ENVIRONMENT
OF THE SLOVAK REPUBLIC IN 2000 – 2012
IN FOCUS

ENVIRONMENT OF THE SLOVAK REPUBLIC IN 2000 – 2012 IN FOCUS
Information brochure of selected environmental indicators

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Environmentálny fond

CONTENT

Introduction

Environment of the Slovak Republic in 2000 – 2012 in focus is an informational brochure intended for professional and for general public as well, promoting access to data and information on the environment of the Slovak Republic, and therefore pursuing an aim of increasing environmental awareness and public information in this area. The brochure prepared by the Slovak Environment Agency in a concise and clear form assesses the status and trends of the environment since the beginning of the new millennium in 12 thematic areas within which 40 selected environmental indicators are presented. As the information sources are stated the original data sources of the respective institutions. These were further processed by the consultants in the output formats of graphs or tables.

The need for sharing environmental information within Europe is covered by its English version. The publication is available in an electronic form at www.enviroportal.sk/spravy/spravy-o-zp/kapitola/77. ■

Slovakia in Focus

Form of state	Republic
Political system	Parliamentary democracy
Establishment of the state	January 1st, 1993
EU member since	May 1st, 2004
Currency	Euro (€)
Area	49 035 km^2 (to year 2012)
Population	5 410 836 (to year 2012)
Population density	109 inhabitants/km^2
Official language	Slovak
Capital	Bratislava (population: 425 533)
Time zone	CET / GMT+1.00
GDP (to year 2012) **• total** **• per capita**	 71 096.02 mil. EUR 13.15 thous. EUR
2014 Environmental Performance Index **http://epi.yale.edu/epi/country-profile/slovakia**	74.45 % 21st from 178 assessed countries

Basic information on the Slovak Republic

The Slovak Republic is a landlocked country in the „heart" of Europe. Near the historic town of Kremnica in central Slovakia a geographical centre of Europe is situated. Slovakia borders with the Czech Republic on the west, with Austria on the south-west, with Hungary on the south-east, with Poland in the north and Ukraine on the east.

Landscape of the country is characterized by large differences in heights. Surface of Slovakia is covered by plains, basins, hills, highlands and mountains. The lowest point is the town Streda nad Bodrogom (95 m.a.s.l.), the highest point is Gerlach peak (2 655 m.a.s.l.) in the High Tatras. Northern and Central Slovakia is mountainous, being the part of the Carpathian arc. Southern and eastern Slovakia is characterized by lowlands and is an important agricultural area in Slovakia.

Slovakia is located in the northern temperate zone, with a regular alternation of four seasons and transient effects of continental and Atlantic climate, causing drought, summer heat and winter frosts. Atlantic air brings rainfall and moderates temperature. Temperature inversions are characteristic for mountain areas mainly in spring and autumn. The average annual temperature ranges from 5.5 °C to 10 °C.

Slovak territory is crossed by main European watershed. The largest central river Danube flows from Austria. It connects Slovakia with the ports of the Black Sea and through the Rhine–Main–Danube with western Europe. Slovakia is a country extremely rich in quality mineral springs and thermal water.

Since long time ago there have been important transport and trade routes in Slovakia between the Baltic and the Adriatic Sea and the Black and North Sea.

Geographical location of Slovakia in the middle of Europe and bordering with the Carpathians and the Pannonian plains, are responsible for rich diversity of flora and fauna. About 11 270 plant species (including algae), more than 28 800 animal species (including invertebrates) and 1 000 species of protozoa were described in Slovakia. Estimates are even higher. The range of communities is very wide, ranging from thermophile in the southern regions to alpine occurring at higher altitudes.

In Slovakia there are 9 national parks and 14 protected landscape areas. So far there have been discovered and registered more than 1 200 caves of various sizes and shapes, of which 18 are available to public.

The population of Slovakia is uneven and concentrated mainly in the lowlands and valleys, mountain areas are only sparsely populated. Ethnic composition of the population constitutes 85.8 % Slovak, 9.7 % Hungarian, and the remaining 4.8 % Roma, Czech, Ruthenian, Ukrainian, Polish, German and other nationality. Life expectancy is 72.5 years for men and 79.5 years for women.

Slovakia is a predominantly Roman Catholic (68.9 %) country; the second largest church is the Evangelical Church. Part of the population adheres well to the Greek Catholic and Orthodox Churches, the rest are Christian Reformed Church believers, believers of smaller churches, non-registered churches and no religion (13 %).

The Slovak Republic was established as a new country on January 1st, 1993 by a break-up of the former Czechoslovakia into two independent, sovereign states (the Slovak Republic and the Czech Republic). Subsequently it became a member of the most important international governmental organizations such as UN, OSCE, Council of Europe, OECD, NATO, V4, and CEFTA, WHO, WTO, UNESCO, CERN, IMF, EBRD, Interpol and others.

On May 1st, 2004 it became a member of the European Union, on December 21st, 2007 a member of the Schengen area, on January 1st, 2009 it became a part of the European Monetary Union and its currency is the euro (€).

1. EMISSIONS OF MAJOR POLLUTANTS

The basic airborne contaminants include particulate matters (PM), sulphur oxides expressed as sulphur dioxide (SO_2), nitrogen oxides expressed as nitrogen dioxide (NO_x) and carbon monoxide (CO).

Particulate matters are divided by size into two main groups:

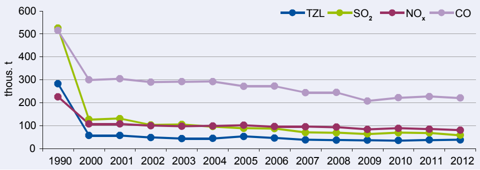
- **PM_{10}** are particles with a diameter of 2.5 to 10 microns, they can easily penetrate into the lung tissue, and can cause health problems in the cardiovascular and respiratory system. Source of PM_{10} particles is blowing dust from roads, industrial plants, burning solids or exhaust gases from motor vehicles.
- **$PM_{2.5}$** are particles with a diameter less than 2.5 microns and, like the PM_{10} have a negative effect on human health and particularly on the respiratory tract. Their sources are all kinds of combustion processes, including residential wood burning, forest fires, plant, processes in agriculture, automobile transport etc.

Sulphur dioxide is gaseous substance which is irritating to the mucous membranes of the respiratory tract and conjunctiva, it is contained in the exhaust gases of internal combustion engines, and it is also formed by the combustion of fossil fuels or in the processing of sulphide ores.

Nitrogen oxides are formed in technical facilities where air at high temperatures is being burned; they are also part of the exhaust gas. They can cause mild to severe bronchitis or pneumonia, and also contribute to ozone depletion of the Earth, rainfall acidification and smog.

Carbon monoxide is a product of combustion in furnaces, boilers and other technological appliances burning gaseous, liquid and solid fuels and is the most poisonous component of exhaust gas. The main negative effect of CO is blocking delivery of oxygen to tissues. The classic symptoms of CO poisoning are headache and dizziness, heart problems and malaise.

Trend of emissions of basic pollutants *(Source: SHMI)*



Particulate matters emissions steadily decreased since 1990 until 2004 due to a change in fuel base in favour of introducing fuel and separation techniques, respectively increasing their effectiveness. Increase in PM emissions between 2004 and 2005 was due to an increase in wood consumption in the small sources (domestic heating) due to increases in natural gas and coal for retailers. Reduction in PM emissions in 2006 was mainly due to reconstruction of separation equipment in some energy and industrial companies. Further reduction in PM emissions in 2007 was due to the fact that several major sources of combustion units were out of service. Since 2008, the trend in PM emissions was steady. Slight increase in PM emissions in 2011 occurred in the household sector, where increased consumption of firewood and briquettes at the expense of natural gas. Within the period 2000 – 2012 emissions decreased by 32.6 % in 2012, however, PM emissions compared to 2011 increased slightly by less than 1 %.

Carbon monoxide emissions have had downward trend since 1990, which was caused mainly by reducing consumption and changing the composition of the fuel consumed by retail customers. CO emissions from major sources declined only slightly. Within total CO emissions, iron and steel industry were involved the most. In 2004, CO emissions increased slightly, especially at large ones. Increase in CO was observed only in the small sources (domestic heating) and is linked to an increase in wood consumption due to increases in natural gas and coal. The increase in 2006 was due to increased production of steel and raw iron. In 2009 there was a decrease in CO emissions due to the decline of steel and iron due to the economic recession. Drop in emissions in the road transport sector affected ongoing vehicle fleet renewal. Between 2010 and 2011, emissions increased slightly because of the increased production of iron and steel, and in 2012 there was a decrease in CO emissions due to a decline in several operators. CO emissions decreased in the reporting period 2000 – 2012 by 26.3 % in comparison of 2012 to 2011 there was a decrease of 2.4 %.

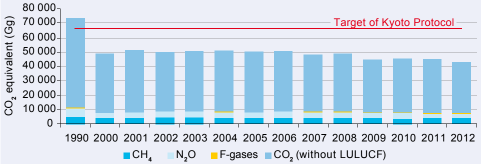
Emissions of sulphur dioxide and nitrogen oxides are reviewed in the indicator No. 4 Emission of acidification substances. ■

2. GREENHOUSE GAS EMISSIONS

Greenhouse gases are gaseous substances causing the greenhouse effect. These include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated greenhouse gases, also known as F-gases, which are divided into groups containing hydro fluorocarbons (HFCs), per fluorocarbons (PFCs) and sulphur hexafluoride (SF_6). These emissions are produced during the natural processes and human activities. The most important natural greenhouse gas in the atmosphere is water vapour. During the human activity large amounts of other greenhouse gases escape into the atmosphere, increasing their atmospheric concentrations. Greenhouse gases are given in the so-called CO_2 equivalents, which is the value for the degree of influence of each greenhouse gas to global warming using the conversion amount or concentration of CO_2, which would have similar effects.

Increasing emissions of greenhouse gases in the atmosphere enhance the greenhouse effect, which in turn causes climate change. ➲

Trend of greenhouse gas emissions *(Source: SHMI)*



Note: sector LULUCF – Land use, land use change and forestry – Land use, land use change and forestry, mentioned CO_2 emissions are without considering CO_2 emissions and collections in this sector.

Kyoto Protocol to the United Nations Framework Convention on Climate Change was adopted on December 11th, 1997 in Kyoto, Japan. Slovakia adopted a reduction target of not exceeding in the period 2008 – 2012 the average level of greenhouse gas emissions from 1990 decreased by 8 %. In spring 2007 the European Parliament adopted a unilateral commitment to reduce greenhouse gas emissions in the EU by at least 20 % by 2020 compared to 1990. Further it is followed by a statement that the EU can extend this commitment to a 30 % reduction if the other developed countries of the world and developing countries with more developed economies will join with the commitments adequate to their responsibilities and capabilities.

Total greenhouse gas emissions in 2012 represented 42 710.20 Gg of CO_2 equivalents (excluding LULUCF sector). This represented a reduction of 41.7 % compared to the reference year 1990. During the period from 2000 to 2012 greenhouse gas emissions fell by 12.7 %, in 2012 compared to 2011 there was a decrease of 4.5 %.

Proportion of emissions in the power industry sector, including transport, on the total greenhouse gas emissions in 2012 was almost 69 % (in terms of CO_2 equivalents), transport emissions within the power industry sector accounted for 20 %. While the share of emissions from stationary sources is declining, the share of transport emissions is increasing. Another area of concern, which is failing to increase greenhouse gas emissions effectively regulate the burning of fossil fuels in households, so-called local fire places.

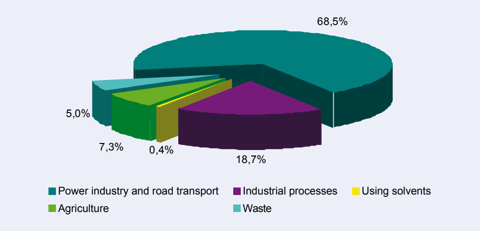
Industrial sector is the second largest sector with 18.7 % share of total greenhouse gas emissions in 2012.

Agriculture sector accounted in 2012 for 7.3 % share of total greenhouse gas emissions. Emissions in this sector declined sharply since 1990, since 2000 the trend was stable and only influenced prices and subsidies for agricultural commodities.

Waste sector in 2012 accounted for almost 5 % of the total greenhouse gas emissions.

Solvent use sector accounted for less than 1 % of total greenhouse gas emissions in 2012. Emissions in this sector are mainly produced in sewage and automotive paint shops, as well as in industry, involving the use of volatile organic compounds.

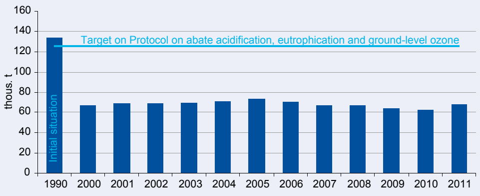
Share of individual sectors on greenhouse gas emissions in 2012 *(Source: SHMI)*



3. EMISSIONS OF NON-METHANE VOLATILE ORGANIC COMPOUNDS

Non-methane volatile organic compounds (NMVOC) are all organic compounds of anthropogenic nature, other than methane, which by reaction with nitrogen oxides produce photochemical oxidants, of which the most important is ozone. Ozone is an extremely toxic substance, which in very low concentrations has a negative effect on human health and vegetation. The main source of emissions of non-methane volatile organic compounds includes the use of coatings and adhesives, dry-cleaning and degreasing, oil processing and transport.

Trend of emissions of non-methane volatile organic compounds *(Source: SHMI)*



In 1999, Slovakia signed the Protocol to the Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone and thus committed itself to reduce NMVOC emissions by 6 % within 2010, compared to emissions in 1990. Slovakia has met this objective and continues to meet.

