The Finnish Environment *579*

Monitoring the living environment

Shortened version of the working group report

HELSINKI 2002

MINISTRY OF THE ENVIRONMENT

Foreword ....

On January 21, 2000, the land use department at the Ministry of the Environment set up a working group to examine the environmental administration's need for information on the state of the living environment and changes in it, survey the monitoring of different aspects of the living environment by the environmental administration and other government agencies, and outline methods of monitoring the state of the living environment and changes in it in accordance with the responsibility to do so provided for in the Land Use and Building Act.

The working group was chaired by Carita Strandell (Senior Architect), and the other members were Timo Saarinen (Senior Adviser), Maaret Stenström (Senior Adviser), Harri Pitkäranta (Counsellor) and Aila Korpivaara (Senior Architect), all from the Ministry of the Environment, Leena Strandén (Senior Adviser) from the Pirkanmaa Environment Centre, Pekka Harstila (Architect) from the City of Tampere and Olavi Mäkelä (Town planning manager) from the City of Pori, with Outi Koskenniemi of the Finnish Environment Institute acting as secretary. During the period January 1 to May 15, 2001, while she was on leave of absence, Aila Korpivaara's place was taken by Harri Hakaste (Senior Adviser). Anna Strandell from the Finnish Environment Institute acted as the working group's permanent expert.

The draft of the working group's final report was completed on April 2, 2001 and sent off on an extensive round of the interested parties for comments, and a hearing was organized for the draft report on May 3, 2001. A total of 29 written comments were received plus a large number of oral observations. Numerous experts from various fields representing government agencies, regional councils, local authorities, universities and colleges, associations and other organizations, have commented on the report, which was finalized on June 30, 2001. The analyses contained in the report were drawn up by Anna Strandell and the report was written jointly by Carita Strandell and Anna Strandell. This publication is a shortened version of the working group's final report.

Contents ....

1 Introduction

The concept of the 'living environment' appeared for the first time in legislation on building, in the new Land Use and Building Act, which came into force at the beginning of 2000. The living environment is mentioned immediately in Section 1 of the Act and item 1) of Section 5 could be considered to encapsulate the essential aim of improving the living environment. The living environment is part of the built environment, which is also dealt with for the first time in legislation in the Land Use and Building Decree, from the point of view of arranging monitoring of its current state and future development. According to the Constitution, government authority has to ensure everyone the right to a healthy environment. This requires sufficient knowledge about the environment. In order to tackle the problems, we have to know what causes them. Knowledge is required about all sub-sectors of the environment, the built environment, the natural environment and environmental hazards.

The concept of the living environment incorporates numerous issues. It covers a multitude of interests while attempting to describe people's housing, working and leisure environments and the sub-areas they include. It is not simply a question of examining the physical environment alone, but the way the physical environment is

"The objective of this Act is to ensure that the use of land and water areas and building activities on them create preconditions for a favourable living environment and promote ecologically, economically, socially and culturally sustainable development." (Land Use and Building Act, Section 1)

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"The objective in land use planning is to promote the following through interactive planning and sufficient assessment of impact:
1) a safe, healthy, pleasant, socially functional living and working environment which provides for the needs of various population groups, such as children, the elderly and the handicapped." (Land Use and Building Act, Section 5)

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"The Ministry of the Environment shall organize the monitoring of the state and development of land use and the built environment, and the maintenance of the necessary database." (Land Use and Building Decree, Section 2)

experienced has to be considered as well. Many of the environmental aims contained in the Land Use and Building Act are also linked with the way the environment is experienced, such as aims for a safe, pleasant and socially functional living environment.

Describing the living environment is a complex and difficult task. What are the issues considered to be so important that they should be the subject of constant attention? How can we describe the living environment's safety, healthiness, pleasantness and social functionality? How can we measure whether we are travelling in a sustainable direction? The working group has endeavoured to find some of the answers to these questions.

The working group has tried to establish a model for examining the living environment. The living environment is seen as an aspect of human living which deals with factors that affect the quality of life and living conditions. The idea has been to systematically build up a descriptive model of the living environment based on the aims of the Land Use and Building Act. The factors that the environmental administration has to examine in monitoring the living environment are chosen on the basis of the descriptive model. The descriptive model may be used for many different purposes, as a basis for monitoring at different levels of the administration, in land use planning and other forms of environmental planning and in environmental impact assessment of individual projects. The descriptive model is also intended to stimulate discussion on what aspects of the living environment are considered to be important and what issues should be monitored.

Although plenty of information about the living environment is available, forming an overall picture of it is difficult. The starting point

in this work is to put together an umbrella for the information on the living environment. The aim is to obtain an overall picture of the state of the living environment and its constituent parts through monitoring and to be able to keep an eye on the changes that take place over time in different areas. It should also be possible to forecast future development. Further information on the factors affecting the living environment is also needed. It should, for example, be possible to evaluate the impact of different measures on the state of the living environment and to determine the causal connections between different phenomena.

Monitoring provides basic information on the living environment for use by officials, decision-makers, and ordinary citizens. The information makes up an overall picture giving us the basis for determining which factors we have to react to rapidly and which issues we have to examine in more detail. The information can be applied in many different sectors and at many different levels of the administration. For instance, local authorities can obtain comparative data covering the entire country.

Everyone is responsible for the development of the living environment. The living environment is affected by the actions of an extensive group of stakeholders, officials, ordinary citizens and the business community. In improving the living environment we need wide-ranging cooperation between the various stakeholders and monitoring data gives us the opportunity to integrate the actions of the various stakeholders. Better information on the environment gives us a new basis for joining the debate on developing the living environment and for making informed decisions about it.

Describing the living environment 2

2.1 What makes up the living environment?

The living environment is made up of a multitude of elements and factors of many different types, which are essential for it to function smoothly. Tampering with one important element can have a decisive impact on people's everyday lives.

The *housing environment* is an important part of the living environment. A well-functioning housing environment is one in which local services and local recreational areas are within walking distance. The housing environment is particularly important to those population groups who spend most of their time in the area where they live, children, young people, the elderly, people who are out of work, people who work at home, and so on. A child's daily routine depends largely on the opportunities for play and movement in the immediate vicinity of the home. A good housing environment can also help old people to manage independently.

Services create the background for the smooth running of the daily lives of local residents and provide opportunities for social contact.

Adequate services within walking distance cut down motor traffic and make it possible for the elderly to continue living in their own homes for a longer period.

The location of *workplaces and jobs* is of considerable importance to the daily lives of the working-age population, for instance, to the length of their journey to work and to the amount of traffic. Some jobs and workplaces are located in housing environments, but there are considerably more in central areas and concentrated in non-residential areas.

Different *population groups* have different needs and expectations in relation to the

A good living environment consists of:
- functional housing environments,
- adequate services in appropriate locations,
- adequate work places in appropriate locations,
- a wide range of parks and recreational areas,
- a balanced community structure,
- a balanced population structure,
- functional social neighbourhood units,
- distinctive townscape and landscape,
- historical layering,
- varied natural surroundings,
- functional transport networks,
- a functional municipal infrastructure,
- an unpolluted, noise-free environment.

living environment at different times and different stages of their lives. Migration and population structure affect numerous factors including housing needs, services, jobs and the social environment. A balanced, stable population structure provides the basis for evenly available services and for residents to settle down.

There is clear interaction between the *social environment* of an area and the physical environment. The social environment is affected by the structure of the area, its scale and visual characteristics, and by the number of contact points, such as services, parks, recreational areas, and indoor communal spaces. When social problems pile up in certain areas, it may cause local recession, give the area a bad name or weaken the quality of the environment.

Townscape and landscape, the visual characteristics of the living environment, have considerable impact on local identity, on the feel-good factor and on whether people want to put down roots. The quality of outdoor public spaces, scale, architecture, important buildings and landscape, vegetation and the rest of the natural environment all have a significant effect on the appearance of an area and its inherent character. The visual appearance of an area also tells us something about its history and gives it depth and permanence.

Parks, recreational areas and the natural surroundings offer residents contact with nature and provide them with opportunities for outdoor exercise, sports, play and relaxation. Parks are an important part of public open space in residential areas and central areas. Water features and shorelines are particularly important elements in the landscape. Most Finnish towns and cities are situated on the coast, beside lakes or on the banks of rivers. Ensuring the diversity of nature is also important in people's everyday functional environment. This means that the viability of green areas has to be maintained, they have to be large enough and the continuity of networks of green areas has to be preserved.

Community structure affects people's everyday lives both directly and indirectly. The location of homes, jobs, services and recreational areas in relation to each other affects the length of journeys to work and to school, the availability of services, the amount of traffic, choice of mode of transport, and the amount of noise and pollution.

The *transport network* creates the basis for the smooth running of people's everyday lives. Non-vehicular traffic and public transport are particularly important to those groups of the population who do not have access to a car. People with mobility problems must also be able to move about everywhere. On the other hand, traffic has deleterious effects on health and breaks up the housing and living environments. Traffic growth and the concomitant noise and pollution have become problems. Traffic safety is particularly important from the point of view of children. The deleterious effects of motor traffic have led to the implementation of car-free zones and pedestrian areas in city centres.

Noise and pollution may present health problems, especially for those living near busy highways or industrial plants. Ground water pollution and polluted land areas are also health risks in the living environment.

Municipal infrastructure, water supply and sewage systems, and waste management are essential for the community to function properly.

2.2 Defining the living environment

The living environment

- consists of people's living areas;
  - people's living areas include the areas in which people's everyday activity takes place and the areas where they spend their time, and the journeys between them.
- deals with factors that affect the quality of life and living conditions;
  - the living environment is examined from the user's or resident's perspective;
  - the importance of functional and social factors is highlighted against the physical environment.

The concept of the living environment is defined here for the purposes of development work on monitoring the living environment from the perspective of land use. In order to define the concept, the working group examined the definitions of the living environment and related concepts used in the literature on the subject.

The concept of the living environment was defined thus:

The living environment comprises the area in which people live their daily lives and deals with factors that influence the quality of life and living conditions in a specific locality.

The living environment is examined from the resident's point of view, whereby the importance of functional and social factors is highlighted against the physical environment. The living environment comprises the areas in which people's everyday activity takes place and the areas where they spend their time, plus the areas between them through which they journey on a regular basis. The areas in which people's everyday activity takes place cover living, working, going to school, using shops and services, hobbies and leisure activities. Areas that are not of key importance from the perspective of the everyday functional environment, such as large tracts of nature that people rarely visit, remain outside the scope of the definition.

It is difficult to set clear-cut limits to the concept of the living environment used here and in many sectors the limits are fluid. The natural environment, environmental hazards and the social environment, for example, are not dealt with comprehensively, but the aim of examining them has been to try and find the link with the living environment, the local perspective and the resident's point of view. The natural environment is not examined from the angle of the viability of individual species, but the aim is to find out what natural characteristics are important as parts of people's living environment from the resident's point of view. With regard to environmental hazards, we examine their impact on the quality of people's living environment and look at how large a part of the living environment they affect. The social environment is described largely by factors that have links with the physical environment.

2.3 Experiencing the living environment

From the resident's perspective, the empirical view of the living environment is important. The quality of the living environment can be evaluated by measurable quality factors on the one hand, and by experience, on the other. Overall experiences of the living environment are affected by numerous contributory factors to the living environment, housing, services, recreational areas, work, the social environment, visual characteristics, transport networks, etc. People interpret the messages the environment contains consciously or unconsciously. An area may seem pleasant or alienating, safe or threatening, depending on the overall impression given by the environment.

It may be difficult to estimate the impact of contributory factors on the overall experience. The socio-psychological environmental characteristics and environmental impacts associated with experiencing the environment are often overshadowed by quality

factors that are easier to define and measure. When measurable quality factors are compared with users' experiences of their own living environments it may reveal information on causal links, such as what environmental factors correlate with feelings of pleasantness or alienation, of safety or threat.

The emphasis on different factors in the living environment varies with the individual, according to age, stage of life, life style and state of health. Despite this, characteristics can be found in the environment, which affect different people in the same way. The living environment affects not only people's *identity and comfort, but also their feelings of security.*

Local identity is a part of a person's overall identity. Experiencing the environment is firmly bound in with local identity. Identifying with a place means putting down roots in a place and recognizing it as one's own. In this way, people feel they belong to a place, are aware of its special nature and particular characteristics, and experience the feeling of belonging to the place along with the other residents. Most people have strong bonds with their housing and living environments. The focus of identification is generally the home.

Local identity is reinforced by various aspects of the environment, how distinctive its character is and how stimulating it is, whether it has a human scale, how easy it is to perceive and to read, and how permanent it is. It is also important to be able to read local history in the environment. If the physical environment is easy to perceive and contains landmarks, nodal points and other structural elements, it is easy to get a clear mental picture of the area and it is therefore easy to find one's way about. Major changes in the environment that take place rapidly are usually seen as a threat to the identity of an area.

