ESTONIAN ENVIRONMENTAL INDICATORS 2012

Estonian Environment Information Centre
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Introduction

Estonian Environmental Indicators 2012 is a publication that provides an overview of the state of Estonia’s environment. This publication is the third of its kind. The first environmental indicator-based publication titled Environmental Review 2005: an Indicator-Based Summary was published only in English in 2007. In 2009, publication titled Estonian Environmental Indicators 2009 was published both in Estonian and English. This publication as compared to the previous one puts a stronger emphasis on indicators that affect the state of environment.

While earlier environmental indicator-based publications also served as the overviews of the Estonian Environmental Reviews that were published at the same time, this publication is completely independent of environmental review publications. This enables a somewhat broader review of the environment and factors that affect the state of environment in particular. Structurally, the book is divided into 11 sections – background indicators, mineral resources, fisheries, game animals, water, forest, biodiversity, air and climate, waste, environment and health, and funding. The section of background indicators characterises the indicators that affect the environment, however, these are not considered as environmental indicators. Environment and health covers some environmental indicators that may have an impact on people’s health. Funding shows sums targeted into environmental projects through Environmental Investment Centre that characterises the implementation of environmental measures to an extent. Other sections are fairly similar in nature, consisting mostly of three types of indicators either independently or in combination – pressure indicators, state indicators and response indicators:

- pressure indicators characterise the direct pressure on the environment;
- state indicators give an overview of the state of environment;
- response indicators characterise technical or management measures implemented for improving the state of environment.

Every indicator independently shows its type; most indicators also refer to the most important environmental or background indicators associated with them.

The environmental indicator-based publication is for everyone interested in the state of the Estonian environment. The publication includes a strategic target, time series and short analysis of every major environmental topic based on the most recent data available in the first half of the year 2012.

Estonian Environment Information Centre publications are available at http://www.keskkonnainfo.ee
# Table of Contents

1. **Background indicators**
   - Estonia’s population
   - Gross domestic product
   - Production and consumption of primary energy
   - Industrial output
   - Agricultural output
   - Cargo turnover by category of transport
   - Passenger turnover by category of transport
   - Land use

2. **Mineral resources**
   - Oil shale mining and reserves
   - Peat harvesting and reserves
   - The fee for extraction right of mineral resources

3. **Fisheries**
   - Fishing in the Baltic Sea
   - Fishing in Lake Peipsi, Lake Lämmijärv and Lake Pihkva
   - Status of fish stock in the Baltic Sea
   - Status of fish stock in Lake Peipsi, Lake Lämmijärv and Lake Pihkva
   - Fishing quotas of internationally regulated species of fish in the Baltic Sea
   - Fishing quotas in Lake Peipsi, Lake Lämmijärv and Lake Pihkva

4. **Game animals**
   - Hunting limits of large predators and the number of hunted individuals
   - Number of large predator litters

5. **Water**
   - Water abstraction and water use
   - Point source pollution load into inland bodies of water and the sea
   - Status of groundwater
   - Ecological status of coastal waters
   - Ecological status of watercourses
   - Ecological status of lakes
   - Price of water
   - Rates of pollution charges for emission of pollutants into aquatic environment

6. **Forest**
   - Share of felling in increment
   - Growing stock
   - Status of forests
   - Share of strictly protected forests
7. Biodiversity
Intersection of main roads network with green network
Share of land improvement systems by ecosystems
Endangerment of biodiversity in ecosystems
Assessment of the status of the European Union Habitat Directive’s habitats
Ecosystem protection

8. Air and climate
Emissions of pollutants in PM$_{10}$ equivalent
Emissions of acidifying substances
Particle concentrations in cities and limit values exceeded
Sulphur dioxide concentration in cities and background stations
Rates of pollution charges for emission of pollutants into ambient air
Emissions of greenhouse gases
Annual average air temperature
Annual average precipitation
Production and consumption of renewable energy

9. Waste
Waste generation
Hazardous waste generation
Municipal waste generation and handling
Packaging waste generation and recovery
Disposal of waste in landfills
Number of landfills in use and classification
Recovery of waste

10. Environment and health
Solar ultraviolet radiation
Concentration of caesium in the environment
Quality of drinking and bathing water
Dangerous substances in the fish of the Baltic Sea

11. Funding
Funding of environmental protection projects from
the Environmental Programme of the Environmental Investment Centre
1. Background indicators
Estonia’s population

Estonia’s population is continuously decreasing. In terms of population, Estonia is one of the smallest countries in Europe. An estimated 1,339,662 people lived in Estonia as of 1 January, 2012. Like in Finland and Sweden, Estonia’s population density is one of the smallest in Europe – 30.8 people/km². 930,240 people lived in urban settlements and 409,422 people in rural settlements at the beginning of 2012. In recent years, the relative importance of population in rural settlements has stabilised, constituting about 30% of the total population.

As of the beginning of the 1990s, Estonia’s population has continuously decreased, and this trend is predicted for the future as well. This is due to low birth rate, especially in the 1990s, and also emigration at the beginning of the 1990s. Birth rate decreased until 1998. This century, the decrease in population has stabilised somewhat as a result of a slight increase in the birth rate and a decrease in the death rate. In 2010, natural growth was positive for the first time since 1990 – the number of births exceeded the number of deaths. Estonia’s crude birth rate, which shows the number of births per 1,000 population, was 11.81 in 2010, which is at a fairly similar level to the European Union’s average (10.70).

Increasing life expectancy and low mortality has caused the ageing of population. The proportion of people over 65 years of age in Estonia’s population is 17.2% as of 1 January, 2012. Life expectancy of men and women living in Estonia differs by ten years, which means that the difference between male and female life expectancy here is one of the highest in Europe.

As of 2010, the life expectancy of Estonian women is 80.5 years and 70.6 years for men. Male life expectancy in Europe is lower only in Latvia and Lithuania.

Gross domestic product

In the last few years, gross domestic product has started to increase again.

Estonia’s gross domestic product (GDP) increased rapidly from 2000. During 2000–2007, the yearly increase of GDP stayed around 6–7%. In 2006, Estonia’s yearly increase of GDP was over 10%. In 2006, Estonia thus held the second place in Europe behind Latvia for economic growth. Rapid economic growth was mainly due to high domestic demand, which was helped along by good loan terms. Private consumption was also promoted with positive trends on the labour market, consumers’ sense of security towards economy, rapid salary growth, reducing income tax and the increase of retirement pensions. Investments also increased, the rapid growth of which was due to active investing by companies thanks to low interest margins and large influx of foreign investments.

Estonia’s economy started to simmer down in 2007 due to decreased domestic demand. As a result of large price increase and decrease of population’s sense of security, private consumption started to decline. The recession also affected the real estate market that had previously been developing rapidly. In 2008, domestic demand continued to decrease and because the effect of the global financial crisis also reached Estonia’s main trading partners, Estonia’s economy went into a rapid decline. In 2009, GDP decreased more than 14% in comparison to the previous year. In the last few years, Estonia’s export volume has significantly increased, and domestic demand is also on the upturn. This has led to the recovery of Estonia’s economy – in 2011, GDP increased by 7.6% in comparison to the previous year. However, a steep deceleration is predicted for Estonia’s economic growth due to the debt crisis in several Eurozone countries.

Gross domestic product and the change in comparison to the previous year. Data: Statistics Estonia.
Production and consumption of primary energy

Energy intensiveness in Estonia is still one of the highest in Europe.

The need for primary energy and end energy consumption decreased significantly in the first half of the 1990s due to the changing economic situation. Energy production and consumption returned to growth as of 2000. The increase in energy consumption was influenced mostly by general consumption, economic growth and the improvement in the quality of life. In 2008 and 2009, both consumption and production of energy decreased a little due to the economic crisis, but in 2010, energy production was on the rise again.

The production of primary energy reached the highest level since the beginning of 1990s, having increased nearly 50% in the last ten years. At the same time, oil shale output has also increased, which was at its highest since 1992 in 2010. Export of electricity, which constitutes about a third of Estonia’s total electricity production, has increased significantly. Production of shale-derived oil has also increased.

Continued use of obsolete, energy-inefficient equipment and technology has led to high energy expenditure in buildings, losses in the energy transmission and distribution and high energy intensiveness of the economy, all of which increase energy demand. Energy intensiveness, which shows energy expenditure per one unit of gross domestic product, has decreased in comparison to the 1990s, but is still one of the highest in Europe.

Associated indicators
Gross domestic product - pg 8
Oil shale mining and reserves - pg 16
Production and consumption of renewable energy - pg 58

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Primary energy production and end consumption compared to gross domestic product (chain index). Data: Statistics Estonia.
Industrial output has been inconsistent over the last few years, thus reflecting general economic trends. Until 2007, industrial production capacity was constantly increasing. This was due to domestic demand and growth of export. The effect of the global financial and economic crisis came to play in 2008. The growth of industrial output stopped and then went into steep decline both in the domestic and foreign market in the last few months of the year as a result of decreased demand. In 2010, foreign demand increased again, and domestic demand started to improve a little over the year as well, which pushed the industrial output into an abrupt growth. The growth continued in 2011, but the current increase of industrial output stopped at the end of the year. Because the current growth of industrial output had primarily taken place due to the increase in foreign demand, the deceleration of economic growth in European Union countries had an adverse effect on further growth.

The majority of Estonia’s industrial output, approximately 87%, is produced by processing industry - primary sectors are processing wood and metal, manufacturing electronics and the food industry. Until 2007, the share of processing industry in Estonia’s total industrial output was constantly increasing, reaching more than 90% of total production. After 2007, the share of processing industry in industrial output started to decline. At the same time, the share of energy industry had declined to 6% by 2007. However, it has increased again over the last few years, now constituting approximately 9% of industrial output. The share of mining industry constitutes about 4% of Estonia’s industrial output.

Associated indicators
Gross domestic product - pg 8
Oil shale mining and reserves - pg 16
Emissions of pollutants in PM₁₀ equivalent - pg 50
Emissions of acidifying substances - pg 51

Change in industrial output (until 2007, according to EMTAK 2003, as of 2005, according to EMTAK 2008) and gross domestic product (chain index). Data: Statistics Estonia.
Agricultural output

The growth of agricultural output is promoted by increased foreign demand.

The relative importance of agriculture in Estonia’s economy has decreased in comparison to the middle of 1990s, and agricultural sector’s competitiveness remains below the average of the European Union, but a large share of food products consumed in Estonia are nevertheless being cultivated/produced within the country. Over the last few years, the relative importance of agriculture in Estonia’s economy has started to increase again.

Animal husbandry plays the most important role in Estonia’s agriculture due to natural conditions. Dairy cattle constitute the largest part of bovine husbandry. In addition to bovine husbandry, pig, sheep, horse and poultry farms are also common. The number of farm animals is on a slow upturn, primarily due to the increase of pigs and sheep. The number of bovines, including dairy cows, on the other hand, is declining.

The surface area of arable land has increased over the last ten years. Most common arable crops here are grains that have the largest share both in terms of surface area and output. In respect to agricultural output, the growth of potato crops has decreased the most, having been replaced by wheat and oil seeds (rapeseed and turnip rape). Arable crops with a high export potential have increased in proportion the most. The export of both wheat and rape and oil seed constitutes nearly half of the total output. The growth of agricultural output over the last few years is precisely due to increased foreign demand.

Associated indicators
Gross domestic product – pg 8
Water abstraction and water use – pg 30
Status of groundwater – pg 32

Change in agricultural output and gross domestic product (chain index). Data: Statistics Estonia.
Note: Data regarding agricultural output of 2011 is estimated.
Estonian Environmental Strategy 2030:
• develop an effective population and production structure to reduce road transport.

Over the last few years, cargo turnover has decreased due to recession.

In 2011, nearly 81 million tonnes of cargo was transported in Estonia’s transport sector. Its cargo turnover reached 15.09 billion tonne-kilometres. The share of international transport in cargo turnover was 12.98 billion tonne-kilometres (almost 80%). Road transport constitutes the greatest share of cargo turnover, followed by railway transport and sea transport. Air transport constitutes only 0.01% of all cargo turnover; inland water transport likewise has a marginal importance.

The period from 2000–2006 is characterised by an annual increase in cargo turnover due to increased road transport. In 2007, cargo turnover remained on a level comparable to the year before, but in 2008 it dropped significantly – by almost 25%, due to a decrease in both domestic and international transport. By 2009, cargo transport had decreased even further, which can be associated with the changes in the general economic situation. Cargo transport had increased a little by 2011 and has once again reached the level comparable to 2008.

Changes have been the greatest in international transport, seen above all with regard to rail transport in the last couple of years. Compared to the beginning of the decade, the share of international transport in sea transport has decreased. The overall proportion of international transport in cargo turnover has thus dropped from 91% in 2000 to 86% in 2011. Changes during the period 2000–2011 can be directly correlated with the overall economic situation and they do not point in any way to development of population and production structure that would reduce road transport.

Even though compared to 2000, cargo turnover had decreased by 2011, the changes are more a reflection of the general economic situation and not compliance with the objectives set in the Estonian Environmental Strategy.

Associated indicators
Gross domestic product – pg 8
Emissions of pollutants in PM₁₀ equivalent – pg 50
Emissions of acidifying substances – pg 51

Cargo turnover by category of transport. Data: Statistics Estonia. Note: Cargo turnover describes the amount of work performed in cargo transport, measured in tonne-kilometres. One tonne-kilometre corresponds to the transport of one tonne of goods for a distance of one kilometre.
Passenger turnover by category of transport

Estonian Environmental Strategy 2030:
• develop an efficient, environmentally sustainable and convenient public transport system, which would result in an increase in public transport.

Passenger turnover of the last few years is characterised by a slight growth, but this is mostly due to an increase in travelling. The overall number of people using public transport is constantly decreasing.

In 2011, passenger turnover was a total of 4.7 billion passenger-kilometres. In the period 2001–2011, overall passenger turnover has increased somewhat, but decreased 35% compared to 1990. The growth in passenger turnover in recent years is above all due to the significant increase in the share of sea and air transport.

The greatest share of passenger turnover is held by road transport (47%), which includes bus, trolley and tram transport. It is followed by sea, air, railway and inland water transport in order of importance.

Despite the increase of passenger turnover in recent years, the overall number of passengers has decreased annually. While in 2001, 249 million passengers used the services of Estonian transport enterprises, in 2011 the figure was 159 million, i.e. 90 million less. The number of passengers using international transport grew from 4.4 million to 8.1 million in the same period.

The most important type of domestic transport is road transport. At the same time, use of public transport has continuously been decreasing due to an inefficient public transport system (especially between rural settlements) and the increase in the number of passenger vehicles.

