mercury levels in Baltic Herring around the ports of Hanko and Kotka in 1990–1998 (mg/kg per kg fresh fish).

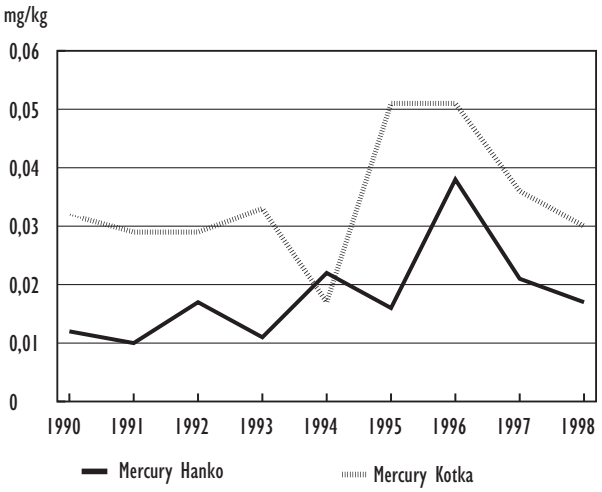
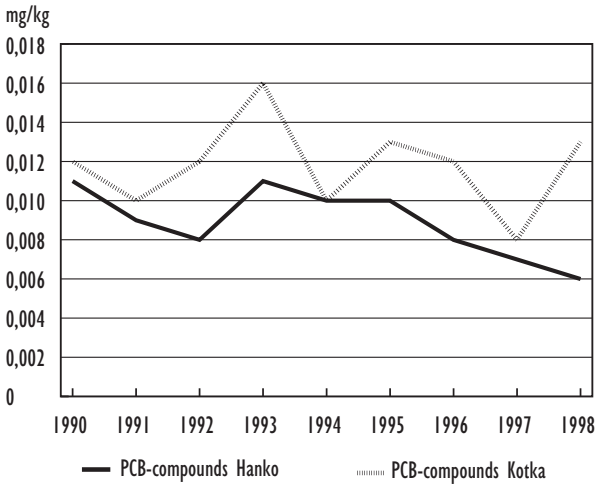


Figure 2.10.2 PCB levels in Baltic Herring around the ports of Hanko and Kotka in 1990–1998 (mg/kg per kg fresh fish).



the sum of the substance's natural concentration in the soil plus that of evenly spread airborne precipitation. 'Natural soils' refers to land that has not e.g. been farmed, artificially fertilised, dug up, filled in, or otherwise used in a manner bringing about chemical changes. A park is defined as a man-made park where (at least) the topsoil has been transported from elsewhere.

Interpretation

Mercury and PCB levels concentrations in Baltic Herrings are significantly lower than the recommended maximums (Hg 0.5 mg/kg, PCB 2.0 mg/kg). Levels are higher in the eastern Gulf of Finland than further west. Mercury levels have declined since 1996. Around the port of Hanko (ca. 100 km west of Helsinki) PCB levels have declined in the 1990s, whereas around Kotka port (140 km east of Helsinki) they have fluctuated wildly.

Background levels of mercury and PCBs in surface soils exceed recommended levels. Median values, however, do not exceed them. Cadmium levels have usually been below the recommended maximums, with considerably greater concentrations measured in surface soils compared to the deeper inorganic layers. It appears that airborne precipitation accounts for a large part of Cd contamination. PCBs are spread into the environment by the combustion processes of energy production, various industries, and traffic. Mercury and lead come from coal burning. PCBs are also present in buildings constructed during the 1950s–1970s.

The measured levels in Baltic Herrings and in soils show chemical contamination to be a problem also in Helsinki. The situation is exacerbated by the stability of heavy metals and the slow decomposition rate in nature of many organic compounds. For example, although leaded petrol is no longer in use, lead levels in surface soil are declining only slowly.

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Silakan kemikaalipitoisuustiedot: Merentutkimuslaitos

Maaperän kemikaalipitoisuustiedot: Helsingin kaupungin ympäristökeskus.

Consultants to the theme

Antti Salla, Helsingin kaupungin ympäristökeskus
Phone: (09) 7312 2772
E-mail: antti.salla@hel.fi

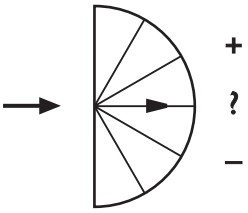
Hannu Haahti, Merentutkimuslaitos
Phone: (09) 613 941
E-mail: hannu.haahti@fimr.fi

Mirja Leivuori, Merentutkimuslaitos
Phone: (09) 613 941
E-mail: mirja.leivuori@fimr.fi

3.
Socio-Economic Factors

Theme 3.1
Demography

In what position would you place the arrow in the sustainable development meter for this theme?



Describes Changes in population structure and size

The theme and its key concepts

Changes in population and population structure are surveyed here. The key concepts are migration, birth and death rates, family, and household.

Why the theme was chosen

It is important to examine the population from multiple perspectives, and to describe other phenomena in relation to changes in population.

What the theme describes and measures

Population growth and other changes in population affect on the structure of the municipality and communities. Central factors in the changes in population are migration, and birth and death rates. Changes in the number of foreign citizens are also examined.

Gender and age distributions as well as the size and structure of families and households affect for example the municipal services. The maintenance rate describes the ratio of the unemployed and the economically inactive to one working person.

The theme is closely related to the theme 2.8. on land use and theme 3.4. (Threats to the welfare of children and the youth).

Calculation principles

The demographic data is based on the statistics of the Population Register Centre, the City of Helsinki Urban Facts, and Statistics Finland. They indicate demographic changes, and especially net immigration, which is the ratio of immigration in to emigration from Helsinki.

Demographic statistics also indicate the excess of births over deaths i.e. the difference between the birth and death rates. They also reveal information about the age and gender distribution, households and family structures.

Interpretation

The population of Helsinki has increased in the 1990's, and it has been estimated that in 2007 the population is 570,000 inhabitants. Clearly more women than men live in Helsinki.

The population growth i.e. net immigration has contributed to the demand for services.

The share of single people is almost 50 % of all the households. Family types have changed only slightly during the 1990's. The share of single parent families has increased again in recent years. About 90 % of single parents are women.

The growing number of the unemployed and the economically inactive has impaired the maintenance rate in Helsinki. There are about 1.5 economically inactive people per one working person. Especially the number of students has increased. On the other hand, due to the growth of the population, the supply of labour force has increased, and competition in the labour market has hardened.

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Väestö: Helsingin väestötietorekisteri ja Tilastokeskus Väestöennuste: Helsingin kaupungin tilastoja 1998:37.

Figure 3.1.1 Population changes in Helsinki 1990–1998.

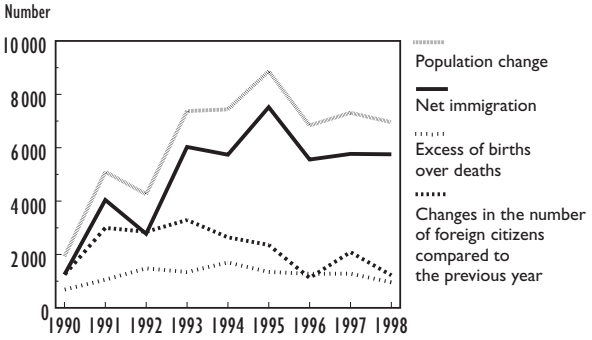


Figure 3.1.2 Population of Helsinki by age group 1.1.1990.

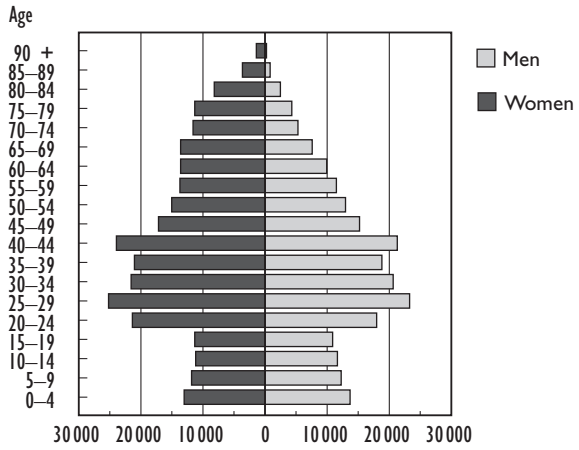


Figure 3.1.3 Population of Helsinki by age group 1.1.2000.

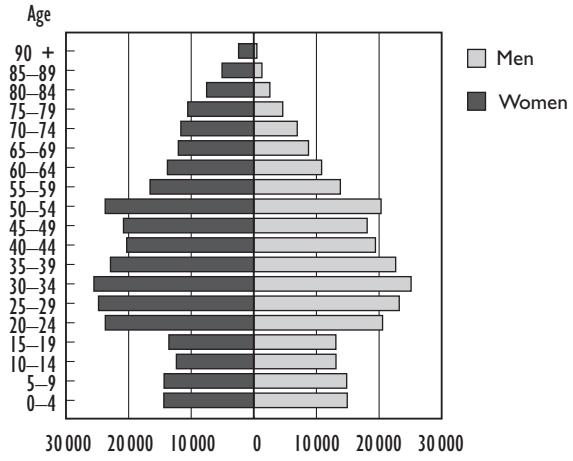


Figure 3.1.4 Households by the number of people in the turn of the year 1989/90 and 1999/00.

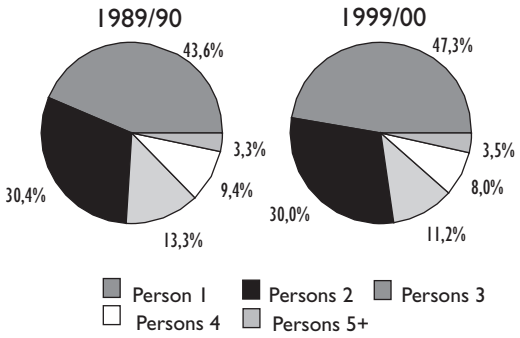


Figure 3.1.5 Share of single parent families of all families with children 1991–1999.

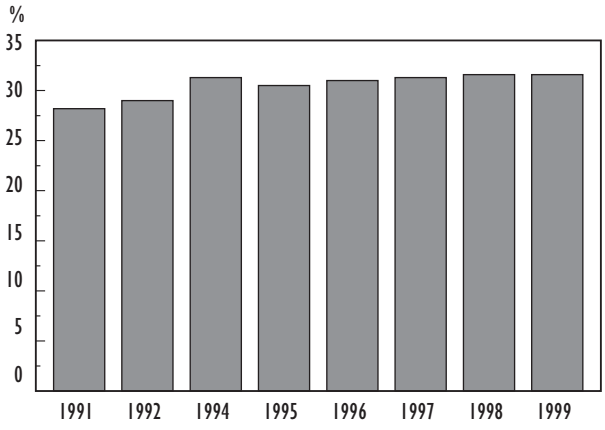
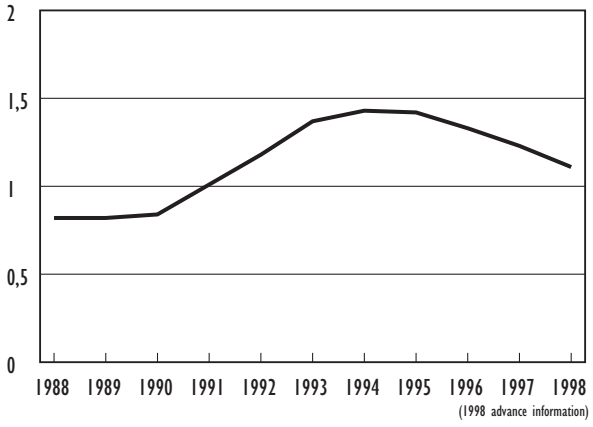


Figure 3.1.6 Economic dependency ratio in 1990–1998.