Identifying with a place is also strengthened by moving about in the area, and working and socializing there. A wide range of opportunities and the fulfilment of basic needs, such as the availability of essential services, plus the chance to influence one's own environment, all promote identification with the area. When people live in a place for a long time it becomes familiar and they put down roots. Identifying with

Strong local identity means

- reinforcing feelings of community, pleasantness and safety,
- identifying with the place, putting down roots, recognizing the place as one's own,
- being aware of the special nature and particular characteristics of the place,
- a feeling of belonging together with the other residents in the area,
- adequate social responsibility and joint care of the environment;

→ and thus strengthening the overall identity of the individual.

a place also helps to strengthen feelings of community, pleasantness and security, joint care of the environment and social responsibility. Weak local identity tends to cause rootlessness and indifference towards the environment which are manifested in the form of increased vandalism and crime.

Pleasantness and a sense of feeling at home are affected by many characteristics of the living environment. Research shows that residents often consider nature and the green environment the most important 'feel-good factors' in their housing and living environment, even in central areas of major cities. Other important 'feel-good factors', especially in the housing environment, are peacefulness and the absence of environmental hazards, particularly noise, location of the area and transport connections, services, the character and atmosphere of the area, opportunities for outdoor activity and exercise, the visual appearance of the area and the social environment. In areas where people feel at home, permanent local neighbourhoods develop, which are manifested in the form of a sense of responsibility for taking good care of the environment. The feeling of being at home may be weakened by external threats of various types, such as the threat of infill building. People fear that the places they themselves consider important, for instance green areas, may be lost or the quality of the living environment may be weakened. It is also characteristic of threats that residents feel they are powerless to influence the course of events. *A sense of security* affects people's everyday lives, encouraging them to move about and get on with things, whereas a feeling of

Local identity is reinforced by

- an area's own distinctive character and how stimulating it is,
- human scale,
- how easy it is to perceive and to read an area, and its degree of permanence,
- historical layering,
- good social environment and atmosphere,
- a wide range of opportunities for activity.

insecurity can be extremely limiting. A sense of security in the living environment is bolstered by collective caring for the environment and by social responsibility, which can partly be influenced by the planning of the physical environment. The formation of domains of familiar territory and the development of a sense of social responsibility can be influenced by the location and design of buildings and access ways and by having a clear hierarchy of spaces – private space, semi-public and public space. Insecurity may be increased by uncertainty about the health risks in the living environment and the chances of accidents. Fears may be caused by the presence of industrial plants, fuel stores, power lines and landfill sites or rubbish tips. Insecurity can also be generated by lack of knowledge about the future development of the living environment and the chances of influencing it.

2.4 The living environment in Finland

What is *the extent* of the living environment *in terms of area*? How much of Finland could be said to make up people's living environment? The living environment is made up of individual human habitats – the surroundings that people use repeatedly, more or less on a daily basis.
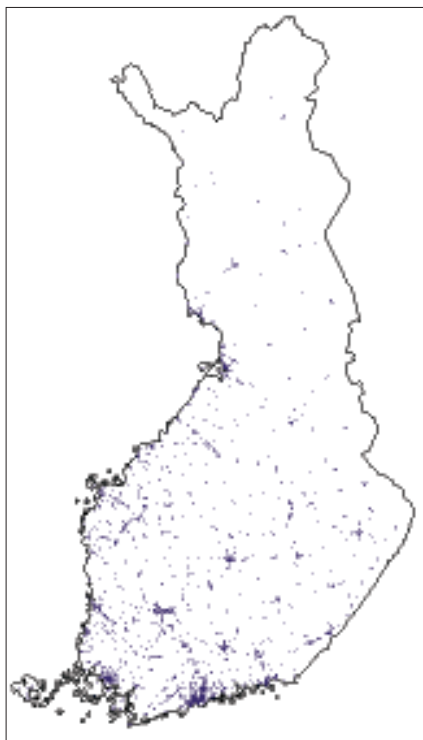

Figure 1. Densely populated areas (of over 200 residents) in Finland, 1995.
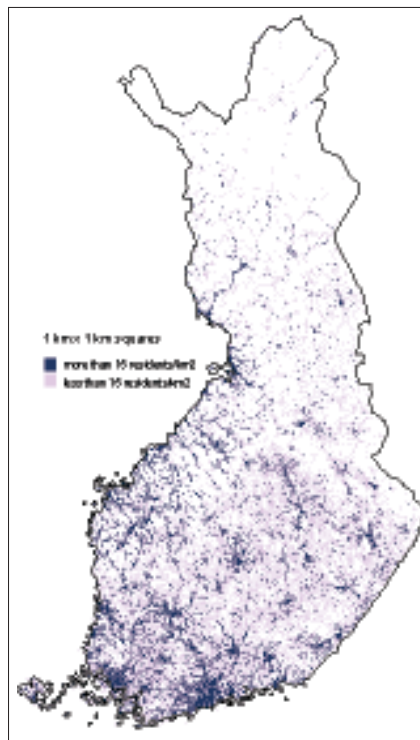
Figure 2. Populated squares, 1995.

The extent of the individual human habitat varies, the habitat of a working adult may encompass almost the whole town, whereas the habitat of a child or an elderly person may only extend to a few neighbouring blocks.

Densely populated areas naturally form part of the living environment. In 1995, densely populated areas of over 200 residents covered a total of 7,600 km^2 in Finland, 2.5% of the overall land area (fig. 1). How much of the remaining land area outside these densely populated areas should be counted as living environment, however, is not quite so clear. Finland is a sparsely populated country where the natural environment is a predominant characteristic. If Finland were to be covered by a one-kilometre-square grid, there would be 300,000 squares, about 100,000 of which would have some form of settlement in them (fig. 2). Although Finland has a sparse population structure, it covers more or less the entire country. Large, unbroken wilderness areas, completely devoid of population, are mainly found in the northernmost part of Finland.

It is difficult to say whether people's living environment is expanding or contracting in Finland. The total area occupied by densely populated areas has grown steadily and the long-term drift to the growth centres and their neighbouring municipalities has tended to
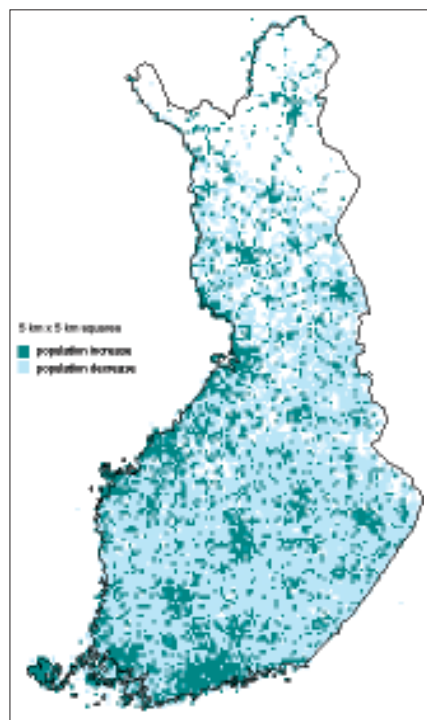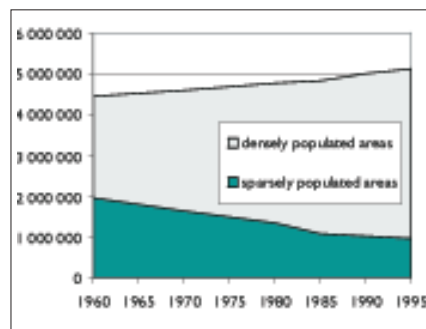
Figure 3. Population changes, 1980-1995.

Figure 4. Population trends in densely and sparsely populated areas, 1960-1995.
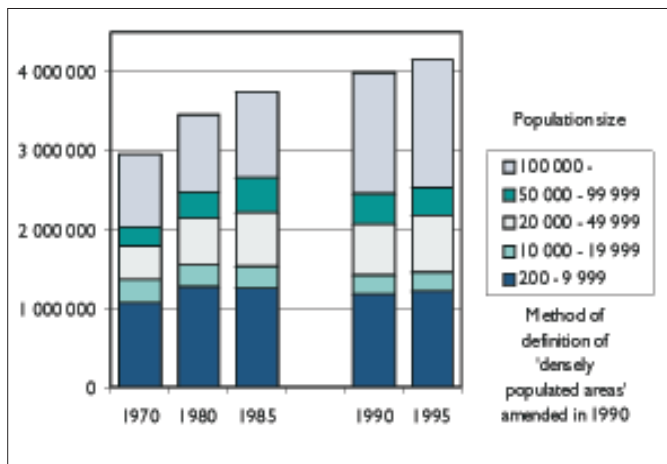
Figure 5. Break-
down of towns
and villages by
population size,
1970-1995.

depopulate rural areas. Areas that have become completely
depopulated are on the increase. It can be seen from the changes in
population from 1980 to 1995 that the population has gone down in
65,000 one-kilometre squares and gone up in 41,000 (fig. 3).

On the other hand, people travel more and the number of holiday
homes has increased, which in turn has expanded people's individual
habitats. Holiday-home areas are linked to the living environment
more or less firmly, depending on how much the holiday homes are
used. Holiday homes are often located in areas where the permanent
population is decreasing. Abandoned farm buildings may be turned
into holiday homes and, although the speed of building holiday homes
has gone down, the stock of holiday homes continues to grow.

In what kind of living environments do Finland's 5.2 million
residents live? In 1995, 81% of the population, or more than 4 million
people, lived in densely populated areas of more than 200 people and
about 1 million people lived in more sparsely populated areas. Because
of the drift to the growth centres, the population of sparsely populated
areas has gone down and the population of densely populated areas
has gone up (fig. 4), a trend that is continuing.

Examining the size of the communities in which the Finns live
gives a more accurate picture of the Finnish living environment. In
1995, there were 906 densely populated areas with populations of more
than 200, but only ten of them had more than 50,000 residents. On the
other hand, 857 of them had less than 10,000 residents. In 1995, 1.6
million people lived in towns and cities with populations of more than
100,000 and 1.2 million lived in small towns and villages with
populations of less than 10,000 (fig. 5). Over half the population of
densely populated areas lived in towns and villages of less than 50,000
residents. Villages and small and medium-sized towns make up the
living environment for a good many Finns.
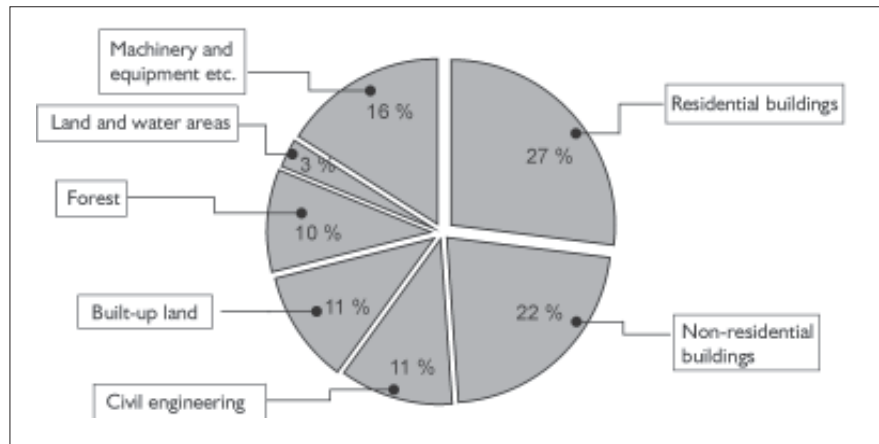
Figure 6. Finland's national assets in 2000, totalling around EUR 500 billion.

What is the *extent* of the living environment *in terms of content*? The living environment contains a large number of buildings, structures, roads, streets, parks and activities. According to data on buildings collected by the Population Register Centre, there are 2.6 million buildings in Finland that have received building permits. Around 71% of Finland's fixed national assets, worth about EUR 358 billion, are tied up in buildings, civil engineering such as transport routes, networks and structures, and building land (fig. 6).

A basis for monitoring the living environment

3

3.1 Need for development of monitoring

Monitoring environmental hazards, the natural environment and the built environment is now a matter of legislation. *Legislation on environmental protection and nature protection* includes provisions on monitoring the state of the environment, environmental loading and the natural environment. According to the *Act on Environmental Impact Assessment Procedure*, the environmental impacts of projects, plans and programmes which may have considerable environmental impact have to be assessed. The *EU Directive on environmental impact assessment of certain plans and programmes* also requires monitoring of the environmental impacts of the implementation of plans and programmes, and to do this, information is needed on the state of the living environment and the changes that take place in it.

In the mid 1990s the new *Constitution* stated that public authority must take steps to guarantee everyone the right to a healthy environment and give them the opportunity to influence decision-making on their living environment. This has contributed to the growth in public participation. One of the basic requirements of increased public participation is that ordinary citizens should have sufficient information available to them on the state of their own living environment and its future development.

