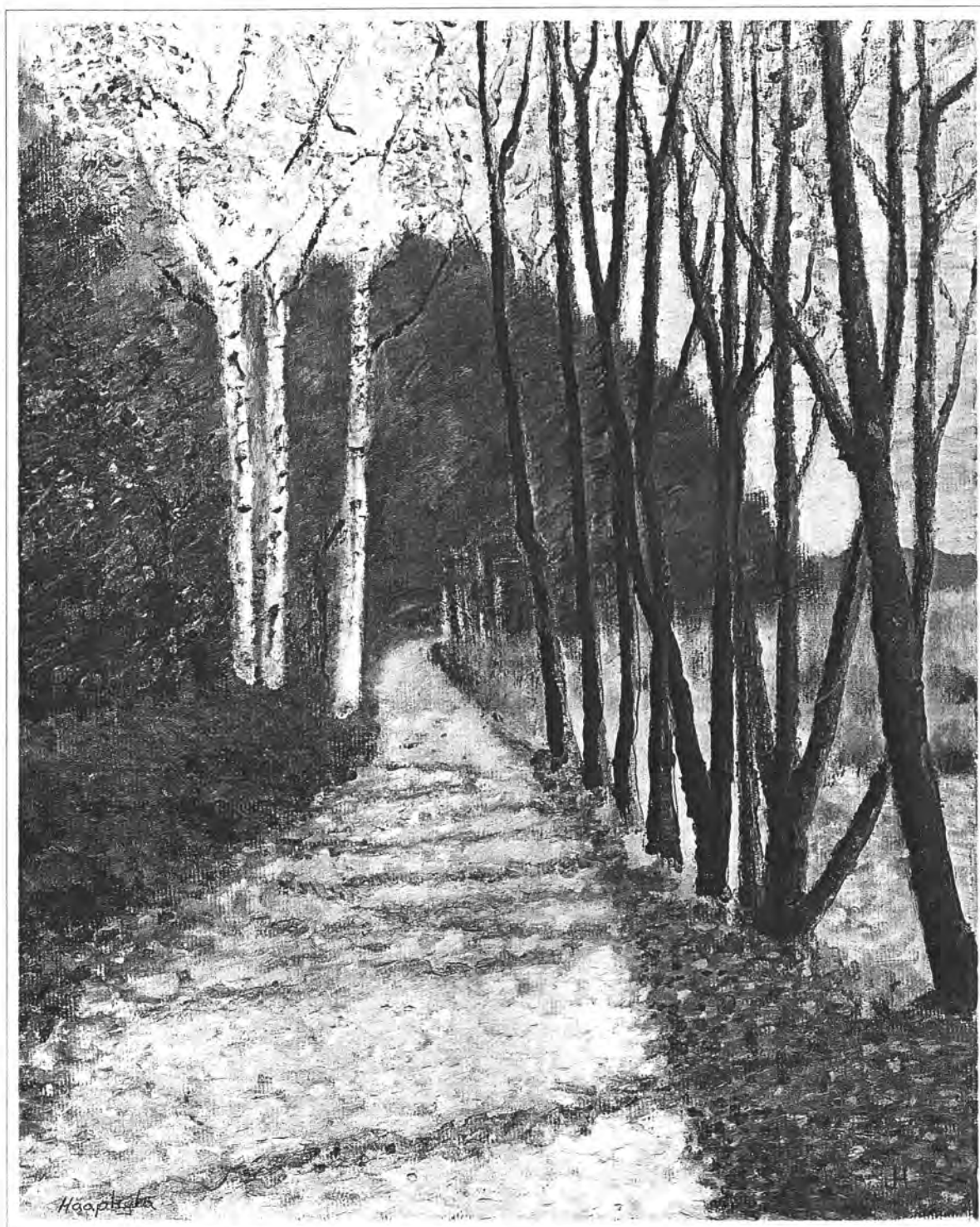


City of Helsinki

# Environment Centre



## Review of the state of the environment in Helsinki

Environment centre publications 5/94

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Taru Vuori-Malmberg (editor)

Review of the state of the environment  
in Helsinki

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## Summary

The concentration of workplaces in the city centre and the dispersal of housing to nearby municipalities has increased the traffic in both the city centre and suburbs of Helsinki.

Traffic has the greatest impact on the air that city dwellers breathe. In the poorly ventilated narrow corridor-like streets of the inner city nitrogen dioxides and carbon monoxide concentrations may periodically exceed the maximum levels. Cars lift grit scattered on the streets into the air, so that recommended limits of airborne dust are often exceeded. In addition to air pollution, traffic produces most of the noise disturbance. Around half of Helsinki's inhabitants live in areas where traffic noise exceeds the recommended limits.

The impact of energy production and industry on city air quality is decreasing. Particulate emissions from power plants have been cut in recent years by 80 % and sulphur emissions by 50 %. Some of the industrial plants polluting the atmosphere have moved away from the city, while others have cut down their emissions by, for instance, changing over to natural gas.

City air sulphur concentrations have decreased by one-fifth compared to the level at the beginning of the 1980s. With growth in traffic and energy production the nitrogen dioxide emissions have increased and emissions of carbon dioxide, which accelerates the greenhouse effect, have also gone up. Acid deposition continues to exceed the buffering ability of nature over the entire Helsinki Metropolitan Area. The long term loading has, among other things, weakened the condition of the forests in Helsinki, eliminated lichens, and increased heavy metal concentrations

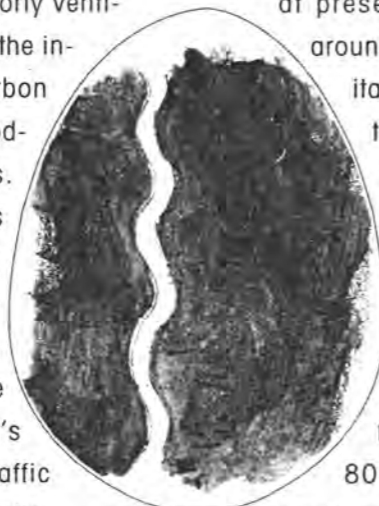
in the soil. Air pollutants have been shown to increase the incidence of inflammation of the respiratory tract among the inhabitants of Helsinki and to bring on symptoms in asthmatics.

The Helsinki marine area is being loaded at present by treated waste waters from around 627,000 Uusimaa province inhabitants. The sea bays became badly eutrophicated during the 1950-70s, when sewage was conducted to the shallow shore waters. These days most of the treated waste waters are conducted to the boundary of the outer archipelago at Katajaluoto and the phosphorus loading has fallen by around one-tenth. Roughly 80 % of sewage nitrogen, however, continues to be passed into the sea.

Conducting waste waters to the open sea has improved the water quality on swimming beaches. However, the bay areas continue to be eutrophicated due, for example, to the nutrients accumulated in the sea bed. In the outer archipelago the water quality is still good, but intestinal bacteria concentrations have increased over practically the entire area.

The amount of waste produced by the Helsinki Metropolitan Area decreased for the first time in 1990. Due to the economic recession, the amount of construction waste has become more obviously reduced, but the amount of household waste has also taken a downturn. Increases in recycling and other uses of waste have also led to less waste being sent to municipal land-fills.

The degree of recovery from wastes in the Metropolitan Area in 1992 was almost 30 %. In the spring of 1993 recovery from household wastes was stepped up, with the sorting at source



of organic waste in north Helsinki in a residential area of 100,000 people.

In accordance with Helsinki land use plans, the present large unbuilt areas and shores will mainly be preserved as recreation and green areas. New residential and workplace areas are being provided by consolidating and densifying the existing urban structure. Additional building threatens, however, recreation areas lying close to residential areas. Densely constructed districts have insufficient green areas while, paradoxically, acquiring more residents means placing heavier demands on recreation areas. Road construc-



An old crack willow survives in a sea of buildings and traffic in inner Helsinki. The tree has been protected since 1924.

tion and the expansion of residential areas also threaten the groundwater reserves.

New residential and recreation areas are also being established in former industrial areas. Since it is possible for harmful substances to have passed into the ground from factories, storage depots and waste treatment facilities, the areas are being carefully inspected and rehabilitated before new construction takes place. Harmful substances in the soil also endanger the area's groundwater reserves. In Helsinki the degree of pollution of the soil has been studied in, among other places, the Tali sewage works, Herttoniemi oil harbour and rifle range areas.

In Helsinki, 50-150 chemical accidents occur every year in addition to around 200 oil spills, but most of the accidents so far have taken the form of minor leaks from tanks. Transportation and storage of dangerous goods, together with the city's dense infrastructure increase the risk of accidents. Owing to the harbours and dense network of fuel distributors a lot of oil and chemicals are transported in the city. To reduce the risk, the transportation of dangerous goods and heavy traffic has been restricted to special routes within the inner city since 1990.

The soil, outside air, building materials and people's own activities all influence the indoor climate. The tendency to make buildings airtight, combined with insufficient ventilation, has weakened the indoor air quality in homes and at workplaces. Radon gas seeping into buildings from the ground increases the risk of lung cancer. In 4 % of detached and terraced houses in Helsinki the radon gas level exceeds the guideline. Volatile compounds, moulds occupying damp buildings, and noise cause symptoms of irritation and adversely affect comfort.

## Zusammenfassung

Die zunehmende Konzentration von Arbeitsplätzen auf das Zentrum von Helsinki bei gleichzeitiger Ausbreitung der Besiedlung auf die Gemeinden der näheren Umgebung hat in den zurückliegenden Jahrzehnten einen Anstieg des Verkehrs im Zentrum von Helsinki wie auch in den Vorstadtgebieten bewirkt.

Vom Verkehr gehen die größten Beeinträchtigungen für die Atemluft der Stadtbewohner aus. In den schlecht durchlüfteten Straßenzügen der Innenstadt überschreitet der Stickoxid- und Kohlenmonoxidgehalt der Luft zeitweilig die Richtwerte. Die Autos wirbeln Streusand auf, und die Richtwerte für schwebende Staubpartikel in der Luft werden häufig übertrafen. Neben Luftverschmutzung bewirkt der Verkehr auch den überwiegenden Teil der Lärmbelastung. Etwa jeder zweite Helsinkier wohnt in Gebieten, in denen der Verkehrslärm die Richtwerte überschreitet.

Der Einfluß von Energieerzeugung und Industrie auf die Qualität der Stadtluft verringert sich. Die Staubemissionen der Kraftwerke sind in den zurückliegenden Jahren um 80 % und die Schwefelemissionen um etwa 50 % reduziert worden. Ein Teil der luftverschmutzenden Industriebetriebe ist aus der Stadt abgewandert, ein anderer Teil hat seine Emissionen verringert, u.a. durch Umstellung auf Erdgas.

Der Schwefeldioxidgehalt der Stadtluft hat sich gegenüber dem Stand vom Anfang der 80er Jahre auf ein Fünftel verringert. Indem der Verkehr und die Energieerzeugung gewachsen sind, hat sich der Stickoxidgehalt erhöht, und die Emissionen des Treibhausgases CO<sub>2</sub> nehmen zu. Die saueren Niederschläge übertreffen im Großraum

Helsinki nach wie vor die Toleranzfähigkeit der Natur. Die seit langem andauernde Belastung hat u.a. den Zustand der Wälder Helsinkis geschwächt, Flechtenvegetation vernichtet und den Schwermetallgehalt des Bodens ansteigen lassen. Die Luftverunreinigungen haben nachweislich die Zahl der Atemwegkrankheiten der Helsinkier sowie die Häufigkeit asthmatischer Symptome erhöht.

Das Meergebiet vor Helsinki wird heutzutage durch die Abwässer von etwa 627 000 Menschen belastet. Schon in den 50er Jahren und den beiden darauffolgenden Jahrzehnten wurde ein starkes Eutrophieren in den Meeresbuchten festgestellt - damals wurden die Abwässer in flache Küstengewässer eingeleitet. Heute wird der Hauptteil der Abwässer im Gebiet der Außenschären bei Katajaluoto eingeleitet, und zugleich ist die Phosphorbelastung auf etwa ein Zehntel des Niveaus der frühen 70er Jahre reduziert worden. Dennoch geraten immer noch 80 % des in den Abwässern enthaltenen Stickstoffs in das Meer.

Die Einleitung der Abwässer in das Außenmeer hat eine Verbesserung der Wasserqualität an den Badestränden bewirkt. Die Buchtgewässer sind jedoch nach wie vor eutrophiert, u.a. wegen der am Boden abgelagerten Nährstoffe. In den Außenschären ist die Wasserqualität weiterhin gut, aber die Kolibakterienmengen haben im gesamten Gebiet zugenommen.

1990 wurde erstmals eine Verringerung des Abfallaufkommens im Großraum Helsinki verzeichnet. Am meisten haben sich die Bauabfälle verringert, was sich aus der wirtschaftlichen Rezession erklärt, aber auch das

Volumen der Siedlungsabfälle zeigt eine rückläufige Tendenz. Das zugenommene Recycling hat für seinen Teil die Mengen des Deponiemülls verringert. 1992 wurden nahezu 30 % des Mülls des Großraums Helsinki der Wiederverwertung zugeführt. Im Frühjahr 1993 wurde das Hausmüllrecycling weiter intensiviert, indem in Nord-Helsinki in Wohngebieten mit insgesamt 100 000 Bewohnern mit der separaten Einsammlung von Biomüll begonnen wurde.