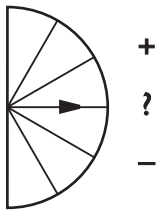
Consultants to the theme

Eeva-Kaisa Peuranen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3178

Pekka Vuori, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 2460
E-mail: pekka.vuori@hel.fi

Theme 3.2
Level of education

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the education of the residents in Helsinki

The theme and its key concepts

In this theme the education level of the population and the differences in the education level between women and men in Helsinki are surveyed. The education level is described according to the educational qualifications that have been attained.

Why the theme was chosen

Education affects employment opportunities, and in information society its importance has further increased. Education level is also an internationally important indicator. Since the adult literacy rate has long been almost 100 % in Finland, it is not used as an indicator for sustainable development in Helsinki.

What the theme describes and measures

The theme describes the education level of working aged population, according to their highest qualifications and the years spent in education. The levels of education women and men are shown separately.

Calculation principles

Statistics Finland has introduced a new classification system for education in 1998. The education level of working aged population (25–64 years) is here described in three categories: basic education, intermediate education and higher education. Since the classification has changed, the chronological development in education can be described only by two categories: a) qualifications from intermediate or higher education, and b) certificates from basic education.

The longer the education takes, the higher the education level becomes. The target level of the qualification primarily defines the education level. The definition of the target level is based on e.g. official curricula, recommended length of education, requirements concerning previous education and qualifications for further education.

* Basic education consists either of the modern comprehensive school (9 years) or the older forms of basic education i.e. primary school, or completion of primary school and the five lowest forms of secondary school
* Intermediate education covers matriculation examination and vocational and professional qualifications.
* University education. The degrees are scientific licentiate and doctoral degrees.
* Higher university degrees. This includes Master's degrees and specialization of medical doctors
* Lower university degrees. Polytechnic degrees and Bachelors degrees, and e.g. engineer, forest engineer and sea captain.
* Lowest tertiary education. This includes for example the non-polytechnic degrees of agrologist, horticulturist, artenomist and nurse.

The education level index of the population is calculated on the basis of the qualifications attained by the population over 20. The index comprises the number of qualifications, emphasizes them according to the level of education. Finally, this information is brought together in one indicator. In figure 3.2.3 the index does not appear as such, but shows the differences in the education levels of women and men in different age groups. It thus indicates which sex in each age group has higher education level.

Figure 3.2.1 Level of education of the 25–64-year-olds in Helsinki 1990–1998.

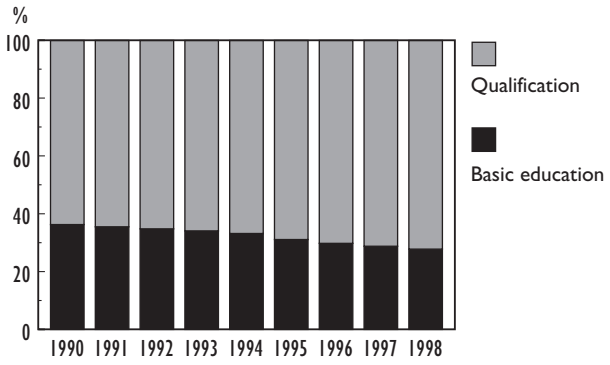


Figure 3.2.2 Levels of education of women and men, December 31, 1998.

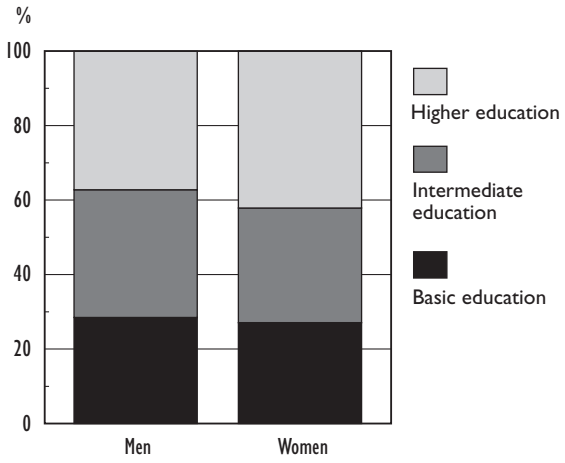


Figure 3.2.3 Gender differences in the level of education by age group December 31, 1998.

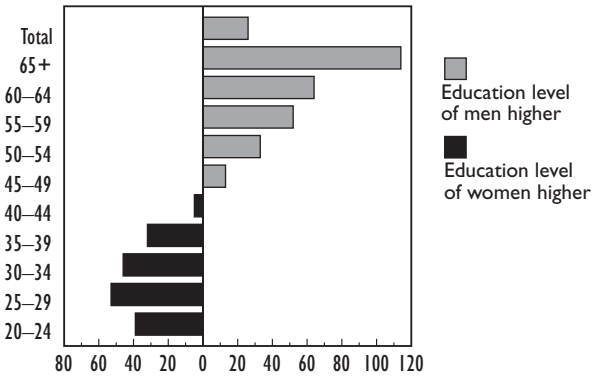
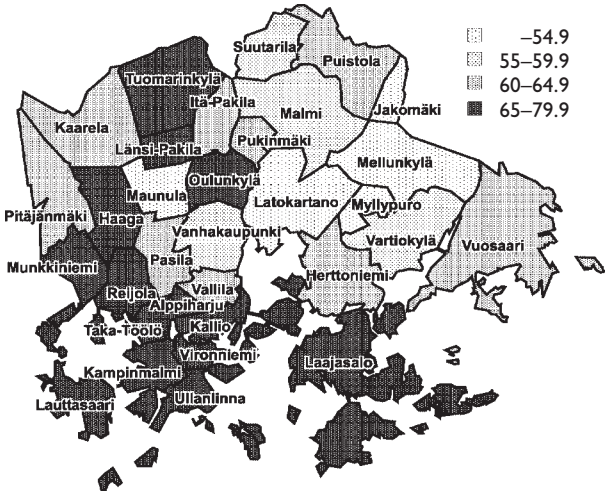


Figure 3.2.4 The share of over 15-year-old population with qualification in the districts of Helsinki, December 31, 1998.



Interpretation

There are plenty of places for education, especially for higher education, in Helsinki and the Helsinki region. All together, there are eight universities for science and arts in the region, and seven of these are situated in Helsinki. In addition, there are seven permanent or temporary polytechnics in the region.

In 1998, 35.6 % of the population of Helsinki had only basic education. 32.5 % had intermediate qualification and 31.8% held higher degree. In different areas of Helsinki the share of the holders of higher degree varied from 10 % in Jakomäki to 47 % in Munkkiniemi. Good education has generally been considered to prevent unemployment whereas the lack of education increases the risk of long-term unemployment.

The difference in education level between women and men has decreased. In the beginning of the 1970's men were more educated than women. In 1997 women in younger age groups (under 45 year-olds) were more educated than men.

The education level of working aged population in Helsinki is higher than elsewhere in the country. Compared to other countries, for example the OECD-countries, the education level in Finland is around the average, though rising.

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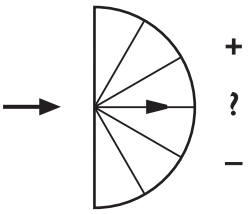
Consultants to the theme

Timo Äikäs, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3184
E-mail: timo.aikas@hel.fi
Salla Säkkinen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3180
E-mail: salla.sakkinen@hel.fi

Theme 3.3
Economic activity

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the business and job structures, and the average income of the population of Helsinki

The theme and its key concepts

In this theme the line of business and job self-sufficiency rate in Helsinki are surveyed. These describe the diversity of business structure generally. In addition, the development in the average income and the differences in income between women and men are surveyed.

Why the theme was chosen

The theme combines the employment opportunities and livelihood of the residents, and vitality and pre-conditions of a healthy urban economy, which among other things enables maintaining the service level.

What the theme describes and measures

The number of jobs, business structure, and job self-sufficiency rate describe the vitality and versatility of the region. At the same time the city's ability to survive in changing circumstances, and the possibility to secure the economical development of the region, and the livelihood of the residents are described.

The job self-sufficiency rate describes the number of jobs in relation to the working population in the municipality.

The income subjected to national tax per income earner describes the average income level in Helsinki. The comparison between the income of women and men describes their general position in the labour market.

Calculation principles

The data is based on the census, and statistics on employment, income and capital provided by the Statistics Finland.

The job self-sufficiency rate is calculated by the following formula: the number of jobs multiplied by 100 and divided by the number of the employed working force.

The average income subjected to the national tax is used in the comparison between the income of women and men. The income subjected to the national tax comprises all income, which can be either money or other valuable benefits. The comparison between the income of women and men is rough, as age, working time and profession have not been taken into account.

Interpretation

Compared to the rest of Finland, Helsinki belongs to an exceptionally large and uniform region of labour and housing market, called Helsinki region. In 1997, 31.6 % of the Gross Domestic Product was produced in this region.

In the 1990's, the business structure of Helsinki became increasingly similar to the business structure of other European cities. During the depression in 1990's the number of jobs in industry and construction sectors decreased more than in the service sector. Consequently, 84% of the jobs are now in the service sector. The share of social and private services has risen, and is now about one third. The combined share of financial services, real property, rental and research services has risen up to one fifth.

Information sector is concentrated in Helsinki and Helsinki region. This so-called information

Figure 3.3.1 Jobs by industry in Helsinki in 1990–1997.

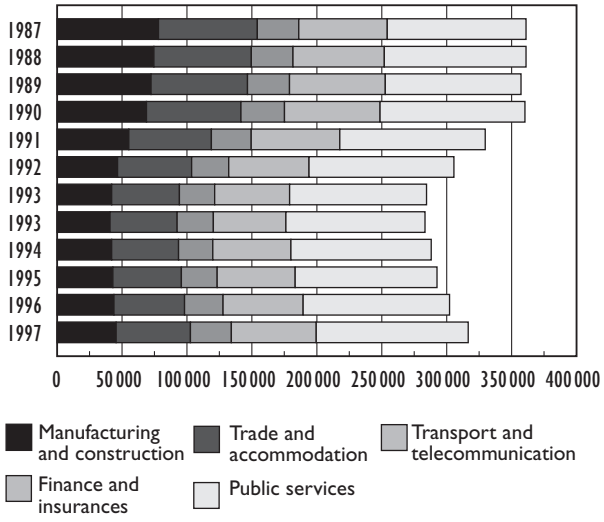


Figure 3.3.2 Job self-sufficiency rate in Helsinki in 1987–1997.