There is greater emphasis in the new *Land Use and Building Act*

The need for information on the living environment has been increased by

- highlighting environmental problems,
- requirements on sustainable development of the environment,
- strengthening of environmental and urban policy,
- increased need for analysis in planning and decision-making,
- increasing public participation,
- increasing international cooperation,
- international environmental treaties,
- legislation on monitoring the environment,
- legislation on environmental assessment,
- the directive on environmental impact assessment of certain plans and programmes.

and Decree on the importance of assessing and monitoring the living environment. The legislation acts more clearly than before to promote sustainable development of the living environment. There has been a desire to develop land-use planning into a comprehensive and wide-ranging process that can respond to the challenges brought by changes in society. Adopting the concept of the living environment in the legislation is an expression of the aim of giving greater emphasis to a more all-embracing environmental viewpoint. Planning based on this type of viewpoint requires sufficient data on the environment as a whole and on its different elements, and the changes that take place in them. The preambles to the Act emphasize the importance of environmental information when making choices at various stages of planning and the importance of continuous systematic monitoring of the state of communities.

Land Use and Building Decree, Section 2, Monitoring land use

"The Ministry of the Environment shall organize the monitoring of the state and development of land use and the built environment, and the maintenance of the necessary database.

"Within its territory, the regional environment centre promotes and steers the organization of monitoring the state and development of land use and the built environment and also contributes to organizing the necessary monitoring.

"Within their territories, regional councils shall see to monitoring of the state and development of land use, the regional and community structure, the built environment and the cultural and natural environment as required for regional planning and building.

"Within their territories, local authorities shall see to monitoring of the state and development of land use, building and the built environment and the cultural and natural environment as required for planning and building."

The requirement for examining the environment during planning has been increased in the new Land Use and Building Act. Land use plans have to be based on adequate research and analysis. The provisions on interaction in planning, environmental impact assessment of land use plans and on monitoring and keeping land use plans up to date requires more information on the environment than before. When drawing up a land use plan, sufficient attention has to be paid to analysing the environmental impacts of the plan on people's living conditions and their living environment. The use of information and its presentation in land use planning has also become more focused.

Section 2 of the Land Use and Building Decree contains provisions on the duties of the Ministry of the Environment, the regional environment centres, regional councils and local authorities concerning monitoring, and it defines

Information produced by monitoring the living environment improves the potential for

- obtaining an overall picture of the state and development of the environment,
- assessing the impacts of actions on the environment,
- obtaining data on causal links between different phenomena,
- predicting future developments,
- focusing research and analysis for land use plans,
- conducting cooperation between different sectors and different stakeholders,
- making informed choices in decision-making and planning.

→ Information produced by monitoring is a basic requirement for effective environmental policies and community planning.

generally the matters that should be covered by land use monitoring. Examining the provisions on the aims and content of land use plans and the quality of building gives us a clearer picture of the issues that are deemed to be important in the living environment and which should be highlighted when monitoring the living environment.

The new land use and building legislation amends the duties of the environmental administration, regional councils and local authorities. The duties of the Ministry of the Environment and the regional environment centres are now weighted more heavily towards development, advance guidance and advice than before. Amending the duties calls for more information on the state of the environment and changes in it, and on plans, their quality and their impacts. The role of monitoring is going to increase considerably at all levels of the administration.

The Ministry of the Environment is monitoring the implementation of the Land Use and Building Act. A monitoring plan has been drawn up in which the development of the monitoring of land use will also make it easier to monitor the implementation of the goals prescribed in the Act which concern the development of communities and the living environment; monitoring the living environment is an essential part of this monitoring. Problems emerging in the implementation and smooth functioning of the Act can be dealt with in various ways, such as by issuing planning guidelines and by adjusting the provisions of the Act.

The environmental administration is currently renewing its IT infrastructure and developing its *environmental information system*. In 1997, a proposal was prepared on the development of an environmental information system named '*Hertta*'. Hertta contains data on surface and ground water, air, soil, nature and land use. The land use information system is part of Hertta and its development is classed as urgent in the report.

In the report of the working group set up to look into developing a *land use information system,* published in 1997, there is a proposal for developing a land use information system, of which monitoring the living environment forms a part. The report says that with regard to the monitoring duties concerning the living environment prescribed in the land use and building legislation, "It is essential to specify the data needs called for by monitoring duties. Methods of collection, storage and use, and the units responsible for them must also be clarified". The working group proposed that the Ministry of the Environment should set up a working group to sort out the information requirements for monitoring the living environment.

3.2 Monitoring in general

So far, monitoring of the living environment has been scattered and deficient; a system of comprehensive monitoring of the state and development of the living environment has not yet been evolved. There is insufficient information available on the quality, pleasantness, healthiness and safety of the living environment so it is difficult at present to form an overall picture of the state and development of the living environment. The lack of information and the difficulty of using the information that does exist have, in turn, made it more difficult to take the quality of the living environment into account in research and development work, planning and decision-making.

The fact that methods of describing the characteristics and quality of the living environment have not been evolved has also made the management and use of information more difficult. No systematic R&D work has been carried out on producing a descriptive model of the living environment or on establishing monitoring indicators for describing its quality. Various Finnish and international projects on indicators have endeavoured to describe the state of the environment and changes in it by using indicators, but usually from the perspective of environmental protection or from the ecological viewpoint. The indicators describe water and air quality and the emissions that go into them, biodiversity and the use of natural resources. Indicators have also been developed with a health or social weighting. Some indicators describing the built environment have been presented, but they generally describe only certain sub-sectors of the environment. None of the indicator projects have attempted to describe the characteristics of the living environment in a systematic way.

Neither are there any good, practical methods for integrating information on the living environment into planning and environmental impact assessment. Consequently, utilizing information

on the living environment in planning, for example, is difficult and time-consuming.

Information is dispersed amongst various sectors of the administration and is the responsibility of many different authorities, and there is insufficient cooperation between them on issues related to monitoring the living environment. There has been no coordination over the generation of information. There are numerous problems inherent in collecting data on the state of the living environment to form an overall picture. Even finding out what information is available on the living environment is difficult. Integrating data is hampered by the fact that different authorities use different data systems, different systems of coordinates for positioning data and different territorial divisions. Functional territorial divisions suitable for monitoring the living environment have not yet been evolved. The territorial division used for national statistics does not follow the boundaries of the functional land use units. Neither is the information always available for a sufficiently long period of time, as the information is updated on a continuous basis and not all of it is archived. The reliability of the data varies and it is often extremely difficult to determine how reliable it is.

Finland has an advanced system of nationwide registers and statistics, which provide an excellent starting point for evolving a system for monitoring the living environment. However, these were not generally designed to serve the needs of monitoring the state of the environment. In most cases, the information in them has to be analysed and edited before it can be used in monitoring. Using the data for monitoring the environment has set new demands for the development of the registers and statistics. Developments in information technology, especially location and positioning technology for geographical use, have made new kinds of information management systems possible,

which, on the other hand, sets new kinds of requirements for information resources and datasets.

3.3 Monitoring the living environment as a part of monitoring land use

The monitoring of the living environment forms part of the land use information system being implemented as a cooperative effort between the Ministry of the Environment, the Finnish Environment Institute and the regional environment centres. Land use monitoring, in turn, is part of the environmental administration's Hertta environmental information system.

Land use monitoring is, in principle, divided into two parts, monitoring the built environment, and monitoring plans and decisions. The dividing line between these parts is not always clear. For example, an inventory of the cultural environment is not only a document and an opinion on items that should be preserved, but it also contains information on the environment. Monitoring can also be roughly divided into two levels, a more general level covering regional and community structure and a more detailed level covering the living environment, with a fairly fluid boundary between the two. These divisions can be reassembled to form a field of four squares, which helps to give us a picture of the build-up of land use monitoring. By locating ongoing sub-projects in the field we obtain some idea of how well they cover the whole field and how they fit together (fig. 7).

The monitoring system for spatial structure of urban regions (YKR) contains data on the community structure of urban regions and changes in it. The data covers the whole country, but at this stage, monitoring is limited to the 30 biggest urban regions and their surrounding commuter regions. The monitoring system for spatial structure of urban regions (YKR) and the living environment information system (ELYSE) both produce data on the built environment and they complement each other. YKR focuses on monitoring at the regional level, i.e. on examining individual urban regions, and ELYSE focuses on the local level, especially on examining housing areas. VASEPA, the nationwide regional plan geographical database produces a nationwide combination of planning information from regional councils on regional plans in vector form. KATSE, the information system for monitoring land use planning, mainly contains data on the state of planning as a whole and changes in it. The purpose of the GISALU project is to develop monitoring by the regional environment centres. GISALU contains geographic data on local master plans and local detailed plans, deviation decisions and the cultural environment. Within the Ministry of the Environment, the development of
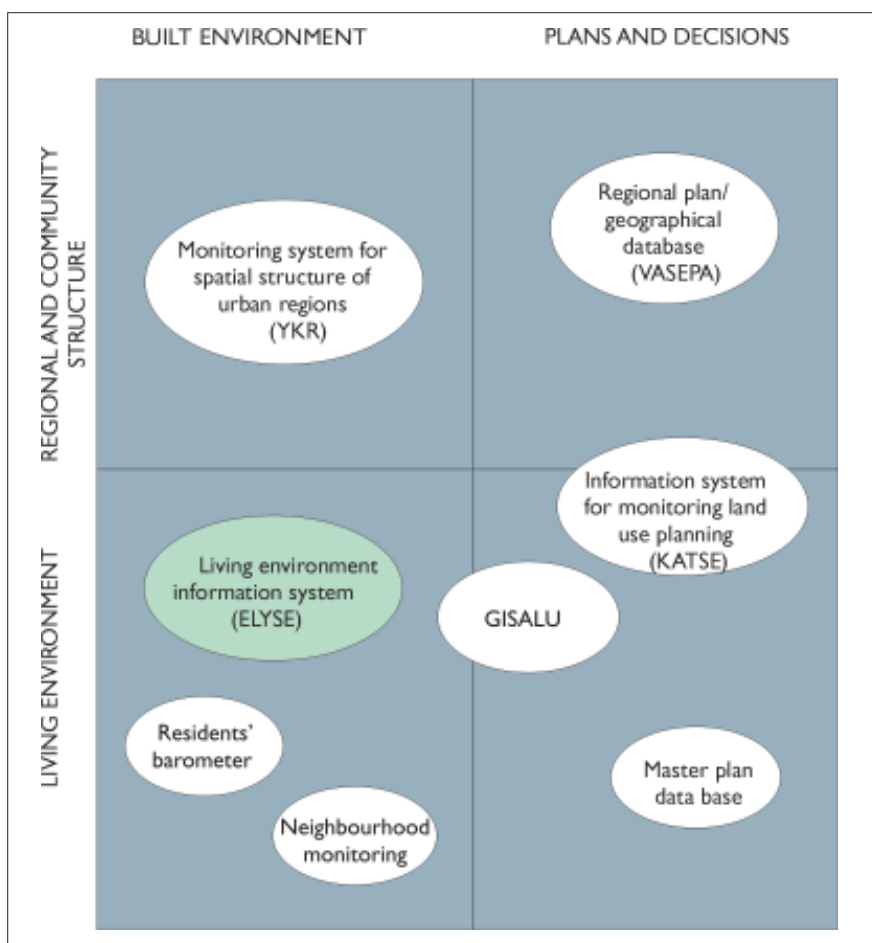
Figure 7. Land use monitoring in the environmental administration.

monitoring of the living environment has been set in motion by establishing a set of indicators associated with it. The aim of the indicators was to describe the living environment and assess its quality. In 1996, a proposal was prepared for a series of residential environment indicators, which was more sharply focused in the 1997 proposal for urban indicators. The proposals have been tested and the indicators have been developed further on two levels: using the indicators in local master planning and, at a more detailed level, in assessing the quality of the residential environment. As a contrast to measurable indicators, a study has been made of indicators that are mainly based on subjective assessment – indicators for evaluating townscape.

So far, the environmental administration has been monitoring the state of the living environment with separate, sample-based studies focusing on housing environments. Monitoring of neighbourhoods is divided into statistical monitoring of the development of 36 sample

neighbourhoods, and monitoring and assessment of neighbourhood urban renewal initiatives. The 'residents' barometer' is an interview-based survey of the quality of the housing environment in towns of more than 10,000 residents. The proposal for a series of indicators for the residential environment was used as the basis for drawing up the questionnaire.

3.4 Users and information needs

There are numerous actors who influence the development of the living environment – public authorities, the private sector, ordinary citizens, decision-makers – and the aim has been to chart their duties and information needs from the perspective of monitoring the living environment. Some general scenarios for using information on the living environment have also been sketched out.

Ministry of the Environment

The Ministry of the Environment's duties include overall development and guidance of land use planning and building. The Ministry also promotes, steers and monitors regional planning. An important new duty of the Ministry is to organize the monitoring of land use and the built environment. The Ministry's work is weighted towards the development of legislation and development work on land use and land use planning. In order to be able to develop and steer land use planning, the Ministry has to have sufficient information about the state of the built environment and the changes that take place in it throughout the country. Using monitoring data, the Ministry should be able to assess the state of the living environment and the direction in which it is developing, the impact of steering instruments on land use, the implementation of planning and its impact on the environment, and to steer action to improve the environment and develop land use planning.