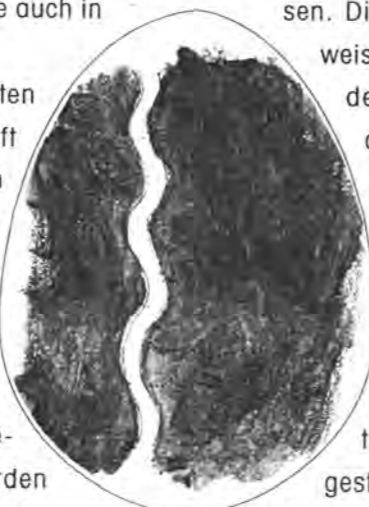
Den Bauleitplänen Helsinkis zufolge werden die heutigen großen, unbebauten Gebiete und Ufer größtenteils als Erholungs- und Grünflächen erhalten. Neue Wohn- und Gewerbegebiete werden durch Verdichtung der existierenden Stadtstruktur gebaut. Intensive Bebauung bedroht jedoch die Naherholungsgebiete der Wohnsied-

lungen. In den dicht bebauten Stadtteilen gibt es nicht genügend Grünflächen, und zugleich erhöht die Zuwanderung neuer Bewohner den Druck auf die vorhandenen Erholungsflächen. Vom Bau neuer Straßen und der Ausbreitung der Besiedlung geht zugleich eine Bedrohung für die Grundwasserreservoirs Helsinkis aus.

Neue Wohn- und Erholungsgebiete entstehen auch in ehemaligen Industriegebieten. Da nicht ausgeschlossen werden kann, daß aus Fabriken, Lagern und Abfallplätzen Schadstoffe in den Boden eingedrungen sind, werden die betreffenden Gebiete vor dem Bauen untersucht und gegebenenfalls saniert. Im Boden enthaltene Schadstoffe bedrohen auch die Grundwasserreservoirs der Umgebung. In Helsinki ist die Verschmutzung des Bodens u.a. in den Umfeldern der Kläranlage Tali, des Ölhafens Herttoniemi und von Schießständen untersucht worden.

In Helsinki ereignen sich pro Jahr 50-150 Chemikalienunfälle und rund 200 Ölleckagen, aber beim überwiegenden Teil hat es sich bislang um kleinere Zwischenfälle gehandelt. Der Transport und die Lagerung von gefährlichen Stoffen sowie die dichte Siedlungsstruktur der Stadt erhöhen die Unglücksrisiken. Wegen der Häfen und des dichten Kraftstoffdistributionsnetzes werden in der Stadt große Mengen Öl und Chemikalien transportiert. Zur Verringerung der Risiken ist der Transport gefährlicher Stoffe sowie der Schwerlastverkehr im Gebiet der Innenstadt seit 1990 eingeschränkt.

Boden, Außenluft, Baumaterialien und das eigene Tun des Menschen wirken sich auf die Raumlufte der Wohnungen aus. Eine dichte Bauweise und mangelhafter Luftaustausch haben die Qualität der Innenluft in Wohnungen und Arbeitsplätzen verschlechtert. Aus dem Erdboden in die Häuser eindringendes Radon erhöht das Lungenkrebsrisiko. In 4 % der Kleinhäuser Helsinkis überschreitet der Radongehalt den Richtwert. Flüchtige Verbindungen, in feuchten Häusern um sich greifender Schimmel sowie Lärm verursachen unterschiedliche Reizsymptome und beeinträchtigen die Wohnqualität.



Ilmo Nikkanen

Diese alte, schon 1924 unter Naturschutz gestellte Bruchweide im Stadtkern von Helsinki trotz zahlreichem Verkehr und der dichten Bebauung.

## Helsinki as a living environment and a place of residence

A fundamental feature of Helsinki's urban structure is the sharp division between the dense inner city and the more open development in the suburbs. The various suburbs are separated by roads and recreation areas radiating out like the spokes of a wheel. The sea, sea shores and archipelago are important elements of the cityscape of Helsinki.

Helsinki's maritime character is also carried over into the city's business life. The city straddles some 588 sq km, 185 sq km of this being land and 403 sq km water; the combined length of shoreline is roughly 96 km.

Helsinki city centre constitutes Finland's largest single concentration of workplaces. The city's population growth levelled off in the mid 1960s, but right up until the beginning of the recent recession new workplaces have repeatedly sprung up. While work-

places are concentrated in the central business district and a network of local centres in the Metropolitan Area, the residential areas have become dispersed. The large number of workplaces and dwellings and their uneven distribution is responsible for heavy traffic both in Helsinki and in the region in general.



### POPULATION AND HOUSING

One-tenth of the population of Finland live in Helsinki and 60 % of the population of the entire Metropolitan Area is concentrated in the capital. At the beginning of 1993 there were 501,518 people residing in the city. The average population density in Helsinki is 2684 people/sq.km, while the density over the Metropolitan Area as a whole is 360 people/sq.km

*In western Helsinki, the Pitäjänmäki and Koneala industrial areas are partly located very close to residential areas. Today the area features, for example, food, chemical and electronics industries and warehouses. Part of the industrial area is scheduled to become residential.*

*Die Industriegebiete Pitäjänmäki und Koneala in West-Helsinki sind teilweise sehr nahe bei Wohngebieten gelegen. Heute sind hier u.a. Betriebe der Lebensmittelindustrie, des Lackiergewerbes und der Elektronikindustrie sowie Lagerhäuser angesiedelt. Ein Teil der Industrieflächen soll den Plänen zufolge in Wohngebiete umgewandelt werden.*



Henri Oksanen

*Although the city centre constitutes Finland's largest concentration of workplaces, the Helsinki promontory has also remained a residential area. The apartment buildings in the old stone part of south Helsinki were mainly constructed during the period 1900-1939.*

*Obwohl das Zentrum von Helsinki die größte Arbeitsplatzkonzentration des Landes darstellt, ist es zugleich auch ein Wohngebiet. Die Wohnhäuser in Süd-Helsinki stammen größtenteils aus 1900-1939.*



Henri Oksanen



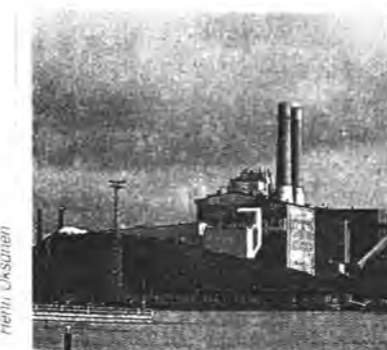
Henri Oksanen

*Appiharju is Helsinki's most densely populated district. Adjacent wooden Puu-Vallila exemplifies the opposite extreme in the residential districts of central Helsinki. Appiharju gehört zu den am dichtesten besiedelten Stadtteilen Helsinkis, das angrenzende Holzhausgebiet Vallila repräsentiert das andere Extrem.*

As family size in Helsinki has decreased, the size of new dwellings has increased. While, thirty years ago, there were something like 20 apartment square metres per resident, the area per individual is now almost twice as large. The largest abodes have mainly been built in new residential areas, way out from the city centre. Most families with children live in the southeastern, eastern, northeastern and northern suburbs of the city.

*The industrial zone in the eastern part of the inner city extends from the Sörnäinen shore to Vallila and Hermannin. Sompassaari harbour is Finland's detachable trailer traffic centre. Coal is brought to Hanasaari and oil to the city power plants. Heavy traffic and power plant emissions weaken the area's air quality.*

*Die Industriezone im Ostteil der Innenstadt dehnt sich vom Meer in Sörnäinen bis hin nach Vallila und Hermannin aus. Der Hafen Sompassaari ist das Zentrum des finnischen Trailerverkehrs, nach Hanasaari wird Kohle und Öl für die städtischen Kraftwerke transportiert. Starker Verkehr und die Emissionen der Kraftwerke mindern die Luftqualität des Gebiets.*



Henri Oksanen



*During the last few decades, northeast Helsinki has become the city's most rapidly growing residential major district. New buildings are continuing to burgeon in the area and the city structure is becoming denser.*

*In den vergangenen zehn Jahren war Nordwest Helsinki am die schnellsten wachsende Wohnregion Helsinkis. Hier entstehen auch weiterhin neue Wohnhäuser, und die Stadtstruktur verdichtet sich.*

### WORKPLACES AND EMPLOYMENT

People from 22 municipalities go to work in Helsinki. In 1990 the theoretical workplace self-sufficiency in Helsinki was still around 140 % and there were approximately 370,000 jobs. The city of Helsinki is one of the country's major employers. In 1993 there were 38,000 city employees. Within the last few decades the majority of new jobs in Helsinki have arisen in conjunction with activities serving financing, insurance



Kyösti Huolari

In north Helsinki, detached and terraced house areas are surrounded by extensive recreation and green areas. The banks of the River Vantaanjoki on the Helsinki side are reserved for recreational use. At Hattiala and Tuomarinkartano the city's last remaining agricultural areas are being carefully preserved.

Die Einzelhausgebiete Nord-Helsinkis sind von ausgedehnten Erholungs- und Grünflächen umgeben. Das auf der Seite Helsinkis gelegene Ufer des Vantaanjoki-Flusses ist für Erholungszwecke ausgewiesen, in Hattiala und Tuomarinkartano werden die letzten Agrarlandschaften Helsinkis gepflegt.

and real estate, public administration and business life. During the 1980s recreation and cultural services also increased. More than 30 % of jobs in Helsinki are in the service professions; there are now 20 % in trade, 19 % in financing and only 12 % left in industry.

Although the number of people working in industry has fallen to a half of the peak years of the 1970s, Helsinki continues to be Finland's largest industrial conurbation. Two-thirds of workplaces comprise less than five people. There are now only five workplaces employing more than 500 people. The most important business areas are the graphics industry, food, metal, textile and chemical industries.

Emissions from industrial plants mainly affect the environment close to the source. For example, odour and hydrocarbon emissions from the food industry and graphical industry disturb residents in the vicinity. By contrast, the service

industries produce very little direct emissions, while they nevertheless increase traffic, energy consumption and the amount of waste.

The entire Helsinki city area can be considered an urban region, even though there are extensive unbuilt green areas within the city limits. In land use planning an effort is being made to concentrate the existing city structure and simultaneously preserve the unbuilt areas mainly used for recreational purposes, and to reduce the problems caused by traffic. The aim is also to emphasise the city's maritime character and preserve urban nature.

Southeast Helsinki is characterised by an abundance of sea and islands. This area has a lot of unbuilt shores used as recreation areas.

Die Landschaft von Südost-Helsinki wird durch das Meer und eine große Zahl von Inseln geprägt. Hier gibt es viele unbebaute Ufer, die als Naherholungsgebiete dienen.



Henri Oksanen

East Helsinki's garden towns were built in the 1960s. Kurkimäki and Vesala are newer residential areas. Striking contrasts to areas covered by blocks of flats in this Major District are wrought by sea shores, Vuosaari's extensive green areas and strips of green connecting the garden cities.

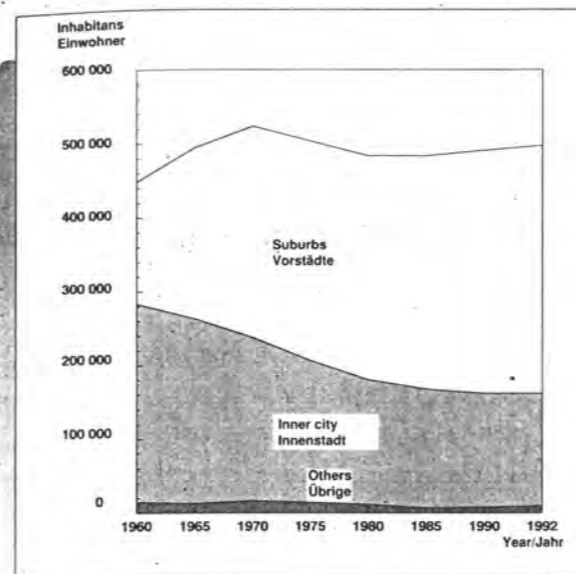
Die Vorstadtgebiete Ost-Helsinkis sind in der Zeit ab den 60er Jahren entstanden, die neuesten Wohngebiete sind Kurkimäki und Vesala. Einen Kontrast zu der weitläufigen Etagenhausbebauung bilden Uferlandschaften, die ausgedehnten Grünflächen von Vuosaari sowie Grünkorridore zwischen den Wohngebieten.