Total emissions of NMVOC dropped significantly since 1990, to what contributed the decrease in consumption of coatings and gradual introduction of low solvent coatings, introduction of measures in the oil refining and distribution of fuel, gasification of combustion plants in the field of municipal energy and change of automobiles toward controlled vehicles equipped with catalytic converter.

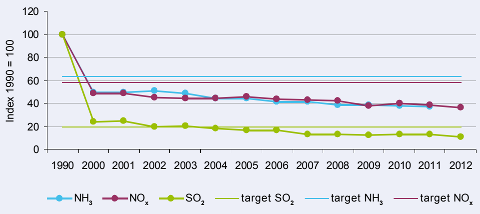
Since 2000 there has been an increase in emissions of NMVOCs, which was mainly due to sector of coatings and adhesives, as their use is part of a broad spectrum of industrial activities and various technological operations. The consumption and imports of printing ink and solvent coating systems continuously increased. Between 2004 and 2005 there was a boom in the automobile manufacturing industry, many coating rooms opened, thus increasing the consumption of coatings. In 2009 there was a decrease in NMVOC emissions associated with a decline in industrial production and this trend continued in 2010. Degrease consumption of metal surfaces and road transport was most involved in lower consumption of solvents.

In the period 2000 – 2011 NMVOC emissions decreased by 1.7 %, but in 2011 compared with 2010 there was an increase of 9.4 %. ■

4. EMISSION OF ACIDIFICATION SUBSTANCES

Acidification is a process which increases the acidity of the abiotic components of the environment. It is caused mainly by the presence of three gaseous emissions: **sulphur dioxide, nitrogen oxides and ammonia**. They react in the atmosphere and cause the acidity of rain. Consequently they acidify the soil, water, lead to deterioration of the health condition of organisms, forest degradation, as well as disruption of building – the technical condition of buildings.

Trend of acidification substances *(Source: SHMI)*



Note: Emissions NH_3 set to 2011

SO_2 emissions amounted to 58 520 tons and NO_X emissions to 80 990 tons in 2012 and production of NH_3 emissions in 2011 amounted to 24 184 tons.

Upon the Protocol to the Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone there is an obligation for the Slovak Republic to reduce SO_2 emissions by 80 %, NO_X emissions by 42 % and NH_3 emissions by 37 % compared to 1990. SR meets this target.

Because of change in fuel base in favour of refined fuels **emissions of sulphur dioxide (SO_2)** have through a change long- term downward trend. Fluctuating trend in SO_2 emissions from 2001 to 2003 was caused by partial or total operation, quality of fuel combustion and the volume of production of energy resources.

Between 2004 and 2006 there was a further decline in SO_2 emissions, which was caused mainly by burning low-sulphur fuel oil and coal and reduction in production volume. In 2005 there was a significant decrease in SO_2 emissions from road traffic, by 77 %, caused by the introduction of measures related to the sulphur content of fuels. Decrease of SO_2 emissions in 2007 was due to the fact that some combustion units were significant sources of outside traffic. Since 2008, the trend in SO_2 emissions has been relatively stable. Smaller increase in SO_2 emissions from major sources by 8 % in 2010 compared with 2009 was due to increased consumption of brown coal power plant facilities, and a slight increase in the sulphur content of the fuel. Within the period 2000 – 2012 SO_2 emissions decreased by 53.9 % and last year, compared with previous year there was a significant reduction by 14.5 %.

Emissions of **nitrogen oxides (NO_X)** reached the highest level in 1990, from that year they have showed a decreasing tendency with slight fluctuations in some years (in 2012 this decline was 64.2 % compared to 1990). Decrease in emissions of nitrogen oxides was caused by a change in emission factor taking into consideration the state of the art and technology of combustion processes and reduction of fossil fuel consumption.

Between 2002 and 2003, denitrification significantly contributed to reduction of emissions. In the year 2006 there was significant decrease in NO_X emissions especially in large and medium stationary sources associated with a reduction in the volume of production and consumption of fossil fuels and natural gas. More significant decrease in NO_X emissions occurred in mobile sources, especially in road transport (renewal of vehicle fleet and trucks). Emissions decrease in 2009 was mainly due to a decrease in production of steel and iron and magnesite clinker as a result of the economic crisis. Another significant decline occurred in 2012, due to a significant reduction in the volume of transported gas compressor stations Eustream Inc.

In the years 2000 – 2012 NO_X emissions decreased by 24.6 % and in 2012 fell almost by 5 % compared to 2011.

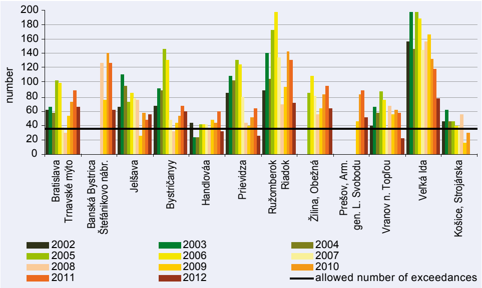
More than 95 % of all **emissions of ammonia NH_3** come from the agricultural sector – animal production and animal waste treatment, as well as the use of artificial nitrogen fertilizers. NH_3 emissions from the energy, industry and transport are minor. In terms of long-term development there is persistent decrease in total NH_3 emissions, largely due to a reduction in the number of livestock. Compared to 1990, NH_3 emissions decreased by 63 % in the period under review by 24.5 % from 2000 to 2011. NH_3 emissions decreased by less than 1 % between two years. ■

5. AIR QUALITY IN URBAN AREAS

Human exposure to air pollution is particularly high in urban areas, where most of economic activity is concentrated. Industrial processes, energy production and transport are major contributors of air pollutants at regional and local level. This variable exposure of urban populations to air pollution focuses on PM_{10}, sulphur dioxide, nitrogen oxides and carbon monoxide.

The biggest problem of air quality in Slovakia but also in Europe is currently air pollution by particulate matter (PM_{10}). It is likely that in the near future daily limit values will continue to be exceeded, even if the value of the long-term annual average of PM_{10} concentrations for SR is below the limit values. ➲

Number of exceedances of daily limit value for PM_{10} in the period 2002 – 2012 at selected monitoring stations *(Source: SHMI)*



Trend of the average annual concentration of PM_{10} in Slovakia has been volatile since 2000, in recent years there has been their slight increase. PM_{10} are currently being monitored at 32 stations of the national air quality monitoring network. In 2012, it exceeded the annual limit value recorded at 2 stations (Jelšava, Ružomberok).

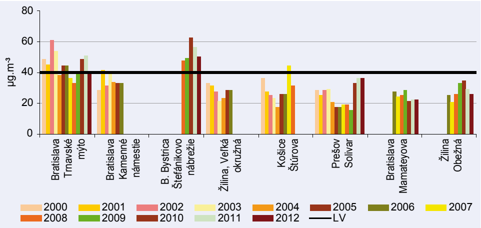
Far more serious and European challenge, however, is exceeding the allowed number of 35 exceeding of daily limit. The limit was exceeded at most monitoring stations in 2012; most exceeding was recorded at the station Veľká Ida (77).

Exceeding the daily limit value of SO_2 to protect human health

SO_2 limit value for the protection of human health (125 μg.m^{-3}) is possible under current legislation in the course of more than 3 times. In 2002 there were the overruns in Slovakia in Trenčín zone at stations Prievidza, Handlová and Bystričany and in 2004 at Bystričany. In 2003, 2005 – 2010 and 2012, there was no exceeding of the limit value at any station. It can be stated that the overall air quality for that pollutant was evaluated for a period of relatively good.

In 2012 exceeded the annual limit value (40 μg.m^{-3}) only at the monitoring station Banská Bystrica – Štefánikovo nábrežie. Average annual concentration at this station greatly exceeded the limit value in recent years, because of the implementation of construction and earthworks in building a ring road in Banská Bystrica. On the other monitoring stations, where an annual average was exceeded in the past, the situation has improved. Limit value for the protection of human health for hourly concentration was not recorded at any monitoring station in more than it is permitted under current legislation.

The annual average NO_2 concentrations at selected monitoring stations *(Source: SHMI)*



Note: LV – limit value

Maximum 8-hour value of moving average of carbon monoxide (CO)

None of the monitoring stations in 2012 exceeded the limit value for carbon monoxide (10 000 μg.m^{-3}) and air pollution levels for the previous period 2000 – 2012 is below the lower limit for the assessment of air pollution.

Air quality to protect the health of the population in Slovakia significantly improved thanks to the adopted policy measures and their effects. In the last two decades, it is possible to observe a consistent and distinct improvement.

6. CONCENTRATIONS OF GROUND-LEVEL OZONE

Most of atmospheric ozone (approximately 90 %) is in the stratosphere (high of 11 – 50 km), the rest in the troposphere. The term **tropospheric (ground-level) ozone** means ozone, which is produced in the surface layer of the atmosphere about 10 km from the Earth's surface. **Ground-level ozone** (O_3) forms major component of photochemical smog and is classified into groups of secondary air pollutant substances. Considering the formation of photochemical smog, volatile organic compounds and nitrogen oxides have the greatest proportion. High concentrations of ozone adversely affect human health (irritating to eyes and respiratory system) and leads to ecosystem degradation (damage to plant tissue).

Number of days exceeding the target value for the protection of human health
(Source: SHMI)

Station	2010	2011	2012	Average
Bratislava, Jeséniova	24	24	48	**32**
Bratislava, Mamateyova	21	27	35	**28**
Košice, Ďumbierska	14	70	25	**36**
Banská Bystrica, Zelená	17	32	53	**34**
Jelšava, Jesenského *	4	13	-	-
Kojšovská hoľa	55	58	37	**50**
Nitra, Janíkovce	16	11	43	**30**
Humenné, Nám. Slobody	8	10	10	9
Stará Lesná, AÚ SAV, EMEP	15	17	14	15
Gánovce, Meteo. st.	7	25	12	15
Starina, Vodná nádrž, EMEP	2	7	7	5
Prievidza, Malonecpalská	9	14	12	12
Topoľníky, Aszód, EMEP	23	-	31	**27**
Chopok, EMEP	36	68	74	**59**
Žilina, Obežná	20	34	34	**29**

** The station had a long-term outage*
Bold values indicate exceeding of the target value

Network-wide average of ozone concentrations in 2003 was the highest for the entire period from 2000 to 2012. Target value of ground-level ozone to protect human health, according the MAEaRD SR Decree Nr. 360/2010 Coll. on air quality, is 120 $\mu g.m^{-3}$ (maximum daily 8-hour value). This value must not be exceeded in more than 25 days per year, averaged over three years. Permitted number of 25 days on average for the years 2010 to 2012 was exceeded at 9 stations, the most at high-mountain station Chopok (74 days).

Annual average concentrations of ground-level ozone in Slovakia in polluted urban and industrial areas in 2012 ranged from 49 – 93 $\mu g.m^{-3}$. The highest annual average ozone concentrations in 2012 had a high mountain station Chopok (93 $\mu g.m^{-3}$). It is associated with high ozone concentration in the zone of accumulation of tropospheric ozone over the territory of Europe, which is located in a layer about 800 to 1 500 m above the surrounding surface.

Alert threshold (240 $\mu g.m^{-3}$) or information threshold (180 $\mu g.m^{-3}$) for alerting the public and to warn the public were in 2012 exceeded at no station. ■

7. CONSUMPTION OF CONTROLLED SUBSTANCES

An important indicator of threats to Earth's ozone layer include monitoring the development of the so-called controlled substances (AI – CFCs, AII – halons, BI – CFCs, BII – CCl_4, BIII – 1,1,1 trichloroethane, CI, CII – HBFC22B1, E – CH_3Br). Concentration of ozone in particular threatens ozonosphere growing emissions of CFCs and halons (CFC – fluorinated hydrocarbons, HCFC – hydrochlorofloro-hydrocarbons). They are fully halogenated or partially halogenated alkanes (compounds of chlorine and bromine). 95 of such substances and isomers enrolled the group of controlled ozone-depleting substances. H_2, H_2O, N_2O, NO_X, CO, CO_2, CH_4 and non-methane hydrocarbons adversely affect the ozone layer.

Slovak Republic is a party to the Vienna Convention for the Protection of the Ozone Layer, 1985, the Montreal Protocol on Substances that Deplete the Ozone Layer of 1987 and the tightening Amendments adopted at the meeting of the Parties to the Montreal Protocol in London (1990), Copenhagen (1992), in Vienna (1995), Montreal (1997) and Beijing (1999). Implementation of the objectives of the Montreal Protocol and its amendments called for the adoption of the Programme of Action of the Slovak Republic on the gradual elimination of ozone-depleting substances, as well as the adoption of new laws.

Following the Montreal Protocol and changes to the London and Copenhagen Amendments consumption of controlled substances of group (fully halogenated chlorofluorocarbons, halons, other fully halogenated chlorofluorocarbons, other perchlorofluorohydrocarbons, carbon tetrachloride, 1,1,1-trichloroethane) in SR from January 1st 1996 should be zero.

Only products from stocks, recycled and regenerated ones may be used. An exception is possible only for the use of these substances for laboratory and analytical purposes. Since 1996, regulated production and consumption of chlorofluorocarbons non-halogen with a commitment to eliminate them by 2020 with that for the next 10 years, these substances can be produced and consumed only for service purposes in an amount of 0.5 % of the calculated base level in 1989. Consumption of methyl bromide had to be till 1999 decreased by 25 % and till 2001 to 50 %, till 2003 by 70 % and till 2005 it should have been completely eliminated. From January 1st 1996, the production and consumption of non-halogen bromine-fluoride hydrocarbons is banned.

The Slovak Republic does not produce substances that deplete the ozone layer of the Earth. All consumption of these substances is secured by imports. These imported materials are mainly used in refrigerants and detection gases, solvents and cleaning agents. In 2012, the consumption of these substances was negligible; respectively their consumption is not counted the applicable methodology, except those included in the CI group under the Montreal Protocol and its amendments.

