



# Strategy for Renewable Natural Resources in Finland

Ministry of Agriculture and Forestry  
Publications 8b/2001

**Publisher**

Ministry of Agriculture and Forestry in Finland

**Cover photo**

Diabox / Hannu Vallas

**Other photos**

Kuvaliiteri Oy

ISSN 1238-2531

ISBN 952-453-054-6

Layout: PixPoint ky

Printing press: Painopörssi Oy, Finland 2002



## Facts about Finland

Finland is one of the northernmost countries in the world. With a total area of 338 145 sq. km, it is Europe's seventh largest and the EU's fifth largest country. The area of Finland is 338,100 square kilometres, of which 27,500 square kilometres (8 %) is agricultural land. As for the rest, 68 % of the area is forest and other area covered by trees, 3 % is constructed area, 11 % is open land, and 10 % is under inland waters. Finnish landscape is characterised by lakes, islands and various kinds of peatlands.

Finland is situated in northern Europe between the 60th and 70th parallels of latitude. A quarter of its total area lies north of the Arctic Circle. The neighbouring countries are Sweden, Norway and Russia, which have land borders with Finland, and Estonia across the Gulf of Finland. Most of the country is a gently undulating plateau of worn bedrock and boreal forests, presenting a striking mixture of wooded hills and waters. High rounded fells dominate the landscape in Finnish Lapland, the most northerly part of the country.

The **climate** is marked by cold winters and warm summers. The mean annual temperature in the capital, Helsinki, is 5.3 degrees Celsius. The

highest daytime temperature in southern Finland during the summer may rise to almost 30 degrees. During the winter months, particularly in January and February, temperatures around minus 20 Celsius are not uncommon. In the far north, beyond the Arctic Circle, the sun does not set for about 73 days in the summer, producing the famous white nights. In the same region, during the dark winter period, the sun remains below the horizon for 51 days, creating the polar night known in Finnish as *kaamos*. The growing season is short, limiting both agricultural production and forest growth.

The **population of Finland** is approximately 5.2 million, making Finland the third sparsest populated country in Europe (17 persons per sq. km). The population growth is very slow, and a turn into a decline is expected to occur in the 2020s. There is a strong internal migration from small municipalities to urban areas. Most Finns, some 67 %, now live in urban areas, while 33 % remain in the countryside.

The **Finnish language** belongs to the Finno-Ugric linguistic family, which includes, in one branch, Finnish, Estonian and a number of other Finnic tongues. The official languages of

Finland are Finnish and Swedish, the latter spoken as the mother tongue by about 6 % of the population. Another indigenous minority language is Sami, spoken by the Sami people (also known as Lapps) of Lapland. The official status of Swedish has historical roots in the period when Fin-

land was a part of the Swedish realm, which lasted from the beginning of the 13th century until 1809. In 2000 there were about 91,000 citizens of foreign countries living permanently in Finland, most of them from the neighbouring countries Russia, Estonia and Sweden.

## The Ministry of Agriculture and Forestry in Finland

The Ministry of Agriculture and Forestry in Finland creates the conditions for the sustainable and diversified use of renewable natural resources and for developing the economic and leisure-time activities of the countryside. The Ministry of Agriculture and Forestry also secures the quality of the commodities obtained from renewable natural resources.

The field of activity of the Ministry of Agriculture and Forestry covers agriculture, horticulture and forestry, fisheries, game and reindeer husbandry. Besides these, it covers other rural industries and the development of rural areas, the use and management of water resources, land surveying, veterinary care and the related monitoring

of the health of animals and plants and of foodstuffs of animal origin.

Finland's Ministry of Agriculture and Forestry contributes to the development of the European Union's Common Agricultural Policy and Fisheries Policy. The Ministry implements decisions within these fields and also within the field of veterinary medicine in Finland. Moreover, through its expertise, the Ministry influences how agricultural matters are handled within the Union. The Ministry of Agriculture and Forestry is responsible for the preparation of legislation, the financing of support measures and the monitoring of implementation, as well as the direction and support of research and advice.

# Contents

<b>Part I Background</b> .....	7
<b>1. Introduction</b> .....	7
<b>2. Strategy for the Sustainable Use of Renewable Natural Resources 1997</b> ...	9
2.1. Natural Resources Strategy of 1997 .....	9
2.2. Assessment of the Natural Resources Strategy of 1997 .....	9
<b>Part II Framework Conditions</b> .....	12
<b>3. Use of renewable natural resources</b> .....	12
3.1. Natural resources and land use in Finland .....	12
3.2. Rural areas .....	16
3.3. Agriculture, food production and food quality .....	17
3.4. Forestry and use of wood .....	23
3.5. Products picked from forests and peatland .....	26
3.6. Game husbandry .....	28
3.7. Reindeer husbandry .....	31
3.8. Fisheries .....	33
3.9. Water resources management .....	38
3.10. Biodiversity and landscape .....	41
3.11. Biotechnology and genetically modified organisms .....	46
3.12. Climate change .....	47
<b>4. Most important strategies and programmes concerning the use of natural resources</b> .....	52
4.1. National strategies and programmes .....	52
4.2. International commitments and EU strategies and programmes .....	52
<b>5. Future challenges and opportunities</b> .....	55
<b>Part III Natural Resources Strategy</b> .....	58
<b>6. Strategy for the sustainable use of renewable natural resources</b> .....	58
6.1. Guiding principle and vision until 2010 .....	58
6.2. Goals, common objectives and main priorities of the 2002 Natural Resources Strategy .....	63
<b>7. Monitoring</b> .....	80
<b>Part IV Impacts</b> .....	83
<b>8. Ecological, economic, social and cultural impacts of the strategic choices</b> .	83
<b>ANNEX 1</b>	
Natural Resources Strategy of 1997- assessment of achievements .....	85
<b>ANNEX 2</b>	
Impacts of the Natural Resources Strategy 2002 .....	89

# Part I Background

## 1 Introduction



Photo: Heikki Ketola

Global problems related to natural resources and the environment, like climate change and decline in biodiversity, have resulted in international agreements aimed at preserving natural resources, their renewing capacity and the quality of the environment. The World Summit on Sustainable Development in Johannesburg in 2002 reaffirmed sustainable development as a central element of the international agenda and gave new impetus to global action to fight poverty and protect the environment. The understanding of sustainable development was broadened and strength-

ened as a result of the Summit, particularly the important linkages between poverty, the environment and the use of natural resources. Commitments by governments and other stakeholders to a broad range of partnership activities and initiatives will all implement sustainable development at the national, regional and international level. Through careful and economical utilisation of natural resources and technological development the future generations will also have access to an adequate amount of natural resources and high-quality environment.

Sustainable use of natural resources is a priority in the Finnish society. Even though the concept of 'sustainable use' varies, the basic principle as such has a long history. In Finland objectives aiming at securing sustainable use have been expressed in the legislation on forestry, fishing and hunting since the 17th century. The tradition to care for the natural resources is closely connected to the ownership of land and water areas.

Changes in values and the way of life have been reflected in the use of natural resources. More recently changes in the values can be seen in the public interest in environmental issues, production ethics, purity of foodstuffs, as well as quality of foodstuffs, other products and production methods. Significant efforts have been made to integrate the different aspects of sustainability in practise based on experience and research.

Renewable natural resources, in the field of the Ministry of Agriculture and Forestry, are arable land, species of plants and animals of agriculture and fur farming, forests and timber resources, as well as products picked from forests and peatland, game animals, reindeer, fish, crayfish and water resources. Rural landscape should also be considered a renewable natural resource.

The task of the Ministry of Agriculture and Forestry is to promote the sustainable and diversified use of renewable natural resources and the high quality of the goods derived from these. To fulfil this task the Ministry of Agriculture and Forestry drew up a Strategy for the Sustainable Use of Renewable Natural Resources in Finland, which was approved in 1997.

In the past five years significant changes have occurred in the society and sectors governed by the Ministry of Agriculture and Forestry. Consequently, it was considered necessary to update the Natural Resources Strategy to comprise the current requirements and expectations relating to the use of renewable natural resources. The new strategy 2002 also contributes to the implementation of the Finnish Programme for Sustainable Development adopted by the Government in year 1998.

In the review of the Natural Resources Strategy, particular attention is directed to the analysis of 1997 Strategy and the changes in the operating environment, as well as the measures, strategies and programmes designed and implemented so far. The new strategy 2002 also includes a vision for 2010 and seven goals based on this vision. According to the current view, the realisation of these goals in co-operation between the administra-



tive sector of the Ministry of Agriculture and Forestry, the society as a whole and other actors involved will make sure that our renewable natural resources are utilised in a sustainable way. Also, as it was required in the Johannesburg World Summit, the key element of this reviewed strategy constitutes to integrate ecological, economic, social and cultural dimensions.

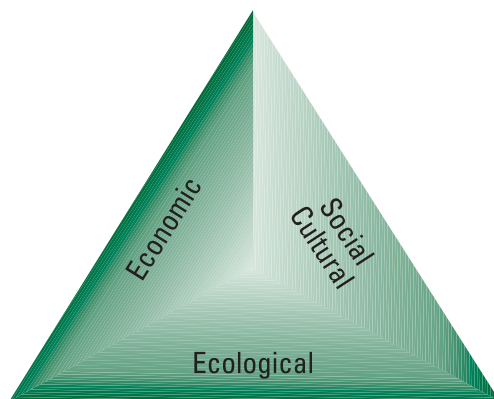
The monitoring of the state of natural resources and the strategy is important. Increasing the efficiency and improved orientation of the research is necessary to prepare for environmental changes and to develop measures to alleviate their negative impacts. Indicators for sustainable use of renewable natural resources serving the monitoring of the realisation of the objectives and evaluation are being developed and will be in use by the year 2003.

## 2 Strategy for the Sustainable Use of Renewable Natural Resources 1997

The sustainable use of renewable natural resources under the Ministry of Agriculture and Forestry is based on the internationally approved principle of sustainable development. In the report of the so-called “Brundtland Commission” appointed by the UN General Assembly this is defined as follows

*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

Both the content and implementation of the concept of sustainable development have been reformulated and specified more in detail since this principle was adopted at a high political level at the UN Conference on Environment and Development in Rio de Janeiro in 1992.



**Figure 1** Dimensions of sustainable development.

### 2.1 Natural Resources Strategy of 1997

The Strategy for the Sustainable Use of Renewable Natural Resources in Finland of 1997 was drawn up a couple of years after Finland had joined the European Union. At that time the strain caused by the economic recession was abating, agriculture was undergoing a rapid structural change, the principle of sustainable develop-

ment was being applied in the spirit of the decisions made at the Rio de Janeiro Conference on Environment and Development (1992), and new kinds of expectations were attached to the sustainable use of natural resources. In many administrative sectors the strategic processes were only getting started.

The Natural Resources Strategy approved in 1997 contained a description of the operating environment. The key areas in the strategy were based on the strengths and opportunities offered by the renewable natural resources available in Finland and the threats related to their use.

The strategy of 1997 presented nine strategic choices, which constitute the objectives in setting the guidelines for the Ministry's activities. Main priorities concerning the different sectors under the Ministry of Agriculture were established for each objective.

The main priorities selected were the sets of actions or means that will be required to meet the objectives. The preservation of the viability of the rural areas and employment effects were also taken into account in the selection of priorities.

The implementation of the strategy was based on the development of legislation and the related statutory

guidance in the administrative sector, economic and informative guidance and advising as well as co-operation between the authorities and, when necessary, other actors and interest groups involved as well as taking account of the different elements in the sustainable use of renewable natural resources in appropriate combinations.

## 2.2 Assessment of the Natural Resources Strategy of 1997

In general it can be noted that significant progress has been made towards the strategic choices outlined in the strategy of 1997. The productivity of renewable natural resources has been maintained and the preconditions for their diverse utilisation have been preserved or improved as a result of the planning and monitoring systems and highly developed information systems.

The forest nature, agricultural environments and waters continue to offer diverse habitats for different species. The new means for preserving forest biodiversity introduced by the Forest Act, such as preserving habitats of special importance under the act and regional forest programmes, have made it possible to protect and take account of the habitats of highly demanding species to an increasing extent. Traditional biotopes and other agricultural environments that are im-

portant for many plant and animal species and would disappear without any special measures are being managed under the Agri-Environmental Programme. Measures have been taken to improve the state of waters and, for example, rivers and rapids have been restored to the virgin state.

Various kinds of rural policy measures have been introduced to secure the viability of agriculture and other

rural industries. The use of domestic wood has increased. At the Ministry and its sectors the implementation of the 1997 Strategy for the Sustainable Use of Renewable Natural Resources has progressed well and most of the objectives set for 2001 have been increased.

Table about the assessment of achievements of the Natural Resources Strategy is as an Annex 1.

## Part II Framework Conditions

### 3 Use of renewable natural resources in Finland

#### 3.1 Natural resources and land use in Finland

*Farmland, forests and other land encompassed by renewable natural resources cover almost 95% of the surface area of Finland. The benefits derived from these are highly important for the national economy.*

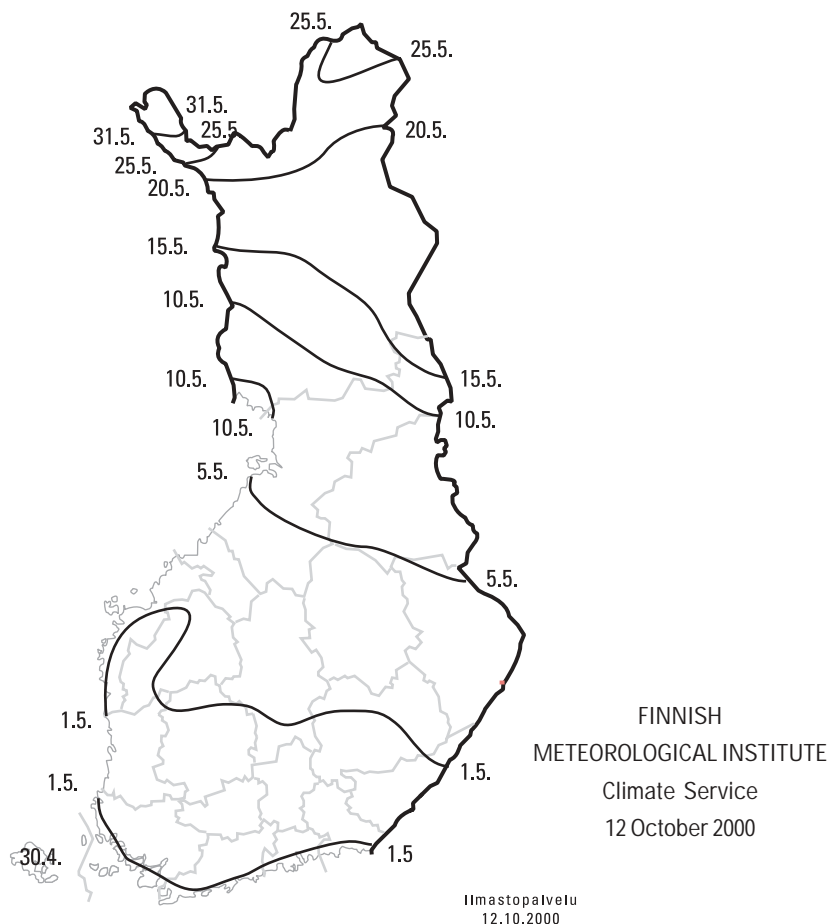


Photo: Veijo Vilksa

The major part of Finland belongs to the boreal coniferous forest zone, which is characterised by considerable variation in the habitats of plants, a mosaic of vegetation and open areas extending from the south to the north caused by the climate. The northernmost parts of Finland, Mountain Lapland may be considered to belong to the subarctic zone. Most of the plant and animal species

found in Finland spread to the region after the last ice age about 10,000 years ago.

The livelihood and employment of Finns is still largely based on benefits derived from renewable natural resources. In regional economies, in particular, the direct and indirect benefits generated by renewable natural resources are highly significant.

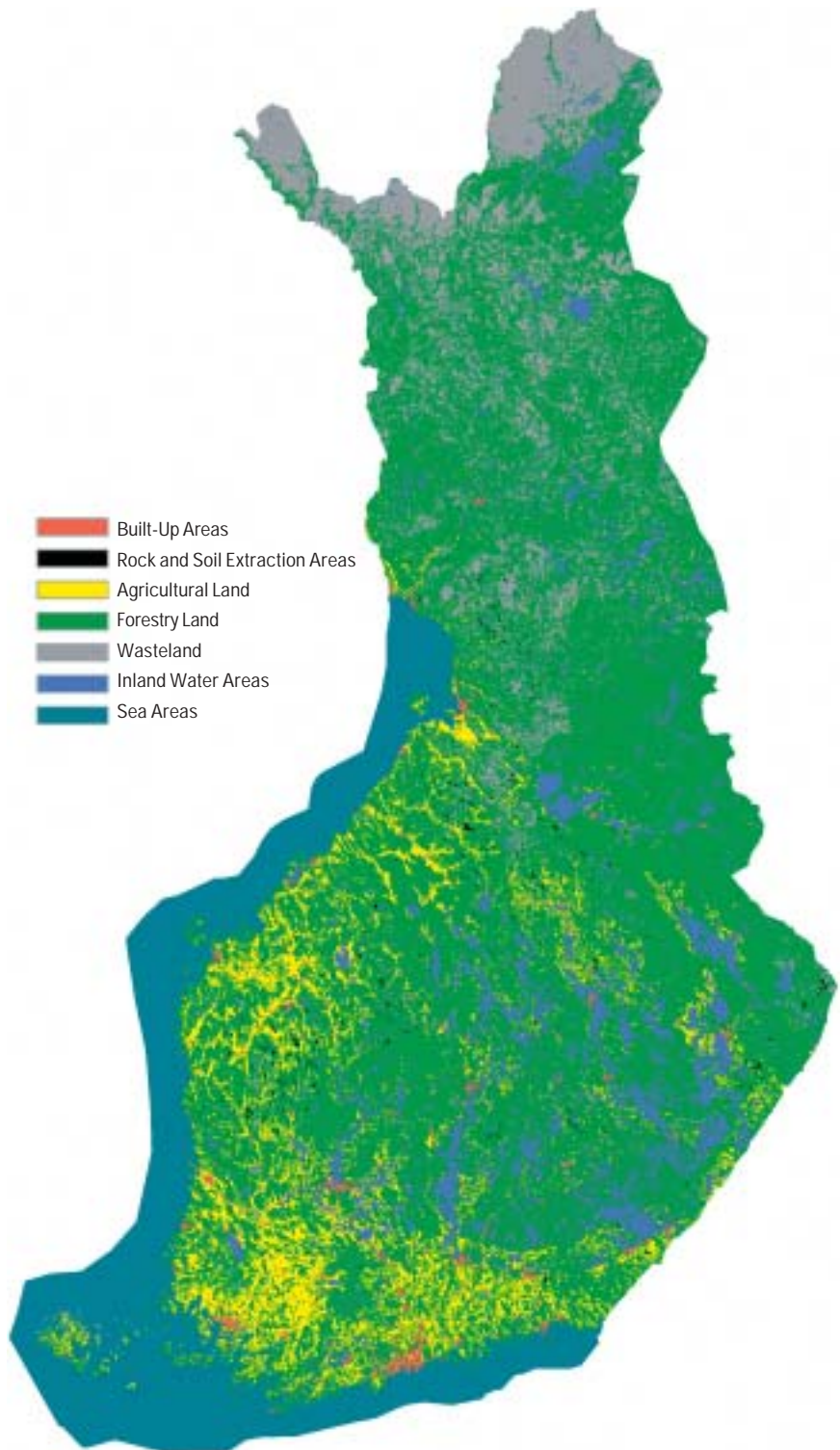


*Figure 2 The beginning of the thermal growing season on average (date) in 1961-90 in Finland.*

The number of jobs in agriculture and forestry, fishery, food industry and forest industry is almost 300,000, and these obviously have considerable multiplier impacts on other processing and manufacturing industries, transport and other services, which means that these sectors are very important for the national economy. In 2000 the gross domestic product in Finland totalled 131.6 bil-