Kalevi Wahisten

TRENDS IN HELSINKI'S POPULATION GROWTH IN 1960 - 1992

ENTWICKLUNG DER BEVÖLKERUNG HELSINKIS 1960-1992



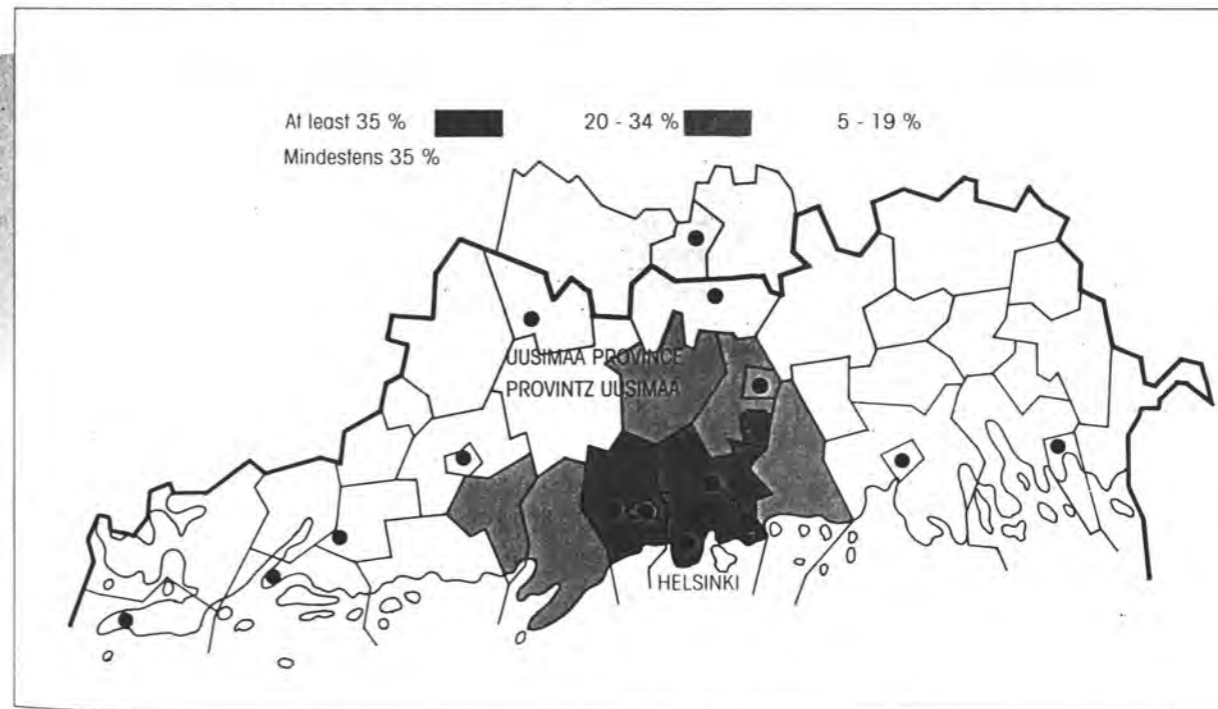
Immigration to Helsinki was at its most vigorous in the 1960s, after which the population shrank up until the 1980s. The population of the inner city has continued to decline, even though the city's total population has grown slightly in the last few years.

Source: City of Helsinki Information Management Centre, 1992

Die Zuwanderungsbewegung nach Helsinki erreichte ihren Höhepunkt in den 60er Jahren. Danach, bis zu den 80er Jahren, verringerte sich die Einwohnerzahl wieder. In der Innenstadt hat sich die Einwohnerzahl auch später noch zurückentwickelt, obwohl die Gesamtzahl der Bewohner Helsinkis in den letzten Jahren leicht gestiegen ist.

Quelle: Statistisches Amt der Stadt Helsinki, 1992

PROPORTION OF POPULATION OF MUNICIPALITIES WORKING IN HELSINKI

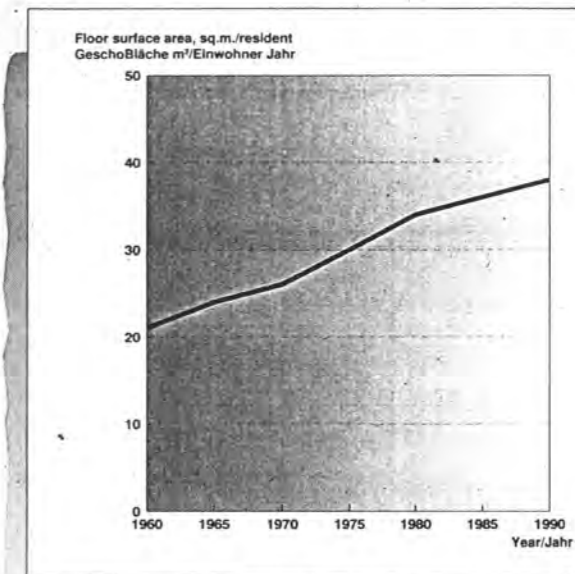


The area from which commuters to Helsinki travel extends as far as Häme Province. More than 5 % of the labour force of 22 municipalities works in Helsinki.

Source: Central Statistical Office, Aarno Laihonon, 1990

TRENDS IN AMOUNT OF HOUSING SPACE IN HELSINKI IN 1960 - 1992

ENTWICKLUNG DER WOHNFLÄCHE PRO KOPF DER BEVÖLKERUNG IN HELSINKI 1960-1992



The average housing space in Helsinki has been constantly growing since the 1960s. The family size has fallen at the same time as the size of the abode has increased.

Source: City of Helsinki Information Management Centre, 1992

Die durchschnittliche Wohnfläche pro Kopf der Bevölkerung in Helsinki ist seit den 60er Jahren stetig gestiegen: Während die Haushaltsgrößen sich verringerten, stiegen die durchschnittlichen Wohnungsflächen.

Quelle: Statistisches Amt der Stadt Helsinki, 1992

PROZENTUALER ANTEIL DER ERWERBSTÄTIGEN MIT ARBEITSPLATZ IN HELSINKI

Das Einzugsgebiet des Arbeitsmarkts Helsinki reicht bis in die Provinz Häme. In 22 Gemeinden der Region haben mindestens 5 % der Erwerbstätigen ihren Arbeitsplatz in Helsinki.

Quelle: Zentralamt für Statistik, Aarno Laihonon, 1990

## Land use

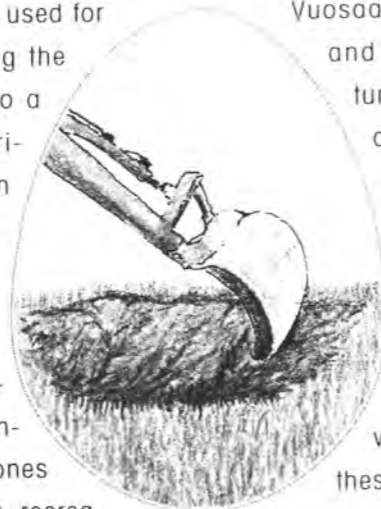
Despite the fact that there are extensive un-built green areas within it, the entire city of Helsinki can be considered a conurbation. In land use planning an effort is being made to intensify the existing city structure, while simultaneously preserving the unbuill areas mainly used for recreational purposes and reducing the problems with traffic. There is also a desire to emphasise the city's maritime character and to preserve urban nature.

### PLANNING

The overall urban structure in Helsinki is laid down in three regional land use plans. Apart from the ones applying to agricultural and forestry, recreation, protected, and waste management areas, the Ministry of the Environment is currently approving plans for urban areas, roads and other traffic areas. The master plan approved by the city council in December 1992 establishes the main aspects of future land use in Helsinki. Secondly, the town plan shows in detail the areas being used for housing, industry, roads, commerce, services, recreation and green areas.

#### THE MASTER PLAN GOVERNS FUTURE BUILDING

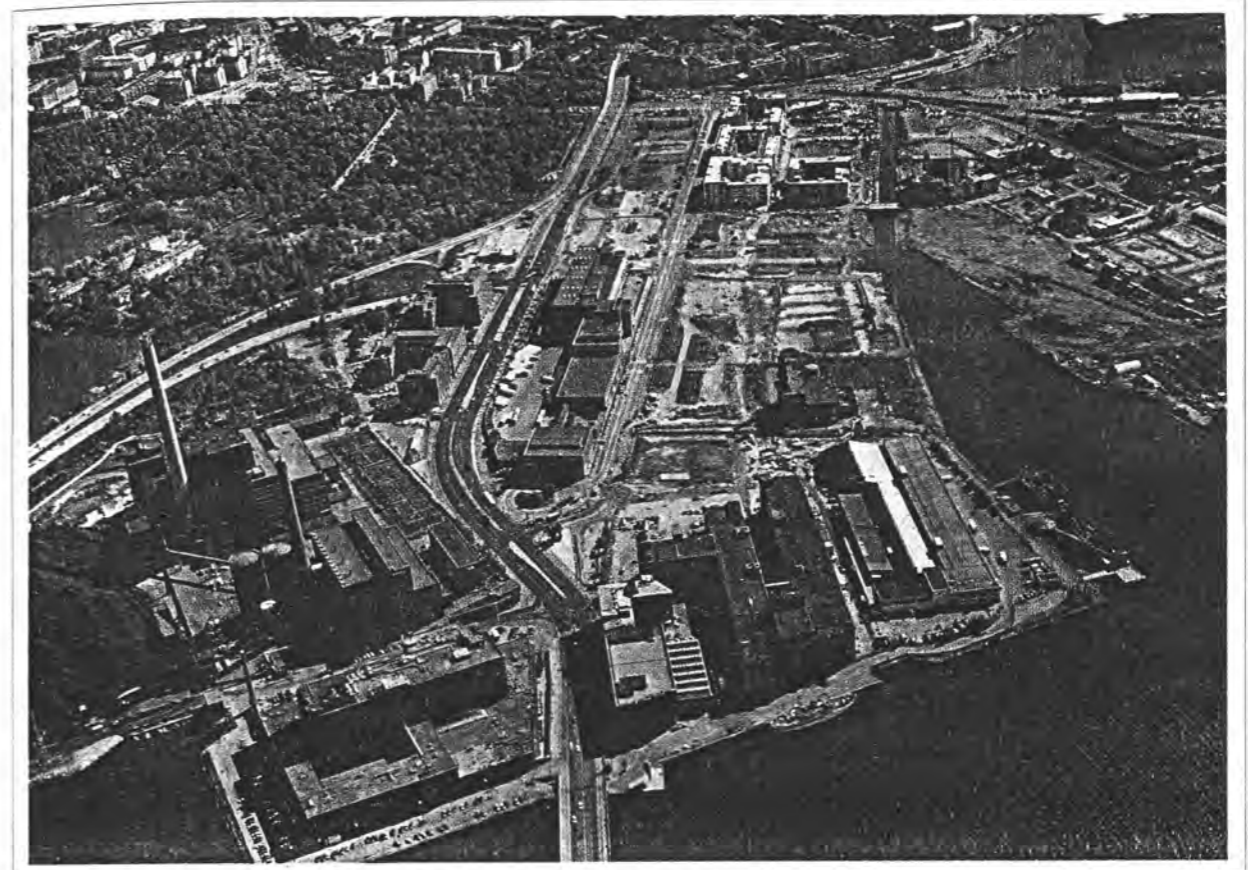
The new master plan preserves Helsinki's fingers-on-a-hand city form and at the same time most of the existing recreation areas. The majority of unbuill seashore areas will also be preserved for recreational use. Some of the traditional industrial areas will remain as industrial and office areas.



Urban structure will be consolidated by, among other things, changing some of the existing industrial and harbour areas to residential uses. According to the master plan, the west harbour and Sörnäinen harbour will be relocated at Vuosaari. Before old industrial, harbour, and sewage treatment areas can be turned into residential and recreation areas, the environmental impact of earlier activities must first be assessed. Foul aromas in industrial emissions, heavy traffic emissions and noise, and accident risks in chemical storage and transportation may create hazards to living when redesign and rebuilding of these areas is accomplished in several stages.

The building of housing and harbours would reduce, for example, the green areas in Vuosaari and Viikki. Consolidation of the urban structure also threatens to reduce nearby recreation areas in residential areas. Paradoxically, growth in the city's population would increase the need for recreation areas.

In the master plan approximately 9 million square metres of new floor space have been ear-marked for workplaces and 8 million sqm for housing. The original aim of the master plan was, however, to place the emphasis on housing production, as jointly agreed on by the municipalities of the Metropolitan Area. The construction of new business premises in Helsinki would further swell commuter traffic in the Metropolitan Area. By contrast, population growth would increase leisure time traffic and passenger cars.



*In Helsinki, old industrial and harbour areas, for instance, will be turned into residential areas. Ruoholahti's new residential area is being built in the west harbour. In the 1992 master plan the harbour is scheduled for resiting at Vuosaari.*

*In Helsinki werden u. a. alte Industrie- und Hafengebiete in Wohngebiete umgewandelt. Das neue Wohngebiet Ruoholahti entsteht am Rande des Westhafens. Im Flächennutzungsplan 1992 wird die Verlegung des Hafens nach Vuosaari vorgeschlagen.*

If Helsinki is to remain uncongested and free from pollution, it must have efficient public transport. To reduce the need for commuter traffic, workplaces and residential areas must be concentrated along metro and railway lines and transverse connection traffic developed at the same time.

Approved town plans already exist for most of the land area of Helsinki but some of the green areas are still awaiting legally binding land use plans.