Finnish Environment Institute

The task of SYKE, the Finnish Environment Institute, is to produce research on the environment, monitor and assess the state of the environment and its development and environmental loading, and to produce and maintain monitoring data on the environment. Information on the state of the living environment is also needed in SYKE research. The environmental administration's Hertta environmental information system, plus the land use information system incorporated in it, are implemented and maintained by SYKE. The Finnish Environment Institute draws up the studies and reports

needed for reporting on international treaties and EU directives. The Institute operates as the National Focal Point for the European Environment Agency and supplies the Agency with information on the state of the Finnish environment.

Regional environment centres

The regional environment centres promote and steer the organization of land use planning and building, and the monitoring of land use and the built environment within their own territories. The regional environment centres' need for information on land use and land use planning is similar to that of the Ministry of the Environment, but the emphases are slightly different because the regional environment centres' duties are different. In order to be able to promote and steer the organization of local authority land use planning and building, the regional environment centres need information on the state of the living environment in their own territories and on its components and changes in them, and on the environmental impacts of planning. Using monitoring information, the regional environment centres should be able to assess the state of the living environment and its development and the effectiveness of steering instruments used in land use planning in their territories and use this information in their operations.

Regional councils

The duty of the regional councils is regional planning. They also have to take care of the monitoring of land use and the built environment in their territory as required for planning and building. The regional councils need comprehensive information on the environment and changes in it in order to draw up regional plans and to fulfil other duties. Information is required for various purposes, such as assessing the need for drawing up plans, drawing up baseline reports, assessing the impacts of plans and determining whether they are up to date. Information is also used in assessing the effectiveness of regional planning and for improving it.

Local authorities

Local authorities are in charge of land use planning and building guidance and control within their territory. They also have to take care of the monitoring of land use and the built environment within their territory as required by planning and building. The local authorities need detailed information on the environment for drawing up detailed plans. Information is required for assessing the need for drawing up plans, drawing up baseline reports, assessing the environmental impacts of plans and evaluating their implementation and determining whether they are up to date. Information on the environment is used in

assessing the effectiveness of local authority planning and for improving it. Information is also used to encourage public participation in planning and to promote interaction.

Other authorities

Various other authorities have an influence on the development of the living environment through their actions. The actions of most government ministries and agencies are associated with the environment in one way or another. The authorities need different sorts of information on the environment in the course of their activities. According to the Land Use and Building Act, land use objectives and plans in accordance with the Act must be taken into account when planning and deciding on the use of the environment on the basis of other legislation. The authorities must have sufficient information available on the quality and development of the living environment so that they can implement the provisions of the legislation in their own activities.

International cooperation

Information on the environment that is internationally comparable is needed in increasing quantities in international cooperation. International environmental treaties, such as those on the climate, have increased the need for information substantially and led to large-scale studies. Information is required particularly on the causal links between different phenomena. The European Environment Agency (EEA) and Eurostat are continually expanding the collection and analysis of environmental information. The EEA collects, analyses and edits information on the European environment and, every five years, draws up a wide-ranging report on the state of the European environment including the urban environment. The EEA also draws up reports annually on the trends in certain components of the environment. Eurostat's duty is to provide the necessary statistical services for the EU. The European Commission uses the data in developing and planning EU environmental policy and in supervising the application of directives. The Member States supply the EEA and Eurostat with environmental data. The Organization for Economic Cooperation and Development (OECD) and the United Nations (UN) also gather information on the state of the living environment and urban development.

Ordinary citizens

The life styles of private individuals and people are of great importance to the quality of the environment and to preventing environmental problems. According to the Finnish constitution, government authority

has to endeavour to guarantee everyone the right to a healthy environment and to give them the opportunity to influence decision-making on the living environment. The objective of the Land Use and Building Act is to ensure that everyone has the opportunity to participate in the planning process and that the process is interactive. Information from monitoring gives ordinary citizens the tools for assessing their own living environment and encourages public participation in planning and decision-making. Information from monitoring should be edited to such a degree that it is easy to digest.

Other users

Decision-makers at various levels of the administration need easily digestible information on the living environment as a basis for their decisions.

The private sector needs information on the living environment so it can be taken into account in business activity.

A good deal of information on land use is needed in research and teaching in various sectors. Television, radio, the press and other media also use information on the living environment.

4 A descriptive model of the living environment

4.1 Principles for developing a descriptive model

In order to provide a basis for monitoring the living environment, a method is needed for systematically describing the component parts of the living environment and the various factors incorporated in it. The descriptive model has to provide a sound basis for assessing the quality of the living environment and for monitoring its development. The use of the descriptive model has to promote development work on the living environment and decision-making during the planning process.

The descriptive model evolved by the working group examines the built environment from the resident's point of view and looks at people's living areas and deals with factors that affect the quality of life and living conditions. In addition to physical factors, the model examines functional and social aspects. The descriptive model of the living environment mainly deals with factors that are influenced directly or indirectly by planning at the local master plan and the local detailed plan level. The descriptive model does not touch on factors related to the interior spaces of buildings, except when they are important from the perspective of planning the living environment and assessing its quality. Neither are economic aspects included in the descriptive model – they require their own separate analysis.

The natural environment, environmental hazards and the social environment, for example, are not dealt with exhaustively, but they are examined with the aim of finding the local perspective, the link to the living environment and the resident's point of view. The natural environment is not examined from the perspective of its potential for supporting biodiversity *per se*, but with the aim of describing those natural characteristics that form an important part of people's living environment from the resident's point of view. With regard to environmental hazards, the model looks at their impact on the quality of people's living environment and how large a part of the living environment they actually affect. The social environment is examined mainly from the perspective of the factors that are linked with the physical environment.

The descriptive model of the living environment describes the state of the actual existing environment. In order to describe the quality of the living environment, we also need information about how people

A descriptive model of the living environment

- describes people's living areas from the resident's point of view,
- describes the characteristics and quality of the living environment,
- describes factors affecting quality of life, living conditions and sustainable development,
- includes factors that are influenced directly or indirectly by planning at the local master plan and the local detailed plan level,
- is drawn up in a systematic way,
- is easy to grasp, easy to use and flexible,
- allows comparison between different areas and monitoring carried out at different times.

experience it. The indicators evolved in the descriptive model also suggest experiences of the living environment to some extent, but do not describe it directly. Information about the way people experience the living environment is mainly obtained through questionnaires, interviews and expert assessments. No methods for describing the way people experience the living environment have been developed in the present study. However, some examples of how experiences of the living environment might be described are given in section 4.4.

The descriptive model has to describe the characteristics and quality of the living environment as well as possible. It must incorporate factors that are of key importance from the perspective of people's welfare and from the sustainable development viewpoint. The descriptive model has to allow comparison between different areas and between monitoring carried out at different times. The model has to be drawn up in a systematic way and has to be easy to grasp, easy to use and flexible. The model has to be clearly structured so that each of the required elements can be chosen, and elements can be added or combined as the need arises. In this way, the model will be able to serve variable monitoring requirements and changing emphases.

The links with planning have to be taken into account when drawing up the descriptive model. Information on the living environment is needed in connection with planning for various purposes including the preparation of baseline reports for land use plans and in evaluating the need for drawing up such plans, in environmental impact assessment and in evaluating the implementation of land use plans and determining whether they are up to date. The structure of the descriptive model has to be compatible with the land use classification applied in land use plans, and with the content structure of baseline reports for land use planning and environmental impact assessments of land use plans. Land use

planning statements are based on the functional structure of the living environment, which is also used in the descriptive model.

The descriptive model is based on the use of indicators. Indicators compress large quantities of information into a form that can be easily mastered and understood. They have to be clear and they have to be important from the perspective of the phenomenon under examination. Established criteria or measurements should be used as much as possible for the sake of clarity and to ensure the availability of information. The descriptive model utilizes both Finnish and international indicator systems and indicator projects.

The idea is that quality aspects of the living environment, such as healthiness, safety, pleasantness and smooth social function, can be described by combining indicators for different sub-sectors. The indicators are chosen to describe important factors from the perspective of sustainable development, so that they can be combined to describe how ecological the living environment is, for example. Townscape and the cultural environment deal with both the built environment and nature, so that we can obtain some idea of them by combining the relevant indicators.

The data obtained on the basis of the descriptive model of the living environment is naturally of a general character, but it can be used to obtain information on phenomena and problems that have to be studied in more detail. Describing the quality of the living environment with quantitative, measurable indicators is not without its problems. The use of indicators always requires interpretation and care in relation to the issues described and the conclusions that can be drawn from the results obtained.

Describing the quality of the living environment using descriptive indicators for its various sub-sectors is difficult, after all experiencing the environment is something that takes place as a whole rather than as the sum of its parts. There is a risk that the concept of the environment remains fragmented and the overall picture does not take shape. However, in examining the living environment we have to rely on describing its component parts, but special attention has to be paid to putting the information together to form an overall picture.

The descriptive model primarily supports the development of a system for monitoring the living environment, but it can also be used for other purposes, such as land use planning, environmental impact assessment, research and teaching, plus public participation. By using a harmonized descriptive model of the living environment in various official tasks, a considerable amount of work can be saved in the long term and the potential for pooling information can be increased substantially. The use of a uniform descriptive model in monitoring at different levels of the administration would make it easier to gather

data and to use it. Local authorities will be able to make better use of central government data and in future it will be easier to collect data from local government monitoring systems and load it into national monitoring systems.

By using the same descriptive model of the living environment in both monitoring and planning, monitoring will provide a better service for planning. Monitoring will provide comparable material of a general nature on different areas as an aid to planning and some of the information needed in land use planning may also be available in a relatively finished form. This will boost the efficiency with which the information is utilized and improve the quality of baseline reports and impact assessments and thus improve the quality of land use plans. The need to harmonize information has also been taken into account in the Ministry of the Environment's new guidelines on statements for local detailed plans. The descriptive model can also be used in research on the living environment, so that data produced by different studies can be combined and compared more easily.

4.2   Developing a descriptive model

The starting point taken for evolving a descriptive model of the living environment is the series of objectives set for the quality of the environment and the quality of building in the Land Use and Building Act, because these objectives describe issues that are important from the perspective of the quality of the environment. The objectives set out in the national land use guidelines were also studied (Finland's National Land Use Guidelines, 2002) as, too, were goals concerning the issue set out in other contexts.

Section 1 of the Land Use and Building Act defines the general objective of land use and building, which is to ensure that the use of land and water areas and building activities on them create the basis for a favourable living environment and promote ecologically, economically, socially and culturally sustainable development. This objective means that development of the living environment should take place on the basis of a comprehensive view of the environment: people's needs should be fulfilled while taking nature into account. On the one hand, the good points of the environment, such as the values of nature, the landscape, the built environment and the cultural environment should be preserved and improved, and biodiversity should be promoted, while on the other, environmental hazards, traffic requirements, pollution, noise, waste, energy consumption, the use of non-renewable resources, and material flows, should all be minimized.

The general objective of the Act is enlarged on in Section 5

Objectives in land use planning and in Section 12 *Objectives of building guidance*. Section 5 describes the goals that have to be set for the environment, in other words the goals we have to aim for in land use planning. The working group adopted the first item in Section 5 as the overall objective for the living environment. The items that follow deal with the aims for the various components of the environment. The objectives enshrined in Section 5 and Section 12 are in turn enlarged upon in terms of the content requirements of local master plans and local detailed plans (Land Use and Building Act Sections 39, 54, 73) and requirements concerning construction (Land Use and Building Act Section 117). Furthermore, Section 50 concerning the purpose of the local detailed plan and Section 118 concerning the protection of architecture and townscape have been taken into account. Requirements on the content of regional plans are not taken into account because the descriptive model deals with the relevant factors at the local master plan and local detailed plan level.

The national land use guidelines taken into account are mainly from the section 4.3 A more coherent community structure and the quality of the living environment in the report Finland's National Land Use Guidelines. Appropriate parts of other sections have also been used (4.2 A well-functioning regional structure, 4.4 The cultural and natural heritage, recreational uses and natural resources, 4.5 Well-functioning communication networks and energy supply). Sections 4.6 and 4.7 have not been taken into account as they deal with special areas. National

> Land Use and Building Act,
> Section 5
> Objectives in land use planning
>
> The objective in land use planning is to promote the following through interactive planning and sufficient assessment of impact:
>
> 1) a safe, healthy, pleasant, socially functional living and working environment which provides for the needs of various population groups, such as children, the elderly and the handicapped;
>
> 2) economical community structure and land use;
>
> 3) protection of the beauty of the built environment and of cultural values;
>
> 4) biological diversity and other natural values;
>
> 5) environmental protection and prevention of environmental hazards;
>
> 6) provident use of natural resources;
>
> 7) functionality of communities and good building;
>
> 8) economical community building;
>
> 9) favourable business conditions;
>
> 10) availability of services;
>
> 11) an appropriate traffic system and, especially, public transport and non-motorized traffic.
>
> The content requirements for the various plans concerning the objectives laid down in paragraph 1 above are prescribed separately below in this Act for each type of plan.