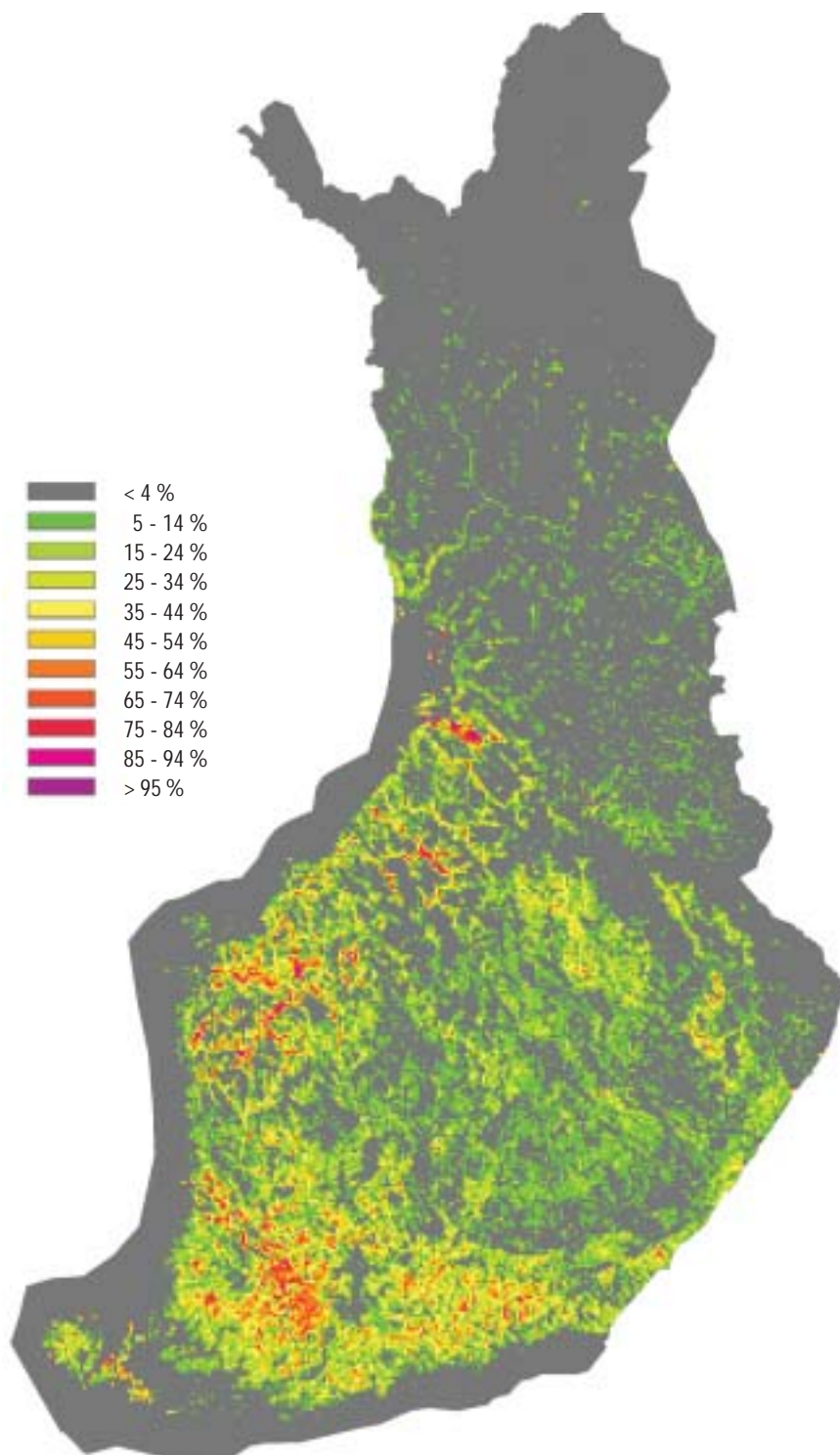
lion €, and the share of primary production was 3.6%, distributed between the different sectors as follows: agriculture 1.2%, forestry 2.3% and fishery and hunting 0.1%.

Agriculture is practised in all parts of Finland, and in the north reindeer husbandry is an important industry. There are considerable regional differences in the climatic conditions



**Figure 3** Share of agricultural land in the land area of Finland

(based on SLICES land use data, Copyright 2001: Ministry of Agriculture and Forestry, Ministry of the Environment, National Land Survey, Finnish Forest Research Institute, Finnish Environment Institute, Population Register Centre).



**Figure 4** Land use in Finland according to main categories

(based on SLICES land use data, Copyright 2001: Ministry of Agriculture and Forestry, Ministry of the Environment, National Land Survey, Finnish Forest Research Institute, Finnish Environment Institute, Population Register Centre).

from the south to the north, and thus the thermal growing period varies from a little under six months in the south to 2-3 months in the north. In Southern Finland the growing period is 170-180 days and in Northern Finland it is 110-130 days. The short growing season naturally means that many plant species that can be grown in the other countries do not succeed in Finland, and breeding is needed to develop varieties that are suited for the Finnish conditions.

Arable land accounts for about 8% of the surface area of Finland. The share of arable land varies considerably in the different parts of the country: in Southern and Western Finland the average share of arable land is almost 30%, in the lake district in Central Finland it is over 10% and in the north it is less than 5%. The climate and location of animal husbandry are reflected in the distribution of arable land in different parts of the country. In terms of biodiversity, however, arable land areas are far more significant in Finland than might be expected on the basis of their surface area.

Forests cover three-fourths of the Finnish land area. Forestry land is divided into categories based on wood production capacity. Both the forest area and volume of the growing stock increased during the 20th century.

### 3.2 Rural areas

*The society and the position of the rural areas are changing, and both national measures and EU financing are being used to secure the role of the rural areas in the distribution of labour in the society and as a place of residence. This calls for reorganisation of the structure of economic activities, functioning service networks and development of the quality of residential environments, social structures and conditions for agriculture.*

Finland is the most rural country in Western Europe, where the average population density is 17 persons/km<sup>2</sup>. More than 80% of the surface area of Finland is extremely sparsely populated (0-5 persons/km<sup>2</sup>). About 20% of the total population of 5.2 million live outside the population centres. In addition to the sparse population the Finnish countryside is characterised by very long distances, low-income level compared to population centres, high rate of unemployment, forests and low land use intensity.

Especially in the remote rural areas depopulation continues as people are moving to population centres, towns and cities to find services and employment. In the past two decades the population density outside the population centres has fallen rapidly. Besides this the number of population



centres has decreased as people have moved away from small rural population centres, and the share of the people living in centres or in areas adjacent to these has grown from a little over 50% to about 80%.

In 2000 primary production employed 7% of the total labour force in the whole country. In 1980 almost 80% of the rural population earned their living from primary production, but in 2000 the share of primary production was less than 30%. This means that the economic structure of the rural areas has become increasingly diverse. Work in the information sector, care services and various kinds of small-scale enterprises and forms of small and medium-sized entrepreneurship are increasing rapidly, substituting to a certain extent for the loss of many traditional jobs. However, agriculture is still highly significant for the economy and employment in many rural municipalities.

Viable and populated rural areas are vital for Finland. One of the main objectives of both Finland and the European Union is to maintain the viability of the rural areas and reduce disparities in regional development. This has also been taken into account, among other things, in the reform of the common agricultural policy, where rural development was incorporated as the second pillar into the common agricultural policy. Rural development meas-

ures are directed, in particular, at strengthening agriculture and forestry, management of the environment and preservation of rural heritage as well as increasing the interaction between the rural and urban areas. Development programmes highlight the local initiative and encourage entrepreneurship, co-operation, strengthening of knowledge and skills and search for new kinds of solutions, i.e. innovation. Rural policy aims at maintaining and enhancing the viability of the rural areas, improving the livelihood of the rural population, and functioning of the services and rural communities and strengthening the competitiveness and amenities of the rural areas, with particular emphasis on the problems faced by remote rural areas. Some of the measures extend beyond the current programming period of the EU.

The public services currently available in the rural areas could well sustain a larger population. Infrastructure - road and energy networks etc. - is adequate and in good condition, at least for the time being. The deterioration of infrastructure and services would seriously affect the possibilities to maintain and develop the viability of the rural areas and manage the natural resources in an appropriate way.

Especially the rural areas located close to population centres offer very attractive residential environments

and most favourable regions in terms of welfare. Highly advanced communication networks provide excellent opportunities for teleworking, and the possibilities for recreation and utilisation of the gifts of nature are abundant in rural areas. Leisure and recreational services, often connected to the nature and utilisation of renewable natural resources, are among the most significant issues to be taken into account in the efforts to maintain and develop the viability of the rural areas.

### 3.3 Agriculture, food production and food quality

*The common agricultural policy of the EU is being applied in Finland. In recent years the number of farms has been decreasing rapidly, and farms have also specialised or turned into part-time or pluriactive farms. In food production responding to consumer objectives has become the primary target, and special efforts are made to guarantee food quality in the whole production chain, from stable to table.*



Photo: Veijo Vilkska

**Table 1** Number of production animals and horses on farms.

	1990 (1000)	1995 (1000)	2000 (1000)
Bovines	1 359.7	1 148.1	1 056.7
Pigs	1 394.1	1 400.3	1 295.8
Chickens	6 477.3	5 657.4	12 569.5
Sheep	103.3	158.6	99.6
Horses	2.6	25.7	25.5

In 2000 the total utilised agricultural area was 2.2 million ha, which is about 8% of the total surface area of Finland. The number of active farms fell steadily all through the 1990s. In 2000 there were a little under 80,000 farms left, and the decrease is expected to continue. During the EU membership the share of livestock farms has fallen and that of plant producing farms has increased. In 1990-2000 the average size of active farms grew from 17.3 ha to 28 ha, but most Finnish farms are still very small, and the production and production lines are clearly concentrated to certain regions. The number of farms has decreased the most in Eastern and Northern Finland. The arable area in Finland has stayed about the same during the EU membership, and it accounts for 1.7% of the total arable area of the EU. Only a small share of the arable land has been afforested or abandoned. Dairy production dominates the livestock sector, and beef, pig meat and poultry production is also important. The welfare of the production animals, including the specific behavioural needs of each species, is taken into account.

Finnish agriculture is practised in quite exceptional conditions compared to the other Member States of the European Union. The growing season is short and yield levels are lower than in other parts of Europe where the cli-

matic conditions are more favourable, and thus the production costs are also higher. In livestock production the long, cold winter requires additional efforts in e.g. building and storage of manure. The short growing period restricts horticultural production in the open, and the energy costs of greenhouse production are high due to the cold climate.

Today only about a third of the farmers is full time farmers (i.e. at least 75% of income comes from agriculture and forestry). The income of many farm families comes from various sources, mostly from the service sector outside the farm or small-scale business activities practised on the farm. In 1999 agriculture employed 118,900 persons, while the number of people employed in the whole food sector totalled 163,000 persons.

In 2000 there were about 1,700 fur farms in Finland, and a little more than half of these operated as independent enterprises. Fur farming practised in connection with agriculture is a regionally significant source of additional income. Fur production is concentrated to Western Finland. It employs about 6,000-7,000 persons, but this varies considerably according to the season.

Animal welfare is highly significant in all livestock production, including

fur farming. On Finnish farms special attention is directed at the care and conditions of the animals. For example, the need for space and activity as well as environmental impacts is being studied and continuous efforts are being made to develop and improve the production conditions.

In addition to the unfavourable production conditions, Finnish agriculture is handicapped by the old age of farmers and small number of farm transfers. However, there are also special strengths, such as the purity of the domestic production, production ethics and environmental considerations, which need to be emphasised in the future, too. In addition to safety and high quality, preference for the domestic and local foods reduces the environmental load due to e.g. transport. One important future trend is the multifunctional role of agriculture. This means that, apart from food production, agriculture plays a significant role in terms of balanced regional development and as the producer of various kinds of environmental, cultural and rural goods and services.

The most serious negative environmental impact of farming is the diffuse source pollution caused by the nutrients contained in fertilisers and animal manure, which causes eutrophication of waters and deterioration in the quality of groundwater.

The relative significance of agriculture in the load on waters has grown in recent decades as the communities and manufacturing industry have intensified their efforts to purify their wastewaters. It is estimated that in 1997 about 60% of the total phosphorus load and almost 50% of the nitrogen load was caused by agricultural production.

Efforts have been made to alleviate these problems by means of the Agri-Environmental Programme for 1995-1999 and Agri-Environmental Scheme applied in 2000-2006. In 2000 91% of the active farms and 96% of the cultivated area were covered by agri-environmental support, which also encourages the farmers to convert into organic production. The number of organic farms has increased rapidly in a very short time, and in the end of 2001 the total area under organic production was estimated at 148,000 ha. Besides water protection, the objectives of environmental support include sustainable agriculture and horticulture, reducing the environmental load, preservation of biodiversity and cultural landscapes in the rural areas, and maintaining the conditions for agricultural production in the long term.

The condition of the soil is very important for agriculture and forestry. The most significant properties of the

soil are its nutrient content, number of living organisms and microbes in the soil, porosity and retaining capacity. Cultivation measures and practices may alter the soil properties, in both positive and negative direction. Sustainable agriculture implies the maintenance and improvement of the condition and productive capacity of the soil, and this must be protected from acidification, especially nitrogen and sulphur deposition and contamination caused by heavy metals.

In Finland far fewer pesticides are being used in most other countries. Based on the sales statistics, the use of pesticides is 0.5 kg/ha of arable land, while in many European countries the average use is 3-4 kg of the active substance/ha, or even higher. In Finland the use of pesticides fell from the 1980s when the average level of active substance was 2,000 tonnes to about 1,000 tonnes in 1996, and the use has stayed at about this level. To join the Agri-Environmental Scheme a farmer must participate in training in the use of pesticides and the pesticide sprayer must be tested every five years. No training is required if the farmer has taken a special degree at the Plant Production Inspection Centre. A farmer who has committed to the Agri-Environmental Scheme must also follow the crop-specific instructions for balanced production of plants cultivated on the farm.

### *Quality control in the food chain*

Finns are used to relying on the safety and high quality of foodstuffs. When Finland joined the EU, extensive official control was replaced by market control and own-control systems. Food markets have opened up and securing the quality of foodstuffs has become increasingly important. This requires both official control and own-control at the different stages of the production chain, because on the single market feed raw materials and animals, and animal diseases, as well as pests, pesticides, fertilisers and raw materials used in food production move across the borders more easily than before the EU membership. In the development of the quality it is important to respond to the needs of the consumers in terms of all quality aspects, giving priority to food safety.

The membership in the EU forced the whole food chain to view their competitiveness on an open market. The value chain has created voluntary tri-lateral contracts where the feed and food industry as well as agriculture agrees on measures aimed at preserving the most important strengths which influence the quality of foodstuffs.

Finland is implementing a very extensive National Quality Strategy for the Food Sector, involving all parties

from the farmers to consumers. Securing the quality in all aspects and stages of the production is based on the idea that all actors in the food chain have adopted the principles of quality management. The objective is that in 2006 quality and environmental systems should cover the whole food chain.

The Quality Strategy is based on a holistic quality concept, which means that consumer orientation, safety, production ethics and environmental considerations are taken into account in all actions. Maintaining food safety calls for continuous efforts and development of the operations and product quality. Securing the availability of high-quality raw material and success in plant and livestock production is based on high-quality inputs.

### *Food production in the world*

Cereal production per capita grew steadily until 1984, when the peak of 344 kg/capita was reached. By 1995 the production had fallen back to 293 kg/capita. Based on the future prospects in food production it seems that the era, when food production grew more rapidly than the world population, has come to an end. Eating habits have also changed and an increasing share of cereals is now being used for raising livestock. This is going to increase the environmental burden especially in the developing countries.

The FAO estimates that during the next 30 years the global food production should increase by more than 75% to secure adequate food supply in 2025 and after that. However, the limits to the increase in the production will soon be reached either due to the decrease in the farmland per capita or deterioration of the production potential of the land. Because of the changes in the land use due to the population growth the arable area decreases by about 1% per year. It is estimated that the earth is capable of producing food for 11 billion people at the maximum.

The main objective set in the World Food Summit fyl (five years later) of 2002 was to accelerate action to halve the number of hungry people from 800 million to about 400 million by 2015.

Because of the growing need for food on the global scale, it is also important for Finland to preserve a food production potential that meets at least the domestic need. For the next 15-20 years it may be necessary to find other uses for the excess arable area in Europe, such as non-food production, so that it will be possible to resume efficient food production on this land. In addition to agriculture, growing expectations will be directed at aquaculture and the whole fisheries sector.

### 3.4 Forestry and use of wood

*Finnish forestry has become increasingly sustainable in recent years. The forests are managed, used and protected so that they provide as much employment and livelihood as possible while maintaining the viability and diversity of forests, which are also an important source of physical and spiritual recreation. The forest sector must also be capable of responding to the expectations of the international operating environment.*

Photo: Risto Sauso



Finland possesses about 0.5% of the world's forest resources, and about 1.5% of the world's harvesting is done in Finland. Our share of the production of the forest industry is 5% and we account for 10% of world exports.

Of the total Finnish land area of 30.5 million ha, 26.2 million ha (86%) is classified as forestry land. This also includes the high-elevation areas in Lapland and similar open lands. Forestry land is classified according to the productivity into forestland, scrub land and wasteland. The area covered with trees is 22.9 million ha,

and almost 60% of this is privately owned. An increasing share of the forest owners lives in urban areas. Most of the State forests are located in Eastern and Northern Finland. The nature conservation areas total 2.7 million ha, of which a little over a half is treeless land.

There are more than 20 native tree species in Finland, but the dominating species Scots pine, Norway spruce and birch account for more than 97% of the growing stock volume (pine 46%, spruce 35%, birch 15%, other broadleaves 3%).

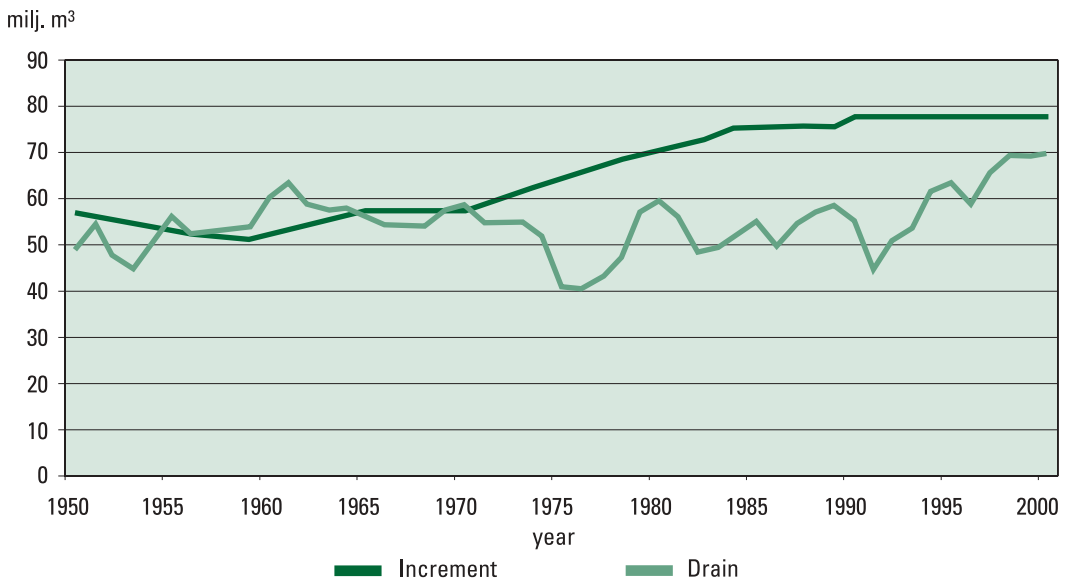
**Table 2** Ownership of forestry land in Finland (1,000 ha)

Source: Finnish Forest Research Institute Metla 2000.

Ownership	Forest land category	Scrub land	Waste land	Roads, depots, etc.	Total
Private	12 263	1 048	709	78	14 097
Companies	1 800	146	101	19	2 066
State	4 922	1 608	2 171	51	8 752
Other	1 042	114	143	11	1 310
Total	20 027	2 916	3 123	158	26 225

**Figure 5** Average annual increment and total drain of the growing stock in five-year periods from 1950 until 1999.

Source: Finnish Forest Research Institute Metla 2000.