Trend of consumption of controlled ozone-depleting substances in Slovakia (tons) *(Source: MoE SR)*

Group of substances	1986 / 1989#	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
A I – freons	1 710.5	0.996	0.81	0.533	0.758	0.29	0.43	0.46	0.34	0.49	0.19	0.067
A II – halons	8.1	-	-	-	-	-	-	-	-	-	-	-
B I* – freons	0.1	-	-	-	-	-	-	-	-	-	-	-
B II* – CCl_4	91	0.01	0.009	0.047	0.258	0.045	0	0.016	0.099	0.119	0.039	0.072
B III* – 1,1,1 trichloretan	200.1	-	-	-	-	-	-	-	-	-	-	-
C I*	49.7	71.5	52.91	38.64	48.76	43.94	41.32	34.35	31.12	0.578	-	0.496
C II – HBFC22B1	-	-	-	-	-	-	-	-	-	-	-	-
E** – CH_3Br	10.0	0.48	0.48	0.48	-	-	-	-	-	-	-	-
Total	**2 019.5**	**72.986**	**54.21**	**39.7**	**49.78**	**44.28**	**41.75**	**34.83**	**31.56**	**1.187**	**1.229**	**0.635**

 # initial consumption
** base year 1989*
*** initial year 1991*

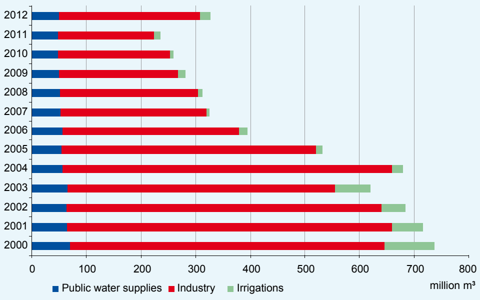
Note 1: In 2001 – 2004 there were imported 0.48 tons of methyl bromide for Slovakofarma as a raw material in the manufacture of drugs, which are not counted under the applicable methodology to consumption.

Note 2: Consumption of CI group in 2010 and in 2012 is represented by imports of reclaimed R22. From January 1st 2010, pursuant to Regulation No. 1005/2009/EC only recycled or reclaimed materials for the maintenance and servicing of equipment; importation, marketing may be placed on the market and use of pure CI group substances is prohibited. ■

8. SURFACE WATER ABSTRACTION

The surface water abstraction is the amount of abstracted surface water by user groups. Surface waters are currently **used mainly** for industrial purposes (approx. 80 %), for agricultural irrigation (approx. 5 %) and for production of drinking water (approx. 15 %). Abstractions for industrial purposes from surface water sources are used as potable water – that is mainly on technology and cooling. Amount of water abstraction for irrigation is dependent on the extent and temporal distribution of natural rainfall during the growing season and recently made considerable fluctuations between years. Direct sampling of streams for drinking purposes is mainly used in areas where it is not possible to provide appropriate resources.

Trends of surface water exploitation *(Source: SHMI)*



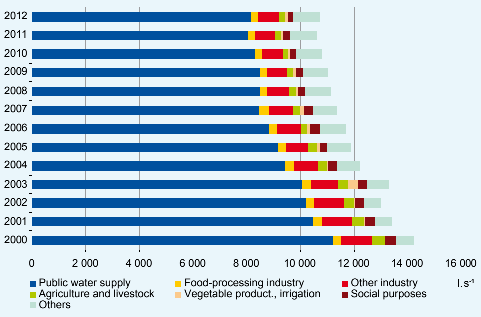
Surface water abstractions had a downward trend over the period 2000 to 2012. Significant decreasing trend was recorded after 2005, due to the change of water use registration. In 2012, the total volume of abstracted surface water reached the value of 326.4 million m^3, as compared to 2000, there was a decrease of 410.6 million m^3 (i.e. 55.7 %). Despite the prolonged downturn, in 2012 there was an annual increase of 90.2 million m^3 (38.2 %).

Surface water abstractions for **industrial purposes** in 2012 amounted to 259.2 million m^3; as compared to 2000 there was a decrease of 316.6 million m^3 (45 %). In this sampling group significant annual increase, by 82.6 million m^3 (46.8 %) compared to 2011 was also recorded. Abstractions for **water supplies** in the period from 2000 to 2012 fell by 30.5 %, but between years 2011 and 2012 increased slightly by 0.55 million m^3 (1.1 %). Abstractions for **irrigation** are fluctuating and depend on the volume of rainfall during the summer. In 2000, withdrawals for irrigation mounted to 90.54 million m^3 (12.3 % of the abstractions in 2000), while in 2012, abstractions amounted to 18.14 million m^3 (6 %).

9. GROUNDWATER ABSTRACTION

The groundwater abstraction is the amount of groundwater absorbed according to user groups. In Slovakia, **special attention** is paid to groundwater because of its use as a main source of drinking water. Due to the uneven distribution of water resources quantitatively and despite the favourable condition in some areas and locations particularly in dry periods, deficit of drinking water may persist. The highest available volumes are documented in the quaternary Podunajská lowland – Žitný ostrov.

Trend of groundwater extraction according to the purpose of use *(Source: SHMI)*



In 2012, based on hydrological assessments and surveys in Slovakia, there were **78 939 l.s^{-1}** available groundwater resources, which constitute about 53 % of documented natural resources. During the reporting period 2000 – 2012 amounts of abstracted water continued to decline, this reduction in 2012 represented 24.6 % of the abstraction in 2000. Compared to 2011, abstractions in 2012 increased by 1.1 %. Overall, consumers in 2012 used **10 719.35 l.s^{-1}** of groundwater, which **represents 13.6 %** of the documented usable quantities.

Significant part in 2012 (about 76 %) involves the use of ground water through the public **water supplies.** In this group was an annual increase of 78.6 l.s^{-1} (1 %), but in comparison with 2000 abstractions fell by 3 038.7 l.s^{-1} (27.2 %).

For a more detailed assessment of groundwater usage by individual purposes in 2012, there can be stated slight increase in water consumption in most groups, in addition to use in non-food industry, social needs and other applications, where a slight decrease in use was observed compared to 2011.

10. SURFACE WATER QUALITY ASSESSMENT

Surface water quality is determined through a set of quality indicators representing the physical, chemical, biological and microbiological properties of the water and are monitored in surface waters and in bathing waters.

Assessment of **water quality** had been conducted till 2007 according to STS 75 221 in 5 classes and 8 groups of indicators, and thereafter pursuant to SR government Regulation No. 296/2005 Coll. Since 2009, water quality has been assessed according **to SR government Regulation No. 269/2010 Coll. laying down the requirements for achieving good water conditions**.

Surface water quality in 2012 at all monitoring sites met the limits of Government Regulation No. 269/2010 Coll. for the selected **general indicators** (Part A): magnesium, sodium, sulphate, free ammonia, fluorides, surface active substances, phenol index, chromium (VI), vanadium, chlorobenzene, dichlorobenzene and the **radioactivity indicators** (Part D): bulk volume alpha and beta activity, tritium, strontium and cesium. The requirements on the quality of surface water were not achieved in the group of **synthetic substances** (Part B) for the parameters arsenic, cadmium, mercury, zinc. In the group of **non-synthetic substances** (Part C) requirements for the annual average of the following substances were not met: alachlor, hexachlorobenzene, di (2-ethylhexyl) phthalate (DEHP), 4-methyl-2,6-di-tert-butylphenol, benzo (g, h, i) perylene + indeno (1,2,3-cd) pyrene and cyanides. Maximum allowable concentration of mercury exceeded the indicators and 4-methyl-2,6-di-tert-butylphenol. Considering the **hydro-biological and microbiological parameters** (Part E) those were saprobic index biosestone, phytoplankton abundance, chlorophyll-a, coliform bacteria, thermotolerant coliform bacteria, intestinal enterococci and culturable microorganisms at 22 °C. Frequently exceeded indicator in all sub-basins in the **general indicators** was nitrite nitrogen.

In addition to assessing the quality of surface waters under Regulation No. 269/2010 Coll. in Slovakia, as well as in the EU, an assessment of the **condition of surface water bodies**, which is based on assessment of the ecological condition, respectively ecological potential and chemical balance of surface water bodies was carried out. This assessment is conducted 1 x per six years and then it derives from other activities related to ensuring the achievement of one of the environmental objectives of the Water Framework Directive, i.e. achievement of good water condition for all water bodies by 2015.

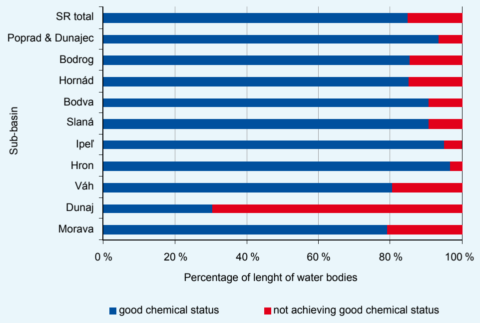
In 2010, of the total number of water bodies (1 648) very good and good **ecological status** were detected in 70.51 % and the moderate status in 25.36 % of water bodies. Bad and poor status was detected at 4.13 % of water bodies. The best situation from the perspective of ecological status was in the sub-basins Bodrog, Hornád, Slaná, Hron and Váh.

The total number of water bodies classified into different classes of ecological status in river basin districts in Slovakia in 2010 *(Source: WRI)*

	Condition of water bodies (number)				
	High	Good	Moderate	Bad	Poor
Danube river basin district	5	1 113	379	61	7
Vistula river basin district	0	44	39	0	0
Total in SR	**5**	**1 157**	**418**	**61**	**7**

Assessment of chemical balance of surface water bodies in 2010 was performed at 1 760 water bodies (these include 1 737 surface water bodies at rivers (flowing waters) and 23 surface water bodies at rivers with a changed category (standing waters). Good chemical status achieved 1 584 (90 %) of water bodies and 176 (10 %) did not reach good water chemical status. The largest share of water bodies with good chemical status to the total number of water bodies in the basin was recorded in the sub-basin district of Poprad and Dunajec. Conversely the worst case was sub-basin district of the Danube, where almost 70 % of water bodies did not achieve good chemical status.

Evaluation of the chemical status of surface water bodies lengths in 2010 *(Source: WRI)*



When assessing the quality of surface water a specific position has monitoring and evaluation of **natural bathing waters**.

The assessment of natural bathing waters in 2012 included 84 sites, which are in addition to other purpose of recreational use. During the bathing season, 506 samples of water were collected from natural bathing waters in Slovakia, where 7 245 physic-chemical, microbiological and biological indicators of water quality tests were carried out. Several water bodies were affected mainly by weather physic-chemical parameters; those represented 68.45 % of the total number of non-compliant indicators. The most frequently unsatisfactory physic-chemical parameters were: transparency, colour, oxygen saturation, pH, less often total phosphorus and phenols. The greatest number of non-compliant microbiological indicators accounted intestinal enterococci, E. coli and less coliform bacteria.

In 2012, on 32 natural sites quality assessment was also carried out as required by Parliament and Council Directive 2006/7/EC concerning the management of the **quality of bathing water**, and repealing Directive 76/160/EEC. Excellent water quality was classified in 23 locations (72 %), 8 sites (25 %) had good water quality and 1 location (3 %) was classified as a site of sufficient quality water suitable for bathing.

11. ASSESSING THE QUALITY OF GROUNDWATER AND DRINKING WATER

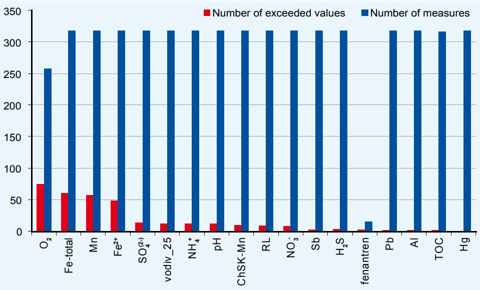
Monitoring of groundwater quality is a systematic monitoring and assessing of the quality and condition of groundwater.

In the period of 1995 – 2006 the groundwater quality was assessed according to STS 75 7111 in 26 important water management areas (alluvial sediments, mezozoic and neovulcanic structures). Percentage of analyses that did not comply with STS 75 7111, it ranged from 65 to 69 %. This value did not express the overall quality of the groundwater, but pointed to significant anthropogenic impact on water quality in the uppermost water-bearing horizons within the monitored areas. Values of permissible concentrations were most often exceeded by indicators as iron, manganese and non-polar extractable substances. The lowest rate of groundwater pollution was recorded in mountain and foothill areas.

Since 2007, groundwater quality monitoring has been carried out on the basis of boundary of groundwater bodies in each river basin and it is divided into basic and operational monitoring. In 2012, **groundwater quality** monitoring was performed in 171 objects and operational monitoring in 259 objects. Exceeding the limit values set by Government Regulation No. 496/2010 Coll. amending and supplementing Decree of the Government of the SR No. 354/2006 Coll. laying down requirements on water intended for human consumption and control the quality of water intended for human consumption were recorded in both types of monitoring. Within the basic monitoring of groundwater quality over the period 2007 to 2012 most often exceeded limit values were in the variables such as iron, manganese and ammonium, suggesting persistent negative state of **oxidation-reduction conditions**.

Character of land use (agricultural areas) translates to an increase of oxidized and reduced forms of nitrogen in groundwater of them exceeded the maximum participated ammonium ions NH_4^+, NO_3^- and NO_2^-. Considering **trace elements** indicators such as arsenic, aluminium, antimony, nickel and zinc exceeded the limit values. Pollution by **specific organic substances** had only basic local character at monitored objects. Wider range of specific organic substances was reported at objects of operational monitoring. The most frequent exceeding was found in indicators of polycyclic aromatic hydrocarbons (phenanthrene, fluoranthene, pyrene, chlorethen, dichlorobenzene, and trichlorethylene) and group of pesticides (desetylatrazine, atrazine, disetylatrazine). Exceeded limit values were also in the group of volatile aliphatic and aromatic volatile hydrocarbons.