Additional floor space was constructed in Helsinki and over the whole Metropolitan Area during the 1980s. The proportion of business and office space has constantly grown and housing provision has fallen behind other con-

struction. In 1992 there was a total of around 3900 ha of housing, and roughly 2500 ha of workplace areas of various kinds. The 1980s was a period when extensive investments were channelled towards expensive office complexes and shopping centres. The rapidly worsening economic situation has recently caused a paralysis in construction and at the beginning of 1993 there was around one third less new business space under construction compared to the previous year. Roughly 6 % of completed business accommodation is at present empty, i.e. around one million floor square metres.

Helsinki's industrial areas were originally established at the fringes of the city. As the city has grown, these areas have become swallowed up by it. The character of the industrial areas has changed, with more offices and services being included in them.



Around half of the Helsinki Metropolitan Area's housing units are being constructed in Helsinki itself. In housing provision the 1980s was a busy time and an average of 4000 dwellings a year were built. In 1992 around 3000 new homes were constructed. The floor area constructed annually is equivalent to the space required by 8000 residents. However, there has been a constant lack of reasonably priced dwellings in the city available for purchase or rent.

## TRAFFIC

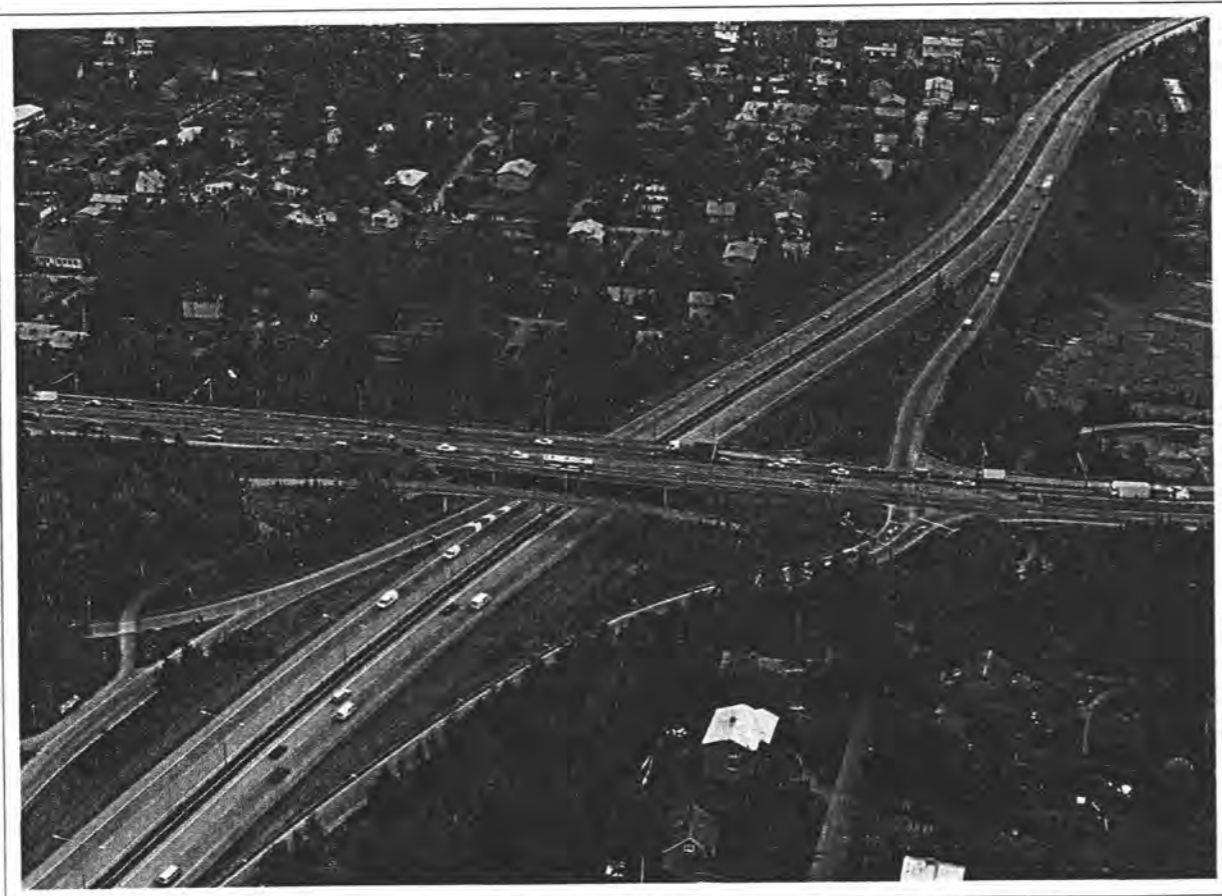
**T**raffic in Helsinki increased dramatically during the 1980s. Both the actual number of cars and the number of kilometres covered in the city expanded. The concentrating of workplaces in the city centre and the dispersal of housing to

neighbouring municipalities have served to swell the amount of traffic.

### RECESSION HAS REDUCED CAR TRAFFIC

**I**n the last few years the traffic density in the inner city has slightly fallen and markedly fewer new vehicles have been registered in Helsinki. However, almost a third of Helsinki residents own a car and this traffic causes considerable air pollution and noise problems.

Helsinki's vehicular traffic is estimated annually along three ring-like transect lines. During the last ten years the amount of traffic at the city limits and transverse connection traffic in the suburbs have increased by 60%. In the inner city and on the Helsinki peninsula the amount of traffic has grown by 16-20%.



Some 60,000 vehicles/cars make use of Ring road I daily and this is one of Helsinki's busiest roads. While the amount of traffic has been reduced by the recession, it is predicted that transverse connection traffic will continue to expand vigorously.

Die Ringstraße I wird täglich von ca. 60 000 Autos frequentiert, womit sie zu den verkehrsreichsten Magistralen gehört. Obwohl das Verkehrsaufkommen aufgrund der Rezession leicht zurückgegangen ist, werden dem Tangentialverkehr auch weiterhin kräftige Zuwächse prognostiziert.

With the deterioration of the economy the amount of traffic has fallen by a few percent, but the traffic density at the city limits has remained almost the same. The daily number of cars along roads leaving the city varies between 40,000 and 60,000. A decrease in the number of people travelling has reduced the traffic in the city centre. Whereas in 1989 on an October day at the Helsinki inner city limit there were 739,000 people in transit, by 1992 there were only 690,000.

The number of cars grew during the 1980s by almost 50%, but in the last few years the number of cars registered in the city has fallen by 2-3% a year. The passenger car density has been reduced more than the total number of cars in the city because the number of residents has increased. Car density was at a peak in 1990, when there were 348 cars per 1000 inhabitants. At the end of 1992 there were 328 per 1000.

In the period 1980-1990 car travel increased in Helsinki by some 2090 million kilometres. The number of kilometres covered had grown by 56% of the 1980 level. Passenger cars accounted for almost 80% of the kilometres travelled. It is predicted that car travel will increase further, although at a slower rate. Growth will be influenced by the economic situation and changes in travellers' attitudes.

### PUBLIC TRANSPORT PASSENGER LEVELS HAVE FALLEN

**I**n the period 1970-1992 the number of passengers on public transport fell by one-fifth. In 1992 around half of the people arriving in the inner city, and roughly 60% of those arriving on the Helsinki peninsula, made use of public transport. In 1980 almost 70% of those travelling to the peninsula used public transport.

In compliance with the objectives set by the city council, the proportion of journeys made by public transport must be increased. The public transport proportion at the inner city limit should grow to 55% and on the Helsinki peninsula lim-

it to 64% by the end of the decade. Achieving this target calls for a sound strategy by the State, Helsinki and other municipalities in the region in regard to traffic planning, decision-making and the distribution of appropriations.

In a public opinion survey made in 1989, 65% of Helsinki residents were keen to reduce private car traffic in the city centre. Improving the public transport services was regarded as the best method of achieving this end. Some form of restriction on private transport was favoured by almost all those interviewed and only 8% wanted to improve the conditions for private cars in the city centre.

Pedestrians account for the greatest proportion of people moving about in the streets of the city centre. In the area between the railway station, coach station and Esplanade the proportion of pedestrians is 44%, people on public transport 30% and those in passenger cars 25%.

## URBAN NATURE AND RECREATION AREAS

**H**elsinki is a northern and maritime city. The southern tip of Greenland and the southern parts of Alaska are located at the same latitude, but the warm Gulf stream makes Helsinki's climate milder. The sea evens out temperature peaks in summer and winter, and the wind blows most frequently through the city from the west or southwest.

In the Helsinki landscape exposed bedrock alternates with flat clay areas that once constituted the sea bed. The shoreline is greatly divided. The construction of the city began on a narrow peninsula jutting out into the sea, from which during the course of time it has penetrated inland and, by the infilling of bays, also out into the sea. Within the city limits there are approx. 96 km of shoreline and 315 islands.



*In Finland, this endangered species of butterbur, *Petasites spurius*, grows only in Helsinki. Altogether over 1 000 vascular plant species have been recorded in the city.*

*Die gefährdete Pestwurzart *Petasites spurius* wächst in Finnland nur in Helsinki. Insgesamt sind in Helsinki über 1 000 Gefäßpflanzenarten anzutreffen.*

Helsinki's fauna is also diverse, although the most sensitive species are absent. There are a total of 30 mammalian species, including moose, fox and hedgehog. Mink and raccoon-dogs are locally so abundant that they are a hazard to birds. In the archipelago and eutrophic marine bays at least 86 breeding bird species are encountered. In 1987 the number of breeding pairs on the islands amounted to over 10,000.

**SOME OF HELSINKI'S VALUABLE BIRD WETLANDS AND HERB-RICH FORESTS ARE PROTECTED**

Nature conservation helps safeguard diversity among the flora and fauna. At the same time, a sample of the habitats in which the city originally sprang up is preserved for posterity. Helsinki encompasses 15 areas protected under Finland's Nature Conservation Act. They include wetlands rich in bird life, herb-rich forests, virgin forests, an arboretum, and an esker. In addition, many individual entities have been preserved as natural heritage sites, including several isolated trees and clumps of trees, pot holes and rock formations. Among items preserved as historical sites there is a shoreline dating from the Bronze Age.

Helsinki's most valuable natural entities belong to international or national protection programmes. A total of 78 bird species nest in the Viikki-Vanhakaupunki protected area and its surroundings and there are a couple of thousand breeding pairs. This area is an important resting place for migrating waterfowl in spring and autumn. The 'bird paradise' right in the middle of the city is incorporated in the International Convention on Protection of Wetlands (Ramsar Convention).

**CITY FLORA AND FAUNA DIVERSIFIED**

The sea, archipelago, shores, Vantaanjoki valley and forests provide the city's animals and plants with a wide variety of different habitats. Biogeographically Helsinki belongs to the so-called mixed forest zone, in which Central European broadleaf forests become boreal coniferous forests (taiga). Biodiversity is further increased by the mixing of a western maritime species assemblage with one from the east. Long established settlement and business activities have also served to add many beneficial plant species to the original flora. However, construction, traffic and physical wear and tear on the habitats have also adversely affected the living conditions for many species.

Helsinki's flora varies from dry pine forests growing on barren rock to moist herb-rich forests on fertile soils. Recently the flora has been documented and so far a total of 1,100 vascular plant species have been found in Helsinki. At least eight nationally endangered species live in the city.



*Many recreation areas are sensitive to physical wear. In places, in both parks close to densely populated areas and in recreation areas serving the entire city, the surface vegetation has been worn away. It takes a long time to return.*

*Viele Erholungsgebiete sind starker Nutzung ausgesetzt. Sowohl in den Grüngebieten im Umfeld dichtbesiedelter Stadtteile als auch in den Erholungsgebieten, die der ganzen Stadtbevölkerung dienen, ist das Gelände stellenweise stark abgenutzt, und die Natur erholt sich nur langsam.*

Porvarinlahti, at Vuosaari, is also part of an important national wetland programme, but it has yet to be legally protected. The Kallalahti protected area is included on the national esker protection programme. There are three herb-rich forests in Helsinki: the Ruutinkoski shore stand alongside the River Vantaanjoki at Haltiala, the Ramsinniemi herb-rich forest at Vuosaari and the Mustavuori herb-rich forest.

**RECREATION AREAS FORM HELSINKI'S "GREEN FINGERS"**

Green corridors reaching out from the inner city into the suburbs set the pattern for Helsinki's urban structure. Acting as important recreation areas and light traffic routes these - the city's 'green fingers' - also help preserve diversity among its flora and fauna.

Helsinki has a wide variety of recreation areas: sports grounds, forests, fields, meadows, parks of various kinds, protected areas, allotments, cultivated gardens and fields, and old estates. Altogether recreation areas account for one-quarter of the city's land area.

With a large number of users, physical wear on the environment overstresses the latter by, for example, damaging the vegetation. In many places, too, traffic noise and littering detract from the enjoyment of green areas.

Apart from extensive recreation areas, parks and woodlands are also needed in residential areas. Families with children and old people, in particular, need recreation areas to be close to home and easily accessible. There are few nearby recreation areas in the inner city in comparison to the population. In the northeast suburbs

and part of east Helsinki there are markedly fewer restored recreation areas than elsewhere in the suburbs.