Since 1974 the annual increment of the growing stock has been 10-20 million cubic metres higher than the total drain (harvesting and natural mortality, e.g. decay). About 95% of the growth occur in forests that can be used for wood production. In 2001

the total volume of the growing stock was estimated at 2 billion cubic metres.

The forecast for the annual increment is 75 million cubic metres, and the maximum allowable cut of forests



available for wood production is about 69 million cubic metres. The take-up rate, i.e. harvesting (about 90% of which is commercial harvesting and the rest mainly firewood for households), has been around 80% of the estimated maximum annual allowable cut. Even if efficient utilisation has influenced the structure and diversity of forests in many ways, modern Finnish forestry is still largely based on the natural structure and dynamics of forests.

In 1997-2000 commercial roundwood harvesting grew from 53 million cubic metres to 58 million cubic metres, while roundwood imports increased from 8.5 million cubic metres to 13.5 million cubic metres. In 1999 5.5 million cubic metres of wood were cut for firewood. When the logging residue and natural mortality is added to the roundwood production, we arrive at the total drain of 69 million cubic metres in 1999.

In the 1990s the share of renewable wood-based energy sources in the Finnish energy production grew to about 20%. The use of wood for energy accounts for about 15% of the total use of wood. Less than a half of this is used as fuelwood in small households. The utilisation of wood material contained in the industrial wastewater and unusable cortex accounts for more than half of the wood-based energy. Even if most of

the constructions have a wooden frame, the share of wood products in the value of building is less than a fifth.

The production of the Finnish forest industry is mainly directed at export, which account for more than 70% of the average annual production. The share of forest industry in the net export income is about a third. Due to the favourable trade cycle the value of the commodity exports of forest industry reached a record of almost 11.4 billion € in 1999. The gross stumpage earnings grew from a little over 0.84 billion € in the early 1990s to the record level of 1.75 billion € in 2000. In 1999 the share of the forest sector in the GDP was 7.6% and that of forestry was 2.4%. Today forestry and the forest industry employ directly about 95,000 persons, and about three-quarters of these work in the forest industry. In addition to this, the labour input in building for farming and other rural business activities in the building sites and building materials industry corresponds to about 20,000 man-years.

The new Forest Act and Act on the Financing of Sustainable Forestry entered into force as of the beginning of 1997. The purpose of the Forest Act is to promote the economically, ecologically and socially sustainable management and use of forests so that the forests provide a sustainable

good yield while the general conditions for the preservation of biodiversity in natural habitats are maintained. Based on the Act on the Financing of Sustainable Forestry State funding may be granted to secure the sustainability of wood production, maintain biodiversity in forests as well as for forest nature management projects. The new Nature Conservation Act, which entered into force in 1997, restricts the use of forests for the part of e.g. key habitats of endangered species, valuable natural habitats as well as particularly valuable landscape areas.

According to extensive research projects undertaken in the past decade, the silviculture and harvesting methods have developed so that the negative impacts on watercourses have decreased considerably. Today forestry is estimated to account for only 5% of the nutrient loading on waters.

The main principles, objectives and means of the new Finnish forest policy have been laid down in the National Forest Programme 2010, which is adopted on a Government resolution of 1999. The implementation of the programme started in 2000.

In 1996-1999 a national certification system was developed for the Finnish forests and this system can be linked to other forest certification systems.

The Finnish system covers all the aspects required for certification: the management and use of forests, verification of the chain of custody and qualifications and quality of the auditing. A broad work group for forest certification established the criteria to be applied in 1997. The certification system is based on voluntary regional group certification, and at present about 95% of the Finnish forests have been certified. The Finnish forest certification system has been approved by the pan-European forest certification system.

### *World timber resources*

In 2000 the forest area in the world was a little less than 3.9 billion ha. Natural forests accounted for 95% and plantation forests for 5% of this. In the past decade the surface area of natural forests fell by more than 4%, mainly due to deforestation caused by the need to produce food for the growing population in the developing countries and by clearing forests into pastures and farmland while using wood for heating and preparing food.

The growing stock of the world totals about 368 billion cubic metres. The annual increment is 5.6 billion cubic metres and the use is 3.8 billion cubic metres. Heating accounts for 52% and forest industry for 48% of the use.

About 47% of the world's forest area is located in the tropical zone, where more than a third or even half of the original natural forests have already been destroyed. Each year about 15 million hectares of tropical forest disappear. Around 20% of the tropical wood is used as raw material in the processing industry.

### 3.5. Products picked from forest and peatland

*Finnish forests and peatlands produce large quantities of natural products, such as berries, mushrooms, lichen and wild herbs. However, only a relatively small share of these is being utilised. The main challenges in improving the take-up rate of these products include keeping up the tradition as well as foreign competition in marketing.*

In Finland the access to forests is free. The so-called everyman's right makes it possible for anyone to roam freely on lands owned by somebody else on foot, skis, by bicycle or on horseback, provided that this causes no damage. This also includes the right to pick wild flowers, berries and mushrooms that do not belong to protected species.

There are 37 species of edible berries in Finland, and 16 of these are collected for household use and for sale. The most significant wild berries are lingonberry, blueberry and cloudberry. About half of our forest a layer of lingonberry and blueberry shrub covers area. The annual yield of wild berries totals 200-400 million kg, with considerable variation from one year to another. In recent years about 40 million kg of wild berries have



Photo: Jarkko Mäkinen

Turban fungus (*Gyromitra esculenta*)

been collected annually, and three-quarters of this goes directly to household use. Three-quarters of the berry crop sold on the market come from the provinces of Oulu and Lapland.

The total number of edible mushroom species is around 200, and the annual yield is about 2 billion kg. 22 mushroom species or groups of species have been approved for sale on the market. The yield varies a great deal, from 350 to 1,000 million kg, of which only about 6 million kg is picked each year. 90% of the wild mushrooms are used in households. 80-90% of the mushrooms sold on the market comes from Eastern Finland.

The value of the wild berries and mushrooms collected annually is, on average, 85 million €. During the 1990s the income from picking the most significant species of wild berries and mushrooms varied from 5-24 million €. More than 20 species of wild herbs are also being collected, but only a few of these are commercially significant. In recent years the value of the trade in domestic wild herbs has been around 1.7 million € per year. In North Ostrobothnia and Kainuu people also collect lichen to be used in wreaths and flower arrangements. Most of this lichen is exported, mainly to Germany, and in 1999 the value of these exports totalled 1.3 million €.

### 3.6 Game husbandry

*As a traditional way of using and managing the nature and means for regulating the game populations, hunting has always been and will continue to be based on the principle of sustainable use.*

Hunting in Finland and Northern Europe in general differs considerably from hunting practices in the other parts of Europe. Game still constitutes a significant source of food especially in some rural regions in Finland.

Finnish game is highly diverse. 34 of the total number 65 of mammal species and 26 of the more than 240 birds belong to game species. Forest game is obviously very significant, because Finland is mostly covered with forests. Game density is small compared to continental Europe, and the populations of small game vary considerably from one year to another.

Today the viability and productive capacity of game populations, except for moose, do not mainly depend on hunting, but the amount and quality of their habitats are far more decisive. Changes in the habitats resulting from changes in the land use and agriculture and forestry pose a major threat especially to the grouse and farmland game bird populations.

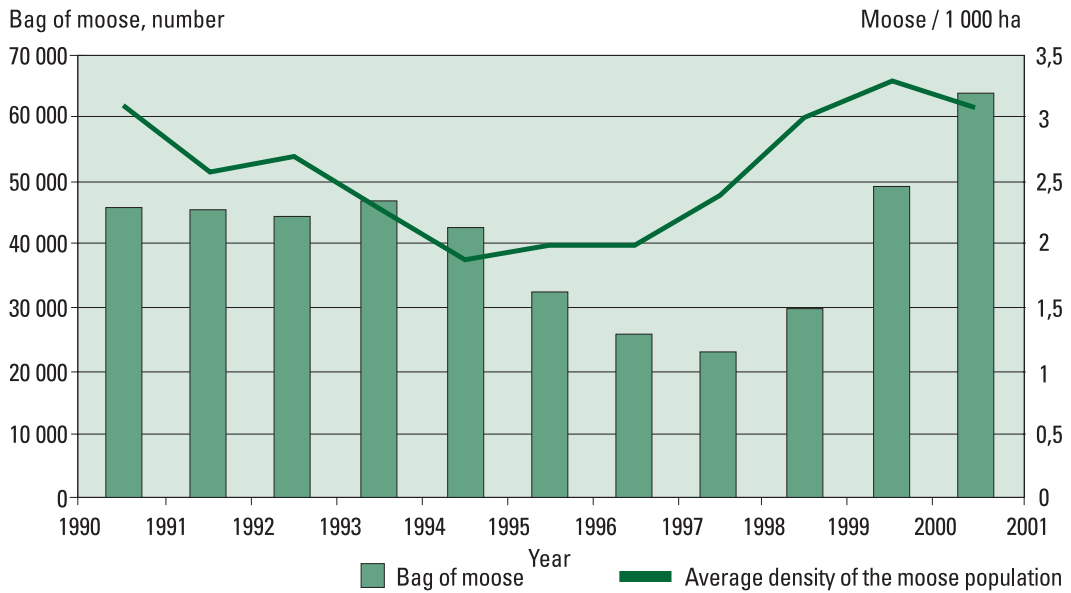
There are hardly any places left where animals can find shelter in arable land areas, and they have decreased considerably in forests as well. In forestry and agricultural practices special attention has been directed at the management of natural habitats and, in particular, the habitats of waterfowl have been restored, often in co-operation with hunting clubs. Hunters carry the main responsibility for other game management (game fields, winter-feeding). Appropriate game management can be considered the management of nature at its best, realised through an extensive network of more than 300,000 Finnish hunters.

The number of hunters has been about the same in the past two decades. The decrease in the rural population has also been reflected in game husbandry, and today an increasing share of hunters live in urban areas and the number of hunting days per year remains quite small. In 2000 one out of four hunters took a year off from hunting. The ageing of hunters is a problem, but not as serious as the age structure of the hunting clubs. All hunters, and especially the young ones, are not willing to seek the membership of hunting clubs, partly owing to outdated rules and requirements, which also affects the game management work. Hunting is mostly done for household use, as well as to get better acquainted with nature

and for recreation. For some people hunting is also an important source of additional income. Game management is an important means serving the appropriate regulation and management of the game populations. The annual value of the game meat has been on the increase in recent years. In 2000 the value of the game bag was as high as 58.7 million €. The share of moose was more than 70% of this, 42.5 million €, and waterfowl, fur bearing animals and grouse account for a little under a third.

Since 1996 the moose population has grown rapidly in all game management districts, and this has also been reflected in the bag. The moose population is strong and structurally in good condition. The densities have for the most part stayed within the limits set by the Ministry of Agriculture and Forestry. The decrease and selectivity in the hunting in the early 1990s improved the structure of the moose population, but this has also led to social problems as the damages to traffic and forests have increased.

Other common species of mammals in the game bag are arctic hare, racoon dog, European hare and mink. The abundance of the arctic hare population varies considerably, and this is reflected in the game bag statistics. The most common game birds are mallard,



**Figure 6** The annual bag of moose and average density of the moose population in 1990-2000. Source: The Finnish Game and Fisheries Research Institute 2001.

black grouse and wood pigeon. In the 1990s the trend in the abundance of grouse population was less regular than before, but in general the populations are decreasing slightly. One reason may be the decrease in the suitable habitats and fragmentation of woodland areas, as well as small predators and other factors that may increase the mortality.


Large predators such as bear and lynx are strictly protected under the Habitats Directive of the EU, but the exceptions to the directive allow their hunting in Finland subject to licence. This possibility has proven necessary due to the concentrations of predators along the eastern border, which may cause considerable damages.

The damages to fishing caused by seals have increased due to the growth in the populations by around 10% per year and changes in their behaviour. According to international censuses, in 2000 the grey seal population in the whole Baltic Sea region totalled more than 9,700, which is clearly the highest count during the 30-year history of these censuses. The real grey seal population is larger than this, because it is estimated that the census covers about 60-80% of the total number of seals. Since the hunting of seals was restricted in the 1970s and 1980s the seals have become more daring, causing more damage to fishing. In recent years licences for the hunting of seals have been granted in areas where the damages are the most serious.

**Table 3** Estimated minimum size of large predator populations according to management areas at the end of 2001.

Source: The Finnish Game and Fisheries Research Institute 2001.

Area	Brown bear	Wolf	Wolverine	Lynx
1	45	3	40	10
2	50	1	5	20
3	85	6	20	20
4	100	5	7	285
5	220	15	8	230
6	350	100	35	290
<b>Total</b>	<b>850</b>	<b>130</b>	<b>115</b>	<b>855</b>



### 3.7 Reindeer husbandry

Reindeer husbandry maintains the population in the northern rural areas and makes a significant contribution e.g. to tourism. Through reindeer husbandry the biological production processes based on nature can be utilised by humans in the northernmost parts of our country. It is of primary importance to the people living up north.



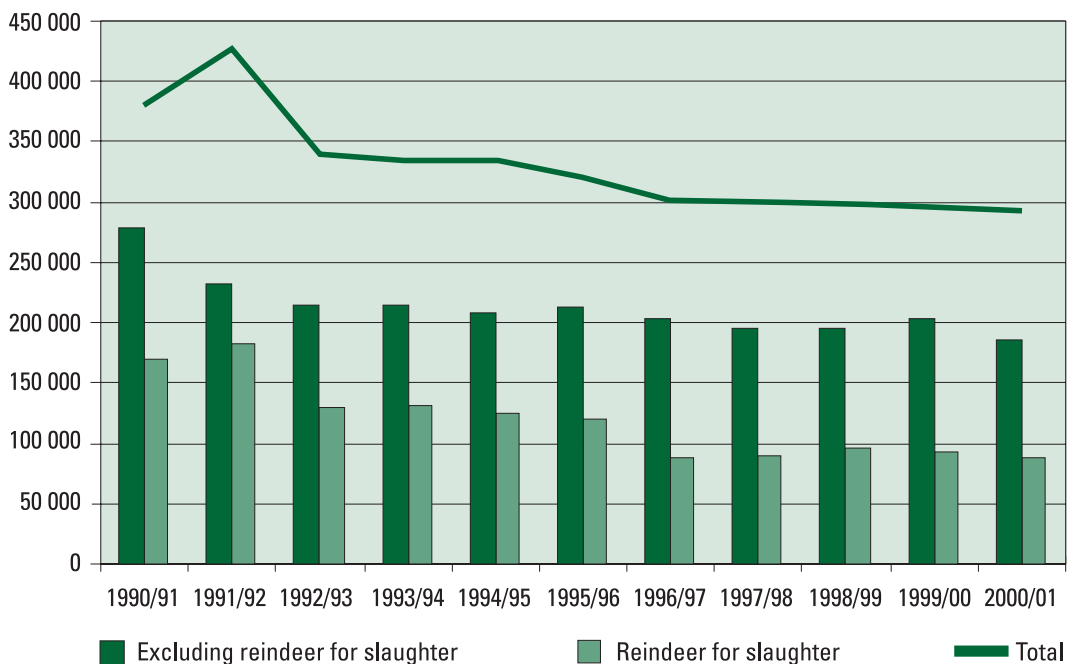
Photo: Kuvalitteri

Reindeer (*Rangifer tarancus*)

The severe natural conditions in Lapland make it impossible to practice traditional farming in the northernmost parts of Finland. The alternatives for economic activities are scarce, and reindeer husbandry has traditionally been the main source of livelihood. In the northernmost municipalities there are still a lot of people who gain a significant share of their livelihood from reindeer and other natural economy industries, which are thus highly significant for the municipal economies. Reindeer herding area covers about a third of the total surface area of Finland, and the number of reindeer owners is around 5,700. About 600 families

practice reindeer herding full-time and for about 800 families this is a part-time industry. Regional reindeer owners' associations have been set up to take care of certain duties laid down in the Reindeer Husbandry Act. In the past two-three decades reindeer husbandry has turned into a modern, professional and highly specialised industry, which has led to an increase in the unit size, and the number of reindeer has also grown.

The Ministry of Agriculture and Forestry determines the number of reindeer to be left alive after the round-ups that each reindeer owners' association is allowed to keep in its territory



**Figure 7** Total number of reindeer, number of reindeer slaughtered and number of reindeer to be left after slaughter each year in the reindeer herding years 1990-2001. Source: Federation of Reindeer Herding Associations.



as well as how many reindeer each partner to the association is allowed to own. This is largely based on the number of reindeer pasturing in the territory of each association in winter, because this may not exceed the estimated sustainable productive capacity of the winter pastures. The maximum total number of reindeer of all reindeer owners' associations has been set at 203,700 for the period 2000-2010. Earlier the allowable numbers of reindeer were often exceeded, but in recent years the reindeer stock has in certain areas remained below these. In the 1990s the average total number of reindeer (those left alive after round-ups and animals for slaughter) was estimated at about 350,000.

The Chernobyl nuclear reactor explosion and bankruptcy of the leading processing company affected the market and the demand for reindeer meat, but towards the end of the 1980s the number of reindeer was growing rapidly. Because of the growth in the reindeer stock many natural pastures were in bad condition, but efforts have been made to reduce the wear of the pastures through pasture rotation arrangements. The maximum numbers of reindeer per reindeer owners' association have been lowered to bring the reindeer stock down to a level that the winter pastures will sustain. The profitability of reindeer herding is based on the ability of the animals to find most of their feed by themselves in

winter as well. In certain areas large predators and eagles cause serious damages to reindeer husbandry, but most of these are compensated by the State.

Because of the cut in the number of reindeer the production of reindeer meat fell from 4 million to 2 million kg during the 1990s. After the peak years the number of reindeer slaughtered per year has been a little less than 100,000. This depends a great deal on the success in calving, because most of the slaughtered animals are calves.

Small-scale processing and direct sale of reindeer meat has become increasingly common in the past few years, but export is still very small. In addition to meat reindeer husbandry produces annually about 75,000 pelts and tens of thousands of kilos of antlers. When the processing, trade and transport are included, the annual value of reindeer husbandry totals about 33.6 million €. Reindeer husbandry and the related culture and traditions are highly significant for the tourist industry in Northern Finland.

### 3.8 Fisheries

*Finland possesses abundant fish resources, and certain species are not being fully utilised. The stocks are managed in a sustainable way in order to maximise the permanent pro-*



*ductivity of waters. Fishery in the sea area is governed by the common fisheries policy of the EU. Both the domestic origin and health considerations support the utilisation of the fish stocks.*

The world's fish resources are being exploited. For a long time the fish stocks grew more rapidly than the world population, but in the 1990s the annual production of fish that is fit for human consumption stopped at 70 million tonnes, i.e. about 15 kg/capita. It is estimated that by means of appropriate management and use, especially aquaculture, the value of the production can be increased at least by a third by 2010.

In Finland the large number of fishing waters provide excellent precondi-

tions for fishing. We have 61 indigenous fish species, of which about 20 are being fished, as well as one indigenous species of crayfish. Four species of fish and one species of crayfish have been naturalised in the Finnish waters.

Recreational fishing accounts for almost 90% of the catch in inland waters and well over a half of the catch at sea, when Baltic herring is excluded. Professional fishing and aquaculture produce almost 40% and recreational fishing about 30% of the fish used for human consumption, and imports account for about a third. The share of the fisheries sector in the GDP is only 0.2%, and with all the multiplier impacts in other sectors the employment effect of fishery is estimated at about 20,000 man-years.