Frequency of exceeded selected indicators in basic groundwater monitoring under Government Regulation No. 496/2010 Coll. in 2012 *(Source: SHMI)*



In 2009, an **assessment of groundwater bodies' condition** was carried out. It was based on an assessment of the chemical status and quantitative status.

Based on the assessment of the **chemical condition of groundwater bodies** (carried out on the basis of the monitoring of groundwater quality in 2007) from a total of 75 groundwater bodies, 13 groundwater bodies were in poor chemical condition and 62 groundwater bodies at good chemical condition. Good chemical condition was indicated in 82.7 % of groundwater bodies, e.i. 76.4 % of the total area of the units (quaternary and pre-quaternary). Bad condition was indicated in 17.3 % of groundwater bodies i.e. 23.6 % of the total area of water bodies.

Assessment of **quantitative status of groundwater bodies** is assessment of impact of documented effects on the groundwater body as a whole. In Slovakia it comes to assessing the impact of groundwater abstractions. The evaluation process was conducted for groundwater status and trend detection, which were published in 2008. Overall assessment of the quantitative status of groundwater in quaternary sediments and pre-quaternary rocks were summarized results of the previous four assessments. In Slovakia, there was a bad quantitative status for 5 groundwater bodies.

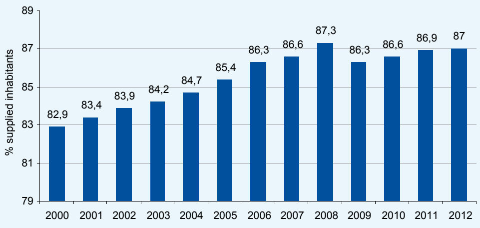
In Slovakia, special attention is paid to groundwater resources, because of their use as a main source of drinking water. **Drinking water quality** in Slovakia has recognized a high quality level for a long time. In 2012, the operating laboratories of water companies analysed 9 274 samples of drinking water, on which 251 195 analyses on individual indicators of drinking water were made. Proportion of drinking analysed water with satisfactory hygienic limits reached in 2012, the value of 99.67 %, while in 2000 it was 98.64 %. Proportion of samples complying with the requirements of all indicators on the quality of drinking water amounted to 94.27 % (in 2011 to 92.05 %). In the period of 2000 – 2012 the highest percentage of analyses going beyond hygienic limits for drinking water, as defined in the Government Regulation No. 496/2010 Coll., had microbiological and biological characteristics and physic-chemical parameters. ■

12. POPULATION CONNECTED TO THE PUBLIC WATER SUPPLY

Level of population connected to quality drinking water from the public water supply reflects the percentage of the population connected to the public water supply distribution network.

The current state of supply of drinking water from public water supplies is uneven in various regions of Slovakia, and one of the key factors is the lack of groundwater resources in passive areas (e.g. south central Slovakia and most of eastern Slovakia). Groundwater resources are mainly used in the SR as sources of drinking water (over 80 %); less than 20 % of drinking water comes from surface water sources.

Trend of population connected to public water supply *(Source: SO SR)*



Proportion of connected inhabitants had upward trend for the period 2000 – 2012, representing an increase of 4.1 %. Number of inhabitants supplied with drinking water from the public water supply in 2012 amounted to 4 707.0 thousand, representing 87 %. Fluctuating nature of the rate over the period of 2007 – 2009 was due to the collection of data, when entering data of the evaluation of water supply even if not yet functional.

In the SR, there were 2 349 individual municipalities that were supplied with public supply water, and their share in total SR municipalities was 81.3 %. Development of public water supplies in Banská Bystrica, Košice and Prešov region lagged behind the national average. The highest number of supplied municipalities is located in the Žilina (96.2 %), Bratislava (94.5 %) and Trnava (89.2 %) region.

Decrease of the abstraction of drinking water was also reflected in the amount of **specific water consumption** by households since 1993, which decreased due to rising process of water, and in 2012 reached 80.8 $l.inhab^{-1}.day^{-1}$. It is alarming, not just for the reason that these abstractions are approaching sanitary limits, but mainly the high price of drinking water makes inhabitants to build their own drinking water supplies, which water quality is in most cases far away from sanitary standards.

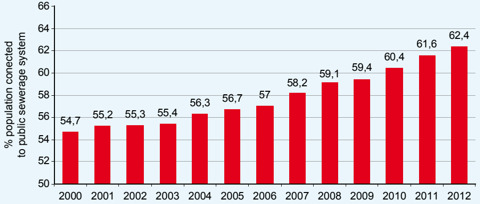
In 2011, in the EU Member States connectedness of public water supplies ranged on average 90 – 95 %. From the neighbouring states the one with the highest connection is Hungary (100 %), and with the lowest is Slovakia.

13. POPULATION CONNECTED TO PUBLIC SEWERAGE SYSTEM

Level of population connected to public sewerage system expresses the percentage of population connected to public sewerage network.

The current state of the population connected to the sewerage system **within the region is uneven** and lags behind the development of public water supply network. Progressive development of public sewerage systems is also needed in order to reduce the negative impacts of pollution on water quality and human health, which is due to the discharge of untreated or insufficiently treated wastewater and municipal wastewater.

Trend of population connected to public sewerage system *(Source: SO SR)*



In 2012, the number of inhabitants connected to public sewerage systems reached 3 376 000 people, which represented 62.4 % of the total population. Within the period 2000 – 2012 upward trend can be seen for this parameter. Since 2000, the share of population connected to public sewerage increased by 420 thousand (7.7 %) and in comparison to the previous year, there was an increase of 29 thousands residents (0.8 %).

Out of a total number of 2 891 individual municipalities in 2012, only 953 municipalities (i.e. 33 % of the total number of municipalities in the SR) had public sewerage system. County of Trenčín, Banská Bystrica, Nitra and Košice are lagging behind the Slovak average.

Number of wastewater treatment plants (WWTP) in the report of water companies, municipal authorities and other entities in 2012 rose to 631, while in 2000 there had been only 344 of them. The greatest share is represented by mechanical-biological treatment. **The total capacity** of the WWTP in 2012 reached the value of 2 010.3 thous. $m^3.day^{-1}$ and it was at the level of year 2000. Total amount of discharged **wastewater** into the public sewerage system reached 389 million m^3, of which 381 million m^3 were purified, what representing share of 97.9 % of the total volume of wastewater. In 2000, 507 million m^3 of discharged waste water and the amount of purified reached the value of 482 million m^3, thus the proportion of treated wastewater was 95.1 %.

Among the neighbouring countries, the most inhabitants using sewerage services were in Austria (94 %) and the Czech Republic (83 %), followed by Hungary (73 %) and Poland (66 %).

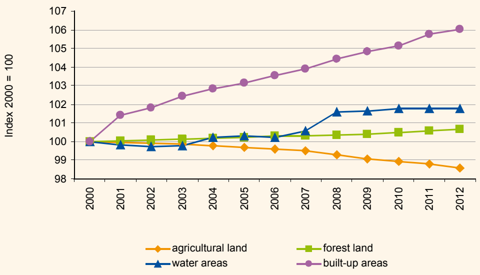
14. CHANGES IN LAND USE

Anthropogenic pressure on land causes loss of agricultural land, which is produced in the long soil-forming process and provides a large number of environmental functions. Reducing the area of agricultural land is mainly due to increasing demand of land for construction purposes. **Land use changes** represent decreases or increases of the economic value of the various types of land.

The total area of the Slovak Republic amounted to 4 903 557 ha in 2012, of which the share of agricultural land accounted for 49.07 %, forest land 41.07 %, water areas 1.93 %, built-up areas 4.74 % and other areas 3.19 %.

Among years 2000 – 2012 there was a decline of agricultural land by 1.4 % (-34 696 ha) to the current 2 405 971 ha. There were increases in water area by 1.8 % (+1 659 ha) and forest land by 0.6 % (+12 806 ha), the largest percentage increase compared to 2000 was in primarily built-up areas and courtyards 6.1 % (+13 261 ha). The year 2012 was marked by a further erosion of agricultural land in favour of the forest, non-agricultural land and forested land. Compared to 2011 the area of agricultural land decreased by 0.2 % (-4 841 ha). ■

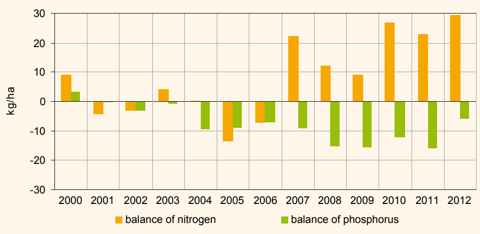
Development of land use change *(Source: GCCA SR)*



15. NITROGEN AND PHOSPHORUS BALANCE

Balance of nutrients (nitrogen and phosphorus) expresses the relationship between the amount of nutrients supplied to the soil (e.g. industrial and organic fertilizers, nitrogen biological fixation) and the quantity of consumed nutrients from the soil (e.g. crop nutrient depletion). The result of converting mutual inputs and outputs of individual nutrients is either the positive balance, indicating their surplus in the soil, or conversely, a negative balance, which shows their lack in the soil. Persistent excess of supplied nutrients indicates the potential risk of environmental problems – a threat to the quality of groundwater and surface water. Persistent lack of risk in turn represents depletion of natural soil nutrients. The aim is to achieve a balance of different nutrients in the soil.

Development of the overall balance of nitrogen and phosphorus in agricultural soils *(Source: CCTIA)*



There has been a growing trend in nitrogen balance, between 2000 – 2012 where at the beginning of the period its value in agricultural soils was predominantly negative, which would indicate a greater amount of nitrogen taken from the soil than supplied nutrients. During the entire period nitrogen surplus on agricultural land increased by 214.8 % to the current 29.31 kg/ha, which is 27.8 % more than in 2011.

Phosphorus balance in 2000 had a positive value and amounted to 3.4 kg/ha of agricultural land. Between 2001 – 2012 the amount of phosphorus in soils was deficient. This lack of phosphorus exerted a negative balance, which continued until 2012, despite the fact that there was an increase in phosphorous in agricultural land this year comparing to 2011. ■

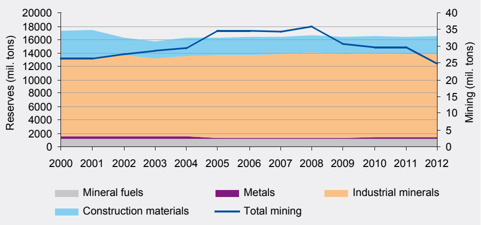
16. GEOLOGICAL RESERVES AND MINING

Mineral reserves are classified as non-renewable natural resources, which require specific conditions for use and protection in accordance with the principles of sustainable development. The current rate of utilization of non-renewable mineral resources must take into account their rarity, non-renewability, level of technology and availability of spare resources. Mineral reserves are reported as geological reserves, i.e. stocks in original condition for deposits, calculated under the terms of exploitable reserves and valid classification of resources. Base for calculations are resources approved by the Commission for the classification of reserves of mineral resources. Sources of reserved minerals (exclusive sources) are the mineral wealth of the country and are in its possession.

Geological reserves of exclusive sources reached 17 300 million tonnes in 2000 with a significant predominance of industrial minerals (11 700 million tonnes). In 2012, the exclusive sources reached 16 460 million tonnes with a substantial predominance of industrial minerals (12 390 million tonnes). Total mining and quarrying in the exclusive sources in the period 2000 – 2012 noticed an increase in 2008 and thereafter decline that was persisting. In 2012, mining reached 24.9 million tonnes, compared with 2000, representing a decrease of 5.3 %. Compared to 2011, total mining declined by 4.7 million tonnes.

Among 2000 – 2012 there was a significant decrease of extraction of metals (by 95.6 %), a decrease in mineral fuels (40.5 %) and a slight decrease in industrial minerals (4.4 %). The increase was contrary recorded in mining volume of construction materials (14.3 %). ■

The total geological reserves and development of mining in the exclusive sources
(Source: SGI DŠ)



17. ENDANGERMENT OF PLANT SPECIES

Endangerment of the species means the proportion of species included in the IUCN categories of endangerment (2001) to the total number of known species. Endangerment status of individual plant species in Slovakia is processed according to the latest edition of the Red List of Plants and Animals of Slovakia 2001 (BALÁŽ, MARHOLD, URBAN et al., 2001).

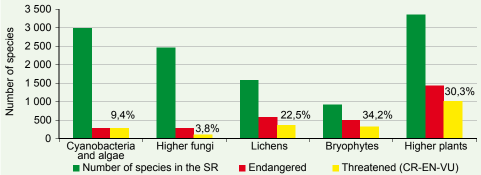
Most critically endangered species of flora of SR come from the globally endangered habitats in Central Europe (peat lands, wetlands, flooded meadows, salt marshes, sand). Underlying cause of danger to plants is just a direct or indirect destruction of these habitats, while their real causes are still unknown.

Currently, there are 3 057 plant species, i.e. a total of 24.2 % in Slovakia according to the Red List of the various degrees of endangerment. Of which original species of higher plants are endangered by over 40 % (or nearly one-third according to categories CR, EN, VU) and of lower plants 17.6 % (or 11.3 %).

Of the 1 428 higher plant species in the Red List, 77 species are extinct and 220 species are classified as endemic – Carpathians and Pannonian.