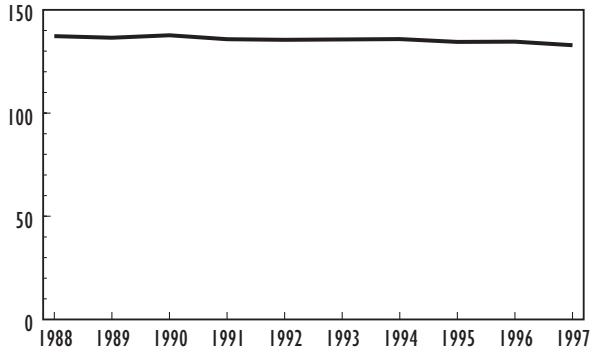


Figure 3.3.3 Average income subjected to national tax per income earner in Helsinki and Finland in 1987–1998.

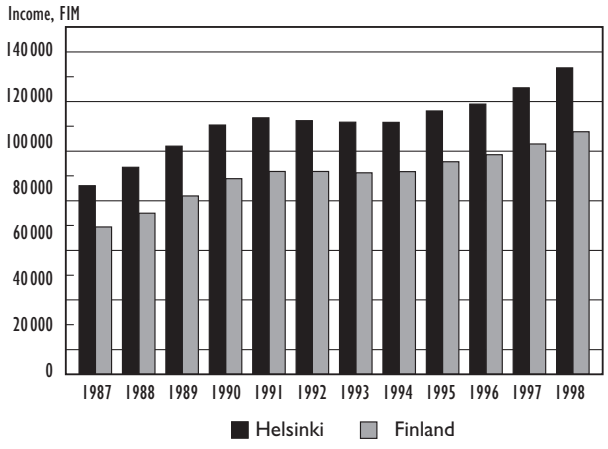


Figure 3.3.4 Share of women's average income subjected to national tax compared to that of men in Helsinki and Finland in 1987 and 1989–1996.

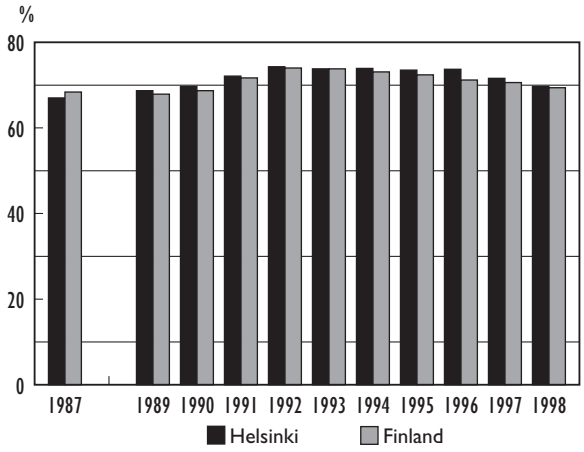
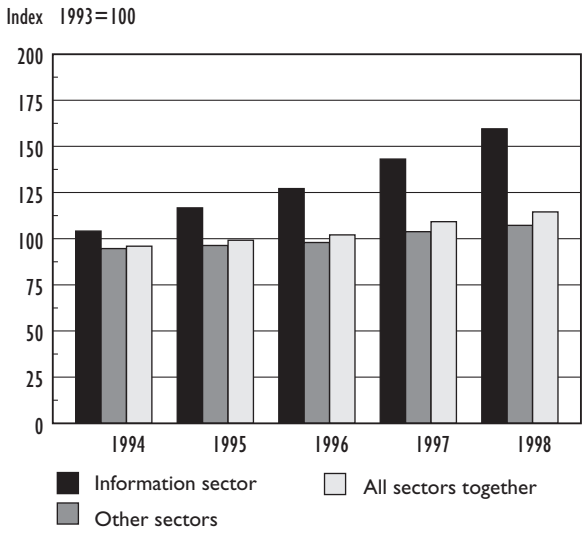


Figure 3.3.5 Employees in enterprises in the information branches and other sectors in Helsinki in 1993–1998.



sector is also described as a new growing sector in Helsinki. The number of jobs in the information sector increased remarkably throughout the 1990's.

According to researches, the industries in Helsinki have formed networks and clusters. Telecommunication, food production, medicine and biosciences, health care and shipbuilding have become important industrial clusters. The growth in these sectors is based on regional advantages, such as high level of local research activities, universities, and advantageous logistic location. Also the education level in this region is higher than the national

average of the working aged population.

There are more jobs than labour force in Helsinki. The job self-suffiency rate decreased remarcably during the recession in the beginning of 1990's. Since 1993 the number of jobs as well as the size of labour force have increased.

The income subjected to national tax per income earner increased from the late 1980's to 1991. After this, the average income decreased for three years. Since 1995, the average income of income earners has been increasing again.

The average income of women increased to 70 % of that of men during the 1990's. In Helsinki the difference is slightly smaller than in the whole country.

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Tilastokeskuksen työvoimatutkimus.

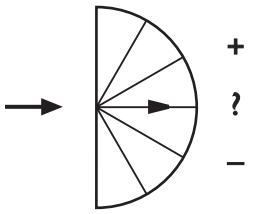
Consultants to the theme

Juha Suokas, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3649
E-mail: juha.suokas@hel.fi

Timo Äikäs, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3184
E-mail: timo.aikas@hel.fi

Theme 3.4 Threats to the welfare of children and the youth

In what position would you place the arrow in the sustainable development meter for this theme?



Describes threatening factors in the growing-up environment of children and youth

The theme and its key concepts

In this theme, especially the alarming trends threatening the welfare and safety of children and youth, which can strengthen the segregation and social exclusion, are surveyed. Unemployment and difficulties in subsistence worsen the living conditions of families, children and youth.

Why the theme was chosen

When aiming at a socially sustainable city, also the drawbacks in the city must be surveyed. It is especially important to take care of the growing-up environment of children and youth.

What the theme describes and measures

Unemployment rate indicates the percentage of the unemployed labour force. The shares of women and men, and the numbers and shares of young and long-term unemployed are shown separately. Living allowance is the official form of social support to people whose salary or other income (e.g. housing allowance) does not reach the specified minimum level of subsistence. The number of recipients of living allowance also indirectly describes poverty.

Crime in the city presents a threat to the safety of the residents. The statistics on the narcotic offences are based on the crimes reported to the police in the district of Helsinki. The theme is closely related to the themes 3.3 Economic activity and 4.1 Pleasantness and safety the neighbourhood.

Calculation principles

The following figures are based on the unemployment statistics from the Ministry of Labour: the number of women, men, young and long term unemployed (unemployed for longer than one year), the unemployment rate, and vacancies reported to the employment office and unemployed job seekers. The average for the year has been calculated on the basis of the situation in the end of each month.

The number of recipients of the living allowance was reported by the social office.

Interpretation

Along with the economic recession in the beginning of the 1990's, the unemployment rate increased remarkably in Helsinki. Only in recent years has it increased again. The unemployment rate has been high in Helsinki.

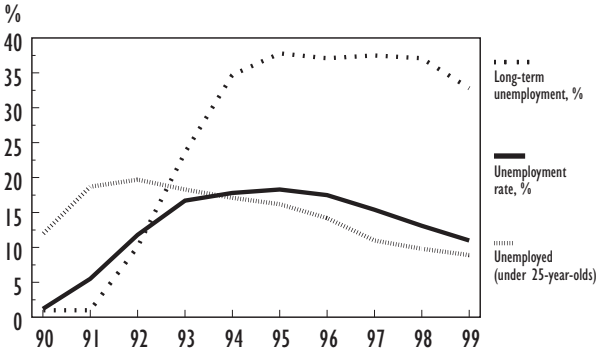
Economy has recovered from the recession in the beginning of 1990's, and in 1999 the number of jobs was the same, or maybe even slightly bigger, than before the recession. The new jobs also demand remarkably highly educated labour force.

The unemployment rate of women has been lower than that of men. For the young and long-term unemployed there has been a change for the better.

On the other hand, education has been made compulsory for the young people under the age of 24 who have not managed to find a job or a place for education.

The increase in the number of recipients of living allowance in the beginning and in the middle of the 1990's was mainly due to unemployment. On the other hand, the other forms of social allowances have been cut down, or their level has not been re-

Figure 3.4.1 Unemployment rate (%) in 1990–1999.



The share of under 25-year-old unemployed job seekers and the long-term unemployed of all the unemployed.

Figure 3.4.2 Number of the unemployed and the shares of different groups in 1991–1999.

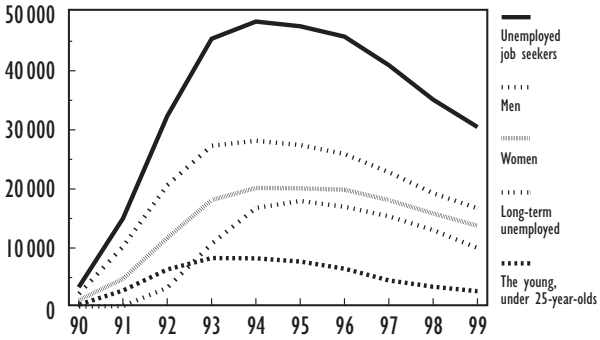


Figure 3.4.3 Number of the unemployed and vacancies in 1990–1999.

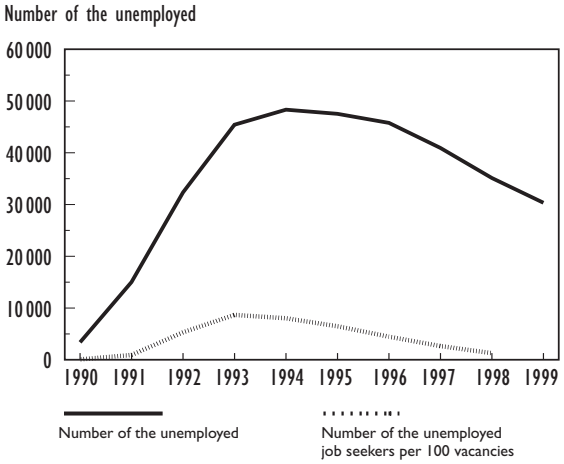


Figure 3.4.4 Share of population receiving living allowance (%) in 1990–1999.