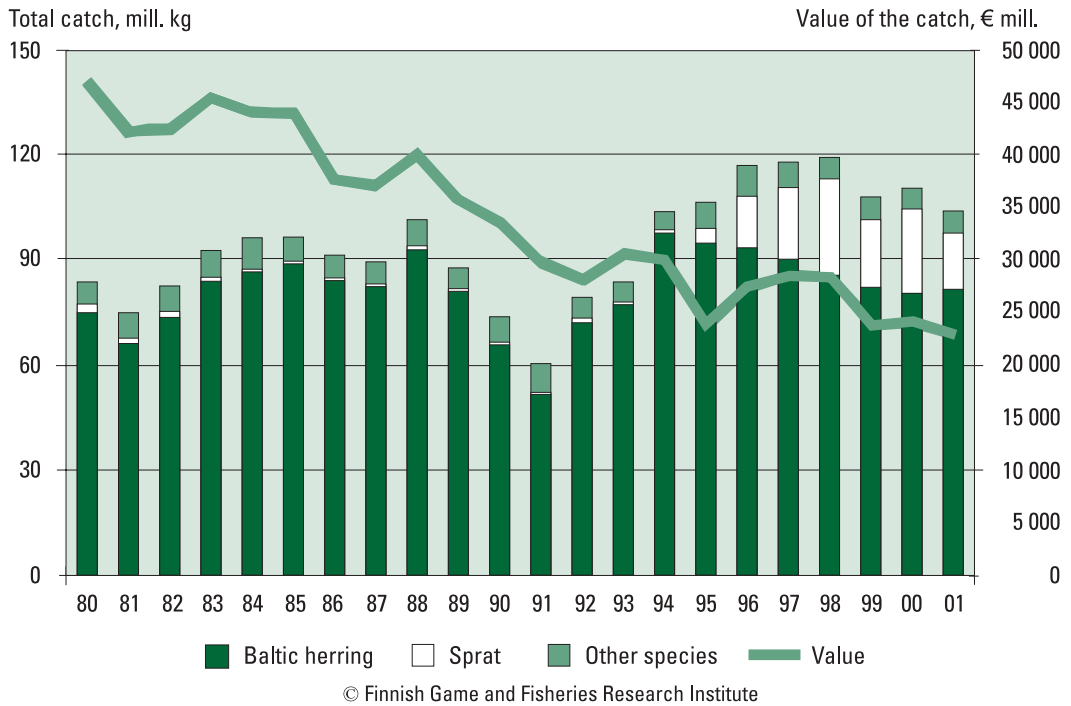
In 2000 the total catch of professional fishing at sea was 110,000 tonnes and, based on the prices paid to fishermen, the value of this was 23.5 million €. Baltic herring accounts for about 75% of the catch, and other important fish species are sprat, cod, whitefish and perch. About a third of the catch is used for human consumption and most of the remaining two-thirds is used as feed in fur farming. The development of professional fishing in the past few decades has led to a considerable reduction in the number of full-time fishermen at sea from more than 4,500 at the end of the 1980s to about 2,700 in 2000. Today about a thousand professional fishermen gained at least 30% and about 1,500 less than 15% of their income from fishing. As a result of the more efficient fishing methods, however, the total catch is about the same as before, or even higher, and the catch per each fisherman has grown.

The number of professional fishermen in inland waters is around 1,000, and less than a third of them gained at least 30% of their income from fishing. Professional fishing in inland waters is mainly based on vendace and whitefish, but pike, pikeperch and perch are also quite important. The fish resources of inland waters, especially roach, perch, smelt, bream and in certain places vendace, are clearly underused. In 1998 the catch of professional fish-

ing in inland waters totalled 4,500 tonnes and the value of this was almost 5.8 million €.

Today people are to an increasing extent trying to combine the nature, recreation and work. Most of the people live in urban areas, and they usually go to the waters near their place of residence or holiday homes to experience the nature e.g. through fishing. Fishing is the most important recreational activity based on the nature: about 2.1 million Finns, i.e. 40% of the total population, enjoy fishing in their free time.

Based on the catch, the most significant species for recreational fishing are perch, pike and roach, which account for two-thirds of the total catch. In 1998 this was 48 million kg, and in recent years it has varied between 40 and 70 kg. The catch consists mainly of natural or naturally reproducing species, but there are also some species that are maintained by means of planting, such as whitefish and various trout. About 66% of the catch of recreational fishing come from inland waters. According to the prices paid to fishermen, the value of the catch of recreational fishing was 53.8 million € in 1998, and it accounts for 90% of the catch from inland waters. Already in 1996 the Finns spent 0.27 billion € on recreational fishing. Recreational fishing is also important for the financing of the fisheries sector.



**Figure 8** Catch of professional fishing at sea and real value of the catch in 1980-2000.

Source: Finnish Game and Fisheries Research Institute 2001.

Of the activities in the fisheries sector, aquaculture grew the most rapidly in the 1970s and 1980s. Small fish farms producing fish for human consumption were set up in different parts of Finland, but most of the production still comes from the coastal area of South-west Finland. The number of fish farming units operating in Finland is a little over 600. The annual production of fish for human consumption has fallen from the peak level of 19 million kg in 1991 to 15-16 kg, and the value of this is about 48.7 million €. There is also extensive and diversified production of fish for stocking in Finland and the production of young fish covers the commercial and protected species

quite well. In recent decades the stocking of fish into the Finnish waters has increased considerably.

The profitability of aquaculture weakened during the 1990s as a result of the changes in the taxation, fall in the rainbow trout prices and EU membership. Obstacles to trade were removed, which increased the imports of Norwegian farmed salmon. The positive development of Finnish aquaculture depends on the introduction of species other than rainbow trout into commercial production.

Professional fishing at sea is also undergoing a transition process, which

started when Finland joined the EU. The number of fishermen is on the decrease and efforts are being made to improve the profitability of fishing. Entrepreneurial activities based on fish, including tourism and aquaculture, will continue to be highly significant in terms of the diversity of economic activities in the rural areas.

The rapid growth in aquaculture also increased the load on waters until the end of the 1980s, but all through the 1990s the loading was on the decrease. The share of aquaculture in the total phosphorus load on Finnish waters is estimated at only 3%, but locally it may still be a very significant source of loading. The load could be further reduced by improving the ability of farmed fish to utilise feed through breeding as well as by developing the feeding stuffs and feeding techniques. The objectives to reduce the loading are mainly directed at the net reservoirs in the coastal area of Southwest Finland.

Of the 35 salmon rivers flowing into the Baltic Sea there is indigenous natural salmon production only in the river Tornionjoki- the river Muonionjoki watercourse area and the river Simojoki. The spawning populations of rivers discharging into the Baltic Sea have decreased because of the construction of dams, other changes in the river environments and intensive fishing. In the 1990s the so-called M74 phenomenon

which caused exceptional mortality (up to 70-90%) among the young of the salmon migrating to the Baltic Sea became a serious threat to the natural stocks. Natural reproduction of Atlantic salmon is now very weak and the stock is mainly dependent on planting. Salmon stocks are also threatened by the spread of the *Gyrodactylus salaris* parasite to the rivers discharging into the Arctic Ocean. The stocking of salmon is based on the performance targets the Ministry of Agriculture and Forestry has set for the Finnish Game and Fisheries Research Institute and stocking licences issued by the Finnish Swedish Frontier River Commission of the river Tornionjoki- the river Muonionjoki watercourse area. The stocking of salmon is also regulated by the Salmon Action Plan (SAP) launched by the International Baltic Sea Fishery Commission (IBSFC). The programme aims at reinforcing the current natural salmon stock and naturalising salmon stocks into rivers where natural reproduction is still possible. The recovery of the natural salmon stocks has also been promoted quite successfully through national restrictions on fishing.

### 3.9 Water resources management

*Finland possesses abundant, high-quality water resources. The use and management of waters is based on their quantitative and ecological state, diversified use and needs of the future generations.*



Water is a vital renewable natural resource. The total surface area of Finnish inland waters is about 33,500 square kilometres; i.e. they cover about 10% of the area of Finland. There are almost 200,000 lakes and ponds measuring more than 0.5 ha, about 56,000 lakes of more than 1 ha, and the number of lakes with a surface area of more than 1 kilometre is also more than 2,500. Most of the Finnish lakes are very shallow, and the average depth is only about 7 metres. With respect to the water supply, however, the water flow through lakes and rivers is abundant, about 300 million cubic metres per day.

Groundwater is also very important in terms of the water supply. The in-

ventories include more than 7,100 groundwater areas, and 2,220 of these are important water supplies. The average of 6 million cubic metres per day are added to the total groundwater resources in the sand and gravel formations in Finland.

About 80% of the total area of Finnish lakes are classified as good or excellent in terms of their usability, and there are serious problems in the quality of water of only 4% of the lake area. In most cases the deterioration in the status of the lakes can be seen as an increase in the blooming of algae or slight sliming of the shores.

Groundwater quality is in general quite good, and in most areas it is

clearly better than the quality of surface waters. However, there have been few isolated cases where the contamination of groundwater has led to serious problems and it has been necessary to restrict the use of groundwater.

In recent years water consumption in households and industry has decreased as a result of the introduction of water-saving technologies, water and wastewater charges, subsidies and advice and renovation of water pipes. Total consumption is estimated at 1 million cubic metres per day, and the share of groundwater is around 0.6 million cubic metres.

The availability of high-quality household water is vital for both settlement and economic activities. Water consumption per customer has decreased, and in the past few years the water consumption at the community level has stayed about the same or fallen slightly. In 1999 waterworks supplied about 240 litres of water per capita a day of which 41% was abstracted from surface waters and 59% from groundwater and artificial groundwater. The share of groundwater is estimated to increase to about 70% by 2010. At the end of 1999 almost 4.6 million Finns, i.e. 89% of the total population, were connected to waterworks, and almost 4.1 million people, or 80 %, were connected to sewerage systems.

In 1999 most of the wastewater of communities connected to sewerage systems was treated biochemically (91%), while a lesser share (9%) was treated chemically. Based on the EU directive concerning community wastewaters, all of these should be treated biochemically by 2005. In 1999 the wastewater plants removed more than 93% of the phosphorus and 44% of the nitrogen contained in community wastewaters.

The ageing of water supply plants and networks and water constructions increases the risks involved in their use. In order to minimise the risks in the water services of communities, the number of water supplies as well as co-operation between the networks and plants should be increased. The water plants are to an increasing extent turning into business enterprises and the size of the plants is also growing. Water supply technology, including the water treatment methods, and automation are developing rapidly, while new investments in community water supply will continue at about the current level. The role of EU funding is becoming increasingly important in supporting the water services in sparsely populated rural areas.

The growth of the population centres increases the need for community water services. The increase in the number of holiday homes and leisure activities sets new challenges for the

development of water services in the rural areas. New projects will be focused in areas where the preconditions for maintaining the population and services, economic activities, tourism and recreational activities exist.

The property value of investments serving the use of the Finnish water resources, including constructions for improving the infrastructure of waterways and reduce flood damages and organisation of water services, has been estimated at more than 25.2 billion €. Appropriate maintenance, use and management of this property secure the conditions for sustainable and diverse utilisation of water resources and support the development of basic services and economic and recreational activities in sparsely populated areas and communities.

Research and modern technologies improve the possibilities for the use and management of water resources. Support systems and models for the observation, communication and decision-making are being applied, among other things, in the use of regulated waters and preparing for floods and risks related to dams.

The EU Water Framework Directive that lays the foundations for water protection in the Member States entered into force in December 2000. The directive demands certain changes in the monitoring of water quality

and introduces new practices aimed at achieving the objectives set for water protection. The primary objective of the directive is to reach a good ecological and chemical status of surface waters and a good qualitative and chemical status of groundwater within 15 years from the entry into force of the directive.

### *World's water resources*

Water issues are becoming increasingly significant on the global scale due to both the increased need for water and food for the growing population and damages caused by floods and droughts. The strong expertise in this sector provides excellent opportunities for Finland to take active part in solving the problems relating to the utilisation of natural resources.

Pure, fresh water is one of the most endangered natural resources in the world. The total water resources are abundant, but only 3% of these is freshwater, which is vital for maintaining life on earth. Of the freshwater only 0.3% is in the atmosphere, soil lakes and rivers, i.e. available to living organisms, and the water resources are also very unevenly distributed. The amount of water is the smallest in regions with the largest population where the birth rate is high. It has been estimated that by 2025 more than 60 states and half of the world's population are going to



suffer from lack of water. The contamination of waters is another global problem. The UN estimates that by 2000 25% of the freshwater was contaminated to the extent that it constitutes a health risk.

In most parts of the world water is the most important factor in terms of improving the productivity of agriculture. At present agriculture uses about 80% of all freshwater, around 30% of the cultivated area is irrigated, producing 80% of the yield. The growth in food production calls for cultivation methods that improve the efficiency in the use of water.

### 3.10 Biodiversity and landscape

*In addition to the use of natural resources, the sectors subject to the Ministry of Agriculture and Forestry are also concerned with the protection of biodiversity. Efforts are being made to take the protection of species and habitats into account as far as possible in all activities in these sectors. The genetic base of local breeds and varieties that have adapted to the Finnish conditions is protected. Rural cultural landscapes are managed so that they stay beautiful and attractive and offer habitats for living organisms.*



Photo: Risto Sauso

*Finnhorse*

Biodiversity refers to the number and variety in the number of habitats and species, as well as genetic diversity within the species. On the global scale the decrease in biodiversity is considered one of the most serious environmental problems.

Finland has about 43,000 species of animals and plants, and there is adequate data for the monitoring of the endangerment status on about 15,000 species. Based on the most recent survey of endangered species published in 2000, 1,505 of these, or about 10%, are endangered. 28% of the endangered species (421) live mainly in cultural habitats that are dependent on human action, and 37.5% of the endangered species live in forests. The forest conservation measures and programmes as well as forest planning provide excellent tools for the development of the protection and management of endangered forest species.

One important aspect of biodiversity is *genetic diversity*, which refers to diversity within the populations of a single species and transmitted genetically between them. The other levels of biodiversity are the *populations* and *communities* of species as well as whole *ecosystems*.

### *Genetic diversity*

The plant genetic resources lay the foundations for agriculture, horticul-

ture and forestry as well as the whole food sector and forest industry based on these. These genetic resources must be protected, maintained and used in a sustainable way to make sure that they are preserved for the future needs as well. Biodiversity connected to agriculture is protected by preserving and managing plant species that occur typically in farming environments and biodiversity within the species. This includes the cultivation of local land races and varieties and protection of their genetic material in gene banks.

Production animals of local breeds and their genetic base are also protected. Genetic diversity of domestic animals is preserved by raising distinct, genetically diverse breeds, as well as through embryo and sperm banks. Genetic diversity makes it possible to continue the breeding of domestic animals to adapt these to the changing production and environmental conditions.

Genetic diversity in virgin forests has been protected by establishing conservation areas, and registered seed collection forests and seed plantations contribute to the preservation of the genetic resources. Genetic reserve forests have been established since 1992 to ensure the genetic variety of forest trees. These may be regenerated either naturally or by means of seeds or seedlings

coming from the same forest. In 2000 the total area of the genetic reserve forests was 7,031 ha.

### *Diversity of populations*

The diversity of populations depends on the properties of a group of living organisms of the same species which breed with each other, as well as the interaction between such groups. The diversity on the level of population is influenced by the variation in the genetic factors between the individuals of the same species. Decrease in biodiversity has been observed in the breeding lines used in animal husbandry.

### *Diversity of communities and ecosystems*

Populations constitute communities of living organisms, and these together with the inanimate environmental factors build up whole ecosystems. The preservation of biodiversity requires long-term efforts in the management of different kinds of natural habitats. Farming and forestry environments are important habitats for the majority of plant and animal species in Finland. Thus changes in agriculture and farming practices as well as management of forests and harvesting influence both the visible landscape and the occurrence of wild living organisms that are dependent on agriculture and forestry. In terms of biodiversity, semi-natural environ-

ments, such as marginal zones between forests and arable land, are particularly important, and various kinds of agricultural and forestry measures may be used to ensure their preservation and maintenance.

Forestry measures also influence the populations of many game species (e.g. grouse). Fisheries suffer both directly and indirectly from changes in their habitats (construction, contamination, selective fishing, unplanned stocking).

### *Management of biodiversity*

The maintenance and development of biodiversity has been taken into account in the programmes for agriculture and forestry during the 1990s (environmental programmes for the rural areas and forestry, Agri-Environmental Programme 1995-1999, Agri-Environmental Scheme 2000-2006 and National Forest Programme 2010), as well as in the legislation (Forest Act, Hunting Act, Fishing Act) and guidance and advisory services relating to the use of natural resources. The objectives of the revised forest treatment instructions and recommendations include, apart from securing wood production, the preservation of the viability and diversity of forests and taking account of the need for their multiple use. The purpose of the Habitats and Birds Directives of the EU is to promote the

preservation of biodiversity in the Member States.

Agriculture has always influenced the Finnish rural landscape in a significant way. Many industries that now have become a threat to many species classified as endangered or vulnerable used to increase biodiversity. Forest environments have been shaped by slash-and-burn cultivation, tar burning and use of wood in households. Clearing of arable land has expanded the habitats of many species and created habitats for new ones. Grazing of domestic animals has created meadows, with special flora and fauna of their own. As the traditional farming methods have given way, many of the ecosystems shaped by human action have returned to their natural state, and the species that used to benefit from these have become less common. Increased specialisation of farms has also reduced the number of plant and animal species used in agricultural production.

### *Landscape*

Environments and landscapes shaped by traditional land use have special cultural value. Cultural landscapes created by rural industries, including the waters, farmland, pastures, buildings and villages, constitute a highly significant aspect of the Finnish landscape.

The area of traditional biotopes shaped by agriculture is estimated at about 20,000 ha. The decrease in grazing has reduced this type of landscapes considerably. In addition to the management of biodiversity, increased grazing would have positive impacts on the landscapes and preservation of semi-natural habitats. One objective of agri-environmental support is to protect the cultural landscapes related to agriculture and take care of the biodiversity in farming regions, and the number of special support contracts concerning these is expected to increase in the next few years.

The Finns utilise nature in a number of ways during their free time. Forests, which cover about three-quarters of the surface area of Finland, are particularly important in this respect. Forests constitute the core of a typical Finnish landscape, and today landscape values and conservation of forest landscapes is fully accounted for in silviculture.

### *Alien species*

The immigration of new species poses a potential threat to biodiversity and natural ecosystems and species, especially if the species concerned is capable of reproducing in the Finnish conditions. Alien species have been introduced to Finland through planting or stocking (e.g. muskrat, white-

tailed deer, North American beaver, various species of fish) or unintentionally (e.g. transported with seeds of cultivated plants). Many pests also belong to the immigrant species. The problems involved may be considerable, particularly in the case of species that are difficult to notice, which makes it difficult to prevent their entry to the country (insects, microbes, fungi, spores).

During the past century at least 13 species of fish have been introduced to Finland for naturalisation, and many species have also been supplemented by stocking and crossbreeding. None of the imported fish species or population are known to have caused any obvious problems in Finland. Globally there are many examples of negative impacts due to transplanting of fish, such as the spread of the *Gyrodactylus salaris* parasite to the Norwegian salmon rivers as a result of the planting of a foreign salmon stock.

The import or release to the nature of foreign species of birds and mammals, including game species, without a permission from the Ministry of Agriculture and Forestry is prohibited. A plant species that has no permanent indigenous population in Finland may not be planted to the yard, outside arable or constructed area or natural waters. This does not concern the planting or seeding of trees for forestry purposes.

The populations of immigrant game species (e.g. Canada goose, white-tailed deer, fallow deer, mouflon, muskrat, mink and North American beaver) are regulated through hunting. These species were transplanted to Finland a long time ago, and they have become fully naturalised. Transplanting projects concerning new game species are not accepted, and no licences have been granted for the import and release to the nature of individuals representing foreign stocks. Efforts are being made to destroy the North American beaver in Lapland and to prevent its spread to the habitats of the European beaver in the other parts of Finland. The management of the populations of immigrant species must be carefully planned, and the species may not be allowed to spread to new territories.

### 3.11 Biotechnology and genetically modified organisms

*The development and use of biotechnology and genetic engineering in agriculture and food production is one important new opportunity for enhancing the operating conditions of agriculture and the whole food sector. They increase the durability and productivity of cultivated crops and production animals, improve the quality and healthiness of the products and reduce the environmental strain. However, in the research and development work as well as use of geneti-*

*cally modified organisms serious attention must also be directed at the potential risks involved.*

Biotechnology is based on the ability to use microbes and cells of multicellular organisms and metabolic products derived from these in production. Biotechnology, especially genetic engineering, is considered one of the key technologies in the near future. It is being widely used in the medicine and biochemical industries, but increased efforts are also being made in the research and development in the agricultural and food sector.