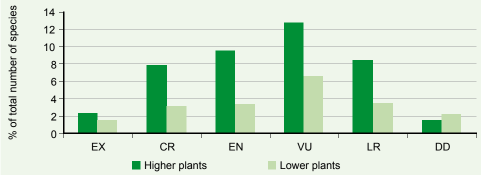
In 2012, the preparation of **Red Lists** of endangered habitats and species of flora and fauna **throughout the Carpathians** within the project "Integrated management of biological and landscape diversity for sustainable regional development and ecological connectivity in the Carpathians" (BioREGIO Carpathians), funded by the South East Europe transnational program started.

Number of plant species and their endangerment *(Source: SNC SR)*



Note: Data in % indicates the proportion of threatened taxa in the total number of taxa; Endangered – species included in all IUCN categories (except NE category); Threatened – only species included in categories CR, EN and VU

Endangerment of plant species according to IUCN categories *(Source: SNC SR)*



Note: IUCN categories of endangerment: EX – extinct, CR – critically endangered, EN – endangered, VU – vulnerable, LR – lower risk, DD – data deficient

18. ENDANGERMENT OF ANIMAL SPECIES

Endangerment of animal species and their status is processed according to the latest edition of the Red List of Plants and Animals of Slovakia 2001 (BALÁŽ, MARHOLD, URBAN et al., 2001). Only Red Lists of molluscs and orthopterans (2005) and fish (2008) were updated.

More than 28 000 of animal species, including 422 species of vertebrates, whereby the state of endangerment is increasingly significant have been described in Slovakia. At all animals, the requirement is to ensure protection of their habitats, well sized and preserved territories where they can live and reproduce.

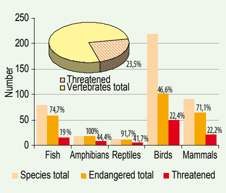
According to the Red List of animals in the various categories are endangered **2 058 invertebrates** (8.5 %) and **257 vertebrate** species, account for more than half of the known species in Slovakia (**60.9 %**). Really threatened (only in categories CR, EN and VU) are 6.4 % invertebrates and 23.5 % vertebrates.

Great endangerment persits for **all amphibian species** and **almost all reptile species** that are **most endangered** vertebrate groups. And also for fish and mammals, the situation is serious; where up to about three-quarters of the species is endangered in some way. This development can be attributed to anthropogenic impacts on biota and especially in their natural environment.

Compared with 2002, increase in the proportion of threatened fish 14 species (17.7 %) can be stated, while it most increased in the category of lower risk (LR). Decreased acute endangerment in categories CR, EN occurred for 9 species, but along with the increase in the category of vulnerable (VU) represents the same level of real endangerment within the reporting period.

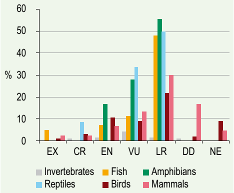
In 2012, the preparation of Red Lists of endangered species throughout the Carpathians, in which experts began work on the evaluation of selected groups of animals – molluscs, spiders, crayfish, dragonflies, butterflies, lampreys, fish, amphibians, reptiles, birds and mammals.

Number of vertebrate species and their endangerment *(Source: SNC SR)*



Note: Data in % indicates the proportion of threatened species in the total number of species; Birds – only nesting (from a total of 341 birds of Slovakia only total 219 species of nesting birds were assessed); Endangered – species included in all IUCN categories (except NE category); Threatened – only species included in categories CR, EN and VU

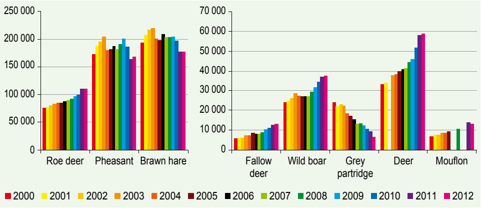
Endangerment of animal species according to the IUCN categories *(Source: SNC SR)*



19. HUNTING AND GAME STOCK

Hunting is part of forest management with a focus on conservation, enhancement, protection and optimum utilization of gene pool of game, which is permanently renewable natural resource. Game management based on the evaluation of spring stock of game (abundance), always totalized to March 31st each year and it is realized by hunting (number of caught game without mortality).

Trend in spring stock of selected game *(Source: SO SR)*



The right to hunt was in 2012 carried out in **1 861 hunting grounds** of the total area of **4 442 thousand hectares**. Compared with 2000, the number of hunting licenses increased by 93 (5.3 %), but their average area (2 387 ha) is lower by 126 ha (5 %), which has in turn negative effect on hunting planning and game management.

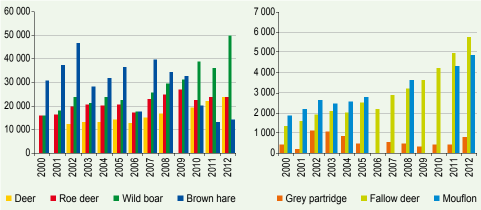
In 2012, **unwanted increase in spring stock of game** (SSG) **of ungulates**, which had lasted since 1998, **was stopped** and there was a stabilization of abundance related to almost all game species. Increase in the number of each species of ungulates, except roe deer, is undesirable because damages to forests and agricultural crops increasing it causes are increasing as well.

Small game continue to experience a decline in their SSG, populations of **large carnivores** are rated as stable, with a positive trend. Considering **rare game** species, there was an increase in population of beaver and otters, while there was unfavourable development in reducing populations of western capercaillie and black grouse.

For the period since 2000, SSG of fallow deer, chamois and wild cats more than doubled and deer, mouflon nearly doubled. Stock of roe deer, wild boar, bears, wolves and lynx increased about 40 – 60 %. Conversely, there was a stable trend of population of pheasant; brown hare stock slightly declined; there was a decrease of one quarter related to western capercaillie and black grouse and the sharpest decline in grey partridge (over 72 %).

Shooting ungulate game for the reporting period increased by 50 % (roe deer) to 340 % (fallow deer). In an average year, 30 bears and 114 wolves were hunted while hunting other rare animal species is strictly regulated.

Trend in hunt of selected game species *(Source: SO SR)*



20. NATIONAL SYSTEM OF PROTECTED AREAS

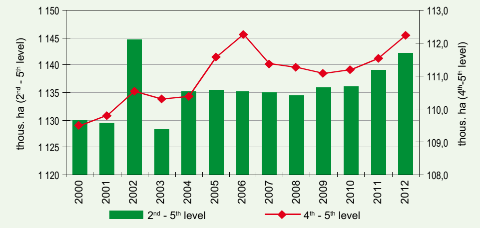
Protected areas (PA) mean a geographically defined area regulated and managed to achieve specific conservation objectives. This indicator evaluates the area of the national system of protected areas, consisting of specially protected areas declared under the Act No. 543/2002 Coll. on nature and landscape protection.

Whole territory of Slovakia is now protected (1st degree of protection). Special protected areas (2^{nd}– 5^{th} level of protection) include national parks and protected landscape areas (so-called large-size PA), protected sites (national) nature reserves, (national) nature monuments and protected landscape fragments (so-called small-size PA).

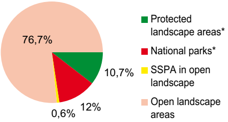
Share of large-size protected area to the total area of Slovakia in the years 2000 – 2012 did not change significantly and it was 22.65 %, while in 2002 two new national parks (NP) were declared: NP Slovak Karst and NP Veľká Fatra (change of category from the original PLA). Proportion in area of small-size PA has been stabilized in recent years, with a gradual slight increase (from 2.28 % in 2000 to 2.44 % as of 2012).

The total area of specially protected parts of nature (beyond special protection areas and protective zones of caves) for the year 2012 amounts to 1 142 151 ha, representing 23.3 % of the Slovak territory. According to OECD standards, it is a relatively high proportion (average of OECD countries represents 12.4 % and 12.2 % of the world). Most protected areas in Slovakia belong to the categories of lower protection, and are large enough to provide home for viable populations of carnivores.

State and trend in size of protected areas

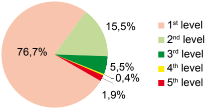


Share of size in selected categories of protected areas in Slovakia (2012) *(Source: SNC SR)*



** including SSPA territories that are therein*

Overview of protected areas in Slovakia by levels of protection (2012) *(Source: SNC SR)*



21. PROTECTED AREAS OF SLOVAKIA UNDER THE EU HABITATS DIRECTIVE

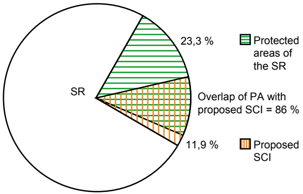
As special areas of conservation pursuant to Council Directive No. 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) are announced **Sites of Community Importance (SCI),** which together with special protected areas are constituted in the pan-european, network NATURA 2000. Its aim is to ensure the favourable conservation status of selected animal species and plant species and favourable conservation status of habitats.

In 2004, the SR Government approved National list of proposed SCI. List included 382 sites and was designed for 44 plant species, 96 animal species and 66 habitat types and their total area amounted to 573 690 ha, which is 11.7 % of the SR territory. Overlap with the national network of protected areas accounted for 86 %.

In 2007, under Article 17 of the Habitats Directive, report on the status of habitats and species of European Importance (EI) for their protection was issued. The report evaluated 66 habitat types, 50 plant species and 150 animal species of EI, and stated conditions in relevant bioregions 19 % as favourable, 34 % as insufficient, 18 % as bad and 29 % in an unknown.

In the SR, SCI approval process ended by approval decisions for the Alpine and Pannonian bio-geographical region in 2007 – 2008 by the European Commission (EC), where the 381 SCI from the national list thus became sites of Community Importance. According to the conclusions of bio-geographical seminars, 17 habitats and 23 species were designated to be supplemented to the Alpine region and in Pannonian region it was necessary to supplement areas for 16 habitats and 29 species. ➲

SCI proportion of the total SR area and of the protected areas *(Source: SNC SR)*



Sites of Community Importance in the SR *(Source: SNC SR)*

A 6-year period for declaration of SCI as protected areas began to run by publication of decisions, where 170 SCI were in the national system of protected areas, and thus require no re-issue. The declaration concerns 97 SCI not overlapping with the national network of protected areas and 114 SCI partly overlapping with the national network of protected areas, which the Slovak Republic declares under national legislation in categories of PS and NR.

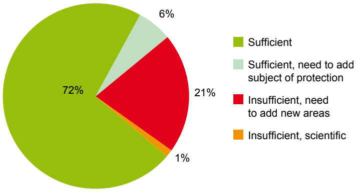
In 2011, there was the first enlargement of the national list of SCI from 2004. Based on the requirements of the EC considering the results of the biogeographic seminars and SR government resolution No. 577 from August 31st, 2011, 97 new sites were added to the national list of SCI. Six indigenous sites were also excluded from the national list (as a scientific mistake). Added sites occupy 11 989 ha, which constitutes 0.2 % of the SR territory.

The overall share of SCI in the area SR increased from 11.7 % to 11.9 % (ranks SR to the 13th place, when comparing with the EU member states, 13.4 % was EU average for 2011). Current total number of SCI is 473 sites, with an area of 584 353 ha. Sites are concentrated on forest land (86.2 %), and less of the agricultural land (9.5 %). A small part is located on the water surface (about 2 %) and on the remaining areas (about 2 %).

48 SCI totalling 6 813.12 ha (1.17 %) were declared in some of the national categories of protected areas as per May 2012 from the total number of 473 SCI.

In 2012, Slovakia held a meeting with the EC regarding the sufficiency of the SCI determination. The assessment of the EC showed that for about 78 % of the species and habitats of EI there is enough SCI in Slovakia. It will however be necessary to add sites for the remaining habitats and species, particularly fish.

Sufficiency of SCI determination in number of species and habitats *(Source: SNC SR)*



22. PROTECTED AREAS OF SLOVAKIA UNDER THE EU BIRDS DIRECTIVE

As special protected areas pursuant to Council Directive No. 79/409/EEC on the conservation of wild birds (Birds Directive) are declared **Special Protected Areas (SPA)** which together with the Sites of community importance form the pan-european network NATURA 2000. Its aim is to ensure the favourable conservation status of populations of selected species of flora and fauna and favourable status of habitats. In Slovakia, SPA is declared as a separate category of protected areas.

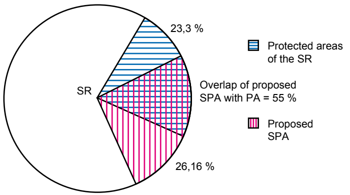
In 2003, the Government Resolution No. 636/2003 approved the **National list of proposed SPA**. The list contained 38 sites and total area occupied **1 154 111 ha** (**23.5 %** of the SR territory). Overlap with the current network of protected areas accounted for **55 %**.

In 2004 the process of drafting regulations and management plans for each SPA began. In particular SPA continuous monitoring of birds was conducted, which aimed to identify the species representation and also the abundance of species in each SPA.

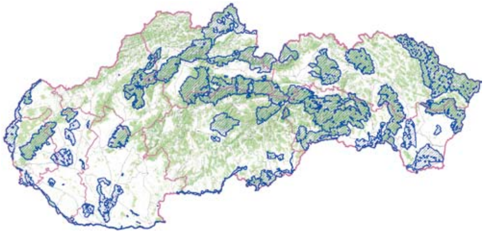
Government Resolution No. 345 dated on May 25th, 2010 amended National list. The list was supplemented with **5 new sites** (Čergov, Choč mountains, Levoča mountains, Slovak paradise a Špačinsko-nižnianske meadows) and 2 sites were **deleted** (Boheľovské lakes and Trnava lakes). Currently, the list includes **41 sites** with an area of **1 282 811 hectares**, which represents **26.16 %** of the SR area. Of this, 64.3 % of areas are situated on forest land and 28.4 % on agricultural land.

In 2012, last site on the national list of SPA was declared, by which SR Government approved all 41 **special protected areas**.