Recreation areas in the inner city mainly take the form of managed parks and park-like entities. The most forests and fields are to be found in the northern and eastern parts of the city. In recent years the city has begun to take special care of the fields and meadows belonging to the old cultural landscape. In the northern section of Keskuspuisto central park a 200 hectare field area has been reserved as a landscape field and recreation area. Some of the former wasteland is now being managed as meadowland. Helsinki boasts a total of 17 old estates.

A nature centre has been established on the island of Harakka, vacated by the defense forces. The centre's premises in the island's old barracks on the shore are currently being renovated and will be opened to the public in 1994. An archipelago wildlife and environmental science 'nature school' is already operating at the centre for the benefit of Helsinki secondary school chil-

dren. In summer there is a boat service to Harakka island, as well as guided nature excursions, nature trails, an outdoor exhibition devoted to animal and plant species of the outer archipelago, and a cultural landscape characterised by one-time fortifications.

Allotments have been established in Helsinki since the 1930s and 1940s. Today there are almost 2000 plots in special gardens, in addition to more than 5000 rented out by the City of Helsinki.

The most extensive recreation areas lie outside the city limits. Helsinki owns 16 large recreation areas in the province of Uusimaa.

There are a total of 360 km of outdoor recreation routes, two-thirds of them inside the recreation areas. Seven out of ten marked nature trails are located in the Helsinki area. Around 800 km of cycle tracks have been provided. Cycle routes into the city centre have been poor but the situation has slightly improved over the past few years.

*The Kallalahti shore meadow has emerged as a result of a shoal between islands becoming dry land. There are many kinds of meadows in this area. This one was protected in the spring of 1993. Kallahdenniemi as a whole is safeguarded by the national esker protection programme.*

*Die Strandwiese von Kallalahti entstand nach der Verlandung des Sunds zwischen zwei Inseln. In dem Gebiet sind verschiedene Wiesentypen zu finden. Die Strandwiese wurde im Frühjahr 1993 unter Schutz gestellt. Die Bucht Kallalahti gehört in ihrer Gesamtheit zum nationalen Os-Schutzprogramm.*

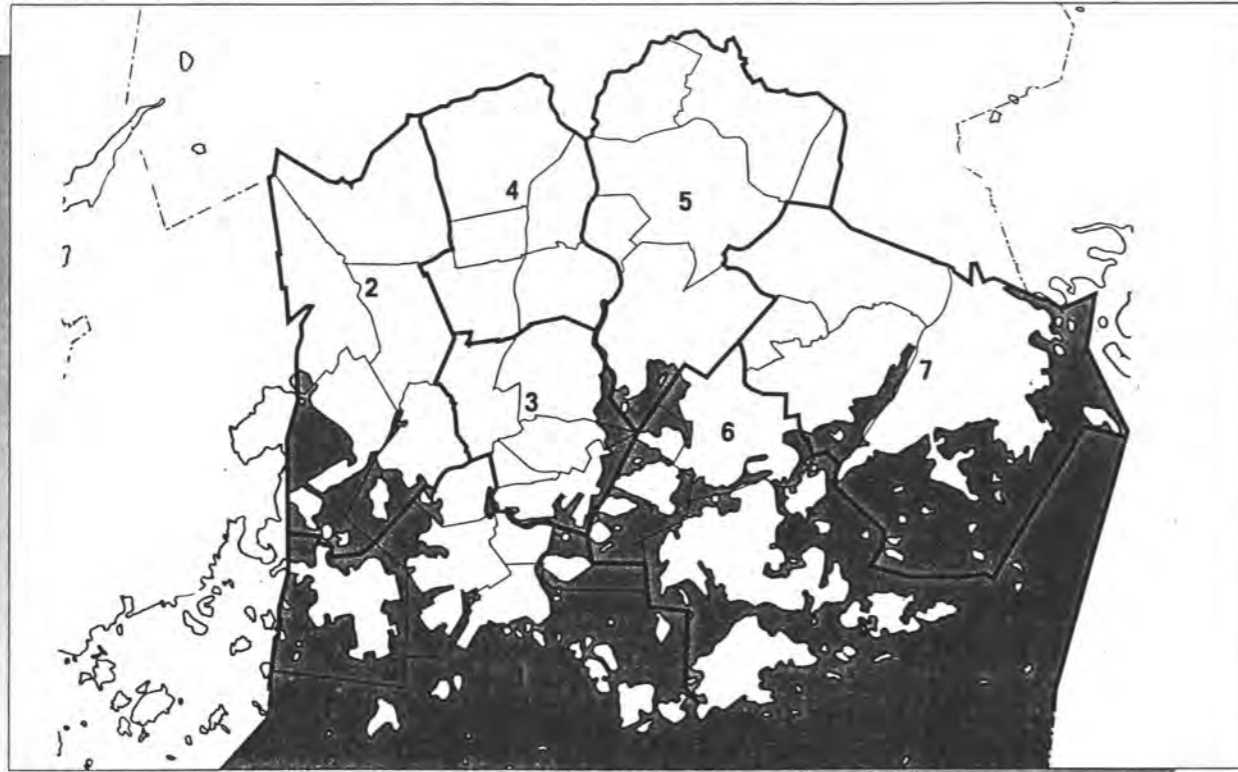


Kyösti Huotari

**EXTENT OF RECREATION AREAS IN RELATION TO THE TOTAL SURFACE AREA AND POPULATION OF THE VARIOUS DISTRICTS IN 1992**

DISTRICT	EXTENT OF RECREATION AREA (HA)	PERCENTAGE OF TOTAL AREA ACCOUNTED FOR BY RECREATION AREAS	RECREATION AREAS IN RELATION TO POPULATION (SQ.M/RESIDENT)
VIRONNIEMI	23	12	20
ULLANLINNA	78	13	35
KAMPINMALMI	41	11	18
TAKA-TÖÖLÖ	68	35	49
LAUTTASAARI	133	37	71
REIJOLA	150	37	145
MUNKKINIEMI	181	40	115
HAAGA	193	35	71
PITÄJÄNMÄKI	162	25	132
ETELÄ-KAARELA	292	31	110
KALLIO	20	8	8
ALPPIHARJU	27	30	23
VALLILA	40	17	40
PASILA	32	8	34
VANHAKAUPUNKI	193	38	119
MAUNULA	208	54	219
LÄNSI-PAKILA	31	14	47
TUOMARINKYLÄ	682	76	936
OULUNKYLÄ	136	31	101
ITÄ-PAKILA	91	26	269
LATOKARTANO	104	10	87
PUKINMÄKI	67	33	74
MALMI	206	19	89
SUUTARILA	131	31	112
PUISTOLA	147	20	87
JAKOMÄKI	48	24	76
KULOSAARI	104	43	291
HERTTIONIEMI	158	23	82
LAAJASALO	122	7	78
VARTIOKYLÄ	141	19	73
MYLLYPURO	106	39	110
MELLUNKYLÄ	210	22	64
VUOSAARI	350	10	94
HELSINKI	4 674	25	92

**MAJOR DISTRICTS OF HELSINKI  
DIE GROSSBEZIRKE HELSINKI**



- 1 **SOUTHERN** Vironniemi Jllanlinna Kampinmalmi Taka-Töölö Lautasaari
- 2 **WESTERN** Reijola Munkkiniemi Haaga Pitäjämäki Etelä-Kaarela
- 3 **CENTRAL** Kallio Alppiharju Vallila Pasila Vanhakaupunki
- 4 **NORTHERN** Maunula Länsi-Pakila Tuomarinkylä Oulunkylä Itä-Pakila
- 5 **NORTHEASTERN** Latokartano Pukinmäki Malmi Suutarila Puistola J.
- 6 **SOUTHEASTERN** Kulosaari Herttoniemi Laajasalo
- 7 **EASTERN** Vartiokylä Myllypuro Mellunkylä Vuosaari

**1. SOUTHERN HELSINKI**

- + the southern peninsula of Helsinki has survived as a mainly residential area, despite traffic problems and the influx of office buildings
- + good public transport service to all parts of the city where people work
- + a lot of managed parks including Kaivopuisto and the southern seashore
- + various kinds of opportunities for recreation
- traffic makes the streets congested, pollutes the air in the city centre
- traffic noise is disturbing to residents in the city centre
- emissions from the Salmisaari power station spread over the entire Metropolitan Area
- The amount of recreation areas is small in comparison to the size of the population.

**2. WESTERN HELSINKI**

- + seashore recreation areas at Seurasaari, Meilahti, Munkkiniemi and Huopalahti
- + north-south green belt to Keskuspuisto central park Tali and Malminkartano cultural landscapes
- + natural gas network expansion to Pitäjämäki and Reimaria industrial estates has reduced the area's sulphur emissions
- Hämeenlinnantie, Porintie and Turunväylä traffic exposes nearby residents to exhaust emissions and noise pollution
- Pitäjämäki and Reimaria industrial estates are located in the middle of a residential area
- hydrocarbon emissions from industrial plants
- odour emissions from a paint factory are bad for local residents

**3. CENTRAL HELSINKI**

- + the area's industry is located far from the residential area
- + many different kinds of residential area from the historical wooden Puu-Vallila to modern high-density Itä-Pasila
- + efficient public transport services: buses, trams, metro and railway
- sulphur and nitrogen emissions from Hanasaari power station spread over the entire Metropolitan Area
- it is possible to reach the sea shore only at Hakaniemi and in the

River Vantaanjoki estuary; the Hermann-Toukola sea shore has been the "entire city's unkempt backyard"

- a lot of heavy traffic to Somppasaari and Hanasaari
- the Hämeentie, Helsinginkatu, Sturenkatu and Mäkelänkatu traffic causes exhaust emissions and noise in this densely populated area

**4. NORTHERN HELSINKI**

- + comparatively open residential area dominated by detached and terraced houses
- + extensive green areas: Keskuspuisto central park, Niskala-Hälliala area, River Vantaanjoki valley
- + the Pitkäkoski herb-rich forest and Ruutinkoski along the River Vantaanjoki, and the Hälliala virgin forest area and Niskala arboretum in the forested area, are all protected
- + a good light traffic network; easy to reach recreation areas
- + the area's low industrial intensity does not cause environmental harm
- passenger car traffic on Ring road I has constantly increased and according to predictions, will increase in the future
- the residential areas extend into the traffic noise and exhaust emission areas of Ring road I and Tuusulan tie
- local main thoroughfares break up the suburban structure e.g. the former centre of Pakila is now divided into four parts
- rail traffic emits noise at Oulunkylä and Veräjämäki.

**5. NORTHEASTERN HELSINKI**

- + Malmi regional centre has increased the number of jobs in the area
- + increases in the amount of local rail traffic along the main line has improved the area's public transport service
- + valuable natural areas: Vanhankaupunginlahti bird protection area, Viikki-Latokartano field landscape and Vantaanjoki-Keravanjoki river valleys
- + emissions from industrial areas are in general low
- + the start-up of the new central sewage works will reduce the obnoxious smell from sewage treatment
- the Suutarila industrial estate produces hydrocarbon emission
- aircraft noise from Seutula airport extends to the northernmost suburbs of the city; noise from Malmi airport disturbs local residents
- noise from the railway filters into the residential areas at

Pukinmäki, Tapanila and Puistola there are few recreation areas in the densely built-up areas and these are located too far away from the residential areas.

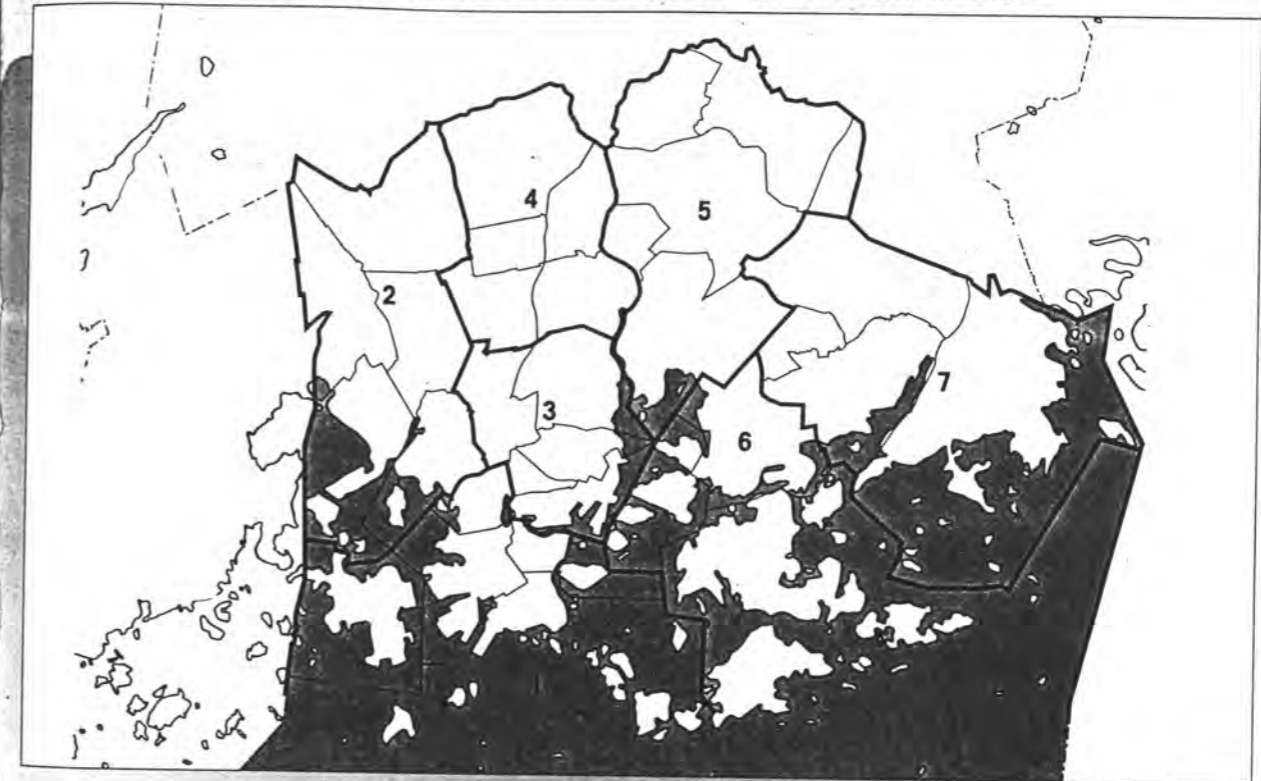
**6. SOUTHEASTERN HELSINKI**

- + forested high ground at Herttoniemi and Roihuvuori, sea bays, the archipelago and estate parks bring variety to the landscape
- + there are many unbuilt shores used for recreation and clear swimming beaches; the old estate lands and cultural landscape are used for recreational purposes
- + in the old garden suburbs services and nearby recreation areas already exist
- + industrial emissions will decrease when the Herttoniemi oil harbour is transformed into a residential area and the oil refinery is moved
- the Herttoniemi industry produces obnoxious solvent emissions the industrial estate increases sulphur dioxide concentrations in the vicinity
- emissions from Hanasaari power station affect the area's air quality.