Genetic engineering makes it possible to strive for more specific breeding objectives more rapidly than through traditional breeding methods. Genetic engineering makes it possible to produce the desired proteins (enzymes or care proteins) in micro-organisms or cell cultures and allows highly accurate modification of their structure.

In agriculture genetic engineering can be used to increase the productivity of plants and animals and their resistance to diseases and environmental strain (drought, cold, saltiness, etc.) and to improve the utilisation of nutrients and quality characteristics of the products. At present genetically modified organisms are used more extensively in the world's agriculture in plant production (e.g. cotton, maize, soya, rape). Genetic engineer-

ing may improve the quantity of usable crop, and in the first stage especially cultivated plants that are resistant to virus diseases have proven important in terms of the food security of developing countries.

According to the EU legislation concerning genetic engineering, genetically modified organisms must go through a detailed approval procedure, where their health and environmental impacts are assessed case by case. By means of risk assessment and control and in accordance with the precautionary principle particularly efforts are made to ensure that the production chains of genetically modified products are safe for humans, production animals and the environment. The Member States must make sure that all the necessary measures, such as the environmental impact assessment, are conducted prior to any intentional dissemination or marketing of genetically modified organisms in order to prevent the possible negative impacts on human health and the environment. In Finland genetically modified plants are not yet being cultivated, but licences have been granted for laboratory and field tests on these.

### 3.12 Climate change

*Climate change is one of the major global challenges for sustainable development. In Finland climate change*



Photo: Mattias Tolvanen

*is estimated to have both negative and positive long-term impacts in terms of the sustainable use of natural resources. Concerns related to climate change have to be addressed through an integrated approach of adaptation and mitigation. Various measures in agriculture and forestry need to be addressed, for example, by reducing greenhouse gas emissions as well as through carbon sinks, i.e. binding of carbon into plants, mainly trees, and the soil.*

#### *Impacts of climate change and adaptation*

The anticipated increase in the average temperature of the earth due to the increased greenhouse gas content would lead to significant changes in the sustainable use of natural resources. In the Finnish Research Pro-

gramme on Climate Change (SILMU) the annual average temperature in Finland is estimated to rise 1.5-4.5 degrees between 1990 and 2100. According to the most recent international research results and estimates presented by the Intergovernmental Panel on Climate Change (IPCC), the temperatures may rise even more, by 1.4-5.8 degrees centigrade in the next one hundred years. Precipitation in winter would probably increase, but it is not yet certain whether precipitation would also increase in summer.

The assessment of the changes in climatic conditions involves a great deal of uncertainty. In most estimates it is assumed that the impact of the Gulf Stream, which is highly important for the climate in Northern Eu-

rope, would not be weakened in any essential way.

In Finland climate change can be expected to have both positive and negative impacts. The warming of the climate would expand the range of plants and animals towards the north, and the effect might be quite dramatic in the border areas of their current ranges.

In agriculture the longer growing period would make it possible to cultivate more productive varieties, and even to introduce completely new crops. The risks in the wintering of cereals would diminish, but the occurrence of pests and plant diseases would increase. Despite the increased evaporation, the likely increase in precipitation would call for additional efforts in taking care of the soil structure and drainage of land. There would be less frost in the ground, whose tilling effect is very important for certain soil types. The cultivation of clay soil might become more difficult, and the only option could be the cultivation of grasses or some new crops. In general the hectare yields would grow, and the average quality would also improve. Warming would improve the profitability of livestock production as the yields of the feed crops would grow, pasture season would be longer, the need to store feed for winter would be smaller, and animal could be raised in lighter shelters than at present.

In forestry the rotation period of trees is long considering the adaptation to the climate change, but according to the current view, warming within the adjusting capacity of trees as well as increase in carbon dioxide content would seem to lead to increased growth of forests. The soil and especially peatland are important carbon reservoirs. The risk of insects and possibly also fungus diseases would increase, and the state of health of the tree stand would become an increasingly important objective in forest management. On the whole the forest environments would become more like the forests in the south and, in particular, deciduous trees would benefit from the warmer climate. Climate change modifies the living conditions of the micro-organisms in the soil, which may affect the functioning of whole forest ecosystems. It may also have considerable impacts on biodiversity, for example, the survival of willow grouse and naturalisation of arctic geese in Finland. Within the next century the share of birch could rise up to 60% of the volume of the growing stock in most parts of Southern and Central Finland, and in some places it could be as high as 80%. However, this will not happen without conscious efforts to favour birch in forest management. The more rapid growth of the stand would make it possible to shorten the rotation periods, and more intensive thinning measures would be needed.



The variation in the quantity of surface waters and groundwater may increase if the climate conditions become more extreme. Higher precipitation alone, which is expected to occur mainly in winter, would increase the variation in water volumes. The possible impacts on waters include increased flow, deterioration in the water quality due to increased leaching, and shortening of the period during which the waters are covered with ice.

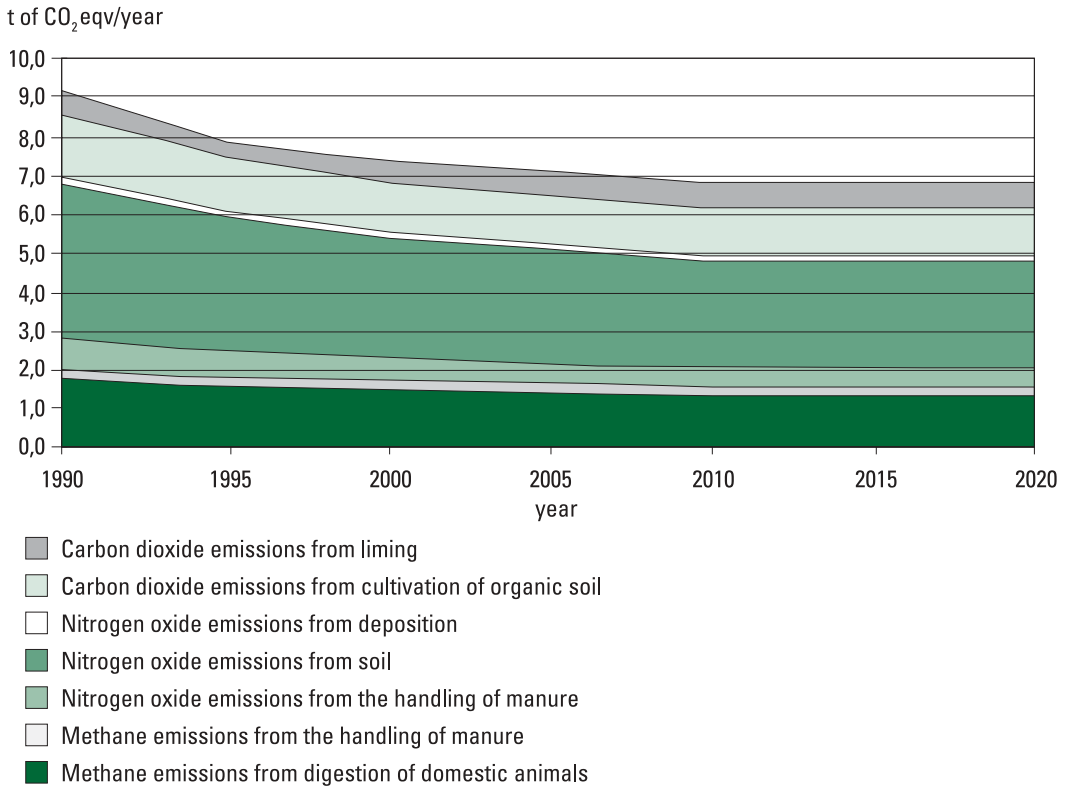
The climate change may not have any major impacts before 2010, but more attention should be directed at exceptional hydrological conditions. Investments in water supply and use of waters are both costly and long-lived, and thus the preparations should be started for the possible extreme conditions and increase in both floods and droughts. More information is needed on the impacts of climate change on exceptional hydrological conditions, requirements for dam safety and preventing flood damages.

The warming of shallow inland waters may change the relative shares of fish species, and the risk of fish diseases would also increase. The expected change would improve the conditions of fish that thrive in warm waters, while the number of salmon, which prefer colder waters, and their role in the catch would diminish.

### *Trends in greenhouse gas balances in agriculture and forestry and climate change mitigation*

In 1990 the greenhouse gas emissions in Finland totalled 77 million tonnes of carbon dioxide equivalent, and the share of agriculture was 10.2 million tonnes. The most important greenhouse gases originating from agriculture are carbon dioxide, methane and nitrogen oxide. In the 1990s the total emission quantities reported by Finland varied between 71 and 80 million tonnes of carbon dioxide equivalent. The greenhouse gas emissions from agriculture had fallen to 7.6 million tonnes of carbon dioxide by 1999 as a result of structural changes in agriculture and through various measures. By 2010 the emissions from agriculture are estimated to stay at the level of about 7 million tonnes of carbon dioxide equivalent per year.

Finnish forests sequester more carbon than they release which means that forests function as a net carbon sink. As a result of the land use and forestry measures the net sink calculated on the basis of a annual increment and drain varied between 9.7 and 38.2 million tonnes of carbon dioxide equivalent. In 1999 the increment was 101.3 million and the drain 90.5 million tonnes of carbon dioxide equivalent and, thus, the net sink was 10.8 million tonnes of car-



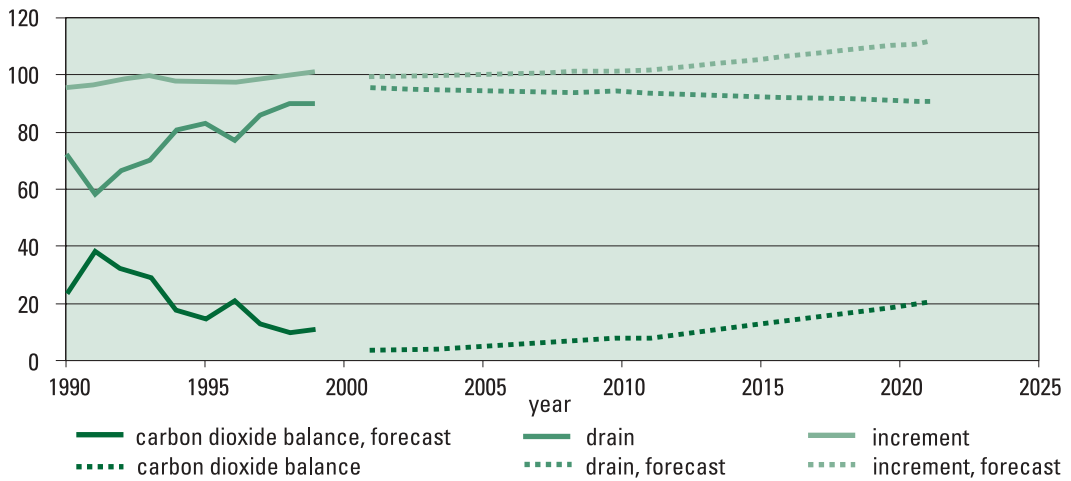
**Figure 9** Greenhouse gas emissions in 1990-1999 and estimated trend until 2020. The estimated emissions do not include the impacts of changes in land use and treatment on carbon dioxide emissions from mineral soil or emissions from energy consumption.

Source: Work group report of the Ministry of Agriculture and Forestry 2001:2. Estimated development in agriculture for the national climate programme. Helsinki 2001

bon dioxide equivalent. In the National Forest Programme the total roundwood production in 2010 is estimated at 63-68 million cubic metres, which would lead to a net sink

of 3-10 million tonnes of carbon dioxide equivalent. By means of appropriate forest management the net sink of forests can be considerably increased by 2020.

Mill. tn CO<sub>2</sub> eqv.



**Figure 10** Carbon dioxide balance of forests in 1990-1999 and estimate until 2020.

Source: Finnish Forest Research Institute and the Third National Communication of Finland to the Secretariat of the Climate Change Convention 2001

## 4 Most important strategies and programmes concerning the use of natural resources



Photo: Vesa Greis

Lingonberry (*Vaccinium vitis-idaea*)

### 4.1 National strategies and programmes

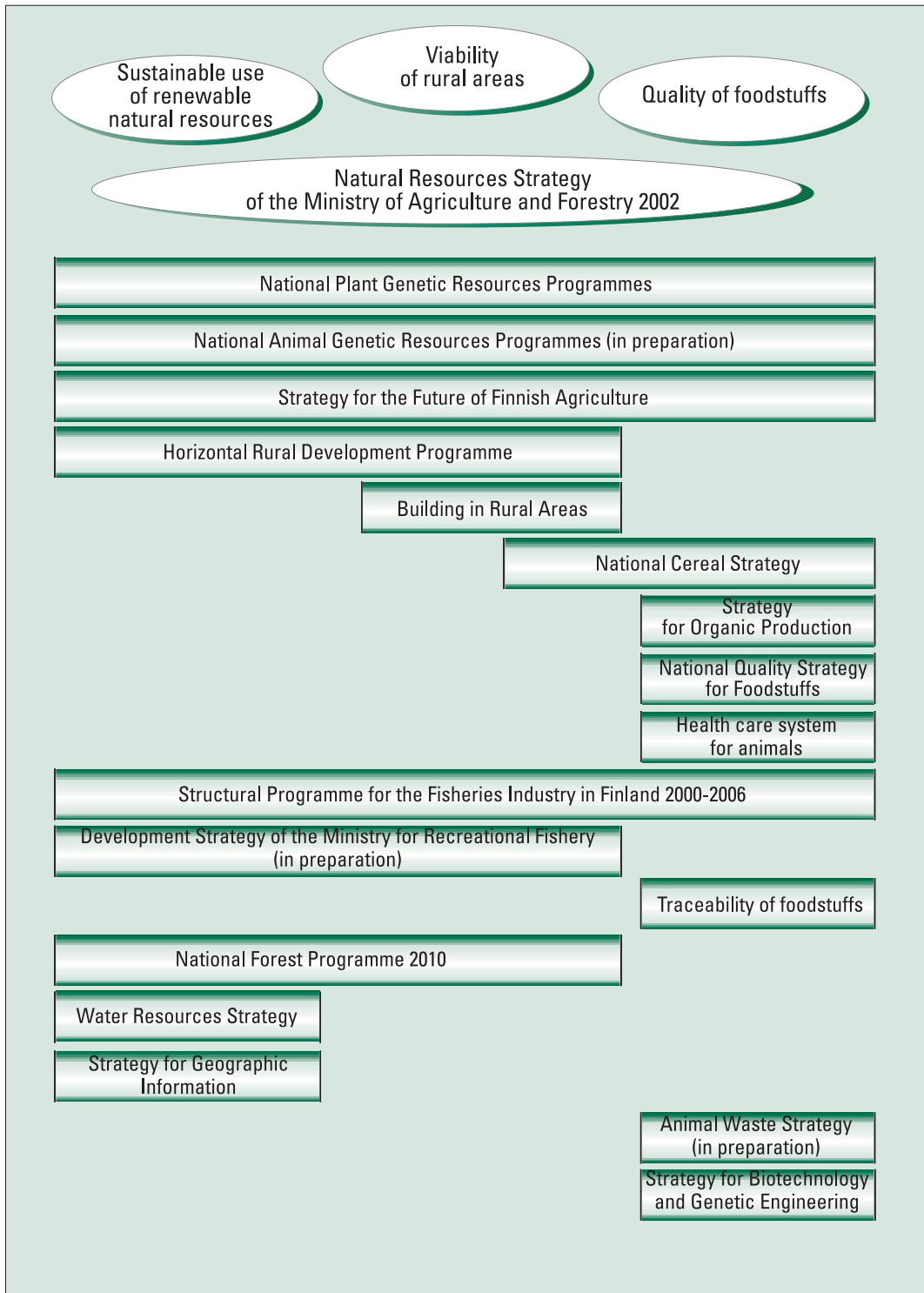
The Ministry of Agriculture and Forestry has drawn up a large number of strategies and programmes concerning the different sectors, many of these in broad co-operation between different administrative sectors and interest groups. The strategies and programmes are implemented through

the guidance and planning at the Ministry, and many of them have been ratified by a Government decision.

The figure 11 presents some of the most important national strategies and programmes as well as strategies of the Ministry of Agriculture and Forestry.

### 4.2 International commitments and EU strategies and programmes

Finland has ratified a number of international environmental and other agreements and is committed to several international obligations and programmes. The obligations concerning nations are in most cases formulated in a quite broad and flexible way, i.e. the main function of the international obligations is to provide the framework for more detailed national rules, regulations and programmes. In Finland the international agreements are usually implemented by Parliament decisions. The figure 12 lists the most important agreements concerning the use and management of renewable natural resources in Finland



*Figure 11 The strategy portfolio of the Ministry of Agriculture and Forestry from the perspective of the Natural Resources Strategy.*

	Global	European Union	Finland
1990	<p>Helsinki Convention (1992)</p> <p>Agenda 21, Forest Principles, Rio Declaration (1992)</p> <p>Convention on Biological Diversity (1993)</p> <p>UN Framework Convention on Climate Change (1994)</p>		<p>Environmental Programme for Rural Areas (1992)</p> <p>Environmental Programme for Forestry (1994)</p> <p>National Action Programme on Biological Diversity (1995)</p>
1995	<p>Convention to Combat Desertification (1996)</p> <p>International Tropical Timber Agreement ITTA (1997)</p>	<p>EU Forest Strategy (1998)</p> <p>Community Strategy on Biological Diversity (1998)</p> <p>Agenda 2000 (1999)</p> <p>EU Framework Directive on Water (2000)</p>	<p>Agri-Environmental Programme 1995-1999 (1996)</p> <p>Natural Resources Strategy (1997)</p> <p>Salmon Action Plan (1997)</p> <p>Government Programme for Sustainable Development (1998)</p> <p>National Forest Programme 2010 (1999)</p> <p>Programme for Promoting Renewable Energy Sources (1999)</p> <p>Horizontal Rural Development Programme (2000)</p>
2000	<p>World Summit on Sustainable Development (WSSD) Johannesburg (2002)</p>	<p>EU Strategy for Sustainable Development (2001)</p> <p>6<sup>th</sup> Environmental Programme of the EU</p>	<p>Finnish Baltic Sea Protection Programme (2001)</p> <p>National Climate Strategy (2001)</p> <p>Natural Resources Strategy (2002)</p>

*Figure 12 Most relevant strategies and agreements concerning sustainable development.*

## 5 Future challenges and opportunities

Since 1997, when the first strategy for Natural Resources was prepared considerable international and national expectations as well as new demands are being directed at the natural resources policy of the Ministry of Agriculture and Forestry. The assessment of new and future challenges and opportunities laid down the foundation for the strategic process.

### *Challenges*

- The urbanisation of the Finnish society continues, increasing the distance between the citizens and nature and natural resources.
- In many rural regions the permanent settlement is decreasing rapidly and the position of agriculture as the basis for economic activity is weakening, calling for particular employment measures through e.g. other entrepreneurial activities and active environmental management measures.
- The enlargement of the European Union and upcoming round of trade negotiations may lead to changes in agricultural support.
- EU legislation imposes new requirements concerning the use and recycling of natural resources.
- Number of farms is falling, the size of the production units is on the increase, and more emphasis must be given to maintaining the profitability of agriculture in order to secure the availability of domestic foodstuffs.
- Large production units may reduce the diversity of cultivation systems.
- Distribution of the production between small and large units calls for better recognition of the relationship between these in the policies concerning e.g. agriculture, reindeer husbandry and forests.
- Afforestation of abandoned arable areas is changing the rural landscape in Northern and Eastern Finland.
- Challenges to reindeer husbandry include regulation of the stock, securing sustainable use of reindeer pastures and development of the structure of reindeer husbandry so that its profitability can be ensured.
- Increased additional feeding and farming of reindeer may weaken the value and image of reindeer meat as a foodstuff derived from wild game.

