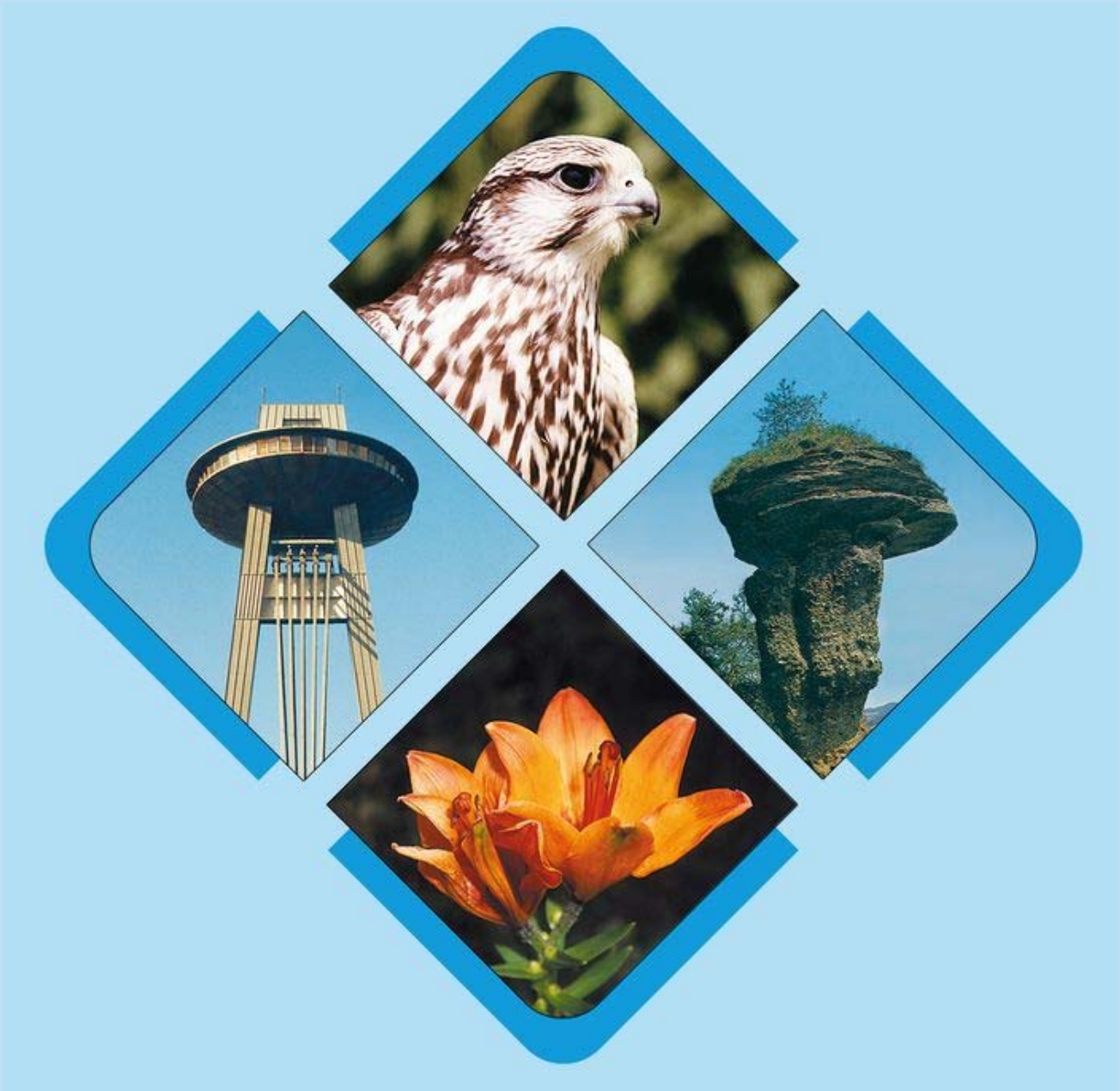




MINISTRY OF THE ENVIRONMENT  
OF THE SLOVAK REPUBLIC



STATE OF THE ENVIRONMENT REPORT

SLOVAK REPUBLIC

2008





## FOREWORD

**The Constitution of the Slovak Republic** guarantees for each citizen **the right** to suitable environment, as well as the right to timely and complete information on the state of the environment, its causes and consequences.

The most significant sources of complex information on the environmental situation in the whole Slovak territory certainly include the **State of the Environment Report of the Slovak Republic**, which has been published by the Ministry of Environment since 1993, pursuant to Act 17/1992 on the environment as amended. This Report provides a complex overview of the components of environment - air, water, rocks, soil, flora and fauna, including the cumulative environmental issues, especially climate changes, depletion of the ozone layer, acidification, and eutrophication. Attention is given also to nature and landscape protection, environmental risk factors with emphasis on waste management, and chemical and physical risk factors. The Report also assesses the degree of environmental impact by individual sectors - transportation, power management, industry, agriculture, forestry, recreation and tourism. Besides, it also refers to the outcomes of implementation of selected environmental protection indicators including environmental impact assessment process, prevention of major technological hazards, integrated pollution prevention and control, environmental management and audit, environmental assessment and labelling of products, science, research, promotion and issues of genetic technologies and genetically modified organisms.

Due to the **cross-sectional character of environmental assessment**, the data contained in the Report represent in summary the result of the work of a broad spectrum of state administration professionals together with other professional institutions in the sector of environmental protection, as well as other involved and cooperating resorts, mainly the Slovak Ministry of Agriculture, Ministry of Health, Ministry of Education, Ministry of Culture, Ministry of Interior, Ministry of Economy, Ministry of Transport, Posts and Telecommunications, Statistical Office, and Nuclear Regulatory Authority of the Slovak Republic. The Report shows a number of outcomes and information reached within the framework of environmental monitoring, mapping of the state of the environment and its components, statistical monitoring, and modelling.

Monitoring of the long-term environmental trend shows a permanent, decreasing trend in basic pollutants emissions, as well as in anthropogenic greenhouse gasses emissions. However, some air quality monitoring stations still show exceeded pollution limits. This especially relates to **air pollution** by the suspended PM10 particles, which substantially exceed the air pollution threshold values generally binding since January 2005. Hence, we do not fully meet the obligations set forth by the pertinent EU provisions as more effective corrective measures are needed. A number of sites still show negative characteristics in ground ozone air pollution, also with exceeded limit values adjusted to human health protection and vegetation protection. It should be noted that the exceeded ground ozone values are largely the result of increased ozone concentrations in the surrounding countries. Outcomes of model calculations have pointed to a very small contribution of Slovakia to the middle-European concentration of ground ozone. Therefore, this issue will have to be solved only through a mutual cooperation with these countries.

Slovakia is to comply with ambitious objectives also in the area of **sewerage systems and waste water treatment**. Notwithstanding the permanent growth of the portion of population connected to water sewerage and treatment systems, much effort and funds are still to be invested into meeting the objectives of the Council Directive 91/271/EEC on treatment of municipal waste water. The Directive also demands that all EU countries ensure that collection systems and adequate treatment be available for all agglomerations of more than 2,000 equivalent inhabitants. In total, the obligation set forth by the Framework Directive on Water requires to achieve a **good water balance** by 2015. Should any of the member states fail to meet this deadline for any reason, the new European water policy may grant exceptions if adequately justified. Slovakia, mindful of its obligation to optimally meet these objectives, created important water management documentation - Water management plan of Slovakia, together with watershed management plans that take into consideration environmental demands and ecological aspects.

Assessment of the **waste management** situation suggests that total volumes of generated waste remain unchanged or show a slight increase for municipal and hazardous waste types, respectively. However, there is still a high proportion of waste disposed of through landfills and a low volume of separated waste calculated as per one inhabitant. To change this will require more than the "overnight" approach. What is needed the most is a responsible approach to implementing the measures included especially in the Waste Management Program of the SR, which can only be carried out with adequate funding. Trend in the collection and disposal of old vehicles and waste from electrical and electronic appliances shows positive outcomes.

**Nature and landscape protection** in 2008 focused mainly on the protected nature segments and implementing the NATURA 2000 system. The system represents a continuous European ecological network of protected areas under special attention of the EU community, created by the member states, independent of their national protected areas systems. In the course of the year, other 14 regulations of the Slovak Ministry of Environment came into effect, declaring other protected bird territories.

In 2008, **implementation of the EU environmental legislation** was carried out. Considering the set objectives, this legislation represents the most ambitious policies, placing high demands on the

professional, organisational, as well as financial involvement. Therefore, this State of Environment Report of the Slovak Republic in 2008 includes also a complex assessment of the **financial coverage of environmental care** not only from domestic financial sources (state budget, Environmental Fund, Recycling Fund) but also from international sources. The assessed time period still included the last PHARE program projects. Implemented were projects within the framework of the first program period of Basic Infrastructure operation program, ISPA, and the Cohesion Fund. The first calls for proposals made within the second programming period under the **Environment Operation Program**. Also, funds from other sources were used for solutions to environmental problems, these including the European Union Life and Life+ program, Global Environmental Assistance, INTEREG III B CADSES, etc. A number of internationally-recognised environmental projects implemented in the territory of Danube marshes promise an excellent cooperation between the state administration authorities, local governments, representatives of the state administration, local governments, water management, forest management, agriculture, scientific and professional institutions, schools, and non-government nature protection associations. The projects also create conditions for social and economic development of the poorer regions, especially in the area of tourism, agro-tourism, and eco-tourism.

Slovakia achieved a major success in Quebec, in 2008 where the World Heritage Committee approved to register **eight wooden churches located in the Slovak part of the Carpathian arch** into the world cultural heritage list. Total number of world heritage sites in Slovakia thus reached the number of seven. A year before, the Vihorlat PLA hosted a ceremony where the UNESCO certificate on registration of Slovak-Ukrainian **Carpathian beech virgin forests** into the world natural heritage list was awarded. The Slovak Government through its Resolution 740/2008 approved the first **Strategy of Geoparks in the SR** with the preference to build three geo-parks located in Banská Štiavnica, Novohrad, and Banská Bystrica.

In the beginning I mentioned the right of each one of us to live in the environment which will not negatively influence our **health and well-being**. Therefore, also the adopted Slovak Government programme declaration together with the National Strategy of Sustainable Development focus on cultivating the environment. However, all of us should create and preserve a high-quality living environment. This obligation for all citizens is also anchored in the Constitution of the Slovak Republic, which holds everyone responsible for protecting and cultivating the living environment and cultural heritage, while we must not, beyond the measure given by law, endanger or damage the environment, natural resources, and culture monuments. Also, this **State of Environment Report of the Slovak Republic in 2008** clarifies for the general public as well as the youth the importance of a systematic environmental education which leads to awareness of the significance of environmental protection.



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## COMPLEX ENVIRONMENTAL MONITORING AND INFORMATION SYSTEM

### • LEGAL OUTCOMES AND CONCEPTS

Environmental monitoring and information systems in the area of environment are implemented pursuant to **Act No. 275/2006 Coll. on public administration information systems, Strategy of the Sectoral information system, and Strategy of completion of the complex environmental monitoring information system in the environment (approved by the Slovak government resolution No. 7/2000)**. In the course of the year 2008 and the first months of 2009, intensive works were carried out on the preparation of a new **Strategy of Environmental Information System Development**, subsequently approved by the Ministry of Finance on 25.6.2009.

### • ENVIRONMENTAL MONITORING SYSTEM

The System of environmental monitoring is an indispensable tool to know the environment and ensure environmental care. The System contains partial monitoring systems (PMS) installed at selected centres. The Information monitoring system (IMS, [www.enviroportal.sk/ism](http://www.enviroportal.sk/ism)) with the goal to create a homogeneous, interconnected information unit consisting of partial IMSs. The unit is able to provide most objective report on the actual state of components of environment and due to interconnected databases is generally accessible through the Internet.

PMS	Guarantor	Centre	Monitored subsystem	
<b>Air quality</b>	MoE SR	Slovak Hydro Meteorological Institute	Level of pollution Ground atmospheric level – air above the whole Slovak territory is divided into 2 agglomerations and 8 zones.	
<b>Meteorology and climatology</b>	MoE SR	Slovak Hydro Meteorological Institute	Network of ground synoptic and air stations Network of meteorological radars Meteorological satellite measurements Network of stations with climatology observation programme Network of precipitation measuring stations Network of stations measuring solar radiation and total atmospheric ozone	Network of phenological stations Network of measuring soil temperature and soil humidity Network of measuring in the ground atmospheric level Aerologic station Storm detection station network
<b>Water</b>	MoE SR	Slovak Hydro Meteorological Institute	Surface water quantitative indicators Groundwater quantitative	Thermal and mineral water Irrigation water Recreational water bodies

			indicators Surface water quality Groundwater quality	
<b>Radioactivity</b>	MoE SR	Slovak Hydro Meteorological Institute	Environmental radioactivity - Ground atmospheric level at monitoring sites	
<b>Waste</b>	MoE SR	Slovak Environmental Agency Banská Bystrica	Waste generation and disposal in Slovak Republic Waste reclamation facilities	Waste reclamation facilities Interstate transport of hazardous waste
<b>Biota</b>	MoE SR	State Nature Conservancy of the SR Banská Bystrica	Fauna Flora	
<b>Geological factors</b>	MoE SR	State Geological Institute of Dionýz Štúr in Bratislava	Landslides and other slope deformities Erosion processes Monitoring of erosion processes Soils of unstable volume Effect of mineral exploitation on environment Change to anthropogenic sediments Stability of rock massifs below historic objects	Anthropogenic sediments buried Tectonic seismic activity of territory Monitoring of snow cap chemical composition Monitoring of seismic phenomena Active alluvial sediments Volume activity of Radon in geological layers
<b>Soil</b>	MoA SR	Soil Science and Conservation Research Institute in Bratislava	Basic network Key locations Special network of sites	Spatial monitoring of agricultural lands Forest land monitoring
<b>Forests</b>	MoA SR	National Forest Centre in Zvolen	Extensive periodical monitoring - 112 permanent monitoring areas Intensive periodical and continuous monitoring – 7 permanent monitoring areas	
<b>Xenobiotic substances</b>	MoA SR	Food Research Institute in Bratislava	Coordinated focal monitoring Consumption pool monitoring	Monitoring of game and fish

Source: MoE SR

**Funds invested in environmental monitoring (thous. SKK)**

PMS	Year						
	2002	2003	2004	2005	2006	2007	2008
<b>Air quality</b>	28 651	27 600	18 400	16 900	28 971	57 748	35 522
<b>Meteorology and climatology</b>	28 300	33 200	35 000	26 031	76 013	29 609	72 590
<b>Water</b>	44 434	35 330	24 192	43 717	44 447	100 440	52 919
<b>Radioactivity</b>	2 668	1 792	1 454	1 500	2 545	2 301	1 500
<b>Waste</b>	3 500	3 500	3 500	3 800	1 040	4 354	2 393
<b>Biota</b>	600	169	600	1 000	1 000	1 000	515
<b>Geological factors</b>	10 000	10 000	10 000	10 000	10 000	9 000	10 500
<b>Soil</b>	9 200	9 200	9 200	9 600	9 100	7 000	8 051
<b>Forests</b>	1 720	2 900	2 900	4 400	8 000	17 159	10 173
<b>Xenobiotic substances</b>	27 032	28 400	27 381	12 454.2	15 301	8 500	10 596,5
<b>Total costs</b>	<b>156 105</b>	<b>152 091</b>	<b>132 627</b>	<b>129 402.2</b>	<b>196 417</b>	<b>237 111</b>	<b>204 759</b>
<b>MoESR costs</b>	118 153	111 591	93 146	102 948	164 016	204 452	175 939

Source: MoE SR

- **ENVIRONMENTAL INFORMATION SYSTEM**

Environmental information system integrates information from environmental monitoring, information from environmental assessment, and spatial information on territory. Other generated information support activities of environment authorities and subjects that enforce legislation within environmental law. These include mainly the Ministry of Environment of the Slovak Republic (MoE SR) and its affiliated organisations, as well as other institutions under different ministries. MoE SR and its daughter organisations maintain other databases, information systems, and internet and intranet portals to support their activities and present their outcomes.

For more information on the organisational structure and pertinent responsibilities, see EnviroInfo meta-information system.

Enviroportal is the gateway to all the mentioned environmental information ([www.enviroportal.sk](http://www.enviroportal.sk)) that gathers data sources through the Ministry's local computer network.

**Overview of the major information systems and databases created and maintained at the Ministry of Environment of the SR, that contain environmental information**

<b>Name of Information System</b>	<b>Operator</b>	<b>Description of IS</b>	<b>In operation since*</b>
<b>Information Environmental System (IES)</b>	SEA	Obtains information from the following systems, subsystems, and databases.	
<b>Enviroportál</b>	SEA	Gateway to environmental information with up-to-date reports including information on amendment procedures, together with discussion forums, and information on environment-related, address books, information on projects and other environmental information. See <a href="http://www.enviroportal.sk">www.enviroportal.sk</a> .	2005
<b>EnviroInfo - metainformation on environment</b>	SEA	Summary information on location of sources, organisation and competencies within the Ministry of Environment. More detailed classification into databases, documents, raster and vector layers of the geographic information systems.	new version since 2005
<b>Environmental videography</b>	SEA	Internet-based accessible catalogue of films and video programmes featuring the topics of environment composed of the international Envirofilm films. After watching the trailer, it is possible to borrow the film over the internet at no cost.	2005
<b>Information monitoring system (IMS)</b>	SEA	Integrates information from ten partial monitoring subsystems. See the overview above.	1999, new version since 2005
<b>ENISI</b>	SEA	The ENISI supplies spatial (geographical) information on the components of environment. At the same time, the document represents a practical implementation in the process of creation and operation of the so-called "national infrastructure of spatial information" (NISI) as defined by the Resolution 2007/2/EC - INSPIRE. The NISI represents a legally justifiable platform with clearly defined rules of sharing and utilisation of spatial information. The following major tasks were carried out under the ENISI project: 1. Information system on territory: 2. Catalogue of objects in the Sector of Environment (CO) 3. INSPIRE : For more information on activities go to <a href="http://www.sazp.sk/inspire">http://www.sazp.sk/inspire</a> .	2004
<b>Information system on the state of environment (ISS)</b>		ISS consists of information files, both in text and table formats that describe the state of environment over the recent time period. The information is categorised by environment components, indicators, and years. Some information is assessed in relation to impacts of economic activities. Institutions within and outside of the Ministry supply documentation that the SEA processes into summary reports or overviews of different classification.	1999
<b>Information system of environment departments and offices (ISEDO)</b>	SEA	ISEDO gradually ensures information support for state administration (SA) activities in the area of environmental creation and protection. Therefore, it consists of subsystems defined by duties of the SA within the area of environment under Act No. 525/2003 Coll. on state administration of environmental protection. This means that regional and local Environment Offices have competencies within the SA of environment protection and creation, in the following areas: a) water management, protection of water quality and volumes and its rational use, b) nature and landscape protection,	2004



		<p>c) protection and regulation of trading endangered species of wildlife animals and plants,  d) fishing, excluding fisheries,  e) air and Earth ozone layer protection,  f) waste management,  g) packages and packaging waste,  h) prevention of major industrial accidents,  i) environmental impact assessment  There is a connection to specific information systems to support the implementation of individual legislation documents in the area of environment.</p>	
<b>Information system of the environmental impact assessment (IS EIA)</b>	SEA	<p>IS on the state, process, and outcomes of environmental impact assessment. Ensures information flow among participants to the EIA process (proponent, pertinent authority, permitting authority, impacted authority, impacted municipality, public, and qualified persons). At the same time is ensures compliance with the Ministry's obligations set forth by Sect. 38 of Act on EIA, e.g. providing of information from documents and files. In its content, the information system includes input information on assessed activities within the EIA process, position statements to activities in the EIA process, and lists and information related to pertinent issues. Technically, the system has the form of a web application through which the impacted authorities connect onto the central database. After authorisation and verification steps, they may input their own data as well as retrieve information. The public can in a specific way access data that can be published.</p>	Part dealing with impact assessment of strategic documents in operation since 2003/2006
<b>IS of integrated pollution prevention and control (IPPC)</b>	SEA	<p>After completed, the system will provide information on the status, process, and outcomes of the IPPC permit process, as well as on closely relating activities, including the best available technologies. Creating an IS will secure information support for the execution of state administration activities within the specific area. Meanwhile, this will create a mechanism for collecting, assessment, and supply of information to the public. Pursuant to the IPPC law, state administration is carried out by the MoE SR and the SEI. Environmental authorities represent the affected bodies within the process of licensing as they are the administrative bodies in proceedings governed by individual norms (on air protection, water protection, waste, etc.) merged into a system of integrated licensing.  IS IPPC comprises the following parts:  - Register of operators and IPPC operations, containing identification data on operations and operators that need the IPPC license  - Register of issued integrated licenses  - Integrated register of contamination containing data and information supplied every year by operators on their operations, emissions, and outcomes of monitoring.  - Register of environmental quality norms for individual sites within the SR  - BAT and BREF register containing the best available techniques for individual industrial sectors and types of operations  - Register of authorised persons within IPPC  Technically, the system has the form of a web application through which the impacted authorities connect onto the central database. After authorisation and verification steps, they may input their own data as well as retrieve information. The public can in a specific way access data that can be published.</p>	first part since 2005

<b>Information system of major industrial accidents (IS MIA)</b>	SEA	Makes available documents relating to the whole process of major industrial accidents prevention, including preparation of their reports for JRC. Comprises 3 registers: - register of business (regulated by the MIA legislation) containing identification data of a company, operator, and a list of selected chemical substances present in the company - register of accidents that supplies information on occurred accidents, their causes, consequences and their troubleshooting - register of authorised persons that contains a list of emergency technicians, list of MIA specialists, and list of authorised personnel	2004
<b>Regional Waste Information System (IS RISONet)</b>	SEA	Provides for system of gathering data on all areas of waste management activities in the SR, registers of waste generators and keepers, data on waste generation and disposal, as well as records of operators and waste reclamation and elimination facilities, records of landfills, and records of hazardous substances transport. The system has been expanded through creation of modules in order to access data to be used by SEI and Recycling funds. Also, a module for publishing specific information online has been created. RISONet also contains a module for automatic input of digital data from individual obliged subjects into the information system.	2002
<b>IS Packaging</b>	SEA	IS Packaging constitutes an instrument that serves to monitor partial objectives in the area of waste reclamation and packaging waste recycling.	2005
<b>IS ELECTRO</b>	SEA	IS Electro is an instrument to monitor the implementation of objectives in the area of waste reclamation and recycling.	2007
<b>IS Environmental damages</b>	SEA	The instrument was built pursuant to Act 359/2007 Coll. on prevention and recovery of environmental damages, and on amendment to other laws.	2008
<b>Register of basic residential units (RBRU)</b>	SEA	Register of basic residential units ensures a stable set of spatial units for geographical localisation of information stored by the SIS intelligence agency. It also supplies updated registers and numeric references of the basic residential units together with their classification into higher-order units, in conformity with the valid territorial and administrative division. The Register provides access to selected information and specific topical outcomes based on the requirements of the users. It has been implemented on a continuous basis. Set of the basic residential units and standard spatial units with defined identifiers was successfully applied at the creation and keeping of various registers and lists, mainly at regular counts of population, houses, and apartments. (1970, 1980, 1991, 2001)	1970
<b>GEMET Database</b>	SEA	Multi-lingual lexicon of environmental terminology	
<b>Environmental videography</b>	SEA	Online catalogue of films and video programmes related to the topics of environment, composed of the films shown at the Envirofilm international film festival After seeing its demo it is possible to borrow the film off the internet at no cost.	2005
<b>IS POVAPSYS</b>	SHMI	IS should help through: 1. Increasing the prior forecast and warning time, which will create conditions for better protection of property and lives against floods	first part since 2005

		2. Ensure more exact and more reliable forecasts and warnings, 3. Ensure a greater number of forecasts for specific time periods and for more sites, 4. Provide outcomes and data available through the Internet or directly by the user. 5. Interconnect information with Hungary, Ukraine, Poland, Czech Republic, Austria, and Germany.	
<b>Hydrological Information System (HIS)</b>	SHMI	Includes Slovak hydrological data by different modes of operation - long-term information on individual network of stations (catalogues), and detected or otherwise acquired hydrological data (registers). Central office is in Bratislava accessed by the SHMI users in Slovakia (Žilina, B. Bystrica, Košice) through user applications (uploads, updates, print administration, overturn administration). Ensures batch saving of sources, interactive update, verification, archiving, statistical processing, and distribution of data through professional data guarantors to the end user.	
<b>Climatology and Meteorology Information System (CMIS)</b>	SHMI	Addresses operational and research activities of all climatology and selected meteorology fields.	
<b>Complex Water Register (CWR)</b>	SHMI	Contains selected information and data on the state of surface and ground water, information on the volume and quality of water formations, data on surface water extraction, on the volume of discharged water, on produced and discharged waste water contamination, acquired from water users through their mandatory notification to SHMI, data on legal water registries, data on protected territories connected to water protection (water courses, major water management courses, etc.) and annual data on emissions to surface water from operators under legislation on IPPC	
<b>Database of single sources of water contamination</b>	SHMI	Created to store information on location and character of potential sources of contamination of surface and groundwater. Also includes the risk assessment module that allows assigning a risk score to individual sites. The module forms the basis for identification of potential sites that are most hazardous to surface and ground water formations as the result of their non-compliance with environmental objectives.	
<b>National Emission Inventory System (NEIS)</b>	SHMI	Includes information on operators, emissions, and technologies of large and medium-size air pollution sources. Provides: collection of data, imposition of fees and creation of output sets for accredited institutions, including sets needed for international exchange of information on emissions. Included is also a module for the operators of air pollution sources, which allows automated calculation of emissions, supplies the needed data in compliance with legislation, and allows importing data directly into NEIS.	
<b>State Register of Protected Areas</b>	SMNPaS SNC SR	Includes data on graphical layers and databases from the area of spatial and individual protection of flora and fauna, and biotopes of European and national significance (State Register of Protected Areas, SSPA and LSPA, Protected Trees Catalogue, Natura 2000 SK) and their updates, catalogue of increments of Protected Areas (PA) and Protective Zones (PZ), Catalogue on PA and PZ.	gradually since 2002
<b>Databases</b>	SMNPaS	Protected Bird Territories database (since 2004), Cave Database of Slovak Republic (since 2003), Journal Database System BACH.	
<b>Information system of taxons and biotopes and other nature protection databases</b>	SNC SR	Database of taxons and biotopes (since 2002), Database of Waterfalls (since 2004), database of bear monitoring (since 2003), CITES database (since 2004), Database of barrier components in landscape, Database of introduced and invasive taxons of plants and animals, Database of Europe's significant taxons of animals and plants.	

<b>International species information system and other databases</b>	ZOO Bojnice	International Species Information System Database - international inventory system of animals raised in ZOO, Yearbook of the Union of Czech and Slovak ZOOS.	
<b>Databases</b>	WRI	Water management plans of watersheds (surface and groundwater sources, water demand and regional water management strategies), Water management balance (data on balance assessment profiles, flows and impacts on water utilisation), Hydro-energy potential of watercourses (water bodies constructed, under construction, and planned, large and small aquatic power plants) Database of watercourses, Database of yields and extractions from water sources, Information Water Supplies and Sewerage Systems administered by water management companies and municipal offices, Geographical Information System on drinking water supply and sewerage system installation in Slovak villages in connection to Water Supply and Sewerage Database, Data on Water Management Construction funded from investments, and on operations in Slovakia, Drinking Water Quality Indicators Database, Database of production and qualitative composition of sludge from municipal wastewater treatment plants, its use and elimination, Database of water contamination dealing with organisations, technologies, substances, and their elimination, Database of technological and operation data of wastewater treatment plants, Database of technological and operation data of water treatment plants, Database of surface and groundwater sources, large and small water dams and water management protection zones.	
<b>Databases and the GIS layers</b>	SNC SR	DSPELEO National database of caves, Hydrological, climatic and bio-speleological monitoring, Geographical Information System of Cave Protection.	
<b>Databases</b>	SMM	BACH and AMIS Collection Database Systems.	
<b>Databases</b>	SEI	Databases from the activities of the inspection for waste, water, air, nature protection, and IPPC.	
<b>Databases and registers</b>	SGI DS	Register of bores (since 2000) and HG wells, abandoned mining sites, slides, Register of mapping (since 2002), Register of geological mapping (since 2002), Register of geo-physical mapping, Register of geo-chemical mapping, Register of surveillance and perspective surveillance areas, Landfill Register, Register of Exclusive Deposits (since 2002), Register of Physical Documents (since 2000), Register of old environmental loads on the rocks, Register of Digitalized Geological Maps, Digitalized Geological Map of the Slovak Republic (since 2006).	
<b>Register of basic residential units (RBRU)</b>	SEA	The BRU register is the basic numbering reference of the EIS components. It provides for spatial identification of information. Directive on spatial identification sets forth localisation of information by standard spatial units (cadastre territories, municipalities, districts,...) New element in the structure of spatial units (SU) under this directive includes basic residential units delineated within the territory on the basis of settlement structure as an element that is independent of relatively frequent changes within the structures of administrative layout. For each element of the spatial unit set, being the basic identifier has been assigned an independent identification number from a prior determined sequence of numbers that remains unchanged during the whole existence of the SU. Set of the ZSJ and spatial units with determined identifiers has been successfully implemented at creation and maintenance of different records and large-scale surveys (registers of municipalities, register of landfills, numerical reference of cadastre areas, registers of public utility equipments, etc.)	

\* missing information *In operation since*: means that the operation began before 2002.

Source: MoE SR

## COMPONENTS OF THE ENVIRONMENT AND THEIR PROTECTION

### • AIR

#### Emission situation

##### ◆ Balance of particulate matter emissions

Pursuant to Act 478/2002 Coll. on air protection, which amends Act 401/1998 Coll. on fees for air pollution as amended (Air Act) (Sect. 19, par. 2(d)) an operator of a **large and medium-sized source** is required to provide to the pertinent local environment protection authority always before February 15 of the current year, a complete and true information on the source, emissions, and keeping of the emission limits and quota for the previous calendar year. Local environmental protection authority will submit these processed electronic data to the authorized MoE SR organization - the SHMI (Slovak Hydrometeorological Institute), which operates the central **National Emission Inventory System (NEIS)**. SHMI processes these data on the national level. In 2001, the SHMI for the first time collected and processed information through the NEIS module, which replaced the previously used REZZO system.

SHMI assesses the volume of polluting compound emissions from the from **small sources** on a yerly basis, based on the volume and quality of sold solid fuels to retailers and households. This information is available from the submitted data to the local environment protection authority by individual sellers, as well as from natural gas consumption by households.

**Mobile sources** emissions have been monitored since 1990 and are determined on the year-to-year basis. To calculate road transport emissions, the method of Computer Programme to Calculate Emissions from Road Transport (COPERT) is used. The method builds on the number of individual automobile types, volume of travelled kilometres, and consumption of individual fuel types. Besides road transport, calculated are also emissions from the railway, air, and ship transports, all in compliance with the Intergovernmental Panel Climate Change (IPCC) methodology.

##### ◆ History of particulate matter emissions and sulphur dioxide emissions

**Emissions of solids** and **sulphur dioxide (SO<sub>2</sub>)** have shown a steady reduction since 1990, which, apart from reduction in production and energy consumption, has been caused by a change within the fuel group toward more purified fuels, as well as by using fuels with higher quality labels.

Reduction in PM and SO<sub>2</sub> emissions at large-size stationary sources in 2007 was caused by ending the operation of several major sources (the Vojany power plant)

##### ◆ Trend in emissions of nitrogen oxides

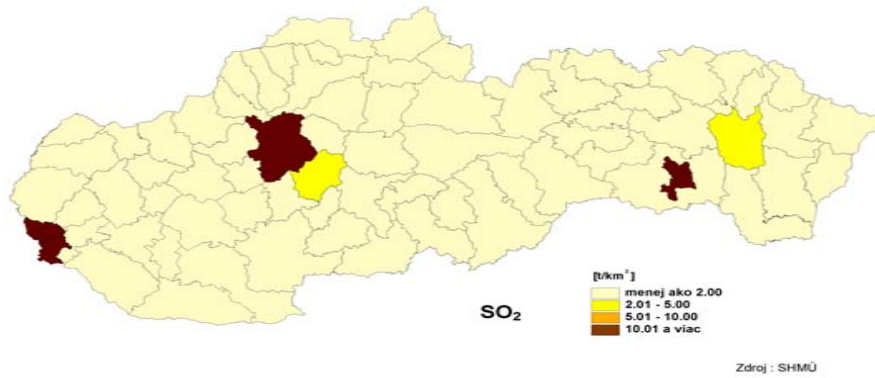
**Nitrogen emissions (NO<sub>x</sub>)** have shown a slight reduction since 1990. Slight increase in emissions in 1995 was related to an increased consumption of natural gas. Decrease in nitrogen oxides in 1996 was

caused by a change to the emission factor that took into consideration the level of equipment and technology of incineration processes. Reduction in solid fuel consumption since 1997 has led to a further decrease in NO<sub>x</sub> emissions. In the years 2002 and 2003, de-nitrification played a significant role in emission reduction (electric power plant Vojany). In 2006, there was a significant reduction in the NO<sub>x</sub> emissions, especially in case of large and medium stationary sources. This reduction relates to reduced production (Zemianske Kostol'any and Vojany electrical power plants) and consumption of solid fuels and natural gas (Zemianske Kostol'any and Vojany electrical power plants and the Slovak gas industry company – transit, Inc. Nitra - /SPP/). Mobile sources also, mainly road transportation, have shown significant NO<sub>x</sub> emissions. This reduction relates to reduced consumption of liquid carbohydrate fuels, compared to 2005, as well as to renovated fleet of personal and cargo vehicles.

♦ **Trend in carbon monoxide emissions**

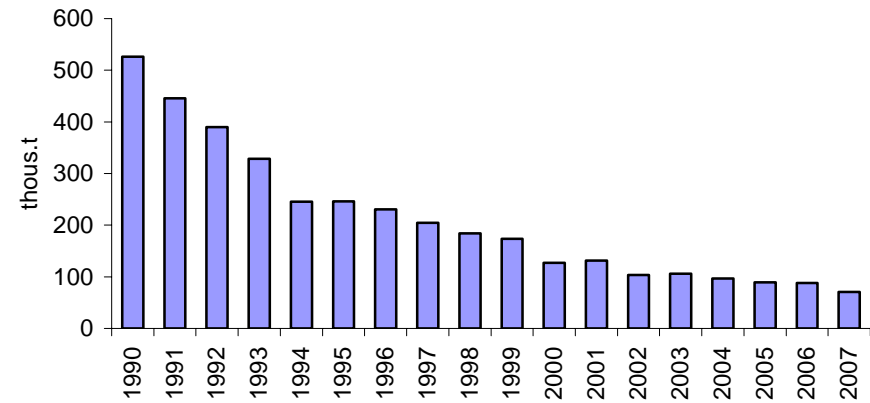
**Carbon monoxide emissions (CO)** since 1990 have shown a falling tendency, which was caused mainly by reduced consumption and change in fuel composition in the sphere of retail consumers. CO emissions from large sources were decreasing only slightly. The most significant share on CO emissions from large sources comes from iron and steel industries.

Element regional emission of SO<sub>2</sub> in 2007 (t.km<sup>-2</sup>)



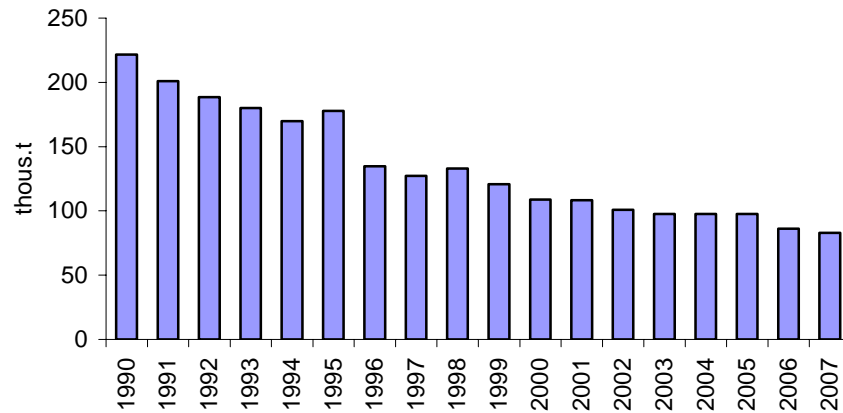
Source: SHMI

Trend in emission of SO<sub>2</sub>



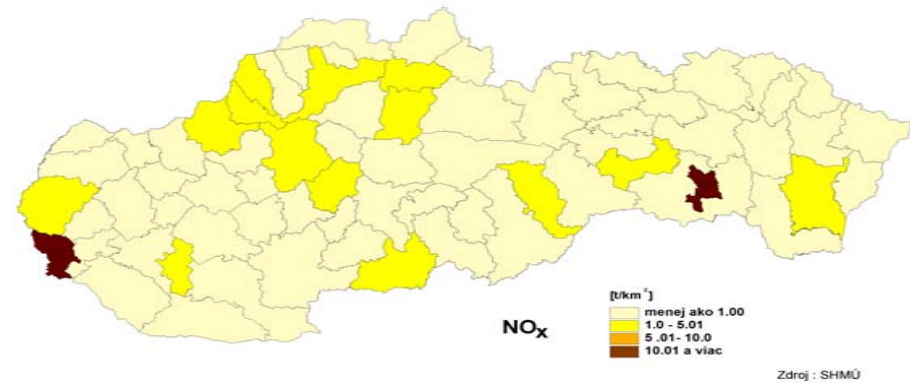
Source: SHMI

Trend in emission of NO<sub>x</sub>



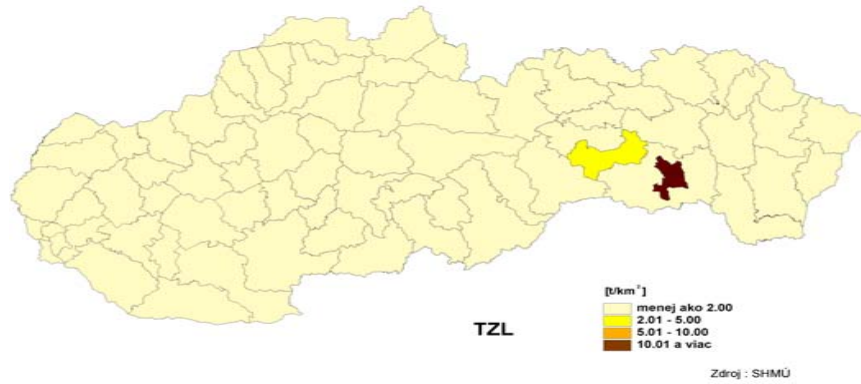
Source: SHMI

Element regional emission of NO<sub>x</sub> in 2007 (t.km<sup>-2</sup>)



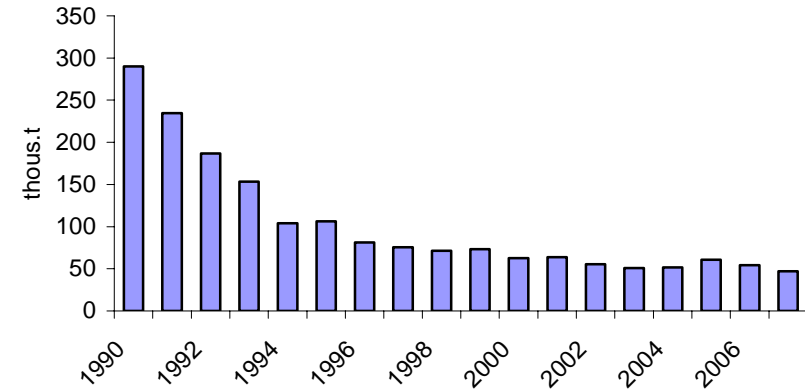
Source: SHMI

Element regional emission of PM in 2007 (t.km<sup>-2</sup>)



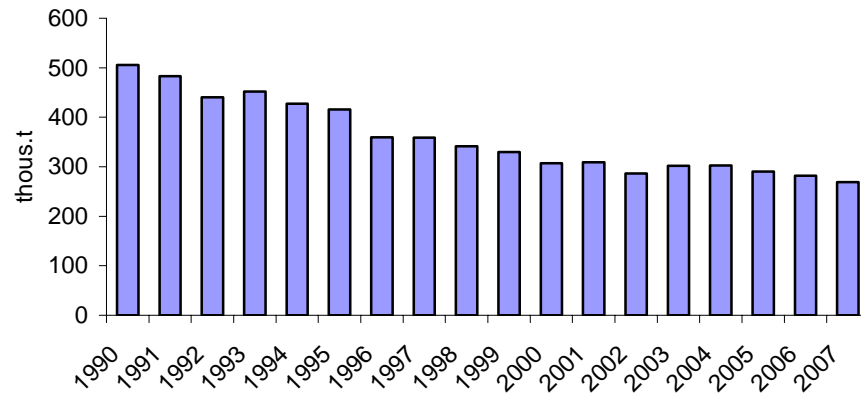
Source: SHMI

Trend in emission of PM



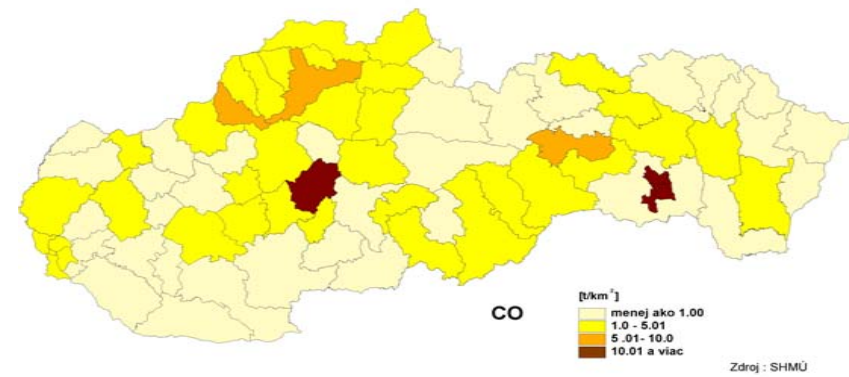
Source: SHMI

Trend in emission of CO



Source: SHMI

Element regional emission of CO in 2007 (t.km<sup>-2</sup>)



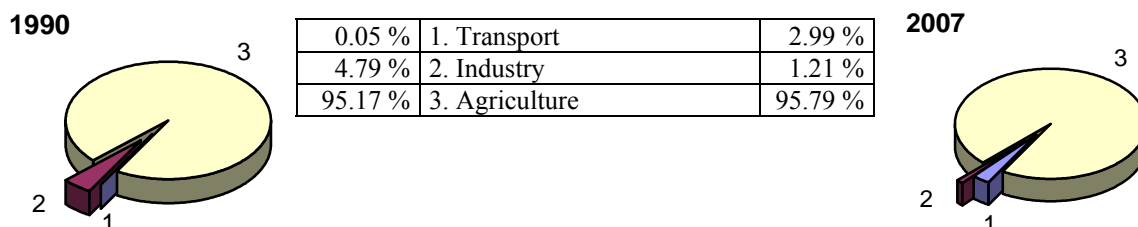
Source: SHMI



◆ **Balance of ammonia emissions (NH<sub>3</sub>)**

Ammonia emissions show a rising tendency mainly due to rising emissions from road transport. Production of the NH<sub>3</sub> emissions in 2007 was 27 234.44 tonnes.

**The contribution of the particular sectors in NH<sub>3</sub> emission**



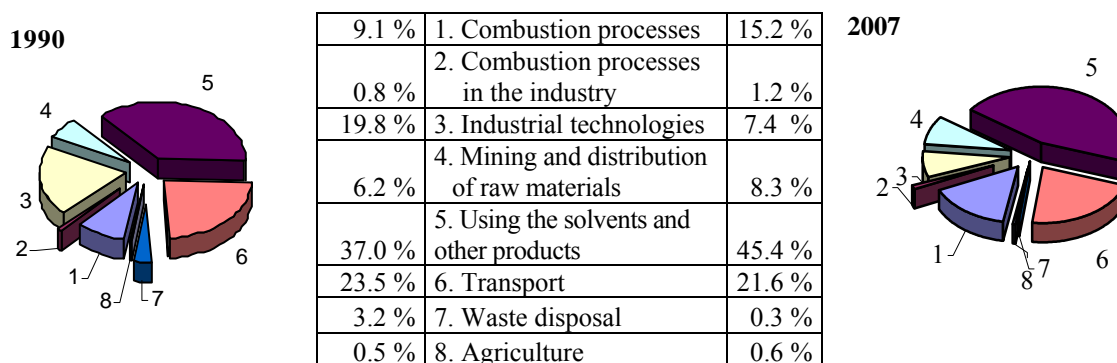
Emissions were stated to the date 31.10.2008

Source: SHMI

◆ **Emissions of non-methane volatile organic compounds**

NM VOC emissions show a lasting decreasing trend since 1990. In 2007, volume of NM VOC emissions reached the value of 73 994 tons, which is a reduction by 46.4 %, compared to 1990. Slight increase in emissions in 2003 and 2004 relates to the consumption of fuels in road transport, paint material used mainly in the engineering industry and construction, as well as to the growth in manipulated volumes of fuels in the sector of fuel distribution.

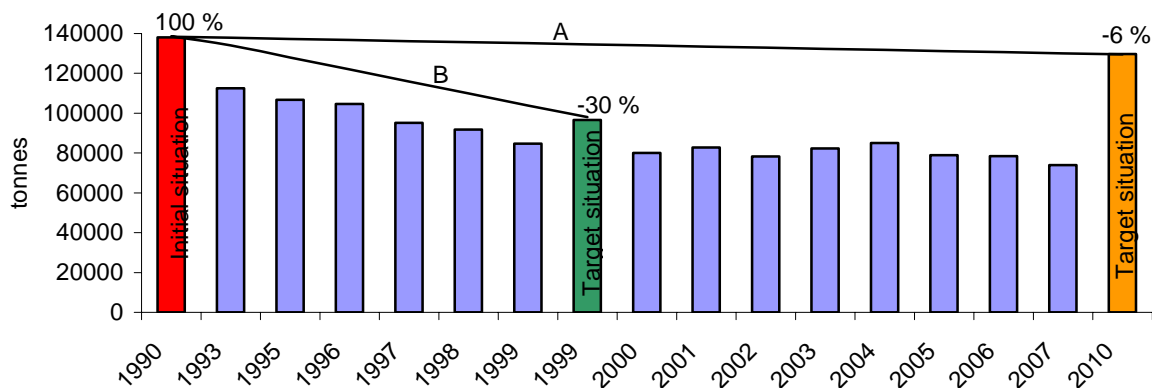
**The contribution of the NM VOC emission according to sector of their origin**



Emissions were stated to the date 31.10.2008

Source: SHMI

**Trend in NM VOC emissions with regard to fulfilling of the international agreements (tons)**



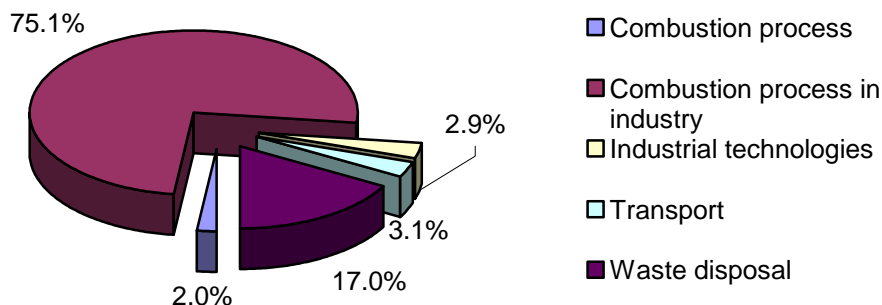
Source: SHMI

A – Reduction aim of the Protocol to abate acidification, eutrophication and tropospheric ozone  
 B – Reduction aim of the Protocol on limitation of VOC emissions or their Cross-Border Transfers

◆ **Balance of heavy metals emissions**

**Heavy metal emissions** (Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, Sn, Mn) have decreased as opposed to 1990. In that year, heavy metal emissions were at the volume of 675.44 tons, while in 2007 it was 269.746 tons, which is a 60 % reduction in comparison to 1990. Besides shutting off a number of old-fashioned and non-effective technologies, this trend has been influenced by extensive reconstructions of the separation equipment, change in raw material used, and, most of all, by transition to using unleaded petrol types since 1996. Since 2004 there has been an increase in Pb emissions as a consequence of increasing production in the areas of ore agglomeration and copper production.

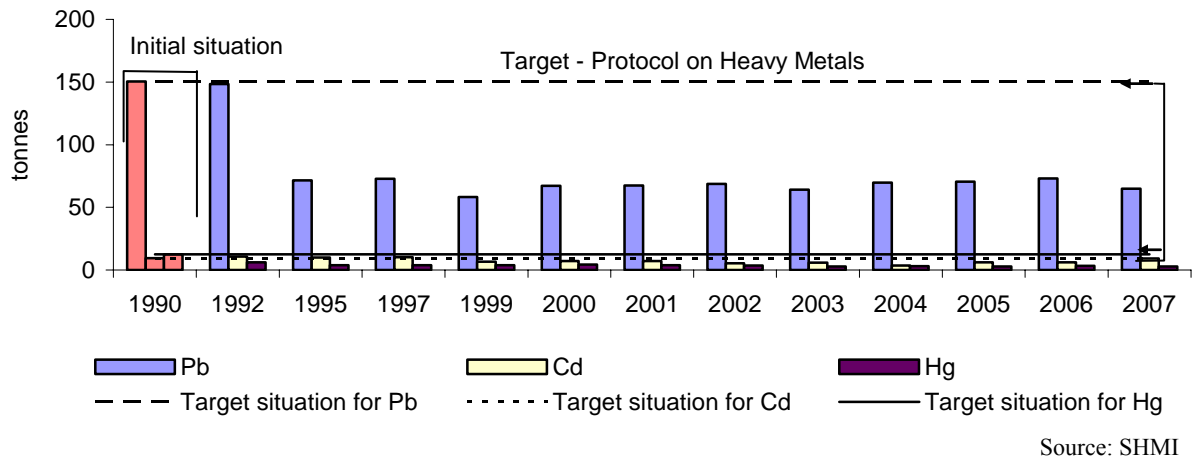
**The contribution of the particular sectors in the Pb emission production for year 2007**



Emissions were stated to the date 31.10.2008

Source: SHMI

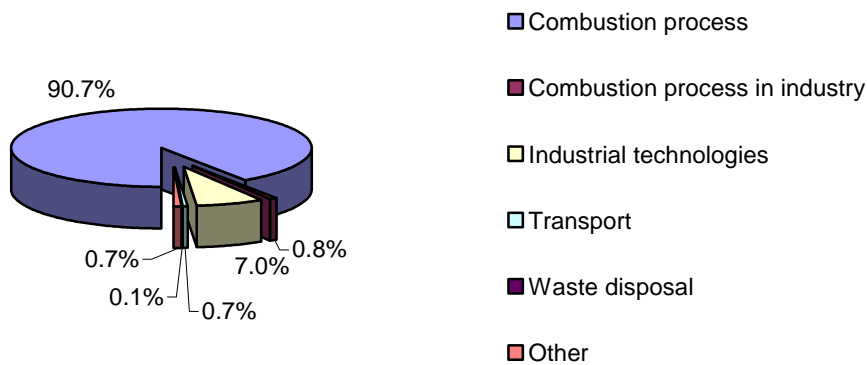
**Trend in emissions of heavy metals regarding the fulfilment of the international conventions**



◆ **Balance of Persistent organic pollutants (POPs)**

Slight reduction to the poly-chlorinated dioxin and furan emissions (PCDD/PCDF) in 2007 was caused by reduction in the sector of Incineration processes within industry (mainly agglomeration of ferrous ores) and waste incineration. Slight increase to polychlorinated biphenyl emissions (PCB) and polycyclic aromatic hydrocarbons (PAH) resulted in increase of road transport (increased consumption of diesel), while the slight increase in the emissions of hexachlorbenzene (HCB) was caused by increased production of secondary copper, slight increase of cement production, and increase in road transport compared to 2006.

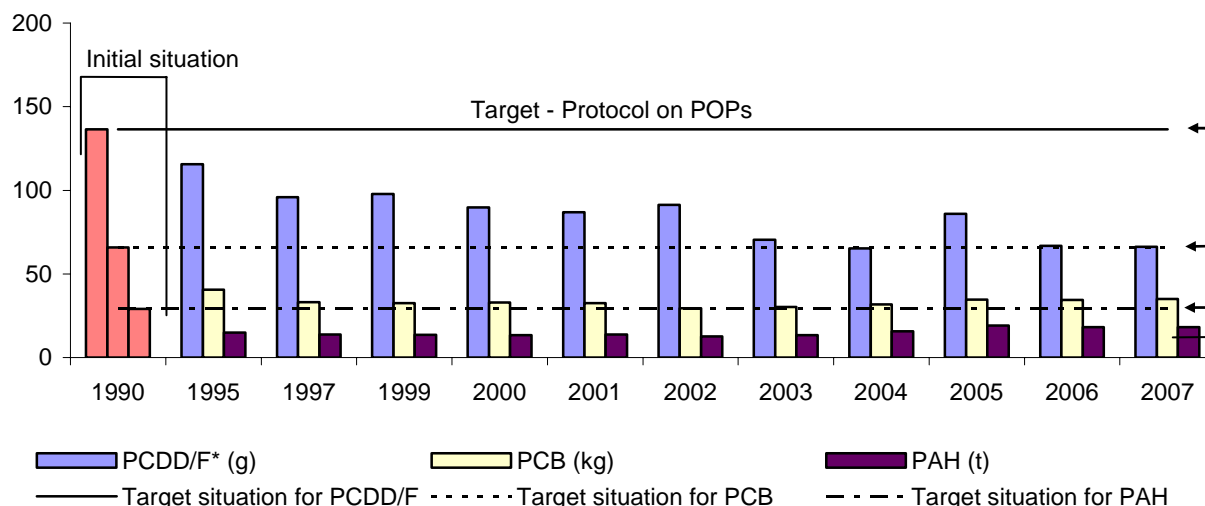
**The contribution of the particular sectors in the PAH emission production for year 2007**



Emissions were stated to the date 15.2.2009

Source: SHMI

**Trend of POPs emissions regarding the fulfilment of the international conventions**

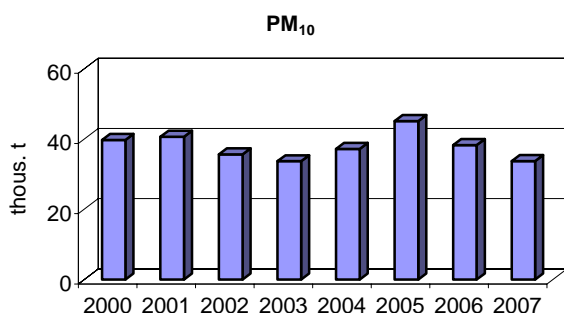


Source: SHMI

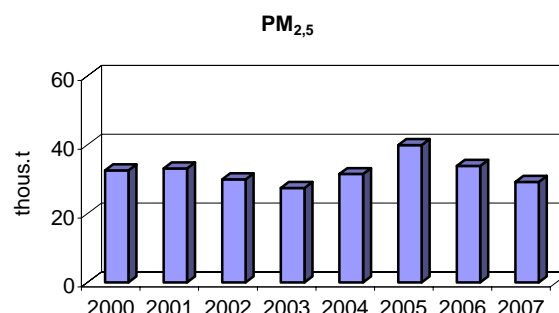
◆ Assessment of PM<sub>10</sub>, PM<sub>2.5</sub> emissions

Every year, the PM<sub>10</sub> and PM<sub>2.5</sub> emissions have been set on the basis of the requirements of the UNECE on Emission Inventory, with the year 2000 being the reference year. Although the PM<sub>10</sub> and PM<sub>2.5</sub> emissions are set on the basis of PM emission values under the IIASA methodology (Institute for Applied System Analysis), they are still in line with the EMEP/EEA Guidebook, which adds the topics of abrasion and emissions from diesel engines to the emissions from petrol engines computed through the COPERT IV programme. In the sector of road transport, diesel engines are among the major contributors to the PM<sub>10</sub> and PM<sub>2.5</sub> emissions. The share of abrasion is less significant than in the case of the PM emissions. In total, the most significant contributors to the PM<sub>10</sub> and PM<sub>2.5</sub> emissions include small sources (heating of houses). Increased emissions in this sector reflects the increased consumption of wood caused by growing prices of natural gas and coal. Significant reduction in emissions in the sector of Incineration processes I is caused by gradual shutdowns of non-ecological sources at the Nováky Power Plant and the Vojany Power Plant of the SE-ENEL Inc. company in line with the valid legislation, which allows for the operation of such installations until 31.12.2008.

Development trends in PM<sub>10</sub> and PM<sub>2.5</sub> emissions



Source: SHMI



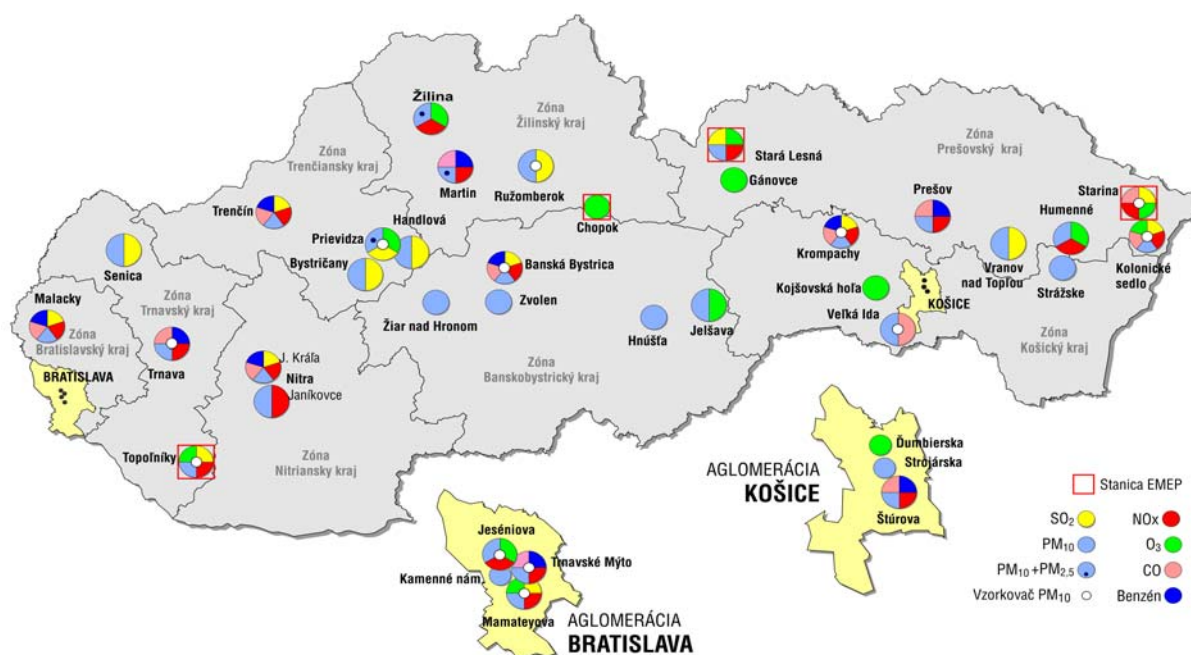
Source: SHMI

## Air pollution

### ♦ National monitoring air quality network

In 2008, the **national air assessment quality monitoring network consisted of 37 automated monitoring stations including 4 stations to monitor regional air pollution and precipitation water chemical composition**. Stations that monitor regional air pollution are part of the EMEP – Co-operative Program for the Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe.

### National monitoring air quality network - owned by SHMI - 2008



Source: SHMI

### ♦ Local air pollution

#### Sulphur dioxide

In 2008, no agglomeration showed exceeded levels of pollution in hourly or daily values beyond the public health limit.

#### Nitrogen dioxide

The annual limit value for human health protection was exceeded only at the stations of Banská Bystrica - Štefánikovo nábrežie. This value was greater than the limit value increased by the tolerance threshold. Local reconstruction of the sewerage collector was the major contributor to this high value. For the major part of the year, a diesel aggregate used for ground works was located immediately next to the measuring station, with a movement of trucks.

**PM<sub>10</sub>**

The biggest challenge in the area of air protection in Slovakia and most European countries is currently air pollution by particulate matter (PM<sub>10</sub>). In 2008, there was a drop in the level of pollution by suspended particulate matter PM<sub>10</sub> as compared to 2007 in the Bratislava agglomeration and the zones of the Trenčín and Žilina regions. On the other hand, increased levels of pollution were detected in the zones of the Trenčín and Trnava regions. In total, the 24-hour limit value was exceeded at 16 stations, with 2 AMS stations also showing the exceeded annual limit value.

**Carbon monoxide**

Carbon monoxide pollution level is relatively low and limit value was not exceeded at any monitoring station.

**Benzene**

The highest level of 1.5  $\mu\text{g}\cdot\text{m}^{-3}$  for benzene in 2008 was detected at the stations of Malacky - Sasinkova, Krompachy - Lorenzova, and Trenčín - Hasičská, which is deep below the limit value of 5  $\mu\text{g}\cdot\text{m}^{-3}$  that is to become effective as from 2010.

**Pb**

The sector of metallurgic industry shows the highest level of air pollution detected at the Krompachy-Lorenzova station, however, all average annual concentrations are substantially smaller than the bottom assessment threshold.

**As, Ni, Cd**

There was no occurrence of exceeded target values for any pollutant in 2008.

**BaP**

The obtained outcomes showed the target value to be reached on 31.12.2010 were exceeded at the stations of Veľká Ida - Letná, Prievidza - Malonecpalská, and Krompachy - Lorenzova.