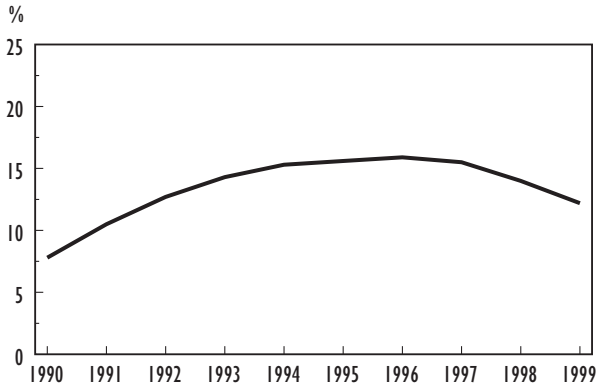
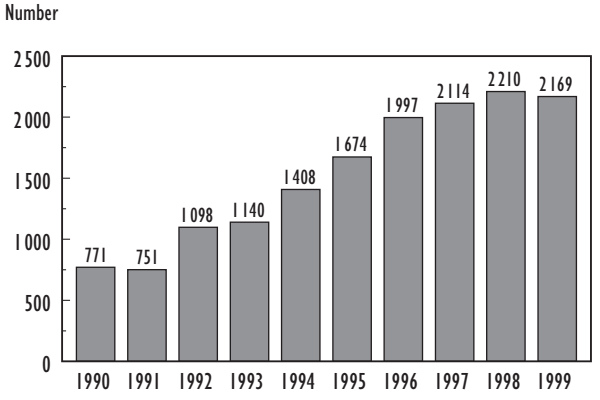


Figure 3.4.5 Offences involving narcotics in 1990–1999.



vised according to the increase in living costs. Especially housing costs have increased during the 1990's; at the same time the housing allowance has been cut down several times. The average duration of the dependence on allowances has increased. In 1997, the number of the recipients of living allowance started to decline. In 1998 the duration of long-term dependence on living allowance ceased to increase.

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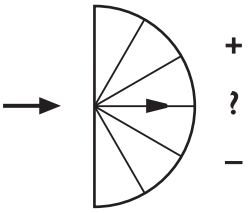
Rikokset: Helsingin poliisilaitos, tietohallintotoimisto ja Tilastokeskus.

Consultants to the theme

Salla Säkkinen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3180
E-mail: salla.sakkinen@hel.fi
Juha Suokas, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3649
E-mail: juha.suokas@hel.fi

Theme 3.5
Health

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the health and life expectancy of the residents of Helsinki

The theme and its key concepts

The health of the residents of Helsinki is examined in terms of life expectancy, the most common causes of death, and changes in these.

Reasons for choosing the theme

Life expectancy is common way to demonstrate international differences in the standard of living. The most common causes of death indicate changes in people's health and their environment. Both indicators have been standardized, and they are used as indicators for sustainable development in international projects.

What the theme describes and measures

Life expectancy and the four most common causes of death are used as the indicators for the general health of the residents. Environmental and other factors that affect the disease and mortality rates of a population become visible relatively slowly in the indicators. Therefore they need to be observed over a long period.

Life expectancy describes the average number of years that a newborn child belonging to a certain age group is expected to live. It comprises the temporal mortality risks of each age group, and enables comparisons between the average life expectancies of women and men. Life expectancy describes circumstances related to the mortality rate and health of the residents of Helsinki, revealing information about changes in their lives and living conditions. Life expectancy can also be considered to indicate social development.

Calculation principles

Life expectancy is calculated on the basis of mortality risks in different age groups. The given figure thus reveals the average number of years a newborn child is expected to live.

The annual figures related to the most common causes of death are proportioned to 10,000 inhabitants.

Interpretation

The most common causes of death have remained almost unchangeable in the 1990's. The most obvious positive changes are related to circulatory diseases, which today lead to death more rarely than before. On the other hand, the net immigration among the young age groups in Helsinki has been positive throughout the 1990's. This is also reflected in the most common causes of death.

The average life expectancy is increasing for both women and men. The difference between the life expectancies of men and women is decreasing, but women still live about eight years longer than men.

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Eeva-Kaisa Peuranen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3178
E-mail: eeva-kaisa.peuranen@hel.fi

Figure 3.5.1 Life expectancy in 1991–1995 and 1996–1998.

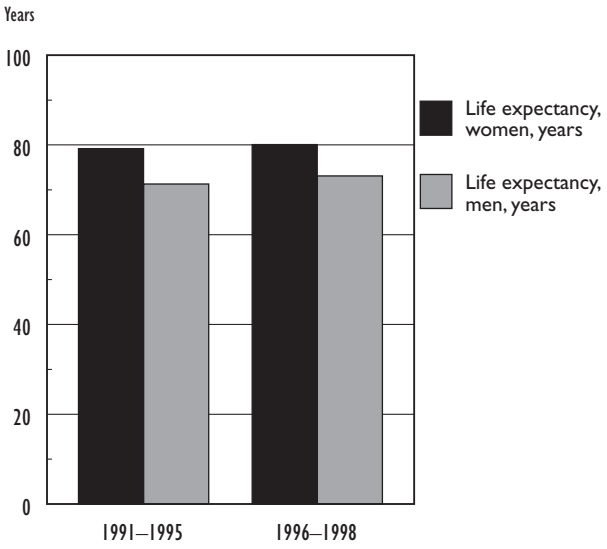
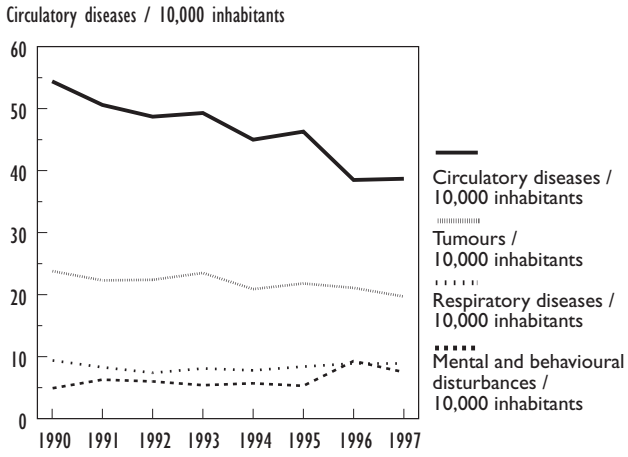


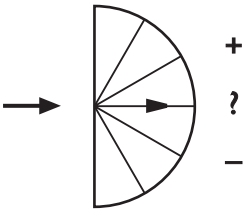
Figure 3.5.2 The most common causes of death in 1990–1997.



Salla Säkkinen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3180
E-mail: salla.sakkinen@hel.fi

Theme 3.6
Housing conditions

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the housing conditions in Helsinki

The theme and its key concepts

The general housing conditions and particularly the special characteristics of Helsinki are surveyed here. The key concepts are living space, cramped living conditions, dwelling by tenure status, queues to the council flats, recipients of housing allowance, the share of housing allowances of the total housing costs of the recipients, average prices and rents per m^2 and homelessness.

Why the theme was chosen

Housing is one of the basic needs, and part of people's welfare and contentment. This theme combines the international indicators for sustainable development, such as the UN indicators for sustainable development, and particular local features.

What the theme describes and measures

The floor area (m_2) per person and cramped living conditions are general indicators for housing standard and living space. The changes in population structure and housing stock are combined in these indicators, and they reflect changes in the economy.

Classification of the housing stock by tenure status describes the housing market in the municipality in general. It also indicates the residents' alternatives for choosing their dwelling. The house prices and rents per m_2 describe the operation of the market. Homelessness and queues to the council-owned dwellings describe the demand for dwellings in general, and more specifically the demand for fair-priced rented dwellings.

Calculation principles

Living space indicates the floor area per person in square meters. Cramped living conditions are defined as more than one person per room. Kitchen has here been counted as one room. Housing stock has been divided into three categories according to the tenure status.

The number of people who have applied and received a council dwelling is based on the dwelling distribution statistics of the city.

The average house prices and rents per m_2 are based on the annual statistics of the Statistics Finland. They have been made comparable through indexation (1985 = 100), and accurate according to the cost-of-living index.

Interpretation

The indicators for general housing standards reveal little changes in Helsinki in the 1990's. Since the beginning of the decade, living space (m^2/person) has increased with about one m^2. In spite of increased living space, housing in Helsinki is more cramped than elsewhere in the country.

In the beginning of 1990's, owner-occupied dwellings were released to the rental market. At the same time, rent regulations were abolished. The survey on the housing stock based on the tenure status shows that the number of rented dwellings has been increased both by the former owner-occupied dwellings and the building of new rented dwellings.

There has been a great deal of demand for rented dwellings in Helsinki during the whole 1990's. This is due to the positive net migration throughout the 1990's (Helsinki is an important student city), unemployment, and economic diffi-

Figure 3.6.1 Living space (m^2) per capita in 1975, 1980, 1985 and 1990–1998.

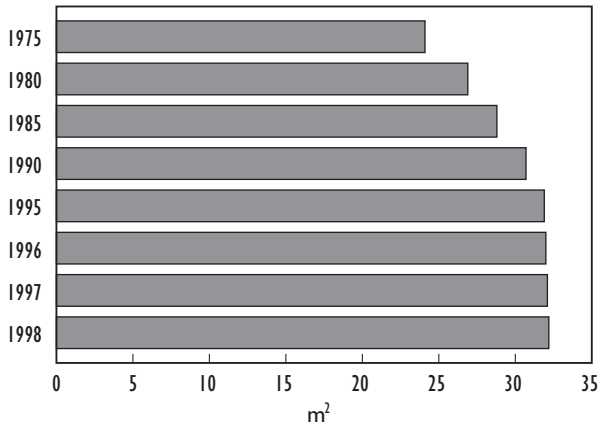


Figure 3.6.2 The share of households and persons with cramped living conditions in 1985, 1990 and 1995–1998.

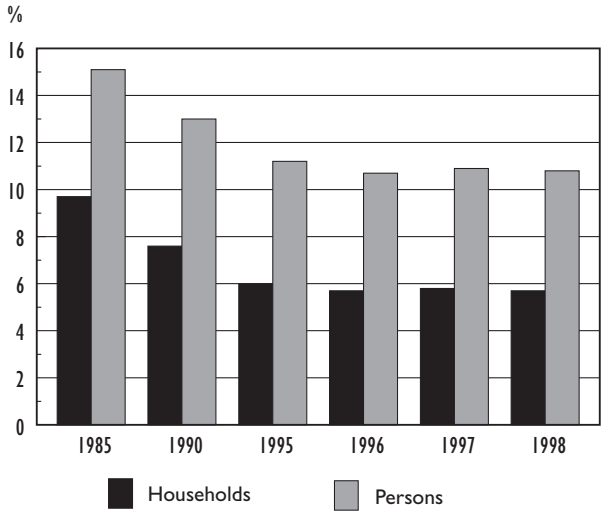


Figure 3.6.3 Housing stock by tenure status in 1990–1998.

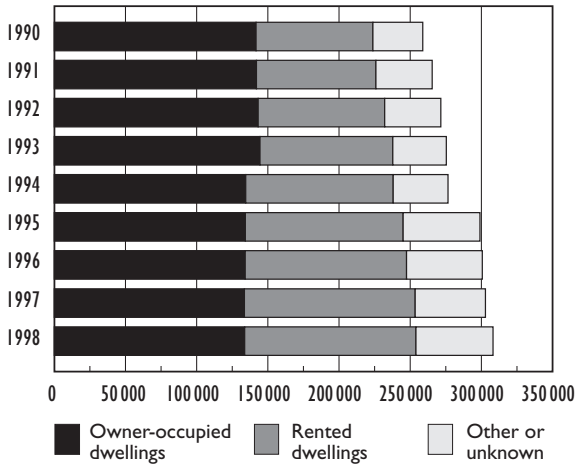


Figure 3.6.4 Applicants and recipients of municipal housing in 1990–1999.