The share of international transport is predominantly in sea and air transport, and the overall passenger turnover has grown above all due to the increase in passenger turnover on international transport operations. From 2001 to 2011, passenger turnover on international transport increased over a two fold, while domestic passenger turnover decreased by 13% during the same period.

-associated indicators-
Gross domestic product – pg 8
Emissions of pollutants in PM<sub>10</sub> equivalent – pg 50
Emissions of acidifying substances – pg 51
Estonian Environmental Strategy 2030:
• preserve coherent and multifunctional landscapes.

In the last decade, Estonia’s land use has above all been characterised by the increase in forest areas and decrease in grassland areas.

Last 40 years show significant changes to most land use classes. In 2010, 49.8% of Estonia was covered in forests, whereas forest area has increased by 270,000 hectares since 1970. Despite intensified deforestation and expanding settlement areas and infrastructure over the last decade, forest area has remained stable due to constant reforestation and afforestation of grasslands.

The area of natural and semi-natural grasslands, on the other hand, has decreased by more than twice. While in the 1970s, 17% of Estonia’s territory was covered in grasslands, the share of grasslands in 2010 was only 8%, i.e. an estimated 346,000 hectares. Meadows were destroyed in the 1970s by cultivating them into fields, but in the 1990s grasslands grew into brushwood as a result of cessation of human activity - mowing and grazing stopped – and were replaced by forest communities over time.

The share of cultivated land in Estonia increased during the period 1970–1990, when agricultural lands constituted 25% of Estonia’s area. The importance of agriculture in Estonia diminished after the subsequent restoration of independence and dissolution of collective and state farms, which led to abandoning fields and their growing into bushes. During 1990–2000, the area of agricultural lands decreased by more than 45,000 hectares. As of 2004, after Estonia joined the European Union, however, the area used for agricultural production has slowly increased, and in 2010, the estimated area of agricultural lands was 1.078 million hectares.

The area of settlements, including residential land and infrastructure area, has been expanded annually. Over the last 40 years, area of settlements has increased by 68,000 hectares, covering 301,000 hectares of land in 2010, which is 6.6% of Estonia’s area.

Forest area has increased by 14% over the last 40 years.
The use of agricultural land has been on the upturn since joining the European Union.
The area of settlements and infrastructure has expanded and is continuing to grow.
As of the 1970s, the area of grasslands has decreased by more than twice.

Associated indicators
Agricultural output – pg 11
Share of felling in increment – pg 39
Growing stock – pg 40
Emissions of greenhouse gases – pg 55

Changes in land use during the period 1970–2010 (LULUCF - land use, land-use change and forestry). Data: Estonian Environment Information Centre; NFI. Note: Land use classes are determined according to the instructions of the committee of the Intergovernmental Panel on Climate Change (IPCC); forest coverage has been assessed according to the definition of a forest provided in the Kyoto Protocol, which is why the assessment differs from that provided in Estonia’s Forest Act.
2. Mineral resources
Oil shale mining and reserves

Estonian Environmental Strategy 2030:
- environmentally sustainable mining of mineral resources that saves water, landscapes and air. Efficient use of mineral natural resources with minimal losses and minimal waste. Keep oil shale mining volumes below the base level, i.e. 11.3 million tonnes per year.

Oil shale development plan:
- 15 million tonnes per year has been set as the upper limit for mining for the year 2015.

**Increased demand for shale-derived oil has also increased the volume of mining oil shale.**

Oil shale is Estonia’s most important energy-containing mineral resource. Oil shale is mostly used in the energy sector; only about 1% of all oil shale is consumed in the industrial sector. About 70–80% of oil shale mined is used to generate heat and power; 80–90% of Estonia’s electricity is produced from oil shale. In recent years, oil shale’s share in electricity production has decreased due to the increasing share of renewable energy. Oil shale is also used to produce heating oil, oil coke, pitch, bitumen and other by-products. As a result of increased demand for shale-derived oil, the consumption of oil shale for producing oil has increased, and the share of producing heat and power in the consumption of oil shale has decreased in recent years.

In 2010, the volume of mining oil shale was somewhat lower than at the beginning of the 1990s, but it has been moving upwards as of 1999. While in 1998, oil shale output was 9.6 million tonnes, it reached 15.1 million tonnes in 2010. The increase in oil shale mining volumes is, on the one hand, conditioned by the increase in electricity production; on the other hand, demand for oil shale as a raw material for oil and chemical products has seen continuous growth. The rise in oil prices created even greater interest in crude shale-derived oil production. According to the oil shale development, 15 million tonnes per year has been set as the upper limit for mining for the year 2015 – this limit was reached in 2010.

Due to the different methodologies and views in determining oil shale reserves, a wide variety of data are presented regarding the amount of oil shale reserves. With regard to calculating oil shale reserves, it is important that possible changes in economic expediency and technologies are considered along with the environmental restrictions imposed on mining.

Oil shale output is growing and has reached the 15 million tonnes per year mark set as the upper limit for mining in 2015.

The environmental strategy’s objective of keeping mining volumes under the level of 2005 has not yet been achieved.

**Associated indicators**

- Gross domestic product - pg 8
- Production and consumption of primary energy - pg 9
- Industrial output - pg 10
- The fee for extraction right of mineral resources – pg 18

*Oil shale output and oil shale reserves. Data: Statistics Estonia.*
Peat harvesting and reserves

Estonian Environmental Strategy 2030:
- environmentally sustainable mining of mineral resources that saves water, landscapes and air.
Efficient use of mineral natural resources with minimal losses and minimal waste. Keep peat harvesting volumes below the base level, i.e. 1.074 million tonnes per year.

The volume of harvesting peat significantly exceeds new peat formation

Peat harvesting has fluctuated from one year to the next, depending on the amount of precipitation. An average of one million tonnes of peat is harvested each year. In terms of formation and use, peat is divided in two – undecayed peat located in the upper layer of bogs and well-decayed peat in the lower layer and the entire bed of fens. Undecayed peat constitutes about 15% and well-decayed peat 85% of the total peat reserve. Harvested peat is more or less distributed equally between undecayed and well-decayed peat. The exception were the years 1999 - 2002, when undecayed peat made up about 80% of all harvested peat. It is economically more profitable to harvest undecayed peat that is used foremost as a substratum. Well-decayed peat is mainly used for heating. Even though the share of harvesting well-decayed peat, which constitutes the majority of peat reserves, has increased in comparison to the beginning of the 2000s, harvesting cannot be estimated to be proportional in terms of distribution of reserves.

Peat reserves are unevenly distributed in Estonia – the largest peat reserves are located in the marshes of Pärnu County, Järva County, Harju County, Ida-Viru County and Jõgeva County. For this reason, the peat harvest varies significantly by county – in 2010, the greatest amount of peat was mined in Pärnu County (32%), followed by Tartu County (15%), Harju County (13%), Ida-Viru County (11%) and Järva County (7%). In 2010, total of 923,500 tonnes of peat was harvested. According to a study conducted by the Tallinn University Institute of Ecology, all mires in a natural state together produce an annual increment of 400,000 to 550,000 tonnes of peat. Thus peat harvesting currently exceeds the current annual increment nearly by double, as a result of which harvesting in current volume is not sustainable.

Considering the annual increment of 400,000 to 550,000 tonnes in natural marshland, harvesting exceeds increment twofold. Even though undecayed peat makes up only 15% and well-decayed peat 85% of all peat reserves, these are harvested approximately equally.

Associated indicators
The fee for extraction right of mineral resources – pg 18
Annual average precipitation – pg 57

Estonian Environmental Strategy 2030:
- environmentally sustainable mining of mineral resources that saves water, landscapes and air.
Efficient use of mineral natural resources with minimal losses and minimal waste.

The fee for extraction right of mineral resources has increased significantly in recent years.

The fee for extraction right of mineral resources is paid for mining, using or turning mineral resources belonging to the state unusable. The price of the fee for extraction right of mineral resources is determined by the Government of the Republic.

Mining conditions, quality of mineral resources reserve, field of use, damage to other natural resources and necessity for protection are considered when determining the fee rates. The objective of the fee is to regulate sustainable use of mineral resources. It also helps to cover expenses made for improving the status of the environment, thus compensating the potential damage associated with mining. Accrued fee for the extraction right is transferred entirely into the local government’s revenue base if mineral resources are mined at a mineral deposit of local importance. If mineral resources are mined at a mineral deposit of national importance, 50% of profits that were valid as of 2009 are transferred to the local government’s revenue base, while the rest of the profit goes into state budget.

Fees for the extraction right of mineral resources have continuously increased. In 1990, the fee rates were small due to the state’s poor economic position and the population’s low solvency. The fees for extraction right have significantly been on the rise during the last ten years in particular. Largest leaps in the price of fees took place in 2006 when the Government of the Republic’s regulation regarding the fees for extraction right of mineral resources for the years 2006–2009 took effect and in 2010 when an analogous document for the years 2010–2015 took effect. Fee rates were amended in the autumn of 2012.

The price increase of the fee for extraction right of oil shale has been steadier than that of peat due to oil shale’s importance as an energy-containing mineral resource. In order to promote the processing of well-decayed peat in addition to using economically more profitable undecayed peat, the fee for extraction right of undecayed peat is about one fifth higher.

Fees for the extraction right have increased to a level where they can now be considered somewhat stimulating to environmental protection.

Associated indicators
Oil shale mining and reserves – pg 16
Peat harvesting and reserves – pg 17
Funding of environmental protection projects from the Environmental Programme of the Environmental Investment Centre – pg 75

Minimum fees for the extraction right of oil shale and peat. Data: Government of the Republic regulation “Fees for the extraction right of mineral resource reserves belonging to the state”.

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Pressure indicator / State indicator / Response indicator
3. Fisheries
Fishing in the Baltic Sea

Estonian Environmental Strategy 2030:
- preserve the fish stock’s ability to naturally reproduce themselves despite the strain imposed by industrial fishing.

The management of primary industrial species of fish is conducted according to the status of fish stock, but the current use of reserves is estimated to be irrational in respect to some species.

The most important industrial species of fish in the Baltic Sea are sprat and Baltic herring, followed by cod, perch, flounder, pike–perch, European smelt, garfish and pike. In 2011, Estonian fishermen caught 34,976 tonnes of sprat and 25,325 tonnes of Baltic herring. Over the last nine years, an average of 44 thousand tonnes of sprat and 27 tonnes of Baltic herring was caught per year. The steep increase in the cod catch in 2011 is a result of improvement in resources in the southern part of the Baltic Sea and the associated increase in catch limitations to trawler vessels. In recent years, cod yield has also increased in Estonian waters, but their number is still at a level which does not allow us to talk about the existence of industrial resource. Perch caught has been relatively stable in recent years, but scientists say that perch stock is not being managed in the most rational way. Flounder abundance mainly depends on the inflow of salt water into the Baltic Sea, and an increase in yield may be expected a few years after higher than average inflow of salt water into the Baltic Sea. In 2011, pike–perch caught was at the level of the last nine year’s average. Due to bycatch of undersized fish, scientists assess the use of pike–perch stock in the Pärnu Bay to be irrational. Reasons for the steep decline of European smelt caught in the last two years are due to overfishing and unsuitable spawning conditions. Garfish arrive to spawn in our coastal waters from the Atlantic Ocean and are caught during a relatively short period, which makes analysing the reasons for the fluctuating yield in more detail impossible. Pike caught in Estonian coastal waters has increased in the last two years and in six years is starting to exceed the average caught of the last nine years.

- Cod yield has increased.
- The sprat and Baltic herring caught has been reduced in recent years in order to ensure a stable status of the fish stock.
- Management of both perch and pike–perch stock in the Pärnu Bay are estimated to be irrational.
- European smelt caught has been decreased by overfishing and unsuitable spawning conditions.

Associated indicators
Status of fish stock in the Baltic Sea – pg 22
Fishing quotas of internationally regulated species of fish in the Baltic Sea – pg 24

Due to the status of fish stock, mainly perch, pike-perch and bream are caught in Lake Peipsi, while cold-water fish stock is at a low.

In 2011, as before (since the 1990s), cold-water fish (vendace, whitefish and burbot) stock is at a low. In 2007, smelt was added to the list with zero yields; the same situation unfortunately repeated in 2011. Warm-water and moderate water fish (pike-perch, perch, bream, roach, ruffe and pike) yields, on the other hand, were at an average or good level in 2011, although pike-perch caught was significantly smaller than a year before. The aforementioned tendencies (fish caught and the ratio of species in the caught) are the consequences of climatic changes and therefore the development of the lake’s ecosystem and fishing organisational measures. Industrial fishing was still based on 5–6 species of fish (ruffe is not caught a lot in Estonia). The primary fish to catch was perch for the fourth time already, followed by bream, pike-perch and roach. Pike caught is on the upturn. Whitefish reached its historical minimum. Vendace was caught for industrial purposes for the first time this century; the lake’s total catch was 6 tonnes, of which nearly 0.5 tonnes was in Estonia.

Fishing in Lake Peipsi and Lake Läänmijärv is seasonal due to fishing regime, composition of stock, fishing interest and natural conditions. Fishing periods with the highest yields are usually in the spring and summer. Perch and bream are caught a lot in the spring and autumn, pike-perch in the winter and autumn, roach, burbot and ruffe in the spring and pike in the autumn.

Warm-water and moderate water fish (pike-perch, perch, bream, roach, ruffe and pike) stocks are at an average or good level.

Cold-water fish (vendace, whitefish, burbot, smelt) stocks are still at a low.

Associated indicators
Status of fish stock in Lake Peipsi, Lake Läänmijärv and Lake Pihkva - pg 23
Fishing quotas in Lake Peipsi, Lake Läänmijärv and Lake Pihkva - pg 25

Data: Ministry of the Environment.
Status of fish stock in the Baltic Sea

Estonian Environmental Strategy 2030:
• ensure a good status of fish stock.

The status of most fish stock in Estonia’s coastal waters is good or stable.

The stock of primary industrial species of fish – sprat and Baltic herring of the Gulf of Riga – has been good over the last three years, and the stock of Baltic herring in the Baltic Proper has been at a low. The use of all three stocks has been at a very high level. In recent years, permitted fishing capacities have been significantly reduced, and thus stabilisation of stock and a certain increase in yields can be expected in the upcoming years. Cod is managed according to the management plan of the European Union, and pursuant to that, fishing mortality level determined by scientists is kept within certain limits and stock is used moderately. Status of cod, flounder, pike–perch, garfish and pike in Estonia’s coastal waters has been stable over the last three years. Garfish stock is estimated mainly based on the comparison of annual yield indicators – garfish only arrives to spawn in Estonian coastal waters, which makes it difficult to accurately assess the stock. Reasons for the decrease of European smelt stock are a decrease in the spawning stock and unsuitable spawning conditions.