**◆ Regional air pollution****Sulphur dioxide, sulphates**

In 2008, regional sulphur dioxide concentrations calculated per sulphur were 0.15  $\mu\text{g}\cdot\text{m}^{-3}$  at Chopok, and 0.66  $\mu\text{g}\cdot\text{m}^{-3}$  at Starina. The limit value for the protection of ecosystems (**20  $\mu\text{g SO}_2\cdot\text{m}^{-3}$** ) was not exceeded at the mentioned stations even during the winter season (**Chopok 0.2  $\mu\text{g SO}_2\cdot\text{m}^{-3}$  and Starina 2.2  $\mu\text{g SO}_2\cdot\text{m}^{-3}$** ) or the calendar year (**Chopok 0.3  $\mu\text{g SO}_2\cdot\text{m}^{-3}$  and Starina 1.3  $\mu\text{g SO}_2\cdot\text{m}^{-3}$** ).

Percentage share of sulphates on total particulate matter mass was 19.6 % at Chopok and 17.1 % at Starina. Sulphates to sulphur dioxide concentration ratios expressed in sulphur was 1.5 at Chopok and 1.2 at Starina.

**Nitrogen oxides, nitrates**

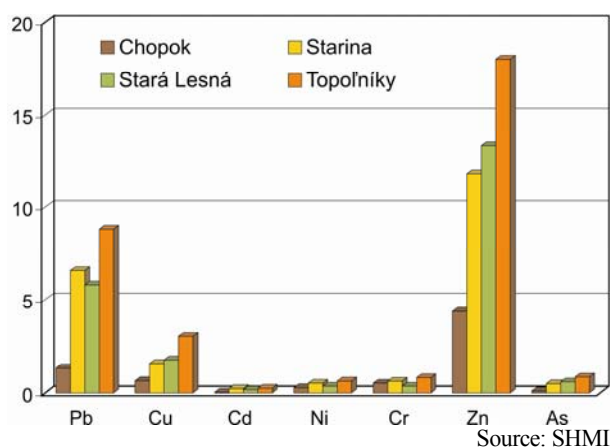
**Concentration of nitrogen oxides** at regional stations expressed in  $\text{NO}_2\text{-N}$  were in 2008  $0.54 \mu\text{g}\cdot\text{m}^{-3}$  at Chopok and  $1.27 \mu\text{g}\cdot\text{m}^{-3}$  at Starina. The limit value for the protection of vegetation ( $30 \mu\text{g NO}_x\cdot\text{m}^{-3}$ ) was not exceeded for the calendar year (*Chopok  $1.78 \mu\text{g NO}_x\cdot\text{m}^{-3}$  and Starina  $4.19 \mu\text{g NO}_x\cdot\text{m}^{-3}$* ).

Atmospheric **nitrates** at Chopok and at Starina were mostly in the aerosol form. Gaseous nitrates in 2008 were in comparison with the aerosol ones lower at both stations. Despite the fact that gaseous and particulate nitrates are trapped and monitored separately, their sum is expressed in line with EMEP, since their phase distribution depends on atmospheric temperature and humidity. Percentage share of nitrates on atmospheric aerosol was 8.1 % at Chopok and 9.6 % at Starina. Ratio of total nitrates ( $\text{HNO}_3 + \text{NO}_3$ ) to  $\text{NO}_x\text{-NO}_2$ , as expressed in nitrogen, was 0.12 at Chopok and 0.25 at Starina.

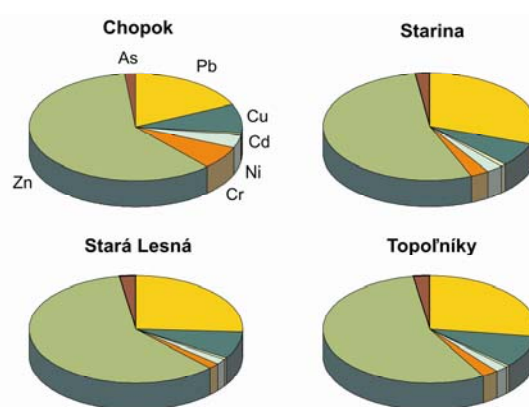
### Atmospheric aerosol, heavy metals

Percentage share of the sum of assessed heavy metals on air-borne dust at regional stations of Slovakia varies between 0.16 and 0.21 %.

#### Heavy metals in the air - 2008



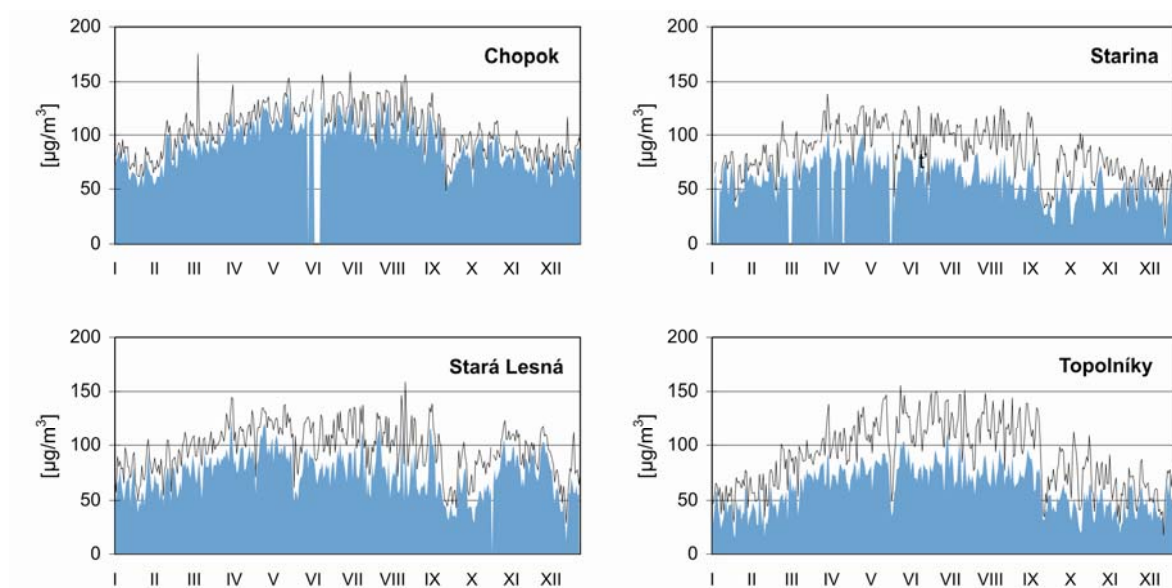
#### Percentage share of heavy metals in 2008



### Ozone

The following figures show the **annual characteristics in the ozone concentration** at regional stations of Chopok, Starina, Stará Lesná, and Topoľníky. Stará Lesná has had the longest time sequence of ozone measurements since 1992. Ozone measurements at Topoľníky, at Starina, and at Chopok started in the course of the year 1994. In 2008, average ozone concentration at Chopok was  $92 \mu\text{g}\cdot\text{m}^{-3}$ , at Stará Lesná  $74 \mu\text{g}\cdot\text{m}^{-3}$ , at Topoľníky  $60 \mu\text{g}\cdot\text{m}^{-3}$ , and at Starina  $59 \mu\text{g}\cdot\text{m}^{-3}$ .

#### Tropospheric ozone 2008



Source: SHMI

### Volatile organic compounds $C_2 - C_6$

**Volatile organic compounds**  $C_2 - C_6$  or the so-called light carbohydrates began to be captured at the Starina station in the Fall of 1994. Starina belongs to the few European stations listed in the EMEP network, with regular monitoring of volatile organic compounds. The compounds are assessed in line with the EMEP methodology under the NILU. Their concentrations range between individual units to hundreds of units ppb. Ethane presents the worst, next is propane, ethene and acetylene. Isoprene releases from ambient forest.

### Average annual VOC concentrations in ambient air (ppb) - Starina 2008

ethane	ethene	propane	propene	i-butane	n-butane	acetylene	butene	pentene	i-pentane	n-pentane	isoprene	n-hexane	benzene	toluene	o-xylene
1.708	0.390	0.786	0.073	0.311	0.294	0.564	0.065	0.022	0.160	0.121	0.069	0.045	0.220	0.023	0.214

Source: SHMI



## • WATER

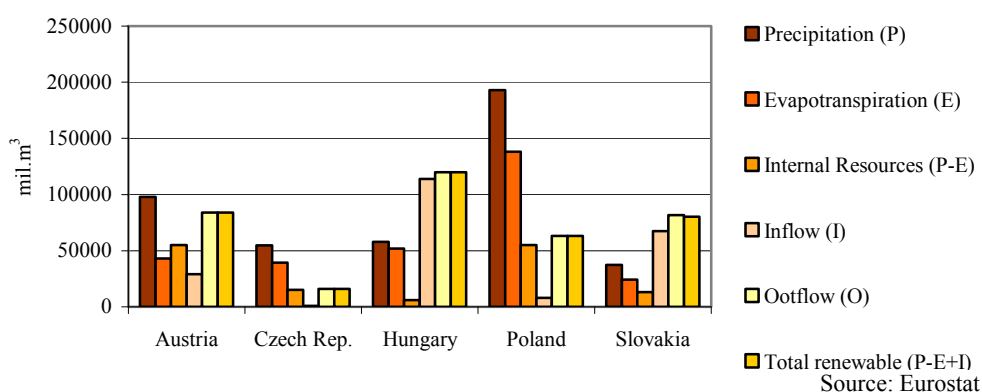
### ◆ Water management planning and River Basin Management Plans

The Slovak Republic creates and publishes documents required by the Water Act, which include **River Basin Management Plans, Water Management Plan of Slovakia, and International River Basin Management Plans.** Watershed management plans represent binding documents approved by the Ministry of Environment of the Slovak Republic for all who carry out activities within the scope of the Water Act. The Water Management Plan of Slovakia sets out broad responsibilities for protection and improvement of water conditions, and for economical exploitation of the water potential. Water Management Plan of Slovakia is approved by the Slovak Government and serves as the basis for drafting the International Danube River Basin District Management Plan and the International Visla River Basin District Management Plan.

### Water sources and water fund

Significant part of the Slovak surface water fund flows in from the neighboring states and the usability of this fund is limited. In total, the long-term in-flow average is approximately  $2.514 \text{ m}^3 \cdot \text{s}^{-1}$  of water, which is about 86 % of our total surface water fund. In the long run, there is approximately  $398 \text{ m}^3 \cdot \text{s}^{-1}$  of water springing in Slovakia, which represents 14 % of the water fund.

### Long term freshwater resources in the selected countries in 2008



### Surface water

#### ◆ Precipitation and runoff conditions

Total **atmospheric precipitations** in the Slovak territory in 2008 reached the value of 817 mm, which represents 107 % of the normal level. In terms of precipitations, this year had been considered normal. Total excess of precipitations reached the value of 55 mm.

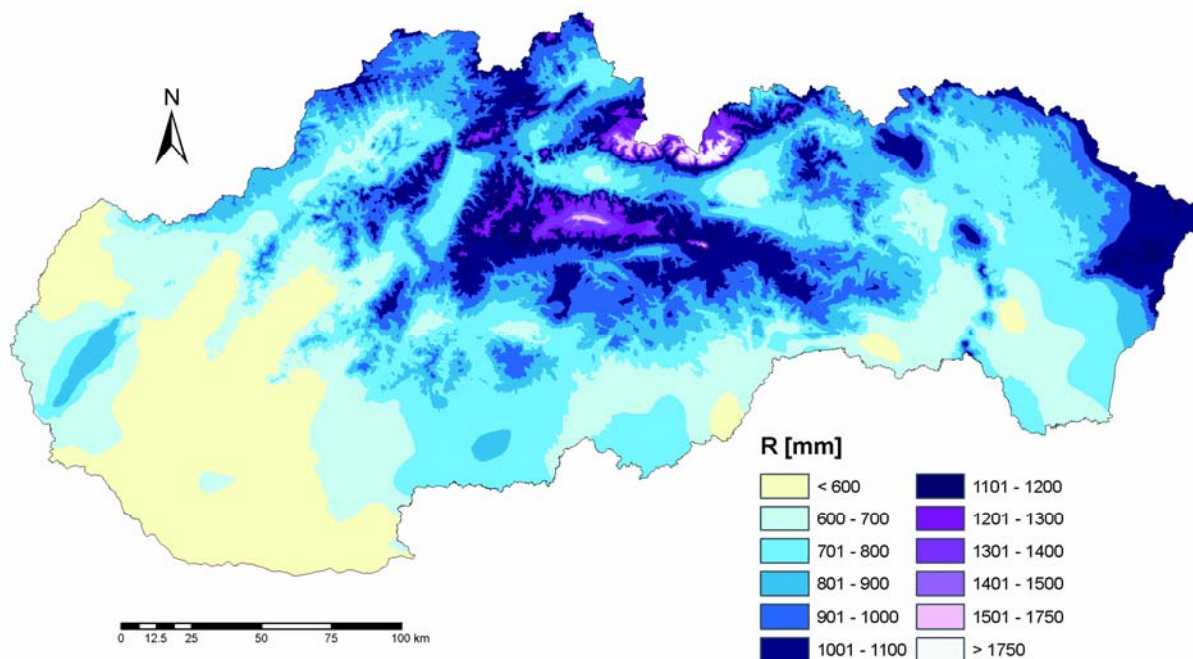
Characteristics of total precipitation figures for most watersheds were normal, with the exception of partial watersheds of Hron, Bodrog, Poprad, and Dunajec that showed humid precipitation conditions. The only very humid partial watershed was that of the Hornád river.

**Average rates of precipitation and runoff in particular catchment areas**

Catchment area	Dunaj		Váh		Hron			Bodrog a Hornád				SR
	*Morava	*Dunaj	Váh	Nitra	Hron	*Ipeľ	Slaná	Bodva	Hornád	*Bodrog	*Poprad and Dunajec	
Catchment area extent (km <sup>2</sup> )	2 282	1 138	14 268	4 501	5 465	3 649	3 217	858	4 414	7 272	1 950	49 014
Average precipitation (mm)	663	600	851	689	872	745	812	737	856	847	981	817
% of normal	97	96	101	99	111	109	103	101	126	120	117	107
Character of rainfall period	N	N	N	N	V	N	N	N	VV	V	V	N
Annual runoff (mm)	94	22	259	105	216	68	140	86	319	219	419	208
% of normal	71	61	83	73	75	50	74	41	72	74	122	79

\* watercourses and corresponding data only for the Slovak part of the watershed  
 Source: SHMI  
 Characteristics of the precipitation season: N - normal, S - dry, SS - very dry, V – humid, VV – very humid, MV – exceptionally humid

**Annual atmospheric precipitation (mm) in Slovakia in 2008**



Source: SHMI

Annual runoff volumes in SR in 2008 reached 79 % of the long-term average value. Runoff volumes from partial catchments exceeded the long-term average only in the Poprad and Dunajec catchments with the value of 122 %. The remaining catchments showed values within 41 – 83 %.

◆ **Water balance**

In 2008, there was 69 005 mil.m<sup>3</sup> of water flowing into Slovakia, which is 5 486 m<sup>3</sup> more than in 2007. **Runoff** from the territory has grown by 794 mil.m<sup>3</sup>, compared to the previous year.

**Total water volume** as of 1.1.2008, in water reservoirs was 798 mil.m<sup>3</sup>, which represented 69 % of total usable water volume in water reservoirs. As of 01.01.09, total available volume of the assessed accumulation tanks compared to the previous year 2008 dropped to 809.4 mil.m<sup>3</sup>, which represents 70 % of total exploitable water.

**Total hydrological balance of water resources in the SR**

	Volume (mil. m <sup>3</sup> )		
	2006	2007	2008
<b>Hydrological balance:</b>			
Rainfall	36 274	39 460	40 049
Annual inflow to the SR	70 711	63 519	69 005
Annual runoff	85 646	72 593	73 387
Annual runoff from the territory of the SR	14 900	9 264	10 146
<b>Water management balance</b>			
Total abstraction of the surface and ground water in the SR	882.47	480	664.6
Evaporation from water reservoirs and dams	55.79	62	51.9
Discharge into surface waters	669.7	628	608.9
Impact of water reservoirs (WR)	7.8	32	12.6
	<b>improving</b>	<b>accumulation</b>	<b>accumulation</b>
<b>Total volume in WR as of 1<sup>st</sup> January of the following year</b>	681.60	798	809.4
% of supply volume in accumulation WR in the SR	59.00	69	70
Rate of water exploitation (%)	6.38	5	6.55

Source: SHMI

◆ **Surface water abstraction**

Decreasing trend in surface water abstractions with all surface water users continued also in 2008, reaching the value of 312.991 mil.m<sup>3</sup>, which is 4.2% lower than in the previous year. This year shows reduced abstractions for all surface water users. Industrial abstractions in 2008 reached 251.797 mil.m<sup>3</sup>, which is 14.98 mil.m<sup>3</sup> less than in 2007, e.g. 5.62 %. A slight reduction was recorded also in surface water abstractions for waterlines, which, compared to the previous year, dropped by 1.26 mil.m<sup>3</sup>, that is 2.7 %. Surface water abstractions for irrigation grew and reached the value of 9 133 mil.m<sup>3</sup>.

**Surface water exploitation in the SR (mil.m<sup>3</sup>)**

Year	Public water-supplies	Industry	Irrigation	Other agriculture	Total	Discharging
1998	68.370	621.858	42.447	0.0400	732.707	1 078.500
2006*	55.567	323.709	15.854	0.0120	395.142	748.537
2007*	53.315	266.776	6.036	0.0120	326.139	628.270
2008*	52.057	251.797	9.133	0.0040	312.991	608.997

\*data from database „Aggregate balance sheet of water“

Source: SHMI

◆ **Surface water quality**

At present, Slovakia is undergoing changes in surface water assessment, pursuant to the provisions of framework Directive on Water No. 2000/60/EC.

Surface water quality assessment has been carried out on the basis of data obtained during the water level monitoring process. For the year 2007, surface water quality monitoring was split into the basic monitoring, operational monitoring, and monitoring of protected territories (PT). This division followed the provisions of **the MoE SR Resolution No. 221/2005 Coll. which sets forth details on detecting the occurrence and assessment of surface and ground water situation, its monitoring, keeping the water register and water balance records.** The basic monitoring network comprised 171 abstraction sites with 35 sites monitored within the water formation characterisation process, 68 within the reference conditions monitoring, 38 were monitored within the boundary water courses, 75 within the process of characterisation of water course types, and 9 abstraction sites were monitored for the ICPDR. (International Committee for the Protection of the Danube River)

**Number of assessed surface water abstraction sites in 2007-2008**

Catchment	Sampling site	
	Basic	Operational
Danube catchments area	21	10
Váh catchments area	25	52
Hron catchments area	22	35
Bodrog catchments area and Hornád catchments area	28	34
Poprad and Dunajec catchment area	6	5
<b>Total</b>	<b>102</b>	<b>136</b>

Source: SHMI

Indicators were monitored within this transitional period that are pursuant to the **SR Government Regulation No. 296/2005 Coll. which introduces requirements on the quality and qualitative goals for surface water, as well as the limit indicator values for wastewater and special water contamination.** General requirements for surface water quality (Annex 1) pursuant to the SR Government Resolution 296/2005 Coll. were fully complied with for the following physical-chemical indicators: total organic carbon, calcium, sulphates, magnesium, as well as micro pollutants that include tensides, cyanides, copper, nickel, chromium, and a various specific organic substances. Indicators with most exceeded values included aluminium and selenium with 100 % occurrence of excessive values. Chloroform and the nitrous form of nitrogen were among the often exceeded indicators. Values for faecal streptococci, thermo-tolerant and coliform bacteria as part of the microbiological indicators were frequently exceeded. Tetrachloromethane, 1,1,2-trichloroethylene, cis 1,2 - dichloroethene, and PCB were not assessed, since the detection threshold was greater than the limit defined in the Government Resolution 296/2005 Coll.

#### ◆ Indicative chemical balance assessment

Indicative assessment of surface water bodies chemical balance involved the use of all measured data for the priority substances, together with other eight pollutants in surface water included in the SHMI database for 2007. The assessment included 67 abstraction sites classified into 46 water bodies. Of 46 water bodies, 24 are assessed as those with poor chemical balance, and 22 bodies are classified into the category of good chemical balance.

The poor chemical balance category included water bodies mainly due to their exceeded environmental quality norms (ENK) for Bis(2-ethylhexyl)phtalate - DEHP (14-times), PAU (6-times), nonylphenols (2-times), chloroform (6-krát), 1,2 dichloroethene (2-times), lead (2-times), and cadmium (2-times) Among the priority substances, the DEHP indicator most often classified the water bodies as "not reaching good chemical balance". Due to the universal occurrence of this substance, it is necessary to test the potential secondary contamination of the extracted surface water samples, especially at their extraction and transport (these are mainly samples extracted from water bodies in the eastern part of Slovakia)

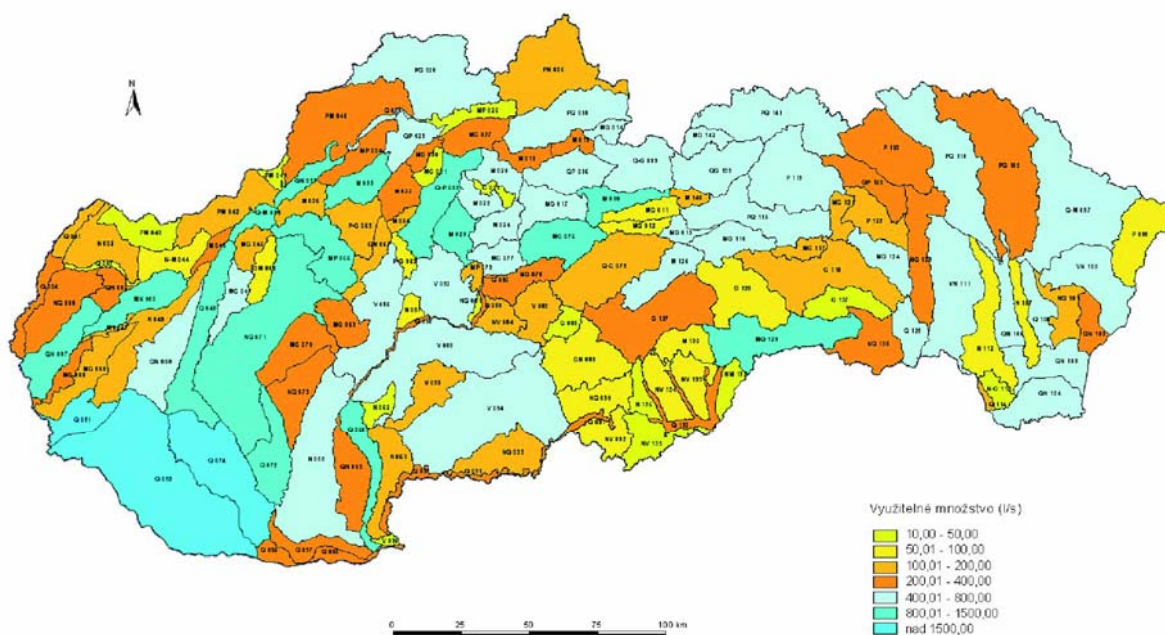
### Ground water

#### ◆ Water resources

In 2008, based on the hydro-geological assessment and surveys in Slovakia, there were **77 080 l.s<sup>-1</sup> available groundwater resources**. In comparison with the previous year 2007, there was observed a slight increase of the efficient groundwater volume by 249 l.s<sup>-1</sup>, i.e. by 0.32 %. In the long-term evaluation, the increase of the efficient volume in comparison with 1990 makes 2 305 l.s<sup>-1</sup>, i.e. 3.1 %.

On the basis of assessment of water management balance expressed by the balance status (proportion of abstractable volumes/abstractions), which is the indicator that shows the rate of water sources abstraction, we see that in **2008, out of total number of 141 hydro-geological regions in SR, 123 regions show good balance status, 17 regions show acceptable status and one region show tense status**. Critical and emergency balancing state did not occur in any region.

#### Efficient groundwater volumes in the hydrogeological regions in 2008 (l.s<sup>-1</sup>)



Source: SHMI

#### ◆ Groundwater levels

In 2008, the highest detected ground water levels were found especially in the period of July through October, with apparent influence of above-normal rainfall totals on the rise of ground water levels, reaching the maximum detected annual ground water levels. In the Morava, Nitra, and Hron watersheds, maximum ground water levels are associated with the Spring months of March - May. Minimum ground water levels were mainly recorded in the winter season, in the months of September - December, while springs showed minimal yields in September through October.

#### ◆ Gabčíkovo interest area

Rainfall totals for the area of Žitný ostrov in 2008 were slightly higher or equal to the long-term average annual totals. Higher average rainfall totals during the operation period of the VDG were recorded at Veľký Meder and Veľký Blahov. Highest monthly totals were detected everywhere in July, only in the area of Bratislava these totals were highest in June. The latter, together with annual maximum Danube levels caused also the rising ground water levels. The lowest monthly rainfall totals were detected in the whole territory of Žitný ostrov in February.

#### ◆ Groundwater abstraction

In 2008 there was being **extracted 11 122 l.s<sup>-1</sup> of ground water in average** by the users (which are subjects to reporting obligation) in Slovakia that was 14.4 % of the documented efficient volume. During the year 2007 the groundwater extractions slightly decreased by 243.9 l.s<sup>-1</sup> which means 2.1 % in comparison with year 2007.

**Groundwater extraction in 2008 according to the purpose of use**

Year	Public water supplies	Food-processing industry	Industry excl. Food-processing	Agricult. and Livestock	Vegetable prod. Irrigation	Social purposes	Others	Total
2005	9 159.87	288.25	856.75	308.82	95.07	279.72	878.98	11 867.46
2006	8 836.13	295.62	852.34	275.80	94.96	340.15	970.20	11 665.20
2007	8 441.59	383.87	891.32	267.84	146.25	333.44	901.65	11 365.96
2008	8 468.82	284.98	823.02	253.29	67.52	271.23	953.23	11 122.09

Source: SHMI

**◆ Groundwater quality**

Pursuant to the WFD requirements, the older system of dividing Slovakia into significant water management areas was abandoned. Since 2007, classification has been based on delineation of groundwater formations. Monitoring of ground water chemical situation has been divided into:

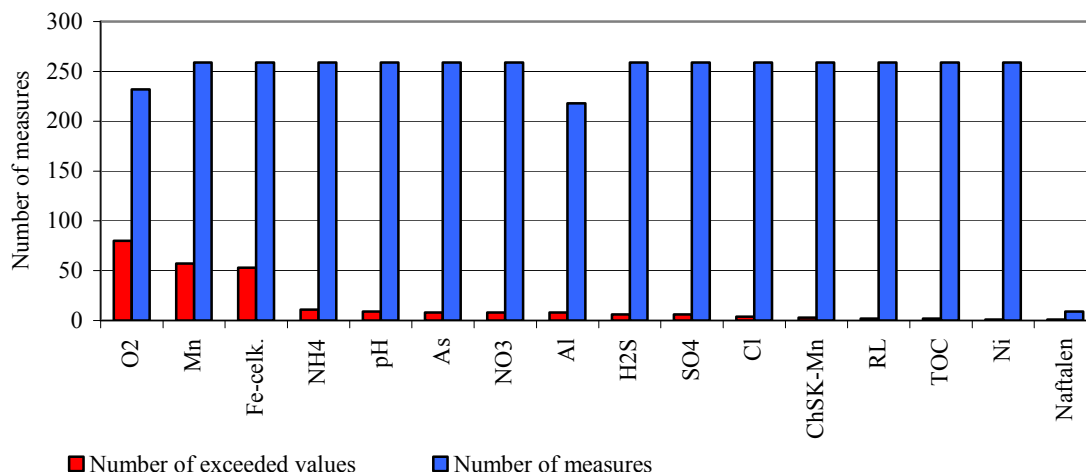
- basic monitoring,
- operation monitoring.

In 2008, ground water quality was monitored at 133 basic monitoring facilities. Ground water samples were extracted 2 times from 40 quaternary objects, 1 times in 49 pre-quaternary objects, and 3 times in 44 pre-quaternary karst objects.

Further, within the operational monitoring conducted for the Slovak territory (with the exception of the Žitný ostrov area) 212 objects were monitored with the assumption to detect a potential penetration of contaminants from a potential contamination source or group into the ground water. Ground water samples were extracted 2 times from 156 quaternary objects, 1 times in 28 pre-quaternary objects, and 3 times in 28 pre-quaternary karst objects.

Adverse **oxidation-reduction** conditions dominate at ground water **basic monitoring** facilities, apparently caused by most frequent occurrences of exceeded acceptable concentrations of total Fe (53 times), Mn (57 times), and  $\text{NH}_4^+$  (11 times). Besides these indicators, there has been an untypical event of exceeded concentrations in the group of **physical - chemical indicators**, specifically in the case of the  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ , and  $\text{NO}_3^-$  anions,  $\text{COD}_{\text{Mn}}$  and  $\text{H}_2\text{S}$ . Most frequently recorded excessive concentrations in **trace elements** included Al (8 times), As (8 times), Pb (3 times), Sb (6 times) and Ni (1 time). Contamination by **specific organic substances** shows only local character and the majority of specific organic substances was recorded below the detection limit.

**Occurrence of exceeded indicators at basic monitoring facilities pursuant to the SR Government Directive 354/2006 Coll. in 2008**

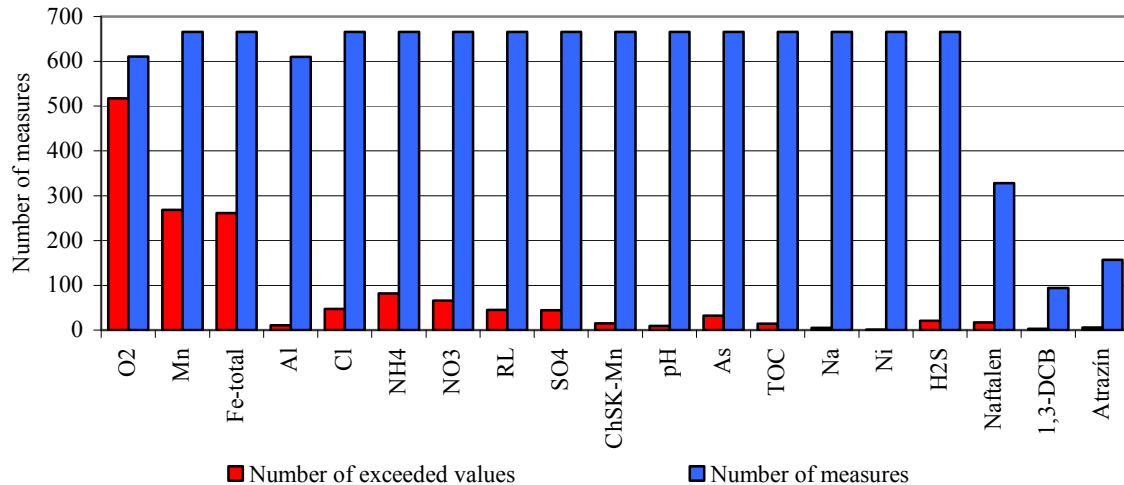


Source: SHMI

Ground water at **operation monitoring** is relatively low in oxygen, with the exception of the Žitný ostrov area. This is also apparent from the fact that the recommended percentage value for oxygen water saturation was reached only in 15 % of the samples. Most frequently exceeded indicators include Mn and total Fe, which suggests persisting adverse **oxidation-reduction situations**. Exceeded Cl<sup>-</sup> and SO<sub>4</sub><sup>2-</sup> limit values also indicate the impact of anthropogenic pollution on ground water quality. Character of land use (agricultural exploitation) is reflected into increased contents of oxidized and reduced nitrogen forms in ground water, with ammonia ions NH<sub>4</sub><sup>+</sup> (82 times) and NO<sub>3</sub><sup>-</sup> (66 times) being the most prevalent. In 2008, the acceptable value set by legislation was exceeded in **6 trace elements** (Al, As, Sb, Cd, Ni, and Pb) at operation monitoring facilities. Most frequently recorded increased contents include Al (11 times) and As (32 times). Presence of **specific organic substances** in ground water indicates impact by human activities. In 2008, operation monitoring facilities detected a wider range of specific organic substances. Most cases involved exceeded limit values in case of indicators from the group of poly-aromatic hydrocarbons (phenanthrene, fluoranthene, benzo(a)pyrene, pyrene) and the group of volatile aromatic hydrocarbons (1,3 dichlorobenzene, 1,4-dichlorobenzene, and 1,2-dichlorobenzene). Limit values for pesticides and volatile aliphatic hydrocarbons were exceeded only sporadically.

#### **Occurrence of exceeded indicators at operation monitoring facilities pursuant to the SR Government Directive 354/2006 Coll. in 2008**





Source: SHMI

#### ♦ Ground water quality assessment on the Žitný ostrov territory in 2007-2008

Ground water monitoring at Žitný ostrov suggests that there is a major issue of adverse **oxidation-reduction conditions** documented by frequently increased concentrations in Fe, Mn, and  $\text{NH}_4^+$ .

Continuing landscape use within the monitored area (urbanised and agriculture territory) is reflected in the increased contents of oxidised and reduced nitrogen forms in water.

In 2007, 56.97 % of all analyses did not meet the criteria set forth by the SR Government Resolution 354/2006 Coll., while in 2008 it was 52.02 %. This means that of the total number of 244 analyses, 139 were such that showed at least one indicator exceeding the values of the Government Resolution 354/2006 Coll. in 2007, while in 2008 it was 129 out of the total number of 248 analyses.

### Waste Water

Decreasing trend in **discharge of waste water** into surface water courses continued in 2008 with 619 286 thous.  $\text{m}^3$ , which was less than in 2007 by 15 133 thous.  $\text{m}^3$  (2.4 %), and less than in 1998 by 518 601  $\text{m}^3$  (54.4 %).

Also, decrease in the volumes of waste water for selected pollution indicators was slighter, with most reduction recorded in the indicator of insoluble substances (IS) - by 669 tons per year, compared to 2007. The other indicators showed only minimal reduction: chemical oxygen demand by dichromate was reduced by 225 tons per year, biochemical oxygen demand by 180 tons per year, and the non-polar extracting substances ( $\text{NES}_{UV}$ ) by 27 tons per year, compared to the previous year.

**Percentage of discharged treated waste water to total volumes of waste water** discharged into watercourses in 2008 was 90.94 %.

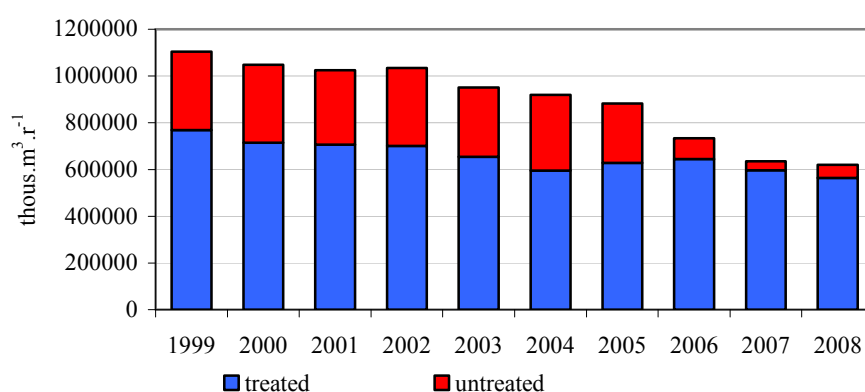
### Load of the balanced contamination sources discharged into surface watercourses in the period of years 1998-2008

Discharged waste water	Volume (thous.m <sup>3</sup> .y <sup>-1</sup> )	IS (t.y <sup>-1</sup> )	BOD <sub>5</sub> (t.y <sup>-1</sup> )	COD <sub>Cr</sub> (t.y <sup>-1</sup> )	NES <sub>uv</sub> (t.y <sup>-1</sup> )
1998	1 137 887	29 443	21 993	66 351	512
2005	881 946	12 670	10 661	37 312	55
2006	733 594	11 200	9 026	31 563	44
2007	634 419	9 405	6 521	26 913	58
2008*	619 286	8 736	6 641	26 688	31

\*data from database „Aggregate balance sheet of water“

Source: SHMI

### Trend in discharging of the treated and untreated waste waters into watercourses in the period of 1999-2008



Source: SHMI

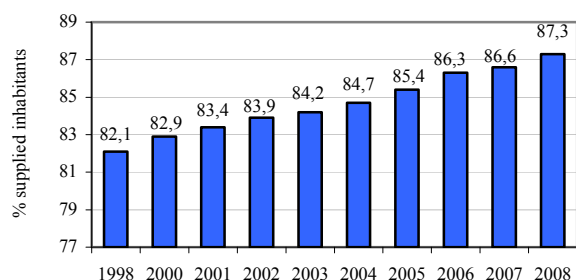
## Public water supply, sewerage systems and waste water treatment plants

### ◆ Public water supplies

Number of inhabitants supplied with drinking water from the public water supply in 2008, reached the number of 4 727 thousand, which represented 87.3 % of supplied inhabitants. There were in the SR 2 353 individual municipalities that were supplied with public water supply, and their portion on total SR municipalities was 81.4 %. Share of Slovak villages connected to public water supply remained roughly at the same level as in 2007.

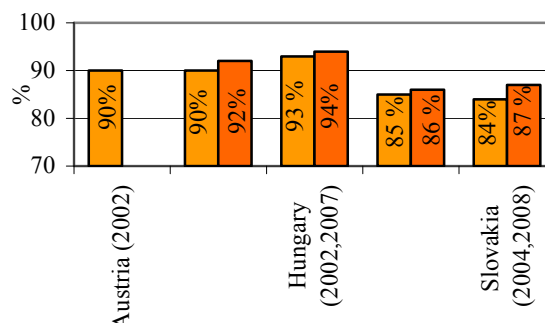
Henceforth there persisted the long-term decrease in the drinking water demand. **The volume of the produced drinking water** reached in year 2008 the value of 319 mil. m<sup>3</sup> of the drinking water, which is the decrease in comparison with year 2007 by 3 mil. m<sup>3</sup>. From the ground water resources there were produced 270 mil.m<sup>3</sup> (84 %) and from the surface water resources 49 mil.m<sup>3</sup> (16 %) of the drinking water. **Water losses** in the pipe system represented in year 2008 28.5 % from the total water produced in the water management facilities. **Specific water consumption for households** decreased in 2008 to 87.3 l.inhab<sup>-1</sup>.day<sup>-1</sup>.

**Drinking water supplying of the inhabitants from the public water supplying in the SR**



Source: SO SR

**Comparison of the drinking water supplying of the inhabitants from the public water supplying in selected countries**

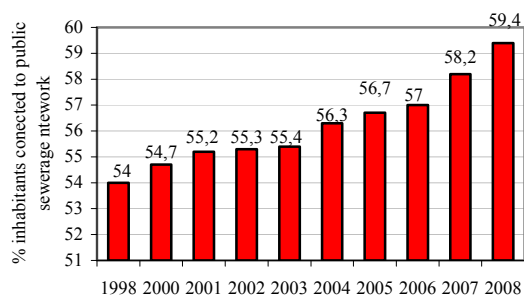


Source: Eurostat, SO SR

**◆ Sewerage system**

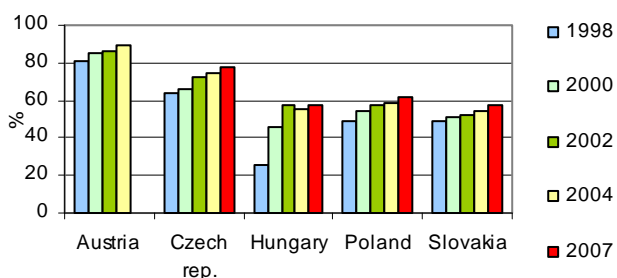
Development of public sewerage systems lags behind that of public water supplies. **Number of inhabitants** living in households **connected to public sewerage systems** in 2008 grew by 66 thousand and reached the number of 3 212 thous. inhabitants, which is 59.4 % of all inhabitants. Of the number of 2 891 of stand-alone municipalities in 2008, 846 of them had public sewerage systems in place (i.e. 29.3 % of all Slovak municipalities), while 636 municipalities (i.e. 22 % of all Slovak municipalities) had their wastewater sent directly off to the wastewater treatment plant. Adverse situation remains also in individual regions of Nitra, Trnava, and Prešov, these regions stay behind the national average.

**Connecting of the inhabitants to the public sewerage network in the SR (%)**



Source: SO SR

**Comparison of the connecting of the inhabitants to the public sewerage network in the selected countries (%)**



Source: OECD

**◆ Waste water treatment plants**

In 2008, 112 waste water treatment plants were added into the Administration of water supplies and water sewerage systems scheme, reaching the number of 612. Greatest share on these had mechanical-biological WWTPs (89.2 %). Increase in WWTP's capacity was still on the rise, reaching the value of 2 211.6 m<sup>3</sup>.day<sup>-1</sup> in 2008.

In 2007, watercourses with public sewerage system (administered by municipalities and water management companies) received 394 mil.m<sup>3</sup> of discharged waste water, which was by 10 mil.m<sup>3</sup> less than in the previous year, and the volume of treated waste water discharged into the public sewerage system reached 395 mil.m<sup>3</sup>.

#### Volume of the discharged wastewater by the public sewerage system (in administration of water sewerage systems and in administration of the municipalities) in 2008

Water discharged by the public sewerage and WWTP	Sewage	Industrial and other	Precipitation	Separate	Administration of the municipalities	Total
	(thous.m <sup>3</sup> .year <sup>-1</sup> )					
Treated	108 312	100 482	45 947	128 782	11 462	<b>394 985</b>
Untreated	1 562	784	1 558	2 574	1 603	<b>8 081</b>
<b>Total</b>	<b>109 874</b>	<b>101 266</b>	<b>47 505</b>	<b>131 356</b>	<b>13 065</b>	<b>403 066</b>

Source: WRI

In 2008, there were 55 305 tons of the sludge dry matter produced in municipal WWTPs. Of this, 38 368 tons (66.4 %) were used for soil processes, 10 766 tons (18.6 %) were temporarily stored, and 8 676 tons were landfilled (15.0 %). In 2008, there was direct application of sludge into the agricultural soil. 33 455 tons of sludge dry matter was used for compost production, while 4 913 tons of sludge were used for soil processes (reclamation of landfills, areas, etc.)

#### Sludge produced in the waste water treatment plant

Year	Amount of the sludge (tons of dry residue)								
	Total	Used				Incinerated	Disposed		In other way
		Applied into the agricultural soil	Applied into the forest soil	Composted and used in other way	Land filled		Total	Suitable for the further use	
2004	53 085	12 067	0	30 437	0	4 723	3 470	5 858	
2005	56 360	5 870	0	33 250	0	8 530	6 960	8 710	
2006	54 780	0	0	39 405	0	9 245	8 905	6 130	
2007	55 305	0	0	42 315	0	3 590	583	9 400	
2008	57 810	0	0	38 368	0	8 676	0	10 766	

Source: WRI

### Drinking water

#### ◆ Drinking water quality monitoring and assessment

Water quality control and its health safety is determined through a set of water quality indicators representing physical, chemical, biological, and microbiological properties of water. Drinking water indicators are defined under the **SR Government Regulation 354/2006 Coll.**, which stipulates requirements on water designated for human consumption and its quality control. Water quality control for radioactivity follows the **Resolution of the Ministry of Health no. 528/2007 Coll.** which

stipulates details on requirements to limit the level of irradiation from natural radiation. Besides the **complete water analysis**, the implemented **minimum analyses** - e.g. analyses of 28 water quality indicators, is carried out to monitor and obtain periodic information on the stability of water bodies and effectiveness of water treatment, mainly water disinfection, biological quality and the sensoric properties of drinking water.

Water quality was assessed on the basis of the number or proportion of individual limits shown to have exceeded the pertinent sanitary norms. In 2008, were analysed at operation laboratories of water management companies 11 382 samples. The samples were abstracted at sites located within distribution networks and 287 783 analyses were carried out to monitor individual drinking water quality indicators. Share of drinking water analyses that complied with the sanitary limits in 2008 reached 99.45 % (in 2007 it was 99.32 %). Percentage of samples that meet drinking water quality demands for all indicators reached 91.84 % (in 2007 it was 89.78 %). These samples did not include the active chlorine indicator, as this test was done separately, in relation to the microbiological quality of drinking water.

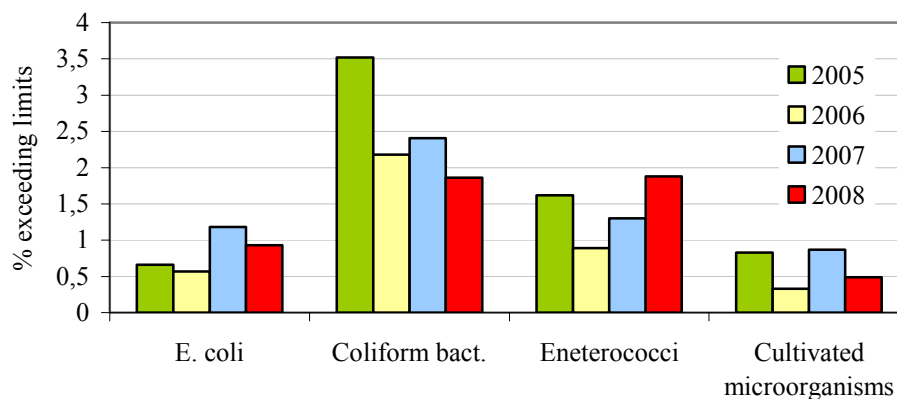
**Exceeding limits in drinking water samples in accordance with the SR Government Resolution no. 354/2006 Coll. on demands on drinking water and drinking water control**

Year	2006	2007	2008
Share of drinking water samples that do not meet the NMH and MHRR limit.	1.32 %	2.03 %	2.34 %
Share of drinking water quality indicators analyses that do not meet NMH and MHRR	0.32 %	2.46 %	1.02 %

NMH - maximum threshold values, MHRR – threshold values of the reference risk

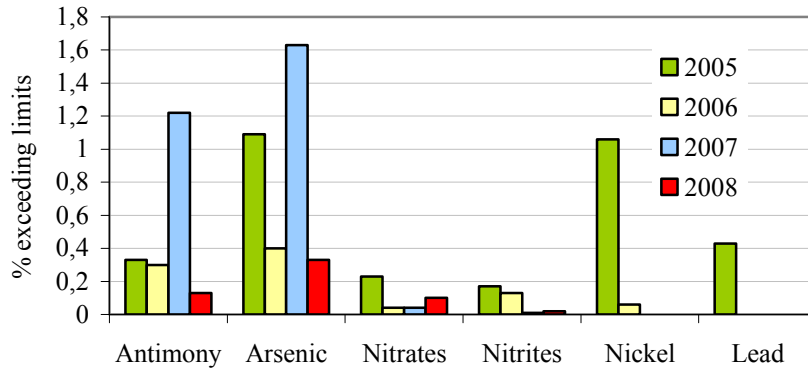
Source: WRI

**Results of monitoring the microbiological and biological indicators of drinking water within Slovakia's distribution networks**



Source: WRI

**Results of physical and chemical drinking water indicators monitoring within Slovakia's distribution networks - inorganic indicators**



Source: WRI

### Quality of recreational water in 2008

**Slovak Government Regulation no. 87/2008 Coll. on the requirements on natural bathing water bodies** effective as from March 5, 2008 implements **Directive 2006/7/EC concerning the management of bathing water quality, and repealing Directive 76/160/EEC.**

In 2008, all public health offices launched the new **Information system** for water bodies and bathing. Besides processing data on natural and artificial bathing water bodies, the system is designed to produce reports in the area of bathing water, as well as to inform the public on the relevant conditions of bathing sites during the season.

The assessment included 70 natural sites - gravel pits, sand pits, and enclosed water tanks used for a number of purposes, including recreation. Organized recreational activities took place at 18 of these sites. 10 sites may be considered as those with partially organized recreational activities. In 2008, 35 natural sites in Slovakia were declared by generally binding resolutions issued by Regional Environmental Offices as those with water suitable for bathing. Compared to the previous year, this time the programme of monitoring did not include three sites - Zelená voda - Kurinec, Veľké Kolpašské lake, and Tona Šurany.

Over the season, 453 water samples were extracted and 6 883 tests were done on chemical, physical, microbiological, and biological water quality indicators. Limit value of detected indicators was exceeded in 218 samples and for 410 indicators. In the area of water quality at natural bathing sites, compared to the previous year, this year there was recorded a higher number of non-compliant water samples for the microbiological indicators - especially for intestinal enterococci.

## • ROCKS

### Geological environmental factors

Partial Monitoring System - Geological Factors (PMS - GF) as part of environmental monitoring in Slovakia, is focused mainly on so-called geological hazards or harmful natural or anthropogenic geological processes that threaten the natural environment and eventually the humans.

From 1.1.2006 data are monitored:

- 01: Landslides and other slope deformation
- 02: Tectonic and seismic activity of the territory
- 03: Anthropogenic sediments of environmental loads sediments
- 04: Impact of mineral exploitation upon environment
- 05: Monitoring of the volume activity of Radon in the geological environment
- 06: Stability of massifs underlying historic objects
- 07: Monitoring of stream sediments
- 08: Volume unstable soils

#### Summary of the major outcomes from the monitoring activities in 2008:

In 2008, monitoring of three basic types of **slope movements** was carried out – slides (15 localities), creep (4 localities), and signs of activated falling movements (9 localities). Sites in the territory of the projected pumped-storage hydroelectric plant of Ipeľ together with the stabilisation water levy in Handlová form an individual category of specific cases of the environment stability assessment process.

In 2008, reports from seismic stations supplied for interpretation more than 5 390 tele-seismic, regional, or local seismic phenomena. 70-80 earthquakes were localised with the epicentre in the focal area of the Slovak Republic. Macro-seismic monitoring in Slovakia were detect 3 earthquakes in 2008, one with epicentre in Banska Bystrica and two in the east of Slovakia.

In 2008, the following localities were included to subsystem **anthropogenic sediments**: Myjava, Modra, Šulekovo, Bojná, Krompachy – Halňa, Šaľa, Chalmová a Poša. Increase in chlorides and ammonia ions was confirmed at the Šaľa site. Analyses carried out for the Poša site confirmed a decreasing trend in elution of the major contaminant - arsenic. Almost the whole area of the Bojná landfill has shown intense ground water contamination over a long time period (chlorides, ammonia ions, sulphates, and boron). Although the Myjava site was recultivated in 2006, it remains to be a long-term source of contamination(ammonia ions, Zn, Ni). The Halňa landfill was shut down in 1999. Subsequent ground water monitoring showed exceeded limits for a number of elements (As, Cd, Ni, B, Zn, Sb). In 2008, changes to mechanical properties at 2 sludge beds of the Slovak Electric Power Plants - ENO (Nováky - Original, and Chalmová - Definite). In 2008, identification sheets were developed for other

five sludge beds, ore waste deposited in the sludge bed of Rudňany and fly ashes in Zvolen, Žilina, Snina, and Sereď.

Monitoring of the **impact of the mining activities on environment** in the area of the brown-coal upper-Nitra territory was carried out for the system of four most important mine shafts (Handlová pri Rybe, the Cígeľ mine, Hlboká, and Lehota pod Vtáčnikom). Increased values in total mineralisation figures of water outflow from mines were recorded (within the interval of 500 – 750 mg.l<sup>-1</sup>); however, these are comparable to the water figures for local recipients (500 – 700 mg.l<sup>-1</sup>). Contents of potentially toxic elements (As, Se, Cu, Zn, Pb, Hg) in water are relatively low. The area of magnesite and talc extraction includes the sites of Jelšava, Lubeník, Hnúšťa - Mútnik, and Košice - Bankov, which have been entered into the monitoring system. Alcalisation of soils and damage to vegetation at the regional level represent the common and major environmental issue in the areas of extraction and treatment of magnesite and talc. Another major environmental issue is the surface stability above the extracted parts of the deposit, and the magnitude of surface collapses. The great number of sites afflicted by extraction of ores include the following sites under monitoring: Rudňany, Slovinky, Smolník, Novoveská Huta, Rožňava, Nižná Slaná, Banská Štiavnica, Hodruša, Kremnica, Špania dolina, Dúbrava, and Pezinok. Active mining works still continue only at the gypsum deposit in Novoveská Huta. The continuing environmental impacts shown at these sites include instability of the rock massif, contamination of surface water courses by mining water outflows, leaching from dumps and sludge beds and, in the case of operated facilities for thermal treatment of ores, also level of pollution of the territory, with negative impacts on the quality of soil, vegetation cover, and air quality. The danger of sudden gushing water from abandoned mines situated above inhabited areas has been a specific issue since 2008. For example, this involves periodic sudden outflows of mine water from the mine of Nová Štôľňa located in the extraction territory of the city of Spišská Nová Ves, above the city's local residential area of Pod Tepličkou.

Monitoring of the **volume activity of radon** in geological layers in 2008 continued at 14 sites distributed all over the whole Slovak territory (7 sites for radon in soil and 7 sites for radon in groundwater). Monitoring of soil radon in 2008 were carried out at six sites that showed middle to high radon risk (Bratislava - Vajnory, Banská Bystrica - Podlavice, Košice-KVP, Novoveská Huta, Teplička, and Hnilec). Sampling and radon measurement in water was carried out at these springs of the Malé Karpaty mountains, on the outskirts of Bratislava - Mária spring, Zbojníčka spring, and Himligárka spring, at Bacúch – spring of Božena Němcová, and at Sivá Brada near Spišské Podhradie – spring of St. Ondrej, spring Oravice near the OZ-1 bore hole, and in Zemplín – the Ladmovce bore hole - preliv. Monitoring outcomes of the radon volume activity in ground water point to the fact that the middle values of radon concentration for springs monitored in 2008 are higher than in the previous years. Complex outcomes of radon monitoring from 2008 and the previous years show that the changes recorded for the radon volume activity within the geological environment are either short-lived (seasonal), long-term (counted in years), and random (local, temporal, climate, etc.)



In 2007, **monitoring of stability of rock massifs** below historic objects concentrated on the following sites: Spišský, Strečniansky, Oravský, Uhrovský, Trenčiansky and Lietavský castles, castle Devín and the Church of st. Juraj in Kostalany under Trábeč.

Within **stream sediments monitoring** was exceeding the reference concentration (Category A) at 35 sites. Exceeding the limite concentration of the B category (expextation of contamination) was detected at 12 sites. Exceeding the limite concentration of the C category was detected (exceeding of this limit suggests impact of demolition activities) at Nitra - Chalmová (Hg), Štiavnica - river mouth (Pb), and Hornád - Krompachy (Hg) sites. Alluvial sediments of the rivers of Váh, Hron, Muráň, Danube, together with the majority of water courses of the East-Slovakian lowland and the adjacent territories are in fact free of contamination, and concentrations of substances represent mainly their natural contents. Monitoring (over the last 13 years) has clearly shown substantially and permanently contaminated water courses of Nitra, Štiavnica, Hornád, and Hnilec. Contamination of the alluvial sediments of Ondava, typical for its increased levels of arsenic was not detected in 2008.

### **Partial information system**

In 2008, data obtained from measuring the monitoring points were gradually stored and processed within the Partial information system of geological factors (PISGF). The data were then exported into a transparent level that enables spatial view of the monitoring outcomes in the form of maps, charts, as well as organized tables. Selected data from the information system are accessible for all interested professional and lay persons at the partial monitoring system website for geological factors (<http://dionysos.gssr.sk/cmsgf>). The Partial Monitoring System website for geological factors is connected to and accessible also from the SGIDS ([www.geology.sk](http://www.geology.sk)) and Enviroportal website (<http://enviroportal.sk/>).

### **Geothermal energy**

At present, there are 26 designated geothermal areas in Slovakia, taking up 27 % of the state's territory. To this day, 120 geothermal wells have been made in these designated areas, analysing 1 787 l.s<sup>-1</sup> of water with the outflow temperature of 18 - 29°C. Geothermal water was detected through wells with the depth of 92 – 3.616 m. Yield at the free overflow from these wells fluctuated within the interval of tenths of a litre to 100 l.s<sup>-1</sup>. Dominating are water types of Na-HCO<sub>3</sub>, Ca-Mg-HCO<sub>3</sub>-SO<sub>4</sub> and Na-Cl with the mineralisation of 0,4 - 90,0 g.l<sup>-1</sup>. Thermal output of geothermal water used up to its reference temperature of 15°C is 306.8 MW, which represents 5.5 % of the total mentioned geothermal energy potential in Slovakia.

Regional **geothermal survey** was conducted in line with the approved Strategy of geothermal energy use in Slovakia by the end of 2008, which involved the following territories: Galanta, Komárňanská vysoká kryha, Liptovská basin, Košická basin – site Ďurkov, Popradská basin, Skorušinská plane, sites

in Galanta, structures in Ďurkov, Žiarska basin, Hornonitrianská basin, Topolčany záliv, Banovská basin, and the Humenský ridge.

### Register of geological mapping

#### Registers of geological mapping (as of December 31, 2008)

Registers of	Accumulation in 2008	Total number
Surveyed territories	44	558
Surveyed territories drafts	50	568
Landslides	82	11 488
Wells	3 156	741 151
Hydro-geological wells	361	23 675
Landfills	6	8 460
Map drawing and purpose mapping	47	9 768
Geophysical mapping	625	5 376
Abandoned mining works	1	16 571

Source: SGI DS

### Abandoned mining works

Pursuant to Act No. 44/1988 Coll. on protection and exploitation of mineral deposits (Mining Act), as amended, MoE SR also ensures searching for abandoned mining works. The State Geological Institute of Dionýz Štúr in Bratislava was commissioned to maintain the Register.

#### Abandoned mining works as of December 31, 2008

Type of abandoned mine	Number
Mining shaft	4 875
Pit (hole)	517
Chute	65
Cut, excavation	88
Pingo	3 987
Pingo field	109
Pingo draw	128
Dump	6 125
Old randing	205
Sink mark	293
Placer	20
Tailings dump	10
Other	155
<b>Total</b>	<b>16 577</b>

Source: SGI DS

### Survey territories

Under the geology legislation and pursuant to the GS SR status - the GEOFOND department keeps the register of survey areas for selected geological activities. In 2008, there were 44 survey areas and 50 registered proposals to designate a survey area. As of December 31, 2008, there were 157 recognised areas.