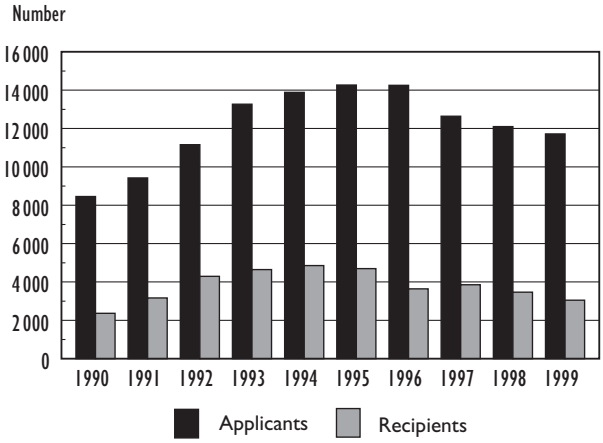


Figure 3.6.5 Average prices and rents per m^2 in 1985–1999.

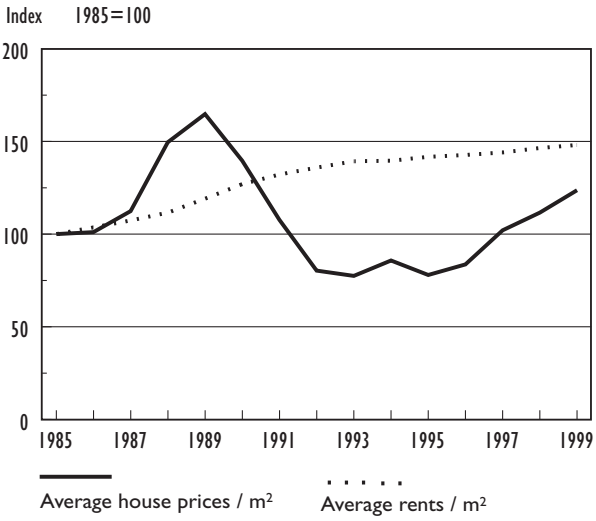


Figure 3.6.6 Households receiving housing allowance (rented dwellings) in 1990–1998.

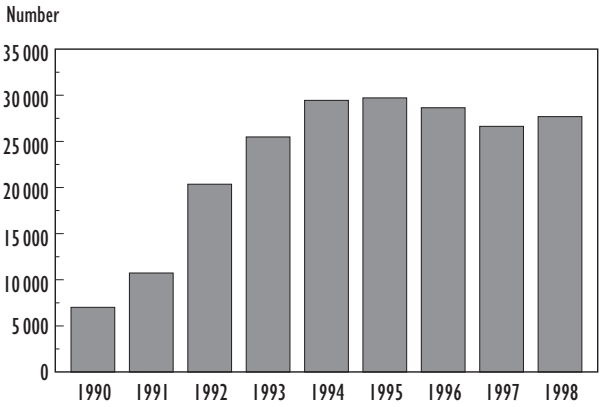


Figure 3.6.7 Share of housing allowance of the recipients' total housing costs in rented dwellings in 1990–1998.

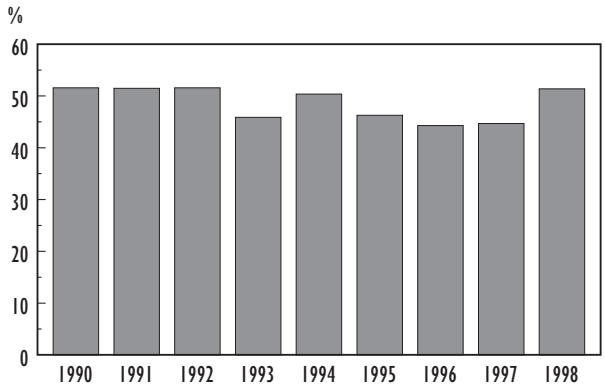
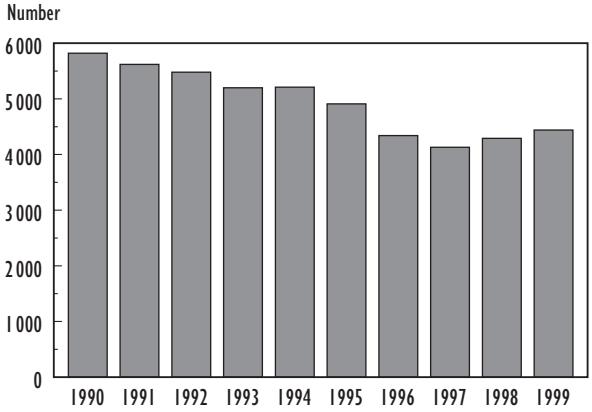


Figure 3.6.8 Number of single homeless people in 1990–1999



culties. The demand for rented dwellings and the abolition of rent regulations have resulted in higher rents. Also the number of people queuing for council dwellings has increased. Compared to the private the council dwellings are cheaper and more stable in terms of tenancy. In 1998 about 90,000 citizens lived in the dwellings owned by the council in Helsinki.

The number of recipients of housing allowance increased in the beginning of the 1990's, but the tightening of the criteria for the allowance in 1995 reduced the number of recipients. The share of the housing allowance of the recipients' total housing costs decreased in the beginning of the decade, but was in 1998 again on the same level as in the beginning of the 1990's.

The number of single homeless people declined rather steadily during the first years of 1990's. In 1997 the direction changed, and for the past few years, homelessness has been increasing.

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Helsingin omistamat asuinkiinteistöt: Kiinteistövirasto.
Kaupungin asunnonjako: Kiinteistöviraston asuntoasiainosasto.

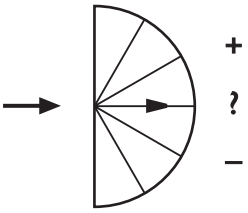
Consultants to the theme

Leila Lankinen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3185
E-mail: leila.lankinen@hel.fi
Jorma Kinturi, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3229
E-mail: jorma.kinturi@hel.fi
Salla Säkkinen, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3180
E-mail: salla.sakkinen@hel.fi

4.
Pleasantness and Service Level of the Neighbourhood

Theme 4.1 Neighbourhood comfort and safety

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the pleasantness and safety of the neighbourhood in terms of noise level, traffic accidents and crime

The theme and its key concepts

The Land Use and Building Act (132/1999) aims at developing a safe, healthy and pleasant living environment. The following factors among others contribute to this: the availability of services, arrangements of public transport and light traffic, beauty and cultural value of the built environment, and a sufficient number of parks and recreation areas. The local characteristics, urban townscape and landscape, as well as the needs of different population groups, such as children, and old and disabled people, should also be considered (sections 5, 28, 39, 54).

Noise has a significant impact on people's well-being. As the density of settlements has increased more and more people are affected by the increased environmental noise, caused mainly by the road traffic. The safety of the living environment includes many factors such as the risk of traffic accidents and fear of crime.

Why the theme was chosen

The pleasantness and safety of the neighbourhood are important factors in social sustainability and the welfare of the people.

Pleasantness of the living environment is also related to the ecological sustainability of a community in multiple ways. A decrease in the well-being leads to many kinds of disturbing behaviours, and increases residents' need to travel away from their usual surroundings in their spare time. This increases the consumption of energy and material.

What the theme describes and measures

There are few objective indicators to describe the pleasantness and safety of the living environment. Different people consider different factors to increase or decrease their well-being and safety.

Of the chosen indicators, noise level describes the share of population that is affected by noise problems in their living environment. Safety is measured in terms of the number of accidents in light traffic, crimes against property, crimes against life or health, and sexual offences.

Green areas and traffic districts, which are closely related to the pleasantness and safety of the neighbourhood, are surveyed in theme 2.8 concerning the distribution of land. This theme is also related to the themes 2.7 (Traffic) and 4.2. (Municipal economy and services)

Calculation principles

Noise level is calculated by using the share of people (% of population of Helsinki) who in 1980 and 1993 were living in areas with noise problems. Areas with noise problems are those where noise from the road traffic exceeds 55 dB (A) at daytime. This data will be updated in soon.

The numbers of deaths and injuries of pedestrians and cyclists are based on the criminal records of the police. The records include all the cases of death, and less than 60 % of the casualties, but only 10–35 % of the injured cyclists. The accident risk is calculated as the number of victims in light traffic per 10,000 residents, and for the major districts, per 10,000 residents and jobs. Motor ways are not included in the calculation.

Crimes against life and health cover manslaughter, murders, killings and their attempts, assaults,

Figure 4.1.1 Share of people living in noisy areas in Helsinki in 1980 and 1993.

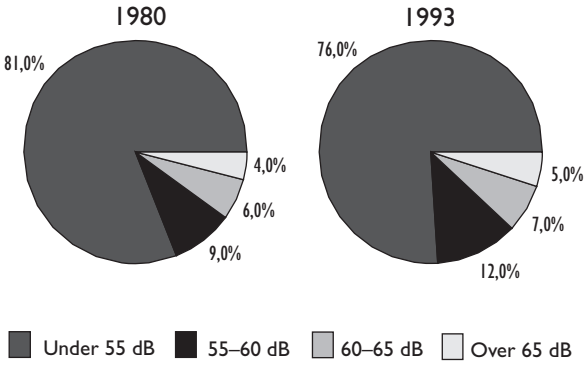
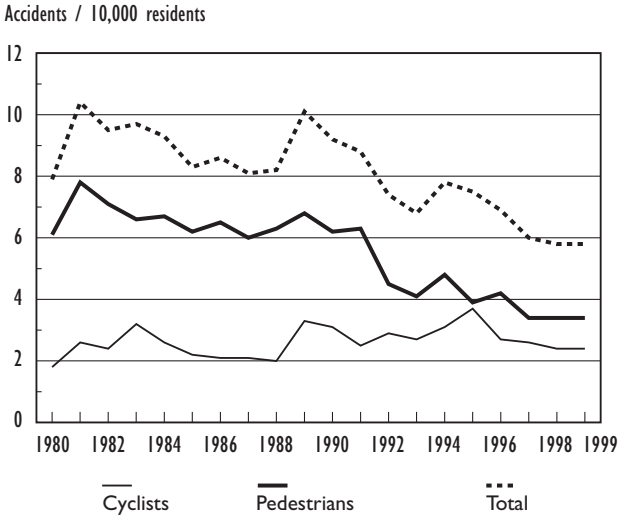


Figure 4.1.2 The number deaths and injuries of pedestrians and cyclists per 10,000 residents in Helsinki 1980–1999 (motor ways excluded).