Sprat and the Gulf of Riga’s Baltic herring stocks are in good condition. Baltic herring stocks in the Baltic Proper are at a low.

Associated indicators
Fishing in the Baltic Sea - pg 20
Fishing quotas of internationally regulated species of fish in the Baltic Sea - pg 24

Abundance of industrial fish stock and level of use (abundance of stock: 1 - high, 2 - moderate, 3 - low, 4 - exhausted, 5 - not researched; use of stock: A - low or no fishing mortality, B - moderate, C - high, D - insufficient data)

<table>
<thead>
<tr>
<th>Species of fish</th>
<th>Abundance of stock</th>
<th>Use of stock</th>
<th>Abundance of stock</th>
<th>Use of stock</th>
<th>Abundance of stock</th>
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Data: Ministry of the Environment.
Status of fish stock in Lake Peipsi, Lake Lämmijärv and Lake Pihkva

Estonian Environmental Strategy 2030:
• ensure a good status of fish stock.

Lake Peipsi’s cold-water fish stock is still at a low; the status of other species is average or good.

Lake Peipsi, Lake Lämmijärv and Lake Pihkva’s fish stock is assessed according to the estimations of abundance and biomass based on test trawling and fishing statistics. Status of pike–perch stock can be considered satisfactory. A new generation of pike–perch has emerged, but its feeding conditions and thus increasing its stock is worse than when the lake’s smelt stocks were in good condition. The generation of pike–perch with the high abundance and mass of 2009, whose sustainable management could ensure a stable, average yield for the upcoming years, has survived. Perch stock is currently at a good level. The strong generation of perch of 2009 constitutes the majority of the stock of 2012. The status of pike has improved and its stock is on the upturn. Pike generations of 2006–2007 constitute the majority of industrial stock; pikes born in 2008 will be free to be fished in autumn 2012. Status of bream is good, its stock and yields are at a high level. Bream stock and yields of 2012 are based mainly on the bream generations of early and mid–2000s. Estonia’s roach stock is stable and at an average level.

Smelt stock and yields are at the lake’s historical low; its recovery is currently doubtful. In recent years, the increasing rate of smelt has been quicker than usual. Industrial smelt fishing is out of the question in the upcoming years.

Perch and smelt stocks are at a good level; the status of pike stock is improving.

The status of pike–perch is satisfactory; roach stock is at an average level.

Smelt stock is at a low and its recovery is doubtful.

Associated indicators
Fishing in Lake Peipsi, Lake Lämmijärv and Lake Pihkva - pg 21
Fishing quotas in Lake Peipsi, Lake Lämmijärv and Lake Pihkva - pg 25

Abundance of industrial fish stock and level of use (abundance of stock: 1 - high, 2 - moderate, 3 - low, 4 - exhausted, 5 - not researched; use of stock: A - low or no fishing mortality, B - moderate, C - high, D - insufficient data)

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Data: Ministry of the Environment.
Fishing quotas of internationally regulated species of fish in the Baltic Sea

Estonian Environmental Strategy 2030:
- manage fish stocks pursuant to the ecosystem as a whole.

In order to ensure a good status of fish stocks, fishing quotas of primary industrial species of fish have decreased in recent years.

Fishing quotas of internationally regulated species of fish in the Baltic Sea are agreed annually in the European Union, and Estonia’s permitted fishing capacity is determined according to historical fishing share. The basis for making the decision is a scientific assessment prepared by the International Council for the Exploration of the Sea (ICES) and reviewed by a Scientific, Technical and Economic Committee for Fisheries (STECF). In respect to Baltic herring and sprat, ICES has developed the levels of fishing mortality, the objective of which is to ensure a long-term maximum yield, in order to manage stocks in a more rational manner. In recent years, the decrease of fishing quotas of sprat and Baltic herring has largely been due to the new approach that has now been taken as a basis for managing fish stock. Quota for cod is imposed according to the cod management plan passed in the European Union at the end of 2007. This prescribes the new permitted levels of fishing mortality in order to ensure a long-term maximum yield. Over the last four years, cod management in the eastern part of the Baltic Sea (most important stock unit for Estonia) has been in accordance with the cod management plan, and because of this, the quota has increased somewhat. Salmon management plan is currently being developed in the European Union; its objective is to pull salmon stock out of the slump, which would allow increasing the quota in some years’ time.

The decrease of fishing quotas for Baltic herring and sprat in recent years has been due to the new approach to managing fish stock in a more rational manner.

Salmon fishing quota has annually decreased due to the low level of salmon stock in the Baltic Sea.

**Associated indicators**
Fishing in the Baltic Sea – pg 20
Status of fish stock in the Baltic Sea – pg 22
Fishing quotas in Lake Peipsi, Lake Lämmijärv and Lake Pihkva

Estonian Environmental Strategy 2030:
- manage fish stocks pursuant to ecosystem as a whole.

Fishing quotas of Lake Peipsi reflect the status of fish stock in the lake – in recent years, the quota for perch has increased the most, while the quota for smelt has decreased to an almost non-existent level.

Because Lake Peipsi is a transboundary body of water, the fishing quotas for Lake Peipsi, Lake Lämmijärv and Lake Pihkva are determined in collaboration with Russia. The status of fish stock is taken into account when determining fishing quotas, which is why the changes in the quota usually also illustrate the changes in the lake’s overall fish fauna.

One of the more significant changes is the decrease in the quota for smelt that has been minimal or non-existent in recent years – smelt that prefers cleaner and cooler water and feeds on plankton has almost disappeared from Lake Peipsi. The number of smelt has decreased due to the increase of nutritional value of the body of water and deterioration of water quality, also strong generations of carnivorous fish (pike-perch, perch). Perch quota has increased the most in recent years.

Considering the status of fish stock, Estonia’s quota for pike-perch, bream, pike and vendace increased in Lake Peipsi, Lake Lämmijärv and Lake Pihkva in 2012. In comparison to 2011, the quota for perch decreased significantly as a result of small growing rate and high mortality of the prolific generation of 2009. Quota for roach and whitefish also decreased slightly.

☞ Quota for perch has significantly increased in recent years, but it decreased abruptly in 2012.
☞ Lake Peipsi’s smelt has practically disappeared from the lake and its fishing quota is non-existent.

Associated indicators
Fishing in Lake Peipsi, Lake Lämmijärv and Lake Pihkva – pg 21
Status of fish stock in Lake Peipsi, Lake Lämmijärv and Lake Pihkva – pg 23
4. Game animals
Development plan 2012–2021 for protecting and managing large predators:
• keep the abundance of wolf and lynx within desired limits by hunting. Continue hunting bears mainly to maintain their
  timidness towards humans and reduce damages inflicted on bears, at the same time promoting the expansion of its propagation
  area southwards.

Over the last ten years, hunting large predators has become significantly more regulated.

The abundance of wolves and lynxes is attempted to be kept within desired limits with regulated
  hunting; the necessity for hunting bears is justified mostly by preventing damage and conflicts. Hunting
  quotas (maximum permitted hunting capacities) are developed prior to each hunting season according to the
  specific objectives annually set within the boundaries of protection and management plan of large predators
  and observation results. Predictions of an increase in population are prepared every year and are pointed
  out in surveillance reports and hunting proposals.

Increasing the population of wolves was an objective in 2002–2006, but as of 2007, the goal has been to
  maintain the size of the current population or reduce it - the limit has been met modestly in years with
  unfavourable snow conditions (2007 and 2009), which has caused a recent increase in abundance over the
  desired limit. An important problem due to a larger than desired abundance of wolves is a great number
  of damages (mostly to sheep farming).

Similarly to wolves, the objective was to increase lynx population until the year 2007; in 2008, the
  attempt was to maintain the existing number, and in 2009–2010 it was to reduce it due to a sharp decrease
  in the environment’s bearing capacity. Reducing the abundance of lynx was considered important in
  those years in order to speed up the recovery of roe deer population, which in turn would ensure the
  improvement of lynx increment. As the abundance of lynx decreased close to the desired minimum level, the
  hunting limit of lynx was once again significantly decreased in 2011.

The desired abundance of bear has no upper limit due to an existence of suitable but not yet inhabited
  habitation in Estonia. Because there is no upper limit, there is also no need to regulate its abundance. Hunting
  foremost regulates the population density of bears and does it in a manner that does not hinder the continuing
  expansion of its propagation area.

- The abundance of wolves exceeds the desired upper limit, which increases damages, in particularly
  to sheep farming.
- It has been necessary to temporarily significantly reduce the abundance of lynx in order to speed up the
  recovery of roe deer population.
- There are plenty of uninhabited habitations suit- able for bears and thus there is no desired upper limit
  for the abundance of bears.

Associated indicators
Number of large predator litters - pg 28

Development plan 2012–2021 for protecting and managing large predators:
• annually achieve and maintain 15–25 wolf and 100–130 lynx reproductive litters and at least 60 bear litters with same-year cubs.

The status of large predator populations is good. There are reliable data regarding the abundance of wolf, lynx and brown bear from 2003 when contemporary surveillance system for large predators was developed and implemented. The species’ propagation and size of population is assessed based on reproductive litters that are relatively easier to distinguish from one another, unlike individuals, and reflect the area’s permanent habitation the best.

The population of wolves was at a low after intensive, insufficiently regulated hunting until 2005; in 2006, there were 15 wolf litters in Estonia and it has fluctuated from 17 to 32 since. First numbered limits for hunting wolves were imposed in 2001. Each fertile female plays a significant role in the increment of wolves as a species with a fairly low number but high increment potential, which is why the relatively large fluctuations of abundance from year to year are expected and difficult to predict.

The abundance of lynx increased to the maximum in 2008–2009 as a result of imposing hunting limits and has decreased since then. The main reason for the decrease in recent years has been a significant decrease in natural increment rate simultaneously with increasing the hunting strain. The reason for this is the steep, multiple decrease in the abundance of roe deer as the primary prey for lynx in the winter of 2009/2010, which was unusually long, snowy and cold. The sharp decline in the prey species led to a situation where the abundance of lynx exceeded the environment’s bearing capacity in 2010.

The abundance of bears continuously increased in 2003–2008 and has remained stable since 2008. The annual number of litters with same-year cubs has remained between 65–70. The increase in abundance of bears is not related to an increase in population density in the central region, but rather to the expansion of propagation area mostly to western Estonia.

Number of lynx litters is within desired limits.
Number of brown bear litters exceeds the desired minimum.
Number of wolf litters fluctuates near the desired upper limit or exceeds it.

Associated indicators
Hunting limits of large predators and the number of hunted individuals – pg 27
5. Water
Water abstraction and water use

Estonian Environmental Strategy 2030:
- use natural resources economically.

Both water abstraction and water use have dropped significantly since the 1990s, but have remained fairly stable in recent years. Domestic water consumption has increased and water consumption in manufacturing has decreased somewhat.

In the period 1990–2003, water abstraction dropped rapidly. In recent years, water abstraction has stayed around 100 million m³, whereas extraction of surface water has increased in the last three years. In comparison to the beginning of the 1990s, water use has more than halved in connection with a decline in production, improved metering of water and more sustainable use of water in domestic households and industry. Investments and political economic decisions that raised the price of water forced both the population and companies to save water and accelerated implementation of accurate metering of water and renovation of pipes and plumbing. In 2011, a total of 35 million m³ of water was used for human consumption, 25.4 million m³ was used for manufacturing and 4 million m³ for agriculture. Water use has been the most stable in agriculture, remaining between 4 and 5 million m³ in 1998–2011.

Decrease in water abstraction in larger water intakes in Tallinn, Pärnu, Tartu, Jõhvi, Kohta–Järve and Sillamäe led to the improvement of groundwater’s quantitative status in 2011. Ida–Viru County accounts for the majority of Estonia’s water abstraction, of which 90% constitutes cooling water for power plants and water pumped out of mines and quarries.

- Water abstraction and water use have been stable in recent years.
- In comparison to the 1990s, water abstraction and water use have significantly dropped.
- Ida–Viru County still uses large amounts of water due to the production of oil shale energy.

**Associated indicators**
Production and consumption of primary energy - pg 9
Industrial output - pg 10
Agricultural output - pg 11
Point source pollution load into inland bodies of water and the sea - pg 31
Price of water – pg 36
Estonian Environmental Strategy 2030:
- achieve a good status of surface water (including coastal water) and groundwater, and conserve bodies of water whose condition is good or high.

**In recent years, new wastewater treatment plants and sewage systems have been established in Estonia and existing ones have been reconstructed.**

Since 1992, pollution load has significantly reduced. In the last few decades, BHT$_7$ load has decreased nearly 95%; at the same time, phosphorus load has decreased nearly 84%. Nitrogen load has reduced 66%, but this indicator has continuously increased over the last three years, being 1.75 in 2009, 1.78 in 2010 and 1.89 thousand t/y in 2011. The reason has probably been water-rich years, when the proportion and load of rainwater have increased in the towns’ wastewater.

Overall pollution load has decreased above all due to the decrease in industrial manufacturing in the 1990s and large investments in Estonia’s water economy over the last couple of decades. Wastewater treatment plants and the majority of small cleaners in nearly all major settlements have either been reconstructed or new ones have been built. The same goes for sewage systems. In recent years, the drop in load has sped up thanks to significant investments that have led to building and renewing wastewater treatment plants in all of Estonia. One reason for the pollution load to decrease is also the increase in the rates of pollution charges and stricter requirements for wastewater treatment.

In 2011, nearly 99.9% of all wastewater that required treatment was treated. The quality of Estonia’s river water has also improved due to more efficient wastewater treatment. Organic pollution is an issue only in some small rivers or streams. The average phosphorus content in rivers has continuously decreased.  

- The share of secondary (biochemical treatment) and third level (phosphorus and nitrogen removal) treatment has remained relatively stable.  
- Point source pollution load has decreased in respect to BHT, and total phosphorus.  
- Some small cleaners are not yet properly operational.

**Associated indicators**

- Water abstraction and water use – pg 30
- Ecological status of coastal waters – pg 33
- Ecological status of watercourses – pg 34
- Ecological status of lakes – pg 35
- Rates of pollution charges for emission of pollutants into aquatic environment – pg 37
Status of groundwater

Estonian Environmental Strategy 2030:
- preserve or improve the status of groundwater, reducing the number of times that the limits for nitrates, plant protection products and other hazardous substances are exceeded.