Energy deposits (state to the date 31<sup>st</sup> December 2008)

Raw material	Number of deposits included into balance	Number of free balance deposits	Number of deposits for mining	Unit	Balance deposits free	Geological deposits
Anthracite	1	1	0	tis. t	2 008	8 006
Bitumen sediments	1	1	0	tis. t	9 780	10 797
Brown coal	11	6	4	tis. t	138 596	461 391
Flammable natural gas – gasoline gas	8	6	3	tis. t	198	395
Lignite	8	3	1	tis. t	111 966	619 110
Non-resinous gases	1	0	0	mil. m <sup>3</sup>	0	6 380
Underground stores of natural gas	9	0	0	mil. m <sup>3</sup>	0	2 246
Crude oil non-paraffinic	3	3	0	tis. t	1 632	3 422
Crude oil - semi-paraffinic	8	3	4	tis. t	132	6 395
Uranium ores	2	1	0	tis. t	1 396	5 272
Natural gas	39	22	12	mil. m <sup>3</sup>	8 663	26 037
<b>Total</b>	<b>91</b>	<b>46</b>	<b>24</b>		-	-

Source: SGI DS

## Minerals deposits balance

 Ore deposits (state to the date 31<sup>st</sup> December 2008)

Type of ore	Number of deposits included into balance	Number of free balance deposits	Number of deposits for mining in 2005	Unit	Balance deposits free	Geological deposits
Sb ores	9	1	0	thous. t	85	3 276
Complex Fe ores	7	2	0	thous. t	5 751	57 762
Cu ores	10	0	0	thous. t	0	43 916
Hg ores	1	0	0	thous. t	0	2 426
Poly-metallic ores	4	1	0	thous. t	1 623	23 671
Wolfram ores	1	0	0	thous. t	0	2 846
Gold and silver ores	11	5	1	thous. t	26 830	32 363
Fe ores	2	2	1	thous. t	14 476	18 743
<b>Total</b>	<b>45</b>	<b>11</b>	<b>2</b>		<b>48 765</b>	<b>185 003</b>

Source: SGI DS

 Non-metallics deposits (state to the date 31<sup>st</sup> December 2008)

Minerals and minerals based products	Number of deposits included into balance	Number of free balance deposits	Number of deposits for mining	Unit	Balance deposits free	Geological deposits
Anhydride	7	5	2	thous. t	659 097	1 250 290
Asbestos and aspestos rock	4	1	0	thous. t	1 808	3 711
Baryte	6	2	2	thous. t	9 226	12 676
Bentonite	23	17	9	thous. t	29 031	42 179
Cast basalt	5	5	1	thous. t	22 774	39 949
Decorative rock	23	14	3	thous. m <sup>3</sup>	11 398	25 503
Diatomite	3	2	0	thous. t	6 556	8 436
Dolomite	20	20	9	thous. t	607 710	634 177
Precious stones	1	1	0	ct	1 205 168	2 515 866
Graphite	1	0	0	thous. t	0	294
Halloysite	1	0	0	thous. t	0	2 249
Rock salt	4	4	1	thous. t	838 841	1 349 823

Kaolin	14	11	3	thous. t	50 903	59 790
Ceramic clays	38	34	5	thous. t	115 227	190 110
Quartz	7	6	0	thous. t	301	327
Quartzite	15	12	0	thous. t	17 448	26 950
Magnesite	10	6	3	thous. t	759 006	1 156 680
Talc	6	3	0	thous. t	93 709	242 178
Mineralized I - Br waters	2	1	0	thous. m <sup>3</sup>	3 658	3 658
Pearl stone	5	5	1	thous. t	30 216	30 536
Pyrite	3	0	0	thous. t	0	14 839
Gypsum	6	4	3	thous. t	49 224	93 460
Sialitic raw material	5	2	2	thous. t	109 269	122 632
Glass sands	4	4	2	thous. t	411 158	589 884
Mica	1	1	0	thous. t	14 073	14 073
Building rock	134	131	83	thous. m <sup>3</sup>	648 534	764 992
Gravel sands and sands	26	22	15	thous. m <sup>3</sup>	135 402	155 097
Brick clay	40	36	12	thous. m <sup>3</sup>	103 547	127 741
Techn. usable miner. crystals	3	1	0	thous. t	253	2 103
Limestone – unspecified	30	27	13	thous. t	1 943 382	2 303 066
High-content limestone	10	10	4	thous. t	3 195 519	3 359 441
Limestone-marl	8	7	2	thous. t	165 531	167 783
Zeolite	6	6	2	thous. t	106 012	111 236
Foundry sands	14	7	1	thous. t	277 940	508 632
Refractory clays	9	6	1	thous. t	3 093	5 318
Feldspars	7	7	1	thous. t	17 648	18 886
<b>Total</b>	<b>501</b>	<b>423</b>	<b>180</b>		-	-

Source: SGI DS

#### Classification of mineral deposits by state of extraction (state to the date 31<sup>st</sup> December 2008)

Extraction symbol	Characteristics	Number of deposits
1	<i>Deposits with developed extraction activity</i> include exclusive mineral deposits sufficiently open and technically apt for extraction of industrial deposit.	219
2	<i>Deposits with fading extraction activity</i> include extraction mineral deposits where extraction activity will cease in a near future (within 10 years)	33
3	<i>Deposits before completion</i> include exclusive mineral deposits with documented deposits that give basis to one of the construction phases (starting with the projection phase)	37
4	<i>Deposits with ceased extraction</i> include exclusive mineral deposits with definitely or temporarily stopped extraction activity.	96
5	<i>Non-extracted deposits</i> include documented exclusive mineral deposits soon <b>to be</b> constructed and extracted.	56
6	<i>Non-extracted deposits</i> include documented exclusive mineral deposits <b>with no plans</b> for their extraction.	180
7	<i>Surveyed deposits</i> include deposits of exclusive and non-exclusive minerals with various degree of mapping.	16

Source: SGI DS

#### Non-reserved mineral deposits (as of December 31, 2008)

Raw material	Number of listed deposit sites	Number of sites with extraction activities
Other raw material	20	2
Building stone	162	52
Gravel sands and sands	223	99
Brick clay	58	1
<b>Total</b>	<b>463</b>	<b>154</b>

Source: SGI DS

**Other raw material deposits (as of December 31, 2008)**

Raw materail	Number of listed deposit sites	Number of sites with extraction activities
Shale	3	0
Floating sand	1	0
Waste rock	6	1
Clays	1	0
Sialitic raw material and marl	6	0
Tuff	2	0
Dried sludge – brucit	1	1
<b>Total</b>	<b>20</b>	<b>2</b>

Source: SGI DS

◆ **Ground water volumes****Ground waters deposits in the SR (state to the date December 31, 2008)**

Category	A	B	C	Total
<b>Efficient deposits of the ground waters (l.s-1)</b>	-	<b>191,63</b>	<b>4 020,95</b>	<b>4 212,58</b>
<b>Efficient amounts of the ground waters (l.s-1)</b>	-	-	<b>13 313,76</b>	<b>13 313,76</b>

Source: SGI DS

Legend:

C calculated on the basis of assessment of the existing hydrogeological mapping

B calculated on the basis of hydrogeological mapping with long-term extraction test

A calculated on the basis of hydrogeological mapping with semi-operational test

## • SOIL

### Land use

#### ◆ Land Use on the basis of the Land Register's data

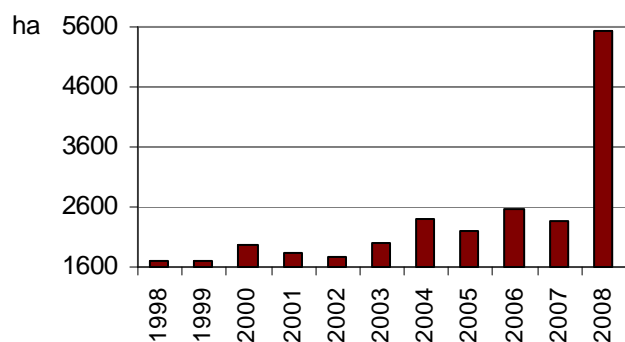
Land Use categories (state to the date 31<sup>st</sup> December 2008)

Land category	Area (ha)	% of total area
Agricultural land	2 423 478	49.42
Forest land	2 008 257	40.95
Water areas	94 575	1.93
Build-up land	229 059	4.67
Other land	148 335	3.03
<b>Total area</b>	<b>4 903 704</b>	<b>100.00</b>

Source: GCCA SR

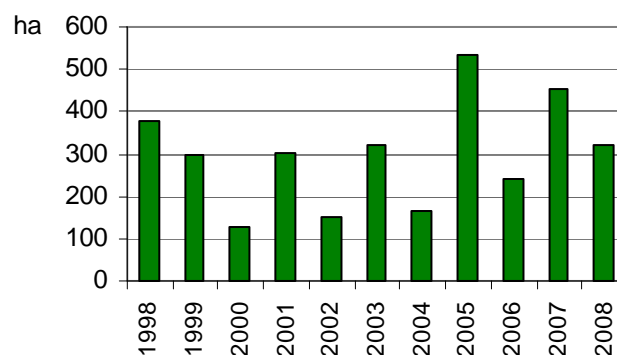
Anthropogenic pressure to use soil for purposes other than its primary production and environmental functions brings about its gradual decrease. In the years 1999-2008, **losses of agricultural soil to construction** grew on the year-year basis, mainly for public, house, and industrial construction purposes (3 190 ha in 2008).

**Trend in agricultural soil loss including the losses of arable soil to forestland, non-agricultural and non-forested soil in the SR**



Source: GCCA SR

**Trend in forestland loss to agricultural soil, non-agricultural and non-forested soil in the SR**



Source: GCCA SR

#### ◆ Changes to the land cover evaluated by comparing satellite images

Changes to land cover in 1990, 2000, and 2006 were mapped on the basis of analysis of satellite images being part of the projects of CORINE1990, I&CLC2000, and GMES-Land 2006. Most significant changes to land cover involved:

- restitutions and changes to land ownership after 1989, with most changes shown especially in 1990-2000 in the north-west of Slovakia,
- natural catastrophes - tornadoes, forest fires (the wind calamity of 2004 in the High Tatra mountains),
- expansion of the traffic infrastructure and industrial parks,

- and activities related to anti-flood activities and energy production. (Gabčíkovo)

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### Total changes to land cover in 2000 - 2006 in Slovakia

Source: SEA

### Soil properties

Information on state and trend in agricultural soil properties and their degradation may be obtained from the Partial Monitoring System - Soil (PMS-S) carried out by the Soil Science and Conservation Research Institute (SSCRI) and from the Agrochemical soil testing (AST) carried out by Central Controlling and Testing Institute in Agriculture (CCTIA). Information on state and trend in forest soil properties may be obtained from the Partial Monitoring System – Forests (PMS-F) carried out by the National Forest Centre – Forest Research Institute.

#### ◆ Chemical properties of soil

##### Soil reaction

**Trend in soil reaction (pH/H<sub>2</sub>O) in the A-horizon of agricultural soil in Slovakia, based on the comparison of outcomes from three PMS-S cycles**

Main soil unit	1993	1997	2002	2007
Mollic Fluvisols AL	7.29	7.24	7.03	-
Fluvisols AL	7.13	6.95	6.84	-
Chernozems AL	7.28	7.31	7.22	7.14
Haplic Luvisols AL	6.71	6.85	6.90	-
Planosols AL	6.66	6.70	6.47	-
Planosols PG	6.31	6.24	6.13	-
Rendzic Leptosols AL	7.27	7.25	7.54	7.97
Rendzic Leptosols PG	7.17	7.18	6.57	7.27
Regosols AL	6.68	6.54	6.95	-
Cambisols AL	6.56	6.42	6.18	-

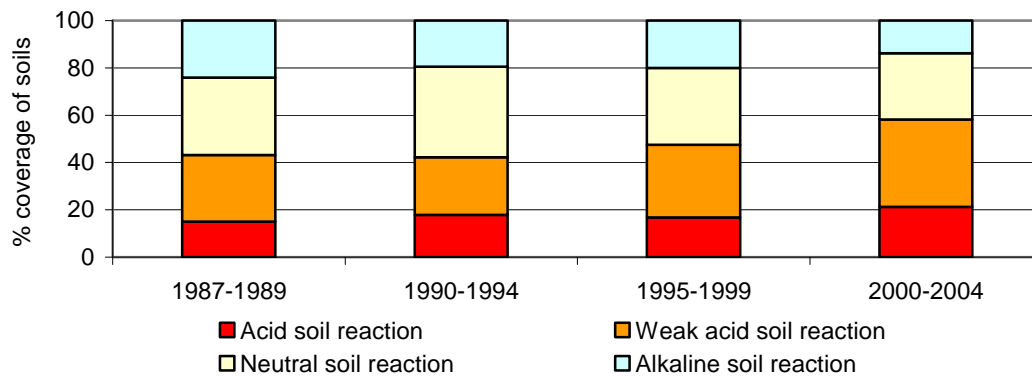
Cambisols PG	5.61	5.56	5.29	-
Solonchaks and Solonetz PG	8.29	7.88	8.45	-
Podzols PG	4.21	3.93	3.88	-

AL – Arable Land, PG – Permanent Grassland

Source: SSCRI

Outcomes from agrochemical soil testing for the VIII. (1987-1989) through XI. (2000-2004) cycle show an **increase in the proportion of agricultural soil with acid (+6.2 %) and weak acid (+8.8 %) soil reaction**. On the other hand, a reduction was seen in the proportion agricultural soil with neutral (-4.7 %) and alkaline (-10.3 %) soil reaction.

**Trend in agricultural soil reaction in the SR (in KCI) based on the outcomes from Agrochemical soil testing**



Source: CCTIA

Most Slovak forestland is mildly to strongly acidic.

**Trend in exchange soil reaction (pH/CaCl<sub>2</sub>) in forest soil in the SR based on comparison of the PMS-F results**

Depth	1988	1993	1998	2006
Upper humic horizon	-	4.8	4.7	4.7
0-10 cm	4.2	4.1	4.1	4.1
10-20 cm	-	3.9	4.0	4.0

Source: NFC - FRI

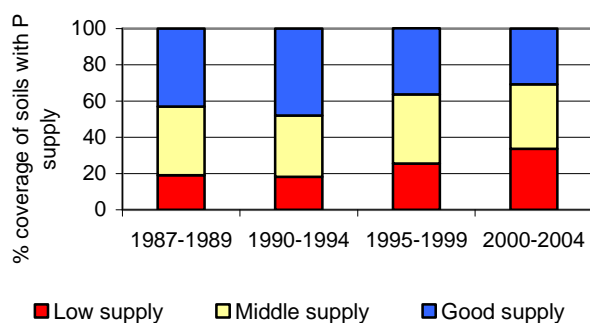
**Available nutrients**

During the period VIII. (1987-1989) through XI. (2000-2004) of Agrochemical soil testing there was an **increase in low supply of all three available nutrients (phosphorus, potassium, and magnesium)**. In phosphorus, it was by 14.6 %, by 10.7 % in potassium, and by 5.3 % in magnesium. However; during this period, good supply of all three available nutrients were reduced (by 12.4 % in phosphorus, by 24.2 % in potassium, and by 12 % in magnesium), which, in terms of plant nutrition, is a negative tendency.

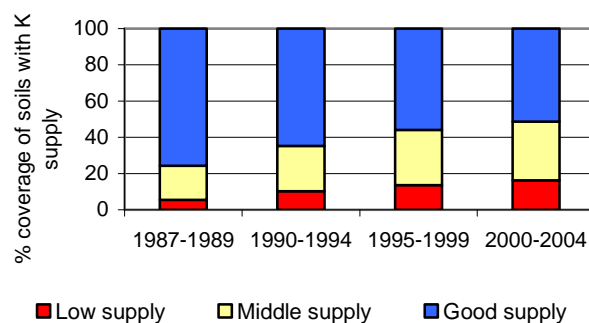
**Trend in phosphorus content in agricultural soil in the SR based on outcomes of Agrochemical soil testing**

**Trend in potassium content in agricultural soil in the SR based on outcomes of Agrochemical soil testing**



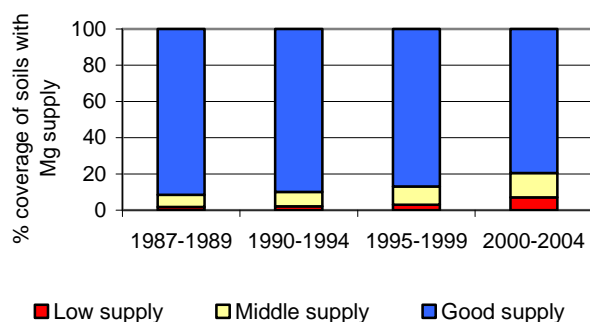


Source: CCTIA



Source: CCTIA

**Trend in magnesium content in agricultural soil in the SR based on outcomes of Agrochemical soil testing**



Source: CCTIA

**Humus**

**Trend in humus content in the A-horizon of agricultural soil in the SR, based on the comparison of outcomes from three PMS-S cycles (%)**

Main soil unit	1993	1997	2002	2007
Chernozems AL	2.74	2.17	3.12	3.19
Mollic Fluvisols AL	3.62	3.10	3.72	-
Fluvisols AL	2.71	2.24	3.03	-
Haplic Luvisols AL	2.07	1.72	2.59	-
Planosols and Luvisols AL	2.05	1.69	2.38	-
Planosols and Luvisols PG	3.79	3.45	5.12	-
Cambisols AL	3.05	2.45	3.45	4.29
Cambisols PG	5.52	4.14	6.55	6.09
Regosols AL	2.07	1.60	2.07	-
Rendzic Leptosols AL	3.74	2.76	3.14	3.83
Rendzic Leptosols PG	5.94	4.32	6.61	7.14
Andosols PG	10.91	12.48	16.55	15.71
Podzols PG	18.79	20.17	24.79	-

AL – Arable Land, PG – Permanent Grassland

Source: SSCRI

Note: Error in humus setting is app. 10%, i.e. 0.3 % of humus, for this reason, differences lower than 0.3 % may be attributed to analytical setting. In case of permanent grasslands differences between years may be caused by high heterogeneity of humus values between individual sites in the land, especially in case of lands above the upper forest border, and they are not statistically significant.

Changes to values in forest soil humus content in individual extraction cycles are shown in Table.

**Trend in humus content in forest soil in the SR based on comparison of the PMS-F results**

Soil horizon	% of humus		
	1993	1998	2006

Upper humic horizon	51.8	55.3	61.7
0-10 cm	9.55	9.79	8.60
10-20 cm	5.55	6.04	5.27

Source: NFC - FRI

#### ◆ Physical properties of soil

The table shows changes to values of total porosity in the A-horizon of agricultural land during three PMS-S cycles.

#### Trend in overall porosity in the A-horizon of agricultural soils in the SR, based on the comparison of outcomes from three PMS-S cycles

Main soil unit	Volume %											
	Light soils				Medium heavy soils				Heavy soils			
	1993	1997	2002	2007	1993	1997	2002	2007	1993	1997	2002	2007
Chernozems	-	-	-	-	51.8	47.3	49.6	49.2	45.0	50.7	46.7	52.1
Mollic Fluvisols	54.0	46.8	42.3	-	46.4	49.5	51.4	-	53.5	48.8	47.3	-
Fluvisols	45.8	50.3	48.4	-	47.8	48.4	52.2	-	47.5	50.8	52.6	-
Haplic Luvisols	-	-	-	-	49.8	47.3	48.7	-	50.5	46.3	51.5	-
Planosols and Luvisols	-	-	-	-	46.0	46.8	49.6	-	50.8	47.6	52.0	-
Cambisols	32.7	45.5	45.5	-	40.2	48.3	52.5	51.3	51.9	51.6	51.8	49.5

Source: SSCRI

### Soil degradation

Serious soil degradation includes contamination with heavy metals and organic pollutants, acidification, as well as alkalization and soil salinization. Recently, soil degradation through desertification grows in significance.

#### ◆ Soil contamination by hazardous substances

Load imposed on agricultural land types by hazardous substances - **diffuse contamination** is monitored directly within the partial monitoring system of **PMS - S** as well as its subsystem of the **Spatial soil contamination survey (SSCS)**.

Outcomes of the II. **PMS -S** monitoring cycle with samples extracted in 1997 showed a slight improvement in the **sanitary condition of agricultural land types**. Apparent vertical migration of high-risk elements in the soil profile was detected (Kobza et al., 2002). Results from the III. cycle with samples extracted in 2002 showed that the **content of the majority of risk substances in selected agricultural land of Slovakia was below the limit**, especially in case of arsenic, chromium, copper, nickel, and zinc. In case of cadmium and lead, excessive limit values were recorded only in soils situated in higher altitudes, podzols, andosols, which may relate to remote transfer of emissions.

Soil samples extracted in the 4th extraction cycle were processed and analysed in 2008 (2007 being the year of extraction). Chemical analyses of monitored land types were completed in November 2008 for the types of andosols (PG), cambisols (PG and AL), rendzic leptosols (PG), and chernozems (AL).

Assessed were the basic statistical parameters ( $x_{\min}$  - minimum value,  $x_{\max}$  - maximum value,  $x_p$  - average value) of the monitored high-risk elements (As, Cd, Co, Cr, Ni, Pb, Zn).

Present condition in contamination of the analysed land types with samples extracted in 2007 was first time assessed on the basis of Annex 2 to Act No. 220/2004 Coll. on protection and exploitation of agricultural land as shown in the following table. Therefore, it is not possible to compare contaminations with the previous monitoring cycles assessed on the basis of laws that were in effect in the past.

**Limit values of risk elements in the agricultural land types defined on the basis of the soil structure and value of soil reaction as well as the critical value of risk elements within the agricultural soil to plant relationship**

Risk element	Limit values for risk elements in agricultural soil (in mg.kg <sup>-1</sup> of dry matter, aqua regia decomposition, Hg total content)			Critical values for risk elements as they relate to the agricultural soil and plant (in mg.kg <sup>-1</sup> of dry matter, in leachate of 1 mol/l ammonium nitrate, F in water leachate)
	Sandy, loam-sandy soil	Sand-loamy, loamy soil	Clay-loamy soil, clay	
Arsenic (As)	10	25	30	0.4
Cadmium (Cd)	0.4	0.7 (0.4)*	1 (0.7)*	0.1
Cobalt (Co)	15	15	20	-
Chromium (Cr)	50	70	90	-
Copper (Cu)	30	60	70	1
Mercury (Hg)	0.15	0.5	0.75	-
Nickel (Ni)	40	50 (40)*	60 (50)*	1.5
Lead (Pb)	25 (70)*	70	115 (70)**	0.1
Selenic (Se)	0.25	0.4	0.6	-
Zinc (Zn)	100	150 (100)*	200 (150)*	2
Fluorine (F)	400	550	600	5

**Note:** Supplied data apply to samples obtained in arable land types from the upper layer of 0.2 m and air-dried to reach constant weigh, \* if pH (KCl) is less than 6, \*\* if pH (KCl) is less than 5,

Contents of risk elements for the soil types assessed in 2008 and extracted in 2007 are shown in the following tables.

**Proportion of As, Cd, Co (in mg.kg<sup>-1</sup> in aqua regia) in selected soils within the 4th extraction cycle (year of extraction - 2007)**

Group of soils	Culture	Soil depth	As			Cd			Co		
			$x_{\min}$	$x_{\max}$	$x_a$	$x_{\min}$	$x_{\max}$	$x_a$	$x_{\min}$	$x_{\max}$	$x_a$
Andosols	PG	0-10	2.9	3.8	3.4	0.45	0.50	0.48	11.3	17.7	14.5
		35-45	1.2	1.3	1.2	0.01	0.22	0.11	12.9	17.8	15.4
Cambisols	PG	0-10	2.0	15.0	6.8	0.14	0.64	0.32	5.8	24.5	14.6
		35-45	1.5	10.2	4.6	0.01	0.17	0.07	6.9	25.3	16.7
Cambisols	AL	0-10	2.0	18.8	7.9	0.16	0.28	0.21	7.9	18.1	11.7
		35-45	2.0	17.0	8.6	0.02	0.13	0.07	10.4	15.8	13.0
Rendzic Leptosols	PG	0-10	2.3	28.8	13.3	0.11	1.87	0.62	1.1	24.0	12.7
		35-45	5.4	16.5	10.8	0.12	0.55	0.30	9.1	22.5	12.5
Rendzic Leptosols	AL	0-10	5.5	24.2	12.7	0.10	0.78	0.41	3.8	22.0	10.0
		35-45	5.6	20.7	12.7	0.06	0.65	0.27	2.9	19.2	8.9

<b>Chernozems</b>	Prevalent	0-10	6.6	14.9	9.5	0.03	0.38	0.18	6.6	10.9	8.8
	AL	35-45	4.5	14.4	9.1	0.01	0.48	0.14	5.4	12.4	8.6

Source: SSCRI

**Note:**  $x_{min}$  – the minimum set value of a selected group,  $x_{mas}$  - the maximum set value of a selected group,  $x_2$  average value of a selected group, AL - arable land, PG - permanent grassland

Contents of contaminating substances in soils of selected cadastre zones are monitored within the **Spatial soil contamination survey (SSCS)**. Selections are made through soil analyses on the basis of detected increased contents of contaminants during the previous SSCS cycles. The file contains also outcomes from soil analyses in the cadastre zones included into the **Coordinated focus-specific monitoring (CFSM)** with monitoring of selected parameters of Pb, Cd, Cr, Ni, Hg, As, together with a number of other parameters required by the centre of coordination. Further, the file also contains soil samples from organic farming. 1,276 soil samples were analysed for inorganic and organic contaminants within the SSCS 2008

In case of forest soil, the most significant effect of their anthropogenic contamination involves accumulation of contaminants in upper humic horizon.

**Content of risk elements in upper humic horizon of forest soil determined in aqua regia**

<b>Risk element</b>		<b>1993</b>	<b>1998</b>	<b>2006</b>
<b>Lead</b>	Mean	61.8	38.4	30.5
	Maximum	300.4	234.8	180.5
<b>Zinc</b>	Mean	131.6	104.2	83.3
	Maximum	401.0	357.2	258.4
<b>Copper</b>	Mean	24.4	20.9	15.3
	Maximum	299.0	240.3	140.7
<b>Cadmium</b>	Mean	1.13	1.01	0.64
	Maximum	2.99	2.51	1.56

Source: NFC - FRI

◆ **Environmental burdens**

Besides diffuse contamination, other environmental burdens are also monitored in Slovakia. Environmental burden means a condition created by negative impacts of anthropogenic activities beyond the measure of the pollution criteria, on the components of environment such as ground water, soil, and rock. Consequences of environmental burdens on ecosystems or human health can be so critical that their sanation is necessary.

As a consequence of the task of Systematic identification of environmental burdens of the Slovak Republic in 2006 - 2008, the Register of environmental burdens in Slovakia included

- 878 probable environmental burdens, 124 of them of high risk, 600 of medium risk, and 154 of low risk sites. The most frequent sources of contamination of sites are municipal waste landfills (39%), industrial production and services (22 %), warehouse facilities of goods and merchandise, including petrol stations (12 %). Other activities such as mining (11 %), military activities (7 %), and transport (4 %) are among the most frequent causes of soil and ground water contamination.

- 257 environmental burdens, 95 of them of high risk, 134 of medium risk, and 28 of low risk sites.
- 684 sanated / recultivated sites. Most of the sanated sites include municipal waste landfills (47 %), warehouse facilities for goods and merchandise (37 %), and industrial production. (7 %).

The most frequent soil contaminants include mineral oils, aromatic hydrocarbons, and heavy metals. Other contaminants include chlorinated hydrocarbons, polycyclic aromatic hydrocarbons, phenols, and cyanides.

#### ◆ Physical degradation

Erosion and soil compaction belong among the major phenomena of physical degradation in Slovakia.

#### Soil erosion

Water erosion is prevalent in Slovakia.

#### Agricultural land endangered by erosion in the SR

Erosion categories	Water erosion		Wind erosion	
	Land area in ha	% from Agricultural Land	Land area in ha	% from Agricultural Land
No erosion or slightly	1 357 390	56.01	2 291 157	94.54
Medium	230 473	9.51	55 253	2.28
Strong	354 555	14.63	45 805	1.89
Extremely strong	481 060	19.85	31 263	1.29
<b>Total</b>	<b>2 423 478</b>	<b>100.00</b>	<b>2 423 478</b>	<b>100.00</b>

Source: SSCRI

#### Soil compaction

Based on the results of the PMS-S for the years 1993-2002, there was an improving tendency in physical soil properties. This also suggests less dramatic compaction of heavy and medium heavy arable soil types. In case of subsoil, greater proportion of compacted sites was found. Heavy soil types show higher rate of compaction over the whole soil profile.

#### ◆ Desertification

Desertification is becoming a major global issue, mainly as a consequence of the global climate change.

Processes of salinisation and sodification are included within soil monitoring to build a network of stationary monitoring sites. The network includes both weak and medium solonchaks and solonetz, as well as the typical solonetz soil types. Of the total number of 8 monitored sites, 6 are situated in the Podunajská plane. Anthropogenic soil sodification is measured in Central Slovakia by the exhausts from the aluminium production plant in Žiar nad Hronom. In the Eastern Slovakian Lowland, the monitoring network includes a typical solonetz in the cadastre area of Malé Raškovce.

Outcomes of the saline soils monitoring in 2008 and their analysis are, with the exception of small deviations, identical to the outcomes obtained for the previous years. The monitored area shows

concurrent processes of salinisation and sodification, with sodification being more dominant. This is to a large degree shown by the Exchangeable Sodium Percentage (ESP) values of over 10% recorded in 2008 in the weak solonetz soils. There was a repeated detection of an apparent change of weak solonetz soil to solonetz soil, or the first sodification level to the medium sodification level, respectively.

In terms of the risks associated with the formation, distribution and development of saline soils characterised by chemical composition of ground water, such risks are most probable in the lower territory of the Žitný ostrov area, in the Zlatná na Ostrove - Komárno zone. This is shown by higher values of electric conductivity ( $>200 \text{ mS}\cdot\text{m}^{-1}$ ), high degree of ground water mineralization ( $>1\,000 \text{ mg}\cdot\text{l}^{-1}$ ), high sodium content ( $\text{Na}^+ > 250 \text{ mg}\cdot\text{l}^{-1}$ ), and high content of hydrocarbonate ions ( $\text{HCO}_3^- > 500 \text{ mg}\cdot\text{l}^{-1}$ ), which indicates real conditions for the development of soda salinisation.

Medium and high mineralized ground water of the Podunajská plane with water evaporation of soils in the conditions of the ongoing climate warming represents a potential desertification threat to the territory.

### **Application of the sewage sludge and bottom sediments into the soil**

**Applying the sewage sludge from waste water treatment plant to agricultural soil and forestland follows the provisions of the SR National Council Act No. 188/2003 Coll. on application of sewage sludge and river bed sediments to soil, and on amendment to Act No. 223/2001 Coll. on waste and amendments to certain laws as amended.**

In 2008, the overall sludge production in the SR was 57 810 tons of dry matter. Of this volume, 38 368 tons (66.4 %) were used in soil processes, 10 766 tones were temporarily stored (18.6 %), and 8 676 tons (15.0 %) were landfilled. In 2008, there was **no direct application of waste water treatment sludge into agricultural soil**. 33 455 tons of sludge dry matter was used for compost production, while 4 913 tons of sludge dry matter were used for soil processes (reclamation of landfills, areas, etc.).

## • FLORA AND FAUNA

### Implementation of PMS BIOTA

The BIOTA partial monitoring system has long been affected and threatened by inadequate implementation of the Concept of actualisation and rationalization of the environmental monitoring related to the amount of assigned funds. In fact, in 2008 there were no financial means given for its implementation. The State Nature Conservancy of the SR used their own resources to carry out the monitoring of 26 % of all permanent monitoring areas planned for 2008.

**The Flora Subsystem.** In line with the plan for 2005-2010, there are 150 sites with the occurrence of 37 species of vascular plants of European importance that are monitored annually. However, in 2008 only 11 species in 50 sites were successfully monitored.

**The Fauna Subsystem.** Of 2 groups and 6 species of animals of the European importance monitored so far, only 4 species were monitored: *Rupicapra rupicapra*, *Lutra lutra*, *Spermophilus citellus*, and *Marmota marmota*, on a limited number of permanent areas.

The **Habitats Subsystem** has not been implemented for a longer time period.

### Flora

#### ◆ Endangerment of plant taxons

#### State of endangerment of plant taxons in 2008

Group	Total number of taxons		Endangered (IUCN cat.)						Ed
	World (global estimation)	Slovakia	EX	CR	EN	VU	LR	DD	
Cyanophytes and Algae	50 000	3 008	-	7	80	196	-	-	-
Lower fungi	80 000	1 295	-	-	-	-	-	-	-
Higher fungi	20 000	2 469	5	7	39	49	87	90	-
Lichens	20 000	1 585	88	140	48	169	114	14	-
Bryophytes	20 000	909	26	95	104	112	85	74	2
Vascular plants	250 000	3 352	77	266	320	430	285	50	220

Source: SNC SR

Legend:

**Ed** – endemic species

**IUCN categories of endangerment:**

**EX** – extinct

**CR** – critically endangered

**EN** – endangered

**VU** – vulnerable

**LR** – less endangered

**DD** – data deficient

Level of **endangerment of non-vascular plants** in Slovakia is presently **17.6 %** (including fungi). Level of **endangerment of vascular plants** is **42.6 %** (for all endangerment categories), or **30.3 %**. (for the CR, EN, and VU categories).

**Comparison of the vascular plant endangerment\* in selected countries**

	<b>Slovakia</b>	<b>Austria</b>	<b>Hungary</b>	<b>Poland</b>	<b>Czech Rep.</b>
<b>Vascular plants (%)</b>	30.3	33.4	19.8	11.0	42.5

Source: OECD Environmental Data Compendium, 2008

\* Among “endangered” taxons are those taxons classified under categories: CR, EN, and VU under IUCN. Czech Rep.: Data include extinct species.

◆ **Protection of plant taxons**

Protection of plant taxons is in the presence regulated by the **Resolution of MoE SR No. 24/2003 Coll.** to the *Act on Nature and Landscape Protection No. 543/2002 Coll.* as amended by Resolution 492/2006 Coll., Resolution 638/2007 Coll and Resolution 579/2008 Coll.. Number of the **state protected taxons** is now **1 418** (vascular plants – 1 285; bryophytes – 47; higher fungi – 70; lichens – 17). There are **823 taxons** occurring in Slovakia (vascular plants – 713, bryophytes – 23, higher fungi – 70, lichens – 17).

**Wild-growing plant taxons in Slovakia protected by international conventions and EU regulations**

	<b>Cyanophytes and Algae</b>	<b>Fungi</b>	<b>Lichens</b>	<b>Bryophytes</b>	<b>Vascular plants</b>
In attachment II of <b>Habitats Directive</b>	-	-	-	9	40
In attachment IV of <b>Habitats Directive</b>	-	-	-	-	42
In attachment V of <b>Habitats Directive</b>	-	-	-	2*	3**
In attachment I and II of <b>CITES</b>	-	-	-	-	110
In attachment I of <b>Bern Convention</b>	-	-	-	8	35

\* *Leucobryum glaucum* and the entire genus *Sphagnum*

Source: SNC SR

\*\* *Artemisia eriantha*, *Galanthus nivalis*, including the entire genus *Lycopodium*

In 2008, there was a transfer of 74 plants of the species of *Dactylorhiza sambucina* **within the scheme of transfers, reintroductions, and restitutions** of the endangered plant species.

New **rescue programmes** for the species of *Radiola linoides* and *Tephroseris longifolia* ssp. *moravica* were developed in 2008. For the species of *Alkanna tinctoria*, *Liparis loeselii*, *Colchicum arenarium*, *Spiranthes spiralis*, *Herminium monorchis*, *Drosera anglic* and *Lycopodiella inundata* the programmes were updated. Implemented were also rescue programmes for *Anacamptis pyramidalis*, *Carex chordorrhiza*, *Orchis elegans*, *Orchis palustris*, *Pulsatilla pratensis* ssp. *flavescens*, *Pulsatilla zimmermannii*, *Drosera anglica*, *Lycopodiella inundata*, *Ophrys holubyana*, *Orchis coriophora* ssp. *coriophora*, *Rhynchospora alba*, *Scheuchzeria palustris*, *Glaux maritima* and *Carex pulicaris*.



Actual problem endangering the diversity of plant species in last years has been becoming **invasive species**. Of the 616 introduced species of plants in Slovakia, 7 are classified as **invasive** pursuant to Regulation 24/2003 Coll., and 89 as potentially invasive plant species. **Number of sites** with the occurrence of invasive plant species has been **rising** every year. No register of invasive species of animals has yet been developed for the territory of Slovakia.

In 2008, **elimination** of invasive plant species was carried out at 72 sites in protected areas of the size of 419,8 ha. This activity followed up on the measures implemented also in the previous years. 14 species of introduced and invasive plant species were thus eliminated: *Robinia pseudoacacia*, *Ailanthus altissima*, *Negundo aceroides*, *Fallopia japonica*, *Heracleum mantegazzianum*, *Fraxinus americana*, *F. lanceolata*, *F. pennsylvanica*, *Solidago canadensis*, *Impatiens glandulifera*, *Impatiens parviflora*, *Asclepias syriaca*, *Solidago gigantea*, *Stenactis annua*, *Aster lanceolatus* a *Helianthus tuberosus*.

Outside the protected areas, eliminated were 4 invasive, 1 expansive, and 1 occasionally invasive plant species at 59 sites of the size of 85.7 ha: *Fallopia japonica*, *Heracleum mantegazzianum*, *Impatiens glandulifera*, *Rhus typhina*, *Digitalis purpurea* – occasionally invasive taxon, *Calamagrostis epigeios* – expansive taxon.

## Fauna

### ◆ Endangerment of animal species

#### State of endangerment of the particular invertebrate taxons

Taxons	Number of taxons		Categories of endangerment (IUCN)							Endang erment total	Endang. %
	World	SR	EX	CR	EN	VU	LR	DD	NE		
Mollusca	128 000	277	2	26	22	33	45	8	135	136*	49.1
Aranea	30 000	934	16	73	90	101	97	45	-	422	45.2
Ephemers	2 000	132	-	8	17	16	-	-	-	41	31.1
Odonata	5 667	75	4	-	14	11	13	5	-	47	62.7
Orthoptera	15 000	118	-	6	7	10	20	10	-	53	44.9
Heteroptera	30 000	801	-	14	7	6	4	-	-	31	3.9
Coleoptera	350 000	6 498	2	15	128	490	81	2	-	718	11.1
Hymenoptera	250 000	5 779	-	23	59	203	16	-	-	301	5.2
Lepidoptera	100 000	3 500	6	21	15	41	17	11	-	111	3.2
Diptera	150 000	5 975	-	5	10	71	19	93	-	198	3.3

\* without the category of NE

Source: SNC SR

Level of endangerment of invertebrates in Slovakia is presently 8.5 %.

**State of endangerment of the particular vertebrate taxons**

Taxons Group	Number of taxons		Categories of endangerment (IUCN)							Total	%
	World <sup>1)</sup>	SR	EX	CR	EN	VU	LR	DD	NE		
Lampreys		4	-	-	1	1	1	-	-	3	75.0
Pisces	25 000	79	4	-	6	9	40	-	-	59	74.7
Amphibians	4 950	18	-	-	3	5	10	-	-	18	100.0
Reptiles	7 970	12	-	1	-	4	6	-	-	11	91.6
Birds <sup>2)</sup>	9 946	219	2	7	23	19	47	4	19	121	55.3 (35.5 <sup>3)</sup> )
Mammals	4 763	90	2	2	6	12	27	15	4	68	75.6

<sup>1)</sup> Source: UNEP – GBO

Source: SNC SR

<sup>2)</sup> only nesting birds – of total number of 341 birds of Slovakia, only the all 219 species of nesting birds were assessed

<sup>3)</sup> % of total number of birds 341

**IUCN Categories:**

EX - extinct taxon

CR - critically endangered taxon

EN - endangered taxon

VU - vulnerable taxon

LR - lower risk taxon

DD - data deficient taxon

NE - non evaluated taxon

**Comparison of vertebrates endangerment<sup>1)</sup> in selected countries (%)**

	Slovakia	Austria	Hungary	Poland	Czech Rep.
<b>Invertebrates</b>	5.3	-	> 0.9	-	13.1
<b>Pisces</b>	24.1	50.6	43.2	21.0	41.5
<b>Amphibians</b>	44.4	60.0	27.8	-	61.9
<b>Reptiles</b>	38.5	64.3	33.3	33.3	72.7
<b>Birds</b>	14.0	27.7	14.5	7.8	55.0
<b>Mammals</b>	21.7	22.0	37.8	13.5	20.0

Source: OECD

<sup>1)</sup> “endangered” taxons include species under categories: CR, EN, and VU under IUCN

Austria) invertebrates: *insecta*, *decapoda*, *mysidacea* and *mollusca*, birds: only nesting birds

Czech Rep.) data refer to autochthonous species and EX including, birds: only nesting birds, pisces: including lampreys

Hungary) birds: all species recorded in Hungary since 1800

Poland) pisces: including lampreys.

**◆ Protection of animal species**

Protection of animal species is regulated by the **Resolution of MoE SR No. 24/2003 Coll.**, which implements the *Act on nature and landscape protection No. 543/2002 Coll.* as amended. The number of **animal taxons under state protection** is now **813 taxons** on the level of species and subspecies and to **12 taxons** on the level of genus.

**Animal wildlife in Slovakia protected by international conventions and EU regulations**

	Invertebrates	Pisces	Amphibians	Reptiles	Birds	Mammals
In annex II of <b>Habitats Directive</b>	53	23	5	1	-	24
In annex IV of <b>Habitats Directive</b>	50	1	10	9	-	46
In annex I of <b>Birds Directive</b> <sup>1)</sup>	-	-	-	-	114	-
In annexes I and II of <b>CITES</b>	2	2	-	1	53	5
In annexes II and III of <b>Bern Convention</b>	33	38	19	12	357	65
In annexes II and III of <b>Bonn Convention</b>	-	3	-	-	209	24
In annex of <b>AEWA*</b>	-	-	-	-	129	-

\* AEWA – African-Eurasian Migratory Water Bird Agreement

Source: SNC SR

**Rescue programmes (RP)** in 2008 were processed for the following taxons: *Castor fiber*, *Mustela lutreola* and butterflies of *Maculinea* genus. Realized were RP for *Parnassius apollo*, *Umbra krameri*, *Bison bonasus*, *Aquila chrysaetos*, *Aquila pomarina*, *Falco cherrug*, *Falco peregrinus* and *Marmota marmota*.

In **rehabilitation stations** operated by the nature and landscape protection organizations there were **adopted** in 2008 altogether **440** injured individuals or otherwise disabled animals. Back to wild nature there were **released** altogether **234** individuals and there was spent more than 264.3 thous. SKK.

No animals were bred (and released) in maturation facilities in 2008.

There was provided **the guarding** of 122 nests of 7 bird of prey species (*Aquila chrysaetos*, *A. pomarina*, *A. heliaca*, *Haliaeetus albicilla*, *Falco peregrinus*, *F. vespertinus*, *Circus pygargus*) - information only for the organization organs of SNC SR. There were successfully **brought up 128 nestlings**, which is in average 1 brought up nestlings per nest and there were spent about 186 thous. SKK.

In term of in situ animal preservation in 2008 there were organized **transfers and restitutions** of protected and endangered animals into proper nature biotopes by nature and landscape protection organizations. There were these animals – *Spermophilus citellus*, *Marmota marmota latirostris*, *Umbra krameri*, *Castor fiber* and *Amphibia* and there was spent more than 238 thous. SKK.

Within the **improvement of nesting and living conditions** of animals, there were realized more than 400 actions, while there was invested more than 905 thous. SKK.

In concern of preventing the collisions of **migrating Amphibians** with the car transport, in 2008, transfers of amphibians were carried out and foil barriers were installed in total length of 27.7 km within the protected areas, as well as in open nature. There was invested more than 125 thous. SKK.

#### ◆ Game stock and hunting and fishing

To 31<sup>st</sup> March 2008, the **spring stock numbers** of the ungulate game species, without Fallow deer species, were higher in comparison to the previous year. Hunting for the rare animal species is strictly regulated.

#### Spring stock of game and game hunting as of March 31 (pieces)

Species	2005		2006		2007		2008	
	stock	hunting	stock	hunting	stock	hunting*	stock	hunting*
<b>Deer</b>	39 738	14 030	41 105	12 888	41 287	15 185 <sup>1)</sup>	44 316	16 889 <sup>1)</sup>
<b>Fallow deer</b>	8 425	2 529	8 010	2 208	8 125	2 890 <sup>1)</sup>	9 068	3 210 <sup>1)</sup>
<b>Roe deer</b>	85 124	20 659	87 324	17 313	89 439	22 723 <sup>1)</sup>	92 680	24 704 <sup>1)</sup>
<b>Wild boar</b>	27 116	22 551	27 175	17 820	27 124	25 758 <sup>1)</sup>	29 290	29 700 <sup>1)</sup>
<b>Brown hare</b>	199 226	36 511	208 946	17 560	202 724	39 892 <sup>1)</sup>	203 123	34 470 <sup>1)</sup>
<b>Grey partridge</b>	17 293	484	15 579	10	13 285	535 <sup>1)</sup>	13 453	462 <sup>1)</sup>

<b>Pheasant</b>	181 374	143 373	187 139	110 113	182 287	160 126 <sup>1)</sup>	190 279	135 332 <sup>1)</sup>
<b>Chamois</b>	625	12	665	8	645	10 <sup>1)</sup>	661	12 <sup>1)</sup>
<b>Bear</b>	1 483	35	1 577	16	1 739	25	1 939	34
<b>Wolf</b>	1 165	74	1 219	91	1 322	123	1 563	121
<b>Otter</b>	343	0	380	0	480	0	680	0

\* Actual hunting in numbers, excluding other kills.

Source: SO SR

Amount of the fish **caught** in the fish ponds, water dams and water flows for economic and sport purposes achieved **2 734 t** in 2008. The waters were **stocked** by **42 474 852 pieces of setting**.

#### Fishing for the economic and sport purposes in 2008 (t)

Fish species	2004		2005		2006		2007		2008	
	total	of this SFA*	total	of this SFA*	total	of this SFA*	total	of this SFA*	total	of this SFA*
<b>Fish total</b>	<b>2 783</b>	1 565	<b>2 652</b>	1 663	<b>2 979</b>	1 697	<b>2 871</b>	1 659	<b>2 734</b>	1 639
Of these:										
<b>Carp</b>	1 360	988	1 281	1 092	1 597	1 169	1 430	1 146	1 430	1 166
<b>Trouts</b>	878	52	800	49	837	49	939	54	833	52
<b>Crucians</b>	80	75	76	71	117	71	8	66	94	62
<b>White amur</b>	28	28	33	24	39	33	45	40	41	36
<b>Bighead carps</b>	8	5	12	6	12	4	8	4	10	3
<b>Sheat fish</b>	36	35	37	35	34	33	40	39	37	36
<b>Maskalonge</b>	66	60	74	67	62	60	58	55	55	54
<b>Sand-eel</b>	78	76	83	82	65	64	68	60	63	63
<b>Grayling</b>	9	8	13	7	8	7	12	6	7	6
<b>Huchen</b>	1	1	1	1	1	1	0,2	0,2	0,7	0,7
<b>Breams</b>	98	98	106	105	95	94	76	75	70	69
<b>Torgoch</b>	0	0	9	1	2	1	3	1	2	0
<b>Chevins</b>	21	21	16	16	16	16	17	17	14	14
<b>Other fish species</b>	120	117	111	107	94	95	168	96	78	76

\*SFA – Slovak Fishing Association

Source: SO SR

### Implementation of the CITES in 2008

In 2008, there was a change in the implementation of the CITES convention in Slovakia through a novelised Slovak National Council Act 15/2005 Coll. on protection of the EU wildlife animals and plants, regulation of their trade, and on the amendment to other laws as amended by Act 672/2006 Coll. - a new **Slovak National Council law 452/2007 Coll.** was adopted.

**Scientific body of the SR**, pursuant to the national and EU legislation in 2008, commented 30 applications filed by the Ministry of Environment of the Slovak Republic (MoE SR) to import of individual animals belonging to the species listed under the CITES convention, 10 applications of the MoE SR to export such animals, and 15 applications of the MoE SR for consultation regarding the origin of individual animals at issuing certificates. Further, the body produced, upon the request of the MoE SR, circuit environmental offices, custom offices, and police other 109 position papers that relate to the area of the CITES convention.

## • CLIMATE CHANGES

In Slovakia, over the last 100 years, there has been recorded an increasing **trend in the average annual air temperature** by 1.1 °C, and reduction in annual precipitation balance by 5.6 % (south of the SR showed a reduction by more than 10 %, while the north and some sporadic northeast locations showed an increase up to 3 % over the whole century). Significant reduction in **relative air humidity** (up to 5 %) and **reduction in snowcap** almost in the whole of Slovakia were recorded. Characteristics of the potential and actual evaporation, soil humidity, global radiation and radiation balance also prove that the south of Slovakia is gradually drying up (potential evapo-transpiration rises and soil humidity decreases); however, no substantial changes were detected in solar radiation characteristics (with the exception of temporary reduction in the years 1965-1985).

Special attention is given to characteristics of climate variability, especially **precipitation balances**. Over the last 7 years, there was a significant increase in the occurrence of extreme daily precipitation figures, which consequently produced a significant increase in local floods in various regions of Slovakia. On the other hand, mainly in the years 1989-2002, there was a more frequent occurrence of local or overall drought, which was caused mainly by long periods of relatively warm weather patterns. Especially harmful were droughts in the periods of 1990-1994, 2000, and 2002.

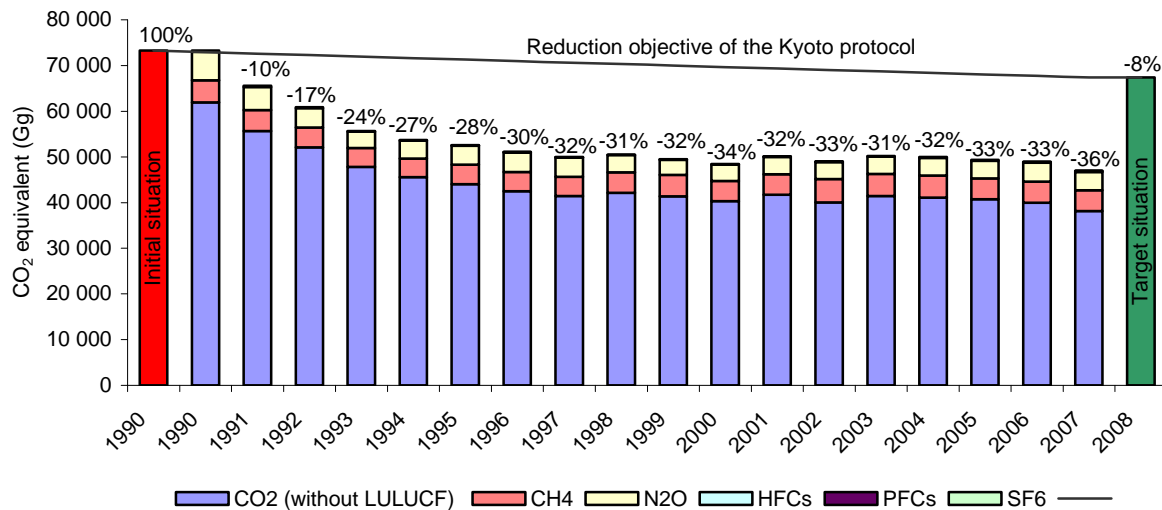
### **International obligations in the area of climate changes**

At the UN Conference on Environment and Development (Rio de Janeiro, 1992) was adopted **framework Convention on Climate Change** – basic international legal instrument for protection of global climate. The convention became effective in the Slovak Republic on November 23, 1994. Slovakia accepted all obligations stemming from the Convention, including the obligation to decrease greenhouse gases emissions by the year 2000 to the level of 1990. Aggregated emissions of greenhouse gases in 2000 (48 421 Gg CO<sub>2</sub> equivalent) did not exceed the level of 1990 (73 255 Gg CO<sub>2</sub> equivalent). Next internal goal that Slovakia set to achieve was to reach the „Toronto Objective" i.e. 20 % reduction in emissions by 2005, compared to 1988. At the conference of signatories to the UN Framework Convention on Climate Change in Kyoto, Japan, in December 1997, Slovakia bound itself to reduce the production of greenhouse gases by 8 % by 2008, compared to 1990, and to continue keep the same level until 2012. The Protocol became effective after its ratification by the Russian Federation, on February 16, 2005, which is the 90<sup>th</sup> day after its signing by at least 55 countries, including the countries listed in Annex 1, that contribute by at least 55 % to total CO<sub>2</sub> emissions for the year 1990 as listed in Annex B accompanying the article 25 of the Kyoto Protocol.

In the spring of 2007, the European Parliament adopted a unilateral obligation to reduce the greenhouse gases emissions within the EU by at least 20 % by 2020, compared to 1990. Next, there was a declaration that the EU will extend this obligation to a 30 % reduction provided that such is adopted

also by other world developed countries and that developing countries with more advanced economies will follow, assuming obligations adequate to their responsibility and capacities.

### Assessment of anthropogenic emission of greenhouse gases under compliance with the Kyoto protocols outcomes



Source: SHMI

### Balance of greenhouse gases emissions

Total greenhouse gases emissions in 2007 represented 46 950.67 Gg. (excluding the LULUCF sector) This meant a reduction by 35.9 %, compared to the reference year of 1990. Compared to the previous inventory year of 2006, greenhouse gases emissions dropped by 4.1 %. Total greenhouse gas emissions are either stabilised or rising only slightly, as the result of the restructuring of industry, growth in the intensity of transport, and anticipated increase in the F-gases emissions, which is caused by the replacement of freons prohibited under the Montreal Protocol. (mainly HFCs and SF<sub>6</sub>) Total greenhouse gases emissions including the sinks in the LULUCF sector reached their maximum in 1998. Significant changes occurred in relation to the NEIS database revisions, in relation to preserving the consistency of data reported under the directive on trading CO<sub>2</sub> emissions, and in relation to changes to the methodology at assessing the LULUCF sector. Over the assessed period of 1990-2007, total greenhouse gases emissions did not in a single case exceed the values of the base reference year of 1990.

Aggregated greenhouse gases emissions constitute total emissions of greenhouse gases expressed as the CO<sub>2</sub> equivalent, calculated through the GWP 100 (Global warming potential). In 2007, CO<sub>2</sub> emissions represent more than 81.2 %, CH<sub>4</sub> emissions (GWP = 21) are on the level over 9.7 %, while N<sub>2</sub>O emissions (GWP = 310) contribute 8.5 %, and the share of the F-gases (HFC, PFC, and SF<sub>6</sub>) is less than 0.5 %.

Main share on the aggregated greenhouse gases emissions is taken by the power industry (75.7 %), with industrial processes taking up 12.4 %, the sector of solvents use taking up 0.2 %, agriculture taking up 6.9 %, and waste taking up 4.8 %. Share of individual sectors on total emissions has not changed much since the reference year of 1990.

Most growth was recorded in the areas of solvents use (as much as 36.9 %), waste (34 %), and industrial processes, due to increased levels of emissions from the F-gasses (10 %) since 1990.

### Aggregated emissions of greenhouse gases (Tg) in CO<sub>2</sub> equivalents

Rok	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007
Net CO <sub>2</sub>	59.56	47.91	42.25	40.07	40.16	37.92	36.52	34.80	36.59	36.86	39.86	36.93	34.92
CO <sub>2</sub> *	61.96	52.06	45.56	42.50	42.10	40.32	41.74	40.05	41.42	41.11	40.74	39.98	38.14
CH <sub>4</sub>	4.80	4.39	4.08	4.22	4.51	4.44	4.48	5.10	4.86	4.84	4.60	4.65	4.55
N <sub>2</sub> O	6.24	4.22	3.92	4.29	3.78	3.59	3.77	3.73	3.76	3.87	3.85	40.08	4.01
HFCs	NA,NO	NA,NO	0.00	0.04	0.04	0.08	0.08	0.10	0.13	0.15	0.17	0.20	0.23
PFCs	0.27	0.25	0.13	0.03	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.04	0.02
SF <sub>6</sub>	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
Total (with net CO <sub>2</sub> )	70.87	56.77	50.39	48.66	48.53	46.04	44.88	43.76	45.38	45.75	48.53	45.91	43.75
Total*	73.26	60.91	53.70	51.07	50.46	48.42	50.09	48.99	50.19	49.98	49.37	48.94	46.95

Emission were assessed by 15.04.2009

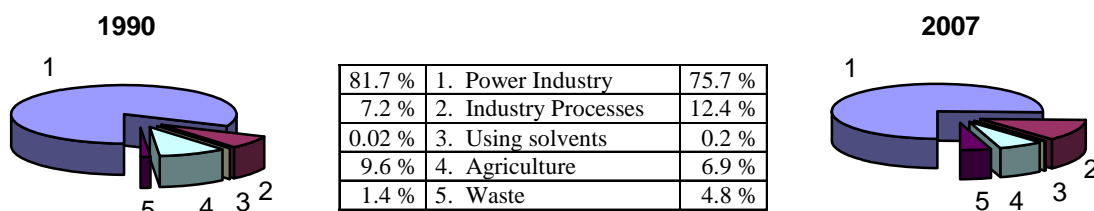
Source: SHMI

The table shows calculated years 1990-2006

\* Emissions without deducting the sinks in the sector of LULUCF (Land use-Land use change and forestry)

NA = no applicable, NO = no occurrence

### Share of individual sources on greenhouse gases emissions



Emission were assessed by 15.04.2008

Source: SHMI

### Aggregated emissions of greenhouse gases (Tg) by sectors in CO<sub>2</sub> equivalents

	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007
Power Industry*	59.88	50.75	44.20	40.99	39.87	38.53	39.86	38.05	36.69	38.54	38.18	37.35	35.53
Industry Processes**	5.26	3.97	4.12	4.57	5.06	4.63	4.89	4.82	4.68	5.67	5.62	5.94	5.83
Using solvents	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.06	0.06	0.08	0.09	0.08	0.08
Agriculture	7.04	5.09	4.22	4.22	3.71	3.49	3.53	3.55	3.41	3.24	3.23	3.18	3.24
LULUCF	-2.39	-4.14	-3.31	-2.41	-1.93	-2.39	-5.21	-5.23	-4.81	-4.23	-0.85	-3.03	-3.20
Waste	1.06	1.08	1.15	1.26	1.80	1.75	1.79	2.51	2.35	2.45	2.26	2.38	2.27

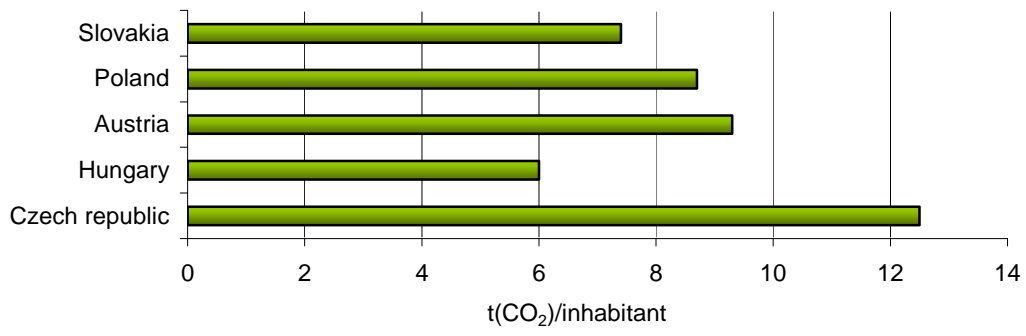
Emission were assessed by 15.04.2009

Source: SHMI

The table shows calculated years 1990-2006

\* Including the traffic \*\* Including the F-gases

### Comparison in CO emissions in selected countries – in 2006



Source: Eurostat



## • ACIDIFICATION

### Air Acidification

Slovakia is a signatory to the **UN Economic Commission Convention on Long-Range Trans-boundary Air Pollution** (which became effective for ČSFR in March 1984 and Slovakia being its successor since May 1993). This Convention became the basis for protocols which also spelled out obligations for the signatories to reduce individual anthropogenic emissions of pollutants contributing to global environmental problems. The following text shows how individual protocol's obligations in the area of acidification are met:

#### ➤ *Protocol on further reduction of sulphur emissions*

This protocol was signed in Oslo in 1994. Ratified by the Slovak Republic in January 1998 the protocol became effective in August 1998. Obligations of the Slovak Republic to reduce the SO<sub>2</sub> emissions as set forth in the Protocol (compared to the reference year of 1980) include:

#### **Obligation to reduce SO<sub>2</sub> emission pursuant to Protocol on further reduction of sulphur emissions**

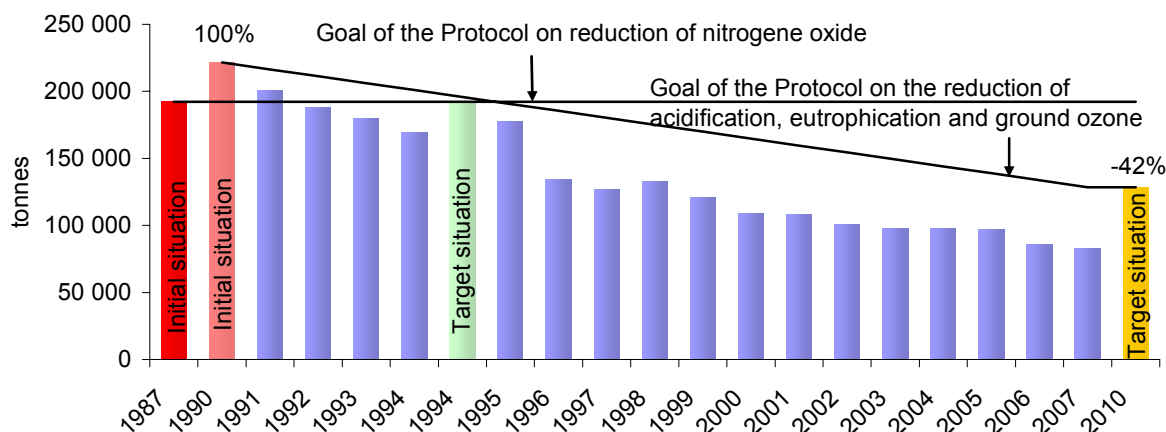
Year	1980 (initial year)	2000	2005	2010
SO <sub>2</sub> emission (thous. t)	843	337	295	240
SO <sub>2</sub> emission reduction (%)	100	60	65	72

Slovakia met one of its Protocol objectives to reduce the SO<sub>2</sub> emissions in 2000 by 60 % compared to the reference year of 1980. In 2000 sulphur dioxide emissions reached the level of 126.952 thousand tons, which is 85 % less than in the years 1980. In 2005 it was 89 thousand tons, which is 89 % less then in the year 1980.

#### ➤ *Protocol on the Reduction of Acidification, Eutrophication and Ground Ozone*

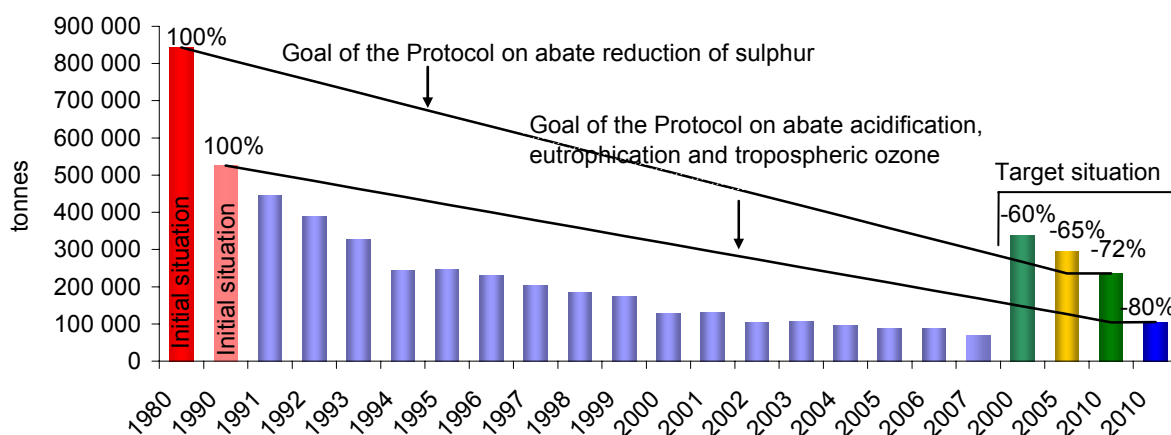
The protocol was signed in Göteborg in 1999. Slovakia signed the protocol in 1999 and ratified in 2005. Slovakia obliged itself to reduce the SO<sub>2</sub> emissions by 2010 by 80 %, the NO<sub>2</sub> emissions by 2010 by 42 %, the NH<sub>3</sub> emissions by 2010 by 37 % and the VOC emissions by 2010 by 6 % in comparison to the year 1990. Slovakia has the potential to fulfill this obligation.