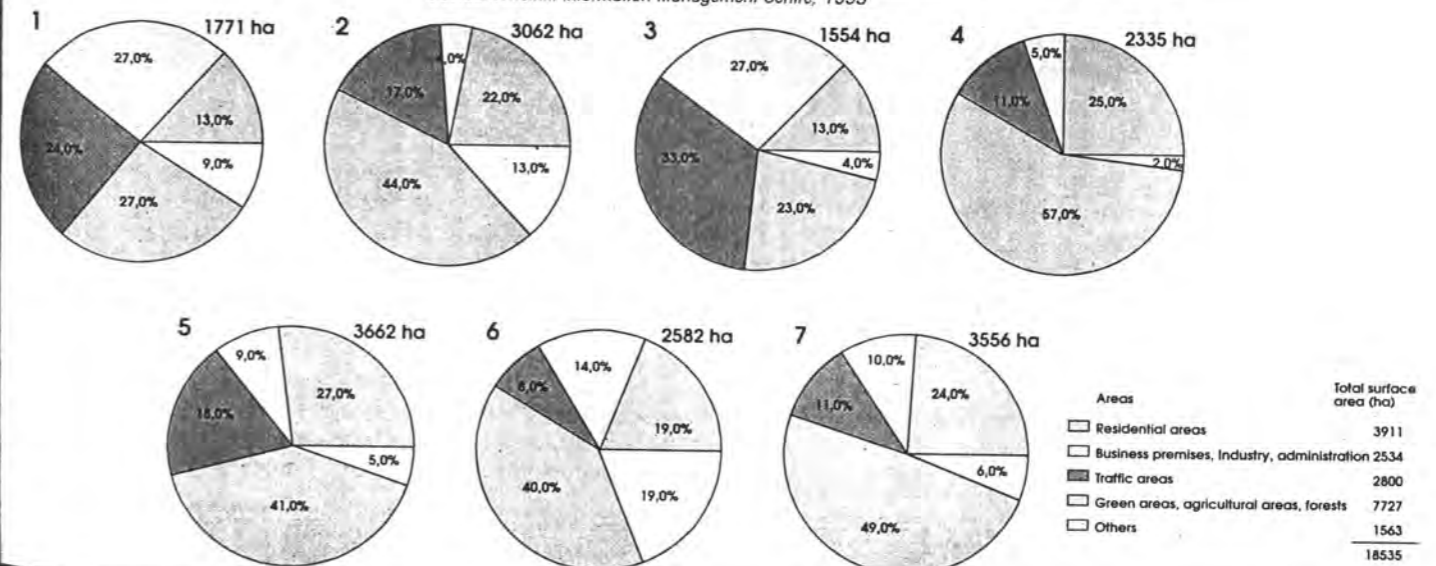
**7. EASTERN HELSINKI**

- + the shores of Vuosaari are mainly used for recreational purposes
- + between apartment building dominated suburbs local recreation areas have been preserved; the area has the city's cleanest swimming waters
- + Kallahdenharju and shore meadow, Ramsinniemi herb-rich forest and the part of Mustavuori herb-rich forest belonging to Helsinki are protected
- + Mustavuori is one of the Helsinki Metropolitan Area's most valuable herb-rich forest areas; it is connected with the nationally valuable Parvarinlahti wetland rich in bird life
- + there are plenty of services at Itäkeskus; this local centre has improved east Helsinki's employment situation
- + public transport services to the city centre are good
- transverse connections to the local centre are poor
- in relation to its population; the area has few jobs
- use of the services at Itäkeskus serves to increase traffic on the Vuosaari industrial estate, the coffee roasting plant and printing works produce solvent, particulate, and obnoxious gas emissions
- the harbour and its thoroughfares planned for Vuosaari would destroy a valuable natural area and increase traffic in the area
- nitrogen emissions from Vuosaari power station will increase when plant B starts up.

**LAND USE IN THE MAJOR DIVISIONS OF HELSINKI IN 1992**



Source: Helsinki Information Management Centre, 1993



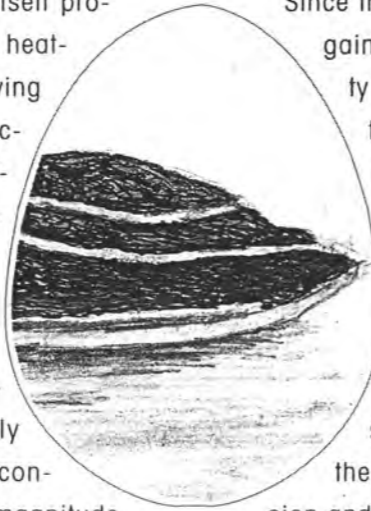
## Energy production and consumption

**H**elsinki's energy demand is met by imported fossil fuels. In the city's own energy production coal and natural gas are mainly used, whereas most of the oil products are consumed by traffic.

The Helsinki Energy Board itself produces almost all the electrical and heating energy required by the city. Owing to the combined production of electricity and heat the city's energy efficiency is good. Some 82% of the energy in coal, oil and natural gas used by power stations and district heating plants is made use of. In motor vehicles the energy efficiency, according to estimates, is only 27% and the loss in traffic fuel consumption is of the same order of magnitude as the total loss from energy production.

Due to its changeable climate, Finland consumes a lot of energy, and consumption is spread unevenly over the year. In European terms we are a peak user of energy, when energy consumption is considered in terms of population.

In Helsinki in 1992 3137 Gwh of electricity, and 5736 Gwh of district heat, were consumed. The service sectors, city and State offices consume half of Helsinki's electricity; households account for about one-third of consumption. There is no energy-dominated industry in Helsinki, so that manufacturing accounts for only 14% of the total electricity consumption. About 90% of the building volume requiring heating in



Helsinki belongs to the district heating network. District heating is used the most for heating homes.

The energy crisis resulted in energy consumption becoming more efficient in the 1970s.

Since then, wasteful consumption has again gained ground in the sector and electricity consumption in both households and the services sector has constantly escalated. In 1992 the electricity consumption of households, the business and transport sectors in Helsinki was still growing. Industry and construction used less electricity than previously, so that overall consumption was slightly lower than in the previous year. The economic recession and warm weather served to reduce electricity consumption for the first time since the early 1970s.

Unusually warm weather over the last few years has also reduced the district heating need.

The combustion of fossil fuels produces emissions that acidify waterways and the soil and accelerate the greenhouse effect. Moreover, energy production leads to the formation of large amounts of waste slag. In 1991 the Hanasaari B plant, according to the water and environment administration, was Finland's second greatest air polluter. Since then the plant's sulphur emissions have fallen by about 80%, nitrogen emissions by almost 20%, and particulate emissions by roughly 70%.

*About 90% of the building volume that has to be heated in Helsinki is connected to the district heating system. The City of Helsinki in 1990 received the United Nation's environment award for among other things the combined production of electricity and heat, which conserves the environment and fuel.*

*Über 90% des beheizten Bauvolumens in Helsinki sind an das Fernheiznetz angeschlossen. 1990 erhielt die Stadt Helsinki den Umweltpreis der UNO, u.a. für ihr Strom- und Heizenergieeffizienz auf Basis der umweltfreundlichen und energiesparenden Kraft-Wärme-Koppelung.*



## Wastes

In 1992 about 500 kilos of wastes per capita were produced by households and businesses in the Helsinki Metropolitan Area. In the peak production year of 1989 there were 730 kg per capita. The reduction in the amount of wastes has been most drastically influenced by a fall-off in construction. However, the amount of municipal waste has now also taken a downward turn, after a period of continual growth.

The Helsinki Metropolitan Area Council handles Helsinki's wastes at the Ämmässuo land-fill in Espoo. Two-thirds of the waste taken to Ämmässuo comes from Helsinki. It is assessed that the present capacity of the land-fill will be sufficient



until the end of the decade, and the area is being extended on the Kirkkonummi side. After this expansion, it will probably be possible to use the land-fill until well into the 2000s. The more effectively the amount of waste is reduced and the greater the amount of waste recycling and conversion, the longer the land-fill will be able to satisfy needs.

The starting point of waste management policy in the Metropolitan Area is the reduction and recycling of wastes, and the promotion of waste conversion. The plan is to reduce the amount of waste taken to the land-fill by salvaging one half by the year 2000. The amount of waste taken to the land-fill would thus be reduced considerably.



*In general, around 3/4 of household waste is suitable for composting or for paper, glass and metal waste recycling. The waste management regulations for the Metropolitan Area contain rules and recommendations for the pre-separation of recyclable and convertible waste and for composting.*

*Vom Hausmüllvolumen sind ca. 3/4 zum Kompostieren sowie für die Altpapier-, Altglas- und Altmetallsammlung geeignet. Die Abfallentsorgungsbestimmungen für den Großraum Helsinki enthalten Anordnungen und Empfehlungen für die separate Einsammlung von Wertstoffen sowie für die Kompostierung.*

### ONE-THIRD OF THE METROPOLITAN AREA'S WASTE IS RECYCLED OR USED AS A RAW MATERIAL

In 1992 almost 30 % of the municipal and building waste in the Helsinki Metropolitan Area was recycled in various ways. Paper and board waste is collected the most. Metal waste and building waste recycling has decreased owing to the fall-off in production.

According to a study made in Helsinki in 1990, a family of four produces around 1,200 kg of waste a year. Approximately 3/4 of the waste from households could today be benefited from in one way or another. Roughly one-third of this waste comprises organic kitchen and garden waste capable of being composted. Another third is recyclable paper and board, and around one-tenth glass and metal suitable for recycling. The remainder consists mainly of packaging materials which cannot at present be sent for recycling. It is already technically possible to recycle plastic waste, but industry is not yet using waste plastic as a raw material on a large scale.

In the northern parts of Helsinki in the spring of 1993 a start was made on the collection of biowaste from households. In compliance with the waste management regulations, some 100,000 apartment building inhabitants sort compostable waste at source. The Helsinki Metropolitan Area Council takes the biowaste for composting to a composting field at Ämmässuo land-fill. The intention is to gradually expand biowaste collection to cover the whole Metropolitan Area. Restaurants and shops where large quantities of organic waste form will also gradually be obliged to pre-separate their waste.

In 1992 almost two-thirds of the paper consumed by households was collected, i.e. roughly 70 kg per capita. The waste management regulations oblige all condominium associations consisting of five or more apartments to have paper collection bins, while detached and terraced house areas have their own collection points. The Helsinki Metropolitan Area Council

also has its own collection bins for glass and metal wastes. Large-sized waste items, such as white goods and furniture, are accepted by the recycling centre, as well as by many flea markets.

It would be possible to make more use of wastes, particularly in firms, shops and offices. Some of the cardboard packaging from shops and office paper still remains uncollected. Around one-fifth of building waste is made use of. The building waste treatment facility which started up in 1991 raised the recovery rate of building waste to around 30 %, but this plant was later closed down because it was unprofitable. The recycling of building waste could best be improved by sorting the waste at the work site. In a sorting trial started at a Helsinki new building work site in the summer of 1992 around 3/4 of the wastes were recycled and waste management costs fell by approximately one half.

### COMPANIES PRODUCE MOST OF THE CITY'S HAZARDOUS WASTES

Some 5,000 to 6,000 tons a year of hazardous wastes of various kinds have been sent from Helsinki to the Ekokem Oy hazardous waste treatment facility. In 1992 Helsinki companies and the City of Helsinki sent more hazardous waste (almost 9000 tons) than ever before to the Ekokem facility.