Themes of the descriptive model

1. Population
2. Land use and community structure
3. Buildings and the built cultural environment
4. Housing
5. Services
6. Jobs
7. Landscape and the natural environment
8. Recreational areas
9. Traffic
10. Municipal infrastructure and energy
11. Environmental hazards
12. The social environment

guidelines dealing solely with planning at the regional level have not been taken into account. A table of the components of the living environment was drawn up from the goals and objectives given above and the themes of the descriptive model were chosen on the basis of this table.

The objectives of the Land Use and Building Act together with the national land use guidelines have been moulded into a set of quality targets for each theme. The quality targets sharpen the focus of the general objectives on sustainable development of land use, and a healthy, safe, pleasant and socially functioning living environment. The living environment factors that have to be monitored for each of the themes have been mapped on the basis of the quality targets. In specifying the information requirements, the aim has been to find the land use perspective and the resident's viewpoint. It is not the intention to monitor, for instance, air quality *per se*, but to monitor how large a proportion of the population lives in areas which do not fulfil certain specific air quality criteria.

The living environment factors that have to be checked theme-by-theme have been turned into a set of indicators that form the most detailed level of the descriptive model of the living environment. The development work on indicators concerning the built environment and the living environment carried out by the Ministry of the Environment and the Finnish Environment Institute was used as well and so were Finnish and international indicator projects connected with the living environment. International projects included EU, EEA (European Environment Agency), Eurostat, OECD and UN indicator projects, while the most important Finnish projects included Finland's indicators for sustainable development, the Ministry of the Interior's urban indicators and the City of Helsinki's A-indicators for sustainable development. The international reporting requirements on land use for both the environmental administration and Statistics Finland were also studied.

The aim has been to choose as indicators measurements that give the best possible description of the quality targets and the living environment factors that have to be monitored. The idea is to choose

Basis for the descriptive model of
the living environment
and its different levels

Land Use and Building Act
objectives and content
requirements
|
National land use guidelines
|
Living environment quality targets
|
Themes
|
Living environment factors that
have to be monitored
|
Living environment indicators

indicators impartially from each of the themes so that together they give an overall picture of the state of the living environment in general terms. The indicators have to allow comparison between different areas and monitoring carried out at different times, and the number of indicators has been limited by choosing only the most essential ones.

The indicators are generally expressed proportionally, for example as percentages, averages, or in relation to population, surface area, and so on. In addition to proportions the living environment indicators also include finite numbers that can be considered as basic data describing the areas, but which can also function as indicators. Finite data also makes it easier to carry out further statistical analysis and to add the data together, so that it applies to larger units of area.

The descriptive model of the living environment incorporates quality targets for the living environment plus three levels of observation: living environment themes, factors and indicators. Depending on the purpose for which it is used, the descriptive model can be adapted and applied at the more general or the more detailed level, or by using the relevant parts.

Because of the clear structure of the descriptive model, the necessary components can easily be extracted from it and new components can easily be added. For example, as far as services are concerned, only three essential services have been included, but other services can also be examined using the same method. Information on a certain topic, such as cultural and heritage environments, or leisure time activities, may be included under several themes. In this case, the necessary information can be extracted from the different themes and combined as required.

4.3 Content of the descriptive model of the living environment

In its final report, the working group gives reasons for its choices of living environment factors and indicators theme-by-theme, and provides a survey of sources of information concerning the living environment. The working group has made its choices using the quality targets for the living environment as a basis. Measurements describing the essential features of the phenomenon have been selected as indicators, and as the aim has been to keep the number of indicators down, the ones chosen do not cover all factors. The indicators presented here are suggestions that may change, and they will also become more specific as the monitoring process is implemented.

In conjunction with the themes, the final report also discusses the availability of information. The working group has made a theme-by-theme survey of the information sources, relying on national registers, statistics and questionnaires for finding out what information is available and in what form, and where the widest information gaps are. Though not comprehensive, the survey should include the most important sources. Only the descriptive model of the living environment is discussed below, theme-by-theme.

1. POPULATION

Living environment quality targets

• Balanced population growth and structure

Factors to be monitored

• Size of population
• Population structure

• Migration

Living-environment indicators

• No. of residents
• Age structure (0-6 years, 7-12 years, 13-17 years, 18-24 years, 25-64 years, 65+ years)
• Distribution of family types
• Size of households
• Net migration
• Number and age of migrants

2. LAND USE AND COMMUNITY STRUCTURE

Living environment quality targets

• Well-functioning and economic land use and community structure
• Ecologically sustainable and more coherent community structure
• Utilization of existing structure
• Decreasing transport needs

Factors to be monitored	Living-environment indicators
• Population density	• Residents/unit land area
• Building density	• Density gross floor area in m^2/unit land area
	• Average plot ratio
	• Proportion of "profitable public transport area" (>20 residents/ha) of built-up land area
• Infill building	• Proportion of buildings constructed during the last five years that are located in densely populated areas
• Land-use distribution	• Land-use distribution by use class (residential areas, non-residential areas, green areas, traffic areas, etc.)
	• Built/unbuilt area
• Self-sufficiency of the area	• Overall self-sufficiency index of services, jobs and recreational areas
• Overall accessibility of functions	• Overall accessibility index of services, jobs, recreational areas and public transport

3. BUILDINGS AND THE BUILT CULTURAL ENVIRONMENT

Living environment quality targets

- Beautiful, distinctive and human-scale built environment, with buildings from different periods
- Protection of the built environment and utilization of the existing building stock
- Protection of cultural values and preservation of built environments of cultural importance
- Ensuring that construction is in accordance with townscape and landscape considerations
- Sustainable and ecological construction

Factors to be monitored	Living-environment indicators
• Building stock	• Total number of buildings, floor area, number of storeys, use class, age and construction materials
• New construction	• Total number of buildings constructed during the year, floor area, number of storeys, use class and construction materials
• Renovation	• Renovation costs • Hours spent by skilled workers on renovation • Renovation of old buildings
• Demolition	• Number of demolished buildings, floor area, number of storeys, use class, age and construction materials • Age of demolished buildings
• Built cultural environments	• Built cultural environments, cultural value, number, area, type and age • Building heritage, cultural value, number, floor area, number of storeys, use class, age and construction materials • Protected buildings, number, proportion of all significant buildings of total building stock
• Old buildings	• Old buildings, number, floor area, number of storeys, age, use class and construction materials
• Ancient relics	• Ancient relics, number, age, type and area

4. HOUSING

Living environment quality targets

- Pleasant, safe, healthy and well-functioning living environment
- Living environment in which the needs of different population groups are taken into account
- Housing stock comprising dwellings of different types
- Appropriate location of housing construction

Factors to be monitored	Living-environment indicators
• Housing stock	• Dwellings, number, size, building type and form of tenure
	• Empty dwellings, number, size and building type
	• Sheltered housing units for the elderly, number, size and building type
• Housing standards	• Amount of living space/person
• Residential buildings	• Residential building type
• Structure of residential areas	• High rise/low rise
• New dwellings/residential buildings	• Features of dwellings/residential buildings completed during the year
• Infill housing construction	• Proportion of dwellings/residential buildings constructed during the last five years that are located in densely populated areas

5. SERVICES

Living environment quality targets

- Services that are fully accessible to different population groups
- A wide range of services in central areas and local services in residential areas
- Location of large retail units should reinforce community structure

Factors to be monitored	Living-environment indicators
• Local services: food shop, daycare centre and primary school	• Food shops, number and floor area by shop category, and floor area/resident • Proportion of residents/the elderly/people without cars living within 500 metres of a food shop • Number of daycare centres and places/children of daycare age • Proportion of children of daycare age living within 300 metres of a daycare centre • Number of primary schools and pupil places/children of primary-school age • Proportion of children of primary-school age living within 500 metres of a primary school
• Services in town centres	• Special shops, number, size and floor area/resident • Restaurants and cafés, number, size and floor area/resident • Proportion of residents living at a certain distance from town centres
• Services in sub-centres	• Special shops, number, size and floor area/resident • Restaurants and cafés, number, size and floor area/resident • Proportion of residents living at a certain distance from sub-centres
• Large retail units	• Large food shops, number, size and floor area/resident • Other retail units, number, size and floor area/resident • Location of large food shops and other large retail units in densely populated areas/sparsely populated areas

6. JOBS

Living environment quality targets

- Pleasantness of job areas
- Adequacy and range of jobs
- Job accessibility

Factors to be monitored	Living-environment indicators
• Number of jobs	• Number of people working in the area
	• Floor area of business premises
• Distribution of jobs by sector	• Sector-specific job distribution
• Job accessibility	• Job self-sufficiency: jobs/resident
	• Proportion of people working in the municipality where they live
	• Amount of tele-commuting
• New premises	• Location of new premises in densely populated areas/sparsely populated areas

7. LANDSCAPE AND THE NATURAL ENVIRONMENT

Living environment quality targets

- Protection of natural environment and landscape and preservation of important natural sites
- Preservation and protection of cultural values and landscape
- Maintaining biodiversity, and keeping natural sites unfragmented
- Integrated use of natural resources

Factors to be monitored	Living-environment indicators
• Area of natural environment	• Total amount of green areas
	• Unpaved land areas
• Use of shores	• Length of shoreline/resident
	• Proportion and length of unbuilt shoreline/resident
	• Distribution of land use in shore areas
	• Number of holiday buildings and new holiday buildings
• Important natural sites	• Protected sites, number, total area and types
	• Important natural sites, number, total area and types
• Important cultural landscapes	• Important landscapes, value, number, total area and types
	• Important traditional rural landscapes, value, number, total area and types
• Extraction of land resources	• Amount and breakdown of extracted land resources

8. RECREATIONAL AREAS

Living environment quality targets
- Adequacy and accessibility of recreational areas
- High quality of recreational areas

Factors to be monitored	Living-environment indicators
• Amount of recreational areas	• Amount of recreational areas, total and per resident • Area of playgrounds, total and per child • Length of outdoor recreational routes, total and per resident • Area of sports fields, total and per resident
• Accessibility of recreational areas	• Proportion of residents living within 500 metres of recreational areas • Proportion of children living within 150 metres of playgrounds • Proportion of residents living within 500 metres of sports fields
• Extent of recreational areas	• Proportion of recreational areas linked with green belts

9. TRAFFIC

Living environment quality targets

- Well-functioning and environmentally friendly transport system
- Taking the mobility requirements of different population groups into account
- Improving the conditions for public transport and non-motorized traffic
- Improving road safety

Factors to be monitored	Living-environment indicators
• Transport networks	• Length of road and street network, total, per resident, and per unit land area • Length of pedestrian and cycle ways, total and per resident • Pedestrian zones, length, area and area/resident
• Transport vehicles	• Number of cars, total and per 1,000 residents, and breakdown into different types • Proportion of households without cars • Proportion of residents with regular access to a car • Number of bicycles
• Traffic	• Amount of traffic, by mode of transport • Amount of passenger traffic, per resident and by mode of transport • Amount of goods traffic, total and per resident • Average commuting distances, duration of trips, and breakdown by mode of transport • Amount of public transport • Standard of service and accessibility of public transport, and proportion of residents living in different service standard zones
• Road safety	• Number of road accidents, accidents on non-motorized traffic routes and road accidents involving children/ 1,000 residents • Deaths and injuries in road traffic/1,000 residents • Average vehicle speed

10. MUNICIPAL INFRASTRUCTURE AND ENERGY

Living environment quality targets

- Well-functioning and environmentally friendly energy and water supply, and waste management
- Economical use of natural resources

Factors to be monitored	Living-environment indicators
• Water consumption and network of sewers and water mains	• Water consumption/resident • Length of sewers and water mains, total, and per resident and land area • Number of buildings connected to sewers and water mains and as a proportion of all buildings • Proportion of rainwater draining to the land/to sewers
• Waste management	• Amount of municipal and construction waste, total and per resident, and recovery rate • Proportion of households sorting waste/composting • Waste taken to landfills, total and per resident
• Energy consumption and district heating network	• Total energy consumption/resident, and by source of energy • Energy consumption by end-use sector, industry, traffic, heating, others • Fuel consumption of cars, total and per resident • Breakdown of building heating systems • Length of district heating network, total and per resident • Number and proportion of buildings connected to district heating network

11. ENVIRONMENTAL HAZARDS

Living environment quality targets

- Safe and healthy living environment
- Minimizing and preventing environmental hazards
- Locating activities causing health problems and risks at an adequate distance from sensitive activities