The overall status of groundwater in Estonia has improved. After the 2007–2008 maximum, nitrate concentrations in groundwater have decreased significantly in nitrate vulnerable zone.

The general state of Estonian groundwater bodies can be considered good, except for the status of the Ordovician Ida–Viru oil shale basin groundwater body due to high sulphate content, high mineral content, hardness and presence of hazardous substances. Higher than permitted fluorine concentrations are seen primarily in the Silurian–Ordovician layers in western and central Estonia. Use of Cambrian–Vendian water is limited by excessive chloride and radon content in some places.

Due to the relatively low average share of agricultural land, nitrate contamination of groundwater is not a serious problem in Estonia on the whole. Increased nitrate concentrations are seen in the Pandivere and Adavere–Põltsamaa nitrate vulnerable zone which makes up 7% of Estonia’s total area. In that area, the share of land under cultivation and number of livestock exceeds the average in Estonia, and groundwater is in places unprotected or weakly protected. The quality of the upper groundwater layers of the nitrate vulnerable zone improved, as measured by nitrate ion concentration, until 1995, after which time the groundwater quality was relatively stable. As of 2006, nitrate concentration has risen significantly in the nitrate vulnerable zone, reaching the highest level in the Pandivere area in 2008. The reason for this is the resumption of intense agricultural production and weather patterns in 2007–2008 – the warm winter of 2007 and the rainy summer of 2008 promoted leaching of nitrates from the soil into surface water and groundwater. In 2009–2010, nitrate concentration decreased a little both in the Pandivere and Adavere–Põltsamaa area. In 2011, nitrate concentration has slightly increased again in both areas.

- The overall qualitative status of groundwater bodies in Estonia is good.
- In 2009–2010, nitrate concentration in groundwater decreased a little in nitrate vulnerable zone, but data from 2011 show a slight increase again.
- The reasons for developments in the nitrate vulnerable zone are not unequivocally clear, and the precise roles of weather patterns and human activity need to be ascertained.

Associated indicators
Agricultural output – pg 11
Water abstraction and water use – pg 30
Point source pollution load into inland bodies of water and the sea – pg 31
Rates of pollution charges for emission of pollutants into aquatic environment – pg 37
Annual average precipitation pg 57

Ecological status of coastal waters

Estonian Environmental Strategy 2030:
- achieve a good status of coastal waters and conserve marine bodies of water whose condition is good or high.

The moderate status of Estonia’s coastal waters stems from the load of nutrients originating both from Estonia’s territory and neighbouring countries, also from pollution that has accumulated in the Baltic Sea over the decades, which has led to severe eutrophication of the entire Baltic Sea.

Estonian coastal sea is divided into 16 coastal bodies of water, the status of which is assessed according to three quality elements – phytoplankton, macroinvertebrates and phytobenthos. The only coastal body of water in good condition is Kihelkonna coastal body of water west of Saaremaa. Ecological status of Haapsalu Bay has been classified as “poor”. Although Haapsalu’s modern wastewater treatment facility was completed in 1998, pollution accumulated in bottom sediments still has an effect due to the shallowness of the bay and poor water exchange. The boundaries of Haapsalu Bay and Matsalu Bay status class require adjustments considering the natural characteristics of the bays.

The status of macroinvertebrates is good in the whole of coastal waters. Phytobenthos is considered moderate only in the coastal bodies of water of Haapsalu Bay and Narva–Kunda Bay; the status is good elsewhere.

It is difficult to assess and associate the tendencies of water quality and ecological status with the changes to load factors – this is due to the yearly variability of weather, differences in water exchange with high seas and inertia of the ecosystem. Over the last couple of decades, a slight increase of nitrogen concentration has been observed in the bodies of water of Muuga–Tallinn–Kakumäe Bay and Narva–Kunda Bay. The maximum phosphorus concentration was in the beginning of the 2000s and has slightly decreased since then. Nitrogen concentration has been stable in the Pärnu Bay and the decrease of phosphorus concentration of the 1990s has ceased in the last decade.

- The amount of phosphorus led to the sea by wastewater and rivers has decreased over the last decade.
- Majority of coastal waters is in moderate status, and considering the general moderate status of the Baltic Sea and slow water exchange, a speedy recovery is not expected.
- The system for assessing the ecological status of coastal waters still requires improvement over the upcoming years. Assessments of some coastal water body status may therefore change in the future.

Associated indicators
Point source pollution load into inland bodies of water and the sea – pg 31
Rates of pollution charges for emission of pollutants into aquatic environment – pg 37
Ecological status of watercourses

Estonian Environmental Strategy 2030:
- achieve a good status of rivers and conserve rivers whose condition is good or high.

Three quarters of Estonian watercourses are in good and about 20% in moderate status.

Estonian rivers, streams and ditches are divided in 639 watercourses based on their type and status. Their ecological status is assessed on the basis of phytobenthos, large plants, macroinvertebrates, fish and water quality indicators.

Human activity has impacted either water quality (wastewater and agricultural diffused load) or hydro-morphological characteristics (drainage of arable and forest lands and establishing barrages) in nearly all Estonian watercourses. Ecological status is considered very good only in Peetri, Kaave, Punapea and Rõngu Rivers and in the lower course of Valgejõe River.

The polluting effect of wastewater from settlements and industry has significantly decreased over the last couple of decades. In comparison to the 1980s, agricultural diffused load has also dropped. Water quality in many rivers has therefore significantly improved, and the status of three quarters of Estonian rivers can be considered good. Water quality is poor in 15 watercourses. In respect to the largest rivers, water quality is poor in Vääna, Keila, Pudisoo and Selja Rivers. Water quality in Pühajõe River that was previously the most polluted river in Estonia can be considered good already.

In these days, the shape of the river bed due to land improvement and changes to water level and barrages that hinder fish migration affect the biota of rivers more than wastewater and diffused load. Water quality would allow good status in several rivers in poor and more than half of the rivers in moderate ecological status, but barrages and consequences of land improvement deteriorate the status. In respect to large rivers, Pärnu, Navesti, Halliste, Kasari, Pirita, Loobu, Kunda, Pedja, Põltsamaa, Võhandu and Valgejõgi Rivers can be given as examples.

- The pollution load caused by wastewater from settlements and industry has decreased, and the quality of river water and status of phytobenthos and macroinvertebrates has improved.
- The status of fish dependent on the hydro-morphological strain caused mainly by land improvement and barrages has remained without change in Estonian rivers.
- Nitrogen concentration in rivers that reflects the effect of agriculture has increased slightly in the last decade.

Associated indicators
Point source pollution load into inland bodies of water and the sea – pg 31
Rates of pollution charges for emission of pollutants into aquatic environment – pg 37
Estonian Environmental Strategy 2030:
- achieve a good status of lakes and conserve lakes whose condition is good or high.

**About 2/3 of the monitored small lakes are in good status. Lake Peipsi is in moderate and Lake Pihkva in poor status.**

The assessment of the ecological status of lakes is based on phytoplankton, flora, macroinvertebrates and water quality indicators. The class boundaries of fish have not been determined yet and fish has not been taken into account in the assessment.

The status of Lake Peipsi is affected most by the content of nutrients which has been fairly stable in recent years and has depended more on the yearly abundance of water and summertime temperature than changes to human impact. Phosphorus concentration in Lake Pihkva has increased in the last five years in comparison to the earlier period and this is the main reason why Lake Pihkva is in poor status. Phosphorus released from bottom sediments probably plays a significant role in the eutrophication of the lake. Unexpected disruptions that have a wide impact on fish may take place in the ecosystem of Lake Peipsi and Lake Pihkva due to the concurrence of heat waves and eutrophication. For example, very hot July in 2010 led to an extensive death of fish.

The status of large and shallow Lake Võrtsjärv is affected mostly by water level due to which the lake’s capacity may change up three times. This significantly hinders assessing the status of the lake, because natural fluctuations overshadow human impact and lead to different assessments in different years. The ecological status of Lake Võrtsjärv is most likely between good and moderate, whereas water quality can be considered good.

The status of small lakes is mostly good. Lake Karuöl and Lake Suurlaht in Saaremaa are in very good status; the status of Lake Saadjärv is also between very good and good. One-third of small lakes (including Ülemiste, Maardu, Tamula, Nõuni and Kaiu Lakes and Lake Vesijärv) are in moderate status. The status of Lake Harku and Võöla Sea are poor.

🔍 The pollution load in lakes has decreased; the status of a number of small lakes has improved.
🔍 Human impact on lakes has stabilised in recent years and their status depends more on weather conditions of different years.
🔍 Approximately one-third of small lakes are in moderate status. The status of Lake Pihkva, Lake Harku and Võöla Sea is poor.

**Associated indicators**

- Point source pollution load into inland bodies of water and the sea – pg 31
- Rates of pollution charges for emission of pollutants into aquatic environment – pg 37
Price of water

Estonian Environmental Strategy 2030:
• use natural resources economically.

The percentage of income spent on water and sewerage service has remained on the same level.

Application of the fee for the use of water and pollution charges and the gradual shift away from water price subsidisation policy have constantly increased the price of public water supply and sewerage. The average price of water service for the population in 2011 was around 1 euro per m³ of drinking water and 1.35 euro per m³ of waste water.

Domestic water consumption has significantly decreased in comparison to the early 1990s. In 2008, the use of domestic water increased somewhat, one reason for which is probably the increase of population connected to the public water supply system. Per capita use of water for domestic consumption was 69 m³ in 1992, while by 2004 it had fallen to 30 m³. The decline has continued and in 2011, the indicator was just a little over 26 m³ per person. In 1992, a total of 188 litres of water per person per day was used in the domestic sector, while the respective figure for 2004 was 83 and for 2011, nearly 72 litres. Water use in the domestic sector has fallen to a level where it cannot decrease any more for hygienic and technological (wastewater treatment and drainage) reasons. Price of water has thus fulfilled its role in making water consumption more economical, and the reason for the future inevitable increase in the price of water is the necessity to largely cover the expenses of water management.

In addition to political measures, the price of water is at times also regulated by natural conditions. The natural quality of groundwater often does not conform to drinking water standards. Excessive iron, manganese, ammonium, as well as, in places, radon and fluorine concentration leads to the need to treat drinking water and increases the price of water for consumers.

• The increase in the price of water has made consumers use water more economically and reduce losses both in the domestic and industrial sector.
• Modern water supply and wastewater treatment is expensive and the price of water still does not cover all necessary investment costs.

Associated indicators
Water abstraction and water use – pg 30
Quality of drinking and bathing water – pg 71

Rates of pollution charges for emission of pollutants into aquatic environment

Estonian Environmental Strategy 2030:
• achieve a good status of surface water (including coastal water) and groundwater and conserve bodies of water whose condition is good or high.

Rates for pollution charges have continuously increased.

The objective of implementing environmental charges is to prevent or reduce potential damage associated with the use of natural resources, emission of pollutants into the environment and disposal of waste. Estonia’s system of environmental charges has been developed according to the principles of ecological tax reform. Pursuant to this, higher environmental charges are introduced gradually over a longer period in order to give people and companies time to adapt to changes and make their activity environmentally more sustainable. Rates for environmental charges are imposed by the Environment Charges Act, which states that of pollutants led into an aquatic environment, charges apply to biochemical oxygen demand, total phosphorus, total nitrogen, suspended particles, sulphates, monophenols, oil, oil products, mineral oil, liquid products obtained from the thermal treatment of solid fuel and other organic matter as well as other hazardous substances for the purpose of Water Act.

Total phosphorus, total nitrogen and biochemical oxygen demand are primary indicators that characterise the pollution load and trophic level of aquatic environment that the assessment of the efficiency of water treatment facilities also focuses on. Rates of pollution charge for these substances have significantly increased since 2006. Rates of pollution charge for biochemical oxygen demand have stabilised in recent years, being 1 392 euro per one tonne of pollutant in 2012. Rate of pollution charge for total nitrogen has moderately increased from year to year, remaining at 1 858 euro in 2012. Rate of pollution charge for total phosphorus has exponentially increased since 2006, today being 5 468 euro per tonne. The pollution load of total nitrogen has increased over the last three years, despite the risen rate of pollution charge. This gives reason to believe that respective rates should be reviewed and adjusted, if necessary.

Charging water resources has had positive effect on reducing the pollution load of water.

Charging total nitrogen has not reduced its load.

Associated indicators
Point source pollution load into inland bodies of water and the sea - pg 31
Funding of environmental protection projects from the Environmental Programme of the Environmental Investment Centre - pg 75
6. Forest
### Share of felling in increment

Estonian forestry development plan 2020:
- ensure the productivity and vitality of forests and its diverse and efficient use; use wood as renewable natural resource in the extent of increment.

**Felling volume in Estonian forests does not exceed estimated increment.**

Estonian forestry development plan 2020 sets a prerequisite for sustainable forest management, which is as uniform use of forest resources as possible in the extent of increment, which in Estonia is estimated to be 12–15 million m³ per year - such an amount of additional wood grows in forests every year. The last time felling volumes reached this level was the turn of the century, when a large number of private forest lands were taken into use as a result of land reform. Felling volume decreased in the following years. This was due to stricter surveillance, but even more so due to rapid changes to the market price of wood and decreased foreign demand (because of the storm in Scandinavia in 2005, for example). Import of roundwood from Russia also increased. Felling volume started to slowly recover only at the end of the decade. According to an expert opinion, approximately 8.7 million m³ of wood was felled in 2011, which constitutes about 70% of increment. The volume of storing wood will depend largely on the forest and energy sector’s demand in the future as well. Using wood for generating energy has increased significantly in recent years. Consumption of wood as fuel will increase even more in the upcoming years due to fulfilling objectives set for the share of producing energy from renewable sources. Even though it would be possible to increase felling volumes, the forest industry’s demand for specific selections (type of wood and quality), relatively small interests of small forest owners to manage forests, large share of forest land outside active management (0.33 million ha or 15% of the total area of forest land as of 2010) and uncertain prospect of foreign markets set their limits to it.

- Felling has not exceeded increment in the last ten years.
- The use of forest in the last decade has been inconsistent both in terms of felling volumes and relative division of felled types of wood.

**Associated indicators**
- Growing stock - pg 40
- Status of forests - pg 41
- Share of strictly protected forests - pg 42
- Production and consumption of renewable energy - pg 58

#### Felling and Increment in 2000–2011. Data: Estonian Environment Information Centre; NFI.
Growing stock

Estonian Environmental Strategy 2030:
- ensure satisfaction of the ecological, social, cultural and economic needs in forest use in a balanced manner in the long term, while preserving the diversity, balance and recovery of forest ecosystems;
- preserve the area of forest lands at the base level of 2.264 million hectares.