#### **Trend in NO<sub>x</sub> emission with regard to following the outcomes of international agreements**



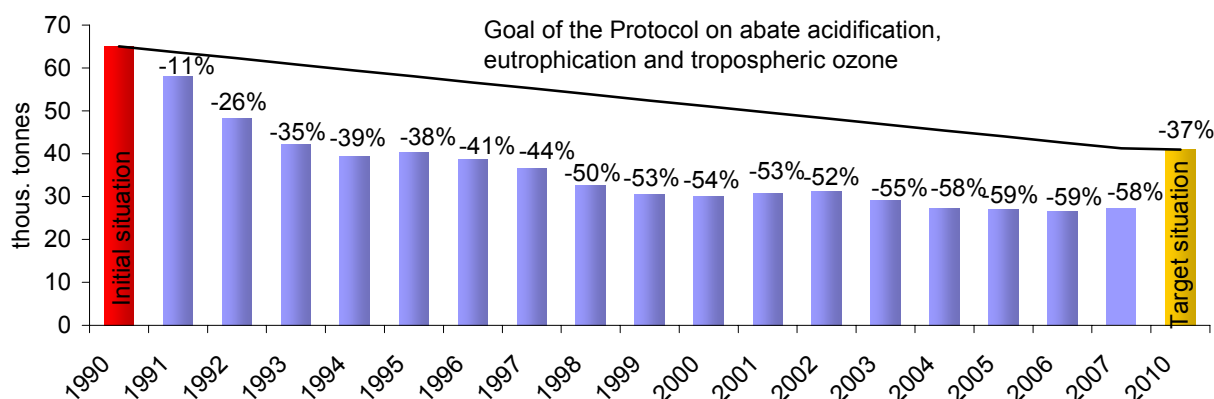
Source: SHMI

**Trend in SO<sub>2</sub> emission with regards to following the outcomes of international agreements**



Source: SHMI

**Trend in NH<sub>3</sub> emission with regard to following the outcomes of international agreements**



Source: SHMI

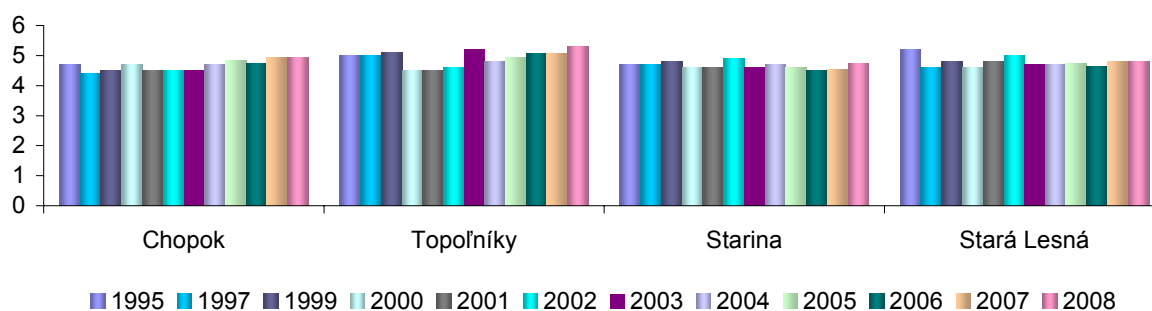
During the period of the years 1990-2007 in case of SO<sub>2</sub> and HN<sub>3</sub> the recorded reduction in emissions was obvious (with slight deviations in some years). Nitrogen oxides emissions showed a slight decrease only in 1995 and 1998 their increase was caused by increased natural gas consumption by retail consumers.

## Acidity of atmospheric precipitations

**Natural acidity of precipitation water** in equilibrium with carbon dioxide has the pH of 5.65. Atmospheric precipitations are considered acidic if the bulk charge of the acidic anions is greater than the charge of cations and the pH value is below 5.65. Sulphates by approximately 60-70 % and nitrates by approximately 25-30 % contribute to the acidity of precipitation water.

In 2008, total **atmospheric precipitations** at regional stations were between 528 and 1 353 mm. Upper limit of the interval was occupied by the highest located station of Chopok, while the bottom limit was occupied by Topoľníky, with the lowest altitude. Acidity of atmospheric precipitations was dominant at Starina, copying the lower limit of the pH interval of 4.57-5.30. Time sequence and pH trend over a longer time period show a reduced acidity. pH values well correspond with the pH values by the EMEP maps.

### Trend of pH precipitation



Source: SHMI

**Concentrations of dominant sulphates** in precipitation water showed the interval of 0.37-0.52 mg.l<sup>-1</sup>. Interestingly, the sulphates concentrations recorded at three stations located at higher altitudes are very similar for annual average figures, and slightly lower at the Topoľníky station. The overall reduction in sulphate concentrations over a long period corresponds to the reduction of SO<sub>2</sub> emissions since 1980.

**Nitrates** that show less influence on the acidity of precipitations than sulphates showed the concentration interval of 0.27-0.32 mg N.l<sup>-1</sup>. Ammonia ions also belong to the major ions, with their concentration interval representing 0.27-0.48 mg.l<sup>-1</sup>.

### Wet deposition of sulphates (g.S.m<sup>-2</sup>.r<sup>-1</sup>) - 2008

Station	Wet deposition of sulphates g.S.m <sup>-2</sup> .r <sup>-1</sup>
Chopok	0.66
Topoľníky	0.20
Starina	0.44
Stará Lesná	0.36
Bratislava	0.34

Source: SHMI

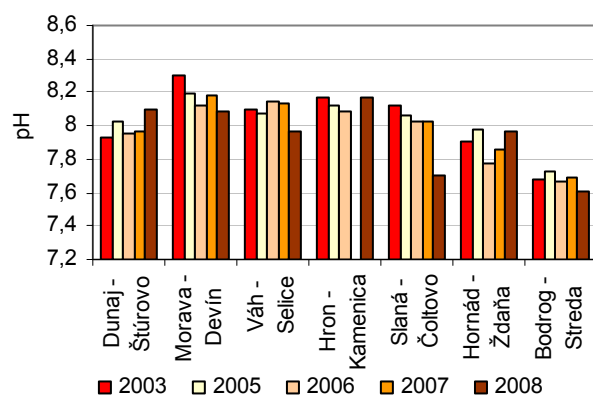
**Annual averages of heavy metals in monthly precipitation - 2008**

	Precip. mm	Pb µg/l	Cd µg/l	Cr µg/l	As µg/l	Cu µg/l	Zn µg/l	Ni µg/l
<b>Chopok</b>	1 159	3.39	0.09	0.22	0.17	1.41	20.92	0.64
<b>Topoľníky</b>	560	1.30	0.05	0.11	0.11	3.03	11.92	0.84
<b>Starina</b>	708	2.12	0.06	0.12	0.16	1.67	10.17	0.60
<b>Stará Lesná</b>	616	2.05	0.14	0.10	0.17	3.40	13.74	0.62
<b>Bratislava</b>	625	1.45	0.05	0.20	0.16	2.89	14.55	0.57

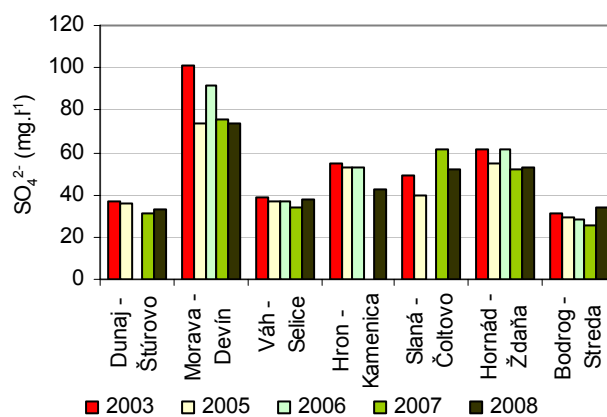
Source: SHMI

**Acidification of surface water**

In general, considering the diversity of the rock aquifer, soil types, hydrological and climate conditions, general assessment of acidification renders itself difficult. Surface water acidification fluctuates depending on the season, especially in running water. Surface stream and lake water is most acidic in spring. In total we can say that the trend in the pH values sulphate concentrations and alkalinity of surface water show variable and fluctuating characteristics. Currently thanks to valid legal standards for releasing acidification mixtures the content of atmospheric and precipitation sulphates and nitrates dropped, meanwhile reducing the risk of acidification of surface and groundwater.

**Trend in pH in selected Slovak watercourses (annual average values)**


Source: SHMI

**Trend in sulphates in selected Slovak watercourses (annual average values)**


Source: SHMI

**Acidification of soils**

Acidification as a process of raising the soil's acidity represents one of the important processes of chemical degradation. Ability of the agro-ecosystem to cope with natural and anthropogenic acidification is defined by the capacity and potential of the buffering function of the soil. This reflects a degree of soil resistance to acidification.

Partial Monitoring System - Soil, provides information on the state and development of acidification of agricultural soil. Monitoring of acidification of forestland is part of the whole-European forest monitoring programme.

Comparing the outcomes of the I. and II. PMS-S monitoring cycles has shown that during the II. monitoring cycle with samples extracted in 1997 there were statistically inconclusive changes together with stabilisation of soil acidification. On the contrary, outcomes from the third monitoring cycle with the extraction year of 2002 showed significantly greater acidification tendencies, especially in cases of mollic fluvisols, cambisols, rendzinas, podsols, rankers, and lithomorphic soils.

The table shows the results obtained from the soil samples treated and analysed since 2008 for the IV. monitoring cycle with extraction of samples in 2007.

**Shown pH values dependent on active aluminium in selected SR soils for the A horizon within the basic partial monitoring system in fourth monitoring cycle (active Al determined in soils with pH in KCl of < 6.0)**

Soil representative	pH in H <sub>2</sub> O	Al in mg.kg <sup>-1</sup>	Al <sup>3+</sup> /Ca <sup>2+</sup>
		x	
Chernozems AL	7.14	-	-
Rendzinas AL	7.97	-	-
Rendzinas PG	7.27	3.925	0.25

AL – arable land, PG – permanent grassland, x – arithmetic average

Source: SSCRI

## • OZONE LAYER DEPLETION

### International liabilities concerning ozone layer protection

Due to the urgency of this global problem, the international community adopted at its UN platform a number of steps to eliminate the ozone layer depletion. First international forum with the first-ever mentioning of the ozone layer took place in Vienna in 1985, with the **Vienna Convention on the Ozone Layer Protection** signed there. In 1987, this document was closely followed by adopting the first enforcing protocol to the **Montreal Protocol on Ozone-depleting Substances**. Since that year, signatories to the Montreal Protocol met five times (in London (1990), in Copenhagen (1992), in Vienna (1995), in Montreal (1997) and in Beijing (1999)), to limit or, if necessary, totally eliminate the production and consumption of substances that deplete the ozone layer.

Slovakia made effective the **Montreal Annex** to the Montreal Protocol on February 1, 2000. This document prohibits Slovakia to import and export all controlled substances, including methyl bromide, from and to non-signatory countries, as well as sets forth the obligation to introduce a licensing system for import and export of controlled substances. In 2002, Act 408/2000 Coll. was adopted, which amends Act 76/1998 Coll. on the Earth's ozone layer protection and on amendment to Act 455/1991 Coll. on small business (Small Business Act) as amended, which transposed the decisive majority of responsibilities stipulated under the European Parliament and Commission Directive 2 037/2000 EC and banned the production of brom-chloro-methane, creating conditions for ratification of the **Beijing Annex** of the Montreal Protocol. (for Slovakia effective as from August 20, 2002).

### Consumption of controlled substances

Slovakia does not produce any ozone-depleting substances. All such consumed substances come from the export. These imported substances are used mainly in cooling agents and detection gases, solvents, and cleaning chemicals.

#### Consumption of substances under control in SR during 1998-2008 (tons)

Group of substances	1986/ 1989	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>AI - freons</b>	1 710.5	1.71 <sup>1)</sup>	1.69 <sup>1)</sup>	2.07	4.1	0.996	0.81	0.533	0.758	0.29	0.43	0.46
<b>A II - halons</b>	8.1	0	0	0	0	-	-	-	-	-	-	0
<b>BI* - freons</b>	0.1	0	0	0	0	-	-	-	-	-	-	0
<b>B II* - CCl<sub>4</sub></b>	91	0.07	0.08	0.022	0.03	0.01	0.009	0.047	0.258	0.045	0	0.016
<b>BIII* - 1,1,1 trichloroethane</b>	200.1	0	0	0	0	-	-	-	-	-	-	0
<b>C I*</b>	49.7	90.48	44.92	64.73	66.8	71.5	52.91	38.64	48.76	43.94	41.32	34.35
<b>C II -</b>	-	0	0	0	0	-	-	-	-	-	-	0

HBFC22B1												
E** - CH <sub>3</sub> Br	10.0	10.20	0	0	0.48	0.48	0.48	0.48	0	0	0	0
<b>Total</b>	<b>2 019.5</b>	<b>102.50</b>	<b>46.69</b>	<b>66.82</b>	<b>71.4</b>	<b>72.986</b>	<b>54.21</b>	<b>39.7</b>	<b>49.78</b>	<b>44.28</b>	<b>41.75</b>	<b>34.83</b>

# Initial usage

Source: MoE SR

\* Initial year 1989

\*\* Initial year 1991

<sup>1)</sup> Usage of substances in groups A I, B II a B III between 1996-2001 represents import of these substances for their analytical and laboratory use in accordance with the general exception from the Montreal Protocol

**Note 1:** Besides the indicated substances, another 250 tons of recycled tetrachloromethane and 20 tons of regenerated freon CFC 12 were imported in 1996, which (with reference to applicable methodology) are not counted in the consumption figures. The data from previous years on usage of substances in groups C I, C II and E are not available.

**Note 2:** Besides the indicated substances, another 40 tons of used Freon CFC 12 were imported in 1997, which (with reference to applicable methodology) are not counted in the consumption figures, and 2.16 tons of methyl bromide for Slovakofarma, which was used as base material for pharmaceutical production and with reference to applicable methodology also are not counted in the consumption figures.

**Note 3:** Besides the indicated substances, 8.975 tons of used coolant R 12 were imported in 1998, which belongs to group A I. With reference to applicable methodology of the Montreal Protocol it is not are not counted in the consumption figures.

**Note 4:** Besides the indicated substances, another 1.8 tons of used Freon CFC 12 were imported in 1999, which (with reference to applicable methodology) are not counted in the consumption figures, and 1.04 tons of methyl bromide for Slovakofarma, which were used as base material for pharmaceutical production and with reference to applicable methodology also are not counted in the consumption figures.

**Note 5:** In 2001, 0.48 tons of methyl bromide were imported for Slovakofarma, which were used as base material for pharmaceutical production and with reference to applicable methodology are not counted in the consumption figures.

**Note 6:** In 2002, 0.48 tonnes CH<sub>3</sub>Br were imported for Slovakofarma, which were used as base material for pharmaceutical product (Septonex) and with reference to applicable methodology are not counted in the consumption figures.

#### Usage of substances under control in 2008 (tons)

Usage	Group of substances							
	AI	A II	BI	B II	BIII	C I	C II	E
Coolant						34.35		
Fire extinguishers								
Isolating gases								
Detection gases, diluents, detergents	0.46			0.016				
Aerosols								
Swelling agents								
Sterilizers, sterile mixtures								

Source: MoE SR

### Total atmospheric ozone and ultraviolet radiation

The average annual value of total atmospheric ozone in 2008 was 319.5 Dobson units (D.U.), which is 5.5 % below the long-term average from measurements in Hradec Králové in 1962-1990. Values from these measurements have been used also for our territory as the long-term normal value.

#### Average monthly deviations within 2008

Month	1	2	3	4	5	6	7	8	9	10	11	12	Year
Average (DU)	323	324	375	362	355	328	316	290	291	275	287	308	319.5
Deviation (%)	-5	-12	-2	-6	-5	-8	-7	-10	-3	-4	-1	-1	-5.5

Source: SHMI

## • TROPOSPHERIC OZONE

**Average concentrations of tropospheric ozone** in the Slovak territory were growing during the years 1973-1990 by app.  $1 \mu\text{g.m}^{-3}$  per year. After 1990, in line with all Central European monitoring outcomes, no significant trend in average concentrations was recorded. Maximal concentrations were decreasing over the last decade. However, ground ozone values are more than two-times higher than they were in the beginning of this century. The exceptional year of 2003 showed extraordinary hot patterns with increased concentrations recorded at all stations. Ground ozone concentrations in the Slovak territory in 2006 were only slightly below the record-breaking values in 2003. Average annual concentrations of ground ozone in Slovakia in contaminated urban and industrial locations in 2008 were within the interval of  $46\text{-}92 \mu\text{g.m}^{-3}$ . Greatest average annual ground ozone concentrations in 2008 were recorded at the Chopok station ( $92 \mu\text{g.m}^{-3}$ ).

**Target value of ground ozone concentration in terms of public health protection** is set by the MoE SR Resolution No. 705/2002 Coll. on air quality quoting Resolution 351/2007 Coll. at  $120 \mu\text{g.m}^{-3}$  (max. daily 8-hour average). This value must not be exceeded on more than 25 days in of the year, for three consecutive years. The following table shows the summary of exceeding values measured over the period of 2006-2008. Concentrations exceeding the public alarm threshold value ( $240 \mu\text{g.m}^{-3}$ ) were no recorded in 2008. Two stations recorded figures that exceeded the information threshold ( $180 \mu\text{g.m}^{-3}$ ) - at Bratislava - Mamateyova (1 times) and at Kojšovská hoľa (2 times).

**Number of days with exceeded target value for protection of public health – 2006, 2007, 2008, average for 2006-2008**

Station	2006	2007	2008	Averaged in 2006-2008
Bratislava, Jeséniova	50	31	32	38
Bratislava, Mamateyova	34	37	24	32
Jelšava, Jesenského	31	50	22	34
Kojšovská hoľa	63	74	39	59
Košice, Ďumbierska	0	20	6	9*
Humenné, Nám. slobody	35	31	10	25
Stará Lesná, AÚ SAV, EMEP	44	36	32	37
Gánovce, Meteo. st.	39	25	14	26
Starina, Vodná nádrž, EMEP	27	18	5	17
Prievidza, Malonecpalská		21	13	17*
Topoľníky, Aszód, EMEP	41	46	39	42
Chopok, EMEP	53	66	66	62
Žilina, Obežná	30*	40	21	30

\* data from the year 2006 were not included in calculating the average, since the station did not measure during the summer season.

Source: SHMI



Target value for the **AOT 40 vegetation protection exposition index** is 18 000  $\mu\text{g}\cdot\text{m}^{-3}\cdot\text{h}$  (MoE SR Resolution No. 705/2002 Coll. on air quality quoting Resolution 351/2007 Coll.). This value applies to the concentrations calculated as the average for the period of five years. Average values for the years 2004-2008 were exceeded at all reference urban and rural stations, with the exception of Košice, Starina, Prievidza a Žilina.

**Values for the AOT 40 for vegetation protection - the year 2008 and for the averaged period of 2004-2008**

Station	Averaged in 2004-2008	2008
Bratislava, Jeséniova	23 033	20 644
Bratislava, Mamateyova	20 554	19 894
Jelšava, Jesenského	19 753	18 677
Kojšovská hoľa	25 167	19 811
Košice, Ďumbierska	*16 621	12 229
Humenné, Nám. slobody	19 946	14 998
Stará Lesná, AÚ SAV, EMEP	19 377	19 844
Gánovce, Meteo. st.	21 179	19 572
Starina, Vodná nádrž, EMEP	*15 692	11 648
Prievidza. Malonecpalská	**17 160	16 853
Topoľníky, Aszód, EMEP	23 851	25 159
Chopok, EMEP	29 925	32 240
Žilina, Obežná	17 942	16 816

\* data from the year 2006 were not included in calculating the average, since the station did not show enough measurements during the summer season.

\*\* the station did not measure data for enough years

Source: SHMI

The reference AOT 40 value for the protection of forests for annual reporting to EC is 20 000  $\mu\text{g}\cdot\text{m}^{-3}\cdot\text{h}$ , and is valid for urban, rural and rural reference stations. These stations show values that are exceeded every year, at some stations during the photochemical active years, the values are exceeded more than two times as much.

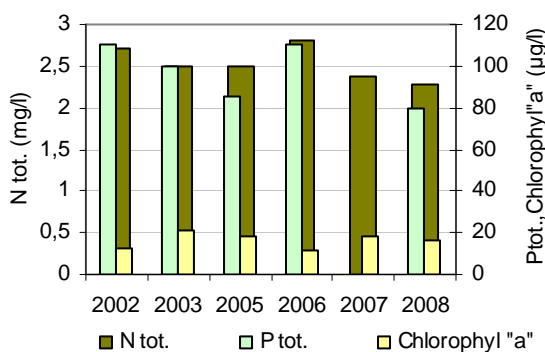
## • EUTROPHICATION

**Eutrophication** means enriching the water with nutrients, mainly nitrogen and phosphorus compounds, which causes an increased growth of algae and higher plant forms. This may bring about an undesirable deterioration in the biological equilibrium and quality of such water. Indicators for the surface water eutrophication include  $N-NH_4$ ,  $N-NO_3$ ,  $N-NO_2$ ,  $N_{org-}$ ,  $N_{tot-}$ ,  $P_{tot-}$ , with phosphorus as the limiting element being most critical in Slovakian watercourses.

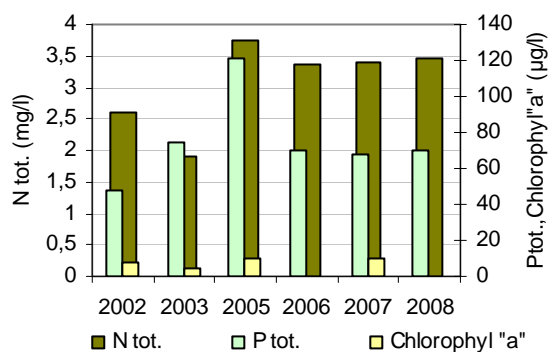
General requirements for the surface water quality are set forth in the Government Ordinance SR No. 296/2005 Coll. which introduces requirements on the quality and qualitative goals of surface water, as well as the limit indicator values for wastewater and special water contamination. Annex 1 of this Ordinance defines the recommended values for total nitrogen ( $9.0 \text{ mg.l}^{-1}$ ), total phosphorus ( $0.4 \text{ mg.l}^{-1}$ ), and chlorophyll „a“ ( $50.0 \text{ }\mu\text{g.l}^{-1}$ ). In 2008 total nitrogen and phosphorus concentrations in surface water in selected water courses did not exceed the limit values defined by the Government Ordinance. In this sense, the most problematic watercourses include Morava, Nitra, and Ipeľ. Nutrient concentrations are generally higher toward the mouth of the river.

### Trend in average annual nutrients and chlorophyll „a“ concentrations at selected abstraction sites of Slovak water courses in 2008

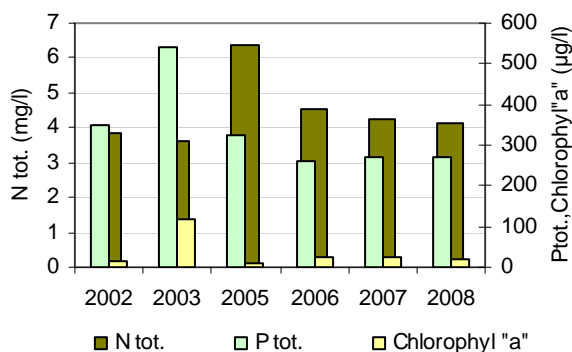
**Dunaj – Komárno stred 1 768 km**



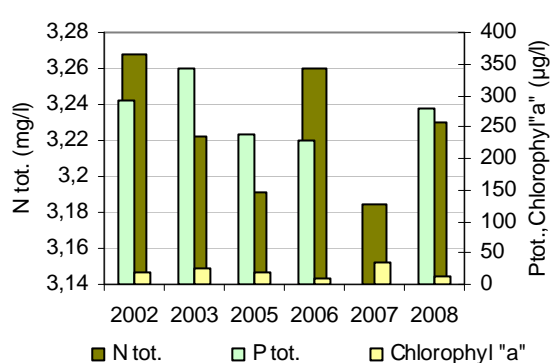
**Váh – Selice 47.7 km**



**Nitra – Komoča 6.5 km**



**Ipeľ – Salka 12 km**



Source: SHMI

## • NATURAL HERITAGE AND ITS PROTECTION

### Protected areas

#### ◆ Protected areas network

Pursuant to the **Act No. 543/2002 Coll. on nature and landscape protection**, the system of complex nature and landscape protection is carried out under 5 protection levels and in the following protected areas (PA) categories:

*1<sup>st</sup> level of protection - territory of the SR not included in any of the higher levels of protection*

*2<sup>nd</sup> level of protection - protected landscape area (PLA),*

*- protected landscape fragment (PLF),*

*- zone D of protected area,*

*- protective zone of the PA with 3<sup>rd</sup> level of protection.*

*3<sup>rd</sup> level of protection - national park (NP),*

*- protected site (PS),*

*- protected landscape fragment,*

*- zone C of the protected area,*

*- protective zone of the PA with 4<sup>th</sup> level of protection.*

*4<sup>th</sup> level of protection - protected site,*

*- nature reserve (NR), national nature reserve (NNR),*

*- nature monument (NM), national nature monument (NNM),*

*- protected landscape fragment,*

*- zone B of the protected area,*

*- protective zone of the PA with 5<sup>th</sup> level of protection.*

*5<sup>th</sup> level of protection - protected site,*

*- nature reserve, national nature reserve,*

*- nature monument, national nature monument,*

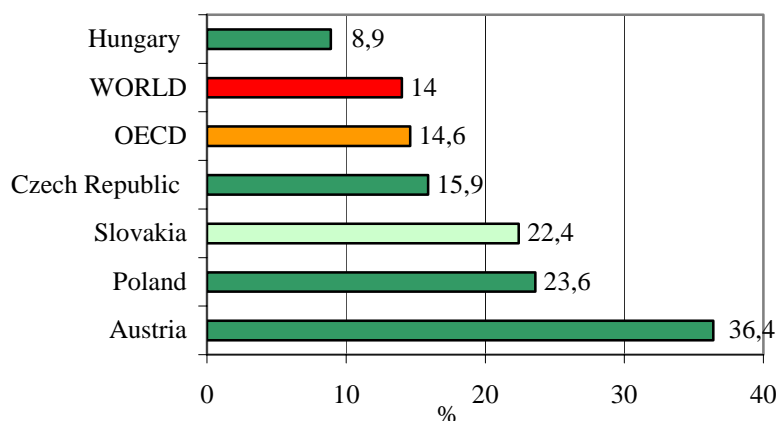
*- protected landscape fragment,*

*- zone A of the protected area,*

- *cave and cave protective zone,*
- *natural waterfall and protective zone of the natural waterfall,*
- *special protection area (SPA)*

In 2008, 4 new protected areas were **declared** (2 PS and 2 NR), 5 new protected trees, and 2 protected cave protection zones, **updated** were 15 protected areas (13 NM and 2 NNM), **cancelled** was 1 protected area (PS) and 10 protected trees.

### Proportion of PA on total size for selected countries



Source: OECD

**Protected areas in the Slovak Republic (state to 31<sup>st</sup> December 2008)**

Category	Number	Designated size of protected area (ha)	Designated size of protective zone (ha)	% of SR territory
Protected landscape areas	14	522 582	-	10.66
National parks	9	317 890	270 128	6.48+5.51
<b>NP + PLA together</b>	<b>23</b>	<b>840 472</b>	<b>270 128</b>	<b>22.65</b>
Protected landscape fragment	1	3	-	0.00
Protected sites	168	5 239	2 419	0.16
Nature reserves	386	12 999	244	0.27
National nature reserves	219	84 156	2 401	1.77
Nature monuments	240	1 600	260	0.04
National nature monuments	60	59	1 577	0.03
<b>Total SSPA*</b>	<b>1 074</b>	<b>104 056</b>	<b>6 903</b>	<b>2.26</b>
<b>Total 2<sup>th</sup>-5<sup>th</sup> level of protection (PA)</b>	-	<b>1 134 489</b>		<b>23.14</b>

\* SSPA – small-size protected areas

Source: SNC SR

In total, **in the territory of PLA** there are **242 small-size** protected areas (SSPA) (this represents 2.3 % of total PLA territory), while **in the territory of NP and their protective zones (PZ)** there are **269 SSPA** (12.5 % of the NP area and their PZs). **Outside PLA, NP, and NP PZ**, which means **the open landscape**, there are **563** small-size protection areas (0.7 % of the open landscape area).

◆ **Endangerment and degradation of the protected areas**

**The condition of protected areas** ranked into the 3<sup>th</sup> - 5<sup>th</sup> level of protection and protected trees is evaluated in 3 endangerment categories. Of the total number of 1 074 small-size protected areas in the 3<sup>th</sup> - 5<sup>th</sup> level of protection, there were **degraded** 35 territories of area of 356 ha (this area presents 0.3 % of total area of SSPA), 438 were **endangered** of area of 20 192 ha (18.2 % of SSPA) and in the **optimal condition** there were 601 territories of area of 90 411 ha (81.5 % of SSPA).

◆ **Care of the protected areas**

Professional nature protection organisations carried out **regulatory intervention** in the field of

practical care of the specially protected nature and landscape parts, with total cost of over 4.6 mil. SKK, with more impacts into this territory (mowing, tree cutting, elimination of younglings and other).

During the year 2008 State Nature Conservancy of the SR (SNC SR) elaborated 8 194 **nature and landscape impact proposals**. The biggest rate was created by the building and regional planning activities (31.0 %) and department of tree species protection (16.7 %). Viewpoints relating to species protection of the plants and animals created 11.9 %, forestry 8.8 %, territorial protection 7.4 %, water management 6.4 %, EIA 5.4 %, agriculture 4.3 % and inorganic nature 3.8 % of all viewpoints.

In 2008, professional nature protection organisations carried out **21 inventory surveys** within small-size protected areas (SPA). Presently, there are also **7 rescue programmes** approved for SPAs.

In 2008 there were (within the organisation units of State Nature Conservancy of the SR) **71 education paths and 36 education localities** put in operation. **13 information centres of nature protection** and the **Nature Protection School** in Varín were administered.

#### Review of Biosphere Reserves and Ramsar-wetlands in selected countries

		Slovakia	Czech Rep.	Poland	Hungary	Austria
<b>Biosphere Reserves (BR)</b>	Number	4	6	9	5	6
	area (km <sup>2</sup> )	407.0	546.8	1 450.8	2 414.5	1 199.6

CR) BR: one common with Poland.

Slovakia) BR: one common with Poland and one with Ukraine.

Poland) BR: one common with Czech Republic and with Slovakia and one with Slovakia and Ukraine.

Source: SNC SR

#### ◆ NATURA 2000 in Slovakia

- **Sites of Community Importance (SCI)** are proposed for **44 plant, 96 animal species and 66 types of biotopes**.

Into the **proposed list** of the SCI there were listed **382 territories** with the area of **573 690 ha**. The territories cover **11.7 % of the SR area**, lapping with present network of protected areas is **86 %**. From the total area of the SCI, there is 86 % on forest land, 10 % is on agricultural land, 2 % is created by water areas and 2 % are other areas.

National list of SCI was published *on the basis of the MoE SR Edict* of July 14, 2004, which publishes the national list of the sites of Community importance. These territories are presently under the so-called preliminary protection, which means the proposed protection level.

- With the European Commission approving the decisions for the **Pannonian** and **Alpine** biogeographical areas, the process of approving Sites of Community importance was completed for Slovakia, while 381 SCIs from the national list became Sites of Community importance;
- Publishing the decisions marked the start of a **6-year time limit** for the declaration of SCIs as protected areas. Since 170 SCIs are located within the national network of protected areas, there is not need to declare them again. The process of declaration involves 97 SCIs that do not overlap with the

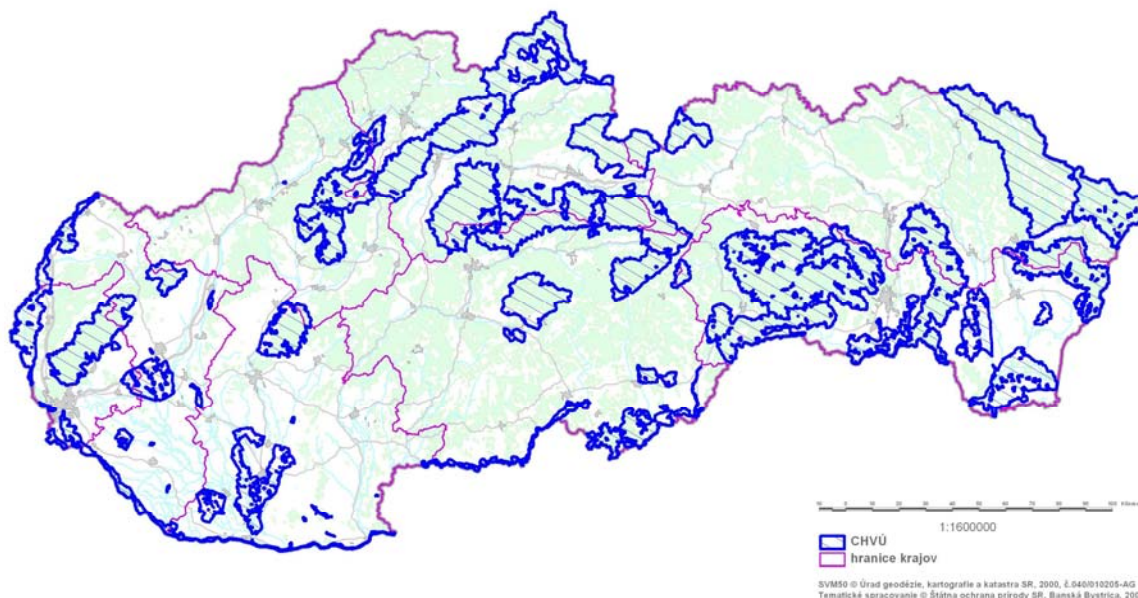
national network of protected areas, while 114 SCIs partially overlap with the inventory, all declared by the Slovak Republic in line with the national legislation of the PS and NR categories;

- On the basis of the outcomes of bio-geographical seminars, Slovakia was required to complete the SCIs national list. In relation to the Slovak Government Resolution 256/2008 (Re-evaluation of the Natura 2000 network) a number of SCIs additions was discarded, adjusted, or complemented.
- To add, the Alpine bio-geographic region followed up on the outcomes of the bio-geographic seminars, with marking 17 habitats and 23 species. No new territories were added for 1 habitat and 5 species. There was a need to add territories for 16 habitats and 29 species in the Pannonian bio-geographic region. No new territories were added for 1 habitat and 2 species. The reason for not designating of territories for these habitats and species is the absence of knowledge on their occurrence outside the SCIs approved by the European Commission, despite the implemented surveys.

- **Special Protection Areas (SPA)** - national list of pSPA includes **38 SPA** with total area of **1 154 111 ha** and covers **23.5 % of the SR area** and lapping of pSPA with the existing network of protected areas in the SR presents 55 %.

The Slovak Government approved the SPA national list on July 9, 2003. In 2004 began the process of creating resolutions and care programmes for individual special protection areas. As of the end of 2008, there **were declared 19 SPAs** by a single resolution.

**Special protection areas in SR**



Source: SNC SR

**Agricultural and forestland in the NATURA 2000 territories**

NATURA	Number	Area (ha)	Agricultural land	Share of agricultural	Forest land	Share of forest
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2000			area (ha)	land (%)	area (ha)	land (%)
SPA	38	1 236 545	365 102	29.5	655 622	53.0
SCI	382	573 690	54 657	9.5	497 295	86.7

Source: SNC SR

### Comparison of the pSCI and pSPA areas in Slovakia with selected countries of EU

Country	SPA			SCI		
	number	area (km <sup>2</sup> )	% of country area	number	area (km <sup>2</sup> )	% of country area
Austria	98	9 744	11.6	168	8 889	10.6
Czech rep.	38	6 936	8.8	858	7 251	9.2
Hungary	55	13 519	14.5	467	13 929	15.0
Poland	124	50 407	16.1	362	28 490	9.1
Slovakia	38	12 236	25.1	382	5 739	11.8
EU-25*	<b>4 850</b>	<b>501 286</b>	<b>10.3</b>	<b>21 574</b>	<b>648 441</b>	<b>13.2</b>

\* only terrestrial NATURA 2000 sites

Source: SNC SR

### Protected trees

The network of protected trees in 2008 was created by 466 protected trees and their groups including alleys (protected objects). Physically it is represented by 1 282 solitary trees of 67 taxons, including 32 domestic and 35 alien taxons.

There were 280 in the **optimal** state (60 %), 149 were **endangered** (32 %) and 37 **degraded** (8 %) of the protected trees and their groups.

### Protected minerals and fossils

Protection of minerals and fossils is regulated by § 32 and § 38 of Act No. 543/2002 Coll. on nature and landscape protection and Decree of MoE SR No. 213/2000 Coll. on protected minerals and protected fossils and on their social evaluation, which stated the list of protected minerals and protected fossils and their social value.

The list of **protected minerals** includes:

- 12 typological minerals, first time scientifically documented from the Slovak territory,
- 61 significant minerals or rare occurrence in Slovak sites, and having European significance, or minerals with specific morphological shape or trend,
- meteorites found in Slovakia's territory.

The list of **protected fossils** includes:

- 655 typological fossils that represent an irreplaceable, unique material of extinct plants and animals that served to describe the specific taxonomic group for the first time,
- selected groups of fossils with rare occurrence that thanks to their characteristics and degree of preservation are unique testimonies of the evolution of organisms in the Slovak geological past.

The samples of protected minerals and protected fossils are deposit especially in the collections of state nature scientific museums.

## • MONUMENT FUND AND ITS PROTECTION

### Monument fund

#### Trend in the structure of immovable national cultural monuments (NCM) by types

Categorization of immovable NCM*	2001	2002	2003	2004	2005	2006	2007	2008
Architectural monuments	7 549	7 612	7 650	7 709	7 738	7 799	7 802	8 069
Archaeological monuments	342	343	351	354	360	368	369	376
Historical monuments	1 398	1 410	1 373	1 405	1 386	1 382	1380	1394
Historical gardens and parks	335	337	339	339	340	341	344	344
Folk architecture monuments	1 821	1 812	1 784	1 837	1 833	1 823	1 821	1 902
Technical monuments	458	462	451	449	454	484	496	500
Art work monuments	819	943	947	977	1 005	1 015	1 007	1 367
<b>Total</b>	<b>12 722</b>	<b>12 919</b>	<b>12 895</b>	<b>13 070</b>	<b>13 116</b>	<b>13 212</b>	<b>13 228</b>	<b>13 952</b>

\* Presented is the number of monument buildings, which comprise the immovable NCM.

Source: MB SR

To 31<sup>st</sup> December 2008, there were 9 539 **immovable national cultural monuments** in Slovakia consisting of **13 952 monument buildings** and **14 493 movable national cultural monuments** (98 % of it has sacral character), which consist of **31 220** cultural articles.

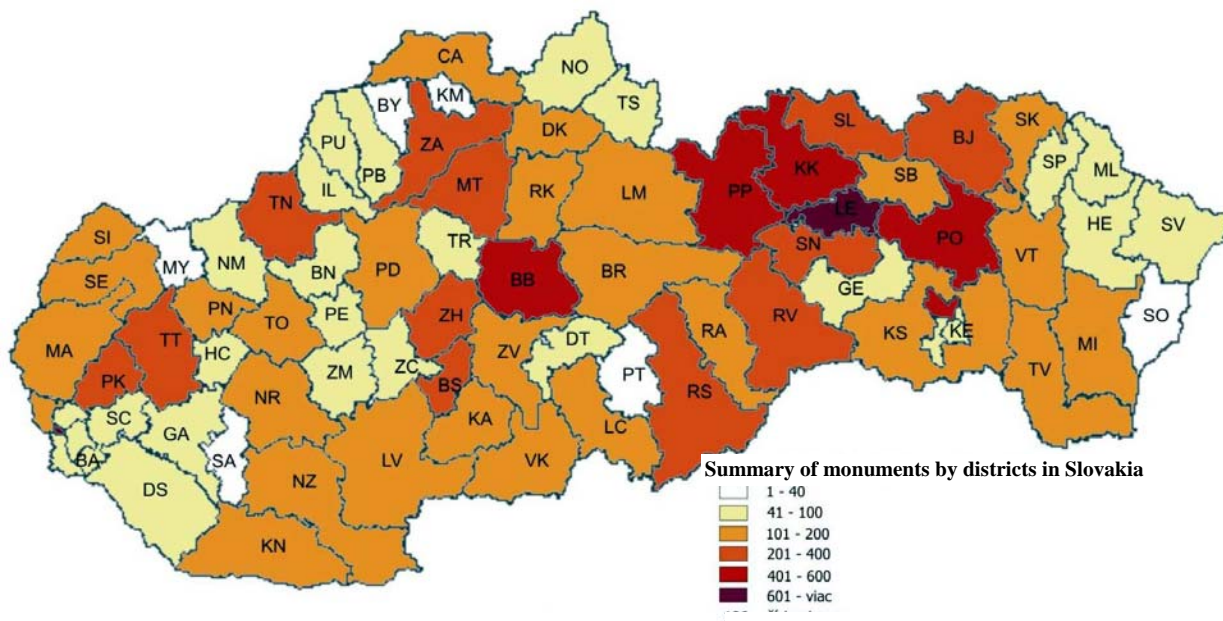
Literary sources point to the past existence of 300 **castles** in Slovakia. Presently, the 9 539 immovable national culture monuments include 109 **castles** and 436 **mansions**. **Monument objects** within the NCM in 2008 register:

- 561 mansions and family households
- 109 castles
- 77 monasteries
- 1571 churches
- 1 329 people's government houses
- 2 400 manor houses
- 189 palaces and villas
- 642 road sculptures and crosses
- 506 commemorative wall tablets and commemorative sites

As of 2008, there were 48 **unused** cultural monuments in Slovakia (according to the MB SR catalogue).

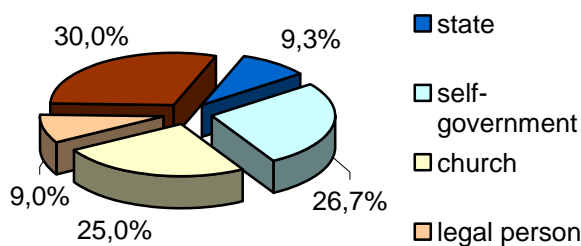
#### Summary of monuments by districts in Slovakia





Source: MB SR

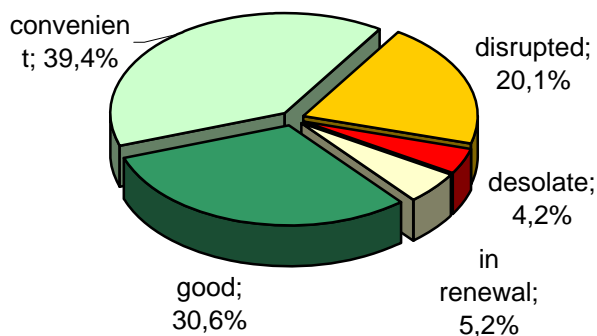
**Ownership form of cultural monuments in 2008**



Source: MB SR

In terms of the **construction and technical state**, there were 2 808 immovable national cultural monuments that were damaged, 654 were in desolate condition, and 729 were in renewal (5.2 %). In 2008, condition of the monuments was stabilised, there was a slight improvement to the condition of monuments within the municipal monument reserve. 70 % of all monuments are in satisfactory (good and convenient) condition.

**Construction-technical state of immovable NCM in 2008**



Source: MB SR

Preservation of monuments in SR is provided by Act No. 49/2002 Coll. on the protection of monuments and historic sites.

Besides the preservation of the historical monuments – the objects as solitaires, the monument fund is also area preserved in the monument areas: monument reserves and monument zones.

### Historical settlement structures in the Slovak republic (2008)

Historical settlement structures (HSS)	Total number of HSS
Town reserves	18
Folk architecture reserves	10
Historical preserved parks	340
Monument zones	83

Source: MB SR

#### Town reserves

Historical settlement structures		
Town reserves	Proclamation	Number of CM
1. Banská Bystrica	18.5.1955	200
2. Banská Štiavnica	11.6.1950	191
3. Bardejov	11.6.1950	131
4. Bratislava	5.10.1954	264
5. Kežmarok	11.6.1950	256
6. Košice	2.2.1983	500
7. Kremnica	11.6.1950	116
8. Levoča	11.6.1950	339
9. Nitra	21.1.1981	23
10. Podolíneč	11.6.1991	63
11. Prešov	11.6.1950	257
12. Spišská Kapitula	11.6.1950	24
13. Poprad - Sp. Sobota	11.6.1950	89
14. Svätý Jur	23.5.1990	26
15. Štiavnické Bane	15.8.1995	20
16. Trenčín	11.9.1987	112
17. Trnava	11.9.1987	139
18. Žilina	11.9.1987	58

Source: MB SR

#### Folk architecture reserves

Historical settlement structures		
Folk architecture reserves	Proclamation	Number of CM
1. Brhlovce	14. 9. 1983	25
2. Čičmany	26. 1. 1977	36
3. Osturňa	3. 10. 1981	135
4. Plavecký Peter	23. 5. 1990	28
5. Podbiel	14. 9. 1977	56
6. Sebechleby	21. 1. 1981	89
7. Špania Dolina	10. 1. 1979	83
8. Veľké Leváre	21. 1. 1981	25
9. Vlkošinec	26. 1. 1977	73
10. Ždiar	14. 9. 1977	183

Source: MB SR

### Restoration of cultural monuments

In 2008, there was 163 101.5 thous. SKK in contributions by the MoC SR to the restoration of national cultural monuments in the SR within **370 projects**. The funds came from the programme "**Let us renovate our house**". It is a complex development programme that supports renewal of national cultural monuments.

#### Contributions of MoC SR for the restoration of national cultural monuments from the programme "Let us renovate our house"

Number of projects	160	920	323	513	389	370
Total funding (thousands SKK)	24 000	118 380	94 648	116 335 000	109 674 000	163 101 500

Source: MB SR

## • SLOVAK CONTRIBUTION TO THE WORLD HERITAGE

### Sites enlisted under the World Heritage List

In 2008, the **World Heritage List** contained **887** sites (including 688 cultural, 174 natural, and 25 mixed) from **148** signatory countries to the *Convention concerning the protection of World culture and natural heritage*.

#### Trend in total number of sites in World Heritage List

	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>Number of enlisted sites</b>	690	721	730	755	788	811	851	878	887
<b>including cultural</b>	-	554	563	582	611	630	660	679	688
<b>natural</b>	-	144	144	150	154	159	166	174	174
<b>mixed</b>	-	23	23	23	23	23	23	25	25
<b>Number of Convention signatory countries</b>	-	-	125	134	134	137	141	145	148

Source: MoC SR

On July 7, 2008 in Quebec, another Slovak site was added on the World heritage list – „**Wooden churches in the Slovak part of the Carpathian arch**“. These represent a group of nine wooden objects – eight churches and one (detached) bell tower – of three confessions, dating back to the 16-18th centuries: *Roman-catholic churches in Hertvanovo and Tvrdošín, Lutheran articular churches in Kežmarok, Leštiny and Hronsek (church and bell tower), and churches of the eastern office in Bodružal, Ladamírová and Ruská Bystrá*. Original wood architecture in the Carpathian arch is considered by the World heritage committee an „important example of rich local tradition of religious culture, where the Latin (western) and the Byzantine (eastern) cultures meet. Meanwhile, it represents a symbiosis of folk and professional architecture and reflects the context of the time of its creation.

**In Slovakia, seven sites were put on the World Heritage List as of 2008.**

#### Under cultural heritage:

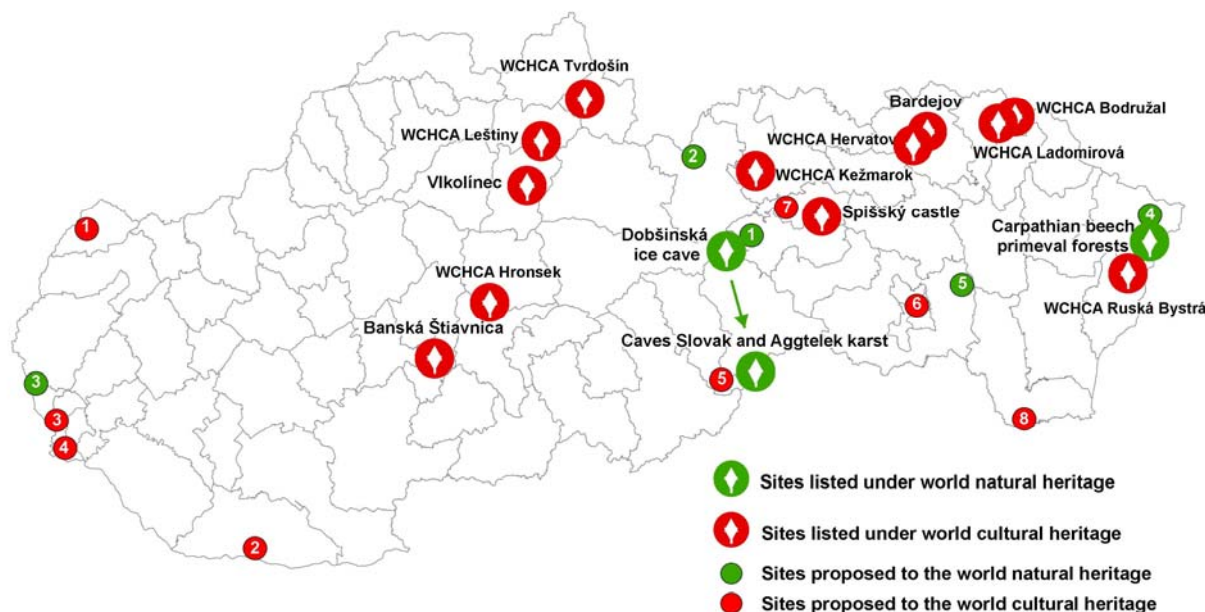
- **Vlkolíne**c Folk Architecture Reserve, local district of Ružomberok (Cartagena, 1993),
- **Spišský** castle and cultural monuments in its surroundings in protective zone of NCM - Spišská Kapitula, Spišské Podhradie, Church of the Holy Ghost in Žehra (Cartagena, 1993),
- **Banská Štiavnica** with neighbouring technical monuments (Banská Štiavnica, Hodruša–Hámre, Štiavnické Mines, Banská Belá, Voznica, Vyhne, Banský Studenec, Počúvadlo, Kopanica, Kysihýbel, Antol, Ilija; especially 23 water dams - tajchas) (Cartagena, 1993),
- Historical Town Reserve of **Bardejov** also with the protective zone, including the Jewish suburb (Cairns, 2000),

- **Wooden churches** of the Slovak part of the Carpathian arch (wooden churches - Hervatov, Tvrdošín, Leštiny, Kežmarok, Hronsek, Bodružal, Ladomirová, Ruská Bystrá) (Quebec, 2008).

**Under natural heritage:**

- **Caves of the Slovak and Aggtelek karst** (Berlín, 1995), to which was added **Dobšinská ice cave** in 2000, including Stratenská cave and Psie diery cave as a one cave system in Duča hill (Cairns, 2000),
- **Beech primeval forests of the Carpathians** (Christchurch, 2007) together with Ukraine.

**World cultural and natural heritage in the SR**



Source: SEA

**Comparison of the number of World Heritage sites (WH) with the surrounding countries to 2008**

Country	Number of WH sites (cultural/natural)
Slovakia	7 (5/2)
Czech Republic	12 (12/0)
Poland	13 (12/1)
Hungary	8 (7/1)
Austria	8 (8/0)
Ukraine	4 (3/1)

Source: UNESCO

**Sites proposed to be placed on the World Heritage List**

The proposed sites to be placed on the list for nomination to the world heritage to 2008 include:

**Under cultural heritage**

1. **Great Moravian settlements:** Slavic fortification complex in Mikulčice and the St. Margaret Church in Kopčany,
2. **Komárno – fortification against the Turks** (together with Hungary),
3. **Monument to Chatam Sófer** in Bratislava,
4. **Limes Romanus – Roman monuments on the middle Danube** (together with Austria, Hungary, in Slovakia only Iža and Rusovce),
5. **Gemer and Abov churches with medieval wall paintings** (planned project with Hungary),
6. **Historic Centre of Košice** (lens-shaped square),
7. **Monuments and landscape of Spiš** (the area around Spišský castle and the surrounding world heritage monuments – with added historical centre of Levoča and the work of the Master Paul),
8. **Tokay vineyard area** (Černov, Veľká Táža, Malá Táža, Slovenské Nové Mesto, Černochovej, Bara, Viničky; inclusion into the Tokay vineyard area in Hungary).

#### **Under nature heritage**

1. **Original meadow pastures** in Slovakia,
2. **Nature reserves of the Tatras** (together with Poland),
3. **Nature and cultural landscape in the sub-Danubian region** (anticipated common proposal with the Czech Republic),
4. **Mycoflora of the Bukovské hills,**
5. **Geysir in Herľany.**

In 2008, nomination projects for the municipal monument reserve Levoča, and a common project with the Czech Republic - Monuments of the Great Moravia (sites of Kopčany and Mikulčice) were prepared.

## • SPATIAL DISTRIBUTION AND FUNCTIONAL USE OF TERRITORY

### Settlement and demographic trend

Since 2003, there has been a rising trend in reproduction potential, birthrate is increasing, number of abortions have dropped, and the number of immigrants has also increased. **Total increment** compared to the previous year was 3 895 inhabitants, mainly due to immigration. As of December 31, 2008, population count in the Slovak Republic reached the number of **5 412 254**. There was **natural increment** in population count, which builds on the positive trend from 2004 that was preceded by a three-year reduction. (2001-2003).

### Basic data about the migration of population in the SR (2008)

Territory	Live births	Dead	Natural increment (loss)	Migration increment (loss)	Total increment (loss)	Number of inhabitants (to 31 <sup>st</sup> December 2008)
Bratislavský region	6 840	5 792	1 048	4 680	5 728	616 578
Trnavský region	5 358	5 468	-110	2 893	2 783	559 934
Trenčiansky region	5 420	5 880	-460	488	28	599 859
Nitriansky region	6 508	8 062	-1 554	1 171	-383	706 375
Žilinský region	7 407	6 800	607	42	649	696 347
Banskobystrický region	6 381	7 019	-638	-333	-971	653 697
Prešovský region	10 022	6 760	3 262	-1 246	2 016	803 955
Košický region	9 424	7 383	2 041	-635	1 406	775 509
<b>Slovak Republic</b>	<b>57 360</b>	<b>53 164</b>	<b>4 196</b>	<b>7 060</b>	<b>11 256</b>	<b>5 412 254</b>

Source: SO SR

### Structure of the settlement in the SR (to 31<sup>st</sup> December 2008)

Territory	Area (km <sup>2</sup> )	Number of inhabitants per km <sup>2</sup>	Number of independent municipalities	Average number of inhabitants per municipalities	Urbanization level (%)	
					Urban area	Rural area
Bratislavský region	2 053	300,3	73	8 446,3	82,30	17,70
Trnavský region	4 147	135,0	251	2 230,8	48,57	51,43
Trenčiansky region	4 502	133,2	276	2 173,4	56,80	43,20
Nitriansky region	6 343	111,4	354	1 995,4	46,80	53,20
Žilinský region	6 808	102,3	315	2 210,6	50,30	49,70
Banskobystrický region	9 455	69,1	516	1 266,9	53,47	46,53
Prešovský region	8 974	89,6	666	1 207,1	49,25	50,75
Košický region	6 752	114,9	440	1 762,5	55,72	44,28
<b>Slovak Republic</b>	<b>49 034</b>	<b>110,4</b>	<b>2 891</b>	<b>1 872,1</b>	<b>55,03</b>	<b>44,97</b>

Source: SO SR

### Index trend in the SR area structure

Trend in the structure of areas of Slovakia in 2008 was affected by further **loss of agricultural land types and arable land types**, giving way to forest land, non-agricultural, and non-forested land types. Compared to 2007, the loss of agricultural land types has grown by 3 637 ha, to the present figure of -5

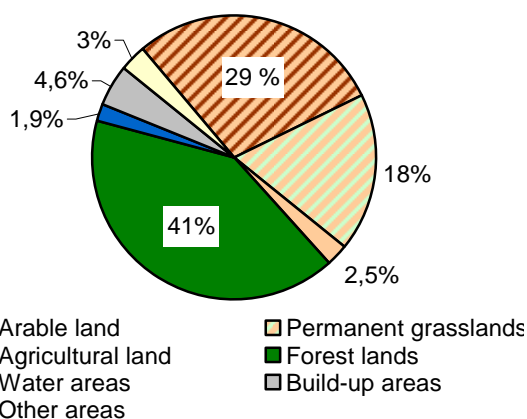
421 ha. Of this, the loss of arable land was greater by 2 583 ha and represents -4 044 ha. As opposed to 2007, the size of forested land increased by another 912 ha (reaching 1 115 ha).

**Overall land categories to 31<sup>st</sup> December 2008 (ha)**

Region	Arable land	Hop-field	Vineyard	Gardens	Orchards	Permanent grasslands	Agricul. land	Forest lands	Water areas	Built-up areas	Other areas	Total area
BA	73 423	.	4 591	4 543	961	9 987	93 504	75 195	5 769	15 958	14 841	205 268
TT	262 098	129	4 264	8 202	2 459	14 763	291 916	65 253	15 620	27 773	14 107	414 668
TN	97 844	354	77	8 122	2 596	96 360	185 353	220 889	6 366	23 405	14 203	450 216
NR	406 761	36	12 150	14 179	4 978	30 566	468 669	96 337	15 691	37 902	15 784	634 384
ZA	62 615	.	.	6 112	398	175 938	245 063	380 173	12 809	25 208	17 624	680 878
BB	166 204	.	3 307	11 102	1 864	235 093	417 571	462 763	7 907	33 204	23 999	545 443
PR	148 886	.	23	10 840	2 034	222 153	383 936	440 742	12 122	31 497	27 088	897 385
KE	204 022	.	2 845	13 536	2 070	114 992	337 466	266 905	16 291	34 112	20 688	675 462
<b>Total</b>	<b>1 421 022</b>	<b>520</b>	<b>27 258</b>	<b>76 636</b>	<b>17 360</b>	<b>879 853</b>	<b>2 423 478</b>	<b>200 905</b>	<b>94 575</b>	<b>229 059</b>	<b>148 335</b>	<b>4 903 704</b>

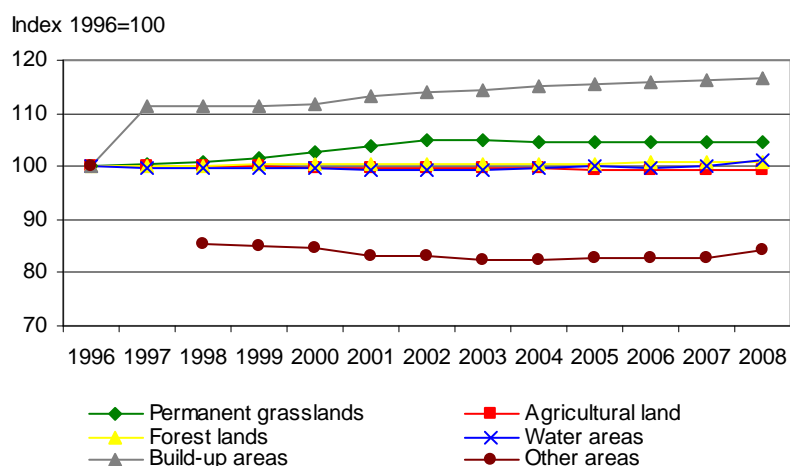
Source: IGCC SR

**Areas structure in the SR (2008)**



Source: IGCC SR

**Index trend in areas structure of SR**



Source: IGCC SR

**Green in the residential areas**

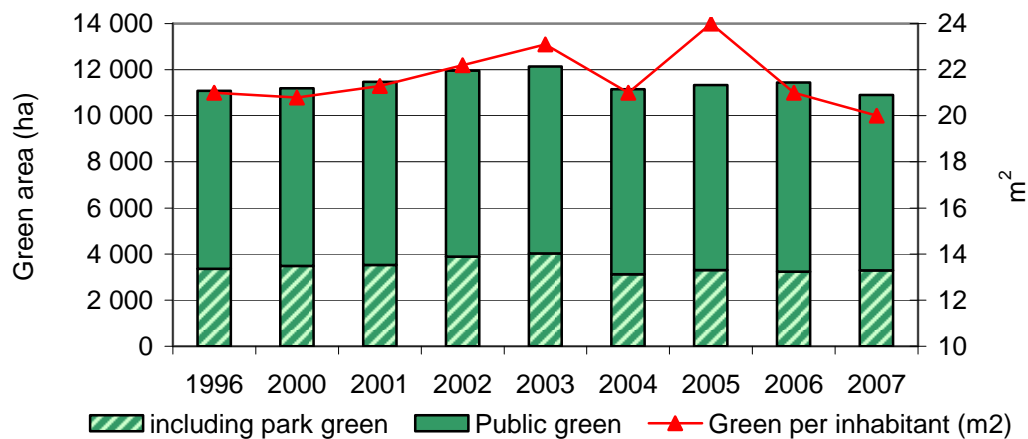
As of 2007, areas of municipal green in the SR reached 10 904 ha, including 3 295 ha of park green areas. Its share per one inhabitant was 20 m<sup>2</sup>.