Share of SPA on total SR area and of PA size *(Source: SNC SR)*



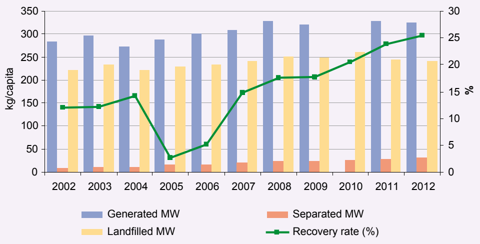
Special Protected Area in the SR *(Source: SNC SR)*



23. MUNICIPAL WASTE GENERATION AND WASTE MANAGEMENT

The municipal waste (MW) is an indicator showing the economic maturity of the society. It indicates a lifestyle of residents and can serve as a proxy indicator of consumer behaviour. Municipal waste is only part of produced waste, but in terms of composition and varied content and different kinds of recyclables, special attention is paid to in. The indicator assesses the total amount of produced and landfilled **municipal waste**, the amount of the separated components MW and **the rate of recovery**, i.e. percentage of recovered waste on its total amount.

Developments in municipal waste generation and waste management *(Source: SO SR)*



Note: Since 2002, assessment of waste generation was carried out under new legislation, harmonized with the existing legal regulation of waste management policy and due to this fact (change in waste categorization and introduction of new methods of waste management) it is not possible to compare with the data for the earlier period.

Municipal waste generation in the years 2002 – 2012 ranged from 1.5 to 1.8 million tons. Increase in 2012 compared to 2002 was 14.8 %. In 2012 municipal waste per capita accounted for an average 324 kg/year, as compared to 2002, there was an increase of 40 kg/capita.

Most of municipal waste was disposed; the dominant activity of waste disposal was landfilling in 2012 with a 74 % share, which represents a decrease by 4.1 % compared to 2002.

Considering disposing of MW there is a growing though still insufficient tendency to separation. In 2012 there were 30.6 kilograms of separated components of municipal waste (paper, glass, plastics, metals, biodegradable waste) per capita, as compared to 2002 (8.6 kg/capita) it is more than threefold increase (256 %).

In comparison with the EU, in 2012 Slovakia ranked among the countries with the lowest CO formation per capita, up to 168 kg less than the average EU-27, but also among the countries with the largest amount sent to landfill per capita (up to 78 kg more than the EU-27 average). ■

24. WASTE GENERATION (EXCLUDING MUNICIPAL WASTE) AND RATE OF RECOVERY

Waste generation is an indicator, which is closely related to the level of economic activity in the country. It is also an indicator of consumption patterns of raw materials. Waste hierarchy, as an instrument of environmental protection, prefers recovery of waste to disposal, which helps to save natural resources and energy, as the waste is used as a secondary raw material. Indicator is concerned with the total amount of **produced waste placed on the market** (excluding municipal waste (MW)) produced by different sectors and the rate of recovery, i.e. percentage of recovered waste to its total amount.

Waste generation (excluding MW) and its disposal *(Source: SEA)*

** The increase in waste generation in 2006 by about 40 % compared to 2005 and 2007 was mainly due to an increase in construction waste, particularly excavated soil resulting from the construction of the tunnel and motorway access Sitina in Bratislava, as well as one-time recognition of slag at U.S. Steel Kosice.*

In the period 2002 – 2012 there was increase of the amount of generated waste by 15 %, i.e. about 915 896.43 tons, while the recovery rate in this period increased by 4.2 % and in 2012 it reached 50 %. Annual evolution between 2011 and 2012 showed a slight increase of recovery rates by 0.5 %.

Within the waste generation according to the classification of economic activities SK NACE, the most of waste was produced in manufacturing (especially other waste), what is 38 % on total waste production, followed by field of electricity supply, gas, steam and air (about 15 %) and construction sector (about 12 %).

In comparison with the EU in 2010 Slovakia produced about 3-times less waste per capita than the average EU-27. ■

25. DOMESTIC MATERIAL CONSUMPTION

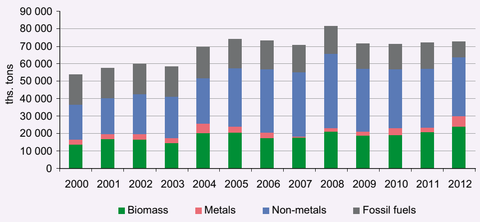
Extraction of raw materials, their processing and use causes numerous environmental problems such as structural changes in the country associated with the extraction of mineral resources, loss of biodiversity by producing agricultural biomass in large-scale agro-ecosystems, eutrophication due to excessive use of fertilizers, global climate change and acidification due to the combustion of fossil fuels.

To determine the quantity of raw materials used in the national economy, indicators of material flows were established. One of them is the **domestic material consumption (DMC),** which measures the total quantity of materials recovered in the economy and it is determined as the sum of the amount of extracted mineral resources and produced harvested biomass, which were obtained in the territory of the state during particular time, and to this domestic materials imports are added and exports of mineral resources, biomass, intermediate and final consumption of the product are deducted. Reduced material consumption leads to a reduction in the overall socio-economic load of the material, which also leads to the reduction of the environmental burden.

In the period 2000 – 2012 fluctuating development of domestic material consumption was recorded in Slovakia. This development was due to increasing domestic consumption of industrial minerals and a downward trend in domestic consumption of fossil fuels, which mirrored the development of the economy in Slovakia. Within the period 2000 – 2012 an increase in domestic consumption of materials was 18 420 thousand tons, representing an increase of 34 %. When comparing with 2011, that was an increase of less than 1 %. Introduction of modern efficient technologies that are less intensive inputs and produce less waste streams as well as increasing the recycling rate is crucial for further reduction of material consumption.

In 2011, DMC per capita in Slovakia amounted to 13.77 tons, which is 0.83 tons per capita below the average for countries of EU-27.

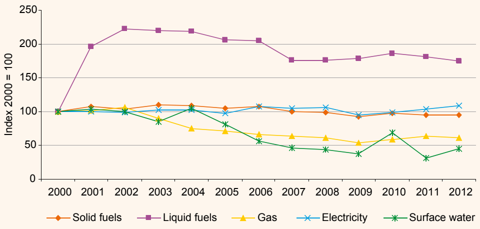
Structure of domestic material consumption by material groups *(Source: Eurostat)*



26. DEMAND FOR RESOURCES IN INDUSTRY

The manufacture of goods consumes raw material, energy, water and **industry** influences the individual components of the environment mainly by emissions of pollutants to air, water, soil and rock environment through accidents, production of industrial waste and occupancy of agricultural land and forest land.

Development of consumption of solid fuels, liquid fuels, gas, electricity and surface water in industry *(Source: SO SR, SEA)*



Consumption of **solid fuels** in industry in 2012 compared to 2000 decreased by 5.6 % and amounted to 9 499 169 tonnes. Compared with the previous year, total consumption of solid fuels in industry fell by 1 %. Within consumption of solid fuels in 2012, coal accounted for the 40 %; brown coal and lignite for 29.9 %, 17.5 % coke coal and firewood for 12.6 %.

Consumption of **liquid fuels** in industry increased by 74.5 % in 2012 compared to 2000 to the amount of 552 910 tonnes. Compared with previous year, total consumption of liquid fuels in industry decreased by 4 %. Within liquid fuel consumption in 2012, heavy fuel accounted for 70.6 %, diesel for 20.6 %, gasoline for 6.5 % and light fuel oil for 2.2 %.

Gas consumption in industry in 2012 compared to 2000 decreased by 39.1 % and amounted to 2 858,117 mil. m^3. Compared with previous year, consumption of natural gas in industry decreased by 4.2 %.

Electricity consumption in industry in 2012 reached 16 912 044 MWh compared with 2000 there was an increase in electricity consumption by 8.5 %. Compared with the previous year electricity consumption in industry increased by 5.1 %.

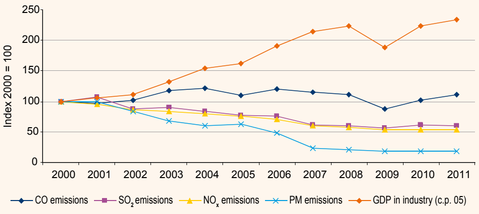
Surface water consumption in the industry in 2012 compared to 2000 decreased by 55 % and compared with the previous year, consumption rose by 46.8 %. Industry in 2012 accounted for 79.4 % of the total surface water supplies.

Improving the impact of industry on the environment can be achieved through introducing **environmental technologies** that will improve the environment and reduce or eliminate environmental pollution, including waste. Environment for the application of environmental technologies will help to create particular tax incentives, public procurement and increase awareness of businesses and consumers.

27. ECO-EFFICIENCY OF INDUSTRY

Eco-efficiency of industry is the relationship between economic activity (GDP by industry) and associated negative effects of industry on the environment. The main objective of sustainable development is to separate, or to interrupt this connection.

Development of eco-efficiency of industry for the emissions of major pollutants from industry *(Source: SHMI, SO SR)*



Within the assessed period of the **eco-efficiency of industry** no significant break-through trends were noted. Its development was affected primarily by continuous growth of GDP from industry, in which, however, in 2009 due to the global economic crisis, was a decline. **The positive trend** of eco-efficiency for the emissions of major pollutants from industry was shown in emissions of SO_2, NO_X, PM and negative for CO emissions.

CO emissions from industry in 2011 increased by 11.5 % compared with 2000. In 2011 they accounted for 98.8 % of the large and medium stationary sources. In 2011, the CO emissions from the industry comparing to previous year increased by 8.8 %.

Industrial **SO_2 emissions** in 2011 decreased by 39.5 % compared to 2000. In 2011, they accounted for 99.6 % of the large and medium stationary sources. In 2011, SO_2 emissions from industry fell by 0.8 % comparing to the previous year.

NO_X emissions from industry in 2011 decreased by 46.8 % compared to 2000. In 2011 they accounted for 89.9 % of the large and medium stationary sources. In 2011, NO_X emissions from industry decreased by 0.1 % comparing to the previous year.

Emissions of particulate matter (PM) from the industry in 2011 decreased by 81.3 % compared to 2000. In 2011, they accounted for 93 % of the large and medium stationary sources. In 2011, PM emissions from industry increased by 2.1 % comparing to the previous year.

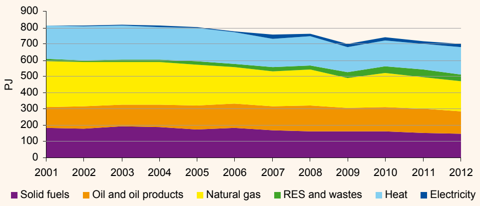
GDP in industry at constant prices of 2005 increased by 134.8 % in the period from 2000 to 2011.

28. GROSS INLAND CONSUMPTION

Energy production and consumption has a significant impact on the environment. Reducing of energy consumption by introducing various austerity measures and increased energy efficiency as well as changes in the composition of primary energy sources are essential to reducing greenhouse gas emissions and improve air quality. It also contributes to reducing environmental pressures and impacts in other areas (e.g. health, resource use, etc.).

Gross inland consumption refers to the amount of energy needed to meet the country's domestic consumption. It includes primary production (brown coal, lignite, oil, gas, heat and electricity) and is adjusted for renewed products, imports and exports balance and draw from stocks.

Gross inland consumption of fuels, heat and electricity *(Source: SO SR)*



Gross inland consumption recorded for the period 2001 – 2012 decrease by about 14.3 % with slight fluctuations. In 2012 it reached the lowest value for the whole period (698.6 PJ). Over the previous year 2011 gross inland consumption decreased in 2012 by about 2.4 %.

The structure of the primary energy sources in Slovakia (the energy mix) was in the period 2001 – 2012 characterized by reduced consumption of gaseous fuels (down by 35.7 %), solid fuels (down 21.5 %) and heat (a decrease of 16.4 %), and increased consumption of liquid fuels (up 12.2 %), renewable energy and electricity (more than threefold).

Consumption of fossil fuels (67.2 %) continued to prevail within energy mix of the Slovak Republic in 2012. The biggest share was assigned to natural gas (26.2 %), followed by solid fuels (20.9 %) and petroleum and petroleum products (20.1 %). Share of renewables was about 9 % with dominant biomass and hydropower. Extremely important role in the structure of primary energy sources plays an exploitation of nuclear fuel (24 % share).

Gross domestic energy consumption in Slovakia is about 3.5-times less than the average consumption in the EU-27.

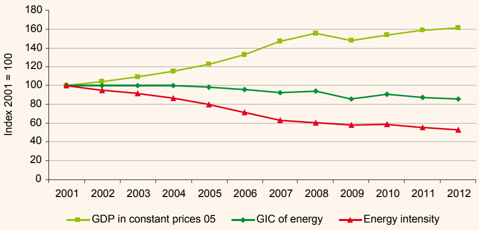
29. ENERGY INTENSITY OF ECONOMY

Energy intensity is an important economic indicator and reflects the degree of maturity of the country's economy due to the efficient use of primary energy sources, specific consumption of materials and energy, the size of the value-added finished products, etc.

Reducing energy intensity in the economy, for example through cost-effective energy savings is one of the main objectives of energy policy to protect the environment.

Energy intensity is defined as the ratio between gross inland consumption (GIC) and GDP in the economy.

Trend in the energy intensity of the economy *(Source: SO SR)*



During the period of 2001 – 2012 significant decline in energy intensity (47 %) was achieved. This was the result of GDP growth, which was increased during the reporting period by 61.8 % and the decline in gross inland consumption, which in the same period fell by about 14.3 %. Year energy intensity dropped to 2012 by 4.1 %.

The favourable trend in energy intensity reduction was mainly due to the transformation of the economy, recession and even closing some outdated, energy-and raw material-intensive production. Heavy industry, as well as the revitalization of development of the industry was related to foreign investments in economy. Decline in recent years has suffered from the effects of the economic crisis.