Factors to be monitored	Living-environment indicators
• Air quality	• Sources and spread of air pollutants • Air quality classification, days categorized by air quality, or proportion of days with poor air quality • Exposure of plants, bioindicators • Proportion of residents exposed to air pollution exceeding permissible limits
• Quality of surface water and ground water	• Area of waterways, breakdown by quality classification • Amount of construction in important groundwater areas • Distance of landfills from important groundwater areas • Proportion of residents using drinking water below quality standards
• Soil	• Amount and area of contaminated land areas, and types
• Noise	• Sources and spread of noise, and size of areas exposed to noise • Proportion of residents exposed to noise exceeding permissible limits • Size of quiet areas
• Radiation	• Proportion of buildings located in radon risk areas
• Risks of environmental damage	• Length of routes on which dangerous goods are transported • Number and floor area of plants and storage buildings with accident risk
• Location of sensitive activities	• Proportion of residents living within 250 metres of important transport routes • Proportion of daycare centres and primary schools located within 250 metres of important transport routes • Proportion of recreational areas located within 100 metres of important transport routes • Proportion of playgrounds located within 250 metres of important transport routes

12. SOCIAL ENVIRONMENT

Living environment quality targets
- Socially well-functioning and balanced living environment providing all residents with equal opportunities
- Taking the needs of different population groups, such as children, the elderly and the handicapped into consideration
- Promoting mental well-being, local identity and community spirit
- Good opportunities for participating in local activities and influencing developments in the area

Factors to be monitored	Living-environment indicators
• Socio-economic and well-being factors	• Proportion of blue-collar and upper-level, white-collar workers of residents over the age of 15 • Proportion of residents over 15 with a higher-education qualification • Income subject to state tax per resident and per household • Unemployment rate • Dependency ratio • Proportion of residents receiving income support, separate figures for tenants in blocks of flats • Number of treatment periods for mental problems per 1,000 residents
• Local identity	• Average residency period in the area or the dwelling • Moves within the area or school district • Proportion of residents moving away from the area • Turnover of tenants in rental dwellings
• Community spirit, participation in local affairs, opportunities for different activities at the local level	• Voting turnout at local and parliamentary elections • Proportion of residents participating in matters pertaining to their residential building or area • Area of indoor communal facilities per resident • Number of restaurants and cafés per 1,000 residents • Proportion of residents chatting with neighbours on a daily basis • Proportion of residents visiting neighbours at least once a week • Residents providing and receiving neighbourly help at least once a week
• Community security	• Amount of crime/1,000 residents (certain types of crime, e.g. house break-ins, crimes on motor vehicles, and assaults) • Amount of vandalism • Amount of disorder caused by intoxicated persons

4.4 Describing experiences of the living environment

A proper description of the quality of the living environment should also draw on experiences. Including the experiences of local residents in the information produced using the descriptive model of the living environment, gives a better overall picture of the quality of the living environment. The area has not been touched in this project, but a number of theme-by-theme experience indicators have been included as examples.

Information on experiences of the living environment can be collected through questionnaires and interviews and assessments based on environmental observations. Most of the examples presented here are from the Residents' barometer, a survey of the quality of the living environment carried out by the environmental administration in 1998. Some of the indicators have also been taken from a report on evaluating townscape, compiled by the Ministry of the Environment and published in 2001. Only one Residents' barometer has so far been produced, though it is the intention to update it about every five years.

Land use and community structure

• Satisfaction with the density of the residential area

Buildings and the built cultural environment

• Residents' satisfaction with the outward appearance of their homes
• Architectural harmony
• Balance between buildings and the natural environment
• Compatibility of old and new
• Variation within the area
• Number of alternative routes
• Attractiveness of ground floors, number of entrances and amount of activity

Housing

• Residents' satisfaction with the size of their homes
• Residents' satisfaction with the pleasantness of the area
• Residents' intention to purchase a new home and reasons for moving
• How highly do the residents value their homes and their gardens, and the area as a whole
• The ideal type of residential building

Services

• Satisfaction with local food shops, comprehensive schools, daycare services, banks, postal services and health centre
• The three services topping the residents' wish list

Recreational areas

• Satisfaction with green areas, local sports fields and outdoor recreation facilities
• Satisfaction with local playgrounds

Traffic

• Satisfaction with pedestrian and bicycle routes in the area
• Satisfaction with road safety in the area
• Proportion of residents who think 7-year olds cannot move about safely in the area without an escort, because of traffic
• Satisfaction with public transport in the area

Environmental hazards

• Proportion of residents who are disturbed by traffic noise in their homes
• Proportion of residents who are disturbed by other outside noise in their homes

Social environment

• Proportion of residents considering their communal facilities insufficient
• Satisfaction with residents' communal activities in the area
• Proportion of residents who have frequently felt insecure when walking in the area
• Proportion of residents afraid of walking alone in the area after 10 pm and those avoiding it altogether
• Fear of crime

5 Principles for developing the monitoring of the living environment

5.1 Monitoring targets

The monitoring should provide different users with basic information about the living environment, the aim being to give them an overall picture of the state of the living environment and its development, examine different phenomena in different areas and enable them to follow changes over time. The aim is also to produce information for examining causal links between a number of phenomena, to be able to assess the environmental impact of different measures, and anticipate future developments. Information should be in the form of easy-to-use monitoring data for each area.

The following targets were set for the monitoring of the living environment:

- Monitoring should fulfil the needs of the environmental administration, and if possible, other government authorities, local authorities, regional councils, ordinary citizens and other users.
- Monitoring should give a broad picture of the quality, state, and the development of the living environment, and changes that take place in it.
- Monitoring should focus on factors that are important for local residents' well-being and sustainable development.
- The information should be reliable, comprehensive and up-to-date and should also allow comparisons between different areas and monitoring carried out at different times.
- The information should be in a user-friendly form and easily accessible to different user groups.

5.2 Defining the limits for monitoring

In monitoring the living environment, the focus is on the local residents' point of view, on areas relevant to their daily lives, and on the various factors in them that have an impact on the quality of life and living conditions. The living environment comprises the areas in which people carry out their daily activities and spend their time, and the journeys between them. The areas that are not important in these respects, such as large tracts of nature that people rarely visit, are not included.

Monitoring of the living environment covers the existing living environment and its state, and the changes taking place in it. As the matter is checked from the point of view of the local residents, functional, social and physical factors are also covered. Monitoring comprises factors that are mainly influenced at the local master plan and local detailed plan level, directly or indirectly. Monitoring covers factors related to the interior of the buildings only when they are relevant to the planning of the living environment and assessing its quality. Plans and decisions concerning the living environment are outside the scope of the monitoring process, as are economic factors relevant to the living environment because they require a separate study. In this report, the aim is to develop monitoring practices based on measurable factors incorporated in the descriptive model of the living environment. Surveys of experiences related to the living environment, carried out with questionnaires and interviews, will be developed separately and will be incorporated into the monitoring process at a later date.

For example, no comprehensive coverage of the natural environment, environmental hazards or the social environment is included, as these will be examined with the aim of finding the link to the living environment from the point of view of local residents. The natural environment is not examined from the perspective of its potential for supporting biodiversity, but with the aim of describing the natural features that are important to local residents as a part of people's living environment. With regard to environmental hazards, the focus is on their impact on the quality of people's living environment, and how much of the living environment they affect. The description of the social environment covers factors linked with the physical environment.

5.3 Information content of monitoring

Monitoring is based on indicators describing the implementation of the targets for the quality of the living environment. Indicators should be of help in finding a method for managing large amounts of information and complex causal links, and they should enable this data to be put into a more comprehensible and lucid form. Indicators always present the facts in a generalized form, which should be taken into account when interpreting them.
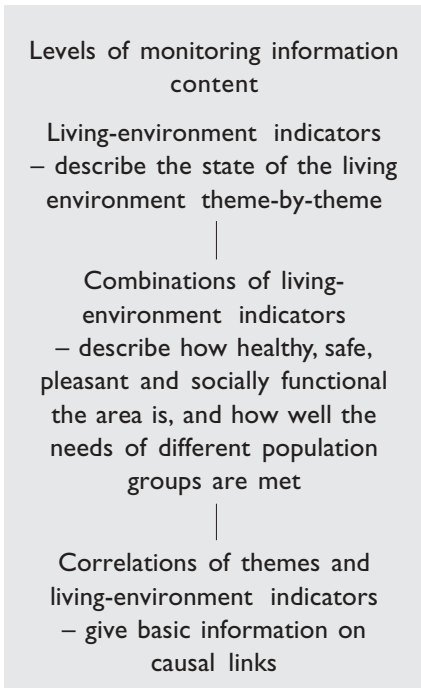
The information content of monitoring will be structured in the same way as the descriptive model of the living environment. Using the model as a basis, a total of 12 different themes will be monitored, and a comprehensive overall picture can only be ensured by including all themes in the monitoring process. In practice, however, prioritization will be necessary and some of the indicators will have to be excluded. There are also indicators for which no information is available. More work on the indicators will be carried out during the test phase, in cooperation with experts from different fields, after which the final indicators will be selected. Information on different aspects of the living environment and from different sources will be compiled into an indicator data bank allowing comparisons of the living environment in different areas and at different times.

It should be possible to combine the information on the monitoring of the living environment with information in other monitoring systems so that causal links between different phenomena and the impact of different plans can be studied. Such needs will be taken into account when planning the structure of the monitoring content. The most important of these systems are the projects for monitoring land use, and other projects in the Hertta environmental information system. There is a need to combine information generated by the monitoring of the living environment with the information produced by the monitoring system for spatial structure of urban regions (YKR) and the monitoring system for land use planning (KATSE), the regional environmental centres' monitoring system (GISALU) and the nation-wide regional plan

Information content of monitoring

- monitoring is based on the use of indicators,
- information is compiled into an indicator data bank,
- the factors to be monitored will be selected using the descriptive model of the living environment as a basis,
- the content will be structured so that the need for sharing data with other monitoring systems can be taken into account,
- the data will be produced in stages.

Levels of monitoring information
content

Living-environment indicators
– describe the state of the living
environment theme-by-theme

|

Combinations of living-
environment indicators
– describe how healthy, safe,
pleasant and socially functional
the area is, and how well the
needs of different population
groups are met

|

Correlations of themes and
living-environment indicators
– give basic information on
causal links

monitoring system (VASEPA). Many of the environmental administration's information systems contain information about such matters as the natural environment and environmental hazards that are needed in analyses carried out as part of the living environment monitoring process.

The process of producing the monitoring data will be phased by prioritizing the relevance of the indicators to the quality and development of the living environment, the construction of a suitable data bank, urgency, and the availability of the information. The phasing of the monitoring process is discussed in greater detail in section 5.10.

Monitoring information can be divided into three levels. *The first level* contains information described by the living-environment indicators (basic indicators), which describe the state of each theme. The indicators enable comparisons to be made between areas and changes to be monitored at different times. To make comparisons between different areas possible, indicators are given as proportions, averages, or they are in proportion to the number of residents, unit area, etc.

A combination of the basic indicators forms *the second level*. In accordance with the basic objectives concerning the living environment listed in Section 5, item 1 of the Land Use and Building Act, the healthiness, safety, pleasantness and social functioning of the living environment and how well the needs of different population groups are met should be described. Combinations of indicators will be developed to describe these factors. In order to examine how well the needs of different population groups are met, it is necessary to collect information about the breakdown of the population into different groups and the needs of these groups. To define the population groups, information about the age distribution of the population, types of family, and the size of households is required. Information about their needs can be gathered by carrying out surveys and questionnaires among local residents. Also other factors, such as the ecological character of the living environment, townscape and the cultural environment can be described by combining different indicators.

The process of examining the correlations between different themes and phenomena comprises *the third level*. Monitoring should give basic information for studying the interdependency of land use, traffic, air quality, and the use of natural resources and changes in the living environment, for example. Examination of the correlations between the development of individual living-environment indicators and different themes produces information for studying causal links.

5.4 Monitoring in terms of area

A successful monitoring process requires information about areas of different types. The overall state of the living environment over the country as a whole can be described using information on regions and municipalities, for example. Comprehensive information about the living environment in a functional area of a certain type describes the state of the living environments in these areas. The information can be applied to densely populated areas, sparsely populated areas, high-rise and low-rise residential areas, town centres, non-residential areas or shore areas. A sample can also cover functional areas of certain types, enabling a more detailed study to be made of the state of their living environments

The way information is gathered, analysed and presented greatly depends on the territorial division used, especially in more detailed studies. Administrative divisions include provinces, regions, regional environment centres and municipalities. Within individual municipalities, the distribution can be on the basis of statistical subdivision, postal codes, school districts, other operational divisions, property distribution, etc. Administrative divisions are widely used as there is a large amount of nationwide data available on individual municipalities From the environmental point of view, administrative divisions are artificial and do not follow the boundaries of functional areas. Besides, they often change, which makes monitoring difficult. As there are areas of many different sizes, it is also difficult to make comparisons between them.