**Estonia is among Europe’s most wooded countries.** Inventories of forest lands are used to assess the area of forest lands. In the last century, the primary information sources were indicators characterising forests that were received from overgrown assessment of forest lands during forest management operations. Since the beginning of this millennium, national forest inventory (NFI) has become the primary information source, i.e. sample survey that measures characteristics describing forests on circular sample areas in the network of sample areas covering the whole of Estonia, and the results are used to calculate assessments that describe Estonian forests for a large number of different indicators.

Estonia holds the fifth place in terms of woodedness after Finland, Sweden, Slovenia and Latvia. The area of Estonian forest land has remained between 2.2–2.3 million hectares over the last 20 years, covering approximately half of Estonia’s mainland territory. The even growth of forest land after the Second World War ended in the 1980s. The growth back then was due to both forestation of arable lands following the forced collectivisation and afforestation and also land improvement operations that picked up speed in the 1950s which led to many previous mires becoming suitable for forest growth. The process of forestation of arable lands that began in the 1990s as a result of a steep decrease in agricultural production has ceased by now due to the recovery of agricultural land use. Recovery of agricultural land use was significantly sped up by agricultural subsidies awarded as part of the joint agricultural policy of the European Union that helped to take many areas that had started to afforest back into use. In the last decade, the area of forest land has decreased a little due to developing infrastructure and the expansion of settlements.

- The area of forest land has increased 1.5 times over the last 50 years.
- Approximately 15% of forest land did not find an end owner during land reform and is out of active use.

**Associated indicators**
- Land use - pg 14
- Share of felling in increment - pg 39
- Status of forests - pg 41
- Share of strictly protected forests - pg 42

![Graph showing changes in forest land area](#)
Status of forests

Strategy pursuant to the convention on long-range boundary air pollution for 2007–2015:

- get an overview of Estonian forest health, changes to the status and other possible causes.

**The status of Estonian forests has been better than the average indicators in Europe.**

Observations of tree crown are the most common indicator of assessing the forest health in Europe. Based on the observations of tree crown, the status of Estonian forests has been good over the last ten years. The number of severely damaged and dead trees has been below 10%. Of the most common trees in Estonia – Scots pine, European spruce, silver birch and downy birch – the most damaged is the Scots pine. Health status of the European spruce has been good and stable. The status of silver birch and downy birch has changed over the years – years with very good health status have alternated with worse ones. We can say that birches are affected by various environmental effects more than conifers.

Tree crown’s status and health condition in the forest depends on many factors. Damages visible to the naked eye are assessed annually together with the observation of the loss of leaves and needles. The largest group of damagers in Estonia have been fungal infections that constitute 2/3 of known injuries. Estonia is among the top three in Europe in terms of fungal infections. The most common fungal infections in middle-aged and older pine stands are Lophodermium needle cast (*Lophodermium seditiosum*) and Gremmeniella shoot canker (*Gremmeniella abietina*). Ten percent of European spruce observation trees have damages caused by Heterobasidion root rot (*Heterobasidion annosum*). Insect damages have been registered much less than fungal infections, less that 10% of all damages. Regionally, the damage caused by insects is very varied – 95% of injuries are found in western Estonia, Saaremaa and Hiiumaa. Fungal infection and insect damages, however, are not the main reason for the loss of trees. 60% of fallen trees are caused by felling, 20% by abiotic factors (wind, snow), 15% by fungi and 5% by insects.

😊 The status of Estonian forests is good – severely damaged and dead trees are less than 10%.

😊 The average loss of needs of the Scots Pine has increased over the years.

**Associated indicators**

Share of felling in increment – pg 39
Sulphur dioxide concentration in cities and background stations – pg 53
Share of strictly protected forests

Estonian forestry development plan 2020:
• take at least 10% of forest land area under strict protection and improve the representativeness of protected forests in order to ensure the diversity of forests and preserve the good status of population of species peculiar to Estonia.

Approximately one-tenth of Estonia’s forest land is under strict protection.

Forests play an important role in preserving human and natural environment. In order to protect the diversity of nature, but also for other protective reasons, economic activity is restricted in forests. Protection of forests is mostly based on the Nature Conservation Act and Forest Act. The Forest Act excludes previously used forest categories (conversation forest, protection forest and commercial forest), and because of that the term “protected forests” has been used in recent years. According to the previous division, former conversation forest can be called strictly protected forest and protection forest can be called economically restricted forest. Strictly protected forests include reserves of protected areas and special management zones, special management zones of species protection site, habitats of I category protected species, key biotopes protected with a contract or located on state land and intended protection areas according to the planned mode. Economically restricted forest consists of limited management zones of protected areas, limited management zones of species protection site, special conservation areas, water protection zone forests, infiltration zone forests, forests designated with a plan to the protection of the status of environment, intended protection areas according to the planned mode and protection areas without updated protection rules.

While Estonia’s forest policy approved in 1997 found it necessary to increase the area of strictly protected forests to 4% of the total area of forest land, the Estonian forestry development plan 2010 passed in 2002 set forth the objective to increase the respective indicator to 10%. The same objective has also been set in the new Estonian forestry development plan 2020. The objective has almost been achieved according to the results of the national forest inventory of 2010 – strictly protected forests constitute 9.8% of Estonian forest land. The Estonian forestry development plan 2010 points out, however, that the typological representativeness of strictly protected forest lands should be improved.

In 2010, 9.8% of forest land was under strict protection.
Typological representativeness of strictly protected forest land must be improved in order to preserve forest species peculiar to Estonia.

Associated indicators
Share of felling in increment – pg 39
Ecosystem protection – pg 48

Share of protected forests in Estonia in 2010. Data: Estonian Environment Information Centre; NFI.
7. Biodiversity
The crossing of main roads and green network is characterised by a high risk of traffic accidents involving wild animals.

The length of Estonian main roads is 4,016 km. Main roads intersect the green network in the extent of 907 km, which makes up 22.6% of the length of main roads. The objective of green networks is to protect biodiversity and enable wild animals to move and migrate. Increased threat of traffic accidents involving wild animals thus characterises the intersection of green network and roads. While main road and green network intersection areas do not lead to particularly severe conflicts in, for example, Saaremaa and Hiiumaa, because traffic volume on those islands is relatively low during the majority of the year, the conflict areas in the vicinity of Tallinn and north-eastern part of Estonia have very high risk. Animal movement paths must be taken into consideration in establishing and renovating the road network in order to disperse such risks. Because of this, one ecoduct or green bridge, eight underpass tunnels for small game animals, one fence opening and five road bridges with shore paths for animals to move through have been built or are being built on Estonian roads.

The density of Estonian road network is not particularly high on the European scale, but the ratio of the movement of people and car ownership is nevertheless very high – main road network with a two kilometre wide so-called impact zone around it constitutes 18% of the total area of Estonia, i.e. as much as the area of Estonia officially under nature conservation. At the same time, the legal status of the thematic plan of green networks is very weak. The only requirements for amending the plan are maintaining its consistency and principle of low density area, but no surveys have been conducted on if and how animal species use the network.

First structures enabling safe crossing for animals have been completed on Estonian roads.

Nearly a quarter of the total length of main roads is made up of sections, where the intersection with green network leads to a high risk of accidents involving both road users and animals.

The legal status of the thematic plan of green networks is very weak.

Associated indicators
Endangerment of biodiversity in ecosystems – pg 46
Assessment of the status of the European Union Habitat Directive’s habitats – pg 47
Ecosystem protection – pg 48
Share of land improvement systems by ecosystems

Nature Conservation Development Plan until 2020:
- ensure a favourable status of species and habitats and landscape diversity and the functioning of habitats as a uniform ecological network.

The share of land improvement systems’ area in natural ecosystems on Estonian mainland is 17.7%.

Land improvement has most significantly impacted shrubbery of which 33% is directly covered by land improvement system. This result is expected, because shrubbery includes drained marshes, former meadows, as well as felled areas and young growths. The large share of land improvement coverage of shrubbery is probably precisely due to earlier draining of meadows and marshes. Land improvement system coverage of forests is 28%. Mixed forests have the highest share with 30% and broadleaf forest has the lowest share with 24%. Although the overall coverage of coniferous forest, the most common type of forest in Estonia, by land improvement system is less than one third (27%), nearly a quarter (23%) of these land improvement systems are on protected areas. This undoubtedly has an impact on the ecology of coniferous forests in the protected areas. In respect to broadleaf and mixed forests, the share of areas covered by land improvement systems on protected areas is 9% and 10%, respectively, but appropriate water regime as a preserver of a favourable status of biodiversity is crucial. Coverage of meadows by land improvement systems is just 5%, but 38% of all natural meadows covered by land improvement systems are on protected areas. The extent of the land improvement impact should be researched separately by types of meadows and protected areas. Coverage of marshes by land improvement systems is also just 5%, but 30% of all marshes covered by land improvement systems are on protected areas. Because nearly all types of marshes except bogs are in an unfavourable status and endangered, the extent of draining impact must be analysed soon by marsh type, protected areas and individual marshes.

- The share of land improvement systems’ area in natural ecosystems in Estonia is less than 20%.
- The share of land improvement systems on the area of meadows and marshes is just 5%.
- Many natural meadows and marshes on Estonian protected areas are affected by land improvement – nearly 40% of all natural meadows and nearly 30% of all marshes covered by land improvement are on protected areas.
- The extent of the draining impact outside the boundaries of land improvement systems on various ecosystems is not known.

Associated indicators
Endangerment of biodiversity in ecosystems - pg 46
Assessment of the status of the European Union Habitat Directive’s habitats - pg 47
Ecosystem protection - pg 48

Share of land improvement system area on protected areas and in Estonia as a whole by ecosystems. Data: CORINE land cover database (2006), PKÜ database of semi-natural communities, ELF database of inventory of marshes, database of objects causing restrictions (phenomenon classes of land improvement systems 2.7.2.1; 2.7.2.2.; 2.7.2.3.), environmental register.
Endangerment of biodiversity in ecosystems

Estonian Environmental Strategy 2030:
• ensure the existence of habitats and communities necessary for preserving vital populations of wildlife species.

Endangerment of species has increased in the ecosystems of forest, meadows and marshes, but it has decreased on the coast.
Threats to fungi and lichens, vascular plants and mosses are increasing in forests, meadows and marshes, also to the meadow and water birds, vascular plants and algae in bodies of water and to fungi and lichens on the coast. There is still a severe conflict in the character of economic forest and biodiverse forest – dead wood in the forest is essential to fungi and lichens, but it is the greatest threat to timber reserves as it attracts pathogens. The worsened condition of fungi and lichens, vascular plants and mosses and birds in meadow ecosystems still indicates the insufficiency of protection measures and the loss of extensive agriculture and small farming. The worsened condition of vascular plants and mosses as well as fungi and lichens in marshes is associated with the long-term consequential impact of draining.
Threats to vascular plants and mosses, birds, mammals, amphibians and reptiles on the coasts, mosses, fungi and lichens, fish, amphibians and reptiles in bodies of water, mammals, birds, amphibians and reptiles in forests, and mammals in meadows have decreased. The improvement of the condition of several species at coastal areas indicates the positive effect of the extensive application of protection to coastal areas as a result of the Natura 2000 programme, but also the continuously functioning prohibitions on construction in these areas.
Threats to fish and amphibians in bodies of water have also decreased. Several spawning fish species that were missing for some time have returned to watercourses. However, the data is insufficient to assess developments in the bodies of water.

• The status of aquatic ecosystems has improved.
• The condition of biodiversity in coastal areas has improved but is not yet sufficient to halt the loss of biodiversity.
• The status of biodiversity in forests, meadows and marshes is still poor and is continuing to deteriorate.

Associated indicators
Share of land improvement systems by ecosystems – pg 45
Assessment of the status of the European Union Habitat Directive’s habitats – pg 47
Ecosystem protection – pg 48

Change in the number of threatened species in ecosystems in 1998–2008. Data: Estonian Red Book 1998 and 2008. Note: An increased number of species shows they are more threatened, a decreased number of species shows they are less threatened.
Assessment of the status of the European Union Habitat Directive’s habitats

Nature Conservation Development Plan until 2020:

- ensure a favourable status of species and habitats as well as landscape diversity and the functioning of habitats as a uniform ecological network.

Marine and coastal habitats are in the most favourable condition, while freshwater bodies of water and marshes (excluding bogs) are in the poorest condition.

There are 60 habitat types endangered in Europe listed in Annex I of the European Union Habitat Directive, the protection and preservation of which we need to ensure. These include more coastal, forest and meadow habitats and somewhat less marshes, freshwater bodies of water, outcrop and marine habitats. The largest share of Estonian habitat types - 25 habitat types - is in favourable condition. 21 habitat types are in insufficient and 9 habitat types in poor condition. The status assessment of five is unknown. Most habitat types in favourable condition are among marine and coastal habitats, and freshwater bodies of water and marshes (excl. bogs) are in the worst condition.

In comparison to other European Union countries, Estonia is not in the worst condition. In the boreal region, only 13% of habitat types are in favourable condition; the majority of habitat types are in insufficient or poor condition. In the European Union as a whole, 37% of types of habitats are in poor, 28% in insufficient and only 17% in favourable condition. Condition of a considerable number of habitat types is unknown (18%).

The condition of Europe’s primary habitat types, the range of which has significantly decreased, is considerably worse. Of the primary habitat types found in Estonia, only three habitat types are in favourable condition, while eight are in insufficient and five in poor condition. The condition of two habitat types is unknown. The situation is not any better in the European Union as a whole – 14% of primary habitat types are in favourable condition, but more than 70% are in insufficient or poor condition.

Nearly half of Estonian habitat types are in favourable condition (42%); coastal and marine habitats are in the most favourable condition.

Half of Estonian habitat types are either in insufficient (35%) or poor (15%) condition; freshwater bodies of water and marshes (excl. bogs) are in the worst condition.

Associated indicators
Share of land improvement systems by ecosystems - pg 45
Endangerment of biodiversity in ecosystems - pg 46
Ecosystem protection - pg 48
Ecosystem protection

Convention on Biological Diversity:
- at least 10% of every ecosystem is protected.

In terms of area, coasts and marshes are protected to the greatest extent in Estonia, while protection of forests, meadows and the sea has room to grow.

Considering the total area of protected area, including limited management zones and special conservation areas, more than 10% of all ecosystems are under protection. However, if we only consider strict nature reserves and special management zones under strict protection, then just 9% of forests and 2% of inland bodies of water and sea are under protection.