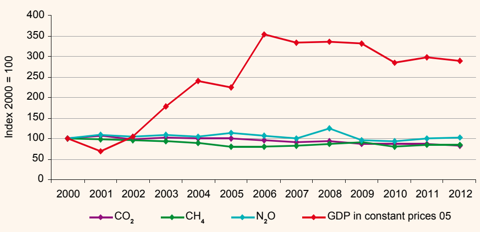
Despite the positive downward trend Slovakia had in 2012 the fifth highest energy intensity among the 27 EU countries, the energy intensity of the Slovak Republic is about 2.3-times higher than the average level of the EU-27.

30. ECO-EFFICIENCY OF THE ENERGY SECTOR

Eco-efficiency of energy sector with respect to greenhouse gas emissions from energy sector determines a correlation between economic activity of energy sector expressed through economic indicator – gross domestic product (GDP) and its associated negative impacts on the environment; in this case there are greenhouse gas emissions from the energy sector.

The main objective is to ensure the economic growth of the energy sector while minimizing its negative environmental impact on the environment.

Trend of eco-efficiency of energy with respect to greenhouse gas emissions from energy sector *(Source: SHMI; SO SR)*



Eco-efficiency of energy with respect to greenhouse gas emissions had positive development for the period 2000 – 2012. Since 2000 there was a gradual separation of curves of economic growth in the sector (**GDP**), which for the period **increased by** 190 % and the curves characterizing the **amount of emissions** of each greenhouse gas emissions from energy, which for the same period with some fluctuations **decreased** or increased very slightly (CO_2 emissions fell by 18.6 %, CH_4 emissions decreased by 16.5 % and N_2O emissions increased by 3.2 %).

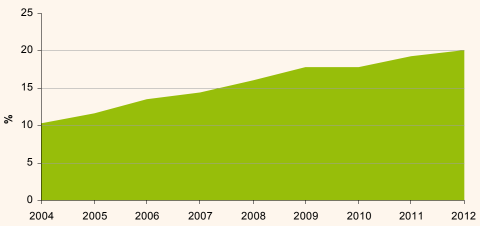
This positive development is the result of attenuation of industrial production, the transition to the use of cleaner fuels and fuels with better quality characteristics, the use of more efficient technologies, decrease energy consumption in energy-intensive industries, as well as the positive impact of direct and indirect legislative measures.

31. RENEWABLE ENERGY SOURCES IN ELECTRICITY PRODUCTION

Share of renewable energy sources (RES) in electricity production is the expression of ratio of gross final electricity consumption from renewable energy sources and the total gross final electricity consumption. **Electricity** generated from **renewable energy sources** includes electricity generated using the hydropower energy (excluding pumped storage power plants), wind, solar, geothermal energy and biomass. Total gross final electricity consumption includes gross final electricity generation from all fuel types, plus electricity imports, minus electricity exports.

Increasing the share of renewable energy sources is one of the basic priorities of the energy policy of the Slovak Republic. RES contributes significantly to reducing greenhouse gases and other pollutants, increases security and diversification of energy supply while reducing economic dependence on volatile oil prices and natural gas. **Binding national target of SR** for 2020 is to achieve a **24 % share of electricity produced from RES**.

Share of renewable energy in electricity production *(Source: Eurostat)*



In 2012 **20.1 %** of generated electricity came from renewable sources. Compared with 2004, when the share of electricity such produced was 10.3 %, we can notice almost double increase. There was an increase of about 4 % between years. Increasing share of renewable electricity for the period is a positive signal for the implementation of the objectives in the use of renewable energy sources. Another positive development is the increasing diversity of the RES, in particular solar energy, which occurred in the last three years.

In 2012, the total actual **contribution from each renewable energy technologies in electricity production** was as follows: hydropower 77.5 %, 15.8 % solar energy, biomass, about 6.6 % and shares of wind power accounted for about 0.1 %. As the largest share of electricity production from RES had all hydropower plants, the amount of electricity produced from RES in Slovakia is largely dependent on hydropower appropriate conditions.

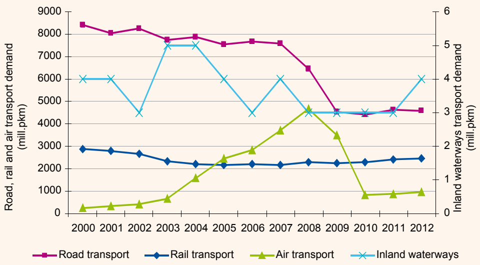
Share of electricity from RES in Slovakia in 2012 was below the average of EU-27 countries, where the share reached 23.5 %.

32. PASSENGER TRANSPORT DEMAND

Passenger transport performance express the volume of transport performances in passenger transport at certain distance by all modes of passenger transport and are given in passenger-kilometres (pkm).

Need of transport system for the provision of transport and mobility of the population consists of rail, road, air and water transport. In the nineties, transport system recorded transfer of substantial part of load freight transport from rail to road transport, and transfer of passenger transport demand from public rail transport and road transport to individual road transport. This negative trend in transport contributes to an increasing burden on the environment, including urban areas by emissions to air and noise pollution from traffic.

Trends in passenger transport demand by mode *(Source: SO SR)*



Between 2007 – 2009 **road passenger transport** demand declined significantly, and beyond this year it had balanced character at about 4 500 mil. pkm.

Over the period 2000 to 2012 road pkm demand decreased by 45.7 %, and in comparison to the previous year there was a decline by 0.6 %.

Rail transport demand during the period 2000 to 2012 declined continuously and until 2007 dropped by 24.6 %, and thereafter began to increase slightly. In 2012, rail performance was moving about 2 500 mil. pkm, while rail pkm decreased by 14.4 % compared to 2000, increase to the previous year was marginal.

Significant fluctuations in this period were visible at **air passenger transport** demand – from 246 million pkm in 2000 to 4 650 million pkm in 2008, after that year the performance began to decline significantly. Since 2010, air pkm began to record a marginal increase. Decline between the years 2008 – 2010 in air passenger transport was caused not only by the economic crisis, but also by closure of two major airlines.

Water passenger transport demand during the period 2000 – 2012 was varied at 3 – 5 mil. pkm.

In term of urban public enterprises demand, a downward trend continued since 1996 at all modes of public transport. Over the period 2000 to 2012 the number of carried passengers was of steady character, and the first place of passenger transport belongs to bus service, followed by trams and trolley buses.

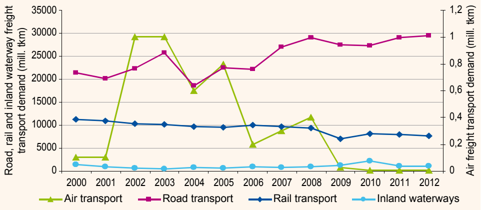
In terms of assessing transport modes by passenger transport modal split in 2012, individual motor vehicles represented 75 %, public road transport showed 13 %, railway transport recorded 7 %, municipal mass transport 3 % and air transport 2 %.

33. FREIGHT TRANSPORT DEMAND

Freight transport demand represents a summary of transportation outputs by movement of goods for a certain distance carried by trucks and are given in tons-kilometres (tkm).

Transport system, for the provision of transport needs, consists of rail, road, air and water transport. The long-term trend of increase in road freight transport and drop of other modes of transport is due to their specific characteristics. Road transport provides its users high speed and flexibility – the factors, that are nowadays in sophisticated logistics and production most important. These factors thus outweigh their own high unit costs and induced negative external costs that put burden on the society.

Trends in freight transport demand by mode *(Source: SO SR)*



Road freight transport demand steadily increased between 2000 and 2012, despite the significant fall in 2004 by 13.4 % compared to 2000. Another significant decrease was recorded in 2009, due to economic crisis. After that year, road freight transport volumes recorded a slight annual increases, and in 2012, volumes were at the level of year 2008 (29 504 mil. tkm). Road freight demand increased by 38.6 % over the 2000 to 2012 period, and between 2011 to 2012 grew by 1.5 %.

Over the period 2000 to 2012 **rail freight transport** demand recorded minimal declines between years, until 2008. Significant decrease was recorded in 2009 to 6 964 mil. tkm, and dropped by 38.1 %, compared to 2000. Between 2008 and 2012, rail freight volume reached the level of 8 000 mil. tkm. The overall, rail freight demand was 32.4 % lower in 2012 than in 2000, and annual decline between 2011 and 2012 was 4.7 %.

Water freight transport demand over the period 2000 to 2012 had a downward trend, until 2005 (680 mil. tkm), and after that year the significant increase was observed in 2010 (2 166 mil. tkm). In 2012, water freight demand was at level of 2011, and since 2000 dropped by 22.1 %.

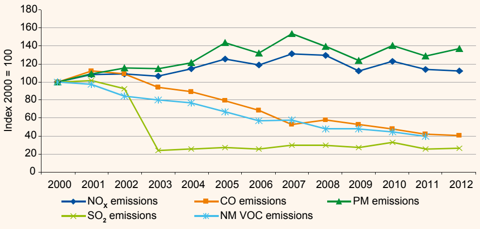
Significant fluctuations over the 2000 to 2012 period were related to **air freight transport** demand, where the highest volume was recorded between 2002 and 2003 (1 mil. tkm). In the next years air freight demand had fluctuating trend, and between 2010 and 2012 they were at the level of 0.008 mil. tkm.

Within the modal split of freight transport demand in 2012, road freight transport share was 76.0 %, rail freight share 20.9 %, inland waterways 2.9 % and air transport was 0.2 %.

34. TRANSPORT EMISSIONS OF AIR POLLUTANTS

Since 1990, SR has performed regular annual comprehensive inventory of emissions of selected pollutants, including the **annual inventory of road, rail, water and air transport operation**. In order to determine the amount of production of the monitored pollutants CORINAIR methodology used in the EU countries, where a special program product COPERT is designed for annual production inventory of emissions from road transport. Since 2008, COPERT IV model is used to process emissions from road transport use, and all values since 2000 were recalculated according to this program.

Trends in emissions of air pollutants from transport *(Source: SHMI)*



Considering total emissions of reviewed air pollutants, in 2012 emissions from transport were as follows: significant 21 % share of CO, 51 % of NO_X and 10 % of NM VOC. Share of transport on solid particles was 7.9 % and 0.39 % on SO_2 emissions. These values were the same level as in 2011.

Over the period 2000 to 2012 we can conclude a downward trend in emissions of SO_2, NM VOC and CO. Conversely, emissions of NO_X and PM show negative developement with varying levels.

Downward trend in **SO_2 emissions** between 2000 and 2003 by 75.6 % was due to the introduction of measures relating to the sulphur content in fuel. Over the period 2003 to 2010, SO_2 emissions slightly increased by 8.6 %, and in 2012, they reached similar levels to 2004. Only **non-methane volatile organic compounds (NM VOC)** decreased by 60.2 % over the time period 2000 to 2012. Since 2002, a significant decrease in **CO emissions** was observed. Decrease in the years from 2002 to 2012 was 68.3 %, despite a slight increase in 2008. Decline of CO emissions was associated with the continuous renewal of the fleet of vehicles with three-way catalytic converter.

NO_X emissions had fluctuating pattern, and throughout the period 2000 – 2012 the increase amounted to 11.9 %. The highest increase in NO_X emissions was recorded in 2007 (31.4 %). Over the period 2000 to 2012, **emissions of particulate matter (PM)** increased by 36.9 %, in 2007 the increase amounted to 53.4 %.

Major pollutants in the road transport sector includes **airborne particulate matter (PM),** which are an important part of automobile exhaust, and also arise by grinding tires and the road surface material. Over the period 2000 – 2012, emissions of PM_{10} increased by 40.5 %, despite the significant fluctuating pattern. The highest increase in PM emissions was recorded in 2007 (63.9 %), but thereafter significantly decreased until 2009. Between 2009 and 2012, PM_{10} emissions increased again by 11.2 %.

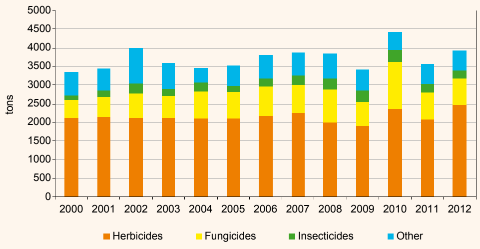
35. PESTICIDE CONSUMPTION

Consumption of pesticides expresses the total amount of consumed substances of chemical, biological or biotechnological origin, which are used for treatment of plants or their products against harmful agents. By their effect on harmful organisms they can be divided into herbicides, insecticides, fungicides and other pesticides. Besides the positive properties they are deleterious when the irrational dosing is released into the environment and remain as residues. The gradual increase in pesticide use may increase the risk of negative consequences for the environment.

Within the period 2000 – 2012 pesticide consumption was more or less stable but in some years there was a slight increase in their consumption. In each group of pesticides between 2000 and 2012 consumption increased by 77.5 tons of insecticides, herbicides of 336.9 and fungicides of the 242.5 tons. Consumption of other pesticides was reduced by 79.7 tons.

Consumption of pesticides in 2012 recorded an annual increase and represented total 3 925 tons. The current dose of pesticides applied in compliance with the principles of good agricultural and farming practices is not a threat to the environment.

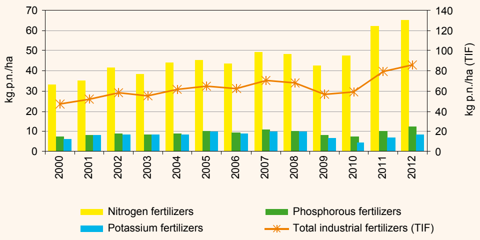
Development of pesticide use in agriculture *(Source: CCTIA)*



36. INDUSTRIAL FERTILIZERS CONSUMPTION

Fertilizers are one of the forms of nutrients entering the agro-ecosystem. **Consumption of industrial fertilizers** is the total amount of consumed nitrogen, phosphorous and potassium fertilizers on farms for the financial year. Excessive and improper application of industrial fertilizers adversely affects soil and other environmental components, which leads to leaching of nutrients from the soil into the groundwater and surface water, or the leakage of nitrogen into the atmosphere.