**Area of municipal green of the SR by regions (2007)**

Region	Public green (ha)		including park green (ha)		Green per inhabitant (m <sup>2</sup> )	
	towns and villages	including towns	towns and villages	including towns	towns and villages	including towns
BA	1 152	939	372	276	19	19
TT	1 446	809	402	136	26	30
TN	1 287	917	338	191	21	27
NR	1 953	973	590	172	28	29
ZA	610	400	279	166	9	11
BB	1 468	873	432	255	22	25
PR	1 349	863	378	202	17	22
KE	1 638	1 042	486	209	21	24
<b>Total</b>	<b>10 904</b>	<b>6 817</b>	<b>3 295</b>	<b>1 608</b>	<b>20</b>	<b>23</b>

Source: SO SR

### Trend of public green in SR



Source: SO SR

### Spatial planning

Main document of spatial planning in the Slovak Republic is the Strategy of Spatial Development of Slovakia, which was approved by the SR Government. Ministry of construction and regional development of the SR that elaborates the strategy is also responsible for its periodical revisions.

KURS 2001 is a physical planning documentation of the national importance. Objectives of physical planning strategy mentioned in the documentation form the basic framework and give direction for the Slovak spatial development within international and national domains. In their recommendations, the strategy fully follows the outcomes of the European spatial concepts – building on their objectives and creatively applying them for the Slovak conditions.

All self-governing regions have valid physical plans that are updated on the need-to-need basis, pursuant to the provisions of Act 50/1976 Coll. on physical planning and building code (Construction Law) as amended.

Pursuant to the Edict of the Ministry of Construction and Regional Development of SR of August 8, 2005 on providing subsidies for development of physical documentation of municipalities, the Ministry has been giving subsidies since 2006.

Subsidies from the Ministry budget to create physical-planning documentation of municipalities:

- year 2006 total 1 mil. SKK (7 municipalities)
- year 2007 total 1.9 mil. SKK (16 municipalities)
- year 2008 total 7 mil. SKK (32 municipalities).

### European Landscape Convention



European Landscape Convention (ELC) as the Council of Europe's Convention **focuses on landscape protection, management, landscape planning, and organisation of European cooperation in this area.**

It became effective on March 1, 2004. On December 31, 2006, other 26 Council of Europe member countries acceded to it or ratified it, and 8 other member countries signed the Convention.

The Convention was signed in Slovakia on May 30, 2005, its ratification took place on August 9, 2005. **The Convention became effective in Slovakia on December 1, 2005.**

**As of December 31, 2008**, 36 countries acceded to the convention, 29 countries ratified it and another two countries made it effective (Sweden and Hungary), i.e. the legislation is effective in 30 countries within the Council of Europe.

**MoE SR** is the competent authority for coordination and management of obligations and cooperation with the affected ministries within the ELC in Slovakia, including the Ministry of Construction and Regional Development SR, Ministry of Culture SR, and Ministry of Agriculture SR. **SEA** (Slovak Environmental Agency) is the executive authority for the MoE SR.

#### **Assessment of implementation of the European Landscape Convention in 2008:**

The year of 2008 in the context of implementation of the convention was marked mainly by preparatory activities on the accompanying legislation of the convention, organizing educational activities for the professional and lay public, building of platform for professional cooperation with international institutions, especially with the Ministry of Environment of the Czech Republic, Council of Europe, and land survey oriented mainly on the area of the White Carpathians. Major activities include organizing the Land - Man - Culture conference in 2008, dealing with new professional perspectives on approaches to landscape conservation.

### **Village Renewal Program**

**Village Renewal Program (VRP)**, over ten years of its existence showed, that is one of the popular and successful instruments for rural development in developed European countries. Countries and regions that are part of the European working community for village renewal and rural development (with headquarters in Vienna) have been applying this instrument for more than 20 years. **Slovakia** has been a member of this community through its Ministry of Environment since 1997, and has been implementing this Program since 1998.

**Main objective** of the VRP is to create organisational and economic conditions to foster activities and support urban and rural populations to improve their environment, preserve natural and cultural values of rural landscape, and to develop environment-friendly management of domestic resources. This is implemented by **SEA**, that receives applications from local governments and rural micro-regions to support their activities through its counselors and secretariat for VRP, organises a national contest called The Village of the Year, and officially represents the Resort before international organisations.

Beside the indirect support, the Program also provides for **financial form of government support** - this is a system of small subsidies, typically several tens of thousand SKK per municipality.

**In 2008, the VRP support** reached total volume of **25 mill. SKK**. Subsidy categories were adjusted to take into consideration the preferences of the Ministry of Environment.

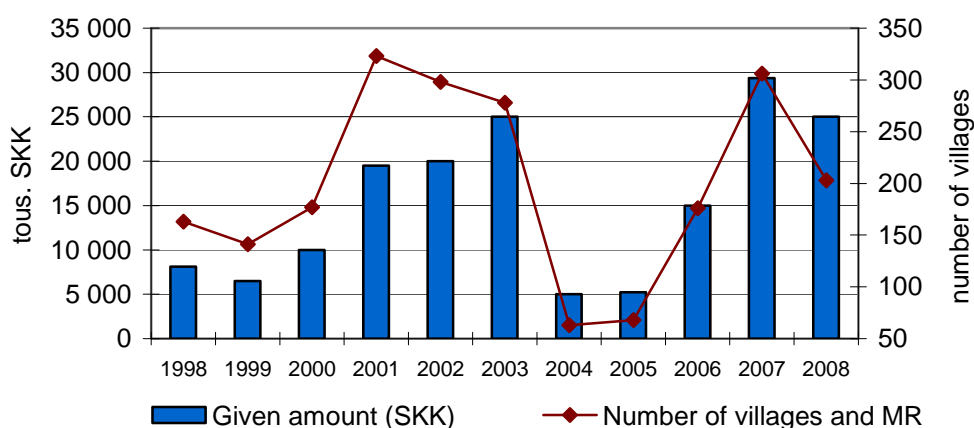
**Total overview of allocating the subsidies to VRP in 2008 (SKK)**

1/ studies, project documentations and SD programmes *		2A/ small realizations		2B/ edification and advertising		Total of 1 - 2	
Number of villages and MR**	Given amount	Number of villages and MR	Given amount	Number of villages and MR	Given amount	Number of villages and MR	Given amount
69	7 340 000	120	15 330 000	14	2 330 000	<b>203</b>	<b>25 000 000</b>

\* SD – sustainable development \*\* MR – micro-regions

Source: SEA

**Trend of allocating the subsidies to VRP**



Source: SEA

Every two years since 1990, *European Working Community for Rural Development and Village Renewal* (ARGE) organises a competition for the "**European Award for Village Renewal**". For the first time ever, in 2002, Slovakia sent its representative – winner of the national competition called „**Village of the Year**“. It was the Soblahov village from the district of Trenčín, while in 2004 it was the village of Hrušov from the district of Veľký Krtíš that had won the competition in 2003, in 2006 it was the village of Vlachovo from the district of Rožňava that had won the competition in 2005 and in 2008 it was the village of Liptovská Teplička from the district of Poprad that had won the competition in 2007.

**In 2008**, the village of **Liptovská Teplička** represented Slovakia at the 10th European Village Renewal Award competition. Motto of the competition was: "*Future through social innovations*" with the Italian village of Sand in Taufers from the southern Tirol becoming the winner from among 29 contesting municipalities. The village of Liptovská Teplička achieved a big success - it fought to become the winner of the competition with other 6 villages, and eventually got away with the European Village Renewal Prize for its complex, sustainable village renewal programme of an outstanding value.

## ENVIRONMENTAL REGIONALISATION

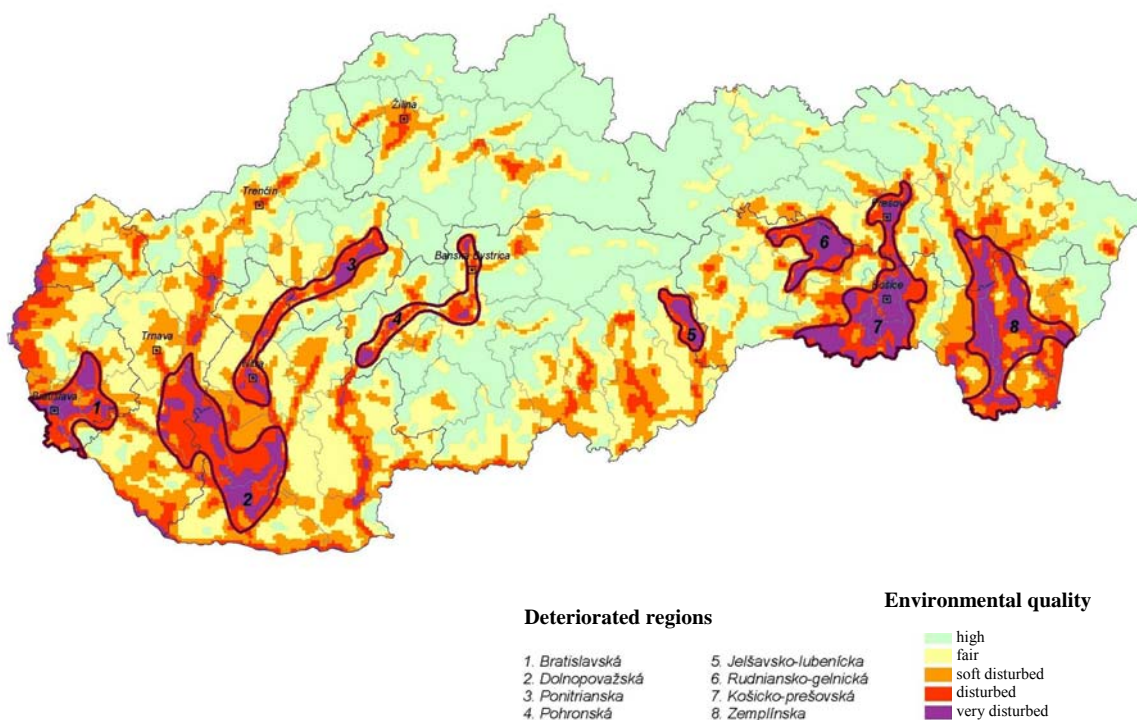
### • ENVIRONMENTAL REGIONALISATION OF SLOVAKIA

**Environmental regionalisation** of Slovakia represents a cross-sectional source of information on the state of environment and reflects differentiated state of environment in different parts of the country. Regions show varying degree of individual environmental loads and also show different risk factors. These impacts, loads, or hazards show (along with a variety of natural conditions) mainly anthropogenic characteristics.

The process of environmental regional classification marks regions of certain quality or level of endangerment of the environment through analyses of individual components (including the risk factors) of environment as well as partial syntheses within the very component of environment or inter-component syntheses, respectively.

One of the final outputs is a map that evaluates the Slovak territory in 5 degrees of quality of environment, which is the basis for identification of areas with the greatest **environmental load**.

#### Quality of the environment (updated in 2008-2009) and the loaded areas



Source: SEA

A number of new trends existing in the Slovak territory may be identified from the updated map showing the original loaded areas (LA):

- territory of some loaded areas has been reduced (e.g. Pohronská LA, Košice-Prešov LA in its northern

- extension in the direction to Prešov),
- size of the core territories within the top 5th environmental quality category was decreased to the minimum level (e.g. Rudňany-Gelnica LA),
  - it will be appropriate to review the size of some LA in the time to come (e.g. Zemplín LA, Dolnopovažská LA),
  - there is a territory located especially in the area of the middle Považie region, which is to be shortly identified and classified as a LA.

#### Differentiation of the Slovak territory by environmental quality

Quality of environment	Size (km <sup>2</sup> ) by 2007	% of the SR size by 2007	Size (km <sup>2</sup> ) after 2008	% of the SR size after 2008	Difference in size (km <sup>2</sup> )	Difference %
1 - high quality environment	19 661	40.0	27 714	56.5	+ 8 053	+ 16.5
2 - sufficient environment	12 580	25.7	11 243	22.9	- 1 337	- 2.8
3 - slightly impacted environment	9 055	18.5	4 256	8.7	- 4 799	- 9.8
4 - impacted environment	5 296	10.8	5 060	10.3	- 236	- 0.5
5 - significantly impacted environment	2 442	5.0	760	1.6	- 1 682	- 3.5

Source: SEA

#### Basic parameters of the loaded areas (LA)

LA	Area* (km <sup>2</sup> )	Number of inhabitants	Location of LA in the region – proportion in %
<b>Bratislavská</b>	488	432 000	Bratislavský 93 %, Trnavský 7 %
<b>Dolnopovažská</b>	1 261	247 000	Nitriansky 66 %, Trnavský 34 %
<b>Ponitrianska</b>	450	272 000	Nitriansky 51 %, Trenčiansky 49 %
<b>Pohronská</b>	203	186 000	Banskobystrický 100 %
<b>Jelšavsko-lubenická</b>	137	21 000	Banskobystrický 100 %
<b>Rudniansko-gelnická</b>	357	52 000	Košický 95 %, Prešovský 5 %
<b>Košicko-prešovská</b>	1 044	425 000	Košický 81 %, Prešovský 19 %
<b>Zemplínska</b>	1 040	173 000	Košický 83 %, Prešovský 17 %
<b>Total</b>	<b>4 980</b>	<b>1 808 000</b>	

\* The territory includes areas in the 5th and 4th degrees of environmental quality.

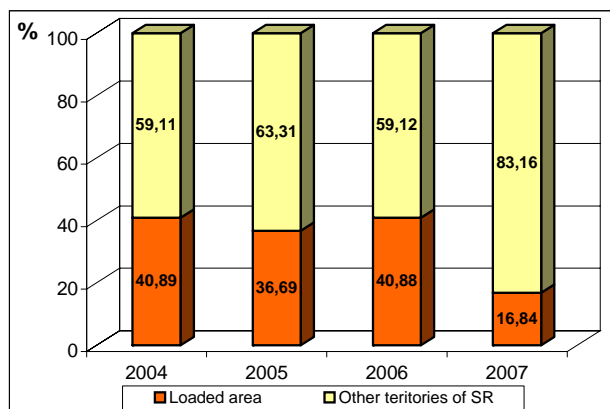
Source: SEA

In the years 2008-2009, SEA worked on updating a map called "Quality of Environment" based on more recent data for individual components of environment with reference to new legislative requirements relating also to the accession of Slovakia into the European Union, especially in the water chapter:

Loaded areas represent approximately 10-11 % of the SR territory. The charts show the fact that in the area of air pollution, water contamination, and waste generation that have significantly contributed to the state of environment in the territory; and most indicators show that the loaded areas bear 50-90 % of environmental load in Slovakia documented by individual indicators.

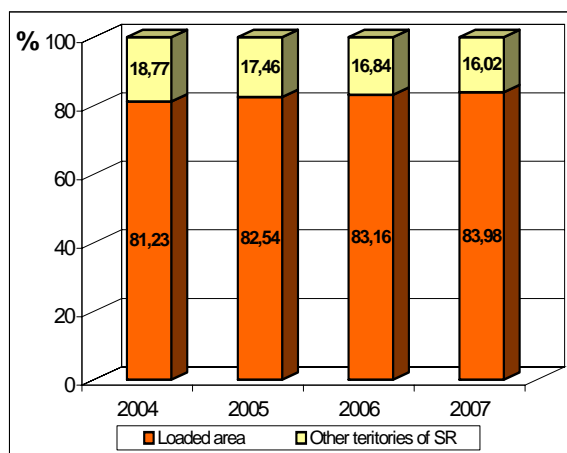
**Air**

**PM emissions from stationary sources in LA**



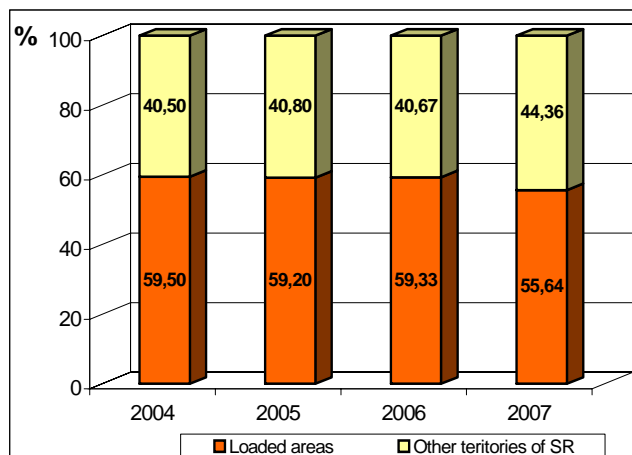
Source: SHMI

**SO<sub>2</sub> emissions from stationary sources in LA**



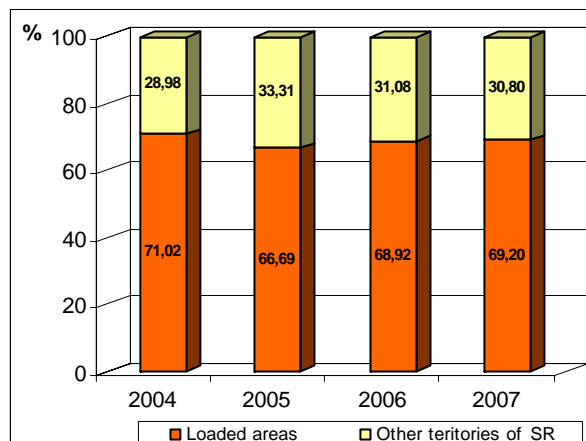
Source: SHMI

**NO<sub>x</sub> emissions from stationary sources in LA**



Source: SHMI

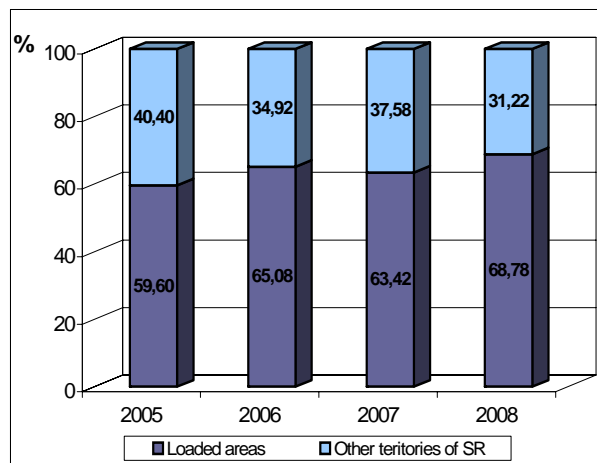
**CO emissions from stationary sources in LA**



Source: SHMI

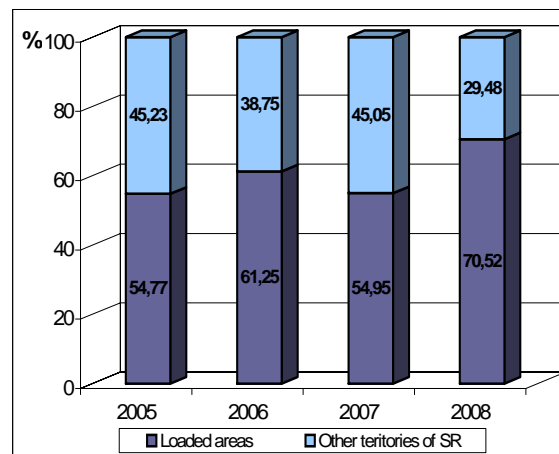
**Water**

**Discharged BOD<sub>5</sub> contamination in LA**



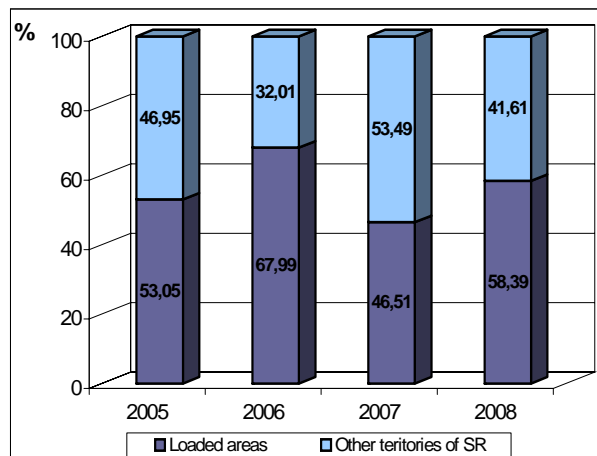
Source: SHMI

**Discharged COD<sub>Cr</sub> contamination in LA**



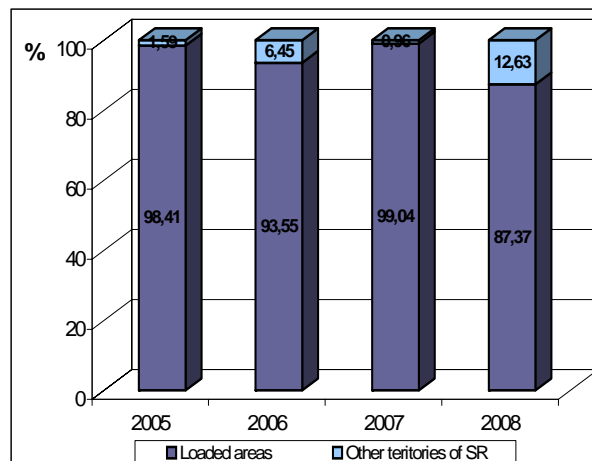
Source: SHMI

**Discharged IS contamination in LA**



Source: SHMI

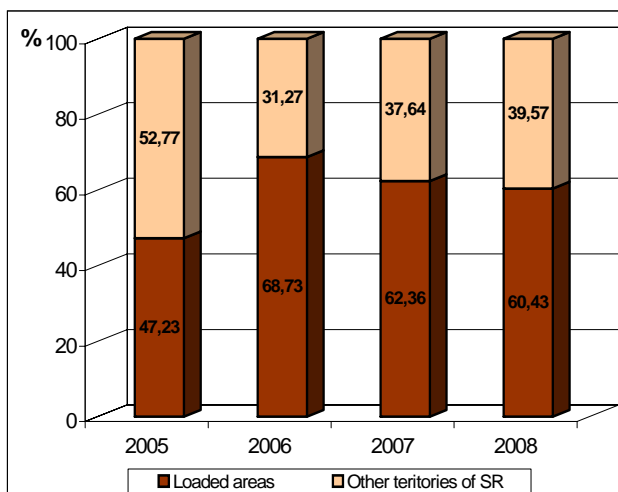
**Discharged NES<sub>UV</sub> contamination in LA**



Source: SHMI

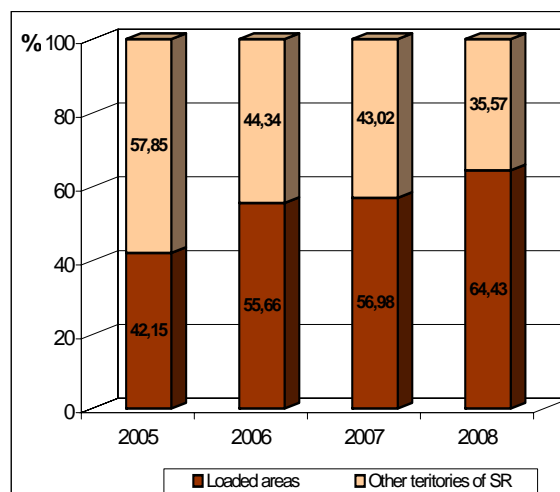
**Waste**

**Other industrial waste generated in LA**



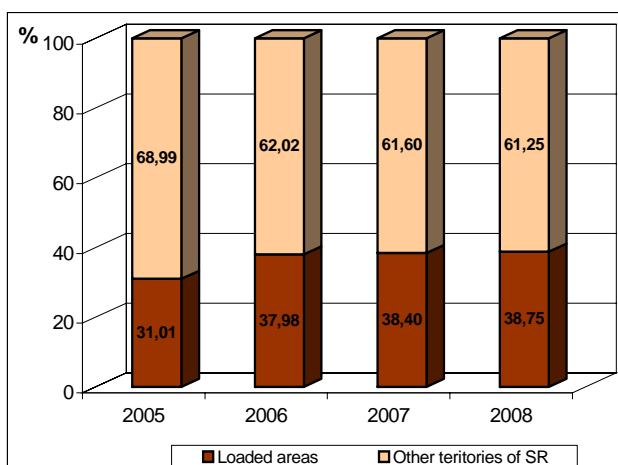
Source: SEA

**Hazardous industrial waste generated in LA**



Source: SEA

**Municipal waste generated in LA**



Source: SEA

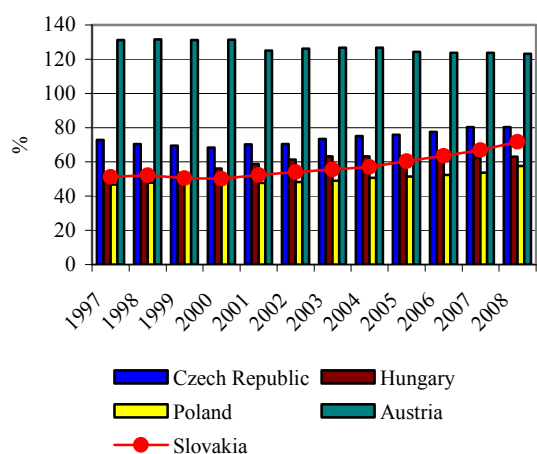
## STATE OF THE ENVIRONMENT - CAUSES AND CONSEQUENCES

### • ECONOMIC SECTORS AND THEIR IMPACT ON ENVIRONMENT

#### Economy trend in the Slovak Republic

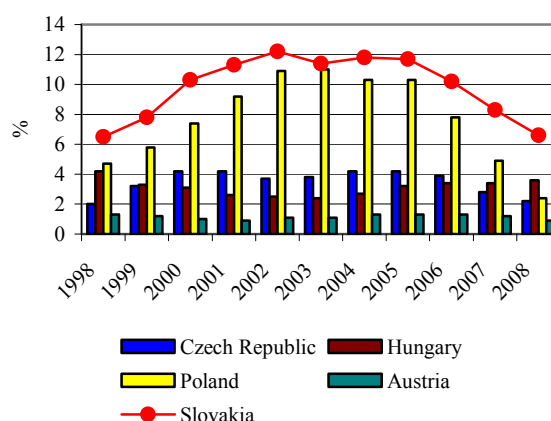
The deepening financial crisis, onset of economic crisis, and preparations for entering into the European Monetary Union were in 2008 the main impetuses that impacted the development of the Slovak economy within the mentioned time period. Slovak economy in the mentioned year generated **the Gross Domestic Product (GDP)** in current prices at 2 0284.2 bill. SKK and in reality increased by 6.4 %, compared to the previous year. Slovak Republic within the group of 27 EU countries had been the second fastest growing economy. Industry with its 33.8 % showed the highest share on the GDP.

#### Trend in GDP per capita in PPS (EU-27 = 100)



Source: Eurostat

#### Long-term unemployment (more than 12



\*Share to total number of employed Source: Eurostat

In 2008, the selective survey of work force showed 257.5 thous. **unemployed** people, with the unemployment rate dropping down to 9.6 %.

Export of motor vehicles that are important for Slovakia dropped by 4.4 % in 2008, compared to 2007. Most vehicles in 2008 were exported to EU countries (74 %), especially to Germany, France, Italy, and Finland. As for the other countries, most vehicles were exported to Russia and USA.

In 2008, **foreign direct investments (FDI)** to the SR economy were 28.672 bill. SKK, and total balance of direct foreign investments in Slovakia reached the sum of 804.470 bill. SKK.

## Industry

### ♦ Share of manufacturing in GDP generation

Pursuant to the Branch classification of economic activities, there are three basic groups involved in industry: **C** - Mining and quarrying, **D** – Manufacturing and **E** – Electricity, gas and water production and distribution.

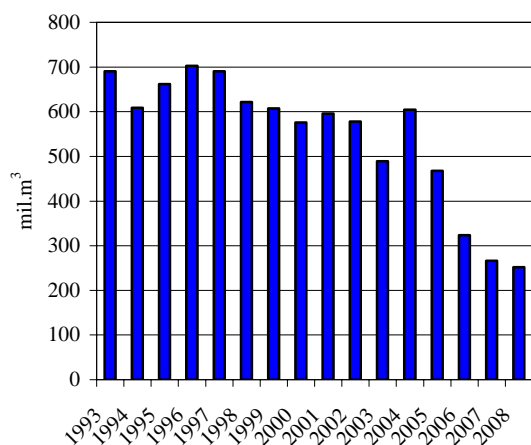
Industry has weakened its position in the Slovak economy, reducing its **share on GDP generation** in 2008 to 33.8 %. (reduction by 3.5 % in comparison to 2007). Within the area of industry, there was an increase in industrial production (6 %) and in the area of electricity, gas, and cold air supply (2.6 %).

### ♦ Demand of industrial production on the exploitation of resources

Compared to other EU countries, energy demand of the Slovak industry is very high. In 2007, share of industry on total energy consumption in Slovakia reached 41.8 % (in the EU-27 countries it was 27.9 %).

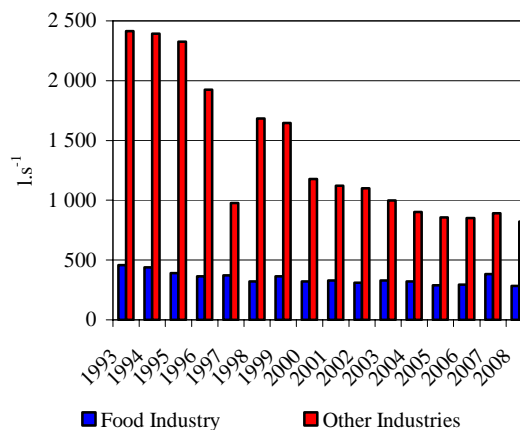
Since 1993, **surface water abstraction** by industry shows a falling tendency. In 2008, surface water abstraction by industry dropped by 29.7 %, compared to 1993. During the year 2008, as much as 37.9 % of total abstractions were industrial. Trends in **underground water abstraction** by industry show analogical tendency.

### Development in consumption of surface water in industry



Source: SHMI

### Advancement in underground water consumption in industry



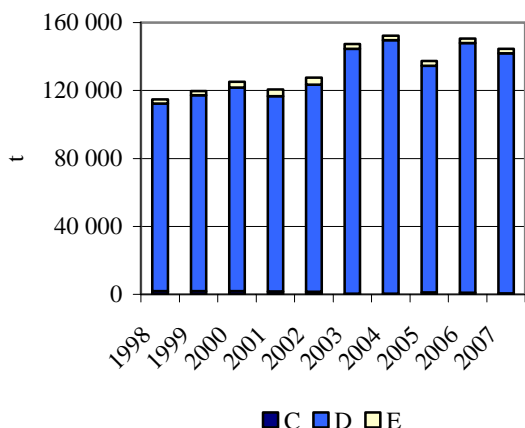
Source: SHMI

### ♦ Impact of industrial production on environment

**CO emissions** from industry in 2007 made up as much as 98.8 % of large-size and middle-size stationary sources and emissions **increased** by 25.9 %, compared to 1998. **SO<sub>2</sub> emissions** from industry in 2007 made up as much as 99.3 % of large-size and middle-size stationary sources and emissions **decreased** by 56.6 %, compared to 1998.

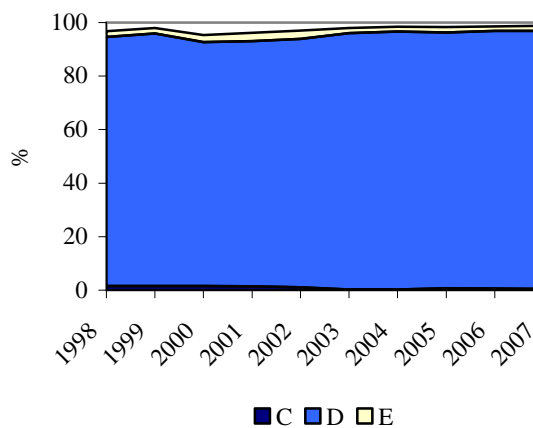


**CO emissions trend from stationary industrial sources**



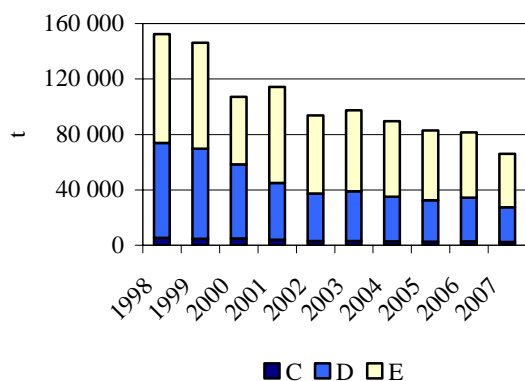
Source: SHMI

**Share of CO emissions from stationary industrial sources on the overall CO emissions**



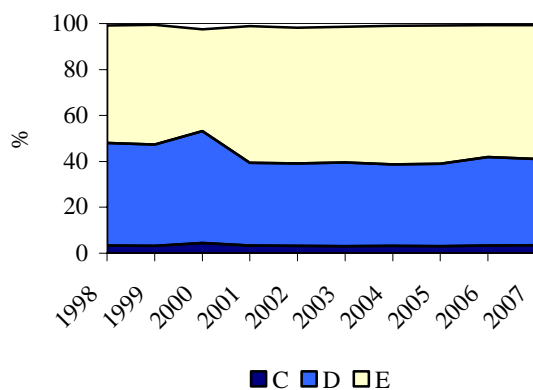
Source: SHMI

**SO<sub>2</sub> emissions trend from stationary industrial sources**



Source: SHMI

**Share of the SO<sub>2</sub> emissions from stationary industrial sources on the overall SO<sub>2</sub> emissions**

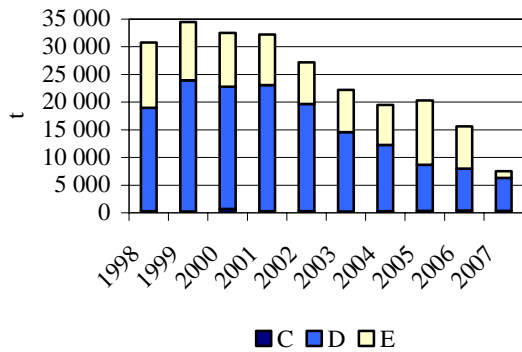


Source: SHMI

**NO<sub>x</sub> emissions** from industry in 2007 made up as much as 90 % of large-size and middle-size stationary sources and emissions **decreased** by 48.5 %, compared to 1998. **PM emissions** from industry in 2007 made up as much as 93.7 % of large-size and middle-size stationary sources, and emissions **decreased** by 75.6 %, compared to 1998.

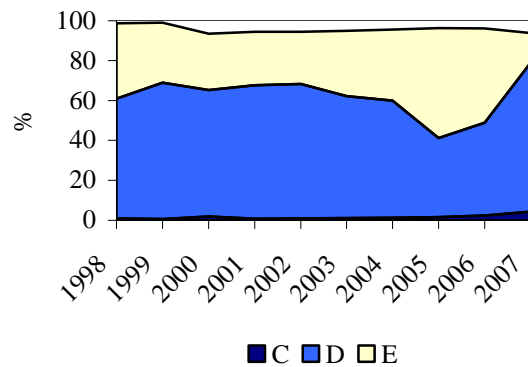
**Heavy metal emissions** by industry have had a decreasing tendency since 1990. In 2007, compared to 1990, only Cd emissions in industrial technologies increased.

**PM emission trend from stationary industrial sources**



Source: SHMI

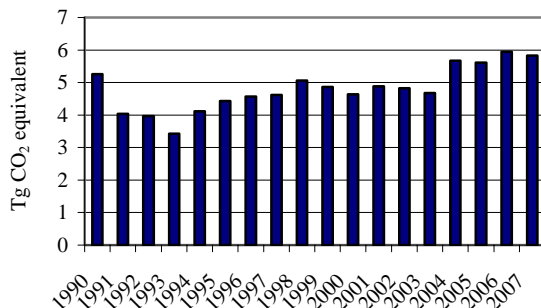
**Share of the PM emissions from stationary industrial sources on the overall SPM emissions**



Source: SHMI

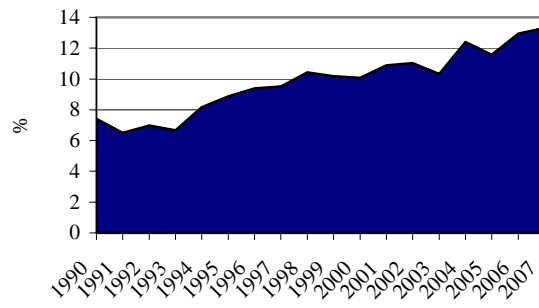
**Aggregated greenhouse gases emissions** from industrial processes in 1990-2007 had a slightly rising trend. Compared to 1990, in 2007, these emissions from industrial processes increased by 10.7 %.

**Trend of aggregated emissions of the greenhouse gases from industry (Gg CO<sub>2</sub> equivalent)**



Source: SHMI

**Share of the emissions of greenhouse gases from industry on the greenhouse gases overall emissions**



Source: SHMI

In 2008, **industry alone generated 6 565 028 tons of waste** (67.7 % share in total waste generation), including **382 286 tons of hazardous waste** and **6 182 742 tons of other waste**.

## Extraction of minerals

Changes that occurred in 2008 lead to the increasing in the exploitation of the majority of minerals.

### Trend in extraction of minerals in 2001-2008

Extracted mineral	Measure unit	2001	2002	2003	2004	2005	2006	2007	2008
Brown coal and lignite	kt	3 761.9	3 661.2	3 508.8	3 101.7	2 513.0	2 208.6	1 851.56	2 242.82
Crude oil, including gasoline	kt	54.085	51.770	47.943	42.082	33.15	30.5	24.49	20.8
Natural gas	thous. m <sup>3</sup>	195 938	200 812	186 797	178 088	150 851	136 881	500 550	111 823
Ores	kt	1 047.5	719.2	706.5	977.8	651.89	741.9	666.57	479.14
Magnesite	kt	1 573.0	1 464.5	1 640.9	1 668.9	1 555.0	1 467.8	1503.60	1 438.50
Salt	kt	104.0	102.7	104.8	104.3	105.1	122.5	116.76	99.31
Building stone	thous. m <sup>3</sup>	3 881.6	4 478.3	4 503.3	4 527.5	6 016.2	6 309.2	6 528.40	7 789.10
Gravel sands and sands	thous. m <sup>3</sup>	2 689.4	2 933.1	3 872.7	3 951.7	4 870.1	5 502.9	5 113.50	6 979.40
Brick clay	thous. m <sup>3</sup>	442.1	433.4	507.4	591.7	466.8	508.0	1 011.70	512.74
Limestone and cement raw materials	thous. m <sup>3</sup>	302.3	332.7	384.9	569.5	690.6	673.5	627.10	757.40
	kt	1 614.6	1 547.4	1 649.4	3 479.8	3 743.3	4 131.2	4 107.80	1 831.50
Limestone for special purposes	thous. m <sup>3</sup>	292.3	833.0	941.4	14.9	28.50	67.0	90.30	136.10
	kt	325.0	0.0	0.0	1 057.5	834.80	1 243.6	1 175.70	862.50
High-content limestone	kt	4 211.1	4 356.8	4 093.0	3 767.3	4 053.5	4 393.0	4 362.00	4 035.00
Other raw materials	thous. m <sup>3</sup> surface	1 026.9	1 216.8	1337.2	567.8	509.1	531.6	476.50	490.71
	kt underground	142.3	86.4	86.2	91.6	106.5	115.3	139.40	140.60
	kt surface	32.30	31.1	11.8	1 143.9	1 024.0	1 279.3	1 457.45	931.80

Source: MMO SR

**Brown coal and lignite** extraction in 2008 grow up. Individual mines showed about 391.26 kt of extracted volumes more than in 2007.

**Crude oil, gasoline, and natural gas extraction** were decreased, compared to the previous year. Total extracted volumes included 18 150 t of semi-paraffin crude oil, and 2 652 t of gasoline. Natural gas stores were decreased by 111 823 thous. m<sup>3</sup>.

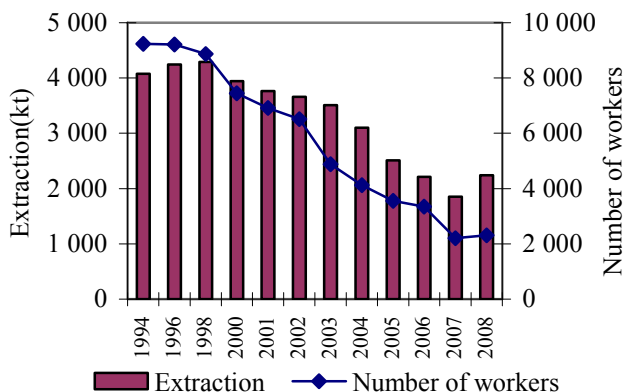
Exploitation of **ore minerals** decreased. The Siderit, Ltd. company in Nižná Slaná has the biggest share on all ore volumes, (443.8 kt). The Slovenská banská Ltd. company in Hodruša Hámre was contributed by 14.74 kt.

In 2008, there was a slight increase in exploitation of **non-ore raw material**. However, 1 438.5 kt of **magnesite** was extracted at three significant magnesite deposits (Jelšava, Lubeník, Hnúšťa), which is a decreasing by 65.1 kt, compared to the previous year.

In 2008, exploitation of **rock salt** (Solivary, Prešov) was at the level of 99.31 kt of salt in salt water. The amount of salt decreased by 17.45 kt compared to 2008.

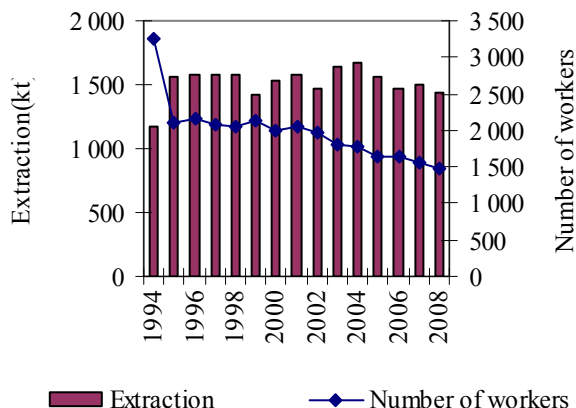
**Basic indicators of mineral extraction trend in SR between the years 1991-2008**

**Trend in brown coal and lignite extraction**



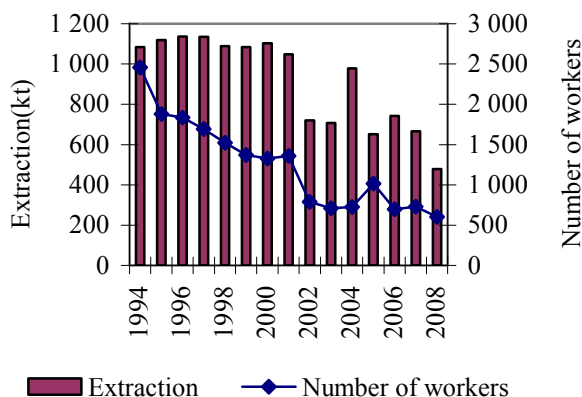
Source: MMO SR

**Trend in magnesite extraction**



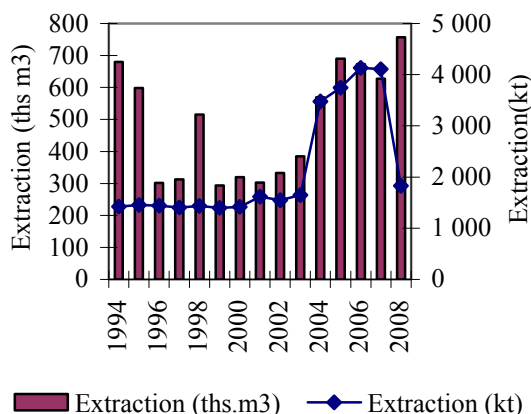
Source: MMO SR

**Trend in ores extraction**



Source: MMO SR

**Trend in limestone and cement materials extraction**



Source: MMO SR

◆ **Environmental impact of mineral exploitation**

The Central mining office keeps records of current mining works including **dumps** and **tailings dumps**. As of December 31, 2008, there were 139 dumps, 97 in extraction site (70 active and 27 inactive) and 26 inactive outside extraction site (40 active and 2 inactive). The territory with located dumps is 286.98 ha.

As of December 31, 2008, there were 40 tailing dumps, 22 in extraction site (15 active and 7 inactive) and 19 outside in extraction sites (13 active and 6 inactive) **tailings dumps**. The territory with located tailing dumps is 18.70 ha.

## Energy management, Heat production and Gas management

### ♦ Energy sources balance

SR ensures almost 90 % of the primary energy sources (PES) through purchase outside the internal EU market. The only significant domestic energy source is brown coal. Domestic exploitation of natural gas and crude oil is not significant.

### Export dependency of Slovakia on energy sources (TJ)

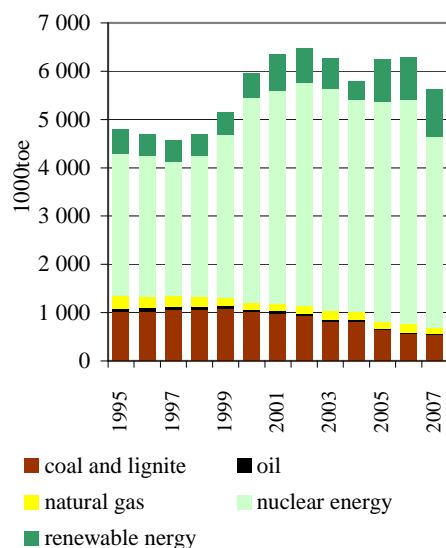
	1999	2000	2001*	2002	2003	2004	2005	2006	2007
<b>Electricity</b>									
Import	5 342	3 424	21 834	24 156	31 043	31 432	28 818	30 924	48 888
Export	3 334	13 129	35 075	39 121	31 161	38 135	40 572	39 316	42 678
<b>Gas fuels</b>									
Import	222 744	242 613	241 080	245 807	230 751	237 753	253 147	238 111	214 804
Export	397	23	0	0	137	35	15 394	20 694	6 270
<b>Liquid fuels</b>									
Import	245 480	231 362	247 399	321 919	272 192	295 922	284 844	297 852	308 357
Export	117 116	119 599	126 743	131 557	141 429	163 185	149 581	154 202	164 013
<b>Solid fuels</b>									
Import	142 530	145 321	151 236	141 409	154 594	158 435	161 394	155 564	165 025
Export	723	1 709	6 886	4 553	2 959	1 524	6 288	6 205	6 343

\* since 2001, data under the revised methodology of the Slovak Statistical Institute 2002

Source: SU SR

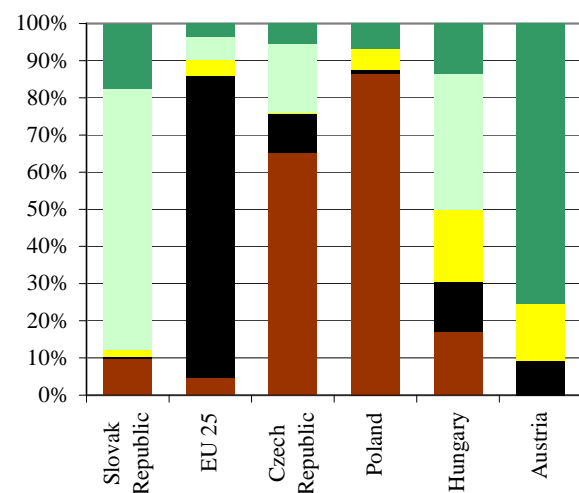
Utilization of nuclear fuels in recent years plays an exceptionally significant role in the PES structure of the SR.

### Trend in used primary energy sources in the SR



Source: EUROSTAT

### Structure of primary energy sources in 2007 – international comparison

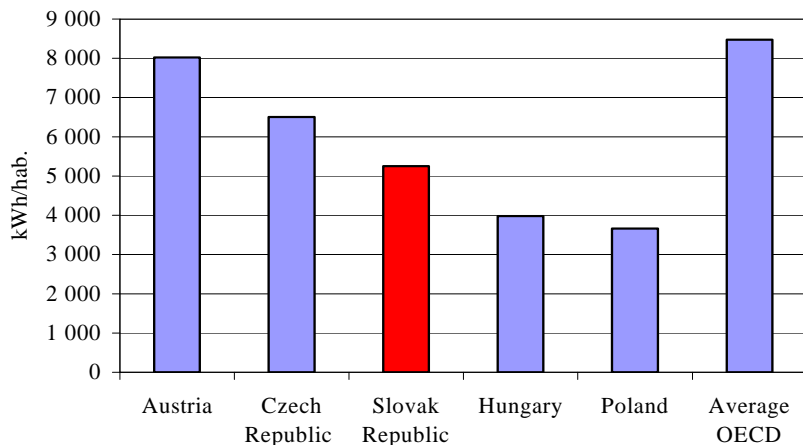


Source: EUROSTAT

Consumption of primary energy sources per capita in the SR is still lower than in the EU 25 countries, which is about 800 PJ per capita. Although it showed some increase in the last year, it currently does not reach more than 90 % of the EU average.

In comparison with developed countries of the OECD and EU, Slovakia shows also lower electricity consumption per capita. This is caused especially by low electricity consumption in households and in the sector of services. Further trend in electricity consumption represents a major factor for strategic planning at all levels. We anticipate a year-to-year increase in total electricity consumption by 1.2 %.

**Total electricity consumption per capita in 2007 - international comparison**



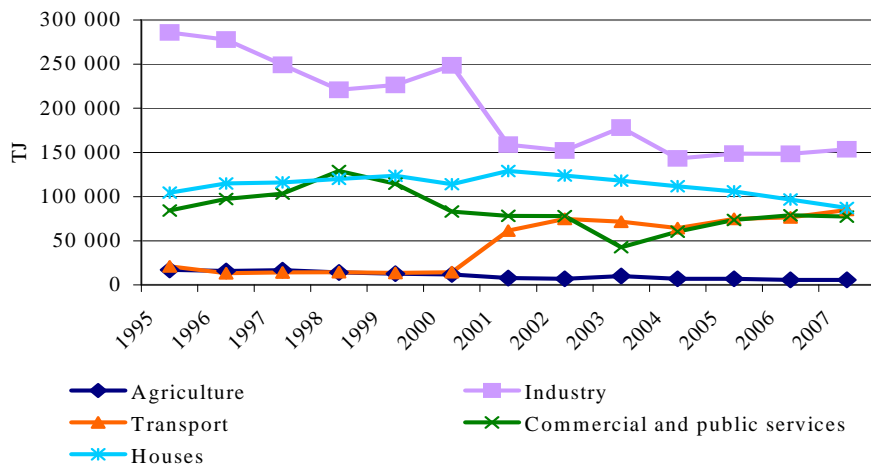
Source: IEA

The period of 2006-2010 introduced a number of changes into the structure of Slovak electric and power industries. Due to Slovakia having complied with obligations assumed as the result of accession talks with the EU and also due to obsolete technology and non-compliance with the ecological requirements, this time period has been marked by a gradual accumulation of large electricity capacities shut-downs.

Data on the final energy consumption trend suggest a decreasing tendency every year, with the exception of transport, commerce, and services. The industry has the major final fuels consumption of all sectors of economy.

Compared to other EU countries, there is a relatively low consumption by inhabitants.

**Trend in final consumption of energy, fuels, electricity, and heat in the sectors of economy**



Source: SO SR

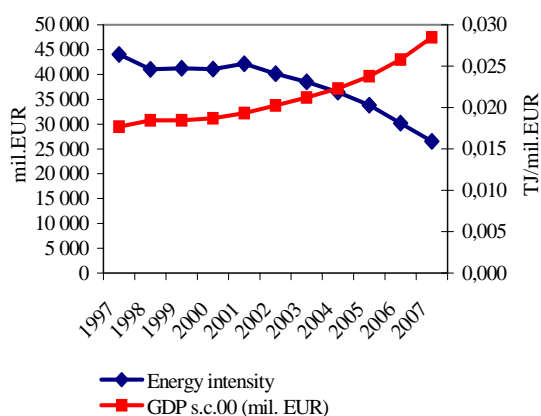
### ◆ Energy intensity

**Energy intensity (EI)** is an important economic indicator also used to make international comparisons. It is defined as the share of the gross inland energy consumption (GIC) on the generated GDP ( $GIC/GDP=ED$ ). Over the recent years, the GDP growth was accompanied by a balanced consumption of energy sources and a drop in the final energy consumption. Since 1993, energy intensity has been decreasing every year by 4 %, caused mainly by more development in the value added production, as well as by introduction of rationalization measures in production and consumption alike.

Estimate of the GDC by 2030 is based on its mild growth. The estimate builds on the premise that by 2015 GDP will grow faster than the rate of reduction in ED, and that after this year there is expected a faster reduction in ED than the GDP growth.

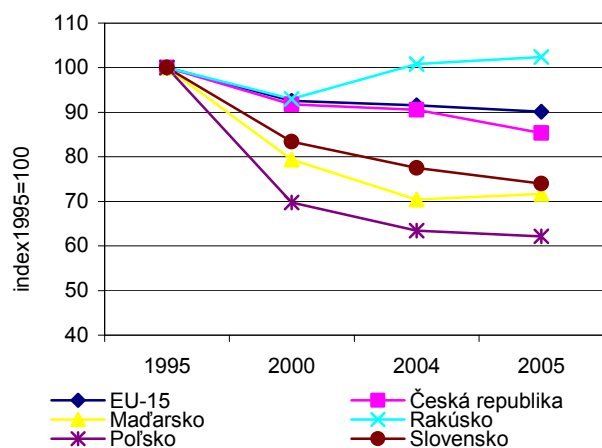
Notwithstanding this positive trend, the EI in Slovakia is still about 1.5-times higher than the average consumption of the OECD countries.

**Trend in energy intensity and GDP in SR**



Source: SO SR

**Trend in energy intensity – international comparison, Index 1995=100**



Source: EEA

### ◆ Electricity power management

Total consumption of the Slovak electricity network in 2008 was 29 830 GWh, and in comparison to 2007 it grew by 198 GWh. The maximum annual load reached 4,342 MW. Installed output of Slovakia in 2008 was 7 453 MW. Output structure of the production base was evenly distributed among the nuclear, thermal, and hydroelectric power plants. Also, the 2nd JE EBO V1 block with the output of 440 MW was shut down as of December 31, 2008.

Total electricity production in Slovakia reached 29 309 GWh, with nuclear power plants showing a 57 % share on production, thermal power plants showed 28.4 %, and 15.6 % was produced by hydroelectric power plants. Compared to 2008, electricity production grew by 1 402 GWh, which represents a 5 % growth in production. This was caused by a significant increase in production by nuclear power, compared to 2007.

#### ♦ Gas management

Slovak Gas Management Industries in Bratislava is the dominant company on the Slovak gas market, with the greatest market share. In 2007, the company provided services to approximately 1.474 mil. of clients in various segments (bulk clients, small clients, and households).

In 2008, most of domestic gas consumption is imported from the Russian Federation (5.7 bill. m<sup>3</sup>). Gas in the volume of 0.07 bill.m<sup>3</sup> originated from household sources from the NAFTA a.s. company.

Volumes of sold natural gas in the designated Slovak territory in 2008 (5 883 mil.m<sup>3</sup>) grew, compared to 2007 (5 668 mil.m<sup>3</sup>), this being both due to a colder weather in the beginning of 2008, as well as due to a stabilisation in adopting economical measures in the area of energies. Compared to 2007, households consumed by 6.5 % more gas, while natural gas consumption by small-size consumers fell by 2.4 % and in large-size consumers it grew by 3.6 %.

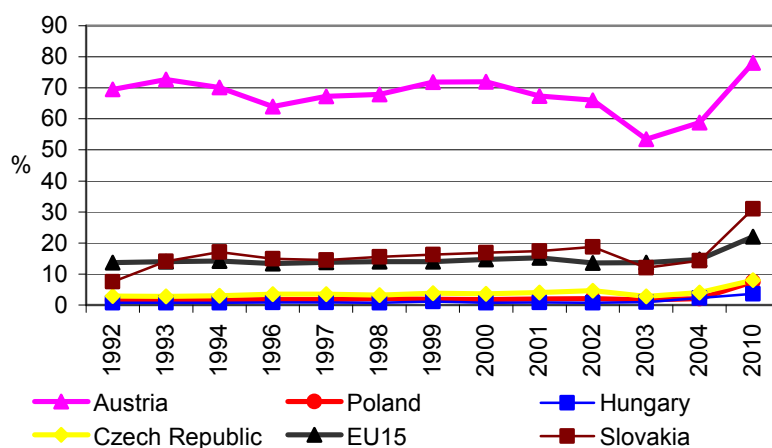
The Slovak gas distribution system is interconnected with the neighboring countries' networks, specifically with Ukraine, Czech Republic and Austria. Capacity of the transport network is more than 90 bill. m<sup>3</sup> annually.

#### ♦ Renewable energy sources (RES)

In January 2008, the European Commission introduced a so-called **climate - energy package**, which is an ambitious approach and will substantially direct the economic trend of the EU member countries in the years to come. It represents a basic tool for reducing the greenhouse gases emissions and increasing the share of renewable sources within the EU energy pool.

Increase in renewable energy sources extraction represents a significant element in the system of measures introduced to meet the Kyoto Protocol's objectives. In 2008, share of electricity produced from the renewable energy sources (RES) on total electricity consumption in Slovakia was 16.6 %, while the greatest share on electricity production from among all RES is shown by large-size hydroelectric power plants (more than 90 %). For this reason, volumes of electricity produced within the Slovak RES network fully depend on favorable hydro-energy conditions. Biomass is the dominant RES used to produce heat.

#### Share of electricity from renewable energy to gross electricity consumption – international comparison

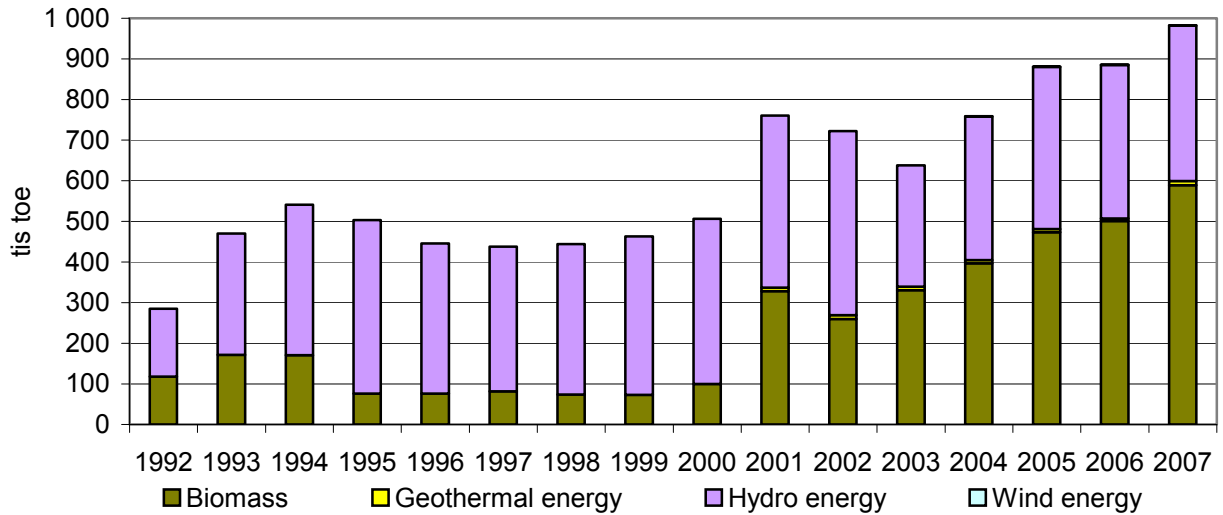


Source: Eurostat



Renewable energy sources in Slovakia show a gradually increasing share on energy production. Based on the figures by Eurostat in 2007, the share of RES on gross domestic energy consumption was 5.5 %. Greatest share in this pool is shown by hydro energy; however, the ratio between its exploitation and the energy consumption of the biomass is gradually equalizing.

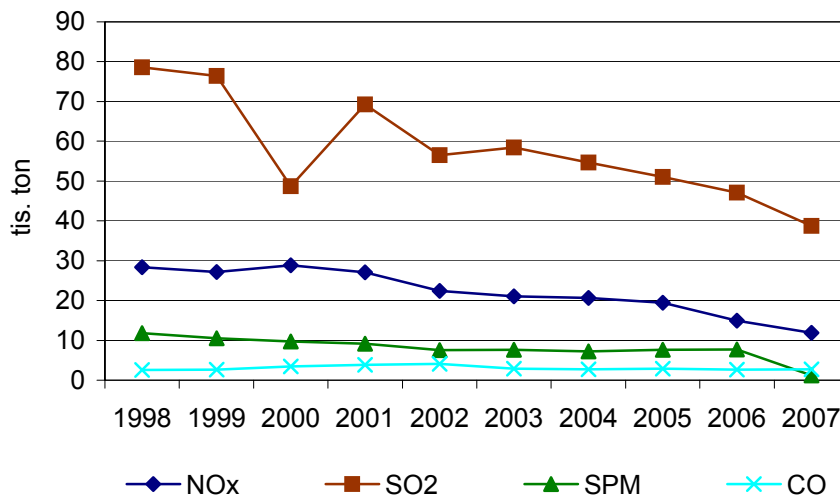
**Trend in the share of individual RES types on total RES consumption**



♦ **Air pollution caused by energy production**

Over the recent years, sulfur oxides (SO<sub>2</sub>), nitrogen (NO<sub>x</sub>), and particulate matter (PM) emissions were reduced significantly. This situation was caused by decreased production and consumption of energy and a shift in the fuel base toward more purified fuels, as well as by using fuels with better quality characteristics.