Areal protection of forest ecosystems is 19% (including green network 72%), but this includes areas where non-conservation economic activity is also permitted. High percentage of areas with green network indicates potential to establish an optimal forest protection network on the basis of already protected areas and green network corridors that would protect biodiversity and enable functioning protection management in the extent of at least half of Estonian forest area.

60% of meadow ecosystem (as much as 84% including green network) is under protection. It is necessary to maintain the meadows – mow or graze them – in order to preserve the biodiversity of meadows. The current system of maintenance support for semi-natural biotic communities functions well, but the system should be rendered even more effective so that the renewed and maintained area would increase from the current one-third to 2/3 of the total area of natural meadows by 2020.

Areal protection of marshes in Estonia is 65% (as much as 98% including green network). Because the CORINE land cover map used in the analysis only allows bogs to be analysed (the area of other types of marshes is so small that they are excluded from the analysis), we can only make conclusions about the protection of bogs. Areal protection of Estonian coastal ecosystems is in the best status – up to 70% (as much as 92% including green network). The building exclusion zone on the coast and shore has had a positive effect on wildlife.

46% of inland bodies of water (as much as 53% including green network) is under classic protection. At the same time, the majority of inland bodies of water are, similarly to the sea, on the area of special conservation areas, the protection adequacy of which requires further analysis.

The general protected area of bogs, meadows and coasts is sufficient.

The general protected area of forests, inland bodies of water and the sea is not yet sufficient.

Assessing the adequacy of protected area of ecosystems by subtypes (types of marshes, meadows, forests, etc. separately) requires more detailed analysis.

Associated indicators
Intersection of main roads network with green network – pg 44
Share of land improvement systems by ecosystems – pg 45
Endangerment of biodiversity in ecosystems – pg 46
Assessment of the status of the European Union Habitat Directive’s habitats – pg 47

![Bar chart showing the percentage of protected areas by ecosystem in Estonia.](chart.png)

8. Air and climate
Emissions of pollutants in PM$_{10}$ equivalent

The national programme 2006–2015 for reducing emissions discharged into ambient air from stationary and mobile sources of pollution:
- reduce emissions of PM$_{10}$ to 16,520 tonnes per year by 2015.

PM$_{10}$ emissions have decreased in recent years, but experienced a noteworthy rise in 2010.

Particle emissions (PM$_{10}$) include primary and secondary particles. Primary particles are fractions that are emitted directly into the atmosphere, while secondary particles form as a result of oxidisation of other substances (SO$_2$, NO$_x$, NH$_3$ and VOC - volatile organic compounds). In 2010, primary particles constituted 25% and secondary particles 75% of the total emission.

PM$_{10}$ emissions have been recorded in Estonia since 2000. Emission calculations are based on expert assessments and as of 2009 also on data gathered from companies. Particle emissions primarily stem from the energy sector, heating and burning domestic waste and mobile sources of pollution. To a lesser degree, PM$_{10}$ emissions also stem from industry and agriculture.

In 2000–2010, PM$_{10}$ emissions decreased by 11.4%. The drop in emissions in 2000–2006 was due to the implementation of environmental protection measures at Narva power plants. In 2007 and 2010, emissions increased due to the increased output of electricity.

Overall, particle emissions are decreasing, but 2007 and 2010 saw a steep increase in emissions.

Emissions are impacted most by burning wood in domestic households and combustion of oil shale in power plants.

Associated indicators
- Production and consumption of primary energy - pg 9
- Cargo turnover by category of transport - pg 12
- Passenger turnover by category of transport - pg 13
- Particle concentrations in cities and limit values exceeded - pg 52
- Rates of pollution charges for emission of pollutants into ambient air - pg 54

Emissions of pollutants in PM$_{10}$ equivalent. Data: Estonian Environment Information Centre.

Primary and secondary particle emissions by sources of pollution in PM$_{10}$ equivalent. Data: Estonian Environment Information Centre.
Emissions of acidifying substances

Estonian Environmental Strategy 2030:
- reduce air pollution emissions from energy production (base level of SO₂ - 75,696 tonnes per year, base level of NOₓ - 43,383 tonnes per year) as well as from transport (base level of SO₂ - 1,410 tonnes per year, base level of NOₓ - 18,130 tonnes per year).

Emissions of acidifying pollutants have dropped significantly compared to the 1990s, but increased again in 2010.
Acidification is caused by sulphur dioxide (SO₂), nitrogen oxides (NOₓ) and ammonia (NH₃) emissions of human origin. These pollutants react with water vapour in the air and fall to earth as acid rain, thus damaging both wildlife and cultural goods. The largest sources of SO₂ emissions in Estonia are the energy sector and industry. NOₓ emissions primarily originate from transport and the energy sector, while NH₃ emissions stem mainly from animal husbandry and use of fertilisers. Compared to 1990, emissions have dropped significantly – SO₂ 69.6%, NOₓ 50% and NH₃ 58.3%.

The changes in SO₂ and NOₓ emissions were occasioned by economic restructuring at the beginning of the 1990s, as a result of which the amount of electricity consumed in industry dropped significantly. The use of fuels has also changed – a transition has occurred from use of heavy oil with high sulphur content to combustion of natural gas and wood. Use of lower-sulphur shale-derived oil and light fuel oil has also increased. The changes of the last few years are due to renovation of few energy units at Estonian power plant and Baltic power plant, where the old pulverised combustion technology was replaced with the new fluidized bed technology. The new technology is more efficient and reduces the required quantity of oil shale. Estonian SO₂ emissions per capita are above the average of the European Union due to the large percentage of oil shale with low calorific value and high sulphur and ash content in the Estonian energy sector.

Increase in emissions of pollutants in 2010 is associated primarily with the increase of energy sector’s output. NH₃ emissions have decreased as a result of the decrease in agriculture. Over the last decade, NH₃ emissions have not changed much.

- SO₂, NOₓ and NH₃ emissions have decreased significantly compared to 1990.
- Compared to other European Union member states, Estonia’s SO₂ emissions per capita are high (62 kg in 2010), while also being much greater than the average for the European Union (10 kg in 2009).

Associated indicators
- Production and consumption of primary energy - pg 9
- Cargo turnover by category of transport - pg 12
- Passenger turnover by category of transport - pg 13
- Sulphur dioxide concentration in cities and background stations - pg 53
- Rates of pollution charges for emission of pollutants into ambient air - pg 54

Pressure indicator / State indicator / Response indicator

Particle concentrations in cities and limit values exceeded

Estonian Environmental Strategy 2030:
- reduce the average number of days in urban areas where the particle concentrations exceed the permitted level (base level of 16 days/year) and the annual average concentration of particles in urban air.

The high particle concentration in urban air remains problematic.

The high particle (PM$_{10}$) concentration in urban ambient air is due primarily to road transport. An important pollution source in areas of detached homes is heating based on wood and wood waste. The daily average limit value of PM$_{10}$ (50 µg/m$^3$, that may be exceeded seven times a year as of 2010) was exceeded in every monitoring station of urban air. Compared to 2007, the number of times the limit was exceeded in Tallinn, however, has decreased multiple times.

In 2010, the limit value of PM$_{10}$ was exceeded most in Kohtla-Järve, which may not signify long-term deterioration of the quality of urban air, however – high PM$_{10}$ concentrations probably stemmed from the construction of sewerage system that lasted throughout the summer. The situation in Kohtla-Järve improved in 2010, but remains worse than in other cities.

Yearly average PM$_{10}$ concentration remained within 20 µg/m$^3$ in all places and has not exceeded the limit value (40 µg/m$^3$) since 2002.

To improve the situation, the number of motor vehicles in large cities should be reduced, intensive flows of traffic should be re-routed away from residential and recreational areas, transport of goods should favour railway and sea transport and public transport and city bicycle rental systems should be developed.

- In recent years, the number of times the daily average limit values are exceeded in Tallinn has reduced multiple times.
- The primary problem in urban air is still the high concentrations of particles (PM$_{10}$), which is dangerous to human health in inhaled air.

Associated indicators

Emissions of pollutants in PM$_{10}$ equivalent – pg 50

Yearly average concentrations of particles (PM$_{10}$) in urban air. Data: Estonian Environmental Research Centre.

Number of times daily average particle (PM$_{10}$) limits have been exceeded. Data: Estonian Environmental Research Centre.
Sulphur dioxide concentration in cities and background stations

Estonian Environmental Strategy 2030:

• reduce the average number of days in urban areas where the concentration of sulphur dioxide exceeds the permitted level.

The concentration of sulphur dioxide (SO₂) in urban air and background station air has remained under the limit value in recent years.

Levels of sulphur dioxide (SO₂) have annually decreased a little. If the current development continues, the sulphur problem that has affected all of Europe for decades can be considered resolved. Monitoring shows that policy measures for limiting sulphur content in liquid fuels have borne fruit. The share of using other fuels has also changed – a transition has occurred from use of heavy oil with high sulphur content to combustion of natural gas and wood. Use of lower-sulphur shale-derived oil and light fuel oil has also increased. The decrease of SO₂ emissions has been helped along by implementing new technology (fluidized bed technology instead of pulverised combustion technology) in power plants using oil shale.

SO₂ levels remained lower than the corresponding hourly average and daily average limit (350 µg/m³ and 125 µg/m³, respectively) at all monitoring stations. In respect to background stations, the highest SO₂ concentration was measured in Lahemaa where pollution levels are affected by the activity of power plants and industrial companies in the north-eastern Estonia.

The relatively high levels of SO₂ are still a problem in the Kohtla–Järve area where most of the larger companies in the chemical industry are based and which is also home to oil shale and producer gas burning heating plants. 2011 monitoring results showed a certain rise in the pollution level in Kohtla–Järve’s ambient air.

The levels of sulphur dioxide have decreased and the limit values have not been exceeded in recent years.

Concentrations of sulphur dioxide remain below the respective limit value in the Kohtla–Järve area, but relatively high levels are still a problem.

Associated indicators
Emissions of acidifying substances – pg 51

Yearly average sulphur dioxide (SO₂) concentrations in urban air. Data: Estonian Environmental Research Centre.

Yearly average sulphur dioxide (SO₂) concentrations in background station air. Data: Estonian Environmental Research Centre.
The rates of pollution charges for emission of pollutants into ambient air have increased, but the efficiency of charges in reducing emissions of pollutants is questionable.

Air pollution charge is part of environmental charges implemented in Estonia since 1991 to prevent or reduce potential damage caused by emission of pollutants into the environment. The objective of environmental charges is to motivate companies to invest more in the promotion of environmental protection to reduce the operational pollution of companies. Money accrued from charges is also used to implement various environmental protection measures that reduce unfavourable impact from human activity on the environment and natural resources. Air pollution charges go to the state budget.

Majority of charges for air pollutants doubled in 2006 according to the principles of ecological tax reform. In 2007–2009, charges for primary air pollutants increased by 20%. They will continue to increase annually by 10–30% depending on the pollutant – 30% for SO₂ and PM₁₀, and 10% per year for NOₓ. Rates for pollution charges have not completely fulfilled their objective, however – companies have invested in environmental protection above all when implementation of new technology has also become required by law in addition to pollution charges. An example of such legal provision is, for example, Estonia’s obligation to ensure that SO₂ emissions from oil shale-fired power plants do not exceed 25 thousand tonnes in 2012 – an obligation undertaken with the Treaty of Accession to join the European Union in 2003. In 2011, this indicator reached 56.6 thousand tonnes. Due to the currently low efficiency of air pollution charges, it is planned to reassess the rates of pollution charges pursuant to the harmfulness of pollutants.

- Increased rates of pollution charges consider the environmental load of pollutants to a greater extent.
- Rates of pollution charges on their own do not force companies to invest enough in the reduction of pollution.

**Associated indicators**
- Emissions of pollutants in PM₁₀ equivalent - pg 50
- Emissions of acidifying substances - pg 51
- Funding of environmental protection projects from the Environmental Programme of the Environmental Investment Centre - pg 75

**Charts and Data**

- **Pressure indicator / State indicator / Response indicator**
- **Euro per tonne**
- **NO₂**
- **SO₂**
- **Particulates (incl. PM₁₀)**

*Rates of pollution charges for emission of pollutants into ambient air. Data: Environmental Charges Act.*
Emissions of greenhouse gases

Action programme of the Government of the Republic 2011–2015:
• total greenhouse gas emissions per year do not exceed 20 million tonnes of CO₂ equivalent by 2020.

**Total greenhouse gas emissions have decreased 50% in comparison to the base year (1990).**

Estonia signed the UN Framework Convention on Climate Change in 1992 and joined the Kyoto Protocol in 1998, thus taking upon itself an obligation to reduce greenhouse gas emissions 8% compared to 1990. In 1990, the total greenhouse gas emission was 40.8 million tonnes of CO₂ equivalent and in 2010 it was 20.5 million tonnes of CO₂ equivalent (without the binding of greenhouse gases from land use, its change and forestry sector). By 2010, Estonia’s emissions have decreased 50% in comparison to the base year. Total emission decreased at the beginning of 1990s mainly because of the transition from systematic economy to market economy; later impacts have primarily been due to economic rises and recessions.

The greatest contributor to the total greenhouse gas emission is the primarily oil shale-based energy sector, the share of which reached 88% in 2010. It is followed by the agricultural sector with 6.5% and industrial process and waste handling sector with 2.4% and 2.3% respectively. The share of land use, its change and forestry sector that in addition to greenhouse gas emissions also considers their binding, has been relatively unstable in 1990–2010. Generally, the latter sector affects the balance of greenhouse gases as a binder of CO₂, but in 2000–2003, its estimated impact was the opposite in the inventory of emission due to large felling volumes in forestry.

The primary greenhouse gas in Estonia is carbon dioxide (CO₂) that constitutes 89% of the total greenhouse gas emission. The share of both methane (CH₄) and nitrous oxide (N₂O) is 5% each and F-gases 1%. In Estonia, the average greenhouse gas emission per capita is 15.1 tonnes of CO₂ equivalent, which exceeds the average for the European Union (9.4 tonnes of CO₂ equivalent per capita) 1.6 times. The main reason for this is the use of carbon-rich oil shale in the energy sector.

- Total greenhouse gas emissions have decreased 50% in comparison to the base year (1990).
- Total greenhouse gas emissions have increased in 2010 comparison to 2008 and 2009.

**Associated indicators**
- Production and consumption of primary energy - pg 9
- Land use - pg 14
- Share of felling in increment – pg 39
- Production and consumption of renewable energy – pg 58

Air temperature has been characterised by great variability in recent years.