Statistics Finland can provide information summed up in grid-based datasets. The monitoring system for spatial structure of urban regions (YKR) makes use of a grid of 250 m x 250 m squares, though for town centres, squares of 125 m x 125 m are also used. Grids produce generalized information as the information is summed up in the centre of the square. Grid division can be used as a basis for different territorial divisions, and the squares can be enlarged, if necessary. When using larger grids, the variations within areas disappear, while smaller grids make the material less illustrative. Grids are often used for presenting regional planning material but they are less suited for local

master plans and local detailed plans and for residential areas. The grids have the advantage of being permanent and they can also easily be compared with each other. They remain unchanged over time and the squares are all of the same size. They also enable large amounts of information to be managed.

Territorial division in densely populated areas and sparsely populated areas based on the density of the population is also used. Both Statistics Finland and the monitoring system for spatial structure of urban regions define the boundaries of densely populated areas every five years. These definitions have the advantage of being independent of administrative boundaries, and they also give an idea of the actual limits of functional areas.

Other functional divisions can also be used. In the monitoring of the living environment, the division can be on the basis of residential areas, which can be divided into areas dominated by high-rise or areas dominated by low-rise housing, for example. So far, such divisions have not been used, though they can be produced using the SLICES land-use database, which has been compiled on the basis of existing geographical datasets on land use. Areas can be grouped still further, using regional or municipal divisions or the size of densely populated areas as a basis, or the grouping can be founded on dividing municipalities in accordance with population increase or decrease. Division can also be between built and unbuilt areas. The boundaries of functional areas will change over the years, and thus changes in their size and changes in their living environments will both be monitored.

Division based on municipalities or grids, for example, can be used in a monitoring process that covers the living environments of the whole country. Comprehensive monitoring of functional areas of certain types requires territorial demarcations, which at the moment are only available for densely populated areas. Clearly defined boundaries of residential areas of different types are needed, because their state is essential in the monitoring of the living environment. During the first stage of the monitoring process, the focus will be on the production of information on the whole country, and the municipalities and functional areas of certain types, especially residential areas.

Territorial divisions to be used in monitoring the living environment

- Administrative divisions
  - whole country
  - regional environment centres
  - regions
  - municipalities
- Functional divisions
  - densely populated areas
  - sparsely populated areas
  - residential areas
  - high-rise residential areas
  - low-rise residential areas

5.5 Monitoring over time

Information about different phenomena is usually needed on an annual basis. If changes are slow, such as those involving land use and community structures, updating can take place every three or five years. On the other hand, there are certain areas, for example the cultural environment, in which the authorities need constantly updated information for their operational tasks.

The monitoring involves the examination of the state of the living environment and its components, usually on an annual basis or every five years. Any changes in the information show development with time and the prevailing trends. Monitoring can only be successful if the information covers a sufficiently long period, so that the changes taking place in the living environment can be described properly. The monitoring information should also form an adequate basis for anticipating future trends and preparing forecasts for planning and so that the necessary action can be taken. Long-term repeat series are also needed so that the impacts of plans, other measures and environmental legislation can be assessed.

Monitoring over time often involves problems, especially when geographical datasets are used. Not all datasets are updated on a frequent basis. It may also be difficult to obtain historical information because updated information is often over-written on old documents, which means that cross-sectional information is not saved. The fact that territorial boundaries and the reliability and extent of the data can change with time makes long-term repeat series based on unified criteria impossible. New territorial divisions are always necessary when using functional areas. The boundaries of functional areas are updated every five years, which makes it impossible to monitor them on an annual basis.

The most important aspects of developments at national level are monitored on an annual basis, while more detailed information about changes in functional areas is gathered every five years. During the first monitoring phase, the current cross-sectional

> **Monitoring over time**
>
> - the cross-sectional situation will be described every year
> - the cross-sectional situation of slowly changing factors needs only to be described every five years
> - changes in cross-sectional situation show the pace of development
> - the first phase will involve both the collection of cross-sectional information and historical information
> - in the future, cross-sectional information will be collected, describing the changes every year or every five years.

situation will be described and long-term repeat series data collected so that changes that have already taken place can be illustrated. After that, changes will be reported on an annual basis or every five years.

5.6   Use of geographical datasets

The use of geographical datasets based on location and positioning technology has increased rapidly as the software for it has become more sophisticated and geographical datasets have become more accessible. Geographical dataset technology enables environmental changes to be monitored more effectively and the information to be used more extensively. With geographical datasets, it is possible to combine environmental information about a certain area and link it with information about plans and other measures for the area. Geographical datasets also make it possible to combine information from different fields, which provides a sound basis for cooperation between different parties. Geographical datasets based on location and positioning technology provide tools for efficient analyses, processing and illustration of information on different areas. Different types of data about attributes can also be incorporated in the features. Geographical data can be presented on maps, which enables the information to be grasped quickly.

Geographical datasets usually describe the actual environment or plans affecting it. A dataset becomes geographical information when the features it illustrates have been directly located with coordinates or through references made to other features located with coordinates, using unequivocal identifiers. Many registers and statistics can be considered as geographic data because their coordinates can be searched using an identifier.

Geographical data is also useful in preparing indicators: information from different sources can be combined on the basis of their location, analysis is efficient and illustration easy. Analyses can make use of several different methods and applications of location and positioning dataset analysis. Location and positioning dataset analyses also allow the calculation of indicator values that cannot be produced in any other way. These include different distance zones, with which such factors as the number of residents in the area concerned or the accessibility of a service using

Use of geographical datasets

- geographical datasets are used for calculating and illustrating monitoring indicators, as appropriate
- geographical datasets should primarily be unit based, not added together.

pedestrian walkways can be ascertained. The use of geographical datasets also makes it possible to use functional territorial divisions that differ from administrative territorial divisions.

In order to make use of these advantages, the monitoring of the living environment should be based on the use of geographical datasets as far as possible. Geographical information based on location and positioning dataset material should primarily be founded on coordinate-based data rather than information that has been added together so that the appropriate territorial division can be chosen.

5.7 Sources of information

The number of datasets related to the living environment is very large, and the information is spread among many administrative sectors and comes under the purview of a number of authorities. In fact, the vast amount of information available makes it difficult to grasp what it actually covers. As part of this project, a survey of the national datasets (statistics, registers, geographical datasets, and information from questionnaires and interviews) produced by the authorities was carried out, and a few private information providers were also included. The intention was to produce a theme-by-theme survey of the available information on the living environment, and to examine the greatest omissions in the available information. Though not comprehensive, the survey includes the most important sources of information. In the working group report, the sources are presented by provider, by theme and by indicator.

This is the first survey on datasets covering the quality of the living environment. It involved a lot of work and showed that the number of datasets is huge, that it is difficult to get an overall picture of the sector, and that it is difficult

The most important sources of information, by producer

- Population Register Centre
    population, buildings, dwellings and business premises
- Statistics Finland
    statistics and registers from different fields
- National Land Survey of Finland
    land use and property
- Finnish Road Administration
    public roads and traffic
- National Research and Development Centre for Welfare and Health
    health services and daycare centres
- National Board of Education
    Educational institutions, education and training
- National Board of Antiquities
    ancient relics
- Vehicle Administration Centre
    vehicle stock
- Ministry of the Environment, Finnish Environment Institute, regional environment centres
    community structures in towns and cities, housing conditions, built cultural environment, areas of important landscape, protected areas, groundwater areas, contaminated land areas, quality of surface water and groundwater.

to obtain such information about the datasets that is needed for the monitoring process. These problems also complicate the use of datasets in land use planning and environmental impact assessment.

The authorities have traditionally collected and maintained datasets so that they can manage their statutory duties. When datasets were originally conceived, not all their potential uses were known. Expanding their use to the planning and monitoring of the living environment sets new demands for their scope and content. Information about the living environment is still produced in an uncoordinated fashion, except for general measures to improve information management by the authorities.

Monitoring of the living environment should primarily use existing information sources and the datasets the environmental administration has already produced or has access to. The aim is to combine information produced and compiled by different bodies into one entity that would cover the different aspects of the quality of the living environment. Without cooperation between different authorities it would be impossible to obtain enough information for monitoring the living environment. When it comes to the most important information sources, it is essential to agree on a division of labour between different authorities and to examine how to fill the information gaps. Improved cooperation can also help to avoid overlaps in the information-gathering process and make it easier to find out about information requirements in other fields.

National statistics and registers should be developed as a cooperative effort so that they can be of greater use in the monitoring and planning of the living environment. Information on the availability of data about the living environment should also be on a better footing. In the long run, it may also be necessary to gather municipal information that is not yet available on a nation-wide basis. This requires improvements in the monitoring of the living environment at municipal level, and guidance and tests that should all be carried out in cooperation with local authorities.

Availability of monitoring data

- priority should be given to existing information sources
- production of important information should be based on division of labour between different authorities
- the contents of statistics and registers should be developed so that they can be better used for the monitoring of the living environment
- information about what data on the living environment is already available should be improved.

5.8 Use of sources of information in the monitoring process

Gathering information for an overall picture of the state of the living environment involves a number of problems. Registers and statistics were not originally designed for the purpose and using datasets for monitoring puts new demands on them. The development of geographical data technology especially has made improvements in them necessary. Information produced by different organizations must be processed before it can be used for monitoring the living environment. There are several factors that have to be considered when using datasets about the living environment: quality and combination of different datasets, and questions concerning data protection, copyright and pricing. Those involved often feel that the prevailing practice is not sufficiently clear.

Different sectors of the government administration have made efforts to improve the quality of the datasets and to facilitate their use. It is the task of the Advisory Committee on Information Management in Public Administration (JUHTA) to promote the use of information technology in the public sector, determine the relevant standards and administrative principles, plan information technology cooperation between central and local government, and to discuss matters related to cooperation in this field.

It is often difficult to combine datasets produced by different organizations because they have a different basis and different structures and make use of differing technical solutions. The fact that the data is based on different territorial divisions is probably the biggest obstacle to joint use of different datasets. Greater compatibility of datasets would also make information more accessible and more widely used.

The quality of the datasets is an important criterion when assessing the usefulness of the information and the potential for combining datasets and the reliability of the results. The reliability of the information varies and it is not always easy to obtain information about this aspect. Descriptions of the processing and content of the datasets may be insufficient, in which case it is impossible to examine the quality and reliability of the material. The Advisory Committee on Information Management in Public Administration (JUHTA) has issued a recommendation on metadata on information products and geographical datasets in its JHS 137 standard. All datasets used in monitoring the living environment should, for example, have descriptions of metadata that are in accordance with JHS 137.

Some of the information in the datasets describing the living environment concerns private persons and may be of a sensitive nature.

For example, information about unemployment, income or income support may lead to certain residential areas, blocks or residential buildings to be singled out. Using geographical datasets it is possible to make highly accurate analyses and maps, and individual buildings can be recognized more easily than from statistical data. Geographical data makes it easy to combine information, which may create combinations sensitive from the point of view of data protection.

Data protection becomes more important as information becomes more accurate, and when different datasets are combined. Monitoring of the living environment primarily involves the processing of detailed information and, thus, it is important to be able to combine different types of information. The development of the monitoring of the living environment depends on the principles governing the application of data protection. On the other hand, while everybody should be covered by adequate safeguards in this respect, data protection should not make important information on the living environment inaccessible. Using data-protected material in geographical data analyses, for example the omission of sparsely populated squares, may lead to inaccuracies. Generalization of information, for example adding it together to form larger territorial units may make it impossible to carry out sufficiently detailed analyses. Therefore, the question of whether there are ways of successfully combining the demands of adequate data protection and the requirements of environmental monitoring should be checked.

Monitoring of the living environment requires a host of different datasets and thus pricing principles are very important for implementing the actual monitoring process. Producing datasets requires a lot of work, and is time-consuming and expensive. Many datasets are collated and productized in accordance with business principles, and thus they may be too expensive, preventing the living environment from being monitored. Pricing should support and help to promote the use of information, and should not become an obstacle to information gathering. Principles governing the pricing of datasets should be developed still further.

Using datasets in the monitoring process

- datasets should be made more uniform
- particular attention should be paid to the quality of the datasets
- all datasets used for monitoring should include a description of their metadata
- principles governing data protection should be clarified
- pricing principles for datasets should be clarified.

5.9   Using the results of monitoring

Using the results of the monitoring of the living environment is important for development work carried out by the authorities, and for land use planning, research and education. It also makes it easier for ordinary citizens to participate in planning and improving the living environment. It is essential that the monitoring results are assessed and used as a basis for legislation and for steering planning. The information should be accessible to all those who need it, and the use of the information in land use planning, especially municipal planning, should be strongly encouraged. In the future, land use planning will be largely based on the management of numerical data, which will increase the need for and use of geographical data.

Information services will ensure that the information produced by the environmental administration through monitoring the living environment is easily available. Information will be disseminated through the Hertta environmental information system, printed publications, and the Internet. Those using monitoring information mainly require processed information that can easily be used without any location and positioning applications. Therefore, access to the information should be browser-based, and it should also be possible to carry out quick searches, combine and compare information, and carry out analyses that serve the users own needs.