Oil wastes from the Metropolitan Area have been accepted since 1991 by the Seutula treatment facility. A reception centre located at Tali, in Helsinki, was closed down with the opening of the new, modern plant at Seutula.

Households in the Helsinki Metropolitan Area take about 2-3 kg of waste per person to hazardous waste reception facilities. According to estimates, around half of the hazardous wastes arising in households are appropriately treated. Household hazardous wastes are collected e.g. in spring and autumn by a collection vehicle that goes round the streets.

## Noise

**N**oise affects our daily lives in many ways. It disturbs or even prevents conversation and sleep, disturbs our concentration and reduces our resistance to stress. It may also cause physiological changes in e.g. our heart rhythm or blood pressure.

Car traffic causes the most noise. Particularly residents living alongside busy roads or in the inner city find road traffic noise disturbing. The Helsinki-Vantaa airport noise zone reaches the northeast part of Helsinki, and noise levels close to the railway are also high.

More than a half of Helsinki residents live in noise zones. Council-of-State has set 55 decibels (dB) as a guideline for noise during the day time, and a noise level of over 65 dB is already considered extremely disturbing. In Helsinki, more than 285,000 residents live in noise zones exceeding 55 dB.

### A QUARTER OF A MILLION HELSINKI RESIDENTS LIVE IN AREAS AFFECTED BY ROAD TRAFFIC NOISE

**S**ome 250,000 Helsinki residents live in areas affected by traffic noise exceeding 55 dB. In the area occupied by around 70,000 residents the noise from road traffic exceeds 65 dB. The over 55 dB noise area spans almost the entire inner city, in addition to a large part of the suburbs.

Traffic noise is affected by the number of vehicles, speed and the proportion of heavy vehicles. The noise situation in the inner city has been improved by banning heavy vehicles. Noise can be reduced in the vicinity of fast roads by imposing speed limits. The noise emissions of

new cars have been reduced by means of technical improvements. In spite of reductions in such emissions, noise pollution will increase if the traffic density increases.

Up to 1992 the city had constructed around 17 km of noise barriers. Residential areas alongside the busiest roads have been protected against noise by means of special fences and concrete walls. Such noise barriers have been constructed since the 1980s at a cost of around FIM 30 million.

Noise barriers are costly and may detract from the beauty of the cityscape. In existing residential areas noise barriers and improvements in the sound insulation of buildings are frequently the only means of protecting residents against noise, pollution but when constructing new residential areas noise abatement must be taken into account at the planning stage. Between places of residence and roads suitable noise protection zones can be left. Industrial and office buildings and multi-storey car parks can be located as noise attenuators on the side of the residential area facing the road.

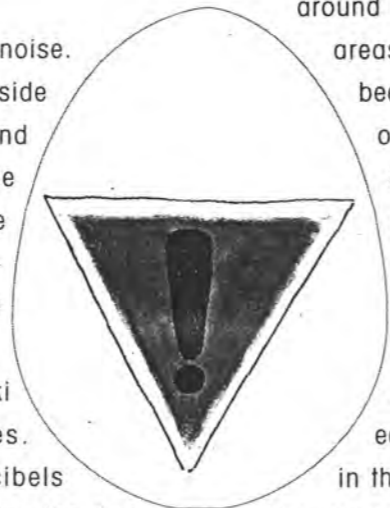
### AIRCRAFT NOISE IS DISTURBING IN NORTHEAST HELSINKI

**A** total of around 30,000 people live in an area polluted by aircraft noise. Air traffic has constantly increased and the 55 dB noise area for which Helsinki-Vantaa airport is responsible extends as far as north Helsinki. The noise level in the city's most badly affected areas exceeds 60 dB; these areas have a total population of 800. Noise from the airport for light aircraft of Malmi percolates into areas where around 2,600

people live. In north and northeast Helsinki there are also large areas where aircraft noise affects recreation and leisure time pursuits.

Aircraft noise will decrease when noise emissions are reduced and air traffic lanes are changed to make them less disturbing from Helsinki's point of view. More stringent international

noise regulations restrict aircraft noise levels. At Helsinki-Vantaa airport a third runway is planned which will reduce the number of take-offs and landings over the city's north and northeast areas. With the completion of this third runway in the year 2002, noise from the airport will only affect 4000 residents.



Noise level due to cars exceeds 55 dB over almost the whole inner city. A total of around a quarter of a million people live in parts of the city affected by noise.

Der Verkehrslärm ist fast im gesamten Innenstadtbereich größer als 55 dB. Etwa eine Viertelmillion Helsinkier wohnen in Gebieten mit überhöhter Lärmbelastung.

### RAIL TRAFFIC NOISE PENETRATES INCREASINGLY FURTHER AS RAIL TRAFFIC AND SPEED INCREASE

**F**inland's busiest sections of rail are those passing through Helsinki. Hundreds of daily local train runs take place along the main line, the track along the shore, and the Vantaankoski

line, which are used by dozens of express and freight trains. Along the railway the noise zone at its worst extends for 300 metres and some 6300 people in the city live in the area affected by it. Along the main track there are many blocks of flats that are very close to it.

The more trains using the railway and the higher their speed, the greater the noise. Long distance and freight trains make more noise than local trains. Along the main railway line the fourth track is currently under construction. The noise from rail traffic will increase if the number of local trains increases when the tracks are completed and the speed of long distance trains increases. Unless noise barriers are erected along the railway, train noise will spread into the residential areas of more than 9000 Helsinki inhabitants. To combat this noise pollution, it would be necessary to construct approximately 11 km of noise barriers.

**ACTIVITIES CAUSING NOISE LEVELS  
ARE BEING MONITORED**

**F**actories and plants can cause noise pollution in their vicinity. For instance, stone crushing plants, motor sports tracks and rifle ranges create distressing noise and now require

a permit for their activities. Noise abatement regulations are incorporated in plant location or environmental permits and the terms set are supervised by making noise measurements.

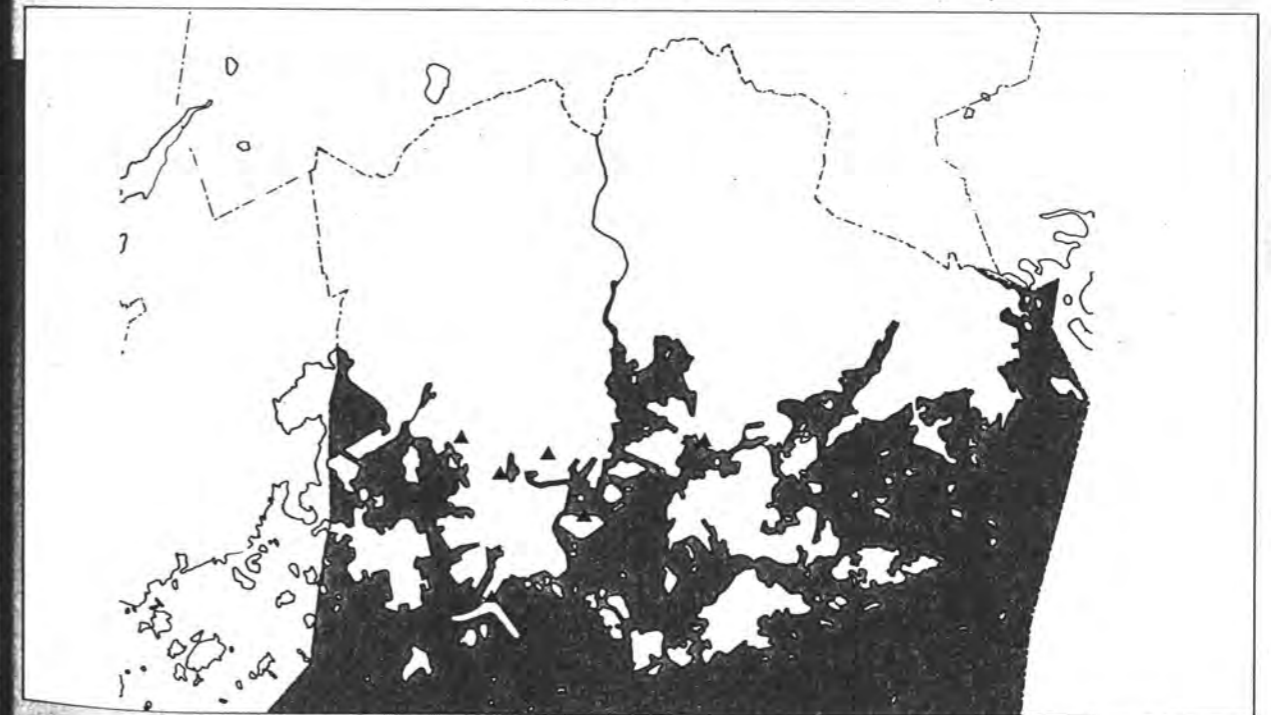
Noise from certain construction activities and public events may also be extremely disturbing to nearby residents. For work and events causing temporary noise notification must be made to the environment centre at least a fortnight before the activity is due to commence. Each year in Helsinki around 100-150 such notifications are made. More than half of the notifications made in 1992 involved various kinds of construction, one-fifth outdoor concerts, one-tenth aircraft, and the remainder different kinds of motor sports, sporting, exhibition, and circus events. When dealing with notifications associated with noise pollution, the environment centre sets, for example, time limits and other constraints in order to reduce noise emissions.

**NOISE LEVELS  
LÄRMPEGEL**

NOISE LEVELS	dB
HEARING THRESHOLD	0
RUSTLING OF LEAVES	10
TICKING OF A WRISTWATCH	20
LIBRARY	30 - 40
WHISPER	30 - 40
OFFICE	50 - 60
TRAFFIC NOISE	55 - 75
BUS AT STREET CORNER	70 - 80
NOISE INSIDE BUS	80 - 90
AN OVERTAKING LORRY	OVER 90
SINFONIA CONCERT (FORTE)	100 - 110
ROCK CONCERT	100 - 120
CAR HORN (1 m)	115
PNEUMATIC DRILL	120
JET TAKE-OFF	125
PAIN THRESHOLD	120 - 130



**AIRCRAFT NOISE  
FLUGLÄRM**



Approximately 30,000 people in northeast and north Helsinki live inside the more than 55 dB noise zone from Helsinki-Vantaa and Malmi airports. There are 6 helicopter bases either marked on the town plan or for which permits have been issued.  
Sources: Danish Acoustical Institute, 1991  
Insinööritoimisto Kari Pesonen Oy, 1991  
City of Helsinki Environment Centre, 1993

In den Einflugschneisen des Flughafens Helsinki-Vantaa und des Flugplatzes Malmi, in denen der Fluglärm zeitweilig mehr als 55 dB beträgt, wohnen etwa 30 000 Helsinkier. Weitere Fluglärmquellen sind sechs Helikopterlandeplätze, die im Raumordnungsplan ausgewiesen sind oder andere Betriebsgenehmigungen erhalten haben.  
Quellen: Danish Acoustical Institute, 1991  
Ingenieurbüro Kari Pesonen Oy  
Umweltzentrale der Stadt Helsinki, 1993



## The Living Environment

City dwellers spend around 90 % of their time indoors. Consequently, the air in homes and work places affects both health and comfort. The city environment centre receives around a thousand complaints a year regarding the healthiness of the living environment. A quarter of the complaints are concerned with noise and the others in some way with the indoor air. Apartments are inspected and noise measurements are also often carried out. Air quality is determined in laboratory tests.

To conserve energy, in the early 1970s buildings were made more airtight. Ventilation in apartments deteriorated and at the end of the decade special attention began to be paid to the quality of the indoor air. Secondly, building materials that are more synthetic than previously produce more emissions than traditional materials. Poor ventilation and the sealing of buildings result in impurities becoming trapped in the inside air.

Indoor air is weakened in particular by tobacco smoke, moulds spreading in damp constructions, compounds evaporating from building materials, and radon gas leaking out of the soil. These can lead to various kinds of symptoms of irritation and illness, besides affecting living comfort. Since the early 1980s, radon gas concentrations, formaldehyde and moulds, for instance, have been measured in homes in Helsinki. The measuring of volatile organic compounds commenced in the 1990s.

### RADON GAS PASSES INTO DWELLINGS FROM THE SOIL

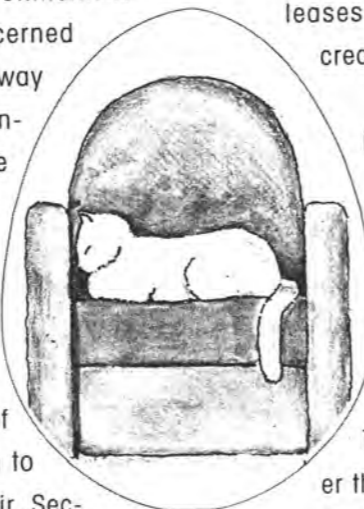
Radon gas originates in soil and bedrock layers, whence it passes into the room space via the foundations and floors of buildings. Radon is a radioactive gas which as it decays releases ionising radiation. Radon gas increases the risk of lung cancer.