Annual average air temperature in Estonia has continued to rise similarly to precipitation. Of the last three years, the warmest year was 2011 (average air temperature 7.0 °C), which places fourth–fifth in the temperature time series during 1961–2011. The lowest annual average air temperature of the last three years was recorded in 2010: 5.1 °C. This is comparable to the average (5.2 °C) of the last climate standard period (years 1961–2011) of the World Meteorological Organisation. Recent years are characterised by a large difference in air temperatures - winters of 2009/2010 and 2010/2011 are characterised by very low air temperature, but the summers of 2010 and 2011 by very strong heat waves. Minimum air temperature in the winter of 2009/2010 was -32.4 °C; in the winter of 2010/2011, it was -33.4 °C. The average air temperature in January of 2010 (-11. °C) is the coldest since January 1987, when the monthly average temperature was -14.7 °C. The maximum air temperature of 35.4 °C measured on 7 August, 2010, in Narva-Jõesuu only fell 0.2 °C short of Estonia’s historically highest temperature recorded on 11 August, 1992, in Võru. July 2010 with the average air temperature of 21.8 °C was historically the warmest in the period 1961–2011. June 2011 was also very warm and its average air temperature of 17.0 °C fell just a little short of the highest temperature of this month (17.8 °C in 1999) of the period 1961–2011. Autumn of 2011 was also uncharacteristically warm with the average air temperature of 9.0 °C. November was particularly warm, the average air temperature 5.1 °C of which was the highest of the period 1961–2011.

Period 1961–2011 is characterised by the rise of average air temperature.

Associated indicators
Annual average precipitation - pg 57

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Recent years have generally been rainier than average. Compared to temperature, the territorial variability in precipitation has been very vast. The period 1961–2011 is characterised by a rise in precipitation amount, whereas precipitation amounts of recent years have been higher than average. Only 2011 saw slightly lower precipitation amount. In terms of months, the abundance of precipitation in December 2011 was remarkable, as its precipitation amount of 111.0 mm is the highest in Decembers of the period 1961–2011. The new monthly precipitation record was then set at 22 meteorological stations. Daily precipitation records have been set at several meteorological stations in the last three years – 81.4 mm at Tallinn–Harku meteorological station in July 2011, 62.7 mm at Tartu–Tõravere meteorological station in June 2009, 53.0 mm at Pärnu meteorological station in August 2011.

Snowiness of 2009/2010 and 2010/2011 winters should be pointed out separately, as the maximum depth of snow (78 and 67 cm respectively) only loses to 1965/1967 and 1983/1984 winters when the maximum depth of snow was 87 and 85 cm respectively. The average depth of snow in the last decade of February 2010 reached 51.6 cm as the mean of Estonia’s meteorological stations – it’s the record in 1961–2011. Depth of snow reached 50 cm at many meteorological stations also in the first decade of January 2011.

Associated indicators

Annual average air temperature – pg 56
Production and consumption of renewable energy

Estonian Environmental Strategy 2030:
- increase the share of electricity produced from renewable energy sources to at least 8% of domestic consumption by 2015.

Production of renewable energy has increased thanks to renewable energy subsidies.
Majority of greenhouse gas emissions in Estonia (88%) is generated by the energy sector. Therefore, the sector also has the highest potential to reduce greenhouse gas emissions. Estonian energy sector is based primarily on oil shale energy with strong environmental load, the negative impact of which is attempted to reduce by adopting more renewable energy resources (biomass, hydro and wind energy). The previously low share of renewable energy in electricity generation has increased significantly in the last couple of years, reaching 10.8% of total consumption in 2010. The objective set in the Estonian Environmental Strategy 2030 – to increase the share of electricity produced from renewable energy sources to at least 8% of domestic consumption by 2015 – has thus already been achieved.

Most of Estonia’s renewable energy comes from generating electricity from waste, biomass and biogas. More than a quarter of renewable energy is generated in wind farms; hydro power is also used to generate electricity to a lesser extent. The share of renewable energy in electricity production has increased above all due to the increase in electricity quantities generated from biomass in CHP plants. Output of wind energy is also continuing to increase. Increased subsidies have promoted the growth of renewable energy production. As of 2012, the subsidy for electricity produced from renewable energy is 0.0537 euro per kilowatt-hour of electricity. Compared to 2010, the total sum of paid renewable energy subsidies increased by nearly 40% in 2011.

The share of renewable energy in the total electricity consumption has increased significantly in recent years, reaching more than 10% in 2010.

Associated indicators
Production and consumption of primary energy - pg 9
Emissions of greenhouse gas - pg 55

9. Waste
Waste generation

Estonian Environmental Strategy 2030 and National waste management plan 2008–2013:
• prevent generation of waste, reduce the amount of waste and hazardousness of generated waste.

Waste generation strongly depends on general economic situation – more waste is generated during economic growth and recession leads to the decrease in waste generation.

In Estonia, more than 80% of waste is generated in the industry, the majority of which – 76% on average – comprises waste related to the oil shale industry and energy sector. A significant share of industrial waste is generated by the wood industry and cement industry – this waste is largely directed to recovery.


Generation of hazardous waste has been fairly stable over the years, 7 million tonnes per year on average, constituting an average of 43% of total waste generation. The share of hazardous waste in waste generation was the smallest in 2005–2008, 38% on average. The increase of shale-derived oil production volumes in 2009–2010 has increased the generation of hazardous waste.

The primary factor to cause changes to waste volumes is related to the changes taking place in the economy. The relative change of GDP in constant prices compared to the relative change of waste generation reveals that waste generation has increased more than economic growth, and this is due to the large amount of waste from oil shale energy sector and the production of shale-derived oil. The growth of non–hazardous waste over the last ten years has been smaller than economic growth.

Waste generation increased until 2007; the indicator has decreased a little in the following three years.

The hazardousness of generated waste has not changed much.

Associated indicators
Gross domestic product – pg 8
Production and consumption of primary energy – pg 9
Oil shale mining and reserves – pg 16
Hazardous waste generation – pg 61

Estonian Environmental Strategy 2030:
• reduce hazardous waste generation compared to the base level (7.029 million tonnes per year).
National waste management plan 2008 – 2013:
• reduce the share of hazardous waste as a percentage of total waste, also reduce the quantities and hazardousness of waste related to mining of oil shale, oil shale-based chemical industry and generation of thermal energy and electricity.

Majority of hazardous waste is generated by oil shale waste.

In Estonia, an average of 98% of hazardous waste is generated in the production of energy and oil from oil shale. A large quantity of hazardous waste is also generated in areas related to transport – sea, railway and land transport – that generates primarily fuel oil and liquid fuel waste. Cement production, where alkaline clinker dust is produced, and manufacturing rare earth metals, which generates hazardous acidic residues, are also waste-intensive. To a lesser extent, hazardous waste is generated by other economic activities, including generation in households.

On average, the generation of hazardous waste increased in 2000–2010. Roughly 7 million tonnes of hazardous waste is generated per year, which makes up about 43% of total waste generation. The share of hazardous waste in waste generation does not show signs of dropping, but at the same time, the increase in production volumes in the oil shale industry has not led to a significant rise in waste volumes. Overall, the generation of oil shale ash has decreased per energy unit generated, as the energy systems at Narva power plants have been renovated and some of them have been replaced with more efficient equipment. Relative proportions of solid waste generated by shale oil production have declined over the years; this is due to optimized use of oil shale.

Development of a domestic network of waste handling companies is of key importance to the handling of hazardous waste - Väävra, Tallinn and Tartu hazardous waste collection facilities are operating successfully. Additionally, a number of companies using modern technologies are collecting and recovering waste. First appropriate health care waste handling facilities have also been established. The network of handling companies needs to be supplemented, however.

The trend of hazardous waste generation has been increasing over the years.

The amount of oil shale ash generated per energy unit and the quantity of solid waste generated from production of shale-derived oil per unit of output have decreased, showing that use of the oil shale resource is becoming more optimized.

**Associated indicators**
Production and consumption of primary energy - pg 9
Oil shale mining and reserves - pg 16
Waste generation - pg 60
Municipal waste generation and handling

Estonian Environmental Strategy 2030:
- reduce deposited municipal waste generation compared to the base level (283 kg per capita per year).

National waste management plan 2008–2013:
- reduce and avoid generation of municipal waste, increasing the share of separately collected municipal waste, increasing recovery of municipal waste (recover 30–40% of waste) and reducing the amount of municipal waste deposited.

Both generation and deposition of municipal waste has decreased, while separate collection and recovery of municipal waste has increased.

Municipal waste constitutes 3% of all waste generated in the country. An average of 400 kg of municipal waste per person is generated every year and municipal waste generation has decreased annually. The drop intensified in 2008 due to the general recession and decrease in purchasing power. Certain decrease in volumes is partially due to changes in methodology used to calculate the total municipal waste generated - in years past, municipal waste also included packaging waste, the separate collection of which has been constantly on the increase starting in 2002, and it is now considered a separate waste group in waste calculations.

Collecting municipal waste separately has increased, particularly in 2008–2009, making up an average of 12% of all municipal waste generated. Waste centres and collection points opened in larger county centres have an important role here: while there were 29 of those in Estonia in 2007, there are 145 centres and collection points as of October 2011. A collection network for end-of-life electrical appliances and electronics has also been developed. Most separately-collected municipal waste is scrap paper and cardboard, followed by glass, metal and wood waste and biodegradable kitchen and canteen waste.

The deposition of municipal waste in landfills has decreased significantly, and the primary category of waste that ends up in landfills is partially-sorted mixed municipal waste. An average of 68% of municipal waste generated has been deposited since 2006. Depositing municipal waste has decreased thanks to the advancement of separate collection and increasing production of refuse-derived fuel since 2009.

Recovery of municipal waste has increased; biological recycling and soil treatment with garden and yard waste constitutes the majority of it. Collected and sorted municipal waste (paper and cardboard, metals) and disposed electrical appliances and electronics are mostly exported and recovered outside Estonia.

- The generation of municipal waste has decreased.
- The share of separately collected municipal waste has increased.
- Depositing municipal waste in landfills has decreased.
- Recovery of municipal waste has increased.

Associated indicators
Gross domestic product – pg 8
Waste generation – pg 60
Packaging waste generation and recovery – pg 63

Packaging waste generation and recovery

National waste management plan 2008–2013:
• increase the recovery of packaging waste to 60% by the year 2013, including recycling to 55–80%.

The generation of packaging waste has stabilised; the recovery of packaging waste is continuing to increase. Estonia implemented the producer responsibility principle in organising the collection and recovery of packaging waste in 2004, and since then the annual generated packaging waste has been on average 120 kg per person. Generation of packaging waste increased annually due to economic growth and improved standard of living, having doubled in 2008 compared to 2001. The sharp increase in 2008 was partially due to the changes in methodology used to calculate packaging waste generation. The basis for calculating the generation of packaging waste was the sorting survey of mixed municipal waste conducted in 2008 that gave a new assessment to the volume of packaging waste in mixed municipal waste. In 2009 and 2010, the calculation of packaging waste generation was based on the new survey on the composition of mixed municipal waste conducted in 2011 that also reflected the decrease of packaging waste due to the impact of recession.

In terms of material groups, it is clear that the quantity of plastics has increased significantly, which may indicate excessive packaging of certain goods. Metal packaging waste generation has been relatively stable. Generation of crate waste has decreased, probably due to the increase of the price of wood and more economical use of timber.

Mandatory target numbers for the recovery of packaging waste were implemented in Estonia in 2004, and recovery of packaging waste has increased since. Recovery of packaging as recycling has also increased. Estonia met the target numbers for recovery imposed in the European Union in 2006, 2007 and 2010. In 2009, Estonia came quite close to meeting the target number for recovery, and only fell short by 1%.

- The trend of packaging waste generation is on the upturn, but it has decreased somewhat since 2009.
- Recovery, i.e. recycling of packaging waste has increased.

Associated indicators
Gross domestic product - pg 8
Waste generation - pg 60
Municipal waste generation and handling - pg 62

Disposal of waste in landfills

Estonian Environmental Strategy 2030:
• reduce the deposition of waste by 30%.

Due to the abundance of waste from oil shale industry, deposition of waste in landfills is the primary method of disposing waste in Estonia.

The main method of disposal of waste in Estonia continues to be deposition of waste in landfills. As waste related to oil shale mining and energy sector accounts for 95% of all landfilled waste, this will remain the predominant means of disposal until oil shale is mined and used to produce energy and shale-derived oil. An average of 65% of generated waste was deposited in landfills. Deposition has decreased since 2006, remaining between 55–60%. The majority (more than 50%) of all deposited waste constituted waste generated in thermal processes - oil shale bottom ash and fly ash and alkaline clinker dust from Kunda cement factory. New solutions for increasing the recovery of oil shale ash have been sought from road construction, cement production, neutralising acidic soils and in the future also filling underground mines. Depositing waste not associated with oil shale has decreased annually, as methods for increasing the recovery of waste have been implemented quite forcefully. Important options for reducing the deposition volumes of mixed waste are both incineration and the so-called mechanical-biological treatment. The latter enables separating a large part of energy-value mixed waste that can be incinerated in cement kilns. While in 2000–2004, for example, deposited waste not associated with oil shale constituted 6% of all deposited waste, the number had halved by 2010 – it made up only 3% of all waste deposited in landfills. The decrease of depositing waste is also steered by the increase in the rate of environmental charges. Since 2005, pollution charge for depositing waste has increased significantly. Additionally, the coefficient for non-compliance was also implemented in respect to landfills, which increased the rate of charges, if the waste was deposited in the landfills that did not conform to the requirements.

The share of waste deposited in landfills compared to the amount of waste generated is decreasing.

**Associated indicators**
- Waste generation – pg 60
- Number of landfills in use and classification – pg 66
- Recovery of waste – pg 67

Number of landfills in use and classification

National waste management plan 2008–2013:

- close and condition non-hazardous waste landfills, ash deposition sites used in the oil shale energy sector and semi-coke deposition sites created in the shale oil production process that are not in conformity with the requirements.

**Most old, non-conforming landfills have been closed.**

The period 2000–2010 is characterised by waste care becoming more professional that is illustrated by closing and conditioning non-conforming landfills and establishing new, modern ones. The basis for changes was the implementation of requirements by regulation of the Minister of the Environment in 2001 for the establishment, operation, closure and aftercare of landfills, and this became the basis for the mass closure of landfills which were not in conformity. While in 2000, 170 landfills were used to deposit waste, the number had decreased to 59 by 2002. On 16 July, 2009, depositing waste in all non-conforming landfills came to a stop. Only six non-hazardous waste landfills where mixed municipal waste and other non-hazardous waste are landfilled remained operational. Closed landfills must be contained by July, 2013.