The information will be loaded in the Hertta environmental information system, a browser-based system enabling quick searches and analyses, for example, when using spreadsheet and statistical software. In addition to spreadsheets and diagrams, the information can also be presented on maps as part of the Hertta map service. In the map service, the environmental administration's geographical data is made accessible through a browser. The required information can be picked out from the datasets and placed on the same map, which can also be printed out. No geographical data analyses can be made, however. The geographical data will be saved to GRIS, the environmental administration's Arc View-based user interface, enabling users to make more specialized analyses. Hertta is used by the environmental administration, and there are plans to expand it in

Using the monitoring results

- The results of the monitoring of the living environment should be accessible to all.
- Monitoring results will be loaded into the Hertta environmental information system.
- A summary of the results will be published every year.
- The results will be published on the Internet.

2002 as an extranet solution so it becomes accessible to other bodies, such as local authorities.

There will be an annual summary of the monitoring results, in which maps, diagrams and reports are used to explain the changes that have taken place during the previous 12 months. A more comprehensive survey will be prepared every five years containing more detailed studies of functional areas and changes in them. A joint report on the results of monitoring the living environment and planning could also be published. Monitoring results will also appear on the Internet so that they can be used by the public and schools, for example. The main monitoring results plus interpretations of them will be presented as printed publications and on the Internet.

5.10 Carrying out the monitoring

An information system for monitoring the living environment (ELYSE) will be set up to provide a basis for centralized storage of information and effective use of the monitoring results. The monitoring will comprise 12 themes, including the living environment factors and the living-environment indicators. Indicator data covering various sectors of the living environment will be made into an indicator databank, for which a browser-based user interface will be built into the Hertta system. In addition to the information content, the system should also contain metadata about the data to be used, covering such matters as origin, processing history, scope and quality.

The indicators will be monitored using administrative divisions. These are the country as a whole, regional environment centres, regions, and municipalities. Within these divisions, there are functional areas, such as densely populated areas, sparsely populated areas and residential areas. To make analyses possible, basic territorial divisions will be typified and grouped in accordance with such factors as the size of municipalities, growing and declining municipalities, and the size of densely populated areas. There will be a separate study of the functional division used in the monitoring process, which will form a basis for selecting areas for monitoring.

The aim is to use indicators showing the situation in the year 2000. After that, the information will normally be updated on an annual basis, though for functional areas and slowly changing factors, the updating will be every five years. Initially, historical information from the period after 1980 will also be collected, wherever possible, and general national historical information could also cover periods going further back in time.

The monitoring indicators will be developed on the basis of the descriptive model of the living environment, and the work will be

Theme>factor to be monitored>indicator	Area	Time period
- Population - Land use and community structure - Buildings and built cultural environment - Housing - Services - Jobs - Natural environment and landscape - Recreational areas - Traffic - Municipal infrastructure and energy - Environmental hazards - Social environment	Administrative areas - Whole country - Regional environment centre - Region - Municipality Functional areas - Densely populated areas - Sparsely populated areas - Residential areas - High-rise residential areas - Low-rise residential areas - City and town centres	- Information on administrative areas will be updated every year - Information on functional areas and slowly changing factors will be updated every five years

Table 1. Information content of the monitoring of the living environment.

carried out in cooperation with experts from different fields. A table has been drawn up of the living-environment factors and indicators, and the information sources. A proposal has been drawn up for the indicators to be implemented first and the information to be used, on the basis of the availability of the information sources. Data the environmental administration has already produced or has access to will be used as primary information sources, and additional material will also be purchased.

The living environment information system (ELYSE) will be implemented in phases, as described below.

Phase 1. Constructing the information system, and the themes of the first phase (2002)

The themes covered by the first phase are population, housing, buildings and services. The content of the information system will be defined, the data model planned and a database created. The routines for gathering and calculating data will be defined and documented together with the system structure. The first phase also comprises the collection of data, and testing and implementation of the indicators for the first four themes.

The results will be incorporated into the Hertta system in which the calculated indicators will be saved, and a browser-based user interface for browsing the information will be incorporated. Result-based theme maps will be incorporated in the Hertta map service. Within the limits permitted by user rights, the system will be expanded on an extranet basis so that it can be used by regional bodies, local authorities and

2002

Population	- Size
	- Structure
	- Migration
Housing	- Housing stock
	- Housing standards
	- Residential buildings
	- Structure of residential areas
	- New dwellings/residential buildings
	- Infill housing construction
Buildings	- Building stock
	- New construction
	- Demolition
Services	- Local services: food shops and comprehensive schools

2003

Traffic	- Transport networks
	- Vehicles
	- Traffic
	- Road safety
Land use and community structure	- Population density
	- Building density
	- Infill building
	- Land-use distribution
Jobs	- Number of jobs
	- Distribution of jobs by sector
	- Job accessibility
	- New premises
Built cultural environment	- Protected sites in built cultural environment
	- Old buildings

2004

Natural environment and landscape	- Area of natural environment
	- Use of shores
	- Important natural sites
	- Important cultural landscapes
	- Extraction of land resources
Municipal infrastructure and energy	- Energy consumption and district heating network
Environmental hazards	- Quality of surface water and groundwater
	- Radiation
	- Location of sensitive activities
Social environment	- Socio-economic and well-being factors
	- Local identity
	- Community spirit, participation in local affairs, opportunities for different activities at local level
	- Security and social well-being

Table 2. Themes to be monitored in 2002-2004.

other outsiders. Registers and geographical data purchased for monitoring purposes can be incorporated in the environmental administration's user interface, GRIS, so that Arc View users can make more detailed analyses.

Phase 2. Other themes (2003-2004)

Other themes are traffic, land use and community structure, jobs, the built cultural environment, the natural environment and landscape, municipal infrastructure and energy, environmental hazards, and the social environment. Phase 2 will be carried out in the same way as phase 1, with appropriate adjustments.

Phase 3. Updating information and developing the system (2005-)

The information in the system will be updated at certain intervals (1-5 years). New themes and information will be added, and information based on samples and questionnaires that are relevant to experiencing the living environment will be incorporated in the system.

Information gathering in the field of the living environment should be a joint undertaking involving government authorities and local authorities. It should be ascertained that the information needed for calculating the monitoring indicators will be available on a continuous basis. There should be cooperation with the bodies responsible for producing information on the living environment to ensure that the required information can be made available.

Information gathered during the monitoring process will be combined with information produced by information systems concerning planning, for example. Methods for describing experiences related to the living environment using material gathered through questionnaires and interviews, and expert assessment of the environment will be developed separately. The results will be incorporated in the system for monitoring the living environment. Monitoring results will be analysed and assessed so that they can be used as a basis for policy development work by the authorities, and for publication.

5.11 The necessary resources

The developing and updating of the living environment information system will be carried out by the Finnish Environment Institute. In 2001, a total of one and a half person-work years was available for the project, and the funding has come from the Ministry of the

Environment. Implementing the information system comprises both development and continuous updating. The first implementation phase will require two person-work years. When allocating resources for the monitoring work, the resources required for the acquisition of data should also be considered.

It is also essential to allocate sufficient personnel resources for the Hertta environmental information system. At the moment, datasets cannot be entered in the system quickly enough to meet the need. For the project to succeed, it is also important to obtain sufficient expert assistance, especially in information technology, from the Finnish Environment Institute and to have good contacts with the IT projects closely connected with monitoring the living environment.

As more and more monitoring information about the living environment becomes available, more research using it will also be carried out. Combining the monitoring of land use and related applied research into one unit would offer synergy benefits to both parties. It is important to set up such a unit within the government administration.

The necessary resources

- monitoring work should be able to rely on adequate personnel resources
- adequate resources must be set aside for the acquisition of data

6 Proposals for action

6.1 Implementing the living environment information system (ELYSE)

The fact that more attention is now being paid to environmental problems and environmental and urban policies has put new pressures on environmental policies and development work, planning and decision-making. As a result, more comprehensive information on the state and future of the environment is needed. It has also become necessary to examine the state of the living environment and its sub-sectors and the changes that take place over time, and the causal links between different phenomena, compare regional differences, assess the impact of different measures on the living environment and anticipate future developments. Moreover, local residents will become more active in matters concerning their living environment if they can obtain enough information about it.

> The working group proposes that a living environment information system should be set up in accordance with the development and implementation principles set out in chapter 5, so that the targets and the monitoring requirements incorporated in the Land Use and Building Act can be put into practice.

6.2 Improving cooperation in the government administration

In the environmental administration's information management strategy, it is proposed that "the gathering and storing of information should be carried out in cooperation with public sector organizations and other stakeholders". Developing the monitoring of the living environment and promoting the use of datasets in the public sector should be coordinated so that the needs of different authorities can be taken into account. The use of datasets covering the living environment will be improved by making them more comprehensive and compatible. Statistics and registers should also be improved so that they can better serve the process of monitoring the environment.

A joint, sector-by-sector databank on the living environment incorporating its most important sources and producers of information should be set up. This would give better access to the appropriate datasets and provide information on them, and could also prevent the gathering of overlapping information. The databank would be maintained by information providers as a cooperative undertaking. Data protection applications for the monitoring of the living environment should also be developed as a joint effort involving different authorities.

The joint working group should include representatives from the most important government authorities producing and using information about the living environment.

> The working group proposes that, in order to improve its capability to monitor the living environment and to promote the use of information about it, the government administration should set up a joint working group so that forms of cooperation can be drawn up. The working group would:
>
> - coordinate the production of data on the living environment by different authorities
> - encourage datasets to be made more comprehensive and compatible, and better suited for monitoring the living environment
> - encourage the use of datasets, for example by setting up a databank of information sources on the living environment as a joint effort involving different authorities
> - develop a set of principles for applying data protection when monitoring the living environment

Documentation page

Abstract	The aim of developing a monitoring system is to obtain an overall picture of the state of the living environment and its various components, and to be able to monitor changes over time and from one area to another. It should be possible to evaluate the impact of different measures on the state of the living environment and study the causal links between different phenomena. The report defines the concept of 'the living environment' and describes the elements that should be included in it. The report also includes a survey of the people who use data on the living environment and the information they need.
	The study develops a descriptive model for examining the living environment, based on the objectives of the Land Use and Building Act and national land use goals. The model incorporates quality targets in specific areas, which are more closely defined as factors that have to be checked and environmental indicators. The model can be used for many different purposes, as a basis for monitoring at different levels of administration, in town planning and other aspects of environmental planning and in environmental assessment of development projects.
	The report presents a set of principles for developing and implementing a system for monitoring the living environment. Monitoring will provide basic information on the living environment for the use of officials, decision-makers and ordinary citizens. The data to be monitored will be chosen on the basis of the descriptive model of the living environment. For the purposes of monitoring, areas will be split up according to functional boundaries such as built-up areas and housing areas, in addition to administrative districts.
	As an action proposal, the working group suggests that in order to fulfil the monitoring duties in the land use and building legislation, ELYSE, the information system for monitoring the living environment should be implemented and that a cooperation group should be set up to improve collaboration on monitoring the living environment by the authorities.

Kuvailulehti

Tiivistelmä	Kehitettävän seurannan avulla on tavoitteena saada kokonaiskuva elinympäristön ja sen eri osa-alueiden tilasta sekä pystyä seuraamaan ajallista ja alueellista muutosta. Muun muassa tulisi voida arvioida eri toimenpiteiden vaikutuksia elinympäristön tilaan ja selvittää eri ilmiöiden välisiä syy-yhteyksiä. Selvityksessä on määritelty elinympäristökäsite ja kuvattu mitä elinympäristö pitää sisällään. Elinympäristötiedon käyttäjät ja niiden tietotarve kartoitettiin.
	Työssä kehitettiin maankäyttö- ja rakennuslain tavoitteisiin ja valtakunnallisiin alueidenkäyttötavoitteisiin pohjautuva kuvausmalli elinympäristön tarkastelemiseksi. Kuvausmalli sisältää teemakohtaiset laatutavoitteet, jotka on tarkennettu tarkasteltaviksi tekijöiksi ja elinympäristöindikaattoreiksi. Kuvausmallia voidaan käyttää moniin tarkoituksiin, seurannan perustana hallinnon eri tasoilla, kaavoituksessa ja muussa ympäristön suunnittelussa sekä hankkeiden ympäristövaikutusten arvioinneissa.
	Selvityksessä on esitetty elinympäristön seurannan kehittämis- ja toteuttamisperiaatteet. Seuranta antaa perustietoa elinympäristöstä viranomaisten, päätöksentekijöiden ja kansalaisten käyttöön. Seurannan tietosisältö valitaan elinympäristön kuvausmallin pohjalta. Seurannan aluejakoina käytetään hallinnollisten alueiden ohella myös toiminnallisia aluerajauksia, kuten taajama-alueet ja asuinalueet.
	Toimenpide-ehdotuksina työryhmä esittää, että maankäyttö- ja rakennuslainsäädännön seurantavelvoitteiden täyttämiseksi toteutetaan elinympäristön seurannan tietojärjestelmä (ELYSE) ja että viranomaisten elinympäristön seurantaa koskevaa yhteistyötä parannetaan perustamalla yhteistyöryhmä.