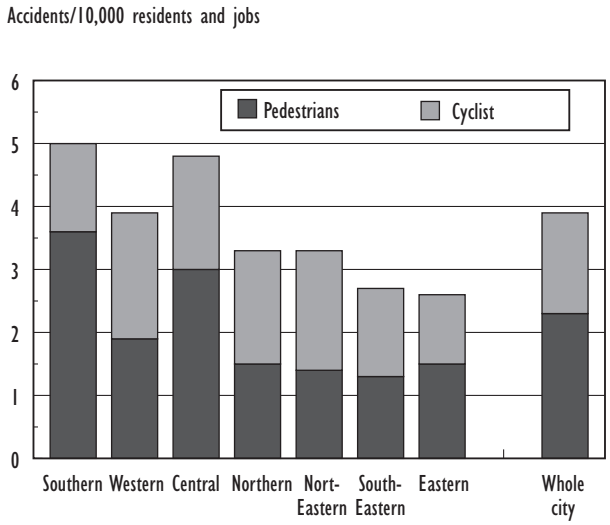
disablement and sexual crimes that have been reported to the police. The number of crimes is given per 1,000 residents.

Crimes against property include theft, larceny and pilfering, unauthorized use of vehicle, robbery, fraud and damage to property that have been reported to the police. Their number is also given per 1,000 residents.

Interpretation

In 1980, 19% of the population of Helsinki lived in areas that were classified as noisy. In 1993 the share was 24 %. Reasons for the change are the increased traffic and density in the city's structure.

Figure 4.1.3 The number deaths and injuries of pedestrians and cyclists per 10,000 residents and jobs in the major districts in Helsinki 1996–1999 (motor ways excluded).



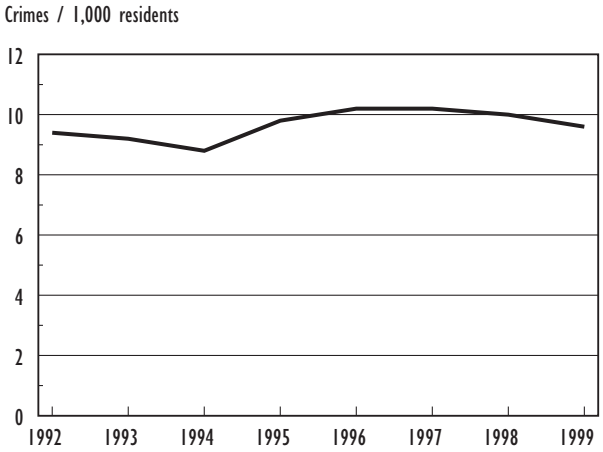
In the end of the 1990's, about 190 pedestrians (4 per 10,000 residents) and 150 cyclists (3 per 10,000 residents) were injured or died in Helsinki every year. In reality, when the difference in the coverage of these statistics is taken into consideration, the number of cycling accidents is probably at least as high as that of pedestrians'.

The safety of pedestrians increased significantly in 1990's. The most significant change took place in 1992 when the speed limit of 40 km/h was introduced in the inner city of Helsinki. The number of cycling accidents did not increase significantly in the 1990's. 1995 was a peak year for both the popularity of cycling and the number of cycling accidents. The accident risk in light traffic is slightly higher for school children (7–14 year-olds) than for adults.

Half of the fatalities in traffic in Helsinki were pedestrians. At the end of the 1990's, six pedestrians and two cyclists died every year. The number pedestrian fatalities dropped to one sixth in three decades in Helsinki: in the 1960's there were about 40 fatalities per year.

Approximately two thirds of the accidents in light traffic took place in the Southern and Central major districts of the inner city. Also the accident risk was higher in these districts. Large part of pedestrian accidents happened in the city centre and on the main streets that lead to the centre. The number of cycling accidents was slightly higher in suburbs than in the inner city.

Figure 4.1.4 Crimes against life and health per 1,000 residents in Helsinki 1992–1999.

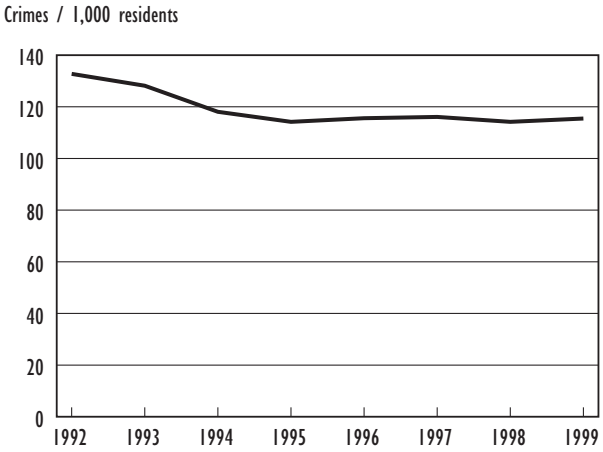


The number of crimes against life and health reported to the police has remained in 10 offences per 1,000 residents. The total number of offences was 4,698 in 1992 and 5,246 in 1999. It is important to remember that for example domestic violence is not always reported to the police.

The number of crimes against property per 1,000 residents started to decline in the beginning of the 1990's, and has remained in 115 offences per year. About two thirds of the offences are thefts. The crimes against property include fraud and embezzlement, which are not directly related to the safety of the neighbourhood. Due to the classification system, however, their share (11 % in 1999) is also included in these statistics.

The number of recorded crimes is affected for example by changes in police surveillance, legislation, and in willingness to report the crime to the police.

Figure 4.1.5 Crimes against property per 1,000 residents in Helsinki 1992–1999.



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Melutiedot: Helsingin melutietokanta

Rikostiedot: Helsingin poliisilaitos ja Tilastokeskuksen Stat-Fin-tilastopalvelu

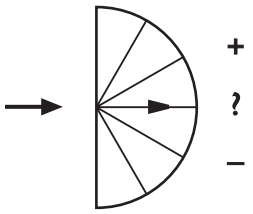
Consultants to the theme

Sari Kettunen, City of Helsinki Environment Centre
Phone: (09) 7312 2917
E-mail: sari.kettunen@hel.fi

Kirsti Nieminen, City Planning Department
Phone: (09) 169 3490
E-mail: kirsti.nieminen@hel.fi

4.2 The municipal economy and services

In what position would you place the arrow in the sustainable development meter for this theme?



Describes the development in municipal tax revenue in relation to the level of services

The theme, its key concepts and sources

In this theme the development of tax revenue of the city, and the amount and use of some services are surveyed. Good municipal economy enables sufficient services of good quality. The tax revenue of Helsinki is surveyed as a change in municipal taxes, real estate taxes and communal taxes.

The description of services is based on the available statistics and surveys. *Helsinki by Districts* publication *(Helsinki alueittain)* and its Internet version provide information on the service supply. Also residents' opinions about the municipal services have been surveyed in 1983, 1989, 1993 and 1998. City Planning Department's surveys on the spatial distribution of basic services in districts also describe the service level.

Helsinki by Districts 2000 is intended for everyone interested in the districts of Helsinki. General reviews of the recent development of the city and theme maps of the districts are given in the beginning of the book. Each of the 33 districts are described in four pages, also the future prospects are described. Each district is given a statistical profile with the help of eight indicators, which enable the comparison of the district to the whole city, and other districts. Tables and figures reveal latest information about the land use, population, housing, construction and services.

Helsinki by Districts publication is available in the Internet at the home page of City of Helsinki Urban Facts, http://www.hel.fi/tietokeskus where there is a link to a database on Helsinki Region Statistics (Helsingin seudun Aluesarjat) where most of the book's statistics are available by sub-district.

The usage of the municipal services depends on population structure, but also on the number and quality of services. The tables on children's day care and libraries are given as examples of the usage of municipal services.

Table 4.2.1 Services.

Health centres	32
Library	37
Health centres	32
Schools	209
Day-care centres	337
Adult education centres	96
Cultural centres	12
Youth centres	about 100
Playground	62
Swimming pool	13
Other indoor sports facilities	382
Sports ground	28
Beaches	20
Park (ha)	919.2
Forest (ha)	3,967
Church	53
Post office	50
National pensions institute -office	13
Pharmacy	70
Alko (State Alcohol Monopoly of Finland)	26
Groceries	314
Other retail shops	2,897
Restaurants and cafeterias	1,431

Why the theme was chosen

Services are a central part of the well-being of the residents. Basic services are provided close to the residents. There are many-sided statistics available about the supply and use of the services in different areas (main districts and districts). Services have an impact on the quality of life.

Figure 4.2.1 Tax revenue of the city of Helsinki in 1993–1998.

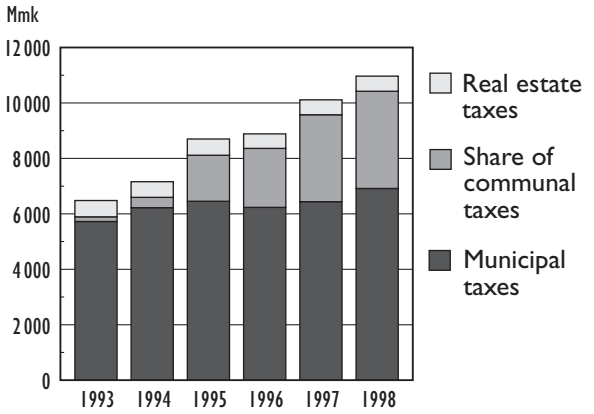
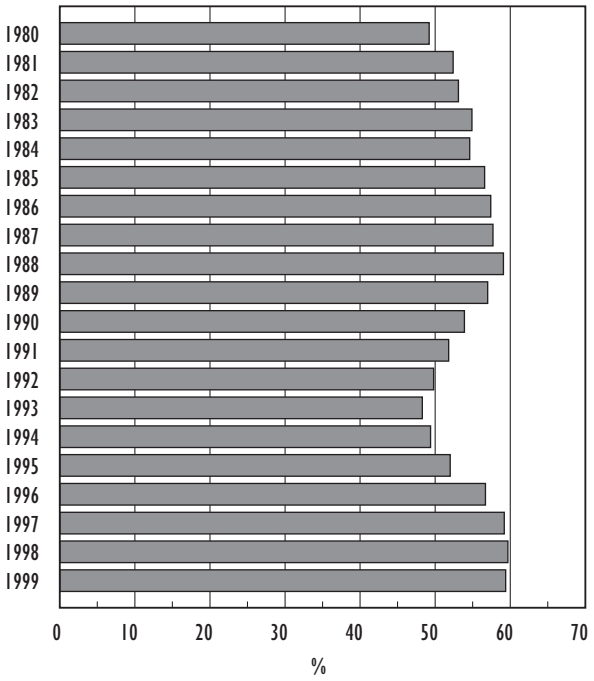


Figure 4.2.2 The share of children (1–6 years) in municipal or private day care in Helsinki 1980–1999.



The economy of the city of Helsinki is based mainly on tax revenue, and the production of welfare services is its largest expenditure.