Radon concentrations measured in Helsinki are of a similar order of magnitude to those found elsewhere in south Finland, with the exception of the eastern part of Uusimaa, Kymenlaakso and South Häme, where concentrations are higher. The mean reading obtained in Helsinki is 134 Bq/cu.m, which is slightly higher than the mean for the whole country.

Radon gas concentrations in residential buildings may not, according to new guidelines, exceed 400 Bq/cu.m. New homes must be designed and constructed so that the radon gas concentration does not exceed 200 Bq/cu.m. Studies made so far reveal that around 4 % of detached houses in Helsinki have radon gas amounts that are higher than the guidelines.

### ROOM AIR MAY CONTAIN INNUMERABLE CHEMICAL COMPOUNDS

Many plastics, paints, varnishes, adhesives, resins and polymers of various kinds release harmful organic compounds into the indoor air. For example, as paints, varnishes and adhesives dry they release solvents into the room air. In addition to synthetic materials, natural mate-



rials can also give rise to different kinds of emissions.

Measurements have shown that several hundred chemical compounds can be present in dwellings in Helsinki. For many organic compounds no limits have been established and it is difficult to assess the effect of individual substances.

Formaldehyde is the most well-known impurity in building materials; it is mostly released into dwellings from particle board. Formaldehyde levels are also affected by the age of the building, ventilation and the relative humidity and temperature in the building. In new dwellings concentrations are lower than in buildings built in the 1970s, because the quality of particle board has improved and secondly its use has diminished. Parquet flooring is also treated now-

adays with water-soluble varnishes containing less formaldehyde than the former two-component lacquers.

The number of complaints regarding formaldehyde has appreciably decreased in Helsinki during the 1990s. Concentrations higher than the guidelines occur less often than previously, and there are no longer the peak concentrations of the 1980s. However, formaldehyde continues to cause a large fraction of the organic loading of indoor air.

The highest permissible formaldehyde concentration in buildings constructed prior to 1983, or in completely renovated buildings, is 0.30 mg/cu.m. In new buildings the guideline is half of this, i.e. 0.15 mg/cu.m. In 1980-1989, 1058 homes in Helsinki were studied; the recommended levels were exceeded in 226 of them.



Henri Oksanen

Indoor air quality is weakened by e.g. compounds evaporating from building materials and furnishings, and moulds that spread in damp buildings. If the house is well sealed, or the ventilation is poor, impurities remain for a long time in the room air.

Die Qualität der Innenluft wird durch Verbindungen, die u.a. aus Bauwerkstoffen und Möbeln entweichen, sowie durch Schimmelbildung in den baulichen Konstruktionen beeinträchtigt. Ist das Haus dicht gebaut oder der Luftaustausch mangelhaft, dann bleiben Verunreinigungen lange in den Raumluft erhalten.

#### MOULDS AND FUNGI ATTACK DAMP BUILDINGS

Growths of mould on surfaces or structures in homes are almost always associated with damage due to damp. Leaking pipes, roofs or wall structures, or standing water under buildings can cause the damage. Damp also gathers in buildings with poor ventilation in bathrooms and other damp places.

High mould concentrations can lead to runny noses due to allergies or promote an asthma attack. Some moulds and actinomycetes also produce toxic compounds in the air.

Each year, around three hundred complaints of mould and damp are investigated in Helsinki. In old buildings the causes are most often water leaks; in new buildings the main causes of damage from damp are bad planning or structural faults.

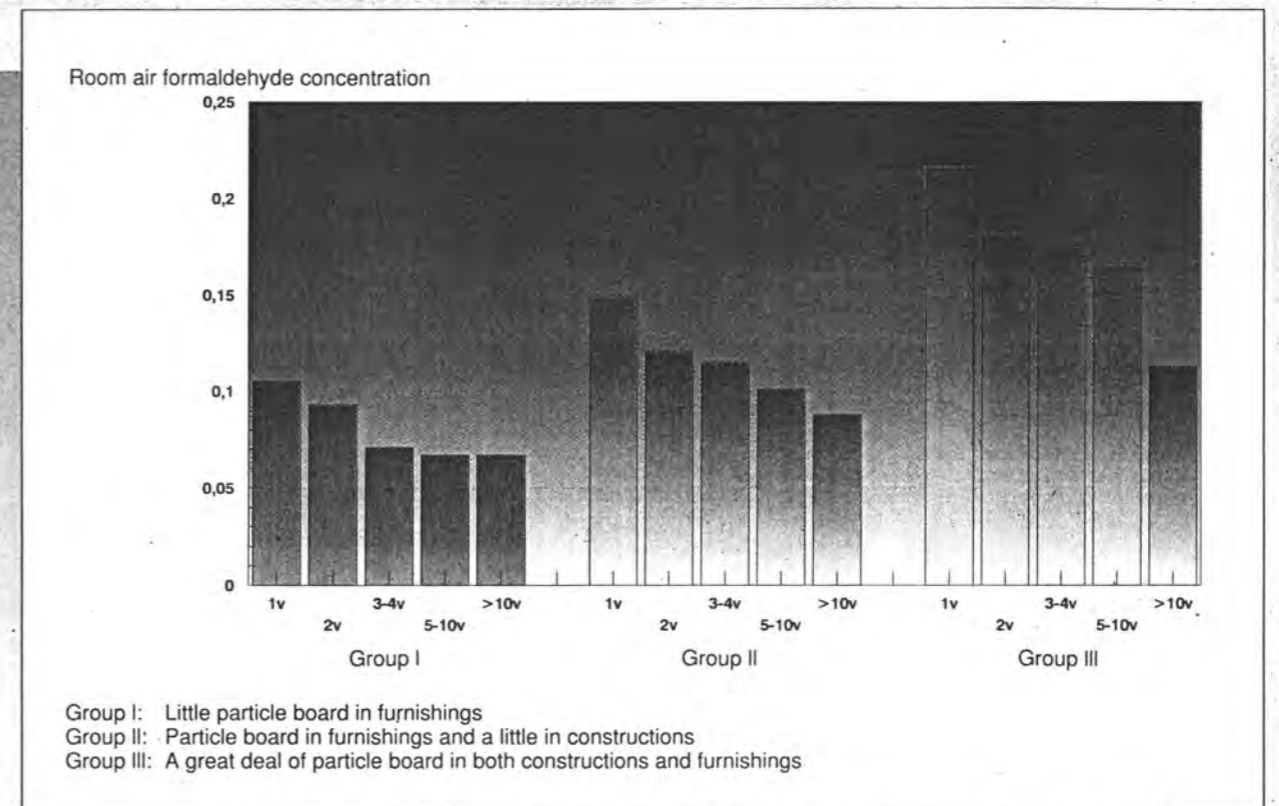
#### INDOOR NOISE REDUCES HOME COMFORT

Technical appliances of various kinds inside buildings cause the most noise in residential buildings. Residents are disturbed by noise from e.g. water taps, drains, ventilating equipment, heating appliances, compressors, communal washing machines, etc. Secondly, noise from businesses, e.g. a restaurant in the same building, can cause disturbance. Complaints about sound insulation in dwellings have increased. Airborne sound insulation between apartments is usually adequate, but sound insulation on stairways between floors is generally unsatisfactory.

The National Board of Health has issued guidelines for permissible noise levels inside buildings. In apartments, noise during the day should not exceed 35 dB, and at night 30 dB. In fact, noise indoors exceeds the guidelines in 80 - 120 buildings a year in Helsinki.

#### AVERAGE FORMALDEHYDE CONCENTRATIONS IN DWELLINGS OF VARIOUS AGES IN 1980 - 1989

#### DURCHSCHNITTLICHER FORMALDEHYDGEHALT IN WOHNUNGEN UNTERSCHIEDLICHEN ALTERS, 1980-1989



In Helsinki in the 1980s slightly over one thousand dwellings were tested for formaldehyde. In approximately one-fifth of these the formaldehyde concentrations exceeded the guidelines. Particle board used in furnishings and for building purposes mainly influences the formaldehyde level of indoor air. Concentrations of the gas tended to be highest in new dwellings.  
Source: City of Helsinki, Environment Centre, 1993

In Helsinki wurden in den 80er Jahren über tausend Wohnungen auf den Formaldehydgehalt der Innenluft untersucht. In etwa jeder fünften Wohnung übertraf der Gehalt die Richtwerte. Hauptquellen für Formaldehyd in Wohnungen sind in Möbeln und baulichen Konstruktionen verwendete Spanplatten, und die größten Werte wurden in neuen Wohnungen gemessen.  
Quelle: Umweltzentrale der Stadt Helsinki, 1993

## Environmental accidents

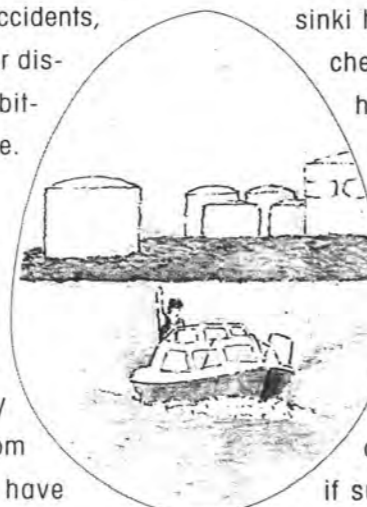
**H**elsinki has a dense city structure. Since harbours, factories and thoroughfares are close to residential and recreation areas, the risk of accidents is greater than in more remote areas. Chemicals, oil and nuclear accidents can pollute the city's air, water or soil. In accidents, short term exceptional emissions or discharges can harm the city's inhabitants, the built environment or nature.

### CHEMICAL STORAGE AND TRANSPORTATION INCREASE ACCIDENT RISKS IN HELSINKI

**I**n Helsinki there are 50-150 chemical accidents and around 200 oil spills a year. The majority of these consist of small leaks from tanks. In a few cases, residents have been requested to move from the vicinity of an accident, or to stay indoors.

Owing to the harbours and dense distribution network, large quantities of chemicals and oil are transported in the city. There are around 100 large chemical handling and storage points. Hazardous substances are handled at e.g. paint factories, car chemical factories and company that packages pesticides. The city gas production plant is one of Helsinki's greatest risk factors; it will continue its operations until 1995.

There are five large oil storage depots in Helsinki. There are 3 maintenance depots in important groundwater areas and around 120 oil tanks. Labyrinthine thoroughfares and rock strewn waters increase the chance of an oil spill. There are some 400 km of 'tricky' channels in Helsinki waters. The city takes care of oil spill clean-ups; the most recent oil spill clean-up plan was approved by the city council in 1989.



To reduce the chance of accidents, transportation of chemicals and oil by land since 1991 has been confined in Helsinki to special routes. In the city centre some kinds of transportation are completely banned, while in Inner Helsinki heavy traffic and the transportation of chemicals are restricted during the rush hour.

The largest chemical handling and storage plants in 1993 have to study possible hazardous aspects of their own operations. In addition, plants liable to cause a major accident are required to prepare a safety report on the avoidance of accidents and indicating how they will act if such an accident, in spite of precautions, should occur.

### RADIOACTIVITY IS CONSTANTLY MONITORED IN MILK AND PIPED WATER

**A**nuclear explosion in the air and a reactor accident at home or abroad can lead to a radiation hazard in Helsinki. The nearest nuclear reactors are located at Loviisa some 100 kilometres away and at St. Petersburg some 400 kilometres away. In a nuclear reactor accident large amounts of uranium fission products of various kinds may be released and dispersed into the environment. The weather situation fundamentally affects the dispersal of nuclear radiation. Radioactive particles can quickly travel for long distances on air currents, so that the time available for issuing a warning may be very short.

The city of Helsinki has been carrying out studies on radioactivity since 1972. During the early years measurements were only made periodically and the purpose was to monitor the impact on food and drinking water of nuclear tests carried out in the atmosphere. The studies were appreciably increased in 1986 after the Chernobyl accident. Aside from samples of foodstuffs and household water, the radioactivity of airborne dust and the external radiation dose rate were measured. When the radioactive cloud passed over Helsinki and its environs, the weather was fair. As a consequence, the radioactive fall-out over south Uusimaa was slight, whereas in the area of Central Finland where there were rain

showers, raised <sup>137</sup>Cs activity levels are still detectable.

Outdoor radiation is measured at the Helsinki environment centre using a constantly operating dose rate meter. Dose rates exceeding normal background radiation have not been observed. There are also a few outdoor radiation dose rate meters in the city's rescue departments. A national measurement grid is formed by around 200 measuring stations belonging to the Ministry of the Interior, defence forces and the Finnish Centre for Radiation and Nuclear Safety from which in the case of a nuclear accident data on the development of the radiation situation can be obtained.

*Over 100,000 tons of chemicals and almost 600,000 tons of oil are transported through Helsinki's harbours every year. In addition to the harbours, dangerous goods are handled or stored at around 100 points in various parts of the city.*

*In den Häfen von Helsinki werden jährlich über 100 000 Tonnen Chemikalien und fast 600 000 Tonnen Öl umgeschlagen. Außer in den Häfen werden gefährliche Stoffe an rund 100 Stellen in verschiedenen Teilen der Stadt gelagert und gehandhabt.*



Henri Oksanen

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