**Trend of basic polluting substances emissions from energy stationary sources in the SR (thousand tons)**



Source: SHMI

Power management sector has the most dominant share on the greenhouse gases emissions. In 2007, the share was almost 81.2 % of total greenhouse gases emissions in the SR. Over the monitored period, greenhouse gases air emissions showed a light reduction in the power management (energy) sector. This was caused by a higher proportion of services on the GDP production, higher share of natural gas within the fuel base, structural changes, and decreased energy consumption in energy-demanding sectors. Compared to 1990, total greenhouse gases emissions in the SR in 2007 dropped by 41 %.

**Trend of greenhouse gasses emissions from energy production in the SR (Tg CO<sub>2</sub> equivalent)**

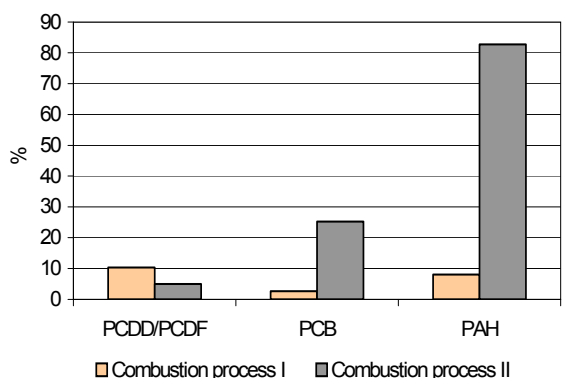
	1990	1992	1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Energy sector*</b>	58.59	47.23	44.37	42.60	43.19	43.39	41.66	40.56	37.82	40.64	38.55	39.03	37.81	37.40	37.19	35.53

\*transport included

Source: SHMI

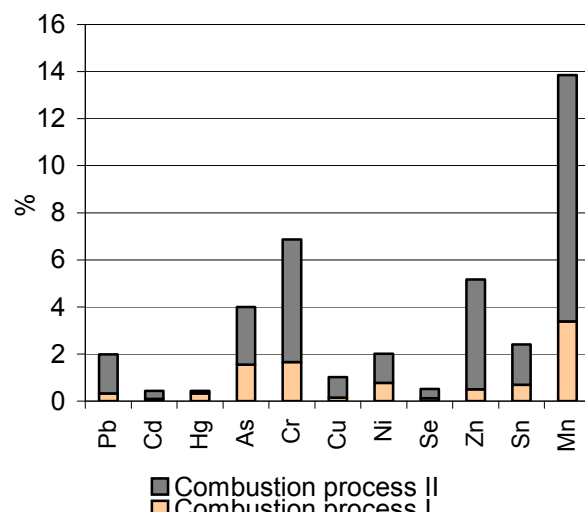
The POP emissions have a falling tendency since 1990. This is caused by a drop in the production and changes to fuels used for household heating. Fluctuations in the PCB emissions (their increase) in 2003 and 2004 relates to the increased consumption of firewood for household heating.

**Share of POPs emission from sector of energy to overall POPs emission in the SR**



Source: EUROSTAT

**Share of heavy metal emission from sector of energy to overall heavy metal emissions**



Source: EUROSTAT

Positive trend in the power management sector is recorded mainly by a dramatic reduction to **heavy metals emissions** (Pb, As, Cu, Ni, Zn).

♦ **Waste water from electricity production and gas management**

Of all areas within the energy sector, electricity power management contributed the most to total volumes of discharged wastewater. Wastewater produced by electric power plants mainly includes water from technological and cooling processes, and also some runoff water. Wastewater from

technologies is chemically contaminated. In case of nuclear power plants, water from the primary cycle also shows a degree of radio-chemical contamination. Water used as a coolant shows mostly thermal contamination. Greatest load exists in the chemical oxygen demand for the COD<sub>Cr</sub> (dichromate) indicator, and insoluble substances (IS).

#### Waste water discharged by energy production in 2008 (electricity production and distribution)

Waste water from electricity production	Volume (thousand m <sup>3</sup> .y <sup>-1</sup> )	IS (t.y <sup>-1</sup> )	BOD <sub>5</sub> (t.y <sup>-1</sup> )	COD <sub>Cr</sub> (t.y <sup>-1</sup> )	ENP <sub>uv</sub> (t.y <sup>-1</sup> )
<b>Treated</b>	14 459.964	179.520	23.577	183.542	0.795
<b>Untreated</b>	9 908.049	75.624	3.338	18.851	0.331
<b>Subtotal</b>	24 368.013	255.144	26.915	202.393	1.126
<b>Waste water from heat production</b>					
<b>Treated</b>	1 090.033	16.453	1.804	23.242	0.175
<b>Untreated</b>	1 098.305	2.339	0.000	1.770	0.011
<b>Subtotal</b>	2 188.338	18.792	1.804	25.012	0.186

Source: SHMI

#### ♦ Waste from electricity production and gas management

In 2008, the SE company, Inc. produced total volumes of 983 491 tons of waste of all categories, including 99.9 % from the „other waste“ category. Considering the fuel base, dominant are thermal power plants burning fossil fuels. Besides these key technology waste types, there are generated also other industrial waste types in a lesser degree, including especially those from auxiliary operations, maintenance and repair facilities, and municipal waste processing facilities.

The SPP Inc. company produced 4 131 tons of waste in 2008, including 968 tons of other waste, and 3 163 tons of hazardous waste.

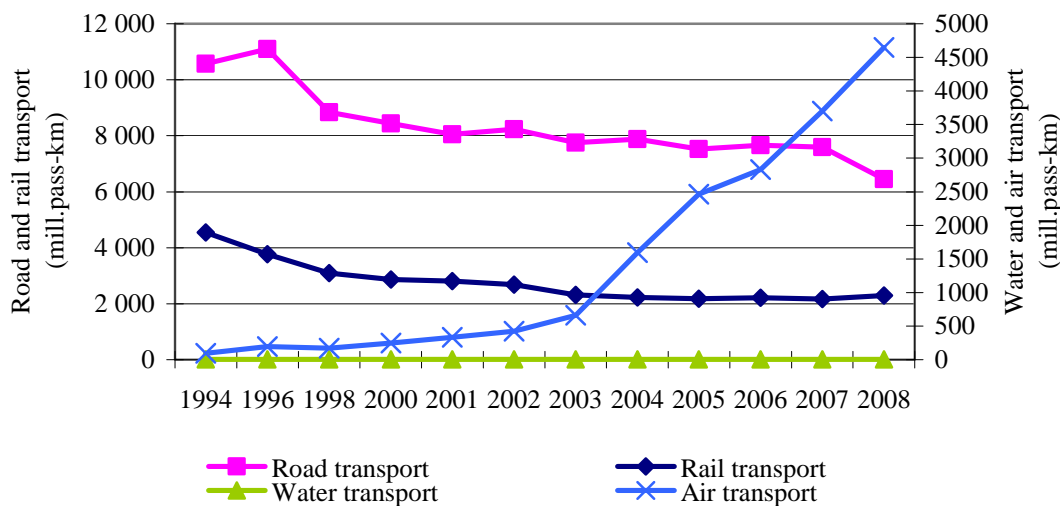
## Transport

### ♦ Passenger and freight transport

In the area of road and railway passenger transport, the trend of long-term drops in transported passengers and total transport performances continued. Compared to previous year, reduction in modal split in road passenger transport was more than 15 %, in case of the railway transport the increasing was even by more than 6 %. Modal split in water passenger transport dropped by more than 25 %. Increasing trend in the number of transported persons as well as modal split, continued in air passenger transport (for the number of transported persons the increase is by 36 %, and in modal split it is by 25 %, compared to 2007).

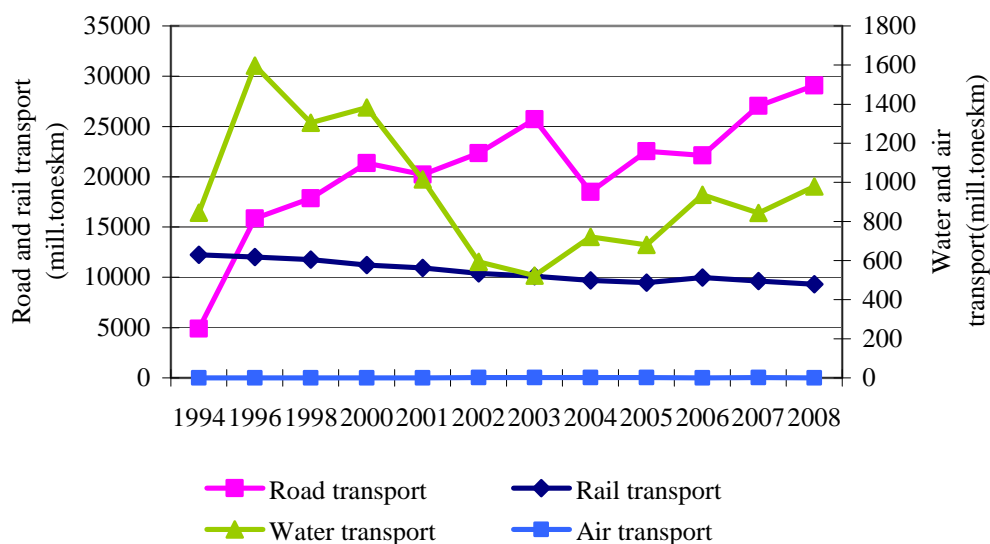
Transport of goods and modal split in road freight transportation grow continually. In 2008, modal split by road freight transport increased by more than 7 % compared to 2007, while modal split by railway cargo transport in 2008 dropped by 8 %, compared to the previous year (compared to 1993, the reduction is by more than 35 %). Compared to the previous year, modal split in aquatic freight transport in 2008 increased by 15 %. Modal split and freight transport in the area of air transport showed a significant reduction compared to 2007 (freight transport dropped from 1 318 t to 7 t, and modal split from 1 219 thous.tkm to 19 thous.tkm).

### Passenger transport demand by mode (mill. pass-km)



Source: SO SR

### Freight transport demand by mode (mill. tkm)



Source: SO SR

MHD companies of Bratislava, Košice, Prešov, and Žilina operate the municipal mass passenger transport (MHD). In 2008, lingered decreasing in the number of carried passenger. Over the period of 15 years (1993-2008), there was reported a 23.8 % decrease in the number of carried passengers. Buss transportation has over the monitored time period been the major player in passenger transport, followed by tram and trolley buss transportation.

### Indicators of city transport

Indicator	1993	1997	1999	2002	2003	2004	2005	2006	2007	2008
Total number of transported passengers (ths.)	525 744	527 662	485 472	370 018	394 465	383 118	395 064	400 673	403 466	399 425
<b>Trams</b>										
Transported passengers (ths.)	188 768	139 668	117 714	96 553	104 560	104 391	109 101	109 836	109 705	107 080
Seat kilometres (mill. km)	2 734	1 301	1 888	1 780	1 764	1 818	1 822	1 797	1 792	1 788
<b>Trolleybuses</b>										
Transported passengers (ths.)	43 346	74 020	71 934	54 707	59 034	57 688	58 032	59 071	60 655	62 038
Seat (mill. km)	717	796	1 039	1 048	1 110	1 103	1 075	1 085	1 104	1 099
<b>Buses</b>										
Transported passengers (ths.)	293 629	313 974	295 824	218 758	230 871	221 039	227 931	231 766	233 106	230 307
Seat (mill. km)	4 998	3 146	4 638	3 990	3 899	3 881	3 846	3 823	3 839	3 826

Source: SO SR

#### ♦ Number of vehicles

In 2008, total number of motor vehicles grew by 168 357 pcs compared to 2007. This means an increase by 32 % over the monitored time period. Total number of motor vehicles in 2007 over the period on 1993 - 2007 grew by 27 %. Major increase in the number of motor vehicles in 2008 was recorded in the categories of heavy trucks and pickup trucks (grew by 123 %, compared to 1993), and passenger cars (grew by 55 %, compared to 1993). Number of transport vehicles in railroad and water

transport types (being the most environmental-friendly transport modes for passengers and goods) dropped by appr. 24 % over the last 12 years.

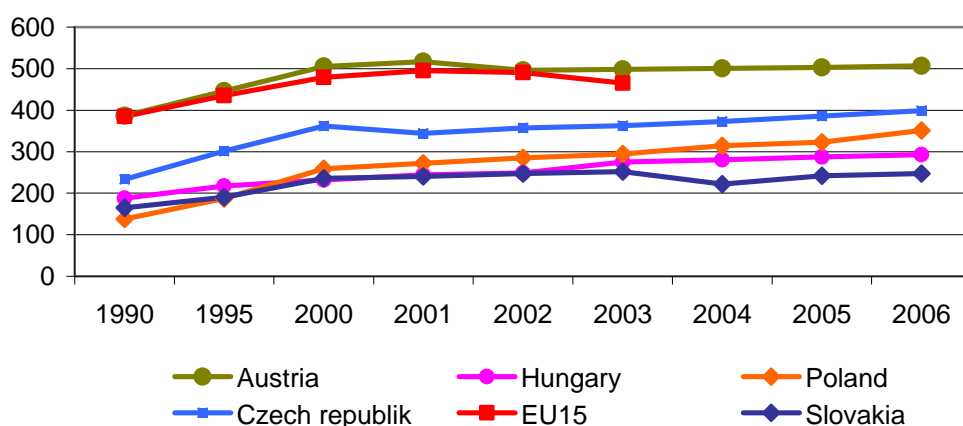
### Number of motor-vehicles by individual types (pcs)

Total number of vehicles	1993	1998	2000	2003	2004	2005	2006	2007	2008
Passenger cars	994 933	1 196 109	1 274 244	1 356 185	1 197 030	1 303 704	1 333 749	1 433 926	1 544 888
Trucks and Pick up vans	101 552	111 081	110 714	142 140	140 395	160 089	172 781	196 141	227 218
Special vehicles	46 121	43 690	39 188	32 033	22 672	22 648	18 708	18 983	19 675
Road tractors	*	1 721	3 281	8 851	11 435	14 141	16 475	19 556	21 444
Buses	12 655	11 293	10 920	10 568	8 921	9 113	8 782	10 480	10 537
Tractors	65 150	63 448	64 351	61 690	44 080	46 544	43 888	44 098	45 387
Motorcycles (excl. small)	81 263	100 891	45 647	48 709	51 977	56 366	58 101	63 897	70 318
Trailers and Semi-trailers (included bus)	167 174	191 241	201 269	218 517	170 491	188 411	188 256	199 329	211 555
Others	-	-	2 226	1 161	-	101	535	3 414	7 159
<b>Total</b>	<b>1 468 848</b>	<b>1 719 474</b>	<b>1 751 840</b>	<b>1 879 854</b>	<b>1 647 001</b>	<b>1 801 117</b>	<b>1 841 275</b>	<b>1 989 824</b>	<b>2 158 181</b>

\* in 1993-1996 included among special vehicles, since 1997 newly-purchased and monitored independently

Source: SO SR

### Comparison in the trend of the number of personal motor vehicles per 1 000 inhabitants in selected countries

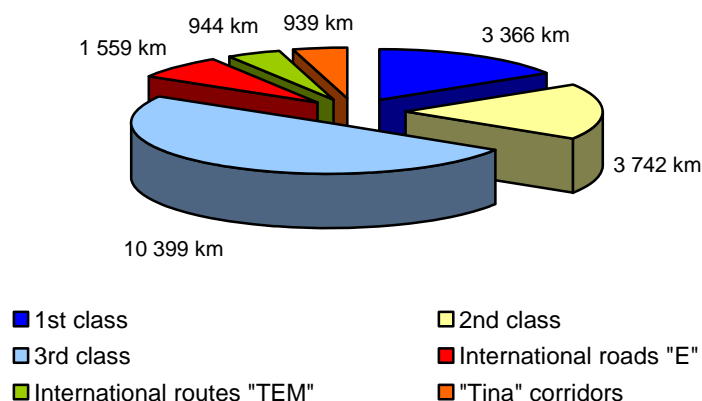


Source: Eurostat

#### ♦ Transport infrastructure

In 2008, the SR transport network included 17 907 km of roads and motorways. Highways represented 384 km of the network and length of local communications was 25 942 km. The length of railways was 3 623 km, with 1 577 km of electrified tracks. The length of navigable watercourses remained unchanged at 172 km, with channel length of 38.45 km.

In Slovakia there are no modern transit points between railway and road freight transportation - intermodal transportation terminals, which, connected to the logistic centres, would allow for transportation of goods from the road freight transportation to railways transportation. Existing container translating sites in Slovakia do not comply with the new technological requirements by international trade.

**Share of the length of individual road categories in Slovakia in 2008 (km)**

Source: SO SR

**♦ Demand of transport on the utilisation of resources**

Final energy consumption in the transport sector over the period of 15 years has more than doubled itself. Overall consumption of liquid fuels (97 %) represents the greatest share of energy consumption in the transport sector on the overall energy consumption, while the share of solid fuels, gaseous fuels and electricity overall consumption remains small. Road transport shows the greatest share on the overall energy consumption in the transport sector (95 %). On the contrary, proportion of the end electricity consumption in the sector of transport is by the railway transport (95%), while the end consumption of liquid fuels shows small proportion of the railway transport.

**♦ Impact of transport on environment**

Over the recent years, important changes in the SR were introduced by a significant increase in the number of motor vehicles. Corresponding changes to the transport situation were dominant mainly in cities and residential zones, where there is an increased load on environment and public health.

Action plan of the European Commission of 2001 plans with a 20 % substitution of petrol and diesel with alternative fuels by 2020. Biofuels and natural gas are also of interest.

**♦ Emissions from transport**

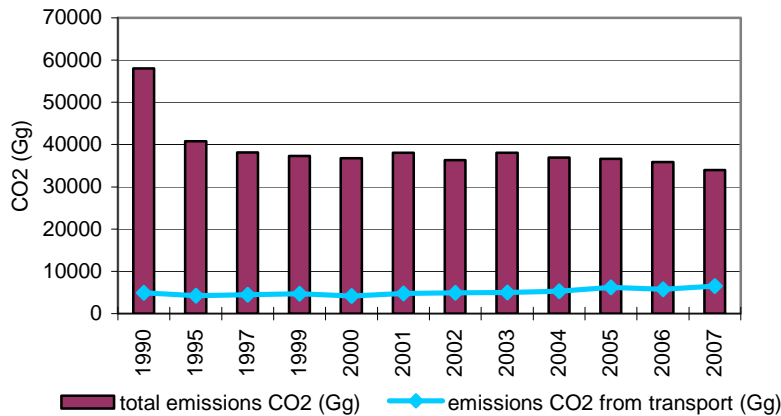
In terms of transport's share on total emissions of the assessed pollutants for 2007, significant is transport's share on CO emissions – 31 %, 43 % in case of NO<sub>x</sub> and 21 % in case of NM VOC. Solid pollutants represented 26 % of all emissions in 2007, while the SO<sub>2</sub> emissions showed 0.35 %.

Transport's share on heavy metal emissions is approximately 2.7 %, with copper showing the greatest share on heavy metal emissions by transport (8.21 %) followed by zinc (3.08 %), and lead (3.06 %). Similarly, in case of other heavy metals there was a slight increase in the values of the recorded emissions, compared to the previous year.

Transport's share on total greenhouse gases emissions is approximately 15 %, with the CO<sub>2</sub> share of 19.0 %, and the N<sub>2</sub>O share of 9.0 % being among the most dominant.

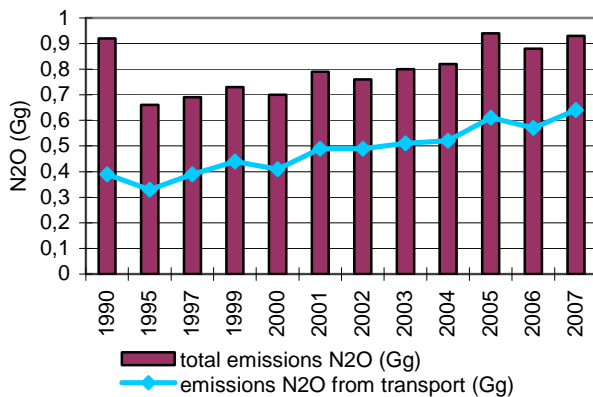
Road transport shows major share on total transport emission production. Share of other types of transport on individual pollutants is very small.

**Trend in the greenhouse gas emissions - CO<sub>2</sub> from traffic operations compared to total CO<sub>2</sub> emissions in Slovakia (Gg)**



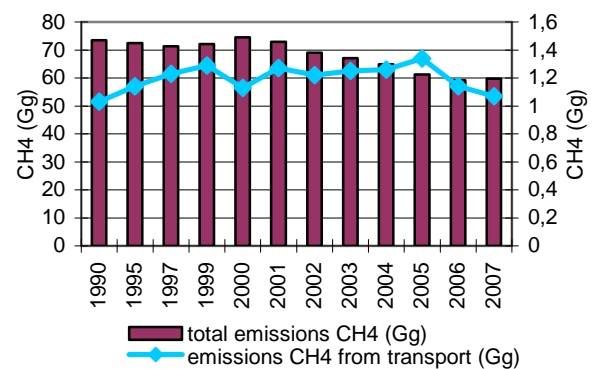
Source: SHMI

**Trend in the greenhouse gas emissions - N<sub>2</sub>O from traffic operations compared to total N<sub>2</sub>O emissions in Slovakia (Gg)**



Source: SHMI

**Trend in the greenhouse gas emissions – CH<sub>4</sub> from traffic operations compared to total CH<sub>4</sub> emissions in Slovakia (Gg)**



Source: SHMI

♦ **Waste from transport**

In 2008, there was 175 233 tonnes of waste generated in the area of transportation. This included 61 207 tons of hazardous waste, and 114 026 tons of other waste. Increase in 2006 was caused by recording about 2 273 000 tons of excavated soil from ground works when building the Sitina tunnels in Bratislava.



#### ♦ Traffic accident rate

There was a slight reduction in the number of traffic accidents in 2008, compared to the previous year. The same trend exists in traffic accidents analysis, with reduced number of traffic casualties, heavily injured, and injured, compared to 2007.

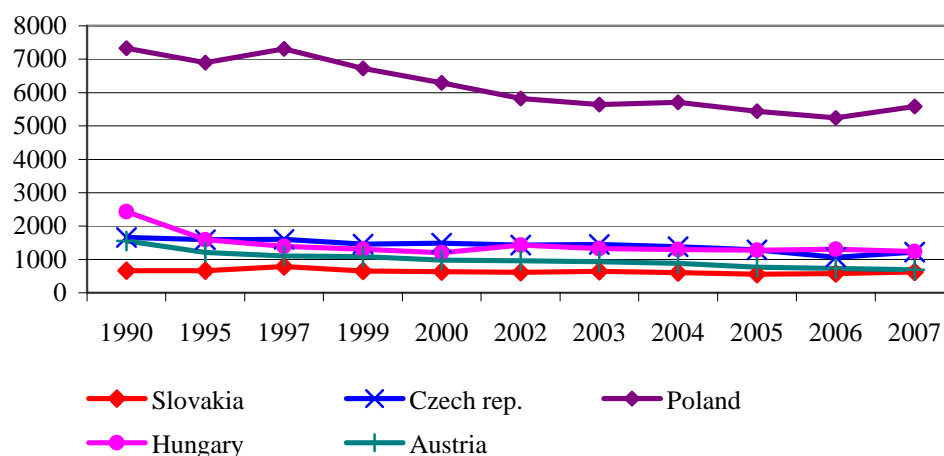
However, over the monitored period of 1993-2008, the number of traffic accidents increased by 15 %.

#### Trend of traffic accidents in SR

Indicators		1993	1999	2000	2002	2003	2004	2005	2006	2007	2008
Traffic accidents	Number of accidents	50 159	55 683	57 060	60 304	61 233	59 991	62 040	61 071	59 008	50 930
	Killed	584	647	610	645	603	560	579	627	558	626
	Heavily injured	2 736	2 684	2 213	2 163	2 157	1 974	2 032	2 036	1 806	2 205
	Lightly injured	8 682	8 782	8 050	9 158	9 033	8 516	8 660	9 274	9 234	7 891

Source: MoI SR, SO SR

#### Number of people killed in road accidents – international comparisons



Source: EUROSTAT

## Agriculture

### ◆ Economy of agriculture

In 2008, the gross domestic product from agriculture was 50 165 mil. € representing a year-to-year reduction by 2 100 mil. € compared to 2007.

### ◆ Structure of agricultural land

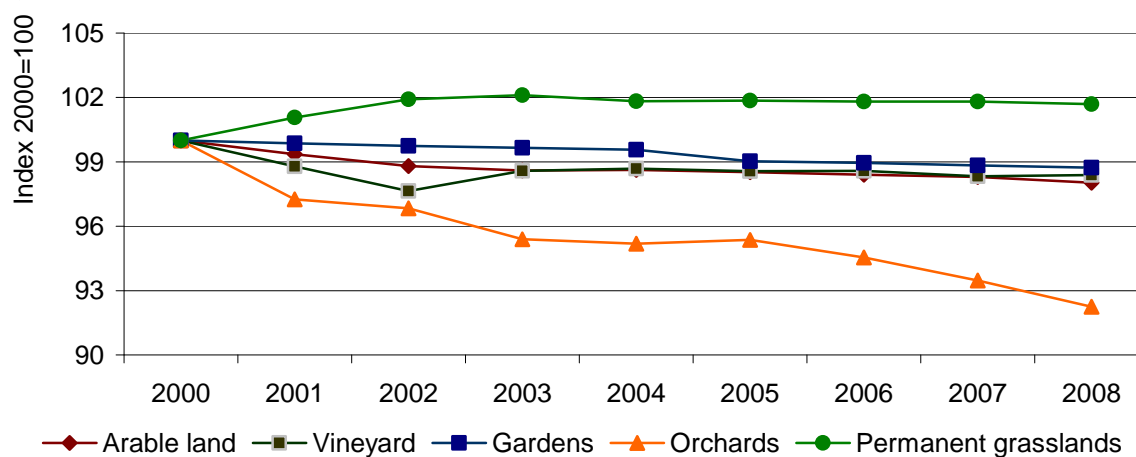
In 2008, total area of agricultural land in the SR was 2 423 478 ha. Loss of agricultural land including the arable land transfer to forestland, non-agricultural and non-forested land in 2008 was 5 524 ha. Size of arable land per one inhabitant in 2008 was 0.2627 ha.

### Structure of the agricultural land (state to the date 31<sup>st</sup> December 2008)

Type of land	Area(ha)	Share of agricultural land (%)
Agricultural land total	2 423 478	100.00
Arable land	1 421 852	58.67
Hop-fields	520	0.02
Vineyards	27 258	1.12
Gardens	76 636	3.16
Orchards	17 360	0.72
Permanent grassland	879 853	36.31
<b>Total area of SR</b>	<b>4 903 704</b>	-

Source: GCCA SR

### Agricultural land fund structure after the year 2000

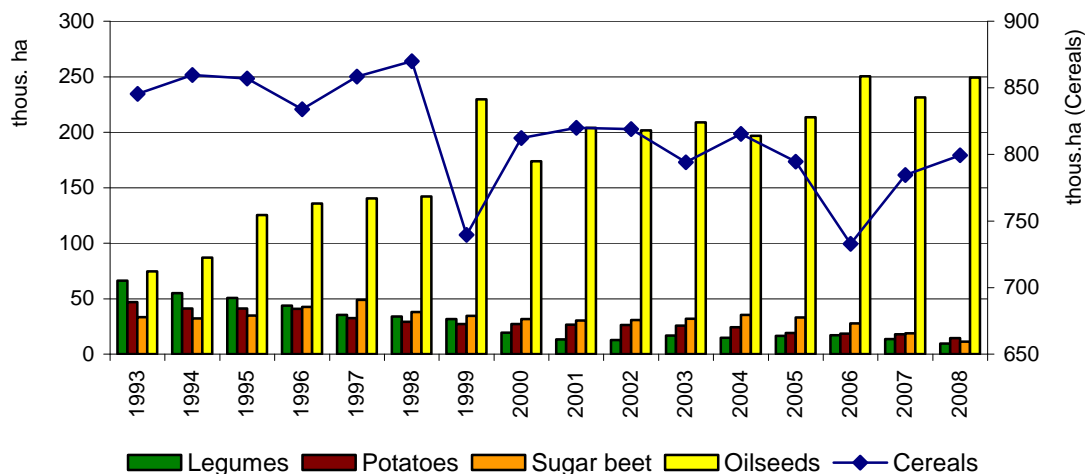


Source: GCCA SR

### ◆ Plant production

In 2008, harvest areas in most agricultural crops decreased from the previous year, especially in sugar beet, legumes, and potatoes. The year-to-year increase was in harvest areas of cereals and oilseeds.

### Harvested areas of agricultural crops



Source: SO SR

Compared to 2007, **genetic diversity** (represented varieties of agricultural crop cultivated in the SR) in 2008 shows **an increase** in all mentioned crop categories, with the exception of fodder beet.

### Number of agriculture plant's varieties in the SR

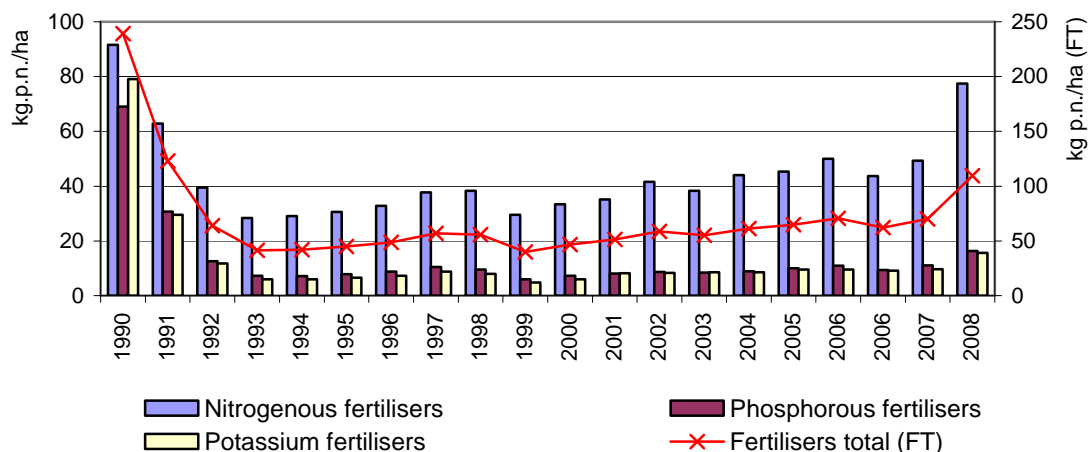
Agricultural plant	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Winter wheat	22	23	24	25	28	28	34	37	41	45	57	75	83	84
Winter barley	11	8	9	10	11	11	13	14	11	14	14	20	21	24
Spring barley	26	27	24	22	23	24	21	24	28	29	30	36	41	47
Potatoes	60	72	70	67	69	75	78	81	90	103	101	109	112	114
Rapeseed	14	12	12	9	14	16	19	22	25	32	29	35	41	52
Sugar beet	40	52	58	61	63	52	53	42	42	38	41	47	56	68
Fodder beet	16	13	12	6	8	8	8	8	7	6	6	6	6	6

Source: RIPP

### Fertiliser consumption

In 2008, consumption of **fertilisers** was 109.4 kg of pure nutrients per hectare of agricultural land.

### Fertilisers consumption in Slovakia (kg pure nutrient/ha)

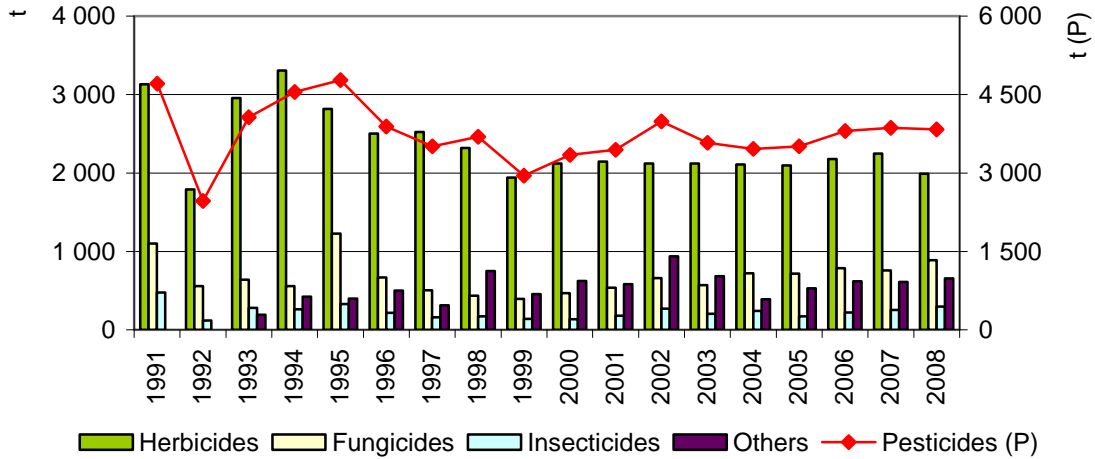


Source: CCTIA

**Pesticides consumption**

Compared to 2007, total consumption of pesticides in 2008 decreased by 31 t. Altogether, 3 834 t of pesticides were applied, including 1 991 t of herbicides, 887 t of fungicides, 298 t of insecticides, and 658 t of other pesticides.

**Pesticides consumption in Slovakia (t)**

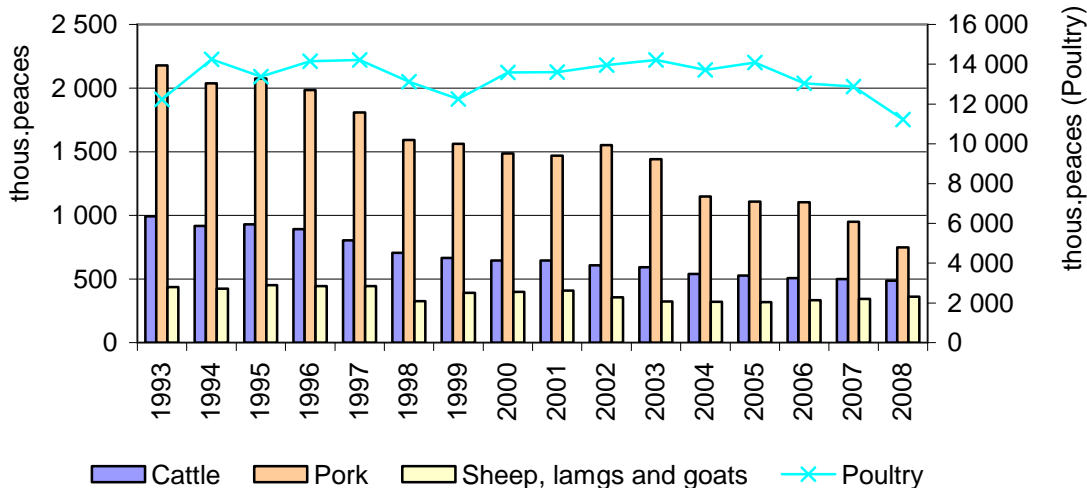


Source: CCTIA

**◆ Animal production**

In 2008, numbers of major livestock categories again dropped, i.e. cattle, pork, poultry, with the exception of the sheep, lambs and goats, which showed a positive growth in numbers.

**Number of livestock in Slovakia (thousand peaces)**



Source: SO SR, MoA SR

Genetic diversity expressed by number of livestock in the SR decreased from the previous year in cases of pork and goats.

## Number of livestock breed in the SR

Breed	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Cattle	5	5	5	5	6	6	11	11	11	11	11	11	12	11	11	12
Pork	15	15	15	15	15	15	16	15	13	11	11	11	11	8	8	7
Sheep	8	9	10	9	9	12	12	13	12	12	13	13	13	13	13	15
Goats	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	3

Source: RIAP

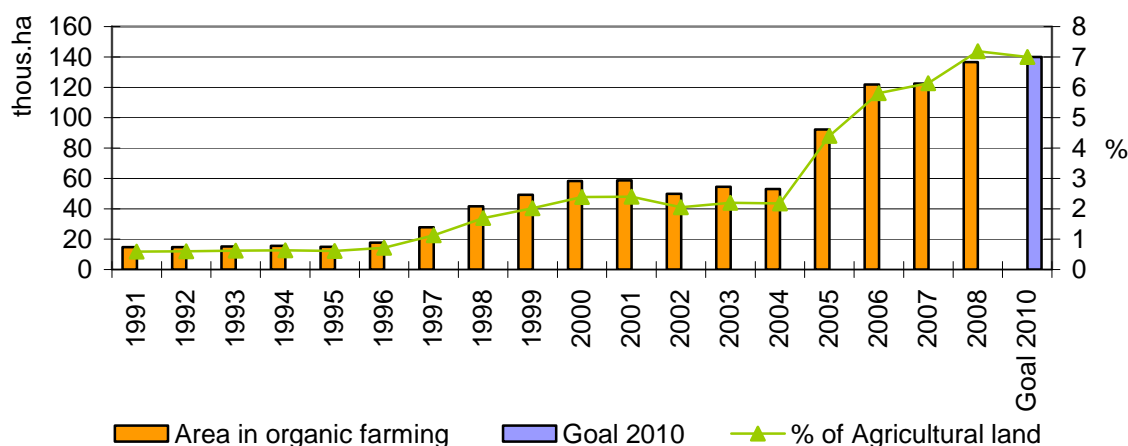
## ◆ Melioration

After 2000, there was a falling trend in the size of irrigated territories, analogous as utilisation of water for irrigation purposes with certain fluctuations. In 2008, there was 15 908 ha of irrigated agricultural land.

## ◆ Organic farming

In 2008, the system of organic farming in the SR included 349 subjects farming on 136 669 ha of agricultural land, which is 7.19 % of total agricultural land. Compared to 2007, the organic farming area increased by 14 080 ha.

## Trend in the organic farming area



Source: CCTIA

## ◆ Agriculture demands in exploitation of resources

In 2007, there was a year-to-year reduction in the consumption of liquid and gas fuels, and electricity. On the contrary, increased consumption was recorded on a year-to-year basis in the consumption of solid fuels and heat.

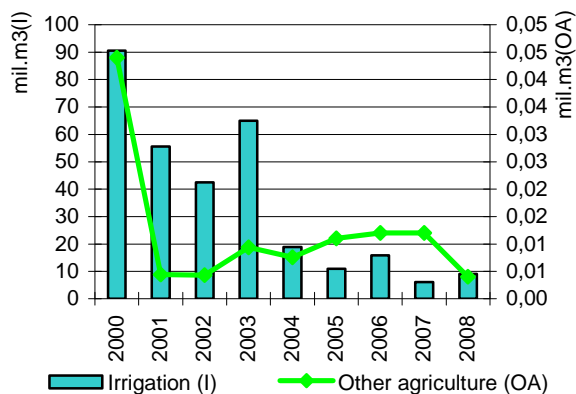
## Consumption of selected fuel types, heat, and electricity in agriculture (TJ)

Kind of fuel	2002	2003	2004	2005	2006	2007
Solid fuel	133	131	82	65	55	58
Liquid fuel	2 665	2 987	3 250	3 417	3 000	2 874
Gas fuel	1 869	3 261	1 781	1 670	1 263	1 137
Heat	270	300	181	179	168	209
Electricity	1 850	3 294	1 530	1 411	1 325	1 278

Source: SO SR

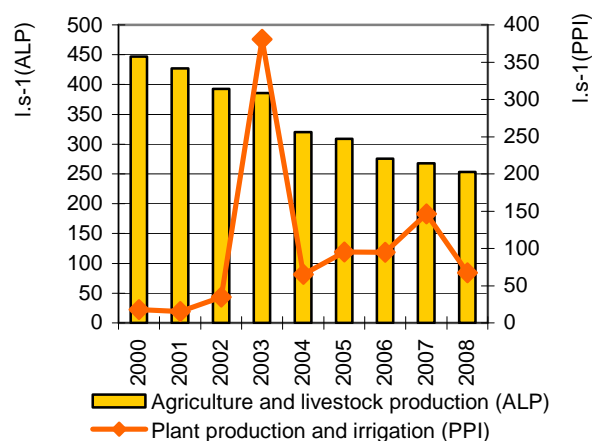
In 2008, compared to the previous year, there was a slight **increase in ground water volumes** used in agriculture for irrigation purposes. Other agriculture sectors used greater volumes of surface water. **Volumes of ground water in agriculture dropped** in 2008, compared to 2007.

#### Trend in surface water use in agriculture



Source: SHMI

#### Trend in groundwater use in agriculture



Source: SHMI

#### ◆ Production of renewable energy from agriculture

Despite its relatively high potential in Slovakia, use of the biomass for energy purposes is not satisfactory from the perspective of including energy-yielding produce into sowing technologies, as well as production of energy from biogas. Technological equipment is lacking in the area of implementation. In 2008, there were 4 biogas production facilities in operation in Slovakia. Biogas was produced from cattle manure at the volume of the 576 thous.m<sup>3</sup>.

#### Total annual production of agricultural biomass suitable for heat production in Slovakia

Crop type	Area (ha)		Yield of biomass (t/ha)		Production of biomass (t/year)	
	2007	2008	2007	2008	2007	2008
<b>Thick-sown cereals - total</b>	612 136.70	629 689.28	3.13	4.27	766 395.20	1 075 509.30
<b>Maize</b>	157 255.60	154 237.60	5.56	11.44	874 341.14	1 764 478.10
<b>Sunflower</b>	64 746.20	74 933.60	4.44	5.58	287 473.13	418 129.50
<b>Rapeseed</b>	153 830.50	162 870.50	4.18	5.22	643 011.50	850 184.00
<b>Orchards</b>	7 329.70	9 389.20	3.50	3.50	25 654.00	32 862.20
<b>Vineyards</b>	15 902.00	15 722.00	1.50	1.50	23 853.00	23 583.00
<b>Flight from permanent grasslands</b>	74 476.60	79 958.30	2.00	2.00	148 953.20	159 916
<b>Total</b>	<b>1 085 677.30</b>	<b>1 126 800.48</b>	-	-	<b>2 769 681.17</b>	<b>4 324 662.70</b>

Source: RIPP

Note: In calculating biomass for densely-sown grains we considered average yields of cereals in the corresponding year in Slovakia and ratio of grain and straw to total biological yield (ratio of grain and straw was 1:0.9).

To produce heat, it is possible to use approximately 40 % of straw from densely-sown cereals. About 60 % of produced straw is added to forage rations for livestock, part of it is used for bedding, and another part is used to balance C in soil. For this reason the table shows only the value of usable straw production potential to produce heat. For maize, the calculated grain – to – corncomb ratio is 1:1.4, for sunflower it is 1:2.2, for rape seed it is 1:2.

◆ **Impact of agriculture on environment**

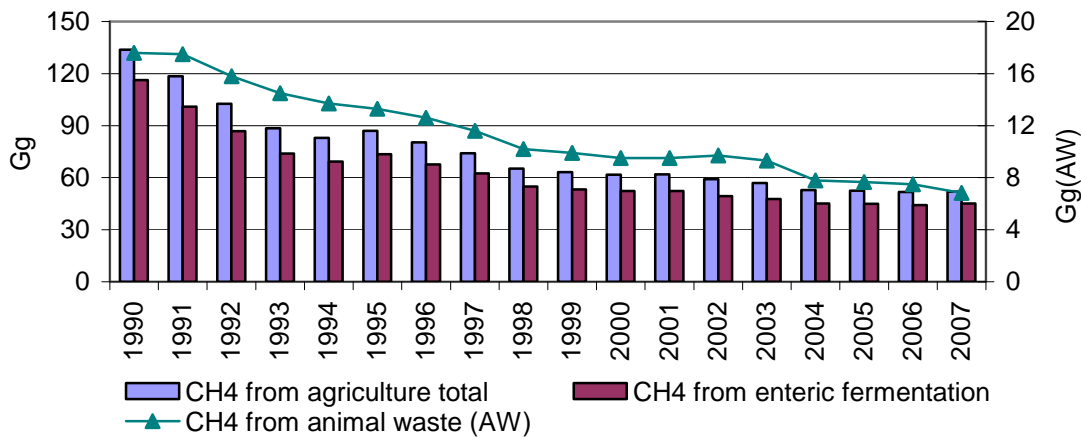
Agriculture is one the important environmental polluters. It mostly contributes to green house gases emissions, production of waste, discharge of waste water, and other.

**Impact of agriculture on air and global climate**

Share of agriculture on total methane production is systematically falling, due to decreased number of livestock. In 2006, agriculture produced 51.7 thous. tons of methane. 51.92 thousand tons of methane produced by agriculture in 2007 represented an increase by 0.23 tons, compared to 2006.

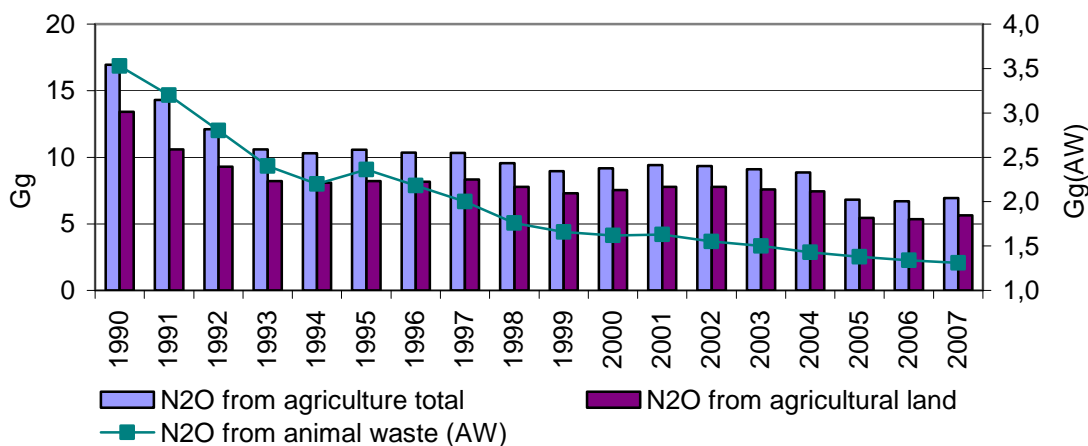
**Production of nitrous oxide by agriculture was in most aspects decreasing after 1990.** Only after 6.95 thousand tons of nitrous oxide produced by agriculture in 2007, the figures increased by 0.26 tons, compared to 2006.

**Trend in methane emissions from agriculture according to type of activity**



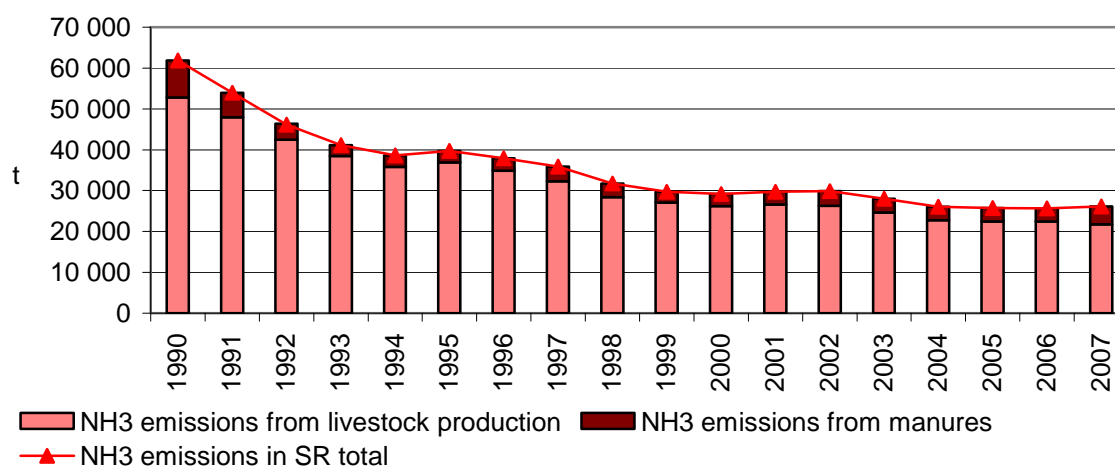
Source SHMI

**Trend in nitrogen monoxide emissions from agriculture according to type of activity**



Source SHMI

Agriculture is the biggest producer of ammonia (NH<sub>3</sub>). Only after 26,089 tons of ammonia were produced by agriculture in 2007, the figures increased by 444 tons, compared to 2006.

**Trend in ammonia emissions from agriculture**

Source: SHMI

**Impact of agriculture on water quality and quantity**

In 2008, there was 478 535 m<sup>3</sup> of discharged wastewater related with agricultural activities.

**Discharged amount of waste water in SR related to agriculture in 2008**

Waste water from agriculture	Volume (m <sup>3</sup> .yr <sup>-1</sup> )	Insoluble compounds (t.year <sup>-1</sup> )	BOD <sub>5</sub> (t.year <sup>-1</sup> )	COD <sub>Cr</sub> (t.year <sup>-1</sup> )	ENP (t.year <sup>-1</sup> )
Treated	171.405	5.305	5.759	12.734	0.000
Untreated	307.130	0.000	0.000	0.000	0.000
<b>Total</b>	<b>478.535</b>	<b>5.305</b>	<b>5.759</b>	<b>12.734</b>	<b>0.000</b>

Source: SHMI

**Production of waste in agriculture**

In 2008, there were 742 270.46 tons of total waste produced in agriculture, which is 92 773.01 tons more than in 2007. Of total produced waste other waste was 700 205.66 tons, which is 63 343.86 tons more than in 2007. Produced hazardous waste in 2008 was 42 064.80 tons of total waste volumes, which is 29 429.15 tons more than in 2007.



## Forestry

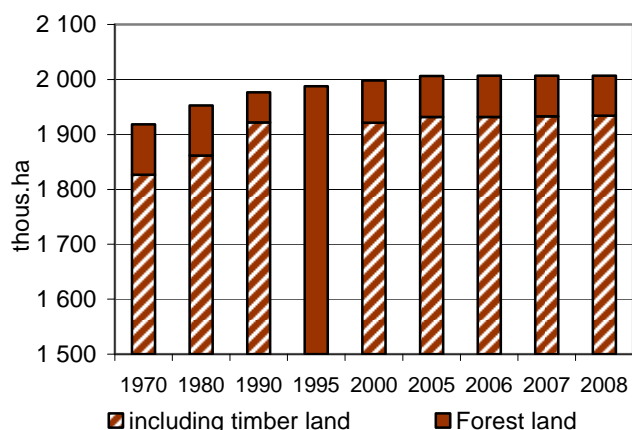
### ◆ Share of forestry on GDP production

The GDP value for the sector of forestry in 2008 grew since the previous year by 0.1 bill. SKK, (8.6 bill. SKK in total); however, its share on the overall GDP fell by 0.04 percentage point. The share would be higher (as much as approximately 3 %) if the public benefits of forests and the wood-processing industry (which are presently not considered) were accounted for.

### ◆ Structure of forest land

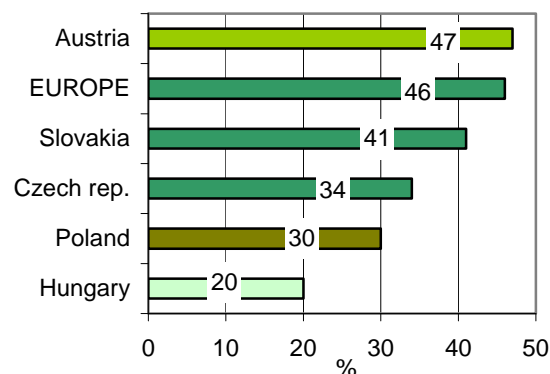
Slovak Republic belongs among those European countries that have the greatest share of forestation. In general, we can see a long-term rising trend in the share of forest land. **Forest land** size in 2008 grew by 1 115 ha, as compared to 2007, which resulted in the growth of forestation in Slovakia by **41 %** (142 ha in 2007). Timber land in 2008 represented app. 96.3 % (1 933 591 ha) of total size of forest land and similarly, there has been a gradual increase in its size. Calculated to the number of inhabitants, this represents **3.71 km<sup>2</sup> per 1 000 inhabitants**.

**Trend in forest land and timber land**



Source: NFC

**Comparison of forestation in selected countries**



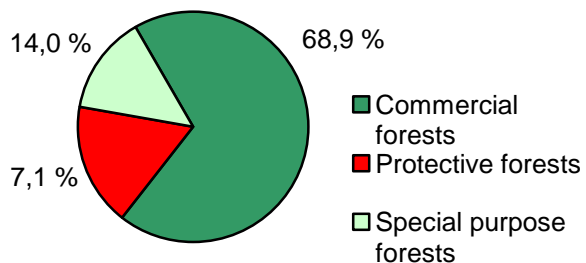
Source: NFC, FAO 2009

**State** organisations of forest management **administer 55.1 % of forests**, which is 14.9 % more than in the state ownership. Compared to 2003, proportion of forests utilized by **private** entities grew from 5.9 % to 7.2 %. **In 2008**, there was **13 830 ha** of forest land returned to the original owners. Forest land with no fully identified or documented ownership claims, or with no claims yet received from the entitled persons, take up **8.2 %** of total SR forest land.

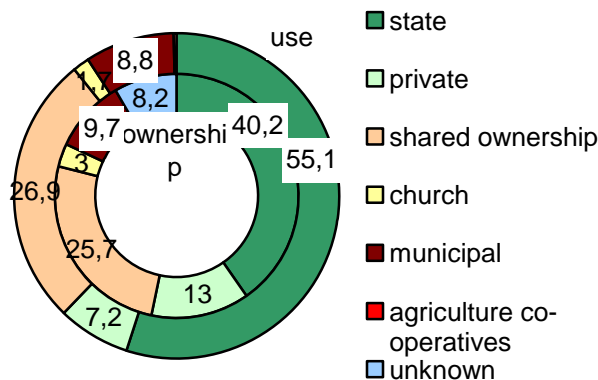
Due to the increased demand for public benefit functions of forests, there was a gradual increase in the size of protection forests (from 7.9 % in 1960 to the present level of 17.1 %, the size is stabilized since recent years) and also forests for unique purposes (forests affected with pollution were removed from this category, which caused reduced size of these forests). Majority of production forests belong to

poly-functional forests that also have other associated ecological and social functions, while only 9.5 % of forests are located in purely production type.

**Spatial representation of forest categories in 2008**    **Structure of forest ownership and use**



Source: NFC



Source: NFC

◆ **Forest composition by species and age groups**

In terms of **forest composition by species**, there is a positive share of broad-leaved trees (59.7 %) compared to coniferous trees (40.3 %). Our forests contain also **introduced tree species**. In total, these represent 25 species and their size has grown by 51.4 ha (however, due to increased size of all tree species their proportion dropped by 0.23 %, down to 2.85 %) *Robinia pseudoacacia* is the most invasive tree type. Other tree types of concern include *Negundo aceroides* and *Alianthus altissima*.

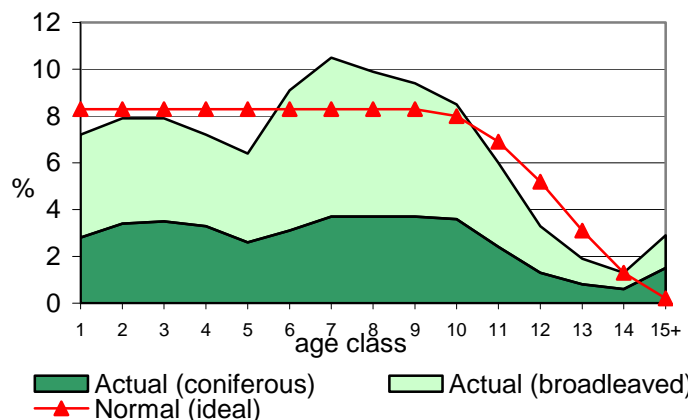
Real **forest age composition** of SR partially differs from the normal (theoretical) one. There are 582 529 ha of forests located in the 1-4 age category, 876 739 ha are located in the 5-9 age category, and 463 398 ha are located in the 10 and more age category, with clearings taking up the area of 10 923 ha.

**Comparison of present tree species composition in the forest of the SR with original and target-perspective one**

Tree species	Tree species composition (%)		
	Original	Target - perspective	Actual
Spurce / Fir	4.9 / 14.1	18.2 / 6.7	25.7/4.0
Pine / Larch	0.7 / 0.1	4.2 / 6.7	7.1/2.4
Other coniferous	0.9	1.2	1.1
<b>Coniferous together</b>	<b>20.7</b>	<b>37.0</b>	<b>40.3</b>
Oak	19.9	17.7	13.3
Beech / Hornbeam	48.0 / 2.6	35.9 / 0.9	31.4/5.8
Maple /Ash	3.2 / 0.4	3.0 / 0.5	2.1/1.5
Robinia / Birch	- / 0.1	0.1 / 0.2	1.7/1.4
Elm / Alder	0.9 / 0.3	1.2 / 0.3	-/0.8
Poplar / Willow	0.1 / 0.1	0.2 / 0.1	0.9/-
Other broadleaved	3.7	2.9	5.8
<b>Broadleaved together</b>	<b>79.3</b>	<b>63.0</b>	<b>59.7</b>

Source: NFC

**Age composition of the forest**



Source: NFC

#### ◆ Forest transport network

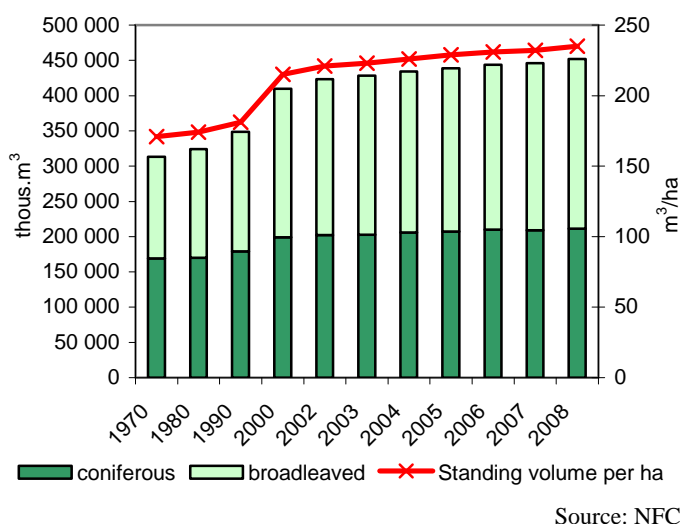
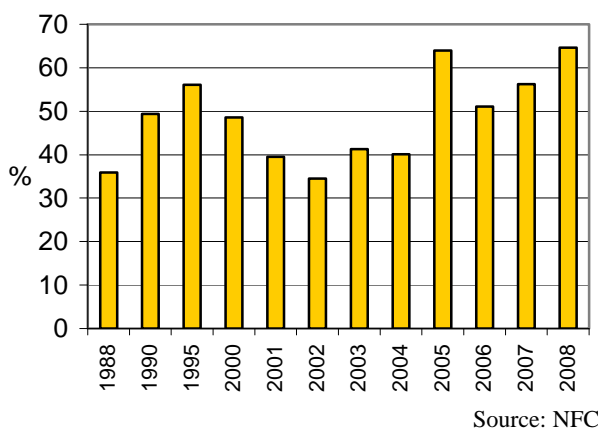
Average density of forest road network in Slovakia is  $18.6 \text{ m}\cdot\text{ha}^{-1}$ . Length of outgoing forest roads in 2008 was **37 165 km**.

#### ◆ Forestation and standing volume

Compared to 2007, total scope of forest renewal grew by 1 704 ha, to the **present size of 15 402 ha**, of which natural renewal grew by 747 ha (to reach 5 418 ha) with its share representing 35.2 %. Growth of clearing areas by 2 846 ha in 2008 is a negative trend.

**Standing volume** in 2008 reached **452.1 mil.  $\text{m}^3$**  of barkless wood matter, with average stock per hectare reaching  $235 \text{ m}^3$ . Still increasing volume of wood stock is mainly influenced by the existing age composition of the Slovak forests, with abnormally high share of most-incremental medium age levels. **Total current increment** decreased since 1990 (through changes to the age composition) and is 11 786 thous.  $\text{m}^3$ . This trend may be considered linear since 2000.

**Trend in share of incidental felling on total volume of timber felling in SR**      **Trends in total standing volume**



#### ◆ Timber felling

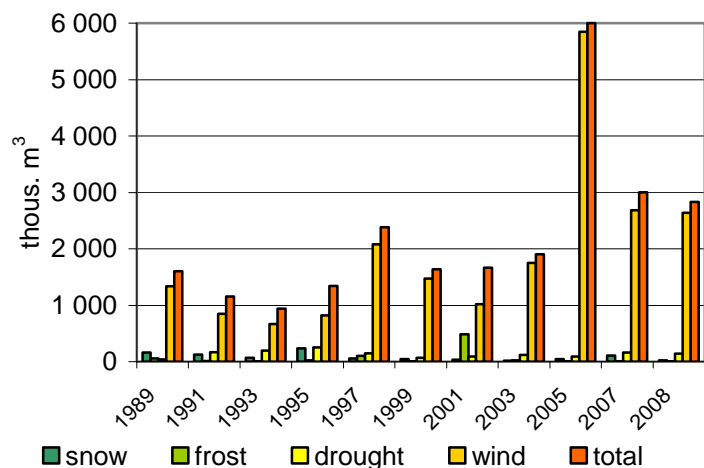
Timber felling in the Slovak forests shows an increasing tendency over a long range. In 2008, it was **9 467.1 thous.  $\text{m}^3$** , which is by 1 100 thous.  $\text{m}^3$  more than in 2007. **Incidental felling** included **64.6 %** of total anticipated harvested timber (including 87.5 % of harvested coniferous trees). Especially, due to high volumes of accidental felling, volumes of total timber felling under forest management plan in 2008 were exceeded by 26 %.