- More detailed requirements for the conservation of the biodiversity in forestry are being directed at appropriate management of forest species and various kinds of habitats, such as ridges, groves and backwoods.
- Forest industry and trade in roundwood has become globalised.
- Activity of forest associations is on the decrease as a growing share of forest owners and hunters live in urban areas, which reduces their familiarity with nature and makes it more difficult for them to participate in the management of forests and game populations.
- EU provisions concerning nature and environmental protection may restrict the current, traditional use of natural resources and have a negative impact on the attitudes of the local population.
- Fish imports weaken the position of domestic fish on the market as it reduces the price of the domestic fish, both farmed and wild, and reduces their supply.
- Preserving the productivity and diversity of fish stocks and their habitats and improvement of their productive capacity.

- Ensuring high level of water supply services, maintaining the high quality of water resources and status of waters, securing possibilities for diversified use of waters.
- Preparing for exceptional conditions and improving the security in water supply and other use of waters.
- Recognition of the research and development needs due to the changing operating environment.

#### *Opportunities identified*

- Innovative technologies and other development work based on solid research data are more closely linked to the sustainable use of renewable natural resources.
- Increased emphasis on emission-free production or lower emissions and production of bioenergy in national industries, especially energy production after the adoption of the Kyoto Protocol.
- Information systems produce larger amounts of accurate monitoring data on the use of natural resources and effectiveness of measures concerning their sustainable use.
- The most important demand directed at the rural areas in the



Finnish society is that agriculture produces pure products in an environmentally-friendly and ethical way.

- Rural areas offer the opportunity for improving the quality of life as residential environments and places for leisure activities and recreation.
- Demands concerning the domestic origin of food and interest in e.g. local foods receive more and more emphasis.
- The large share of domestic feeding stuffs helps to prevent animal diseases and improves the profitability of farms.
- Appreciation of reindeer meat as a pure game product increases the value of the meat and contributes to maintaining the livelihood of reindeer owners.
- Tourism and other industries provide new sources of livelihood to reindeer herders.
- High expertise and natural conditions make it possible to practise forestry in a sustainable way.
- Hunting and game management based on high-level research secures a good status of game populations.
- Damages due to game animals can be reduced and prevented through hunting.
- Higher efficiency makes it possible to keep the catch of professional fishing at the current level even if the number of fishermen is on the decrease.
- Emphasis on the domestic origin of fish and health considerations promotes the use of domestic fish.
- The quality and selection of fish products is developed.
- Possibilities for recreational fishing are secured.
- Aquaculture production and the range of species can be increased without increasing the load on waters.
- Sustainable use of water resources contributes to the preservation and improvement of the good status of waters and water quality.

## Part III Natural Resources Strategy

### 6 Strategy for the sustainable use of renewable natural resources

#### 6.1 Guiding principle and vision until 2010



Photo: Ilkka Toivonen

#### *Guiding principle of the Ministry of Agriculture and Forestry*

The guiding principle of the Ministry of Agriculture and Forestry is stated as follows:

*The Ministry of Agriculture and Forestry creates the conditions for sustainable and diversified use of renewable natural resources, development of economic and leisure-time activities in rural areas, as well as ensures the high quality of foodstuffs and health of plants and animals.*

All the duties mentioned in the guiding principle relate to the use of renewable natural resources. Sustainable use comprises the ecological, economic, social and cultural components, where the ecological sustainability lays the foundation for the realisation of the other components.

#### *Vision for the future - Sustainable use of natural resources*

- The Ministry of Agriculture and Forestry is both nationally and internationally a widely recognised body in the promotion and steer-

ing of the sustainable use of renewable natural resources, viability of rural areas and quality of foodstuffs.

- The development of the Finnish economy is still essentially based on the use of renewable natural resources.
- Economic and cultural development ensures the sustainable use of natural resources and technical development has further raised the value added.
- Sustainable use of natural resources contributes to nature and environmental protection, based on voluntary agreements and incentives as well as statutory guidance.
- Food production is capable of meeting the consumer demands mainly through domestic products.

### *Rural areas*

- As the number of farms has stabilised at a lower level and the unit size has grown, basic agriculture is being complemented by an increasing number of diversified farm enterprises and small-scale rural businesses.
- Especially the younger age classes have trained themselves into highly skilled entrepreneurs and

found new job opportunities in rural areas.

- In many regions the countryside offers a low-priced, attractive place for permanent residence or second homes where the people can maintain their contact with nature.
- Owing to economic supports, e.g. tax benefits and flexible telework arrangements, the rural village centres balance the growth of large population centres and telecommunication links and information technology cover the rural areas as well.
- Rural areas are attractive recreational environments for both Finns and foreigners, where entrepreneurship based on nature experiences, such as hiking, fishing and hunting, produces services to meet the growing demand.
- Interaction between the urban and rural areas is reflected e.g. as an increase in the number of holiday homes.
- Commercialised tourism based on rural experience and Finnish cultural heritage extends to the majority of rural areas and it is practised in co-operation between Finnish and foreign entrepreneurs.

- The current rural development programmes and further measures based on these improve the employment opportunities in rural areas, and diversify the economic activities.

### *Agriculture and Food Production*

- Finns still mainly consume food that has been produced and processed in Finland.
- The good animal disease status is preserved.
- EU enlargement, among other things, has shifted the emphasis of the common agricultural policy towards the development of diversified rural industries and environments, while the support for production from the common funds has decreased.
- Agricultural policy both in the EU and in Finland highlights objectives relating to food safety, quality of foodstuffs and farming environment; the quality of Finnish food is high, quality chains cover the whole process and the whole chain is traceable.
- The load on the environment is minimised in the use of production inputs and methods in arable farming and livestock production and animal welfare is taken into account.
- More attention is directed at the management of biological diversity related to agriculture.
- Use of genetically modified organisms is based on a careful approval procedure and in a customer-oriented and environmentally-friendly way for the cultivation of more certain and productive varieties and the production of high-quality and varied foodstuffs as well as medicines.
- Organic production has established its position in terms of both the domestic consumption and export and 15% of the arable area is under organic farming.
- Development of local food systems gives the consumers the opportunity to obtain high-quality foodstuffs in a highly sustainable manner.

### *Reindeer Husbandry*

- Reindeer husbandry is based on careful adjustment of the number of reindeer and pasture area to each other and a pasture rotation system: reindeer grazing in the wild survive mostly without any additional feeding.

- The majority of reindeer owners are active reindeer herders who are capable of earning most of their income from reindeer husbandry.
- The transfer of the business to the next generation is realised so that young entrepreneurs are capable of preserving the viability of reindeer husbandry.
- Tourism and other sideline industries have been successfully combined to reindeer husbandry as additional sources of income.
- The image and value of reindeer meat as a product derived from wild game is preserved.

### *Forestry*

- The economic, ecological and social sustainability of forests is secured in a balanced and holistic way.
- Forests as a renewable natural resource make a significant contribution to sustainable development. They offer a natural and solid basis for the economic, ecological, cultural and social development in Finland
- Forests are viable and diverse. Commercial forests are also managed and used so that their viability

and biodiversity is maintained and they continue to offer both wood and other benefits in a sustainable way.

- Market-oriented, profitable forestry and forest industry offer employment and livelihood.
- Forests provide spiritual and cultural recreation. Landscape and cultural values and multiple use of forests are taken into account in forestry.
- Finnish forest expertise is very high. Training, research and the development of products and services in the forest sector is of top quality and internationally recognised.
- Finland takes an active part in the development of sustainable forestry globally, in Europe and in the neighbouring regions.

### *Game Management*

- Hunting is appreciated as one sustainable use of renewable natural resources and management of nature, based on the monitoring of game populations and management of game habitats.
- Game populations have strengthened due to the improvement in their habitats, hunting of small

predators is developed to secure the populations of small game.

- Damages caused by e.g. moose, seals and large predators are restricted by means of hunting and measures to prevent the damages.
- The number of hunters, i.e. persons who pay the game management fee, stays at the current level.

### *Fisheries*

- Fish stocks are utilised in a sustainable way within their productive capacity by means of e.g. stock regulation strategies and monitoring.
- Eating habits favour fish, and thus the competitiveness of domestic fish is good despite the growth in imports, and the consumption of fish from inland waters has also increased
- Salmon stock in the rivers discharging into the Baltic Sea is strong
- Nutrient load from aquaculture plants has decreased as a result of better feeding stuffs and technological development of the plants. The relocation of the plants has also reduced the environmental impacts of the loading.

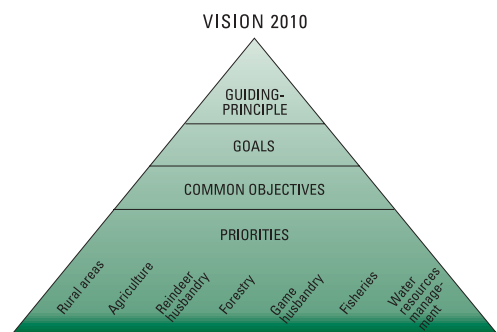
- Recreational fishing has maintained its position and fishing tourism which is mainly based on naturally breeding fish stocks has increased.
- There is a wide range of possibilities for recreational fishing available to all Finnish citizens and foreign visitors.
- Finns preserve the high level of skills in the use and handling of fish.

### *Water Resources Management*

- Use of water resources is diversified and the different kinds of needs, rights and obligations are taken into account in a balanced way. The use is socially, economically and ecologically sustainable.
- Users of water resources are satisfied with the water supply services as well as the usability and state of waters.
- Functioning of water supply, management of water resources duties and safety of water constructions are secured in exceptional conditions as well.
- Ecological status of waters has improved and eutrophication has been brought under control.

## 6.2 Goals, common objectives and main priorities of the 2002 Natural Resources Strategy

The Natural Resources Strategy of the Ministry of Agriculture and Forestry aims at steering the development until 2010. It is constructed as follows:



**Figure 13** Structure of the Natural Resources Strategy; relationship between guiding principle, goals, common objectives and priorities.

Some of the most essential assumptions about what should happen in the society as a whole and through various actors to pave the way for the sustainable use of renewable natural resources are listed below.

- Finnish economy in general develops in a positive way.
- There are no disturbances in foreign trade.
- Employment situation will not deteriorate.
- Financing to Finland under the common agricultural policy of the EU continues on the same level as

during the current financial period and the allocation of support does not weaken after 2006.

- Weakening of regional development is prevented and development becomes more controlled.
- No obstacles are raised to the characteristically scattered structure of rural settlement and its development, including environmental protection.
- Forestry financing is in accordance with the National Forest Programme 2010.
- The EU and national legislation concerning nature and environmental protection support the sustainable use of renewable natural resources that is well suited to the Finnish conditions.
- Public funding to the sectors governed by the Ministry of Agriculture and Forestry stays at least on the current level.
- The availability of energy to the extent that it secures our competitiveness is secured.

Should these assumptions or the operating environment in general change in an essential way, the strategy will allow enough

### Goals

The strategy lays down seven goals for the sustainable use of renewable natural resources based on the vision until 2010 (target-state).

The goals are sets of objectives that cover all the activities under the Ministry of Agriculture and Forestry aimed at reaching the target state, or vision, from the perspective of sustainable development. In many cases the goals cannot be met through actions by the Ministry of Agriculture and Forestry or its administrative sector alone, but this also depends on operations of other actors as well as changes in the operating environment.

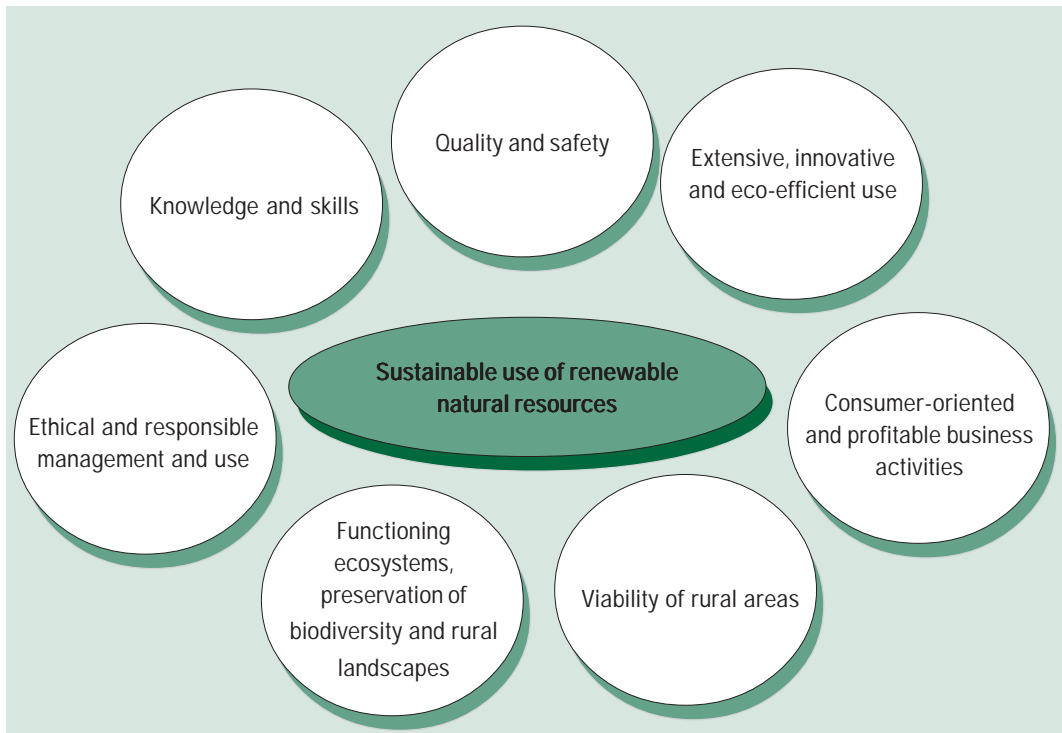
### *Common objectives*

The common objectives cover all activities of the Ministry and the administrative sector aimed at realising

sustainable development mainly through the means available to the Ministry and its sector. Financing decisions, especially those based on the State budget, constitute the most important set of issues that depends on the society and other actors involved.

### *Priorities*

Priorities are sets of measures, such as strategies and programmes for the actions of the different sectors, whose implementation contributes to reaching the target state based on the vision and meeting the common objectives established on the basis of each goal.



**Figure 14** Goals of the Strategy for the Sustainable Use of Renewable Natural Resources.



## GOAL 1.

**Natural resources are managed and used in an ethically responsible way; their vitality and renewing and productive capacity is secured in accordance with the principle of sustainable development.**

### COMMON OBJECTIVES

- 1.1 Renewable natural resources are used sparingly and with careful consideration within their renewing and production potential. Use of natural resources does not weaken the quality of the environment.
- 1.2 Genetic resources of agricultural and horticultural crops and domestic animals are preserved.
- 1.3 Natural resources are managed, protected and used in a sustainable way in compliance with international agreements and obligations and efforts are made to influence the content of the EU and international commitments.
- 1.4 Arable farming, animal husbandry, reindeer husbandry, forestry, fishing, game husbandry and management of water resources in Finland contributes to the preservation of the vitality and renewing and production potential of natural resources.

1.5 Natural resources are used in a responsible way, efforts are made to prevent negative environmental changes and, when necessary, the adjustment to the changes is secured. Plans will be made to prepare for problems due to climate change and global population growth in the long term.

1.6 Breeding grounds and habitats of fish and game populations are preserved and protected from external harm.

1.7 Availability of domestic foodstuffs and raw materials is secured, also in exceptional circumstances.

### PRIORITIES

#### *Agriculture and Food Production*

- A. Sustainable and ethical production methods (fertilisation based on plant-specific need, filter strips, headlands, parcel-specific cultivation practices, management of soil, appropriate crop rotations) maintain the good condition of farmed areas and minimise the load on waters; farms are encouraged to use nutrient balance calculations.
- B. Productive capacity, structure and nutrient balance of the soil is preserved and occurrence of harmful substances is kept low.

- C. Production animals are treated well, animal health is promoted and the physiological and behavioural needs of the animals are taken into account.
- D. Arable land is used for production or kept available for resuming production to guarantee food security and reach as high self-sufficiency in feed as possible.
- E. Biotechnology and genetic engineering methods are developed and utilised in agriculture in a controlled way, based on sustainable use of natural resources, safety and high quality of the products, open actions and efficient control.
- F. Use of plant and animal species suited to the Finnish conditions is favoured, which also contributes to the preservation of the domestic genetic base.
- G. Production of local foods, functional foods, organic products and other special products in accordance with the demand is secured. Efforts are made to diversify the regional production structure of agriculture.
- H. Agricultural inputs (pesticides, feedingstuffs, fertilisers) are developed so that they burden the nature as little as possible.

### *Reindeer Husbandry*

- A. Sustainable use of reindeer pastures is secured by regulating the number of reindeer.
- B. Reindeer herding plans of reindeer owners' associations are developed and these are based on the management of pastures by means of e.g. pasture rotation systems and other reindeer herding practices.

### *Forestry*

- A. Viability and productive capacity of forests is secured by developing and implementing good forest management in accordance with the relevant legislation, Environmental Programme for Forestry and National Forest Programme 2010, including guidelines for forest management and management of nature and the environment.
- B. Extensive application of forest management guidelines in practice is secured through planning, advice, monitoring and communication. Measures are directed specifically at the management of young stands, first thinning, ditch cleaning and supplementary ditching and management of forest nature.

- C. Forests are managed so that they can be used to mitigate climate change while taking into account the adaptation of forest ecosystems to the changes.
- D. Use of Finnish forest resources is promoted in accordance with the multiple objectives presented in the National Forest Programme 2010, and a level of forest management that corresponds to the needs of sustainable use of wood is secured.
- E. Free access to forest i.e. “Everyman’s right” continues to stay in force and efforts are made to promote its responsible use.

### *Game Husbandry*

- A. The state of game populations is monitored by means of appropriate methods for each species.
- B. Game management regulates and maintains the balance between the populations of game animals and other animals.
- C. Hunting is adjusted to the game populations.
- D. Measures are taken to reduce and prevent damages caused by game animals.

### *Fisheries*

- A. Fish stocks are secured by means of fishing arrangements, carefully targeted and high quality stocking as well as improvement of watercourses. Multiannual regulation strategies are drawn up for the most important commercial fish stocks at sea.
- B. Natural breeding of fish stocks is taken advantage of in the management of fishing waters.
- C. The restoration of waters to improve the habitats of fish continues in the present extent in flowing waters and this is increased in lakes.
- D. Efficient action is taken to prevent the spreading of diseases threatening the fish stocks.
- E. Crayfish stocks are protected against crayfish pest and other diseases and the spread of the diseases is prevented.
- F. Utilisation of the most important fish stocks is regulated on the basis of e.g. the state of the stocks, with the aim of reaching the maximum productivity and profitability. Salmon fishing is regulated so that the share of stocked salmon increases, without endangering the natural salmon stocks.

G. Utilisation of underused fish resources is promoted.

H. Quality of feedingstuffs used in aquaculture, efficiency in the utilisation of nutrients, feeding methods, fish farming techniques and plants are developed and more attention is directed to the appropriate adjustment of the size of the plants and their location.

### *Water Resources Management*

A. Usability of waters, the ecological and chemical status of surface waters and quantitative and chemical status of groundwater are maintained.

B. Waters are managed and restored in a way that allows their multiple use.

C. Availability of high quality household water, appropriate drainage and proper treatment of wastewater is secured also in sparsely populated areas.

D. Groundwater areas of special importance are appropriately managed.

E. Efficient action is taken to prepare for floods and prevent these.

## GOAL 2.

**The functioning of ecosystems and protection of biodiversity and rural landscapes are secured.**

### COMMON OBJECTIVES

2.1 Rural environment is protected and managed well.

2.2 A favourable conservation status of wild species and their habitats is secured.

2.3 The genetic diversity of agricultural and horticultural crops (especially local varieties, traditional commercial varieties and the transformed strains of these) and domestic animals (especially local breeds) as well as forest trees and commercial species of fish is preserved.