Development of consumption of industrial fertilizers per hectare of agricultural land *(Source: SO SR)*



In the period 2000 – 2012 there was growing trend in the consumption of fertilizers and during this period it increased by 85.1 % to the current 85.8 kg p.n./ha (kilograms of pure nutrients per hectare of agricultural land), which is 6.2 kg per ha more than in 2011. Within entire period, consumption of nitrogen fertilizers increased by 95.2 % (+ 31.7 kg p.n./ha), phosphorus fertilizers by 70.8 % (+ 5.1 kg p.n./ha) and potassium fertilizers consumption by 43.3 % (+ 2.6 kg p.n./ha).

Gradual improvement in the economic situation of farmers may lead to further build-up of doses of fertilizers, thus the non-compliance with the principles of good agricultural and farming practices can negatively impact the environment. ■

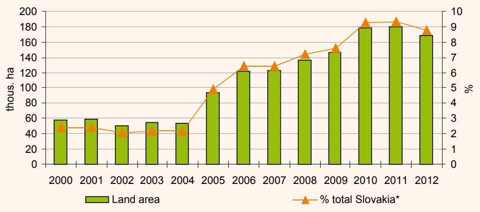
37. AGRICULTURAL LAND IN ORGANIC FARMING

Area of agricultural land in organic farming represents acreage of agricultural land with balanced agro-ecosystem of a permanent implemented nature and which is mainly based on local and renewable resources. Organic farming emphasizes the use of economic practices that favour the application of organic matter into the soil, using environmentally friendly methods of agronomic, biological and mechanical methods, as opposed to synthetic preparations. In animal keeping sector the emphasis is placed on comfort and animal welfare, care to the overall harmony of the agro-ecosystem and its biodiversity.

In the years 2000 – 2012, there was an increase of agricultural land under organic farming by 189 % to the current 168 602 hectares of agricultural land. Organic farming began to be applied more noticeably after 2004 with the accession of Slovakia to the EU, following the adoption of the Common Agricultural Policy and the provision of payments supporting this way of farming. Area of agricultural land under organic farming in 2012 reached 8.75 % share of the total area of agricultural land, a decrease of 0.6 % compared to 2011.

In 2012, the area of agricultural land in organic farming in the EU-27 reached 5.8 % of the total utilized agricultural land. When compared to the average of the EU-27, Slovakia achieved a higher proportion of organically farmed land in a given year.

Development of agricultural land in organic farming *(Source: CCTIA)*

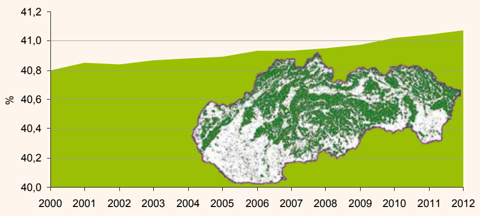


** the ratio of agricultural land in organic farming in total agricultural land of Slovakia*

38. FOREST AREA

Forests are national wealth and represent main landscaping eco-stabilizing element. They are significant source of renewable raw stock, but they also fulfill an important irreplaceable function in the landscape. A significant characteristic is therefore their area, which describes the spatial representation of forests (forest land) expressed by their share of country area, eventually region. This is a quantitative indicator that however does not express the quality of forest management.

Trend in forest area in Slovakia *(Source: NFC)*

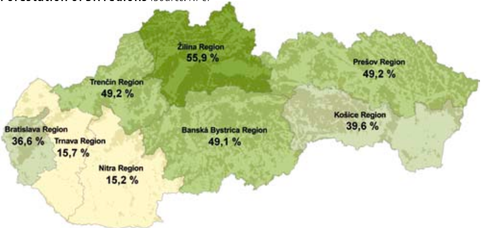


The territory of Slovakia was probably wooded up to 90 % before intensive human intervention in the vegetation cover. Slovak Republic ranks among the European countries with high forest cover. As a positive one can be ranked fact that the area of forest land is relatively stable, currently represents 41 % of the total state area (2 012 414 ha). In the long term, however, the area slightly increases, including timber land. In comparison with 2000 it increased by 12 806 ha (0.64 %) and prior to 2011 on 947 ha. The area of timber land since 2000 has increased by 18 886 ha (1 %).

Increasing forest area has recently occurred mainly due to the harmonization between actually state and the state registered in the cadastre and in forests management plans and also due to the afforestation of agricultural unused land and transfer of agricultural land covered with forest trees (so called white areas).

Within regions of SR, forestation remained unchanged compared to 2002 in Trnava, Trenčín and Nitra. It slightly increased in the Žilina region (+0.5 %) and Košice (+0.7 %), and decreased in Bratislava (-0.2 %), Prešov (-0.2 %) and Banská Bystrica (-0.3 %).

Forestation of SR regions *(Source: NFC)*

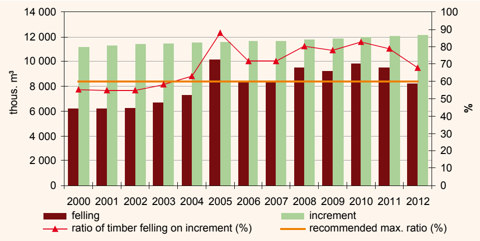


According to FAO (Global Forest Resources Assessment 2010) only Finland (73 %), Sweden (69 %), Slovenia (62 %), Latvia (54 %), Estonia (52 %), Russia (49 %) Austria (47 %), Bosnia and Herzegovina (43 %), Liechtenstein (43 %) and Belarus (42 %) have a higher percentage of forest area. The average forest coverage of Europe represents 45 %.

39. USE OF FOREST RESOURCES

Use of forest resources is one of the important indicators of sustainable forest management. It evaluates the intensity of timber felling defined as the share of timber harvesting and timber increment. Within longer time intervals it can be used for assessing the use of forests due to their actual productivity in terms of relative balance between growth of forests and their felling. If the proportion is less than or equal to one, it means that the felling is less than or equal to the annual increment. However, more than 60 % of the increment volume should not be logged.

Trend in ratio of timber felling and its increment *(Source: NFC)*

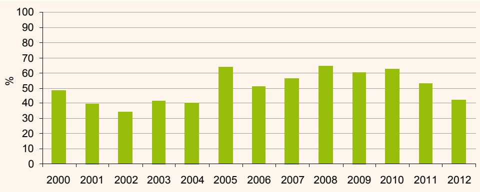


Timber felling in the SR forests has continued to grow since 2000 and in 2012 it amounted to 8 232 thous. m^3, which is an increase of 32.4 %. Compared with the previous year it felt by 13 %. Only the year 2005 goes beyond the trend, when mining due to wind calamity in November 2004 reached 10.2 million m^3. But development of planned annual intentional (educational and restoration) timber felling, long-term is influenced and complicated by incidental felling. These accounted for on average to more than half (50.6 %) of the total felling for the period 2000 – 2012, thereby exceeded the total annual volume of planned timber felling in the current forest management plans.

Also increments are important for forests production assessing and balancing felling possibilities. In the trend of total current increment (TCI) gradual increase may well be observed, which is related to the current age structure and development of standing volume of forests. In 2012 it amounted to 12,126 mil. m^3, which is compared to 2000 increase by 8.2 %.

Utilisation of forests or ratio of timber felling on the increment increased from 55.5 % in 2000 up to 82.5 % as of 2010 (mainly due to the excessive incidental felling caused by disasters), then decreased again to the current 67.9 %. Utilisation of forests in Slovakia may still be considered sustainable, whereas felling is less than the annual increment, but should not exceed 60 % of TCI volume.

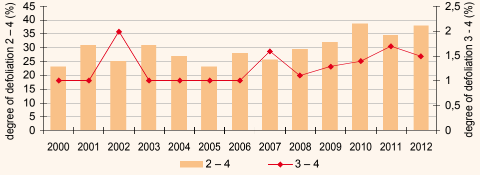
Percentage of incidental felling of the total volume of timber felling *(Source: NFC)*



40. FOREST CONDITION ACCORDING TO DEFOLIATION

Forest condition is defined on the basis of defoliation and assessed by the visual estimation as a percentage within internationally established 5-class scale of damage. To assess the health condition of forests, ratio of trees in the damage degrees 2 – 4 is crucial, i.e. with defoliation more than 25 %.

Trend in tree defoliation rate *(Source: NFC)*



Degrees of damage to trees: 0 – defoliation of trees between 0–10 % – no defoliation (healthy trees); 1 – defoliation of trees between 11–25 % – slight defoliation (slightly injured trees); 2 – defoliation of 26–60 % – medium defoliation (medium injured trees); 3 – defoliation of 61–99 % – strong defoliation (strongly injured trees); 4 – defoliation of 100 % – dying and dead.

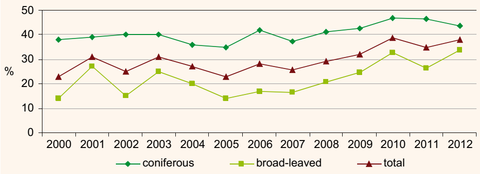
Slovakia has one of the best preserved forests in Europe, yet their condition is weakened. Forest health condition in Slovakia, characterized by defoliation and degree of damage, has been stabilized in recent years, with fluctuations in individual years that are caused mainly by climatic factors and weather. It should be still considered negative, while showing signs of damage of 38 % of the trees. It is worse than the European average, mainly due to worse condition of coniferous trees. Broad-leaved trees are in better shape, as they are more resistant to stress factor, which is mainly due to the different time of assimilation organs persistence.

Forest ecosystems health condition is monitored through the national program, which is implemented annually to 112 permanent monitoring areas (PMA) in a net of 16 × 16 km (extensive monitoring) and 7 research PMAs (intensive monitoring) that are part of the European network of monitoring areas in the program UN / ECE ICP Forests.

In 2000 the lowest share of damaged trees (23 %) since the start of monitoring (1987) was recorded. Subsequently, there was varying increase of defoliation, and again in 2003 – 2005, the share of damaged trees decreased to the level of 2000. Since 2005 they recorded a gradual increase in the proportion of defoliated trees up to 37.9 % in 2012. Compared to 2011, the proportion of trees in defoliation degree 2 – 4 increased in all trees by 3.2 %.

Most damaged tree types are spruce, fir and oak. The least damaged are hornbeam and beech. Regions with the prolonged worst health condition of forests in Slovakia are in the south-west Slovakia, Orava and Spis-Tatras region.

Development of representation of individual tree species in degrees of defoliation 2 – 4 *(Source: NFC)*



Alphabetical List of Selected Abbreviations

AMS	Automated Monitoring Stations
AOT40	Accumulated Dose Over a Threshold of 40 ppb
CCTIA	Central Controlling and Testing Institute in Agriculture
CEFTA	Central European Free Trade Agreement
CERN	European Organization for Nuclear Research
CET / GMT	Central European Time / Greenwich Mean Time
Coll.	Collection of Laws
CR	Critically Endangered Taxon
DD	Data Deficient Taxon
EBRD	European Bank for Reconstruction and Development
EC	European Commission / European Community
EEC	European Economic Community
EFTA	European Free Trade Association
EI	European importance
EMEP	European Monitoring and Evaluation Programme (Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe)
EN	Endangered Taxon
EU	European Union
EUROSTAT	Statistical Office of the European Communities
EX	Extinct Taxon
FAO	Food and Agriculture Organization of the United Nations
GCCA SR	Geodesy Cartography and Cadastre Authority of the Slovak Republic
GDP	Gross Domestic Product
GIC	Gross Inland Consumption
Gg	Giga Grams of CO2
GHGs	Greenhouse Gases
ha	Hectare
IMF	International Monetary Fund
IUCN	The International Union for the Conservation of Nature and Natural Resources
KP	Kyoto Protocol
LR	Lower Risk Taxon
LULUCF	Land Use-Land Use Change and Forestry
MAEaRD SR	Ministry of Agriculture, Environment and Regional Development of the Slovak Republic
m.a.s.l.	Metres above sea level
NATO	North Atlantic Treaty Organization
NE	Not Evaluated Taxon
NFC	National Forest Centre
No.	Number
NP	National Park
NR	Nature Reserve
OSCE	Organization for Security and Co-operation in Europe
OECD	Organization for Economic Co-operation and Development
PA	Protected Area
PLA	Protected Landscape Area
PM_{10}	Particulate Matter between 2.5 and 10 µm in size
$PM_{2,5}$	Particulate Matter to 2.5 µm in size
PMA	Permanent Monitoring Areas
POPs	Persistent Organic Pollutants
PS	Protected Site
pSCI	Proposed Sites of Community Importance
pSPA	Proposed Special Protected Area
RES	Renewable energy sources
SCI	Sites of Community Importance
SEA	Slovak Environment Agency
SGI DS	Slovak Geological Institute of Dionyz Stur
SHMI	Slovak Hydrometeorological Institute
SNC SR	State Nature Conservancy of the Slovak Republic
SO SR	Statistical Office of the Slovak Republic
SPA	Special Protected Area
SSPA	Small-size protected areas
SR	Slovak Republic
SSG	Spring stock of game
STS	Slovak Technical Standards
UN	United Nations
UN / ECE	United Nations Economic Commission for Europe
ICP Forests	International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNFCCC	UN Framework Convention on Climate Change
V4	The Visegrad Group - an informal grouping of four central European countries: the Slovak Republic, the Czech Republic, the Republic of Hungary and the Republic of Poland
VOC	Volatile Organic Compounds
VU	Vulnerable Taxon
WHO	World Health Organization
WRI	Water Research Institute
WTO	World Trade Organization