Natural conditions in the SR forests allow implementing the shelter wood system on about 60 % of timber land, selection harvest on about 10 %, and clear cutting on the remaining 30 % of timber land. **Intensity of forest resources utilisation** for this year is as much as 80.3 % (share of felling volumes and increment). At present, no more than 60 % of total current increment volume should be harvested.

#### ◆ Injurious agents and forests condition

As a consequence of negative impacts of wind, snow, frost, drought, and unknown **abiotic factors**, there was **2 831.2 thous. m<sup>3</sup>** of wood matter **processed** this year, with more than 93 % caused by the wind. Processed was 89 % of the wood matter, with 333 thous.m<sup>3</sup> remaining unprocessed.

#### Trend in damages caused by abiotic agents



Source: NFC

#### Forest damage caused by anthropogenic agents (m<sup>3</sup>)

Agents	Affected	Processed
Immisions	200 021	169 547
Fires	7 654	3 250
Wood stealing	8 032	8 032
Other anthropogenic agents	3 478	3 478
<b>Total</b>	<b>215 707</b>	<b>180 829</b>

Source: NFC

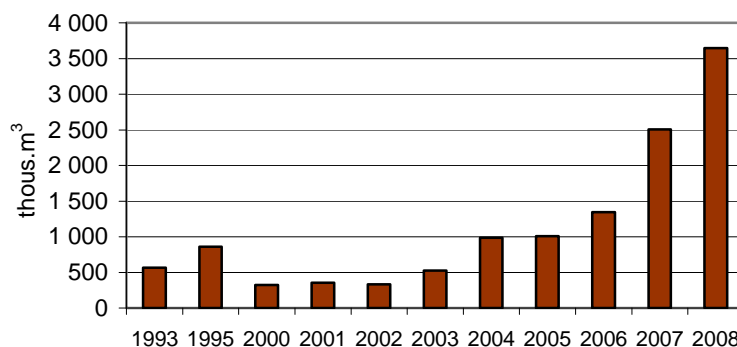
Size of individual zones with pollution risk is **6 265 ha** of forests. In 2008, Slovakia registered **182 forest fires** on the size of **118 ha**, causing **27 mill. SKK** in damages, which, compared to 2007 (460 fires), means a significant reduction. Most frequent causes included setting fires in open nature (44), burning of grass (30) and manipulation with open fire (20).

Of the **biotic harmful factors** of forest lands, bark-beetles and woodworms have the most dominant share on random incidental felling. **European spruce bark beetle** was the most significant harmful agent, with more than 86 % contribution to total affected wood matter. Since 1993, most wood matter damaged by bark beetles and woodworms was processed in 2008. Almost twice as much wood matter was not processed as in 2007, which is alarming in terms of woodworms prognosis for 2009. **Leaf-eating insects** in 2008 were in the latency stage, with their gradation expected as late as in 2013. Most significant **phyto-patogenic** harmful agent was *Armillaria*, which impacted 81 % of all wood matter attacked by phyto-patogenic organisms and which contributed to decomposition of spruce trees on acidic substrates in Kysuce, Orava, the sub-Tatras regions, in Spiš and Slovak rudohorie.

**Forest damage caused by biotic injurious agents (m<sup>3</sup>)**

Phyto-pathogenic microorganisms	269.4 thous. m <sup>3</sup>
Decays and tracheomycoses	39.3 thous. m <sup>3</sup>
Leave-eating and sucking insects	587 ha
Bark beetles and woodworms	3 644.9 thous. m <sup>3</sup>
Game	854 ha

Source: NFC

**Trend of damages caused by bark beetles and wood borers**


Source: SO SR

**◆ Forest condition monitoring and assessments**

National programme of **forest ecosystems health condition monitoring** was implemented also in 2008. The programme operated 112 permanent monitoring areas (PMA) within the 16x16 km network (extensive monitoring), and 7 research PMAs (intensive monitoring). Both monitoring levels are part of the European network of monitoring areas, in which presently participate 39 European countries.

Ratio of trees **in the 2-4 degrees of damage** is the determining factor for assessment of deterioration or improvement to the health condition of forests, with defoliation greater than 25 %.

**Most damaged** tree types included oak, spruce, larch, and fir. The least damaged were beech and hornbeam. Over the last twelve years, there has been an improvement in health condition, with the average defoliation of all tree types dropping below 25 %. Coniferous tree types have shown balanced values of average defoliation since 1996 (26.2 % - 28.3 %), for broad-leaf tree types, there are more fluctuations between individual years.

**Results of forest condition monitoring in SR in 1987-2008**

Year	Tree types	Representation of trees in various damage degrees in %							
		0	1	2	3	4	1-4	2-4	3-4
1987	Coniferous	11	36	41	11	1	89	53	12
	Broadleaves	26	47	22	5	0	74	27	5
	Total	19	42	32	7	0	81	39	7
1997	Coniferous	13	45	38	3	1	87	42	4
	Broadleaves	22	55	21	2	0	78	23	2
	Total	18	51	28	2	1	82	31	3
2000	Coniferous	18	44	35	2	1	82	38	3
	Broadleaves	29	57	13	1	0	71	14	1
	Total	25	52	22	1	0	75	23	1
2002	Coniferous	8	51	38	2	0	92	40	3
	Broadleaves	23	62	14	1	0	79	15	1
	Total	17	58	23	1	0	83	25	2
2004	Coniferous	4	60	35	1	0	96	36	1
	Broadleaves	16	64	19	1	0	84	20	1
	Total	11	62	26	1	0	89	27	1
2006	Coniferous	5	53	41	1	0	95	42	1
	Broadleaves	21	62	16	1	0	79	17	1
	Total	14	58	27	1	0	86	28	1
2007	Coniferous	5	58	36.1	1.1	0.3	95.3	37.5	1.4
	Broadleaves	19	65	14.9	1.7	0.0	81.5	16.6	1.7
	Total	13	61.8	24.0	1.5	0.1	87.4	25.6	1.6

<b>2008</b>	Coniferous	3	55.9	39.7	1.4	0	97	41.1	1.4
	Broadleaves	15	64.2	20.0	0.8	0	85	20.8	0.8
	Total	10	60.7	28.2	1.1	0	90	29.3	1.1

Description of damage degrees of monitored trees:

Source: NFC

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 trees between 26 - 60 % medium defoliation (medium injured trees)

3 - defoliation of trees between 61 - 99 % strong defoliation (strongly injured trees)

4 - defoliation of trees between 100 % dying and dead

### Results of tree defoliation in selected European countries

Country	Number of assessed trees	Degree of injury				
		0	1	2	3+4	2+3+4
<b>Czech Republic*</b>	5 489	12.2	30.7	55.4	1.7	57.1
<b>Hungary*</b>	1 872	51.8	27.5	12.5	8.2	20.7
<b>Poland*</b>	9 160	23.8	56.1	19.4	0.8	20.2
<b>Austria**</b>	3 425	57.8	27.2	10.7	4.3	15.0
<b>Slovakia</b>	4 083	10.0	60.7	28.2	1.1	29.3
<b>EÚ*</b>	82 467	27.9	48.2	21.2	2.7	23.9

Source: NFC, FAO, 2008

Notes: \* - data to 2007

\*\* - data to 2006

#### ◆ Hunting

There were **1 837 hunting areas** in Slovakia in 2008, including 33 game protection territories and 13 pheasant territories. Total size of the hunting territory is **4 529.5 thous. ha**.

Spring stocks of the cloven-hoofed game as of March 31, 2008 were higher than in the previous year.

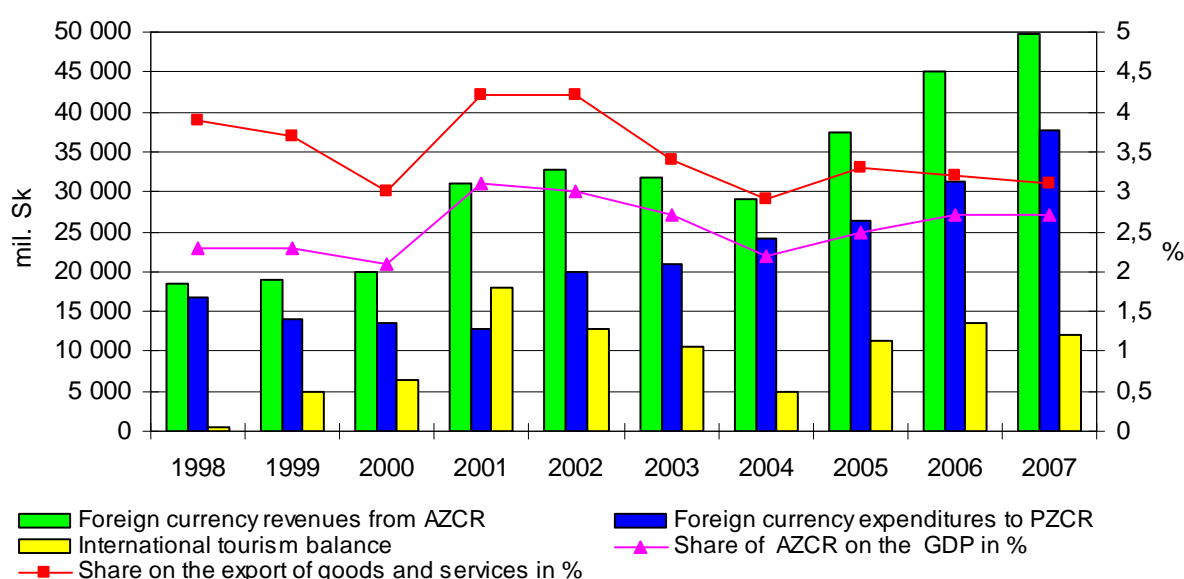
**Shooting** of clove-hoofed game in 2008 was higher than in the previous year, however, it should even be higher (the shooting plan was not met).

Spring stock of pheasant, rabbit, partridge and turkey increased. Numbers of **large predators** increased statistically. In terms of other **rare species** of animals, compared to the previous year, their numbers increased, excluding marmot. Hunting of rare game species is strictly regulated. Permitted shooting limit of **bear** was 42, while the actual number of shot animals was only 34. 121 wolves, 9 alpine chamois and 1 bison were shot.

## Recreation and tourism

Notwithstanding their fluctuating characteristics, **foreign exchange revenues for active tourism balance (AZCR) in 1997-2002 were on the rise**; however, **during the period of 2002-2004, there was a reduction**, caused by major changes outside the sector (strengthening of the Slovak currency conversion rate, especially relating to the US dollar and Polish zloty, increased original VAT tax rate from 14 to 19 %) **In the period of 2005-2008, there was a recurrence in a very significant rise in revenues and tourism balance figures.**

### Tourism and the consolidated balance sheet of the State, share on the GDP and export in 1998-2008



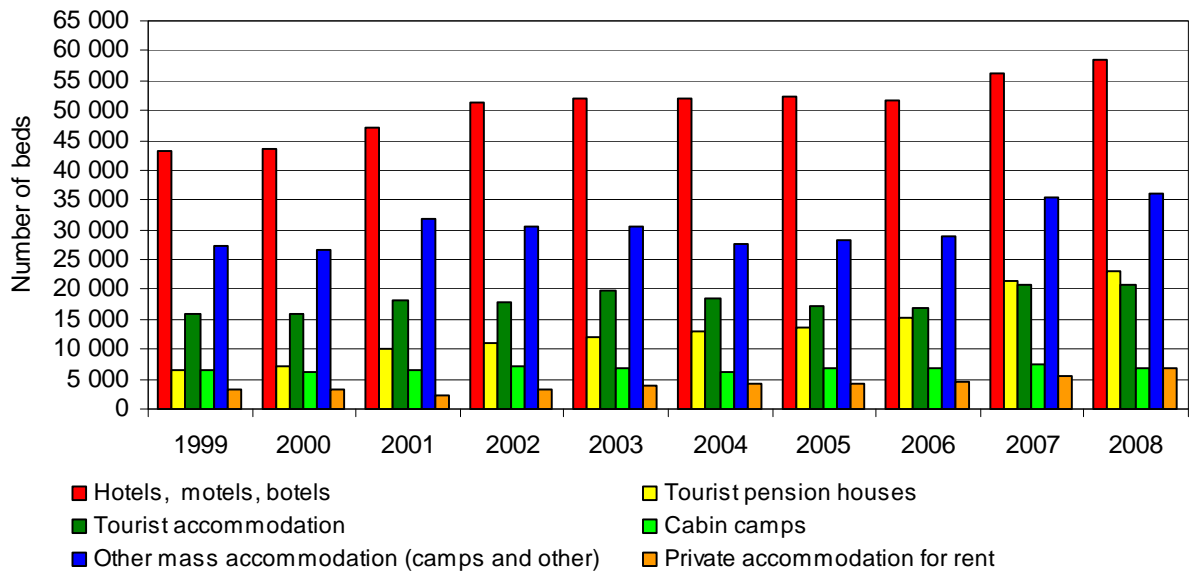
Source: SO SR

\* - level of revenues in foreign exchange in 2001 is partially affected by transition to Euro toward the end of the year and the SR citizens placing foreign exchange on their foreign exchange accounts

#### ◆ Specific analysis of recreation and tourism

**Increase in the bed capacity of accommodation facilities in 1999-2003** can be assessed positively as this increase has been caused especially by increased numbers of more affordable small, environment friendly accommodation facilities – pensions and hostels. **In 2004-2006, there was a stagnation in the number of beds in all other categories of accommodation facilities, with the exception of beds in boarding houses and cabin settlements** After 2006; however, there has been again a significant rise in the number of beds in all categories of accommodation facilities, especially in the case of boarding houses and private accommodation houses.

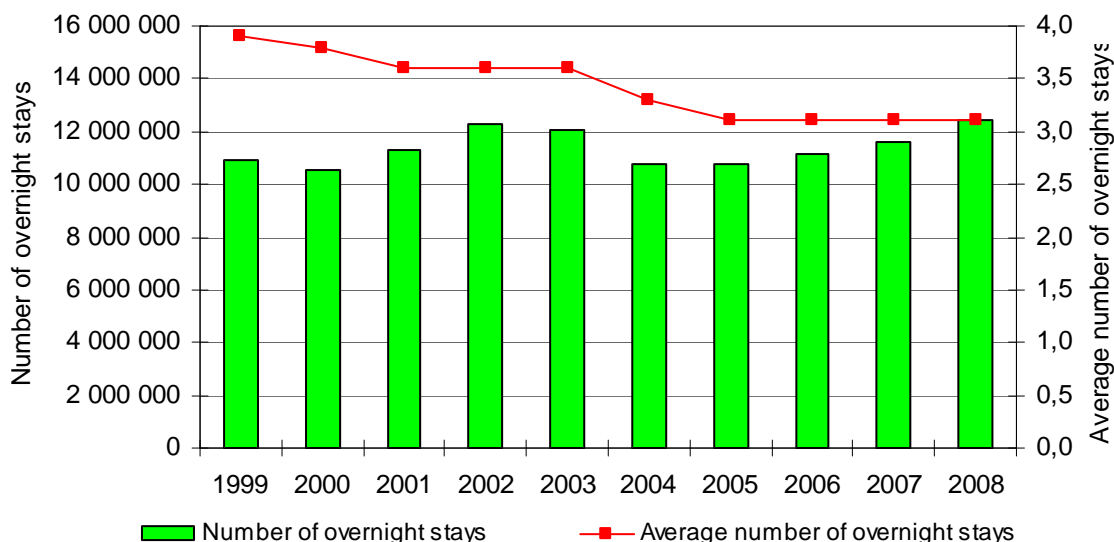
### Number of beds in accommodation facilities in the Slovak Republic in the years 1999-2008



Source: SO SR

Notwithstanding the fluctuating characteristics of statistical data and a slight growth over the period of 1997-2005, **number of overnight stays is still stagnating**. Most importantly; however, **average number of overnight stays stagnates or decreases continually**. This relates to the attractiveness of the tourist destination and the level of development of its infrastructure. This is what influences the length of actual stays.

**Number of overnight stays in accommodation facilities in the Slovak Republic in 1999-2008**



Source: SO SR

◆ **Demand of tourism on exploitation of resources**

In terms of national economy, **tourism with its little demand on material resources does not represent a significant demanding sector**. This fact is especially important for a country like Slovakia, which depends much on export.



**Demand of tourism on the exploitation of natural resources and land occupation is important especially on the local level.** This phenomenon is caused by major seasonal differences in the number of tourists to individual tourist destinations. Compared to other economic activities, **it is not possible, for example, to supply data on the energy and material demand of tourism**, because of the lack of good data retrieving and collecting mechanisms to meet specific indicators. **Tourism** being a sector of economic activity **does not have high demands on water or fuel consumption.** These requirements; however, are more typical generally for major fluctuations between the main tourist season, and the low tourist season.

#### ◆ **Environmental impact of recreation and tourism**

Intensity of visitor stays is not uniformly distributed throughout the territory. The most attractive but also potentially endangered tourist destinations, mainly due to the influence of mountain tourism, include mainly national parks. Sites for mountain tourism activities are concentrated within the Tatranský National Park (Roháčska valley in the Západné Tatry, and Mlynická, Mengusovská, Velická, Malá, Veľká Studená, and Skalnatá valleys in Vysoké Tatry), Nízke Tatry National Park (Demänovská and Jánska valleys, and northern slopes of Chopok, Bystrá valley, and southern slopes of Chopok), and Malá Fatra National Park (Vrátna valley). In terms of density of **marked biking trails and marked hiking trails, the most fragmented territories**, in consideration of their size, are areas of the **Pieninský National Park, NP Muránska Plane, and the NP Slovenský raj.**

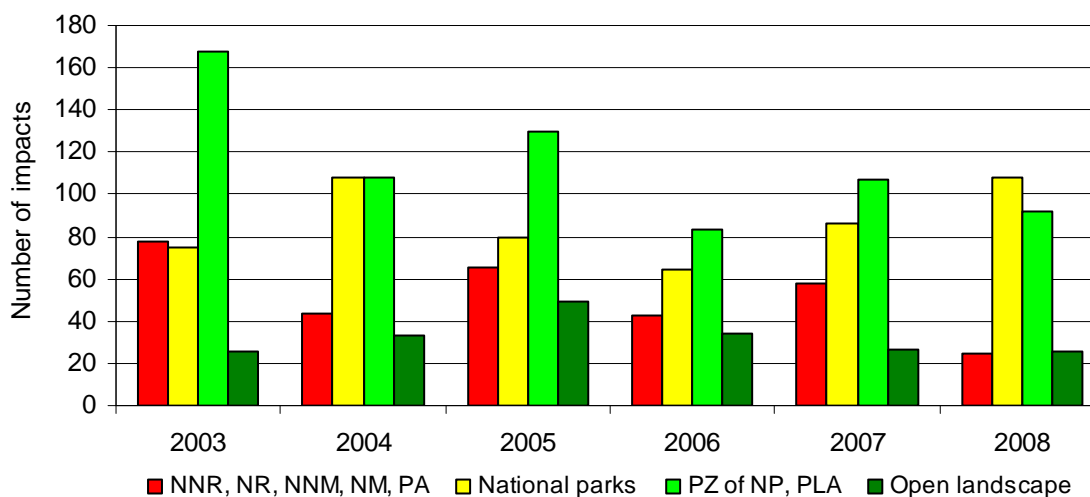
**Continuing increase in the length of erosion-impacted hiking marked trails** presents a significant environmental issue. These trails are **in the zone above the upper forest border and in precipices** where, due to extreme climate conditions, exist greatly deteriorated local conditions for regeneration of the soil and the flora. **Critical soil erosion** may be seen at marked hiking trails **in the territory of the national parks (NP) of Nízke Tatry**, (substantial erosion increase in 2006-2007), **the NP of Malá Fatra** (substantial erosion increase in 2002-2003), and **the Muránska Plane NP** (substantial erosion increase over the years 2004-2005). **In 2004-2008, significant increase in erosion of marked hiking trails** was recorded also **in the territory of the Tatras NP.**

Highest degree of endangerment of small-size protected areas from tourism-related activities exists in the following territories: Tatras National Park, NP Nízke Tatry, NP Malá Fatra, NP Pieniny, NP Slovenský raj, PLA Dunajské luhy /Danube marshes/, PLA Malé Karpaty /Small Carpathians/, PLA Strážovské hills, PLA Poľana, PLA Cerová hills, and PLA Vihorlat.

Although **all categories of protected territories together take up only about 18 % of the whole Slovakia's territory, they represent in total 60-80 % of the assessed impacts into nature and landscape** that require permission of a pertinent nature protection authority (especially the areas of

TANAP, Nízke Tatry NP, NP Slovenský raj, and NP Malá Fatra) In terms of the categories of protected territories, **most assessed impacts** over the period of 2004-2007 **always relate to protection zones within national parks, as well as protected landscape areas and national parks.** Open landscape shows the least number of assessed impacts. Over the years of 2006-2007 the number of these impacts grew slightly, with the exception of open landscape. On the contrary, in 2008 there was a significant rise in the number of assessed impacts only inside the national park territories, while the number of these impacts significantly dropped in the territories of nature protection categories 4 and 5 (NNR, NR, NNM, PP, PA) and protection zones of NP and PLA.

#### Number of assessed impacts in nature and landscape, related to activities in tourism in 2004-2008



Source: SNC SR

## • PUBLIC HEALTH

### Life expectancy at birth

**Average life expectancy at birth** is rising for both genders, reaching 70.85 years for men and 78.73 years for women in 2008. The SR population is aging at the base of the age pyramid, i.e. from the bottom, due to a reduction in fertility and natality, as well as near the top of the age pyramid due to an increasing average life expectancy.

**Structure of population** by gender is the result of natality, mortality, and external migration. The secondary masculinity index, i.e. the number of born boys per 1 000 born girls, shows generally fluctuating characteristics. The most positive element in the demographic trend of 2008 was a relatively substantial increase in the number of live births, reaching the level shown in 1998.

### Morbidity and mortality

In 2008, there were 27 994 deaths for men and 25 170 deaths for women. Compared to 2007, this is lower by 232 deaths in men, and 460 deaths in women. In 2008, men comprised 52.7 % of deaths, while women 47.3 %.

Greatest public mortality both in men and women over a long time period has been from **circulatory system diseases**, with 28 502 deaths in 2008, which is 46.9 % in men and 61 % in women. Second most frequent cause of death for both, men and women, are still **tumours**. Compared to the last year, cancer shows a slightly rising tendency, with 11 992 deaths in 2008, which is 24.6 % of men and 20.3 % of women. In men, third most frequent cause of death is **injuries and poisonings and other external causes** (9.2 %). In women, the third most frequent cause of death includes **other diseases** (6.5 %).

### Public Health – selected indicators

Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>Life expectancy at birth</b>									
• Men	69.15	69.51	69.77	69.76	70.29	70.1	70.4	70.51	70.85
• Women	77.23	77.54	77.57	77.62	77.82	77.9	78.2	78.08	78.73
<b>Live births per 1 000 inhabitants</b>	10.2	9.5	9.5	9.6	10.0	10.1	10.0	10.1	10.6
<b>Deaths within 1 year of age per 1 000 live births</b>	8.6	6.2	7.6	7.8	6.8	7.2	6.6	6.1	5.9
<b>Infant mortality rates</b>	5.4	4.1	4.7	4.5	3.9	4.1	3.53	3.4	3.4
<b>Deaths</b>	52 724	51 980	51 532	52 230	51 852	53 475	53 301	53 856	53 164
<b>Deaths per 1 000 inhabitants</b>	9.9	9.7	9.6	9.7	9.6	9.9	9.9	10.0	9.8

Source: SO SR

## ENVIRONMENTAL RISK FACTORS

### • PHYSICAL RISK FACTORS

#### Radiation protection

Under **Act 126/2006 Coll. on public health and amendment to other laws**, the Public Health Authority of the Slovak Republic in cooperation with other pertinent resorts have an obligation to carry out monitoring of the radiation situation and secure collection of data in the Slovak territory for the purposes of assessing the impact of radiation on public health.

#### ◆ Air dose equivalent rate

Input of the external photon dose equivalent in air H in 2008 in the early alarm networks of in the whole SR territory reached the average value of 111.2 nSv.h<sup>-1</sup>.

#### ◆ Air Contamination

Air contamination has continually been monitored by measuring the volume activity of individual radio nuclides in **aerosols** extracted in the ground atmospheric level. Their <sup>137</sup>Cs concentration in Slovakia in 2008 reached average value 1.10<sup>-6</sup> Bq.m<sup>-3</sup>.

In 2008, no major air contamination by man-made radionuclides was detected, <sup>137</sup>Cs radionuclide concentration in **radioactive fallout**, originating in the upper atmospheric layers as a result of nuclear weapons tests, was about 1.6 Bq.m<sup>-2</sup> in Slovakia.

#### ◆ Contamination of other environmental compounds

**Average soil** contamination by the <sup>137</sup>Cs radionuclide in 2008 was about 9.3 Bq.kg<sup>-1</sup>. Average activity of the <sup>137</sup>Cs radionuclide **in water** in 2008 was below 0.015 Bq.l<sup>-1</sup>. Average tritium activity **in water** was at the level of 5.1 Bq.l<sup>-1</sup>.

#### ◆ Contamination of foodstuff and agricultural products

Of all man-made radionuclides, in 2008, just like in the previous years, it was possible to detect in food samples only the <sup>137</sup>Cs radionuclide.

#### Nuclear installations in the SR

Under Act 575/2001 Coll. the Nuclear Regulatory Authority of the Slovak Republic carries out state supervision in the area of nuclear energy use and safe handling with burnt nuclear fuel and radioactive waste at physical protection of the nuclear material, and at contingency planning in the

Slovak Republic for cases of radiation threat. The Authority meanwhile controls implementation of responsibilities stemming from international treaties and agreements in the area of peaceful use of nuclear energy. Act 408/2008 Coll. was adopted in 2008, which amends the Atomic Act 541/2004 Coll. due to transposition of the Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel.

#### List of nuclear installation in the SR and their operators

Location	Nuclear installations	Operator
Mochovce	NPP Mochovce, 1. a 2. block NPP Mochovce 3. a 4. block under construction	SE, Inc.
Bohunice	NPP V-2	
Bohunice	NPP Bohunice V-1 NPP Bohunice A-1 Repository of Spent Nuclear Fuel (SNF) Technologies of treatment and processing RAW	JAVYS, Inc.
Mochovce	Final treatment of liquid RAW Republic deposit RAW	

Source: NRA SR

Slovakia is a signatory to all major international agreements and conventions in the area of peaceful exploitation of nuclear energy.

#### ◆ Activity of nuclear installation in the SR

##### *Operated nuclear power plants in the SR*

There is 6 block of nuclear power stations with nuclear reactor VVER-440 nowadays.

#### List of operated nuclear power plants (NPP) in the SR

Nuclear Power Plant (NPP)	Start of operation	Reactor type	Operator
NPP Bohunice V-1	1978, 1980	VVER 440/230	JAVYS, Inc.
NPP Bohunice V-2	1984, 1985	VVER 440/213	SE, Inc.
NPP Mochovce 1,2	1998, 1999	VVER 440/213	SE, Inc.

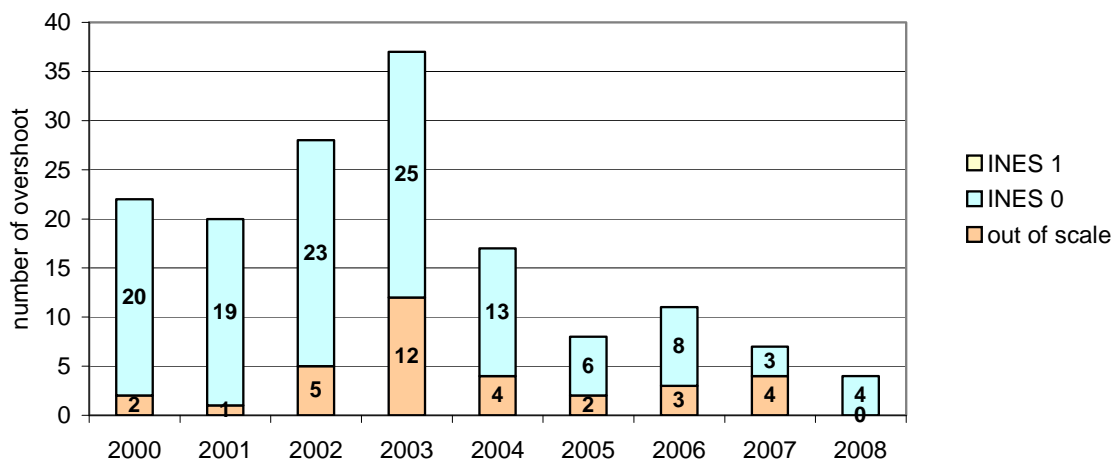
Source: NRA SR

#### **NPP V-1 Bohunice**

First block of NPP Bohunice V-1 was put out of operation in December 2006, and in February 2008 the block was switched into regime 7, meaning that the fuel from the reactor was transported out to the storage pool. Reactor and the primary circuit is assembled and filled with pure condensate. Second NPP V-1 block in Bohunice was in operation in 2007 according to demands of Slovak energy control centre. In December, the block was shut down as the consequence of the Slovak Government decision.

In 2008 there were no major operating events at the nuclear power plant of V-1 Bohunice, and based on the outcomes of control activities and assessment of safety indicators, NRA SR assessed the operation of both NPP V-1 blocks as safe and reliable in 2008.

**Number of occurrences of block NPP V-1 Bohunice**

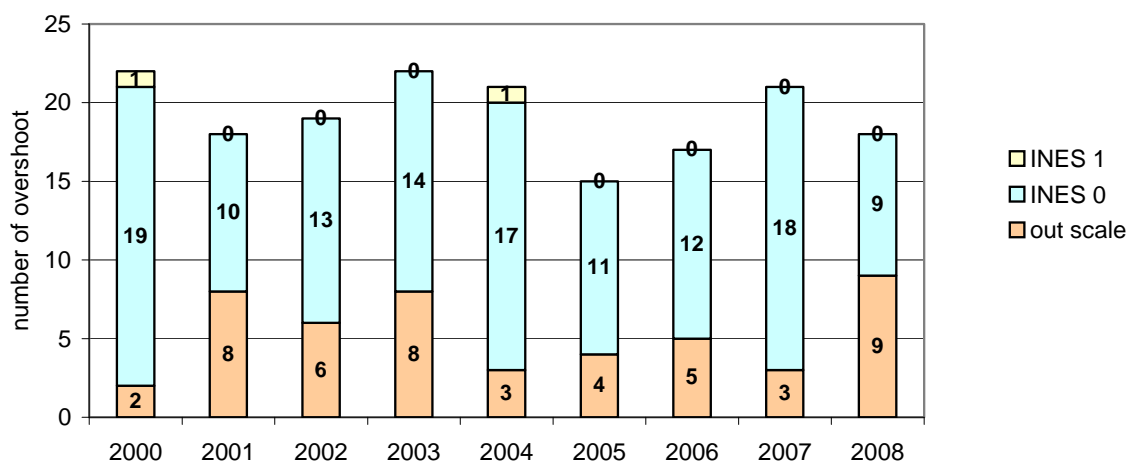


Source: NRA SR

**NPP V-2 Bohunice**

In terms of nuclear safety, the V-2 blocks, meaning blocks 3 and 4 in the NPP Bohunice, which are operated by the SE, Inc. company, represent a newer and substantially improved series of VVER 440 model V-213 blocks, compared to V-1 blocks. NPP is able to handle accidents up to the level of the main circulation pipe rupture, without major impacts on the population and environment. In 2008, both NPP V-2 blocks met the demands of the Slovak energy control centre. In 2008, there were shut-downs within the NPP V-2 zone on fuel exchange blocks as well as overhauls of blocks, during which were implemented investment projects aiming at continual increase of nuclear safety that built on the experience with operation at both national and international levels.

**Number of occurrences of block AE V-2 Bohunice**



Source: NRA SR

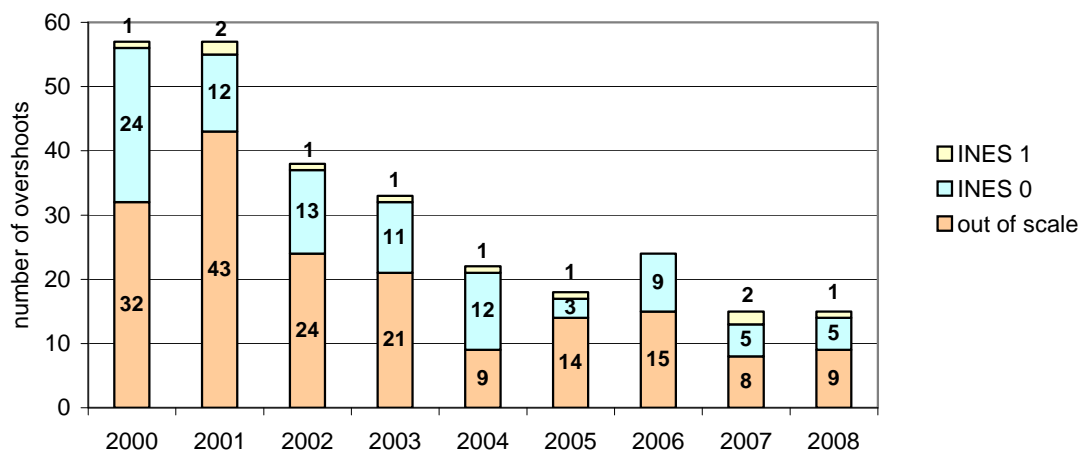
The number and character of events and occurrences in 2008 was within the realm of common technical malfunctions, without a unique safety issue. Events that occurred at NPP Bohunice V-2 did not have a major impact on nuclear safety. There were no cases of automatic shut-downs of AO-1.

NRA SR assessed the operation of both NPP V-2 blocks in 2008 as reliable, with no major failures in the area of nuclear safety. The most important event was a failure of the control of armature at the technical water feed stream to the rinsing system cooler. The operator took a series of corrective measures with the objective to prevent the recurrence of such events

### NPP Mochovce 1, 2

In 2008 in NPP Mochovce 1, 2 planned shutdowns were implemented at the blocks for overhauls and fuel changes. There were two major operation events in NPP Mochovce 1, 2 in 2008. The first event relates to insufficient sealing of primary circuit (PC) return valve, while the second event relates to faults in set paths for measuring sealing characteristics of PC equipment division planes.

#### Number of occurrences of block AE Mochovce 1, 2



Source: NRA SR

#### *Nuclear power plants under construction*

At present, one atomic power plant is under construction in Slovakia - NPP Mochovce 3, 4 in the ownership of SE, Inc.

### NPP Mochovce 3, 4

Conservation and protection works on 3rd and 4th blocks of NPP Mochovce continued also in 2007. NRA SR periodically controls and assesses their condition. Planning works began in 2007 as a result of a decision of the owner of the plant. Their result should involve continuing construction of blocks 3 and 4.

#### *Nuclear power plants to be phased out*

In 2008, one atomic plant – NPP A-1 in Bohunice was phased out. After the SE Inc. division, the plant became the ownership of JAVYS, Inc. Prepared for shut-down are Block 1 of the NPP Bohunice V-1 that finished its output operation in 2006, and Block 2 of the same power plant that finished its output operation as of December 31, 2008.

### *Operated nuclear installations (NI)*

**Jaslovské Bohunice temporary storage of burnt fuel (MSVP)** stores burnt fuel from the NPP V-1, NPP V – 2, and NPP Mochovce 1, 2, before its transport to the re-processing plant or before its permanent storage.

Over the course of 2008, the assessment activity was focused on assessing the condition of operation checks at construction and technological parts and the systems of MSVP and the stored SNF. There was no case of non-compliance with the conditions of nuclear and radiation safety and operation directions; hence, the operation may be assessed as safe and reliable.

**Technology of processing and treatment of radioactive nuclear waste (RAW), Jaslovské Bohunice** includes two bitumen lines, cement line, and the Bohunické RAW processing centre. Bitumen lines with the capacity of 120 l/h are designed to process RAW concentrates from the operation of nuclear power plants. RAW is processed into 200 litre barrels placed into fiber-concrete containers before its final storage.

In 2008, the discontinual bitumen facility designated for the fixation of ionex and sludge into the bitumen matrix continued to be put into operation. Outcomes of the control activities suggest that the operation of NI Technologies for radioactive waste processing and treatment may be assessed as safe.

**National discharge site of radioactive waste Mochovce** is a multi-barrier discharge site of the surface type, designed for final storage of solid and solidified RAW generated at the operation and phaseout of NPP, at research institutes, in laboratories, and in hospitals in Slovakia.

Inspection activities at the National Discharge Site of Radioactive Waste in 2008 focused on the process of receiving the radioactive waste to the repository, and on controlling of the properties of fibre-reinforced concrete containers by the site operator. Based on the outcomes of control activities, operation of the National Discharge site of Radioactive Waste in Mochovce may be assessed as safe, without a negative impact on environment.

**Final processing of liquid radioactive waste (RAW) sludge, Mochovce** is in the ownership of JAVYS, Inc. and aims at final processing of liquid radioactive waste from the operation of NPP Mochovce into the form appropriate to be stored within radioactive waste deposit. Technology consists of two individual processes involving bituminization and cementation.

In 2008, NRA SR issued a decision on extending the test operation period of this nuclear facility. Inspection activity at FS KRAO was focused on making sure the test operation complies with the set criteria.

The above mentioned nuclear facilities recorded one operation event outside the INES scale, i.e. with no impact on nuclear safety.

### **Nuclear facilities to be phased out**

VUJE, Inc. owns two experimental nuclear facilities – bituminization line and RAW incinerator, both in the I-st. stage of phase-out.



◆ **Handling with radioactive waste**

In Slovakia, **radioactive waste** (RAW) is defined as unused material that due to its radionuclide content or contamination by radionuclides cannot be introduced into the environment.

**Handling of radioactive waste** constitutes an integrated system that includes the collection, separation, storage, processing, treatment, manipulation, and discharge of radioactive waste.

Objective of the activities that precede the placing of radioactive waste involves the optimization of the loading process and increasing its safety and economic efficiency through creating a packaged form suitable to be stored at the RAW repository. Storage plays an important role between the generation of RAW and the individual steps of the radioactive waste handling system. Final step in the process of RAW handling constitutes its storage, which should be the objective of all activities related to RAW handling, and which represents a permanent placement of the packaged RAW forms in the storage facility. National RAW surface discharge storage site in Mochovce stores the RAW generated in Slovakia. It is assumed that individual NPP blocks will produce over the project operation time.

## • CHEMICAL RISK FACTORS

### Chemical substance

On June 1, 2007, a new EC Regulation 1907/2006 became effective in all EU member states. This legislation addresses registration, evaluation, authorisation, and restriction of chemical substances (REACH) and also establishes the European Chemical Agency. This legislation amends and supplements Directive 1999/45/EC and supersedes Council Regulation (EEC) 793/93 and Commission Regulation (EC) 1488/94, Council Directive 76/769/EEC, and Commission directives 91/155/EEC, 93/67/EEC, 93/105/EC, and 2000/21/EC (hereinafter only „the REACH regulation“).

Changes emanating from the amendments to Directive 67/548/EEC were transformed and subsequently implemented by the Ministry of Economy into the Slovak legal system through novelization of Act 163/2001 Coll. on chemical substances and chemical compounds as amended. (Act 405/2008 Coll.)

The **Rotterdam Convention** on prior informed consent procedure for certain hazardous chemicals and pesticides in international trade is a major international law instrument to improve international regulation of trade with certain hazardous substances and pesticides. This Convention entered in effect for Slovakia on April 26, 2007.

In 2008 works on the preparation of a new directive were carried out, with active participation of the Ministry of Environment together with the Ministry of Economy. In June 2008 the Official EU Journal published a new EP Directive (EC) 689/2008 on export and import of dangerous chemicals.

### SAICM

Ministry of Foreign Affairs of Slovak Republic nominated the Ministry of Environment to be the national contact site for Strategic approach to international chemicals management (SAICM) in Slovakia. In 2008, MoE SR was involved in preparing the strategy and participated in workshops of the SAICM organizations.

### Xenobiotics in the food chain

Volumes of xenobiotic substances in foods are regulated by limits published in the Slovak Food Code and compatible with the EU limits.

Monitoring of the occurrence of xenobiotic substances in the components of environment and the products of agricultural and food production is carried out in two ways – through a random control, and a regular monitoring.

**Testing for xenobiotics** is carried out by testing organisations under the valid legislation, with the goal to prevent the flow of unacceptable foods to the consumer. Results from the tests serve as the basis for adopting immediate decisions.

**Monitoring of xenobiotics** collects information on the status and trends in pollution of individual components of environment, as well as information on health safety of local foods. Results from the monitoring, including the risk assessment, serve as a basis for adoption of preventive measures.

♦ **Monitoring of xenobiotics in the food chain**

Partial monitoring system called: **Xenobiotic in foods and forage** is composed of three subsystems:

- Co-ordinated focus-specific monitoring (CFM) has been used since 1991
- Consumption pool monitoring (CPM) has been used since 1993
- Monitoring of game, wildlife, and fishes (MGF) has been implemented since 1995

Partial monitoring system has been connected to the GEMS/FOOD EURO international monitoring system since 1994.

**Coordinated focus-specific monitoring (CFM)** has the objective to determine actual mutual relationship between the degree of contamination of agricultural land, irrigation water, feeding water, crop and animal production, within the primary agricultural production, and obtain information on the contamination of individual food chain components.

**36 088 samples** were extracted over the entire monitored period (17 years), containing **2 461** limit-exceeding samples, which represents **6.8 %**. Monitoring was carried out for 810 agricultural subjects (in 75 districts), analyzing soil samples from 478 287 ha.

Most limit-exceeding samples were detected **in water** (mainly nitrites and nitrates) and **in forage**. (nitrites) **Since 1991**, soil contamination balance showed significant improvement, with decreased average contents of **mercury** and **arsenic** in 2007. On the contrary, average detection and number of limit-exceeding soil samples for **cadmium** and **lead** increased. In case of water for animal feed, non-compliant values were detected for nitrates as well as nitrites; however, the number of limit-exceeding samples dropped. Irrigation water did not show a single event of limit-exceeding values. For the first time, forage showed limit-exceeding values in 2007. Contents of PCB also show positive balance as there were no limit-exceeding samples detected in 2005 - 2007.

**In 2007**, total number of **1 634 samples** were extracted from 596 hunts and subsequently analysed for content of chemicals, PCB, nitrates, and nitrites. Monitoring was implemented for 47 agricultural subjects in 39 districts, with analysis of the soil samples from 25 781 ha, including the crop produced from this soil.

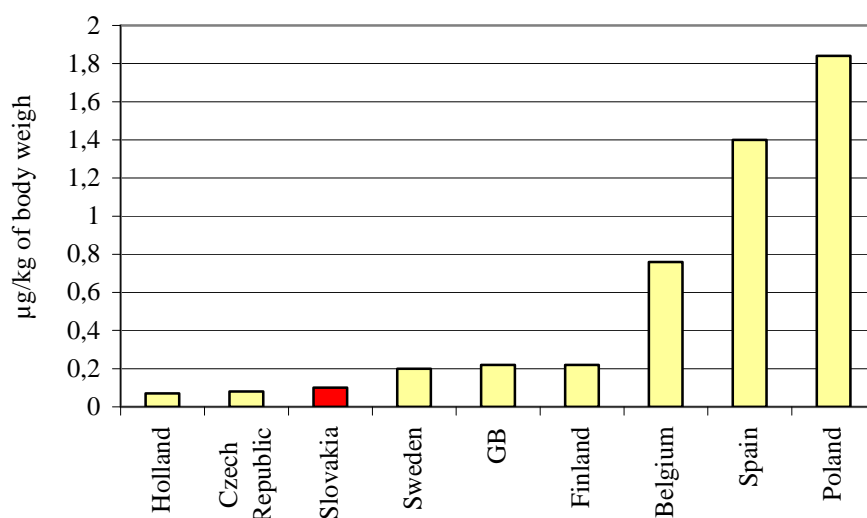
Comparison of contamination of individual commodities suggests that the limit-exceeding samples in 2007 were detected in water for animal feed, contributed to by nitrites and nitrates, while cadmium, lead, and nickel were found in soil.

Objective of the **Consumption pool monitoring (CPM)** is to obtain data on contamination of foods within the consumer network and subsequently assess exposition of the population to the monitored contaminants. Samples are purchased from the commercial network twice a year (May, September) at 10 Slovak sites.

Over the period of **fifteen years, 10 984 samples** were analysed, including **501 samples**, i.e. **4.6 %** that exceeded permitted limit values, especially in nitrates and chemical elements.

Consumption pool in **2007** included 26 basic foods. (by statistical consumption) Samples of drinking water from public sources were not monitored in the given year. **607 samples** were analysed, including **7 samples** (i.e. **1.2 %**) that were unacceptable.

#### Comparison of the weekly absorption of mercury by the human organism between Slovakia and other world countries



Source: FoRI SR

Compared with available international data, the SR may be considered among countries with **lowest values** of weekly intake of arsenic, cadmium, mercury, chrome, nickel, lead, and nitrates by the human organism.

## • WASTE AND WASTE MANAGEMENT

### Initial situation

The year 2008 was the third year of meeting the objectives of the Programme of Waste Management of the Slovak Republic for the years 2006-2010.

### Balance of waste generation

Since 2003, waste generation assessment has been split into 2 tables. The first shows total volumes of generated waste based on notifications from waste generators. More information in terms of strategic territorial development of waste management infrastructure shows the table containing just those waste volumes that are located on the market, i.e. the producers had to submit waste for recovery or disposal to the authorities dealing with waste handling, pursuant to waste law. Waste volumes located on the market represent the initial statistical basis for monitoring the waste management trend.

#### Waste generation (t)

Waste category	Amount (t)
Hazardous waste	602 480
Other waste	12 962 808
Municipal waste*	1 790 691
<b>Total</b>	<b>15 355 979</b>

Source: SEA, SO SR

#### Generation of waste located on the market (t)

Waste category	Amount (t)
Hazardous waste	523 928
Other waste	9 177 459
Municipal waste*	1 790 691
<b>Total</b>	<b>11 492 078</b>

Source: SEA, SO SR

\*MW contains both categories (hazardous and other waste, it is necessary to separate the category of municipal waste considering the unique character of its regime, typical of municipal waste

Compared to 2007, the annual growth of waste put on the market is about 5 %. The decrease existed in hazardous waste generation by 1.5 % compared to the previous year.

In the area of waste generation by economic activities classification SK NACE, manufacturing industry has been the dominating component over the recent years, with 65 % share. Sector of building industry follows with 13 %, agriculture with 8 %, and trade with 5 % share. It is necessary to point out that the total amount of waste produced by particular economic sectors does not include municipal waste.

#### Waste generation by particular economic sectors in year 2008 (t)

SECTION	Total (t)	Hazardous waste (t)	Other waste (t)
<b>A - Agriculture, Forestry, Fishery</b>	788 788	42 249	746 539
<b>B - Mining and quarrying</b>	150 860	569	150 291
<b>C - Manufacturing</b>	4 469 017	327 051	4 141 966

SECTION	Total (t)	Hazardous waste (t)	Other waste (t)
D - Electricity, gas, steam and air conditioning supply	1 150 662	9 871	1 140 791
E - Water supply; sewerage; waste management and remediation activities	794 489	44 795	749 694
F - Construction	1 301 761	5 413	1 296 348
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	486 109	20 123	465 986
H - Transporting and storage	175 233	61 207	114 026
I - Accommodation and food service activities	1 731	112	1 619
J - Information and communication	7 752	362	7 390
K - Financial and insurance activities	380	95	285
L - Real estate activities	7 750	297	7 453
M - Professional, scientific and technical activities	41 101	1 592	39 509
N - Administrative and support service activities	33 170	2 453	30 717
O - Public administration and defence; compulsory social security	33 880	1 480	32 400
P - Education	1 106	165	941
Q - Human health and social work activities	106 176	4 211	101 965
R - Arts, entertainment and recreation	4 389	150	4 239
S – Other services activities	1 377	212	1 165
Unknown	145 656	1 521	144 135
<b>Total</b>	<b>9 701 387</b>	<b>523 928</b>	<b>9 177 459</b>

Source: SEA

## Waste handling

### Handling with waste by means DO, O and Z codes (t)

Disposal code	Activity	Total (t)	Hazardous (t)	Others (t)
DO	Handing over of waste for domestic use	72 222	0	72 222
O	Handing over to another subject for next recovery	218 924	21 399	197 525
Z	Storage of waste	271 051	7 462	263 589
<b>Total</b>		<b>562 197</b>	<b>28 861</b>	<b>533 336</b>

Source: SEA

## Waste recovery

There were 5 157 389 **tons of waste recovered** in the SR in 2008. This represents **53 % of total volume of waste** located on the market (not included MW). R5 activity – Recycling or re-extraction of other inorganic compounds has the greatest share on waste recovery with a 35 % share.

### Waste recovery following codes R1 – R13 in year 2008 (t)

Code	Activity	Total (t)	Hazardous waste (t)	Other waste (t)
R1	Used mainly as fuel or to extract energy through different approach	429 068	12 584	416 484
R2	Solvent reclamation/regeneration	4 020	3 995	25

<b>R3</b>	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)	583 119	29 851	553 268
<b>R4</b>	Recycling or reclamation of metals and metal compounds.	680 866	6 703	674 163
<b>R5</b>	Recycling or reclamation of other inorganic material.	1 789 301	2 533	1 786 768
<b>R6</b>	Regeneration of acids and bases.	392	228	164
<b>R7</b>	Recovery of components used for pollution abatement	376	194	182
<b>R8</b>	Recovery of components from catalysers.	2 399	2 355	44
<b>R9</b>	Oil re-refining or other re-uses of soil.	10 121	10 067	54
<b>R10</b>	Treatment of soil to benefit the agricultural production or to improve environment.	796 051	9 771	786 280
<b>R11</b>	Use of waste obtained from the activities R1 to R10.	34 303	375	33 928
<b>R12</b>	Treatment of waste generated by any of the R1 to R11 activities.	216 842	11 311	205 531
<b>R13</b>	Storing of waste before using any of the R1 to R12 activities (besides temporary storage prior to collection at the place of waste generation).	610 531	20 542	589 989
<b>Total</b>		<b>5 157 389</b>	<b>110 509</b>	<b>5 046 880</b>

Source: SEA

## Waste disposal

Of total volumes of generated waste placed on the market 3 981 801 t, **41 % was disposed** (without MW). Dominance of landfill waste is a historical rule with a 81 % share on total waste disposal, what means the decreasing about 20% compared to previous year (without MW). As of December 31, 2008, there were 143 landfills operated in Slovakia.

### Number of landfills (towards 31.12.2008)

Region	Hazardous waste landfills	Landfills for not hazardous waste	Inert waste landfills	Total
<b>Bratislava</b>	2	10	3	15
<b>Trnava</b>	2	8	1	11
<b>Trenčín</b>	1	16	3	20
<b>Nitra</b>	3	18	2	23
<b>Žilina</b>	0	16	2	18
<b>Banská Bystrica</b>	1	18	2	21
<b>Prešov</b>	1	18	1	20
<b>Košice</b>	3	10	2	15
<b>Total</b>	13	114	16	143

Source: SEA

### Waste disposal following codes D1 – D15 in year 2008 (t)

Code	Activity	Total (t)	Hazardous waste (t)	Other waste (t)
<b>D1</b>	Underground or surface waste disposal. (e.g. landfill)	3 211 530	109 791	3 101 739
<b>D2</b>	Treatment by soil processes (e.g. biodegradation of liquid or sludge waste in soil, etc.)	153 319	117 963	35 356

Code	Activity	Total (t)	Hazardous waste (t)	Other waste (t)
D8	Biological treatment non-specified in this annex that generates compounds and mixtures eliminated by any of the D1 to D12 activities.	38 626	16 716	21 910
D09	Physical-chemical treatment non-specified in this annex that generates compounds and mixtures eliminated by any of the D1 to D12 activities. (e.g. vaporizing, drying, calcinations, etc.)	83 140	52 932	30 208
D10	Incineration on land.	65 878	47 772	18 106
D13	Mixing or blending prior to any of the D1 to D12 activities.	9 138	2	9 136
D14	Placing into other packaging prior to any of the D1 to D12 activities.	81	80	1
D15	Storage before implementing any of the D1 to D14 activities (besides temporary storage prior to collection at the place of waste generation).	420 089	39 302	380 787
<b>Total</b>		<b>3 981 801</b>	<b>384 558</b>	<b>3 597 243</b>

Source: SEA

### Waste from electrical and electronic equipment (WEEE)

There were placed on the market 60 661 of electrical devices in Slovakia in 2008 (11 kg per inhabitant). Amount of collected WEEE was approx. 19 388 thousand tons (3.6 kg per inhabitant).

#### Summary reports by producers of electrical equipment for the year 2008 (kg)

Category under Annex 3 of the waste law	Introduced to market (kg)	Collected (kg)	Processed (kg)	Recovered (kg)	Recycled (kg)
1. Big domestic appliances	32 945 912	12 457 771	12 457 771	10 856 092	10 778 928
2. Small domestic appliances	4 964 096	1 323 392	1 323 392	1 035 681	980 754
3. IT and telecommunication devices	6 533 492	2 531 997	2 531 997	2 253 576	2 189 353
4. Consumer electronic devices	7 278 287	2 265 225	2 265 225	1 945 263	1 908 896
5. Sources of light	3 266 171	179 201	179 201	164 208	158 262
5a. Gas lamps	419 409	132 314	132 314	116 697	116 697
6. Electrical and electronic instruments	4 399 961	179 558	179 558	152 045	150 419
7. Toys, devices designated for sport and recreational use	494 589	7 076	7 076	5 946	5 926
8. Medical devices	93 871	79 535	79 535	68 931	68 876
9. Machines for monitoring and testing	110 350	76 951	76 951	69 804	69 595
10. Vending machines	154 888	154 909	154 909	135 022	134 212
<b>Total</b>	<b>60 661 026</b>	<b>19 387 929</b>	<b>19 387 929</b>	<b>16 803 265</b>	<b>16 561 918</b>

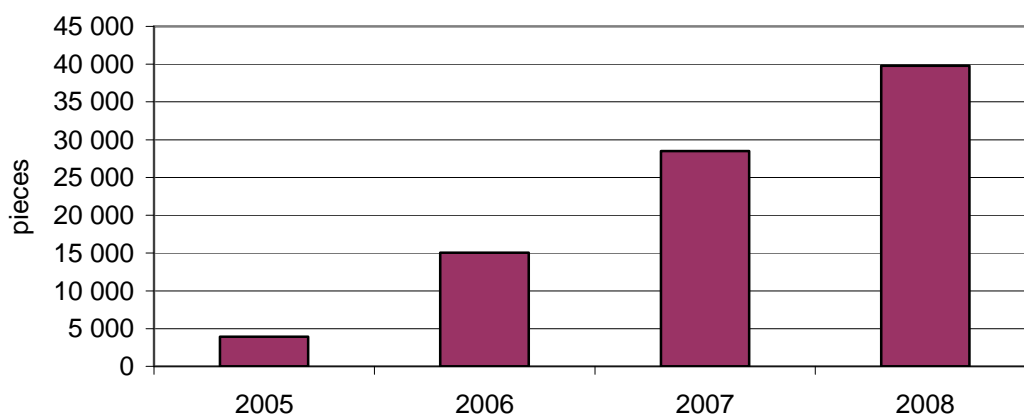
Source: SEA

### Old vehicle

There were 39 769 old vehicles processed in 2008. Compared to 2007 this means increasing about 28 %.



### Processed old vehicle (amount of cars)



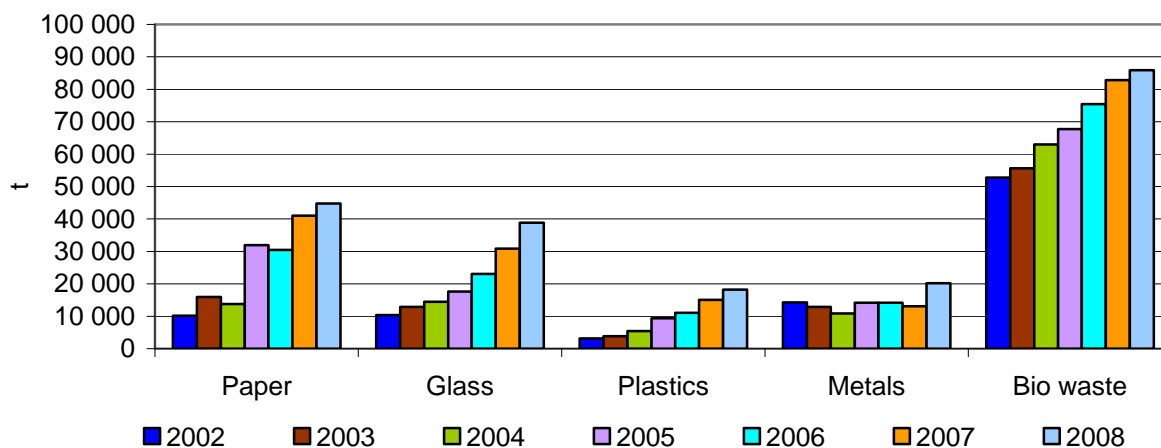
### Municipal waste

According to data from the SO SR, there were **1 790 691 tons of total municipal waste** generated in Slovakia in 2008. This volume represents **331 kg of municipal waste per capita**. Compared to 2007, this is an increase by 22 kg per capita. Long-term waste **disposal on landfills (76 %)** is the **most frequent method** of municipal waste handling, following by incineration with energy recovery (9 %).

In terms of **municipal waste composition**, mixed municipal waste (68.5 %) constitutes the major component of municipal waste together with bulky waste (11 %), small construction waste (5 %). Biologically degradable waste was 5 % and waste paper and cardboard was 3 %.

According to the SO SR, **volume of separated municipal waste per capita is 25 kg**, which means that the level of municipal waste separation decreased by 9 kg compare year 2007. Volume of **recovered municipal waste per capita increased to 58 kg per capita**.

### Separated waste collection (t)



Source: SO SR

### Financial mechanisms of waste management

## ◆ Recycling fund

## Finances paid from Recycle fund (SKK)

Sector	2003	2004	2005	2006	2007	2008
Spent batteries and accumulators	14 665 664	6 123 789	27 762 392	6 548 521	1 521 960	4 527 804
Waste oils	25 978 911	13 513 450	31 838 929	27 122 645	51 419 465	39 142 693
Used pneumatic tires	55 526 823	31 938 861	52 227 842	31 876 532	43 394 128	5 609 428
Multi-layer combined materials	11 200 000	6 011 426	15 788 362	6 104 424	9 436 275	27 270 084
Electric and electronic devices	108 444 952	31 809 571	43 873 057	12 177 730	1 817 482	2 040 451
Plastics	45 331 744	97 465 327	85 257 226	43 462 867	25 886 202	29 895 738
Discharge light sources containing mercury	3 376 397	1 747 720	1 788 973	31 836	0	0
Paper	66 861 855	66 541 864	63 043 210	119 539 255	43 400 107	68 191 721
Glass	6 662 395	26 397 285	36 443 376	41 612 019	20 643 076	22 393 694
Vehicle	20 708 446	73 828 884	50 661 866	135 715 643	167 310 817	408 120 244
Metal packing	0	12 385 467	6 909 123	11 020 641	9 028 531	4 273 598
General sector	16 673 117	69 584 229	34 684 182	1 691 695	4 710 600	6 486 091
General sector - municipalities	5 031 880	27 467 030	33 956 530	17 614 220	63 019 868	112 769 390
<b>Total</b>	<b>380 462 184</b>	<b>464 814 903</b>	<b>484 235 068</b>	<b>454 518 027</b>	<b>441 588 511</b>	<b>730 720 935</b>

Source: RF

## ◆ Environmental Fund

In 2008, the Environmental Fund in the area of waste management, 100 applicants funded, with the amount of 307 mil. SKK.

## Finances invested according to the supported activity in year 2008 (SKK)

Activity	Finance
Separate collection	62 426 000
Waste recovery	94 733 418
Landfill closing and recultivation	150 113 600
<b>Total</b>	<b>307 273 018</b>

Source: EF

## Packaging and waste from packaging

## Amount of packaging materials made, imported, exported and introduced to the market in year 2008 (t)

Material	Production (t)	Import (t)	Export (t)	Market (t)
Gas	47 415	66 188	25 336	75 802
Plastics	43 853	91 690	41 357	80 653
PET	1 104	1 071	1 414	762
Paper and cardboard	62 394	161 004	97 690	117 523
Composite	6 147	13 541	7 502	12 058

<b>Aluminum</b>	476	4 674	813	4 232
<b>Steel</b>	23 084	37 132	35 490	15 688
<b>Wood</b>	96 180	46 623	85 019	18 207
<b>Others</b>	17	361	234	142
<b>Total</b>	<b>280 670</b>	<b>422 284</b>	<b>294 855</b>	<b>325 067</b>

Source: SEA

### Packaging waste handling in year 2008 (t)

Packaging waste Material	Amount (t)	Recycling		Recovery			
		Material recovery (t)	(%)	Energy (t)	Others (t)	Total* (t)	(%)
<b>Glass</b>	75 802	36 109	47.6	-	111	36 220	47.8
<b>Plastics</b>	81 415	35 578	43.7	747	1 328	37 653	46.3
<b>Paper**</b>	129 581	69 422	53.6	310	3 167	72 899	56.3
<b>Aluminum</b>	4 232	1 219	28.8	-	19	1 238	29.3
<b>Steel</b>	15 688	9 890	63.0	-	104	9 994	63.7
<b>Metals</b>	19 920	11 109	55.8	-	123	11 232	56.4
<b>Wood</b>	18 207	2 932	16.1	975	3 004	4 499	24.7
<b>Total</b>	<b>324 925</b>	<b>155 150</b>	<b>47.7</b>	<b>2 032</b>	<b>7 733</b>	<b>162 503</b>	<b>50.0</b>

\* material recovery included

\*\* Tetra-pack included

Source: SEA

### Trans-boundary movement – import, export and transit of waste

Over the period of 1.1.2008 to 31.12.2008, the MoE SR issued **147 decisions on trans-boundary transport of waste.**

### Summary of the number of effective licenses for trans-boundary transport of waste (t)

Issued in year	Import	Export	Transit	Total
2007	76	7	12	95
2007- 2008	92	39	16	147
<b>Total</b>	<b>168</b>	<b>46</b>	<b>28</b>	<b>242</b>

Source: SEA

### Total permitted volumes of waste by individual countries in year 2008 (t)

	Import to SR (t)	Export from SR (t)
<b>Belgium</b>	-	4 800
<b>Belarus</b>	40	-
<b>Czech Republic</b>	487 100	300
<b>Netherlands</b>	370	1
<b>Japan</b>	60	-
<b>Hungary</b>	179 100	150
<b>Germany</b>	149 950	606
<b>Poland</b>	376 084	1 383 895
<b>Austria</b>	191 700	-
<b>Romania</b>	2 400	5 200
<b>Russia</b>	6 000	-
<b>Ukraine</b>	23 120	78 000
<b>Great Britain</b>	500	-
<b>Total</b>	<b>1 416 424</b>	<b>1 472 952</b>

Source: SEA

## • NATURAL AND TECHNOLOGICAL HAZARDS

### Accidental deterioration of water quality

In 2008, the SEI statistics showed reduction in the number of events and recorded 102 emergency deteriorations or threats to water quality (EDW). Of all recorded events, 49 were cases relating to surface water, and 53 were cases of threats or contamination of ground water.