The joint index of basic services describes the service level in different districts. It is based on the spatial distribution of services. Basic services are the services that the residents need most often. These should be available in different parts of the city. Basic services are health centres, kinder gardens, youth centres, comprehensive and high schools, municipal libraries, indoor sports facilities and groceries. The joint index describes the average service level of the district (Priha, 1998).

Figure 4.2.3 Visits to libraries and number of loans per resident in 1985, 1990–1999.

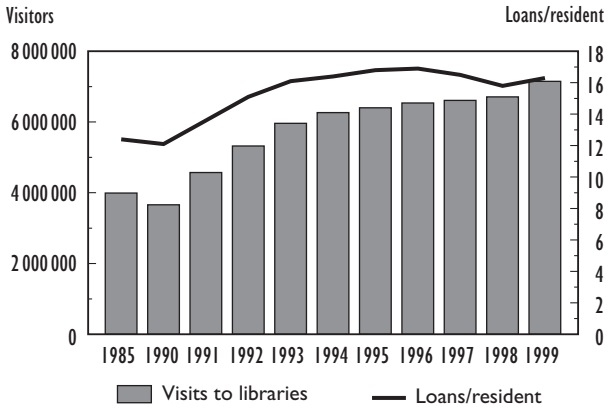


Figure 4.2.4 The joint index of basic services by district in 1998.

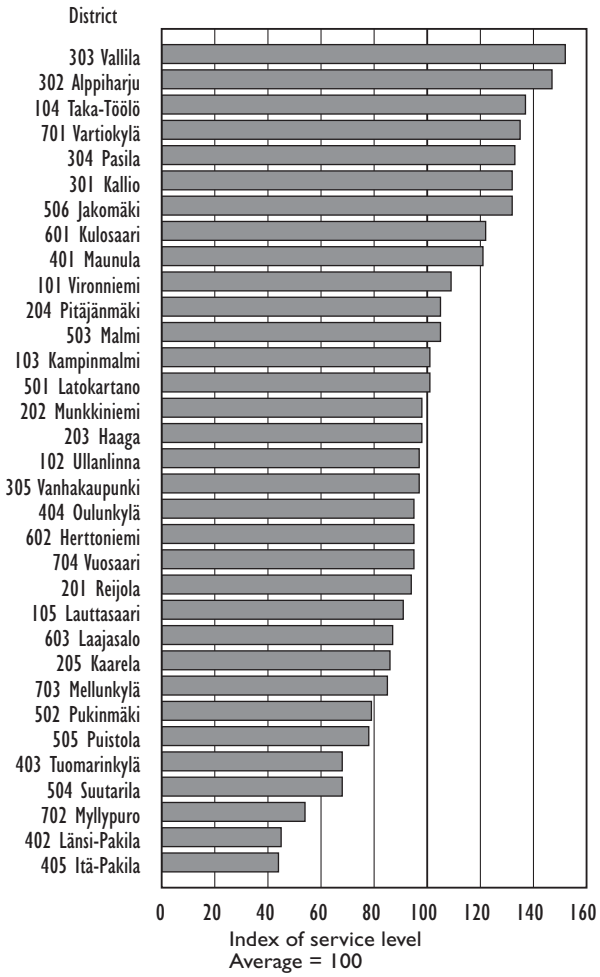
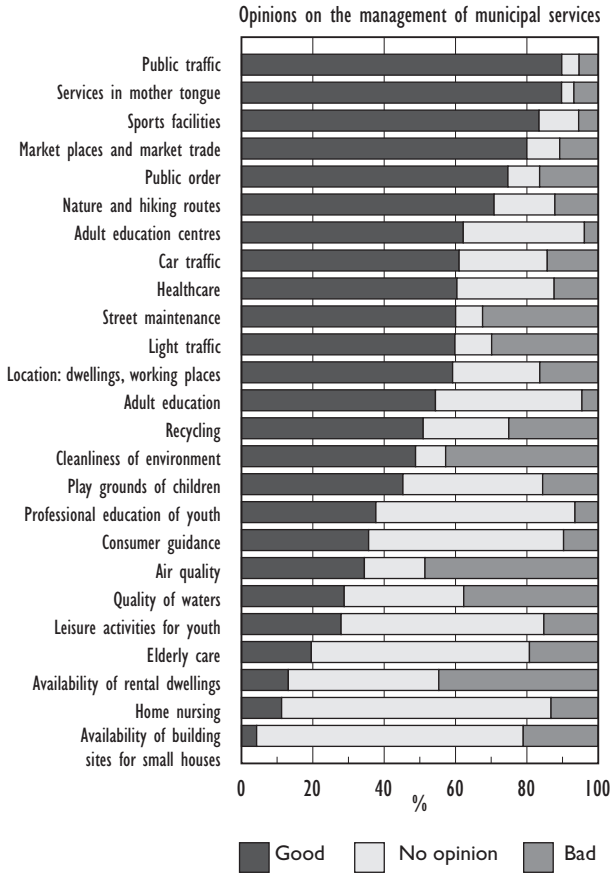


Figure 4.2.5 Opinions on the management of municipal services in Helsinki in 1997.



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Helsingfors svenska arbetarinstitut.

Helsingin kaupungin kulttuuriasiainkeskus.

Helsingin kaupungin nuorisoasiainkeskus.

Consultants to the theme

Heikki Helin, City of Helsinki Urban Facts
Phone: (03) 743 2927
E-mail: heikki.helin@hel.fi

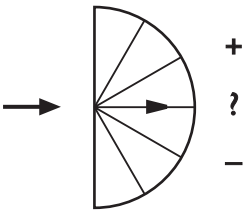
Jaakko Priha, City Planning Department
Phone: (09) 169 3615
E-mail: jaakko.priha@hel.fi

Timo Äikäs, City of Helsinki Urban Facts
(statistics and information services)
Phone: (09) 169 3184
E-mail: timo.aikas@hel.fi

5.
Participation and Responsibility

Theme 5.1 Environmental attitudes and behavior

In what position would you place the arrow in the sustainable development meter for this theme?



Describes how the attitudes and actions of residents and enterprises reflect the principles of sustainable development

The theme and its key concepts

The attitudes related to the state and protection of environment are important for the further protection of the environment.

Environmental behaviour refers to people's practices and behaviour in relation to the central environmental problems. Avoidance of waste production, recycling of waste and habits related to transport are examples of such practices.

The voluntary introduction of environmental management systems (EMS) shows that environmental aspects have become part of everyday practices in enterprises. Environmental management systems make it easier to approach to environmental issues systematically, and at the same time their implementation shows the company's willingness to take care of the environment. Environmental management systems based on Eco-Management and Audit Scheme (EMAS) of the European Union, or on the international ISO 14001 standard, and they are always inspected by an expert from outside the company. WWF and Greenseal Oy have developed the Green Office system, which is a special environmental management system for offices and enterprises providing services.

Why the theme was chosen

Environmental attitudes are not always reflected in people's actual practices and consumer behaviour. On the other hand, the possibilities to recycle waste or buy eco-labelled goods vary in different regions and households. We are still trying to discover a sufficiently reliable indicator to show how the principles of sustainable development are rooted in the everyday practices of the residents and enterprises in Helsinki.

What the theme describes and measures

The share of people who consider environmental protection important describes the residents' general attitudes towards environment in Helsinki. The sorting of glass waste is an example of environmental behaviour.

The environmentally friendly household practices are indicated for example by the amount of mixed waste per resident and the reception of organic waste in the theme 2.6 concerning the amount and reclamation of waste. Also the share of people using public transport and the number of cyclists surveyed in the theme 2.7. (Traffic) describe the same phenomenon.

The development in the number of environmental management systems describes the environmental attitudes and practices of enterprises in Helsinki.

The indicators for environmental behaviour are being developed further.

Calculation principles

City of Helsinki Urban Facts and City of Helsinki Environment Centre have surveyed the environmental attitudes of the residents of Helsinki. In 1989 (684 responses) and 1994 (820 responses) the surveys were conducted through telephone interviews, and in 2000 (1,220 responses) through posted questionnaires. The results of the year 2000 are tentative.

The number of environmental management systems certified by the ISO 14001 standard is from July 2000, and it comprises the enterprises that are registered in Helsinki or have a separate office in Helsinki. Some information may still be lacking.

In March 2000 there were no environmental registrations based on the EMAS scheme in Helsinki.

Table 5.1.1 Opinions of the residents in Helsinki concerning the importance of environmental protection in 1989, 1994 and 2000. (% of responses).

Environmental protection is	1989 %	1994 %	2000 %
Extremely important	75	66	75
Very important	24	32	24
Not important	1	1	1

Figure 5.1.1 Importance of environmental protection and other societal targets in 1989, 1994 and 2000 (the share of 'extremely important' answers of all responses)

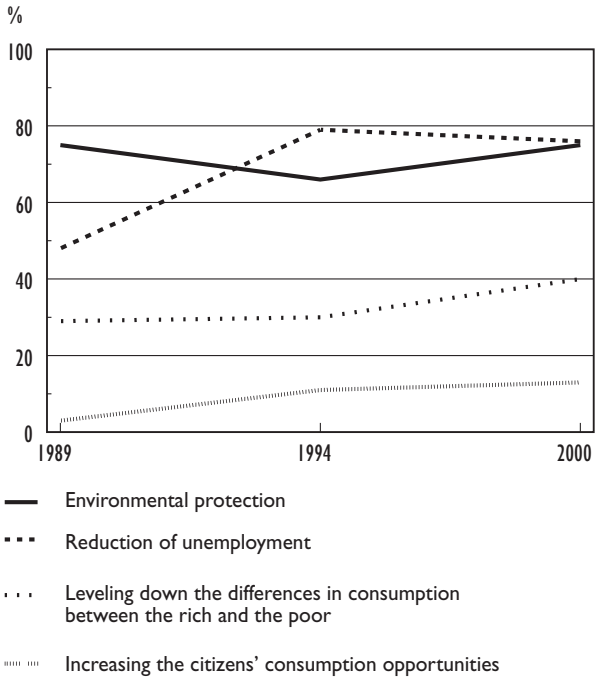


Figure 5.1.2 Frequency of glass waste sorting among the residents of Helsinki in 1989, 1994 and 2000 (% of responses).