2.4 Cultural and natural landscapes and semi-natural environments are preserved in rural areas.

### PRIORITIES

#### *Agriculture and Food Production*

A. Rural environment is managed through the rural regional development programmes, common agricultural policy of the EU and horizontal rural development pro-

gramme, which includes the Agri-Environmental Scheme.

- B. The positive development in agriculture in reducing the eutrophication of waters and greenhouse gas emissions is secured by continuing the support schemes and promoting the planning and realisation of riparian zones and wetlands according to the catchment areas.
- C. Planning methods are developed for the implementation of measures concerning biological diversity (incl. traditional biotopes) and the management of landscapes and game habitats.
- D. The appreciation and management of valuable cultural environments in rural areas and rural building suited to the environment is promoted.
- E. Nordic cooperation aimed at the protection and sustainable use of genetic resources, especially the gene bank, is continued.
- F. The National Plant Genetic Resources Programme of Agriculture and Forestry as well as the National Animal Genetic Resources Programme for Finnish Agriculture to be completed in the near future are implemented.

### *Reindeer Husbandry*

- A. Pasture rotation system is developed to meet the current requirements, for example, summer and winter pastures are distinguished from each other as far as this is allowed by the reindeer owners' association system.

### *Forestry*

- A. Ecological sustainability of forests is secured by maintaining the special characteristics of habitats of special importance referred to in the Forest Act and other important habitats and implementing of other measures to maintain the biological diversity of commercial forests.
- B. The achievements in the management of forest nature are monitored and the use of environmental support is promoted by means of advising, forest planning and communication.
- C. Protection and management of groves and backwoods which are important habitats for many endangered species is promoted, the number of deciduous trees and the amount of decaying and burned wood is increased, and the preservation of margin zones between forests and arable land which are also important in terms of biodiversity is promoted.

- D. Game habitats are managed. Forest management and measures have contributed to the preservation of game populations, especially those of grouse.
- E. The existing forest conservation programmes are implemented and forest protection objectives are defined and realised.
- F. The National Plant Genetic Resources Programme for Agriculture and Forestry is implemented and the genetic diversity of forest cultivation material is preserved.
- G. Load on watercourses due to forestry is reduced by means of riparian zones left in harvesting and other detailed water protection measures in all forest management, especially in ditch cleaning and supplementary ditching.
- H. Protection of forest landscape and far-view scenery areas is secured through forest planning, especially in forests adjacent to settlement and farming areas and around watercourses.

### *Game Husbandry*

- A. Diversity of game populations and their habitats is maintained and promoted through game management measures.
- B. Populations of waterfowl and grouse are reinforced by developing the hunting of small predators.
- C. Release of foreign game species and populations to the Finnish nature is prevented and efforts are made to control the negative impacts of foreign species on game populations.

### *Fisheries*

- A. Genetic diversity of commercial fish populations are maintained by means of e.g. regulation of fishing, improvement of waters as well as aquaculture and the related gene banks.
- B. Salmon fishing is regulated so that it is to an increasing extent directed at stocked salmon and salmon which has completed the migration at sea.
- C. New fish species and stocks are imported with extreme caution due to the risks involved, e.g. diseases and crossbreeding.
- D. Regional environmental programmes for aquaculture are drawn up for areas where this is a common industry.
- E. Fish farming and processing plants are encouraged to invest in environmental protection by means of

e.g. appropriate allocation of structural support.

F. Management plans are drawn up for fish stocks which call for special measures and the farming plans are updated (salmon, arctic charr in Lake Saimaa, the most important sea and lake trout stocks).

### *Water Resources Management*

A. Principles of environmental river engineering of waters are taken into account in water projects.

## GOAL 3.

**The viability of rural areas is promoted through sustainable use of renewable natural resources.**

### COMMON OBJECTIVES

3.1 The current structure of villages and sparsely populated areas is reinforced in rural development measures.

3.2 The viability of economic activities in rural areas is promoted.

3.3 Functioning of the services and infrastructure (road network, communications, water supply, waste management) is secured.

3.4 The attractiveness of the rural areas as places of residence and work is increased by improving the quality of life and well-being of the people, especially women and the young.

3.5 Local initiative of rural communities in rural development work and growth in the social capital is promoted through networking of village activities and work of the local action groups.

3.6 The local cultural identity and its use in the commercialisation of local products and services is reinforced.

3.7 The development of recreational use and leisure services offered by rural areas is promoted.

### PRIORITIES

#### *Rural areas*

A. The viability of rural areas is promoted by means of a broad rural policy as well as the implementation of national and EU rural programmes (e.g. Objective 1, Regional Rural Development Programme, Leader+, other local action groups).

B. Continuation of the means used in the programme policy after the current programming period is secured.

### *Agriculture and Food Production*

- A. Profitability and preconditions for basic agriculture are secured on both family farms and in larger production units.
- B. Farms are considered as pluriactive entities e.g. when granting financing aid.

### *Reindeer Husbandry*

- A. The structure of reindeer husbandry is developed so that the majority of reindeer owners are active reindeer herders who gain most of their livelihood from reindeer husbandry.
- B. Connection between tourism and other business activities and reindeer husbandry is strengthened.

### *Forestry*

- A. Special emphasis is given to wood processing industry linked to farms and small and medium-sized wood processing industry.
- B. Functioning of infrastructure needed in forestry and other rural industries, e.g. road network, is secured.

- C. Entrepreneurship related to the use of wood and peat for heating is promoted.
- D. Preconditions for the natural product (non-timber forest products) sector are secured.

### *Game Husbandry*

- A. Possibilities for hunting contribute to rural amenities. Hunting clubs stimulate the village communities and bring the villagers closer together.

### *Fisheries*

- A. Position of fisheries and fish processing in rural development is reinforced.
- B. Possibilities for fishing are improved to increase the attractiveness of rural areas and maintain their viability.

### *Water Resources Management*

- A. Development of water services related to both recreational and business activities in sparsely populated areas are promoted.



## GOAL 4.

**Economic activities based on renewable natural resources are consumer-oriented and profitable.**

### COMMON OBJECTIVES

- 4.1 Preconditions for profitable and efficient utilisation of natural resources are maintained.
- 4.2 Opportunities for entrepreneurial activities offered by the management, use and protection of nature and natural resources are reinforced in a consumer-oriented way.
- 4.3 The standard of living of the rural population who earn their livelihood from the utilisation of natural resources is fair and just in relation to that of other population groups.

### PRIORITIES

#### *Rural areas*

- A. Education and training of the rural population is promoted to reinforce business activities based on, for example, natural resources and environments.
- B. The high level of skills relating to the quality and environmental systems for farms is secured.

#### *Agriculture and Food Production*

- A. Income level of farmers is secured.
- B. Possibilities for pluriactivity of farms are increased.

#### *Reindeer Husbandry*

- A. Preconditions for reindeer husbandry are developed and the adjustment of the industry to the changing conditions is supported.
- B. The possibilities for profitable activity are secured especially for those reindeer owners who gain a significant share of their livelihood from reindeer husbandry.

#### *Forestry*

- A. Profitability of forestry and competitiveness of companies based on forestry is promoted.
- B. Possibilities for multiple use of forests are improved by developing e.g. entrepreneurship related to recreation and tourism, raising the value added of natural products (berries, mushrooms, herbs) in small rural enterprises and promoting the marketing of these products.
- C. The forest sector is promoted as an environment for employment and business to make this field a more attractive career choice,

which secures the availability of skilled labour.

### *Game Husbandry*

- A. Projects connected to wildlife and hunting tourism are monitored.

### *Fisheries*

- A. Preconditions for fisheries and adjustment to the changes in the operating environment is promoted.
- B. Profitability and competitiveness of the sector is improved by means of support for the export and use of fish, higher quality, diversification of the production and increased value added.
- C. Employment related to fisheries and entry of young fishermen to the industry is supported.
- D. Fishing tourism and development of services, products and projects based on sustainable utilisation of fish resources is supported through e.g. investments, product development, marketing, training of small-scale entrepreneurs and guides and cooperation between enterprises.

### *Water Resources Management*

- A. Consumers are guaranteed the access to high-quality water services at reasonable cost.

## GOAL 5.

**Extensive, innovative and eco-efficient use of renewable natural resources is promoted.**

### COMMON OBJECTIVES

- 5.1 Renewable natural resources are substituted for unrenovable natural resources whenever this is ecologically justified, economically feasible and safe.
- 5.2 Production and use of renewable or slowly renewing energy sources (such as peat) is promoted.
- 5.3 Establishment and functioning of innovative systems as well as extensive utilisation of innovations is encouraged.
- 5.4 The transfer of the know-how relating to the sustainable use of natural resources to other countries is promoted.
- 5.5 Used natural resources are recycled and utilised as extensively as possible; waste is appropriately treated by means of safe methods to allow the utilisation of the final product as well.
- 5.6 New tangible and intangible benefits are developed in the use of renewable natural resources.

## PRIORITIES

### *Agriculture and Food Production*

- A. Development of use of biomass from arable land for energy and innovation relating to cultivated products, such as vegetable oils, functional foods, fibre crops, etc. is encouraged.
- B. Efficient use of animal manure in the production is promoted especially in large animal production units and innovation promoting the collection of biogas and its use for energy and utilisation of waste is encouraged.
- C. Offal from fisheries and slaughterhouses continue to be utilised efficiently in fur farming.

### *Forestry*

- A. Finnish expertise in the wood sector is promoted through education and research. Design, product development and innovation in the use of wood as well as networking of companies in the wood sector, especially the small rural enterprises, is supported.
- B. Skills and innovation in the forest sector are developed through further reinforcement of research, education and international activities.

- C. Use of wood instead of fossil fuels in the municipal heating and combined heat and electricity production is promoted e.g. through entrepreneurship related to heating.
- D. The methods for harvesting wood for energy and wood burning techniques are developed. Use of peat for energy is kept at the current level and appropriate after-treatment of peat production areas is taken care of. Use of wood in construction is promoted.
- E. Finnish forest expertise is emphasised in international contexts.

### *Fisheries*

- A. Negative environmental impacts of feedingstuffs used in fish farming are reduced e.g. by replacing the animal protein in feed to an increasing extent by plant protein.

### *Water Resources Management*

- A. Guidelines for research and development are updated and the national coordination of the activities is secured.
- B. Water is used sparingly and appropriate purification of wastewater is supported.

## GOAL 6.

**High quality and safety of the production as well as products derived from renewable natural resources is secured, and these constitute an important competition and success factor.**

### COMMON OBJECTIVES

- 6.1 Production inputs and methods as well as the products are of high quality, safe, ethically acceptable and environmentally-friendly.
- 6.2 Production based on renewable natural resources is competitive.
- 6.3 Foodstuffs and other goods derived from natural resources are produced by means of systematic quality work in a customer-oriented, profitable and competitive way with due respect for humans, animals and nature.
- 6.4 The whole production chain and life cycle of products are taken into account in the management and use of natural resources and the related production, products and after-use (waste management and recycling) in different sectors.
- 6.5 Food production areas and products are protected against external impurities and harmful loading as well as risks.
- 6.6 Quality and environmental systems as well as certificates and environmental labels have been developed and introduced in different production sectors.

### PRIORITIES

#### *Agriculture and Food Production*

- A. Methods are developed to reduce the risks in the use of pesticides and the burden they cause to the environment.
- B. Quality and environmental systems for farms as well as quality systems for the food production chain and food control are developed, and their use is encouraged through systematic training and new attitudes.
- C. Quality systems are linked to the quality systems of food industry so that the quality chains are watertight from primary production to the consumers.
- D. Use of product labels highlighting the good quality of the agricultural and food sector and development and use of market-oriented mechanisms (e.g. marketing and sales promotion campaigns, environmental labels, commercialisation, pricing of public goods) is promoted to create an image of high quality based on fact for

both domestic and foreign consumers.

- E. Production chains must be open and traceable to indicate the origin, production method, composition and quality of the products.
- F. Livestock production methods promoting the welfare of animals are developed.
- G. Animal healthcare system and control system for zoonoses are developed.
- H. Arable land is protected against heavy metals and other impurities, for example, by allowing Finland to continue the application of requirements for fertilisers that are stricter than in most other EU countries.
- I. In securing the quality of the products attention is directed, among other things, at the welfare of production animals, production conditions and methods as well as production ethics by developing training and advising.
- J. Processing of organic agricultural products as well as the production, handling and processing methods of foodstuffs (e.g. fish) is developed with special emphasis on small-scale food processing methods.

### *Reindeer Husbandry*

- A. Quality and monitoring systems are developed to secure the high quality of products derived from reindeer and watertight quality chains.
- B. Reindeer husbandry is mainly based on reindeer grazing in the wild; if additional feeding and temporary farming is needed for special reasons, the animal protection and health requirements are fully complied with.
- C. The appreciation of reindeer meat as a game product is promoted.
- D. Reindeer meat is processed in slaughterhouses which fulfil the EU requirements and by skilled slaughtering, maintenance and cleaning staff.

### *Forestry*

- A. Quality and monitoring systems are developed to secure a good level of forest management and the whole operation chain, and quality and environmental systems for the utilisation of natural products are promoted.
- B. Market-oriented and other practices are developed to increase the consumer confidence in the sustainability of Finnish forestry and high-quality forest products.

C. Production and use of seedlings whose origin is suited to the Finnish conditions is secured and biological methods for preventing forest damages are promoted. The risk of forest damages is reduced.

### *Game Husbandry*

A. Appropriate handling of game is developed and the quality of products sold on the market is secured.

### *Fisheries*

A. Implementation of the quality strategy for fisheries is promoted so that high-quality and competitive fish products produced in a responsible way can be offered to the consumers.

B. Recreational fishing and advising of fishermen is developed, in particular, to take better advantage of the underutilised fish species.

C. Quality and selection of fish products is developed, efforts are made to broaden and diversify the consumer habits and maintain the skills in the handling of fish.

### *Water Resources Management*

A. Availability of high-quality water services is secured by promoting the utilisation of groundwater re-

sources, building auxiliary water supplies and combining networks.

B. Availability of high quality and safe household water is secured.

## GOAL 7.

**Sustainable use of renewable natural resources is based on knowledge and skills which guarantee that their use is ethically, ecologically, socially and culturally sustainable.**

### COMMON OBJECTIVES

7.1 All practices are evaluated and developed continuously to make sure that they are ethically, ecologically, socially and culturally acceptable and in harmony with the different types of use and other economic activities.

7.2 Research institutes in the administrative sector of the Ministry of Agriculture and Forestry produce information in support of sustainable use of natural resources.

7.3 Consistent administration systems are developed for the planning, decision-making, guidance and related monitoring.

7.4 Participative, open and up-to-date monitoring systems are developed.

- 7.5 Goals for the sustainable use of renewable natural resources laid down in the Natural Resources Strategy are taken into account in the allocation of the Ministry's research funds.
- 7.6 Advising and training promoting sustainable use of natural resources is increased.
- 7.7 The Ministry develops and takes advantage of a wide range of expertise in the planning, implementation and monitoring of the use of natural resources.

## PRIORITIES

- A. Knowledge and information basis concerning the social, ecological, ethical and cultural aspects in the use of natural resources is reinforced.
- B. A management system for information concerning natural resources is developed to assist in the decision-making, steering and monitoring. The system compiles the information produced by the most important indicators for the use of natural resources and its impacts.
- C. Needs for monitoring and sustainable use of natural resources are taken into account in the development of national geographical data reserves and systems.

### *Rural areas*

- A. Environmental education, production of information on rural areas, advising and the related implementation are continued.
- B. Closer integration of rural and agricultural research is promoted.

### *Agriculture and Food Production*

- A. Open discussion on the value basis of food production continues.
- B. Information and communication on raising livestock is promoted. Practices and facilities are developed to meet the needs of the animals and production operations.

### *Reindeer Husbandry*

- A. Monitoring of the feed resources of reindeer and size and productivity of reindeer populations is developed and the monitoring of the amount and state of pasture resources is continued.

### *Forestry*

- A. Monitoring of the protection of forest biodiversity is developed as well as monitoring and statistics concerning the management of forest nature on the regional level.

- B. Assessment of the impacts of forest management measures is developed from the perspective of nature management.
- C. Planning systems contributing to diverse material and spiritual welfare derived from forests are developed and applied.
- D. Developing the national forest inventory as an up-to-date and varied monitoring system continues.
- E. First thinning areas and forests grown on peatland are utilised more efficiently by developing new technologies.
- F. Traditional and experience-based know-how is taken advantage of in forestry.

### *Game Husbandry*

- A. Exchange of information on game management and special characteristics of hunting in Finland in international contexts is promoted.
- B. Monitoring of the results of the measures to manage and improve the state of game populations and game habitats and damages caused by game is reinforced and statistics

on e.g. the game bag and hunting in general as well as the geographical information system for game populations are developed.

- C. Data on game animals and hunting are updated regularly.

### *Fisheries*

- A. Assessment and monitoring of the abundance of fish stocks, impacts of stocking and results of the measures to manage and improve the habitats of fish as well as statistics on the catch and fisheries in general are developed.
- B. Research on recreational fishing and its social and economic impacts as well as assessment of the intangible benefits of recreational fishing are developed.

### *Water Resources Management*

- A. General awareness of the Finnish water resources, use and state of waters and water supply services based on efficient utilisation of modern technologies is improved.
- B. Principles of interactive planning and multiple use of waters are applied to water and drainage management.



# 7 Monitoring

## Implementation and monitoring of sectoral strategies

Photo: Timo Vuorialainen



The Natural Resources Strategy of the Ministry of Agriculture and Forestry is implemented in cooperation with the different actors in the sectors governed by the Ministry. The actors in different sectors carry the main responsibility for the practical implementation through sectoral or theme-specific strategies and programmes. The strategy is also implemented through operational and financial planning at the Ministry and through performance guidance of the

organisations subject to the Ministry. This means that the implementation of the strategy is monitored both through the follow-up of each single strategy and programme and as part of the regular administrative monitoring.

As far as possible, the progress in the implementation of the objectives and priorities of the Natural Resources Strategy is monitored on an annual basis.

**Table 4** *Monitoring of the strategy portfolio of the Ministry of Agriculture and Forestry from the perspective of the Natural Resources Strategy.*

STRATEGY	MONITORING
National Plant Genetic Resources Programme	<ul style="list-style-type: none"> <li>Plant Genetic Resources Council will be set up to monitor the implementation of the programme</li> </ul>
National Animal Genetic Resources Programme	<ul style="list-style-type: none"> <li>The animal genetic resources work group will present a plan for the monitoring of programme implementation</li> </ul>
Strategy for Finnish Agriculture	<ul style="list-style-type: none"> <li>Ad hoc work groups</li> </ul>
Horizontal Rural Development Programme	<ul style="list-style-type: none"> <li>Monitoring groups for the Horizontal Programme and environmental support</li> <li>Ex ante, mid-term and ex post evaluation</li> <li>Annual reporting of realised expenditure and estimates for the following years to the Commission</li> </ul>
Strategy for Organic Production	<ul style="list-style-type: none"> <li>Task of the Food Production Committee to be appointed</li> </ul>
National Quality Strategy for the Food Sector	<ul style="list-style-type: none"> <li>Monitoring is steered by the Department of Agriculture</li> <li>Quality Management Group monitors the progress in quality work</li> <li>Project-specific steering groups</li> </ul>
Animal Health Care System	<ul style="list-style-type: none"> <li>Regular review of the realisation of the strategy with interest groups</li> <li>Results of the compilation of data, follow-up studies and control reports are examined annually</li> <li>Records on training and participants</li> </ul>
Development Strategy for Professional Fishery	<ul style="list-style-type: none"> <li>Structural aids are monitored through the project register for fisheries</li> <li>Independent mid-term evaluation of the realisation of the programme</li> <li>Ex post evaluation within three years from the completion of the strategy</li> </ul>
Development Strategy for Recreational Fishing	<ul style="list-style-type: none"> <li>Administration and organisations in the field</li> </ul>
National Forest Programme 2010	<ul style="list-style-type: none"> <li>Forest Council</li> <li>Annual follow-up reports</li> </ul>
Water Resources Strategy Environment Institute	<ul style="list-style-type: none"> <li>Performance guidance between the Ministry, Regional Environment Centres and Finnish</li> <li>Impact surveys when considered necessary</li> <li>Development of indicators for monitoring</li> </ul>
Strategy for Geographical Data	<ul style="list-style-type: none"> <li>Monitoring of the realisation of the annual objectives by means of data from performance guidance</li> <li>Monitoring group for general follow-up and development strategies</li> </ul>

### *Indicators for monitoring*

The impacts of the Natural Resource Strategy are monitored through indicators related to the monitoring systems for measures based on the priorities as well as through the general indicators for the sustainable use of natural resources.