By 16 July, 2009, hazardous waste landfills, of which the majority also deposit oil shale processing waste, had to conform to the requirements of legal instruments as well. Depositing oil shale pitch waste in semi-coke landfills stopped in 2003 already. Depositing areas non-conforming to environmental regulations of semi-coke landfills located in Kohtla-Järve and Kiviõli have been closed. Companies are continuing to use other depositing areas that have been brought into conformity.

In 2010, three of the hazardous waste landfills were in use for the deposition of oil shale waste, two for waste generated in the production of shale-derived oil, and three waste landfills for depositing other hazardous waste. Two of inert waste landfills were operational in 2010. Inert waste (inert waste is waste where no significant physical, chemical or biological changes take place) landfills are essentially waste facilities for extractive waste where waste produced in the mining of oil shale is deposited.

- The number of landfills decreased 91% in the period 2000–2010.
- The number of non-hazardous waste landfills has been optimised, conforming waste handling centres have been established and waste is deposited only to landfills that conform to the requirements.
- While the environmentally sound closure of waste landfills has gone fairly well, the final conditioning and covering is still underway, and aftercare has not yet been launched.

**Associated indicators**

- Waste generation - pg 60
- Hazardous waste generation – pg 61
- Municipal waste generation and handling - pg 62
- Packaging waste generation and recovery – pg 63
- Disposal of waste in landfills – pg 65

Number of landfills in use in 2000–2010. Data: Estonian Environment Information Centre. Starting in 2003, a new classification system for landfills entered into force based on the landfill regulation (non-hazardous, inert and hazardous waste landfills). Before that, landfills were classified as either municipal or industrial waste landfills; industrial landfills included both hazardous and non-hazardous waste landfills.
Recovery of waste

Estonian Environmental Strategy 2030:
• increase the recovery of waste, including recycling, in order to reduce the amount of disposed waste to a minimum.

National waste management plan 2008 - 2013:
• increase recovery of waste to 50% by the year 2013.

The proportion of recovered waste in total waste generation has increased.

Recovery of waste to as great an extent as possible is one of the top priorities for waste management, apart from waste prevention in the first place. When it comes to waste recovery, re-use is considered the most preferable, followed by recycling as material or raw material and only then, the use of the potential energy contained in the waste. Recovery of waste has increased in Estonia, but it has not exceeded 37% of waste generation. Pursuant to the European Union directive on waste, 50% of glass, paper, metal and plastic in municipal waste must be re-used or recycled as material by 2020.

In Estonia, a large amount of waste from timber industry (nearly 100%) is recovered. Similarly, a considerable part of the waste from oil shale mining, construction and demolition (incl. excavated soil), agriculture, dairy industry, metal, waste water treatment, garden and yard is recovered. Recovery is also considered to include preparatory activities of recovery – collecting waste for processing, sorting mixed waste and crushing waste. Metal and construction waste is the most common type of waste that undergoes crushing and sorting before its ultimate recovery. Large amount of sorted waste is exported and re-used outside Estonia.

Recovery of waste is affected with various economic measures: pollution charge for depositing waste into the environment, excise duty on packaging for not performing the recovery obligation, producer responsibility principle, according to which the producer has to ensure the collection and re-use, recovery or disposal of problematic products (e.g. batteries, tires, electronic devices).

New methods for recovering waste are constantly being developed – for example, manufacturing rubber mats from old tires, manufacturing construction materials from plastic waste, using oil shale mining waste in road construction, etc. The most important thing for Estonia is to search and find new options for increasing the recovery of oil shale waste.

Recovery of waste has increased. Actual waste recovery may even be greater as the estimates do not include waste (sawdust, wood waste, construction waste, clinker dust, whey, etc.) that is granted into the use of individuals or undertakings that are not required to submit waste reports.  

Associated indicators
Waste generation – pg 60
Packaging waste generation and recovery – pg 63
Disposal of waste in landfills – pg 65
10. Environment and health
Solar ultraviolet radiation

Erythemal UV-radiation has remained stable over the last decades.

Solar ultraviolet radiation (UV-radiation) is a radiation with a wavelength shorter than that of visible light and has a strong effect on wildlife. UV-radiation may cause skin damages, including skin cancer, but the burning effect depends on the radiation’s wavelength. The range of UV-radiation wavelength that causes sunburn is called erythemal UV-radiation. Erythemal UV-radiation is measured as erythema-effective radiation density that can be used to derive UV index in order to inform the public. In Estonia, Tartu Observatory has been regularly recording erythemal radiation density since the beginning of 1998. Erythemal radiation densities from as far back as 1953 have been reconstructed with the help of integral solar radiation survey results. The surveys reveal that the majority of annual erythemal radiation (89%) is accumulated during the summer half-year. The UV-radiation of four summer months (May–August) contributes most to it.

Cloudiness, total volume of atmosphere-ozone as well as the volume and optical specifics of aerosol in the atmosphere affect UV-radiation doses. Ozone layer largely protects wildlife from the harmful UV-radiation. Chlorofluorocarbons (CFC-compounds), halons and other substances that arise from human activity and reduce ozone layer cause the thinning of the ozone layer. Thus, the amount of UV-radiation that reaches the ground increases, causing the frequency of damages to the eye and skin cancer. Measures for limiting the use of substances that reduce the ozone layer have been implemented globally. Since 1979, no significant changes have been noted in the thickness of ozone layer above Estonia. Erythemal radiation density has also remained fairly stable across the entire time series, depending mostly on weather conditions.

No significant changes to the thickness of ozone layer have been noted above Estonia over the last 30 years; erythemal UV-radiation has also remained stable.

Associated indicators
Annual average air temperature – pg 56
Annual average precipitation – pg 57

[Graph of Annual erythema-effective UV-radiation density dose and annual average thickness of ozone layer above Estonia. Data: Tartu Observatory.]
Concentration of caesium in the environment

Estonian Environmental Strategy 2030:
• ensure the safety of the population and protection against risks endangering their security.
National radiation safety development plan:
• ensure radiation safety and readiness to react to radiation emergency.

Concentration of caesium ($^{137}$Cs) in air has remained stable and reduced moderately in seawater.

The radioactive pollution of environment is assessed based on the concentration of caesium radioactive isotope $^{137}$Cs in various environmental spheres. $^{137}$Cs is a radionuclide with a half-life of 30 years, which is formed during nuclear fission and was released into the environment as a result of nuclear testing and the nuclear accident at Chernobyl in 1986. $^{137}$Cs level is monitored in air, aquatic environment, river and drinking water, milk and food products in order to protect humans and nature against the harmful effect of ionizing radiation and discover the transmission of radioactive pollution to Estonia during nuclear and other accidents. Radionuclides are transmitted from air to water, surface and food products and they may affect people in several ways, for example, by increasing the likeliness of tumours and hereditary diseases.

Only very small amounts of $^{137}$Cs have been found in air. The level of $^{137}$Cs in air fluctuates in time, but as a rule has not exceeded 10 Bq per million cubic meters. Temporary rise of $^{137}$Cs level in air was noted at the end of the summer of 2006 during large forest fires in Russia, as a result of which radioactive pollution from Chernobyl that had deposited on the ground was discharged into the atmosphere where the wind carried it to Estonian territory as well. There was also temporary rise in March–April of 2011 due to the accident in Fukushima nuclear plant in Japan, but this concentration was of no danger to human health. The difference in the results in Narva-Jõesuu and Harku air is caused by the fact that after the accident at Chernobyl, a larger quantity of $^{137}$Cs was deposited in north-eastern Estonia than elsewhere in the country.

$^{137}$Cs concentration in the aquatic environment, river and drinking water, milk and food has also remained low. Although data in seawater varies at the same stations over the years, we can see a moderate decrease in the concentration of $^{137}$Cs, which is related to the inflow of clean water.

Radiation levels in the Estonian environment continue to be at the usual level and do not present significant risk to human health.
Quality of drinking and bathing water

Estonian Environmental Strategy 2030:
- ensure that drinking and bathing water is safe for human health.

The quality of both drinking and bathing water has improved over the last 20 years, but aged pipelines affect drinking water at times.

Microbiological and chemical parameters of drinking water characterise direct risk to human health, while indicator parameters affect water’s organoleptic properties and show the overall water pollution, but exceeding upper concentrations is not directly dangerous to health.

Microbiological parameters - disease outbreaks spreading through the water network have not been recorded in Estonia since 1996, although there have been fairly extensive outbreaks in previous years. Chemical parameters - in respect to the concentration of fluorides that have proved to be problematic in previous years, the quality of drinking water has significantly improved in recent years thanks to implementing modern water treatment methods. This has also led to the decrease in the share of waterworks not confirming to requirements in respect to chemical parameters. Indicator parameters - non-conformity of drinking water in terms of indicator parameters is mostly related to excessive concentration of iron, manganese, ammonium and chloride, which are either of natural origin or caused by the poor status of pipelines.

Quality of bathing water has significantly improved since the beginning of 1990s thanks to better waste water collection and treatment. Monitoring of bathing water changed completely in 2008 - quality of bathing water is now assessed according to new, slightly stricter regulations. The number of non-conforming tests has therefore increased a little in recent years. An issue for bathing beaches is also the proliferation of blue-green algae blooms, which may cause health problems.

😊 Quality of drinking and bathing water is generally good.
😊 At times, the poor condition of pipelines has a negative effect on the quality of drinking water.

Associated indicators
Point source pollution load into inland bodies of water and the sea - pg 31
Status of groundwater - pg 32
Ecological status of coastal waters - pg 33
Ecological status of lakes - pg 35

Share of non-conforming drinking and bathing water tests. Data: Health Board.
Estonian Environmental Strategy 2030:
• achieve and preserve the good status of coastal water; the concentration of pollutants in food products must be safe for human health.

HELCOM:
• reduce the concentration of dangerous substances in the Baltic Sea either to the level of natural background or zero in respect to synthetic substances from human activity.

Concentration of dangerous substances in the fish of Baltic Sea does not present risks to the health of humans consuming them.

The concentration of dangerous substances is analysed in Baltic herring and perch in order to monitor the environmental status of Estonian coastal waters. Long-term changes to dangerous substances are characterised according to the test results from Baltic herring, which allow assessing the status of open sea. Perch test results are used to assess the environmental status of various bodies of surface water in Estonian coastal waters.

The average concentration of heavy metals measured in fish caught in Estonian coastal waters is comparable to the average indicators of the Baltic Sea. Increase in the concentration of copper and cadmium, but also zinc in the liver of Baltic herring since 2007 presents a certain indicator of risk. The increase of concentrations ceased in 2011, but there are still some instances of high copper and cadmium concentration. Reasons for the increase of concentration of some heavy metal in tests taken from the liver of Baltic herring require additional research. However, in comparison to the 1990s, the concentration of most heavy metals in fish has been lower in recent years.

Concentration of dioxins and dioxin-like PCB compounds in Baltic herring is basically equal in the whole of Estonian coastal waters. The concentration of dioxin-like PCB compounds is somewhat higher in fish in the eastern part of the Gulf of Finland. Concentration of dioxins and dioxin-like PCB compounds was relatively high in 2010 and 2011. This may be due to different circumstances (for example: tests have been taken only in the Gulf of Finland, analysed fish are somewhat older and pollutants have thus accumulated for longer) and may not indicate an increase in pollution.

Although the concentration of some heavy metals has increased in the liver of Baltic herring, the concentrations of analysed dangerous substances (heavy metals, organic pollutants and dioxins and dioxin-like PCB compounds) in Baltic herring and perch do not present any risk to the health of humans consuming them.

In comparison to the 1990s, the concentration of most dangerous substances in fish has decreased.

A sign of danger in recent years is the increased concentration of some heavy metals in the liver of Baltic herring.

Associated indicators
Ecological status of coastal waters - pg 33
Concentration of dioxins (PCDD/F) and dioxin-like PCB compounds (dioxPCB) in Baltic herring. Data: Veterinary and Food Board.
11. Funding
Funding of environmental protection projects from the Environmental Programme of the Environmental Investment Centre

Projects related to water economy have received the most monetary funding; in terms of numbers, projects promoting environmental awareness have received the most funding.

Environmental protection projects have been funded from environmental charges. Increased environmental charges have allowed to invest more into environmental protection projects. As a result of financing environmental protection projects, the status of environmental protection infrastructure has improved, the necessary nature conservation work have been carried out, research essential to the field of the environment has been conducted, etc.

National funding of environmental protection projects increased annually until 2008, but recession significantly affected financial allocations to environmental protection projects as well - while a total of 50.6 million euro was appropriated for projects in 2008, the allocated sum in 2009 was 29.8 million euro. The number of subsidised projects decreased from 1,375 to 668. Once the economy saw an overall recovery, the amount of allocated sums increased abruptly. In 2011, 59.5 million euro was allocated from the EIC Environmental Programme for 1,166 projects.

Since 2000, more than 14,000 projects have been allocated a total of 387.8 million euro from the EIC Environmental Programme. Projects related to water economy constitute the greatest share in monetary terms - 40.1%. This is followed by waste handling (13.8%), nature conservation (9.6%), atmospheric air protection (8.4%) and environmental awareness (7.2%) projects. Even though in monetary terms, the most support has gone to water economy-related projects, in terms of submitted applications and the number of subsidised projects, the greatest number has been in the field of promoting environmental awareness - the objective of 34.8% of the supported projects has been to increase people’s environmental awareness. In terms of the number of projects, it is followed by nature conservation (16.2%), county (14.1%) and water economy (11.7%) projects.

Financing environmental protection projects has increased despite the economic crisis.

Associated indicators
The fee for extraction right of mineral resources - pg 18
Rates of pollution charges for emission of pollutants into aquatic environment - pg 37
Rates of pollution charges for emission of pollutants into ambient air - pg 54

Sums allocated from the EIC Environmental Programme by areas. Data: Environmental Investment Centre.
**Abstract**

Estonian Environmental Indicators 2012 provides a concentrated overview of Estonia’s environment and its main influences. Environmental indicators are used to describe the status of the environment. The book consists of 11 blocks: background indicators, mineral resources, fisheries, game animals, water, biodiversity, air and climate, waste, environment and health, financing. Most of the thematic blocks consist of three types of indicators: pressure indicators (indicate direct pressure on the environment), state indicators (describe state of the environment) or response indicators (describe efforts towards improvement of the environment by using technical or management measures). Strategic target, time series and short analysis is provided for every environmental indicator based on latest data available on the first half of year 2012. Additionally, for most of the indicators, related indicators are pointed out.

**Keywords**

Estonia, environment, mineral resources, fishery, game animals, water, forest, biodiversity, air, climate, waste, environment and health, financing, environmental indicators

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