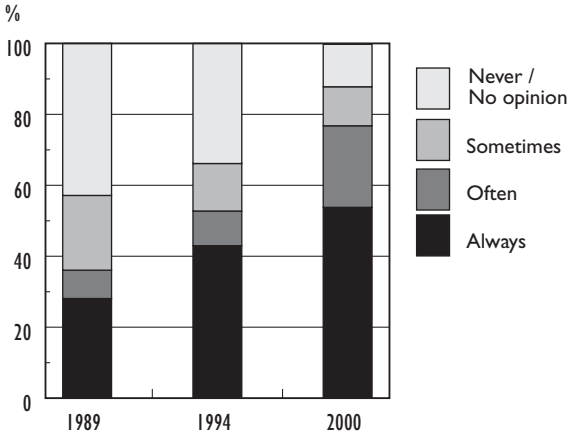
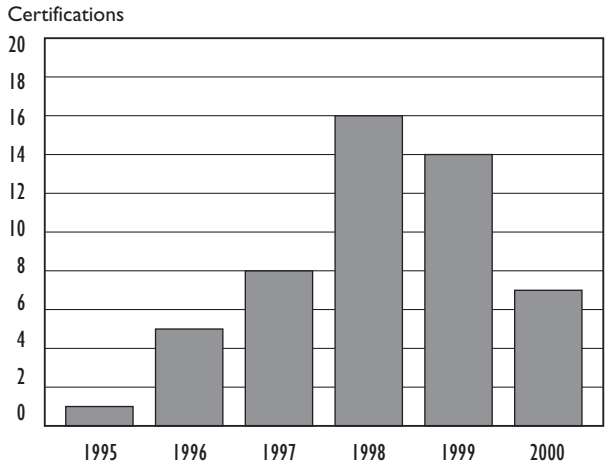


Figure 5.1.3 Certifications of environmental management systems based on ISO 14001 standard in enterprises in Helsinki in 1995–2000 (situation in July 2000).



This scheme is intended for industrial enterprises, but after a reform all organizations will be able to participate in this environmental management system.

In the beginning of 2000, six offices in Helsinki had the Green Office system.

Interpretation

According to the opinion polls, environmental issues are important to the residents of Helsinki. In 1989 environmental protection considered as the most important of societal targets. In 1994 and in 2000, nature and environment were still considered important, but due to the economic recession, the reduction of unemployment was regarded just as important.

When environmental protection was weight against economic growth, only 5 % of respondents placed economic growth first even in case it would cause some environmental damages. The rest of the respondents placed environmental protection first (45 %) or thought that achieving both targets is possible at the same time (44 %).

Environmental behaviour has changed. According to the surveys, 54% of residents always sorted the glass waste in 2000. In 1994 the share was 43 %,

and in 1989 28 %. At the same time the possibilities for recycling glass have increased. 83 % of residents told they always recycle paper and 42 % recycle organic waste.

Every year since 1995, 5 to 16 enterprises in Helsinki have certified an environmental management system based on the ISO 14001 standard. In July 2000, around 50 enterprises had implemented the ISO 14001 system in Helsinki. In whole Finland the number was over 350. Environmental management systems are relatively new, and they were originally planned for the industry. Most of the enterprises in Helsinki are in the service sector where the introduction of environmental management systems has started later.

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Consultants to the theme

Camilla von Bonsdorff, City of Helsinki Environment Centre
Phone: (09) 7312 2680,
E-mail: camilla.bonsdorff@hel.fi

Kaisa Pajanen, City of Helsinki Environment Centre
Phone: (09) 7312 2682
E-mail: kaisa.pajanen@hel.fi

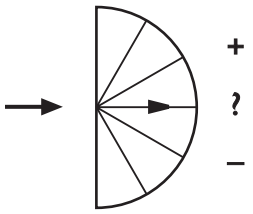
Markku Lankinen, City of Helsinki Urban Facts
Phone: (09) 169 3111
E-mail: markku.lankinen@hel.fi

Marja Laitio, SFS-Sertifiointi Oy
Phone: (09) 149 9331
E-mail: marja.laitio@sfs.fi

Virpi Liesimaa, Finnish Environment Institute
Phone: (09) 4030 0325
E-mail: virpi.liesimaa@vyh.fi

Theme 5.2
Self-sufficiency

In what position would you place the arrow in the sustainable development meter for this theme?



Describes self-sufficiency in terms of local food production and maintenance services

The theme and its key concepts

In this theme the self-sufficiency and initiativity of the residents of Helsinki are surveyed especially in relation food production and maintenance services. Self-sufficiency comprises local or regional food production, and services.

Allotment areas, allotment garden areas and land cultivated by the city of Helsinki are the land areas used for cultivation in Helsinki.

The 39 allotment areas of the Helsinki City have been rented to the district or allotment gardeners' associations. The associations rent single allotments to the residents. The allotments are used only for cultivation. The use of chemical pesticides is forbidden, and all the organic matter originating from the allotment must be composted within the allotment.

Allotment gardens with small cottages are meant for home-gardeners. There are nine allotment garden areas in Helsinki, and in 1999 the total number of allotments was 1916. Eight allotment garden areas have been rented to associations, and one is maintained by the council.

Maintenance services refer here to the different kinds of repair and maintenance services, and rental and co-use services.

Why the theme was chosen

It is impossible to achieve complete self-sufficiency in foodstuffs in Helsinki. The local production of food and services shortens the transport distances and thus decreases emissions from the traffic. Compared to the food produced far away from the consumers, locally produced food is often fresher and less packaged. In allotments it is possible to grow plants without chemicals (i.e. ecological food products). Allotment gardening can also increase the initiativity of people. In addition, allotment gardens, allotment areas and fields are important green areas.

The repair and service of goods lengthens their life-span, and thus decrease consumption and import, and increase self-sufficiency. Renting and co-use of goods also decrease the amount of consumer goods and the environmental load of consumption.

What the theme describes and measures

The area of allotments, allotment gardens and cultivated land owned by the council describe the residents' possibilities to pursue self-sufficiency in food production.

Local maintenance services are measured by the number of enterprises that provide repair and maintenance services for household and personal goods. The indicator describes the residents' possibilities to increase the life-span of goods, and the self-sufficiency in maintenance services.

The theme is closely related to the theme 1.1 (Ecological footprint) and the theme 2.8 concerning the distribution of land.

Calculation principles

The cultivated area of Helsinki covers the land cultivated by the council. It comprises the fields used for plant production and pasture. At least 10 % of the cultivated area is fallow land. In addition, the city of Helsinki owns arable land in other municipalities. There are also fields owned by others in Helsinki. For example, the University of Helsinki owns fields in Viikki.

Maintenance services comprise enterprises that primarily provide repair services for household and

Table 5.2.1 Allotment areas and cultivated area owned by the city of Helsinki in 1991–1999.

	Allotments total, ha	Cultivated area owned by the city of Helsinki, ha
1991	44	449
1992	47	438
1993	47	443
1994	49	447
1995	49	439
1996	49	430
1997	49	430
1998	51	447
1999	52	447

The area of allotment gardens has been 98 hectares for a long time.

Table 5.2.2 Enterprises providing repair and maintenance services for personal and household goods.

Year	Enterprises
1995	155
1996	159
1997	169
1998	189
1999	193
2000	192

personal goods, such as shoes, electric household equipment, clocks and jewelry. The repair services for motor vehicles are not included.

Interpretation

There were only slight changes in the cultivated area in Helsinki in the 1990's. The allotment area increased by about 18%. The area of allotment gardens and cultivated area owned by the municipality remained almost unchangeable. Small changes in cultivated area and the popularity of allotment gardens show that the residents of Helsinki are active and interested in achieving self-sufficiency in food production.

The number of enterprises providing repair and maintenance services has clearly increased (24%) since 1995. This shows that people are willing to repair and service goods, even if it may sometimes cost as much as buying a new product.

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Consultants to the theme

Reima Markula, City of Helsinki Building Department
Phone: (09) 728 7943
E-mail: reima.markula@hel.fi

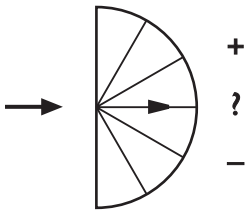
Kaija Rantala, City of Helsinki Building Department
Phone: (09) 166 2706
E-mail: kaija.rantala@hel.fi

Juha Suokas, City of Helsinki Urban Facts
Phone: (09) 169 3649
E-mail: juha.suokas@hel.fi

Maija Hakanen, Association of Finnish Local and Regional Authorities
Phone: (09) 771 2106
E-mail: maija.hakanen@kuntaliitto.fi

Theme 5.3
Participation

In what position would you place the arrow in the sustainable development meter for this theme?



Describes participation in the municipal decision making

The theme and its key concepts

In this theme the residents' participation in the municipal decision making is surveyed.

Why the theme was chosen

The Constitution of Finland states that the citizens have the right to participate in the decision-making concerning them and their living environment. According to the section 14, "the public authorities shall promote the opportunities for the individual to participate in societal activity and to influence the decisions that concern him or her." The section 20 states that "the public authorities shall endeavour to guarantee for everyone the right to a healthy environment and for everyone the possibility to influence the decisions that concern their own living environment."

One of the aims of the Land Use and Building Act is to ensure the opportunities for public participation and interactive planning in land use.

Also the Local Government Act emphasizes that local authorities should take an active role in the promotion of citizens' participation.

Voting is an opportunity for public participation for all the citizens who have turned 18. It is also a traditional way of public participation. The citizens of Helsinki can also influence local decision making by taking initiatives, sending inquiries to the elected officials and authorities, and by taking part in discussions concerning the city. Participation in non-governmental organizations and residential associations are also important ways of public participation.

Participation is voluntary – not every citizen has the time or the interest to do so. However, it is important that the citizens are aware that they have a possibility to influence and take part in decision making.

What the theme describes and measures

Voting activity measures the participation in decision making by the means of participatory democracy, i.e. by voting in municipal elections.

In addition to voting activity, we are trying to develop another indicator to describe other forms of active participation and interactivity. This indicator to should include for example the number of residents' initiatives and responses to them, and/or a Gallup poll on how the residents feel about their possibilities to influence decision making.

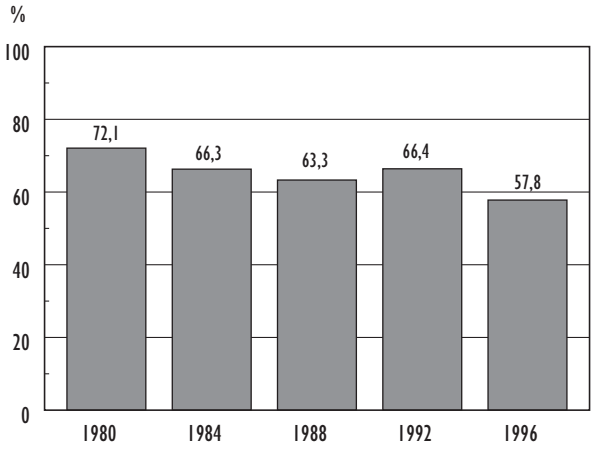
Calculation principles

Voting activity is based on the share of actual voters of all those entitled to vote in municipal elections. All the citizens who are over 18 years old and registered in the municipality have the right to vote in these elections. Also foreign citizens living permanently in Finland are entitled to vote.

Interpretation

Voting activity in municipal elections has decreased from 72 % in 1980 to less than 60 % in 1996. During the whole period examined here, the voting activity in Helsinki has been a few percents lower than the national average (78.1 % in 1980 and 61.3 % in 1996).

Figure 5.3.1 Voter turnout in municipal elections in Helsinki 1980–1996.



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Pia Bäcklund, Helsingin kaupungin tietokeskus,
puh. (09) 169 3604, pia.backlund@hel.fi

Consultants to the theme

Markku Lankinen, City of Helsinki Urban Facts
Phone: (09) 169 3111
E-mail: markku.lankinen@hel.fi

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