In Finland the set of indicators for sustainable development was prepared in co-operation between the different administrative sectors and research institutes, and they were published in 2000. The sectoral or theme-specific indicators for the use of renewable natural resources include the criteria and indicators for sustainable forest management, indicators for the use and management of water resources, indicators for monitoring the rural development programme as well as rural indicators.

In 1999 the Ministry of Agriculture and Forestry introduced the general indicators for sustainable use of renewable natural resources for test use. They assist in the monitoring of sustainable development in agriculture, fisheries, game husbandry, reindeer husbandry and use and management of water resources. In connection with the updating of the Natural Resources Strategy, the indicators for sustainable use of renewable natural resources will also be revised in co-operation between the various parties involved. The general indicators for sustainable use of renewable natural resources will be applied in the regular monitoring of the Strategy. The indicators will be available for use in the beginning of the year 2003.

### *Evaluation of the Natural Resources Strategy*

The Strategy for the Sustainable Use of Renewable Natural Resources is to be evaluated once prior to 2010.

## Part IV Impacts

### 8 Ecological, economic, social and cultural impacts of the strategic choices

The development in the administrative sector of the Ministry of Agriculture and Forestry has been rapid in recent years due to the changes in the operating environment. This has been concretised as amendments to the legislation and strategies and programmes drawn up in the administrative sector. In the case of e.g. biotechnology and quality of foodstuffs the outlines set out in the previous Natural Resources Strategy are no longer enough, and changes in the emphasis have also occurred in issues relating to the climate change and management and protection of biological diversity.

The assessment of the impacts of the Natural Resources Strategy aims at improving the general awareness of the impacts of the Strategy, recognising potential future trends and identifying possible conflicts between different goals and sectors. Only qualitative estimates of the impacts of specific goals and priorities on a general level can be given, i.e. it is not possible to present any figures or other quantitative estimates.

#### *Participation and cooperation*

The revision of the Natural Resources Strategy of 1997 has been an

open process, which was started in January 2001 by organising discussions between the departments of the Ministry of Agriculture and Forestry and various interest groups. The purpose of the discussions was to evaluate the Strategy of 1997 and establish the points where revision would be needed. Towards the end of 2001 seminars were held for research institutes as well as other parties involved in the initial discussions and other interest groups. The seminars dealt with both the objectives, goals and priorities of the Natural Resource Strategy and their ecological, economic and social impacts. Statements on the Strategy were requested from various organisations and interest groups (Rural Departments of the Employment and Economic Development Centres, Regional Environment Centres, Forestry Centres and Game Management Districts). The feedback from all these processes was highly valuable and it was taken into account in the final Strategy.

#### *Impact assessment*

The purpose of the impact assessment is to provide an overview of the most significant environmental as well as economic and social impacts of the goals and objectives set out in the

Natural Resource Strategy. In addition to the general impacts, efforts were made to identify possible conflicting impacts between both the different sectors and the ecological, economic, social and cultural dimensions.

The assessment of the impacts of the Strategy reinforces the functioning of the different objectives and priorities

on the level of practice, and it also contributes to the future evaluation and revision of the Strategy as a basis for outlining new objectives and priorities.

The assessment presented in Annex 2 is also concerned with impacts other than those related to the goals, common objectives and priorities of the Natural Resource Strategy.

## Natural Resources Strategy of 1997- assessment of achievements

Targets for 2001	Assessment of achievements
The sustainable use of natural resources has been integrated into the activities of the Ministry and it forms an integral part of these.	The principle of sustainable use has been taken into account in the strategies and programmes adopted in different fields of activity under the Ministry.
The activities of the Ministry and research institutes and other organisations subject to it makes sure that natural resources are used in a sustainable way.	Sustainable use of natural resources has been integrated into the activities of the Ministry and implemented e.g. in the operational guidance.
The administrative sector has follow-up and information systems that produce up-to-date and comprehensive data on natural resources and their use, utilisation potential and state.	Natural resources database plan has been completed. Management system for natural resources data is being prepared. Information systems have been strengthened for different sectors.
Quality systems have been introduced in the food sector: quality systems for agricultural production are implemented on farms and quality systems are being applied in large firms in the food sector.	The action programme concerning the implementation of the National Quality Strategy for the Food Sector was completed in spring 2001.
Finnish foodstuffs have gained a footing on the European markets as a result of more efficient marketing efforts.	No significant progress compared to the earlier situation.
All Finnish farms follow environmentally friendly methods in their activities.	About 91% of farmers have committed to the terms of environmental support. Environmental criteria have been included in the terms of other supports. Control is extensive.
A significant reduction has occurred in the nutrient loading on watercourses caused by agriculture.	It is estimated that in the long run the Agri-Environmental Programmes for 1995-1999 and 2000-2006 will lead to a reduction in the phosphorus and nitrogen loading on waters by about 50% from the state in the early 1990s. The monitoring study of the environmental support system examines the impacts of the support.
Over 90% of the cultivated area is covered by environmental support. The area under organic production has grown to at least 150,000 hectares.	Environmental support covers about 96 % of the cultivated area. The preliminary estimate for 2001 is 148,000 hectares.
The high level of forest management has been secured.	The National Forest Programme 2010 and Regional Forest Programmes have been prepared. Wood production is promoted in a balanced manner comprising the management of nature. Recommendations for good forest management practices were published in the beginning of 2001 and these are implemented widely.
Use of wood from first thinning has grown three-fold from 1995.	The area subjected to first thinning was 150,000 ha in 1996 and 200,000 ha in 2000. The objective set in the National Forest Programme is 250,000 ha by 2010.

Targets for 2001	Assessment of achievements
<p>In addition to objectives related to wood production, protection of biodiversity is taken into account in forest management.</p>	<p>Protection of biodiversity was taken into account in the reform of forest legislation in the 1990s. The funding for promoting the management of forest nature was raised to 4,2 million euros in the State budget for 2000 and 2001. Habitats of special importance have been preserved under Article 10 of the Forest Act and Article 29 of the Nature Conservation Act. Development of forest conservation in Southern Finland is being examined in working groups.</p>
<p>Quality systems for forests are used extensively.</p>	<p>At the end of 2001 the area under certified forest was 21.9 million ha, which is 95% of forestry land in Finland.</p>
<p>In Southern Finland, in particular, felling has increased so that the annual drain is almost equal to the growth.</p>	<p>The objective of the National Forest Programme approved by the Government is to increase the annual roundwood production by 5-10 million cubic metres to 63-68 million cubic metres by 2010. In 1999 roundwood production totalled 60.9 million cubic metres, and commercial felling accounted for 91% of this. In 2000 commercial felling rose by about 5% from 1999 to almost 58 million cubic metres.</p>
<p>Wood is to an increasing extent substituting unrenovable natural resources in building, and considerable increase has occurred in exports related to building and wood-based furniture industry.</p>	<p>The objective of the National Forest Programme is to double the value of wood industry's exports to 4,2 billion euros by 2010. Exports of planed timber and glued laminated timber (glulam) have almost doubled in the past two years. The per capita consumption of sawn wood is the highest in the world.</p>
<p>The use of wood for energy has increased.</p>	<p>The objective of the National Forest Programme is to increase the annual use of wood for energy by 5 million cubic metres by 2010. Support for the chipping of wood chips was introduced in 2000. Efficiency in the use of wood chips is increased through the Action Plan for Renewable Energy Sources of the Ministry of Trade and Industry and Wood Energy Technology Programme (1999-2003). The use of wood chips recorded in the statistics totalled 747,000 cubic metres. In recent years the forest industry has considerably increased the use of wood-based fuels for energy production.</p>
<p>In accordance with the principle of sustainable development the number of reindeer have been determined on the basis of reindeer herding measures and the state of grazing grounds.</p>	<p>The number of reindeer was checked in 2000 and their number has been cut.</p>
<p>There is reliable data available on the state of reindeer pastures.</p>	<p>Finnish Game and Fisheries Research Institute and the University of Oulu inventoried both summer and winter pastures (surface area and condition).</p>

Targets for 2001	Assessment of achievements
Pasturing methods for improving the state of pastures are being developed.	Development work has been promoted by means of performance guidance of the Reindeer Herders' Association.
Fishing and the management of fishing waters are based on the use and management plans of fishing districts.	There is still considerable variation in the quality of the use and management plans, but progress has been made in their use.
Management measures for fisheries in waters and new fish products are being developed.	Fishing for the management of waters has become increasingly common in recent years and in some places the results have been very good. Restoration of waters, organisation of fishing and planting continue in the earlier extent but the actions are targeted more carefully.
The preconditions for aquaculture have been secured by means of environmental programmes for aquaculture in sea areas.	Environmental programmes have been drawn up. Production has not grown as expected and the emissions per kilo of fish produced have decreased, and thus the preconditions for aquaculture have been secured.
The number of fish species in aquaculture has increased.	Whitefish and arctic char have been introduced as new species to commercial aquaculture. The farming of perch as also been tested.
Salmon fishing in sea areas is mainly directed to planted salmon and it does not affect the recovery of the natural salmon populations.	The objective has been met, and e.g. the production of fingerlings has increased in the rivers Tornionjoki and Simojoki.
The spreading of fish diseases has been prevented.	Except for the VHS disease the situation is good. VHS may have been transmitted from wild fish, which means that there was no way of preventing the outbreak.
The preconditions for hunting, recreational fishing and other diversified use of nature have improved.	The possibilities for recreational fishing have improved due to amendments to the legislation of fishing and development of the activities of the fishing districts.
Game populations have increased further as a result of the improvement in their habitats and regulation of hunting.	Methods for estimating the abundance of game populations have been developed. Regulation of hunting has stopped the growth in moose population. Development of populations has been regulated by means of licences and hunting seasons.
Nature tourist services have been developed in the commercial basis.	Considerable efforts have been made to develop services for fishing tourism, e.g. in a couple of years more than 100 products took part in the fishing tourism product competition. Other entrepreneurship related to the nature has become increasingly common. The Villi Pohjola (Wild North) of the Forest and Part Service develops nature tourism services on State lands.



Targets for 2001	Assessment of achievements
<p>The share of groundwater and artificial groundwater has risen to over 60% of the total quantity of water supplied through the waterworks and more than 90% of the population are connected to waterworks.</p>	<p>In 2001 the share of groundwater and artificial groundwater was estimated at 61%. 90% of the population were connected to waterworks.</p>
<p>The regulation of watercourses has been considerably improved by means of co-operative measures and, when necessary, revising the conditions for licences issued by the Water Courts.</p>	<p>More than 80 development projects of various kinds for the regulation of waters are under way or have been completed during the past decade. Major surveys for the development of regulation which have led to good results were completed for the Iijoki and Oulujoki watercourses, the lakes Inarijärvi and Päijänne as well as the lake Konnivesi-Ruotsalainen.</p>

## Impacts of the Natural Resources Strategy 2002

	<b>Ecological impacts</b>	<b>Economic impacts</b>	<b>Social and cultural impacts</b>	<b>Possible conflicts</b>
<b>Rural areas</b>	<p>The cultural landscape of the rural areas is lively and well managed.</p>	<p>Entrepreneurial activity in the rural areas is strengthened.</p> <p>Infrastructure is maintained in the rural areas.</p>	<p>Interaction between the local action groups increases.</p> <p>The population structure of the rural areas improves.</p> <p>Rural tourism increases the knowledge on the rural areas and activities among the urban population</p>	<p>Rural policy is not capable of curbing the migration to the urban areas.</p> <p>Viability of economic activities in the rural areas calls for more efficient regional policy.</p>
<b>Forestry and use of wood</b>	<p>Forest management measures and protection of forest nature maintain and improve biodiversity and ensure a favourable conservation status of forest species and habitats.</p> <p>Increase in deciduous trees and decaying and burned wood reduces the endangerment of certain species.</p> <p>Forests are genetically diverse.</p> <p>More riparian zones are left after felling to reduce the nutrient load on waters.</p> <p>Substituting wood for fossil fuels reduces harmful emissions and slows down climate change.</p>	<p>Number and networking of small and medium size enterprises (SMEs) increases.</p> <p>Profitability of tourism enterprises is stable.</p> <p>An increasing share of the products of forests and peatland are collected and the level of processing is raised.</p> <p>Use of wood in energy production continues to grow.</p> <p>Use of quality and monitoring systems for forest management ensures the sustainable management and use of forests.</p> <p>Use of wood in building increases. Increased interest in building with wood is reflected in the number of SMEs.</p>	<p>Sustainable use of forests supports employment and rural development</p> <p>Possibilities for recreational use of forests are preserved.</p> <p>High-level research, statistics and inventoring related to forests continue.</p> <p>Finnish forest skills are kept at an internationally high level.</p> <p>Forest certifications systems prevent wrong images that may be attached to Finnish forest management and forestry.</p>	<p>Forest conservation, wood production and other uses of forests are harmonised.</p>

	<b>Ecological impacts</b>	<b>Economic impacts</b>	<b>Social and cultural impacts</b>	<b>Possible conflicts</b>
<b>Agriculture and Food Production</b>	<p>Loading on waters and the air due to agriculture decreases.</p> <p>Farming land stays in good condition (humus content, pH, micro-organisms).</p> <p>Heavy metal content of the soil is low.</p> <p>Populations of Finnish local breeds reach a viable level.</p> <p>Use of domestic plant varieties increases.</p> <p>Number and area of traditional biotopes, riparian zones and wetlands increases.</p> <p>Plant and animal genetic resources programmes secure the preservation of the genetic base.</p> <p>Utilisation system of manure is closed to 100%.</p> <p>An increasing share of agricultural waste is recycled.</p> <p>Instructions for environmental protection reduce the regional environmental problems due to fur farming.</p> <p>Pesticides cause less burden to the nature.</p> <p>Harmful emissions into the air fall due to highly developed techniques for the handling of manure and increased use of renewable energy sources, e.g. wood</p>	<p>Income level of agricultural producers is competitive in relation to other population groups.</p> <p>High quality of the products increases the sales of Finnish foodstuffs on domestic and foreign markets.</p> <p>Yields and health of the production animals stay on a high level.</p> <p>Production and use of bioenergy increase.</p> <p>The range and sale of organic products increases.</p> <p>Self-sufficiency in food production is high.</p>	<p>Viability of local cultures is preserved. Traditional skills relating e.g. to agricultural products strengthens and is utilised in commercialisation.</p> <p>Agricultural support and contracts systems serve a number of objectives and cover a broad range of rural economic activities.</p> <p>Knowledge on the rural activities grows.</p> <p>Open and transparent production chains reduce the conflicts and prejudices between the producers and consumers and improve the interaction between the urban and rural areas.</p>	<p>Increased production efficiency and farm size call for new supplementary sources of income in rural areas.</p> <p>There may be conflicting attitudes to the use of genetically modified organisms in Finnish agricultural production.</p>

	<b>Ecological impacts</b>	<b>Economic impacts</b>	<b>Social and cultural impacts</b>	<b>Possible conflicts</b>
<b>Reindeer Husbandry</b>	<p>State of reindeer pastures improves.</p> <p>Development of pasture rotation systems increases the amount of feed available to reindeer so that the capacity of pastures is not exceeded.</p>	<p>Costs due to additional feeding fall.</p> <p>Total number of reindeer herders falls, but reindeer husbandry becomes more profitable to those actively engaged in it.</p> <p>Use of quality and follow-up systems increases, improving the quality and traceability of products.</p> <p>Extensive monitoring of reindeer and pasture resources continues.</p>	<p>Social role and cultural values of reindeer herding are preserved.</p>	<p>Harmonisation of reindeer husbandry and other uses of nature.</p>
<b>Game Husbandry</b>	<p>Game populations (incl. large predators) stay at a sustainable level and strengthening of populations reduces the risk of extinction and improves the preconditions for preserving genetic diversity.</p> <p>Game management improves the living conditions of game and other animals.</p> <p>Hunting of small predators improves the state of waterfowl and grouse populations.</p> <p>No more game species of foreign origin are introduced to Finland.</p>	<p>Damages, caused by game animals, are at reasonable level.</p> <p>Monitoring and statistics of game management and geographic information system for game become more accurate, making it possible to adjust hunting to sustainable use.</p> <p>Wilderness and hunting tourism projects increase.</p>	<p>Game management measures make it possible to adjust hunting to the principles of sustainable use.</p> <p>Wilderness and hunting tourism projects contribute to recreation and increase knowledge about nature.</p> <p>Awareness of game animals and hunting and nature in general increases.</p>	<p>Damages due to deer, large predators and seals to various industries.</p> <p>Fear of large predators, especially bears, reduces the utilisation of nature's products and other recreational use of forests.</p> <p>Negative impacts of forestry on grouse habitats and populations.</p>

	<b>Ecological impacts</b>	<b>Economic impacts</b>	<b>Social and cultural impacts</b>	<b>Possible conflicts</b>
<b>Fisheries</b>	<p>Fish stocks are at a sustainable level despite the increased fishing.</p> <p>Management of fish resources and stocks maintains and improves biodiversity e.g. by maintaining viable fish stocks and restoring species and stocks that have become rare.</p> <p>Salmon fishing at sea is mainly directed at stocked salmon.</p> <p>Habitats of fish are in good condition.</p> <p>Diseases threatening fish and crayfish stocks are kept under control.</p> <p>Number of environmental programmes for fish farming increases.</p> <p>Development of methods and techniques for fish farming reduces nutrient load on the environment.</p> <p>Development of methods and techniques for professional fishing increases the sustainable utilisation of fish stocks</p>	<p>Measures based on the quality strategy for fisheries industry promote the demand and supply of high-quality fish products produced in a responsible way.</p> <p>Management plans and farming programmes for fish stocks to be protected are updated regularly.</p> <p>Income level of professional fishermen is competitive with other occupations.</p> <p>Development of economic activities related to recreational fishing, e.g. fishing tourism services, creates job opportunities and produces additional income on coastal areas as well.</p> <p>Degree of processing and value added of domestic fish increases and development of marketing contributes to employment.</p> <p>Monitoring the abundance of fish stocks and related statistics as well as monitoring of the impacts of stocking become more accurate.</p>	<p>People's awareness of less valued fish species increases.</p> <p>Use of domestic fish for food increases and becomes more diversified.</p> <p>Recreational fishing has a major role in recreation and promoting health.</p> <p>Cultural heritage related to fishing is preserved in the coastal areas.</p> <p>Development and strengthening of fishing area and district activities serve the common interest of all fishermen</p>	<p>Damages to fishery caused by seals.</p> <p>Import of salmon and rainbow trout raised abroad reduces the demand for domestic fish.</p> <p>Occurrence of environmental toxins threatens the demand and utilisation of fish coming from the Baltic Sea</p>

	<b>Ecological impacts</b>	<b>Economic impacts</b>	<b>Social and cultural impacts</b>	<b>Possible conflicts</b>
<b>Water Resources Management</b>	<p>Quality of surface water and groundwater improves, reaching the status 'good' where this is not yet the case, or staying at the levels 'good' or 'excellent'.</p> <p>Quality of surface water and groundwater areas stays good and biodiversity of aquatic environments increases.</p> <p>Economical use of water increases.</p> <p>More efficient treatment of wastewater in sparsely populated areas reduces nutrient load on waters</p>	<p>Availability of high-quality household water and appropriate treatment of wastewater at reasonable cost is secured also in sparsely populated areas.</p> <p>Development of water services in sparsely populated areas (water pipes, sewerage, treatment of wastewater) increases the year-round use of holiday homes.</p>	<p>Measures to develop water resources and restoration of waters improve the preconditions for multiple use of waters.</p> <p>Research and development activities relating to water resources management are further improved.</p>	<p>Possible negative impacts on fish stocks and aquatic ecosystems</p>