### Special deterioration or quality menace of water of the SR in the years 2000-2008

Year	EDW recorded by SEI	Special deterioration of water					
		Surface			Ground		
		Total number	Watercourses and basins	Water courses	Total number	Pollution	Endangerment
2000	82	55	2	9	27	3	24
2001	71	46	1	4	25	1	24
2002	127	87	1	6	40	5	35
2003	176	134	2	3	42	0	42
2004	137	89	1	10	48	11	37
2005	119	66	2	5	53	2	51
2006	151	94	0	3	57	6	51
2007	157	97	1	4	60	4	56
2008	102	49	0	6	53	4	49

Source: SEI

In 2008 again, in terms of hazardous compounds, deterioration of water quality was caused mainly by crude oil compounds in 65 cases (63.7 %), waste water in 15 cases (14.7 %), and in 6 cases (5.8 %) no contaminant was detected. Livestock excrements in 7 cases (6.8 %), insoluble substances, caustic alkali, pesticides, and other toxic substances have smaller impact on SDW.

### Progress in number of WQEDA according to the sort of WDS in the years 1994 – 2008

Sorts of water deteriorative Substances (WDS)	1994	1996	1999	2001	2002	2003	2004	2005	2006	2007	2008
Oil substances	63	69	54	40	64	59	70	63	69	76	65
Alkalis	3	5	5	2	5	3	1	0	3	4	2
Pesticides	1	1	1	0	1	0	3	0	2	0	0
Excrements of farm animals	9	14	7	4	9	21	15	14	14	12	7
Silage fluids	0	1	2	0	2	1	1	0	0	0	0
Industrial fertilisers	0	0	0	0	0	1	0	0	0	0	0
Other toxic substances	5	1	6	5	3	3	0	4	4	5	2
Insoluble substances	4	4	1	2	6	11	3	4	3	3	2
Waste water	6	6	6	10	17	35	20	10	28	24	15
Other substances	13	9	4	1	3	7	10	8	6	7	3
Water detrimental substances impossible to determine	17	7	12	7	17	35	14	10	22	26	6

Source: SEI

In 2008, there was only one such emergency deterioration of water outside the Slovak territory. Unknown originators (17.6 %) and so-called foreign organisations (7.8 %) represent stable contributors to emergency deterioration of water quality.

Just like in the previous years, in 2008, human factor and poor technical condition of equipment or facilities for hazardous substances were the most frequent causes for SDW. High number of SDW was caused by transport (38) and transfer of hazardous substances (6).

## Fire risk

In 2008 were documented in the SR **11 045 fires**, causing 68 casualties and 232 injured. Direct material damage reached 1 310 287.1 thous. SKK (43 493.6 thous. €), while the volume of preserved values was calculated at 5 840 030 thous. SKK (193 853.5 thous. €).

Although the number of fires dropped by 3 321, compared to 2007, material damage as well as the magnitude of preserved values copied the level of 2007.

Compared to previous years, greatest number of fires originated surprisingly in the **household sector** – 1 983, with 42 casualties and 138 injured persons. Direct material damage reached the value of 154,581 mil. SKK (5,131 mil. €). In terms of fire statistics, **agriculture** shows the second greatest number of fires – 1 633, occasioning direct material damage at 81,252 million SKK (2,697 mil. €), with 4 casualties and 5 injured persons. Least number of fires was recorded in the **commercial** sector, with 162 direct material damage totalling 145,446 mil. SKK (4,827 mil. €).

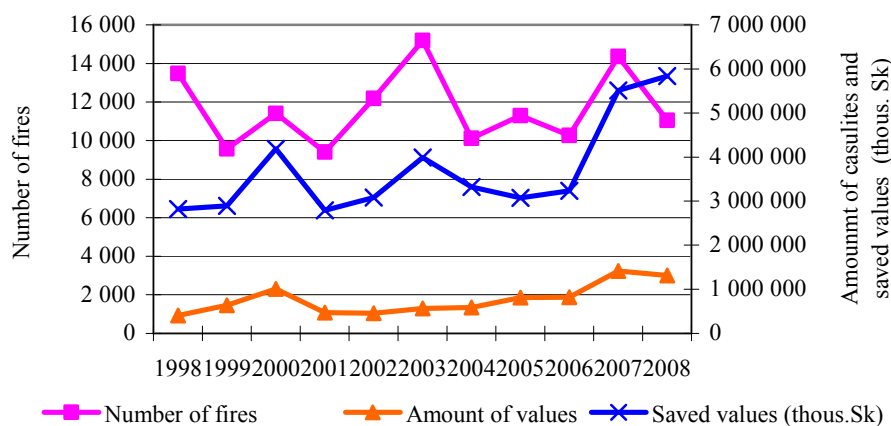
From the perspective of administrative distribution of territory, **most fires** occurred in 2008 in the Košice region (1 768), while **least** fires were recorded in the Trenčín region (989). **Greatest damage** due to the occurrence of fires was recorded in the Žilina region (446 373.0 thous. SKK / 14 816.9 thous. €) and the **least** in the Trenčín region (58 630.9 thous. SKK / 1 946.2 thous. €).

### Relationship between number of fires and number of killed or injured persons in 1998-2008



Source: FPRS MoI SR

### Relationship between number of fires and number of casualties or amount of saved values in 1998-2008



Source: FPRS MoI SR

### Floods

In 2008, there were 188 municipalities affected by floods, where 1 675 houses were flooded (cellars, basements). 10 742 inhabitants felt the aftermath of the floods, including 691 persons who had to be evacuated. Total cost and damages by floods in the SR in 2008 amounted to 1 377.381 mil. SKK (45.720 mil. €), including the rescue costs of 75.764 mil. SKK (2.514 mil. €), and safety works of 108.055 mil. SKK (3.586 mil. €).

Material damage amounted to 1 193.491 mil. SKK (39.616 mil. €), damage to private citizens' property was 57.134 mil. SKK (1.896 mil. €), and damage to municipal property was 270.460 mil. SKK (8.977 mil. €), damage to higher territorial governing units was 271.866 mil. SKK. Flood prevention construction measures at water courses were damaged, resulting in damages at 310.218 mil. SKK (10.296 mil. €).

In January 2008, works begun to be implemented on transposition of the **EP and Council Directive 2007/60/EC on the assessment and management of flood risks** into Act No. 666/2004 Coll. on flood protection.

### Floods aftermath over the period of 2001-2008

	No. of flood stricken residential areas	Flooded territories (ha)	Damages by floods (mil. SKK)	Costs (mil. SKK)		Total costs and damages (mil. SKK/mil. €)
				Rescue activities	Maintenance and safety activities	
<b>2001</b>	379	22 993	1 960.60	57.10	32.10	2 049.80 / 68.04
<b>2002</b>	156	8 678	1 525.70	58.10	50.10	1 639.90* / 54.43
<b>2003</b>	41	744	43.90	5.69	4.20	53.79 / 1.79
<b>2004</b>	333	13 717	1 051.80	37.23	102.93	1 191.96 / 39.57
<b>2005</b>	237	9 237	800.46	67.82	80.64	948.92 / 31.50
<b>2006</b>	512	30 730	2 425.90	180.35	193.4	2 799.64 / 92.93
<b>2007</b>	60	339	109.58	9.14	6.39	125.11 / 4.15
<b>2008</b>	188	3 570	1 193.5	108.00	75.80	1 377.38 / 45.72

\* including also the sum of 6.0 mil. SKK – cost of anti-mosquito chemical spray treatment

Source: MoA SR, MoE SR

## ENVIRONMENTAL CARE

### • ENVIRONMENTAL LAW

In 2008, The Slovak Collection of Laws published the following laws in the area of environment: 4 acts, 16 regulations of the Slovak Ministry of Environment, and 1 announcement on issuing a decree of the Slovak Ministry of Environment.

#### Acts

- Act 100/2008 Coll., which amends Act 151/2002 Coll. on the use of genetic technologies and genetically modified organisms as amended
- Act 514/2008 Coll. on handling of waste from mining industry and amendments to other laws
- Act 515/2008 Coll. which amends other laws in the area of environment protection, related to the introduction of the Euro currency in Slovakia
- Act 519/2008 Coll. which amends Act 223/2001 on waste and amendment to other laws as amended.

#### MoE SR Regulation

- MoE SR Regulation 17/2008 Coll., which declares the Special Protection Area of Trábeč
- MoE SR Regulation 18/2008 Coll., which declares the Special Protection Area of Ostrovné lúky
- MoE SR Regulation 19/2008 Coll., which declares the Special Protection Area of Ondavská rovina
- MoE SR Regulation 20/2008 Coll., which declares the Special Protection Area of Poiplie
- MoE SR Regulation 21/2008 Coll., which declares the Special Protection Area of Kráľová
- Vyhláška MŽP SR č. 22/2008 Coll., ktorou sa vyhlasuje Chránené vtáčie územie Košická kotlina
- MoE SR Regulation 23/2008 Coll., which declares the Special Protection Area of Parížske močiare
- MoE SR Regulation 24/2008 Coll., which declares the Special Protection Area of Poľana
- MoE SR Regulation 25/2008 Coll., which declares the Special Protection Area of Bukovské vrchy
- MoE SR Regulation 26/2008 Coll., which declares the Special Protection Area of Medzibodrožie

- MoE SR Regulation 27/2008 Coll., which declares the Special Protection Area of Dolné Pohronie
- MoE SR Regulation 30/2008 Coll., which declares the Special Protection Area of Cerová vrchovina-Porimavie
- MoE SR Regulation 31/2008 Coll., which declares the Special Protection Area of Žitavský luh
- MoE SR Regulation 32/2008 Coll., which declares the Special Protection Area of Sĺňava
- MoE SR Regulation 51/2008 Coll., which executes geological survey
- MoE SR Regulation 63/2008 Coll., which amends MoE SR Regulation 391/2003 Coll., which executes Act 245/2003 Coll. on integrated prevention and pollution control of the environment and on amendment to other laws.

**MoE SR Decree**

- Announcement of the Slovak Ministry of Environment 131/2008 Coll. on issuing a decree on providing subsidies to municipalities to cover costs for delegated state administration responsibilities regarding Slovakia's environment (Decree 3/2008 of April 3, 2008).



## • ENVIRONMENTAL IMPACT ASSESSMENT

The process of environmental impact assessment in the conditions of Slovakia is regulated by **Act 24/2006 Coll. on environmental impact assessment and on amendment to other laws.**

In 2008, the Slovak Ministry of Environment issued 189 final position statements to the proposed activities.

Within the SEA process, MoE SR continued to assess strategic documents that may have a major impact on environment that extends beyond national borders, as well as strategic documents applicable to the whole state's territory. 5 strategic documents were assessed within the assessment period.

In the said year were realised also trans-boundary assessments of the strategic documents of "Strategy of the final part of nuclear power industry", "Strategy of energy safety", and the proposed activity of "Increasing the output of the EMO 1, 2 nuclear power plant blocks in Mochovce" with Austria being the affected party. In the area of proposed activities, Slovakia acts as the affected party in the process of assessment of the trans-boundary activity of *"Total water management treatment project of Danube to the east of Vienna."*

Slovak Ministry of Environment continued to keep records of all assessed strategic documents and proposed activities, and implemented a complex information system of environmental impact assessment. In May 2008, another phase of building the information system for the area of strategic assessment was completed under a project funded from the PHARE - Transitional Fund of *"Completion of the information system for environmental impact assessment - part SEA"* The project included also two pioneering issues of the SPRAVODAJ SEA/EIA magazine, which are publicly accessible at [www.enviroportal.sk](http://www.enviroportal.sk).

Assessment of strategic documents pursuant to Sect.4 and Sect.7 of Act 24/2006, as well as proposed activities under Sect. 29 of Act 24/2006 (finding proceedings) was implemented also by local and regional environmental authorities.

### Outcomes of the EIA process in 2008 – the MoE SR level

Number of assessed buildings and activities at MoE SR - EIA	<b>216</b>
Number of final positions issued - EIA	<b>189</b>
Number of assessed drafts of strategic documents - SEA	<b>7</b>
Number of final positions issued - SEA	<b>5</b>

Source: MoE SR

### Outcomes of the EIA process in 2008 – the environmental authorities level

Number of assessed constructions and activities at regional and district environmental authorities - EIA	<b>584</b>
Number of decisions whether the proposed activity will not be assessed according to the Act issued by regional environmental and district environmental authorities - EIA	<b>567</b>
Number of final position statements published by regional and district environmental authorities	<b>8</b>

- EIA	
Number of assessed drafts of strategic documents - SEA	<b>79</b>
Number of decisions whether the proposed activity will not be assessed according to the Act issued by regional environmental and district environmental authorities - SEA	<b>111</b>
Number of final position statements published by regional and district environmental authorities - SEA	<b>44</b>

Source: MoE SR

Complete documentation (hard copies) from the EIA process of proposed activities carried out and completed by MoE SR since 1994 until 2004 are archived in the **EIA Documentation centre** at Slovak Environmental Agency. Documentation as from January 1, 2005 until the end of 2007, is kept at MoE SR. Information from the documentation may be requested from SEA and MoE SR.

Documentation of the processes carried out by regional and local environment agencies is archived at individual authorities.

In 2008, Slovak Ministry of Environment began to prepare amendment to Act 24/2006 Coll. as a result of formal notification by the EC, in which Slovakia was cautioned about their faulty adoption of a number of provisions of Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment as amended by law on EIA.

## • INTEGRATED POLLUTION PREVENTION AND CONTROL (IPPC)

IPPC was introduced into the Slovak legal codes and implemented through **Act 245/2003 Coll. on integrated environmental pollution prevention and control and on amendments of certain laws as amended (Act on IPPC)**.

In March 2008, came into force a MoE SR Resolution 63/2008 Coll., which amends Resolution 391/2003 Coll., amending Act on IPPC, and which regulates the process and form of acquiring a certificate of professional training to offer professional counselling in the area of IPPC. The Resolution also specifies the data to be acquired and notified by the IPPC operators before February 15 of each year into the integrated information system register.

**Slovak Environmental Inspection is the administration authority** in the process of integrated licensing and issuing of integrated licenses. The Slovak Environmental Inspection Authority carried out 236 controls of compliance with the conditions of the integrated licensing (IL) of operations. The system of integrated environmental pollution prevention and control has been developed to ensure a complex collection of data and information on the IPPC. Under the law, information system of the Integrated Prevention and Pollution Control. (Art. 6(2) of Act on the IPPC) contains:

- a register of operators, operations that require the IPPC, and operations licensed under the integrated licensing,
- register of issued integrated licences,
- data and information on operations, their emissions, and monitoring outcomes, annually provided by the operators,
- norms of the quality of environment for individual sites within the Slovak territory,
- best accessible technologies for individual industrial sectors and types of operations,
- register of authorised persons.

The IPKZ information system may be accessed at <http://ipkz.enviroportal.sk/informacny-system.php>

## • PREVENTION AND REMEDYING ENVIRONMENTAL DAMAGES

In 2007, Slovak Republic included in its legislation an EP and Council Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (hereinafter only „directive“) through its **Act No. 359/2007 Coll. on the prevention and remedying of environmental damage and on amendment to other laws.**

Prevention and elimination of environmental damage should be implemented through the „**polluter-pays**“ rule, in compliance with the principle of sustainable development. Fundamental principle of the directive that is also reflected in the corresponding law requires the operator whose activities occasioned environmental damage or pose an imminent threat of such a damage, to be considered financially liable. The objective is to force the operators to adopt and execute measures and strategies to minimize environmental damage, as this would reduce their financial liability risk.

The law considers **environmental damage** as only **damage to protected species and biotopes, on water and on land**, rather than any damage to environment. Nevertheless, any adverse change to any of the mentioned natural resources is considered damage, regardless of whether such was caused by breaching legal provisions or by acting in compliance with them. Operators carrying out work activities defined by legislation are liable for such environmental damage. This is the case of objective liability, while the operators involved in other work activities fall under subjective liability pertaining only to the damage on protected species and biotopes.

Information system of the prevention and remedying of environmental damage was implemented – [www.enviroportal.sk/environmentalne-skody/](http://www.enviroportal.sk/environmentalne-skody/).

In **2008**, there was no environmental damage recorded in Slovakia.

## • PREVENTION OF MAJOR INDUSTRIAL ACCIDENTS

Prevention of major industrial accidents is regulated through the following legislation:

- Act No. 261/2002 Coll. on prevention of major industrial accidents and on amendments to other laws as amended (hereinafter only the Accident Act),
- Resolution No. 489/2002 Coll. which executes several provisions of Act No. 261/2002 Coll. on preventing major industrial accidents and on amendments to other laws as amended,
- Resolution No. 490/2002 on safety administration and on emergency plan as amended.

Act on accidents divides businesses by total volumes of selected hazardous substances present in the plant into **A category and B category (so-called SEVESO businesses)**.

Basic obligations of business operators with present selected hazardous substances include:

- to revise total volumes of selected hazardous substances in the plant and subsequently classify the business into a pertinent category,
- to issue a report on registration of the business by local district environmental authority.

Business registered under a given category should:

- appoint a qualified person,
- develop a programme of prevention of major industrial accidents and introduce safety control system,
- develop risk assessment and safety report,
- develop an emergency plan,
- inform the public,
- engage rescue service,
- make agreement on liability insurance,
- submit documentation for developing a public safety plan.

**Information system of prevention of major industrial accidents** for public together with authorised version for competent organs was put in practice.

Register of qualified persons in 2008 included **249 professionals in the area of prevention of major industrial accidents** and **32 emergency technicians**. The list of authorised persons in 2008 included **31 subjects**.

In 2008, the Slovak Ministry of Environment was notified of **6 imminent threats of major industrial accidents**. In **2008**, there was no major industrial accident recorded in Slovakia.

### Overview of reported events for individual years of 2003-2008

	2003	2004	2005	2006	2007	2008
<b>Imminent hazard of major industrial accident</b>	7	4	1	1	5	6
<b>Major industrial accident</b>	0	0	2	1	0	0

Source: MoE SR

## • GENETIC TECHNOLOGIES AND GENETICALLY MODIFIED ORGANISMS

The area of using genetic technologies and genetically modified organisms (GMO) within the Slovak legal code is addressed by the **Act No. 151/2002 Coll. on the use of genetic technologies and genetically modified organisms as amended by the Act No. 587/2004 Coll., and the MoE SR Regulation 399/2005 executing this Act as amended by Regulation 312/2008 Coll.**

The law makes it possible to use genetic technologies and genetically modified organisms in three ways:

- in enclosed areas (devices),
- intentional release, including
  - a) introduction to the environment,
  - b) introduction to the market.

### ◆ Using of genetic technologies and genetically modified organisms in vitro

Plans the use of genetic technologies and genetically modified organisms in enclosed areas (laboratories, greenhouses, cultivating rooms, and other enclosed facilities) is divided into four at risk categories (RC), while the RC 1 represents no or negligible risk, RC 2 means small risk, RC 3 means medium risk, and RC 4 means significant risk.

On the basis of received applications and notifications by the MoE SR in 2007, 39 facilities were entered into the register of facilities. License was given to 16 facilities for their first use of genetic technologies, while 3 facilities were given the permission to initiate the RC 2 activities. MoE SR did not object to commencement of activities in RT in 78 facilities.

### ◆ Intentional release

In 2007, MoE SR issued 1 permit for test cultivation of genetically modified corn.

### ◆ Biological safety commission

Commission for the biological safety (commission) is the professional consulting body to the Ministry of Environment of the SR in the area of biological safety. Commission administered by the department of biological safety of the Slovak Ministry of Environment of the SR has 11 permanent members and 15 experts who come from a wide spectrum of professionals in the area of science or other sectors, together with state officers appointed for the individual involved resorts, and representatives of the public, including users and citizens.

In 2008, there were 14 sessions of the commission. At the mention sessions, the Commission commented on the statements adopted by the EU, proposals to issue licenses for the first use of the facilities for genetic technologies, and on the notification reports on launching of operations in facilities.

## • ENVIRONMENTAL ASSESSMENT AND PRODUCT LABELLING

Environmental labelling of products in Slovakia has been carried out since 1997. At that time the Minister of Environment declared the **National Programme of Environmental Assessment and Product Labelling. (NPEHOV)** Gradually, over the subsequent years, environmental criteria for 32 product categories were created by the Slovak Ministry of Environment through its NPEHOV directives, decrees and notices.

On the basis of the expressed interest by producers or importers, it is possible to assess compliance of the registered products with unique conditions for the mentioned product category under the Slovak Ministry of Environment's notice (of the Ministry's decree) with the objective to grant the right to use the national environmental label of "**Environment-friendly product**". As to date, as many as 215 products have been awarded the national environmental label. Of this number, in 2008 were awarded most national environmental labels for products since the existence of environmental labelling in Slovakia, which represents 88 products.

Special regulations apply for granting and use of the European Community environmental label. Basic norms include the regulation of the European Parliament and Council (EC) No. 1980/2000 and criteria for the corresponding product category. The European Community environmental label was first time awarded in 2008 to a product from the product category of "Tourist accommodation services".

## • ENVIRONMENTAL MANAGEMENT AND AUDIT

International norms of the ISO 14000 group deal with various environmental management aspects. The ISO 14001:2004 norm sets forth the requirements for the system of environmental management (hereinafter only EMS) built on the continuous management cycle of P-D-C-A. The other norm of ISO 14004:2004 provides general provisions. Other norms and regulations within the ISO 14000 group address specific environmental aspects, including labelling, assessment of the organisation's behaviour, life cycle analysis, communication, control, and others. Functionality of the implemented EMS within organisations, together with compliance to a specific norm is verified through an audit carried out under the ISO 19011 norm and attested by a certificate.

In the course of 2008, 182 new organisations with introduced and certified EMS started in Slovakia, raising the total number of organisations with the valid EMS to 637, as of December 31, 2008. This is the biggest increment for a single year over the whole period of EMS recording in Slovakia.

### **The European Eco-management and Audit Scheme (EMAS)**

Conditions for the EMAS membership for Slovakia are set forth by the *European Parliament and Board Directive No. 761/2001 and its two implementing acts - Act 491/2005 Coll. on environmental inspection and registration within the European Community scheme for environmental management audit, and the MŽP SR Directive 606/2005 Coll., which executes Act no. 491/2005 Coll.*

Over the course of the year 2008, one organisation - SEWA, Inc., Bratislava was entered into the EMAS register of organisations, which increased the number of Slovak organisations entered in the register to 6 organisations. This qualifies Slovakia for the fifth place in the category of newly-accepted EU member countries, ranking after Czech Republic (34), Hungary (18), Poland (16), and Lithuania (8).



## • ECONOMICS OF ENVIRONMENTAL CARE

### State budget and investment policy

Funds that pertain to environmental protection and development were released from the state budget of the Slovak Republic through subsidies from budget chapters at different Ministries and from the Environmental Fund.

### Environmental investments of some government departments of SR financed from the state budget in 2008 (thous. SKK)

Department	WWTP Sewages	Other WM actions	Waste management	Air Protection	Others	Total	%
MoE SR	3 109 093	1 650 465	308 017	484 157	81 615	5 633 347	19,5
MoA SR	0	20 974	0	0	5 456 088	5 477 062	18,9
MoTPT SR	370 621	433 711	191 494	39 998	266 868	1 302 692	4,5
MoCRD SR*	79 950	159 666	62 192	10 474	401 286	713 569	2,5
MoI SR	9 647	5 586	0	54 142	18 999	88 374	0,3
MoH SR	77 213	1 122 254	14 167 242	241 550	91 191	15 699 450	54,3
MoJ SR	357	1	136	0	1	3 669	0,01
<b>Total</b>	<b>3 646 881</b>	<b>3 392 657</b>	<b>14 729 081</b>	<b>830 321</b>	<b>6 316 048</b>	<b>28 914 988</b>	<b>100,0</b>

\*Include investments from structural funds

Source: Proper resorts

During the period 1993-2008, Ministry of Environment SR designating the sum of 24.3 billion SKK to environmental investments and the Ministry of Agriculture designated the sum of 13.6 billion SKK.

### Budget grants determined on realization of environmental programs

The environmental fund was established on January 1, 2005, through Act No. 587/2004 Coll. on environmental fund and amendment to certain laws.

### Review of financed grants in 2008

Area of budget grants	Number	SKK
Protection of air and of ozone layer	73	95 396 100
Protection and rational efficiency of water	455	1 689 641 160
Including: - WWTP and sewers	300	1 145 900 160
- water lines	129	452 291 000
- anti-flood measures	26	91 450 000
Development of waste management	100	307 273 018
Protection of nature and lands	23	33 418 000
Environmental education and promotion	41	32 897 580
Survey, research and development	12	61 027 993
Accidents	2	3 221 637
Programme of rebuilding the village	203	25 000 000
<b>Total</b>	<b>909</b>	<b>2 247 875 488</b>

Source: Environmental fund

Of total volume of released assistance through a subsidy at the sum of 2 247 875 488 SKK, 75.2 % was used within the area of protection and rational use of water (including 51 % to WWTP and sewage, 20.1 % to water supplies, and 4.1 % to flood-protection measures), 13.7 % was used in the area of development of waste management, 2.7 % was used for research and development, 1.5 % used for environmental education, 4.2 % used for protection of air and the Earth's ozone layer, 1.5 % in the area of nature and landscape protection, 0.1 % in the area of accidents, and 1.1 % in the area of Village Renewal programme.

### Economic tools

#### ♦ Fees for pollution and exploitation of natural resources

In 2008, the greatest portion of fees for pollution of environment came from air pollution fees (517.585 mill. SKK).

#### Gains from selected economic tools exercised in 2008 (thous. SKK)

Sort of payment	2008
Charges for pollution of air	517 585
Retributions for tapping of waste water	288 085
Charges for loading of wastes	0
Penalisation for the failure to pay air-pollution fees	0
Financial compensation for using the biotope	468 421
<b>Payments for the using the nature:</b>	
Retributions for taking of subterranean waters	399 404
Settlements for yielding spaces	22 578
Settlements for mined minerals	84 688
Settlements for loading of gases and liquids in natural rocky-structures and subterranean places	35 795
<b>Total</b>	<b>1 816 556</b>

Source: Environmental fund

#### ♦ Fines imposed by the State administration environmental authorities

State administration environmental authorities impose fines for non-compliance with the provisions set forth under generally binding legal policies.

#### Penalties laid by executive administration for the environment during the period of 1993-2008 (thous. SKK)

Sector	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>Protection of air</b>	3 771	2 334	1 644	2 220	6 176	1 847	4 328	6 016	3 545	2 564	4 893
<b>Protection of water</b>	7 850	6 733	6 038	8 887	5 858	8 030	9 540	10 603	14 832	12 679	11 940
<b>Wastes</b>	8 659	7 012	9 213	9 269	3 743	6 129	7 899	6 994	9 635	9 813	9 319
<b>Protection of nature</b>	1 893	1 659	1 498	1 581	3 532	1 255	1 421	1 607	2 703	3 227	50 992
<b>Penalization</b>		692	417	4 244	1 357	353	553	192	0	0	0
<b>Building law</b>			1 091	5 671	7 135	3 716	917	469	245	0	48
<b>Packaging</b>						5	2	1	310	0	300

Prevention of gross industrial averages						4	7	31	226	0	20
Trading with endangered species of animals and plants						43	73	81	160	0	175
Public water-supply and sewages								1	0	0	24
Integrated prevention and control								125	284	1 440	3 162
GMO								150	50	3	6
Geological works								5	0	0	0
Fishery									3	0	0
<b>Total</b>	<b>22 173</b>	<b>18 430</b>	<b>19 901</b>	<b>31 872</b>	<b>27 801</b>	<b>21 382</b>	<b>24 740</b>	<b>26 275</b>	<b>17 161</b>	<b>29 726</b>	<b>80 879</b>

Source: MoE SR

In 2008, the greatest sum of fines was imposed in the area of protection of nature (50.992 mill. SKK) and in the area of protection of water (11.940 mil. SKK).

### Environmental gains and expenses

Financial indicators of environmental protection in Slovakia are systematically monitored by the Statistical Office of Slovak Republic for 1998-2008, both as investments – common internal company expenses and yields for protecting the environment, and as expenditures of individual budget chapters.

#### Environmental gains and expenses according to contemporary way of statistical showing, during the period of 1998-2008 (thousand SKK)

Domain of gains and expenses	2001	2002	2003	2004	2005	2006	2007	2008
<b>Investments</b> on protection of environment covered from state sources	1 195 411	1 070 774	891 491	797 000	1 027 000	1 143 000	858 000	1 018 000
<b>Investments</b> on protection of environment covered from foreign sources	133 748	2 164 044	328 000 <sup>1)</sup>	135 000 <sup>1)</sup>	802 000 <sup>1)</sup>	1 638 000 <sup>1)</sup>	1 594 000 <sup>1)</sup>	2 440 000 <sup>1)</sup>
<b>Current costs</b> of protection of the environment	9 209 273	11 485 181	11 389 498	13 886 000	15 100 000	23 277 000	17 452 000	14 434 000
<b>Intradepartmental disbursement</b> – wage	612 137	842 778	877 277	912 000	1 068 000	1 111 000	1 020 000	1 168 000
<b>Intradepartmental disbursement</b> – other	4 892 388	5 579 150	5 290 254	4 849 000	5 373 000	13 460 000	4 561 000	5 249 000
<b>Disbursement of organization on protection of the environment covered by other subject</b> Charges and payments to public organs and organizations	2 653 205	2 919 064	2 991 248	1 492 000	4 345 000	4 033 000	6 059 000	2 553 000
<b>Payments</b> to private person or organizations	1 051 543	2 144 189	2 230 719	6 631 000	4 314 000	4 673 000	5 811 000	5 464 000
<b>Profits from the protection of the environment</b> Sales from selling of products, tools and components	659 868	709 743	106 022	111 000	52 000	65 000	85 000	47 000
Sales from selling of technologies	16 116	1 100	30	0	0	13 000	5 000	0
Sales from provided services	477 601	1 056 806	1 497 401	4 497 000	5 613 000	4 506 000	5 758 000	7 973 000

<sup>1)</sup> without expenses of municipalities

Source: SO SR

## • SCIENCE, RESEARCH AND ENVIRONMENTAL EDIFICATION

### Science and research

Research endeavours in 2008 carried out by professional organisations within the sector focused on the following:

**State Geological Institute of Dionýz Štúr (SGIDŠ).** Its main priorities included regional geological mapping of the Slovak territory in the scale of 1:50,000. Major scientific outcomes were reached within the objective of updating the geological structure of the Slovak problematic areas. Continuing was tasks focused on elaboration of the set of geological environmental maps on the scale of 1:50 000 in selected Slovak regions. The project of Creation of geological maps on 1:50 000 for the needs of the integrated landscape management has reached its advanced level of implementation. Investigation programme within the framework of sustainable development of society in 2001 also included continuing solution of tasks focused on analysis and assessment of ground water formations, geothermal water, strategic environmental raw material (zeolite, perlite, e.g.), and fuel - energy raw material (coal, crude oil, natural gas, uranium). Addressed were also projects focusing on the elimination of harmful and hazardous substances through their deposition within the rock environment (CO<sub>2</sub>, radioactive waste), or environmental research and characteristics of ecological geogenic and anthropogenic loads. Priority tasks in 2008 also included building of the geological information system and registers. A map server located at [www.geology.sk](http://www.geology.sk) was made accessible to the public since April 1, 2008. The server is part of the GeoIS (Geological information system) project.

**Water Research Institute (WRI).** The major research projects implemented in 2008 focused on:

- The Slatinka water body - assessment of minimum flows at Slatina and the middle Hron region
- Assessing the fill-up process of the Žilina water body on the basis of transversal profiles tracking.
- The Zemplínska aquatic route - INTERREG III.A.
- Flood threat maps and flood risk maps in the Domanižanka river watershed - part 1
- Hydraulic calculations of different solution variants for rinsing the left-sided network of the Danube river branches.

WRI was a major contributor also to international scientific projects under various EU programmes.

- The NORMAN project - network of reference laboratories and partner organisations for monitoring and bio-monitoring of environment-threatening pollutants.
- The SOCOPSE Project (Source Control of Priority Pollutants in Europe) - Development of the control system for Europe
- The Project of DINAMICS – Diagnostic sensors at the level of nano-technology and micro-technology
- Capacity Building Support to the Water sector in Turkey, TR 06 IB EN 01

- Project acquired within the Operation programme of environment - Water balance monitoring in SR.

**Slovak Hydro Meteorological Institute (SHMI).** Ten projects were included among the applied research and development activities in 2008. SHMI was involved in two of the projects (the SRDA projects) as a co-authoring organisation.

- Methodology of the UV biometers calibration.
- Revision of groundwater sources of Slovakia
- Reference laboratory for the area of measurements for Air - pollution and emissions
- Development, adaptation, and maintenance of the NWP systems and applications I
- Research and development of the means for alarm signalling service and nowcasting.
- Satellite applications for hydrology.
- Setting of values for the water quality environmental standards.
- RSV implementation - Classification of surface water bodies and reference conditions
- SRDA - Micro-climatic impacts of forest vegetation in Vysoké Tatry
- SRDA - Probability design of constructions for the impacts of snow loading

SHMI as part of the consortium was involved in the Hydrological SAF project, development of satellite applications for operative hydrology. Accession of Slovakia to the European centre for the medium-term weather forecast has shown benefits in continuing improvement of the weather forecast. Since January 2008, SHMI, as part of the EUMETNET community, got involved in the process of compliance with the European Multi-services Meteorological Awareness Programme. In 2008, there was a successful presentation of outcomes of the project "Improving the flood management system". The Slovak Government consented to signing a Memorandum of understanding between our government and the Office of the Secretary of the UN European Economic Commission on the International Water Assessment Centre. This significant activity that relates to the localization of the IWAC secretary office at SHMI has the objective to cooperate with the affected parties on the integrated management of water sources and support to implement the water convention.

In 2008, **the State Nature Conservancy of the SR (SNC SR)** facilitated the implementation of a number of projects in the area of nature and landscape protection. As part of the research assignment of "Analysis of the impact of the barrier elements on national and European significant protected territories and species", the organisation monitored the barrier elements in landscape and their impact on animals. The Transport Research Institute in Žilina received a 10-year monitoring of encounters of protected animals with road transport. Studies involved 155 sites with 300 newly recorded findings of beetles, 12 information on the occurrence of fishes, and 110 entries on the occurrence of bats of the European significance. Occurrence of habitats and plant species was monitored during the EDIT-ATBI project's implementation phase in the territory of the Muránska planina National Park. All data was edited into the ISTB database (Information system of habitats and taxons).

Within the INTERCAFE project, the SNC SR in cooperation with the Slovak Fishing Association and the Society for the Protection of Birds of Slovakia participated in every-year numbering of the great cormorant in Slovakia.

Partial numbering of large predators in order to determine their numbers was carried out in selected areas. Individual organisation units of the SNC SR carried out mapping of the occurrence of other than original species of animals and plants under priority protection in the protected areas.

**Administration of the Slovak Caves** merged with the SNC SR on the basis of a decision of the Slovak Minister of environment of December 5, 2007 No. 74/2007 - 1.8. effective from January 1, 2008, and implemented other tasks and projects of basic and applied research.

Research within the **Slovak Museum of Nature Protection and Speleology (SMNPaS)** continued for the proposed European significance territories in the area of botany and zoology. Continuing works included the GPS detection and tracking of the Marmot colonies in the Západné Tatry mountain range (Červené vrchy). Research of the cave minerals of Slovakia (Slovenský karst, Muránska plane, Nízke Tatry, Malé Karpaty) was a VEGA 1/3057/06 coordinated project. Research of the cave introduced (non-native) sediments took place, together with the geomorphological research. 127 new sites were added to the national database of the Slovak caves, representing the total number of caves of 5 652, as of the end of 2008. 4 declared small-size protected areas, 2 protection zones, 13 publicly accessible caves, and 16 special protected areas were added to the State register. Projects from the structural funds were developed and accepted. Digitalisation of funds and technical support of information technologies in the area of nature protection, NATURA 2000, life-long education, Obtaining geographical coordinates of cave entrances, and completion underground karst formations archive.

Research in the **Bojnice ZOO** was focused on the protection of species and their raising by humans. Collection of data and experience in the area of Barn Owl breeding methodology continued, together with monitoring of releasing the matured birds into the open nature. Historical data on breeding of animals at the Bojnice ZOO also continued to be processed (polar bear, *Garrulax ocellatus*).

**Slovak Environmental Agency (SEA)**, as part of the project: *"Testing of the INSPIRE proposal for specification of data for topics defined in Annex 1 of the INSPIRE Directive (Hydrology and Protected Areas)"* carried out testing of a data specification proposal for the mentioned topics within the Slovak conditions. In 2008, SEA implemented also *"The Register of landscape documentations in the Slovak territory (database)"*. Its use will be within the European Convention on landscape implementation process and after the inclusion of the landscape ecological planning process into the amendment of the law on physical planning, also for this part of competencies. SEA participates as co-author in the project

of *"Analysis of material flows in the management of natural resources aimed at utilisation of agricultural biomass for energy management purposes (the SRDA 0174-07 project)"*.

Coordination of research with the objective to ensure other priorities in the area of environment was implemented through cooperation agreements with the Slovak Academy of Sciences (SAS) and the Association of Slovak Scientific and Technological Societies.

On January 15, 2008, the MoE and the President of SAS signed an updated **Agreement on cooperation in the area of environmental research and monitoring between the Ministry of Environment and the Slovak Academy of Sciences**. It aims at a closer cooperation between both institutions. Environmental research and monitoring by the SAS continued in 2008 through the VEGA, 6-7 projects. RP EU, SRDA, COST, ŠPVV, UNESCO, ESF, and others. In 2008, the VEGA agency assisted in 123 projects aimed at the protection of environment. In 2008, SAS, through its 10 organisations, implemented 18 projects with the results used in the area of environment protection, funded by the Slovak Research and Development Agency (SRDA) In the same year, the SAS institutions were involved in 76 projects of international scientific and technical cooperation (6.FP, 7.FP, COST, NATO, UNESCO, SOCRATES, and others) with focus on environment.

Also in 2008, the Slovak MoE and the SAS cooperated at the development of a representative essay called **Landscape Ecology in Slovakia**. The document was presented at the 7th IALE world congress in Wageningen (Holland), on July 8-12, 2007.

Slovak Ministry of Environment and the Slovak Academy of Sciences cooperated on the area of **genetically modified organisms**, at establishing a reference laboratory for monitoring, qualitative and quantitative analyses of genetically modified organisms and DNA tests for the Slovak MoE. In 2008, the Slovak MoE continued its cooperation with the SAS on the project of **Monitoring of seismic phenomena in the Slovak territory**, which is part of monitoring the geological environmental factors, etc.

## **Environmental edification**

### **Presentations and exhibitions**

- Enviro Nitra 17.04. – 20.04. 2008
- Recycling – Innovation - Separation Banská Bystrica 22.04. -25. 04. 2008
- AQUA Trenčín 23.09. – 25.09. 2008

With the exception of permanent expositions of the SMNPaS in Liptovský Mikuláš, various expositions and exhibitions were organised by specialised organisations within the resort. Similarly, various presentations were organised in the hallway of the Slovak MoE building.

Throughout the whole year, the Ministry of Environment organised touring exhibitions also in other organisations. It has become a tradition that these exhibitions enrich various events of nature-related focus.

♦ **Conferences, seminars, workshops, round tables**

In 2008, MoE SR in cooperation with professional organisations within the sector organised a number of events for professionals and general public alike:

- The World Day of Wetlands - conference
- The issue of large predators in Slovakia and the EU countries
- Declaration of new protected bird territories, negotiations with the European Commission
- Technologies for reclamation of biological waste at the municipal level - a workshop for local governments
- 13th professional seminar for workers of accessed caves
- 7th meeting of the Council of Europe for implementation of the landscape convention
- Hydrochemistry 2008 - conference with international participation
- World Water Day - Let us protect water and it will protect us - XIV. annual international conference
- Earth Day - announcement of a media campaign - Let us clean our Slovakia
- A Council of Europe workshop on the European Landscape Convention - Landscape strategies and management: integrated spatial management
- Enviro-i-forum - IV. annual conference for the professional public, focused on the development of computer science in environment in Europe, and the achieved advances in this area in Slovakia
- Relevant issues of nature protection in the NATURA 2000 territories in national parks - conference
- Environmental policy and economic development of Slovakia

♦ **Festivals, competitions, and projects for the public**

**ENVIROFILM 2008** - XIV. international festival of films, TV programmes, and video-programmes with the topic of creation and protection of environment, this year with the motto: "Life for Future". The festival took part in May 12-17, 2008 in Banská Bystrica, Banská Štiavnica, and Kremnica. 165 films from 32 countries from all around the world were nominated for the main competition. More than 10 000 visitors from all over Slovakia and different countries came to the event. The festival included the conference Landscape - man - culture, various exhibitions, lectures, workshops, and competitions.

**DANUBE DAY 2008** - International Danube day - June 24, 2009 took part in Bratislava for the 5th time, with the central motto Shared waters - 14 countries - joint responsibilities - let us protect Danube!

**Festival of wits, crafts, and fun** - XI. annual event in Banská Štiavnica, this year focused on textile and clothing.

**Cap á le Est** - Journey to the East - European festival of poetry, theatre, and music. This 6th annual event was dedicated to the Roma, as well as other minorities.

**Hypericum** - physical exercise and trivia competition for young people - tenth anniversary of the national competition focused on the promotion of the system of protected areas of the EU member countries (NATURA 2000) on June 24, 2008.

**Children to nature** - VI. annual competition took place in September 25 - 26, 2008 at CEE Drieňok in Teplý Vrch. This year, the event featured the issue of NATURA 2000.



**Fair of the environmental educational programmes of Šiška** - organised in 2.10 - 4.10.2008 was the 9th year of an annual fair organised at the CEE Teplý Vrch, with the main topic of education toward nature and landscape protection specialised on NATURA 2000.

**Enviroquestions** - THE ENVIRONMENT OLYMPICS - IV. annual national correspondence trivia competition for pupils of the higher school classes (5th -9th) dedicated to the topic of environment.

**ProEnviro** - 4th year of an annual competition looking for the best environmental project organised by the school.

**Summer camps** - water world, camping in the museum

**School in the Museum and Let's play Science** - long-term projects that involve education activities of all museums assembled within the Slovak National Museum.

**Living Gallery Project** - cooperation with schools at increasing the environmental awareness of pupils and students.

### **Publication activity**

Major periodicals published in the sector of environment included the MoE SR Journal, Enviromagazine magazine, Aragonit, Mineralia Slovaca, Slovak Geological Magazin, Protected areas of Slovakia, Protection of the Slovak Nature, Water management bulletin, publications of the State of the environment report, Water in the Slovak Republic, Slovak Karst Journals, Naturae Tutela, Sinter bulletin, ZOO news. Further activities of the MoE in 2008 included the publication of: Waste - Damoclean Sword of the civilisation, and Environmental loads - The unwanted legacy.

Besides these periodicals, the edition plan included annual reports, journals from various events, educational methodological workbooks, taxonomic identification guides for plant and animal species, advertisements and educational brochures, posters, pamphlets, cave guides, maps.

The following promotional and educational films were produced and presented:

- National Parks in Slovakia
- GMO in Slovakia
- Environmental loads
- From the life of water
- Waste - bad conscience of the civilisation
- Danube - the Slovak greatest river

### **Environmental Law and Access to Information**

In 2008, on free access to information and amendment to certain laws according to **Act No. 211/2000 Coll.**, were registered 1 492 applications. 58 personal inquires have been processed directly by the public office.

## INTERNATIONAL CO-OPERATION

### • INTERNATIONAL CARE OF THE ENVIRONMENT

#### **Coordination of environmental activities in Slovakia and the European Union**

Coordination of the SR strategy within the EU for the area of environment is supervised by the MoE SR. Ministerial coordination group for environment oversees the first stage of coordination. Ministerial coordination group for environment approved positions for negotiations of task force groups of the European Council on environment, made comments to the proposed instructions prepared for the Joint Committee on European affairs 1, as well as to the proposed mandate for representing Slovakia at the level of the European Council on environment.

#### **Cooperation of the Vysegrad group**

On September 18 - 19, 2008, the **15th meeting of the Vysegrad group (V4) Ministers of environment** was organised in Budapest. The ministers exchanged experiences related to the EU legislative instruments used to reduce CO<sub>2</sub> emissions from motor vehicles. Further, they discussed the issue of illegal waste transport between the member countries, the issue of "green taxes", and got acquainted with each other's positions at negotiations on future obligations of countries in the area of reducing the greenhouse gases emissions and implementation of the climate-energy package.

#### **Multilateral cooperation**

The major conference organised in 2008 included the **14th conference of parties to the UN Framework Convention on climate change**, and the **4th meeting of the Kyoto Protocol parties** that took place **December 1-2, 2008 in Poznan**. Slovakia was given moral recognition for supporting further activities of the Expert group for the transfer of technologies for the years 2008 and 2009.

Another major conference was the **9th conference of the parties to the Convention on Biological diversity in Bonn (May 19 - 30, 2008)** where the countries' representatives agreed to substantially reduce the loss of biological diversity in the course of the two following years.

Slovakia acceded to the Protocol on the Register of pollutants and their transfer (the PRTR Protocol) - document on the accession of Slovakia was put on file on April 1, 2008. Slovakia ratified

also amendments and annexes to the UN EEC Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. (Document on ratification put on file on April 1, 2008).

On May 29, 2008, Slovakia ratified the Protocol on strategic environmental assessment under the UN EEC Convention on Trans-boundary environmental impact assessment that was ratified by Slovakia in 1999. In relation to the mentioned convention, Slovakia adopted Annex 1 and 2. (Document on adoption put on file on May 29, 2008)

### **Bilateral cooperation**

During November 24 - 27, 2008, a 6-member delegation from the Republic of China, lead by the deputy to the minister of water resources, Zhou Ying, visited Slovakia. Aim of the visit was to exchange information in the area of water resource management, including their exploitation and protection, getting acquainted with implementation of the Framework Directive on waters, and extension of the Memorandum of understanding between the Slovak Ministry of Environment and the Chinese Ministry of Water Resources.

## • PROGRAMMES AND PROJECTS OF INTERNATIONAL CO-OPERATION

### **PHARE - National Programme**

The years of 2008 and 2009 are the last years of implementation of the projects funded from the PHARE programme. 3 projects were completed in 2008 under the PHARE - Transition Fund 2007:

- **TF 2005/017-464.06.01 - Determination of environmental quality standard values for water and strengthening of regional and circuit environment authorities to implement water control and monitoring** - twinning. Total financial volume 2 016 400 €
- **TF UIBF 2005/017-464.08.01 - Development of national concept for determining water quality in lowland rivers, in line with the Framework Directive on water, with the use of phytoplankton, and a proposal to monitor phyto-benthos** - twinning light. Total financial volume 120 000 €
- **TF UIBF 2005/017-464.08.01 - Completion of the information system for environmental impact assessment - part of strategic environmental evaluation** - technical assistance. Total financial volume of 147 000 €

These last three projects will be completed in 2009:

- **TF UIBF 2006/018-175.06.01 - Implementation of the European Parliament and Council Directive 2006/21/EC on management of waste from the extractive industries** - technical assistance. Total financial volume of 210 000 €
- **TF UIBF 2006/018-175.06.01 - Strategy for record keeping and collection of devices with the PCB content below 5 dm<sup>3</sup> in Slovakia**. Total financial volume of 130 000 €
- **TF UIBF 2006/018-175.06.01 - Information system on water designated for human consumption**. Total financial volume of 150 000 €

### **The Operational programme of Basic Infrastructure, ISPA, Cohesion Fund - 1st Programme period**

The Operational programme of Basic Infrastructure (OP ZI) designates areas for using the financial assistance from the EU funds, directly from the **European Regional Development Fund (ERDF)**. Slovak MoE for this period acted as a mediator for the supervising authority (MCaRD of the SR) within the OP ZI Priority 2 of the Environmental Infrastructure, which is one of its three priorities. Each priority is divided into a number of measures. In case of Priority the measures include the following:

**2.1 Improvement and development of the water protection and rational exploitation infrastructure**

**2.2 Improvement and development of the air protection infrastructure**

**2.3 Improvement and development of the waste management infrastructure**

**2.4 Protection, improvement, and regeneration of the natural environment.**

As of **December 31, 2008**, the Slovak Ministry of Environment registered **467 applications** for non-refundable financial contribution under Priority 2: OP ZI Environmental infrastructure.

	Registered applications	Approved applications	
		number	financial contribution (€)
Measure 2.1	172	74	70 408 652.75
Measure 2.2	67	35	54 989 773.68
Measure 2.3	149	63	33 590 761.25
Measure 2.4	51	26	8 010 765.04

As of **December 31, 2008**, the Minister of environment **approved**, based on the recommendation of the selection committee (Environmental Project Board), **198 applications** for non-refundable financial contribution. Of this number, **agreements** have already been **made** with **198 applicants** for granting a non-refundable financial contribution.

During the period of 2000-2006, Slovakia was receiving the EC assistance under the **ISPA** programme (Instrument for Structural Policies for Pre-Accession) As of December 31, 2008, this programme supported 22 large projects in the area of building the environmental infrastructure, at total sum of 316 566 370 €

As of December 31, 2008, the **Cohesion fund (CF)** as a successor of the ISPA programme funded 7 projects dealing with the environmental infrastructure, at total sum of 298 983 765 €

## **Operational programme of Environment - II. Programming period of 2007-2013**

*Operational programme of Environment (OPE)* is the programming document for Slovakia in order for using the EU funds in the area of environment for the years of 2007-2013. Slovak Ministry of Environment is the supervisory body. OPE supports projects that aim at improvement of the environment through the following priority axes:

**Priority axis 1: Integrated protection and rational water exploitation**

**Priority axis 2: Flood protection**

**Priority axis 3: Air protection and minimisation of adverse impacts of climate change**

**Priority axis 4: Waste management**

**Priority axis 5: Protection and regeneration of natural environment and landscape**

## Volume of funds allocated for individual Environmental nature protection Priority axes

	Allocated funds (€)	
	Total	of which
Priority axis 1: (water)	1 077 227 136	Cohesion fund 915 643 065 State budget 161 584 071
Priority axis 2: (floods)	141 176 471	Cohesion fund 120 000 000 State budget 21 176 471
Priority axis 3: (air)	211 764 706	ERDF 180 000 000 State budget 31 764 706
Priority axis 4: (waste)	570 588 235	Cohesion fund 485 000 000 State budget 85 588 235
Priority axis 5: (nature and landscape)	59 714 041	ERDF 50 756 935 State budget 8 957 106

Source: MoE SR

As of December 31, 2008, the Slovak Ministry of Environment issued **17 calls** for applications for non-refundable financial benefit (NRFB), with total allocated sum of 465 472 017 €. As of the mentioned date, of **446 registered applications** for NRFB with the total applied-for sum of 904 912 891 €, the Selection committee at the Slovak Ministry of Environment for the ERDF and CF projects **approved** 114 applications for NRFB in the sum of 189 330 673 €. As of December 31, 2008, 48 projects were **signed** for the sum of 58 510 635 €, of which 51 301 389 € come from the EU funds. 43 projects are being implemented; none of them has been completed.

## Result of the published calls as of December 31, 2008

Priority axis	Number of approved projects	Sum of approved non-refundable financial contributions (in thous. €)			% of total allocation of the Environmental Operation Programme	Allocation balance (structural funds/cohesion funds + state budget)
		Total	including			
			structural funds/cohesion funds	State budget		
1 Integrated protection and rational water exploitation	6	20 878	17 959	2 919	1.94	1 056 349
2 Flood protection	16	14 525	12 995	1 530	10.29	126 651
3 Air protection and minimisation of adverse impacts of climate change	14	30 727	26 284	4 443	14.51	181 038
4 Waste management	67	113 842	99 849	13 993	19.95	456 746
5 Protection and regeneration of natural environment and landscape	11	9 359	7 956	1 403	15.67	50 355

Slovak Ministry of Environment also received 22 project concepts of large projects, including 21 addressing the operational objectives of 1.1 (drinking water), and 1.2 (WWTP and sewage) with anticipated total cost at 1 195 728 946.23 € and 1 project concept of a large project for the operational objective 2.1 (flood prevention measures) with anticipated total costs amounting to 76 177 620.66 €

## **Central Europe Operational Programme**

MoE SR is the **national authority** for the programme. On March 3, 2008, **first call for the submission of projects** within the OP SE scheme was opened, with the leading partners submitting the total of 95 applications for non-refundable financial contribution, and the Slovak project partners being involved in 44 projects, including three projects where they assumed the role of project leading partners.

In total, 29 project applications were approved under the first call for proposals, amounting to 66.8 mil. € from the ERDF, while co-funding from public sources represents 15.1 mil. € and co-funding from private sources is 2.2 mil. €

## **South-eastern Europe Operational Programme**

For Slovakia, the whole national territory is eligible for this programme. Institutions at the national, regional, and local level may apply. Total financial allocation for Slovakia for OP JvE for the period of 2007-2013 represents **9.896 mil. €** Rate of co-funding from the ERDF for the Slovak project partners represents 85 % of total justifiable expenditures for their implemented activities within the project.

National Development Agency in Budapest was appointed the **managing authority** for the OP JvE. Slovak Ministry of Environment is the **national authority** for OP JvE.

**First call** for the submission of project proposals was opened on May 5, 2008 as part of the programme. Within the total number of 1 099 submitted project proposals, of which 700 passed through the formal control, there were 202 Slovak project partners, included 17 who took the role of leading project partners.

As of 31.12.2008, the process of assessment and selection of project proposals was not completed.

## **LIFE and LIFE+ Programme**

Slovak Republic has been participating in the LIFE programme since 2002. In total, 11 projects at the total sum of 13 718 193 € were approved, including the LIFE programme contribution of 5 994 084 € The European Commission carries out monitoring of the programme and projects, with the Ministry of Environment of Slovakia being the national organisation for the programme.

Programme LIFE+ is a continuation of the successful LIFE programme. Overall programme budget for the years 2007-2013 is 2.143 bill. € including at least 78 % designated directly for funding projects and at least half of this package is designed to fund projects in the area of Nature and Biodiversity In 2007, allocation for Slovakia was 2 857 mil. € in 2008 it was 3 171 mil. € and in 2009 it is 3.83 mil. € and each subsequent year the sum will rise slightly and exceed 4 mil. € annually. Out of 5 project proposals submitted in 2008, 3 were approved at the EC level.

## **INTERREG III B CADSES**

The MoE of the SR is the national organisation for Slovakia, active within the Community Initiative Programme CIP INTERREG IIIB CADSES.

A call for submitting applications for a non-repayable financial contribution from the state budget was published on November 16, 2006. As of **31. 12. 2008**, 17 project applications were submitted for a non-repayable financial contribution from the state budget with total volume of the state budget requested funds at 1 015 228 €(30 584 766 SKK). At the meeting of the INTERREG IIIB CADSES steering committee, 14 project applications were approved in total as of December 31, 2008, with total volume of 693 296 €(20 886 237.68 SKK) of the state budget funds to be disbursed.

## **GEF - Global Environmental Facility**

In the period of July 1, 2006 to June 30, 2010, a new programming period has started for the Global Environment Facility initiative (GEF 4), with the priority areas narrowed down to **climate changes and biodiversity**. In the area of Biodiversity, Slovakia was placed in a group of 93 countries with an average allocation per country up to 3.5 mil. USD by 2010. In the area of Climate changes, Slovakia was assigned an individual allocation of 5.7 mil. USD by 2010.

During 2008, two new national projects were under preparation. Slovak organizations continue to participate in fourteen international projects, with 3 other international projects being currently in preparation.

## **EEA mechanism/ Norwegian financial mechanism (NFM)**

Based on the agreement between the EU countries and the EFTA countries, in the period of May 1 to April 30, 2009, Norway, Island, and Lichtenstein will offer Slovakia and other countries a financial assistance of total annual volume of 13.36 mil. € Over the period of five years, Slovakia is to receive the total sum of 67 mil. € Government Office of the Slovak Republic has become the national contact point for the implementation of the EEA financial mechanism and the Norwegian financial mechanism in Slovakia

## **Swiss Financial Mechanism**

For the period of five years, the Swiss confederation agreed to release funds amounting to 1 billion Swiss Franks, which is approximately 616 mil. € The distribution key shows that Slovakia has been allocated the funds in the volume of 66 866 000 Swiss Franks, which is approximately 41 mil. € Government Office of the Slovak Republic has become the national contact point for the Swiss financial mechanism in Slovakia. In the course of the year 2008 no call for project proposals was yet published.



**ALPHABETICAL LIST OF ABBREVIATIONS**

ADI	Acceptable Daily Income
AL	Arable Land
AMS	Automated Monitoring Stations
AOT40	Accumulated Dose Over a Threshold of 40 ppb
AST	Agrochemical Soil Testing
AT	Alarm threshold
BaP	benzo[a]pyrene
BAT	Best Available Techniques
BI OP	Basic Infrastructure Operation Programme
Bq	becquerel
BOD	Biochemical Oxygen Demand
BREF	BAT Reference Document
CCHSP	Centre for Chemical Substances and Products
CCTIA	Central Controlling and Testing Institute in Agriculture
CFM	Coordinated Focus-specific Monitoring
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CM	Cultural Monument
COD <sub>Cr</sub>	Chemical Oxygen Demand by Dichromate
COD <sub>Mn</sub>	Chemical Oxygen Demand by Permanganate
Coll.	Collection of Laws
CPM	Coordinated Purpose-oriented Monitoring / Consumption Pool Monitoring
CR	Critically Endangered Taxon
ČSFR	Czechoslovak Federative Republic
DD	Data Deficient Taxon
D.U.	Dobson units
EC	European Commission / European Community
Ed	Endemic Taxon
EDW	Emergency Deteriorations of Water
EEA	European Environmental Agency
EEC	European Economic Community
EFP	Environment-friendly Product
EI	Energy efficiency
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EMAS	Eco-Management and Audit Scheme
EMEP	European Monitoring and Evaluation Programme
EMO	Nuclear Power Plant Mochovce
EMS	Environmental Management System
EN	Endangered Taxon
ENP <sub>UV</sub>	Extracting Non-polar Substances
EOP	Environmental Operation Programme
EP	European Parliament
ERDF	European Regional Development Funds
EU	European Union
EUROSTAT	Statistical Office of the European Communities
EX	Extinct Taxon
FAO	Food and Agriculture Organisation of the United Nations
FDI	Foreign Direct Investments
FoRI SR	Food Research Institute of SR
GCCA SR	Geodesy Cartography and Cadastre Authority of the Slovak Republic
GDP	Gross Domestic Product
Gg	Greenhouse Gases / Giga Grams of CO <sub>2</sub>
GMO	Genetically Modified Organisms

GS SR	Geological Survey of the Slovak Republic
GWh	Giga Watt hour
ha	Hectare
HW	Hazardous Waste
IBA	Importance Birds Areas
ICP Forest	The International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests operating under UNECE (United Nations Economic Commission for Europe)
IEA	International Energy Agency
IGCC SR	Institute of Geodesy, Cartography and the Cadastre of the Slovak Republic
IMS	Information Monitoring System
Inc.	Incorporated
INES	International Nuclear Event Scale
IPCC	Intergovernmental Panel of Climate Change
IPPC	Integrated Prevention and Pollution Control
IS	Insoluble Substances
ISO	International Organization for Standardization
IT	Information threshold
IUCN	The International Union for the Conservation of Nature and Natural Resources
JRC	Joint Research Centre
kt	Kilotonnes
KURS 2001	The Conception of Spatial Development of Slovakia 2001
LA	Loaded Area
LR	Lower Risk Taxon
Ltd.	Limited corporation
MB SR	The Monuments Board of the Slovak Republic
MGF	Monitoring of Game, Wildlife, and Fishes
MMO SR	Main Mining Office of the Slovak Republic
MoA SR	Ministry of Agriculture of the Slovak Republic
MoC SR	Ministry of Culture of the Slovak Republic
MoCRD SR	Ministry of Construction and Regional Development of the Slovak Republic
MoD SR	Ministry of Defence of the Slovak Republic
MoE SR	Ministry of Environment of the Slovak Republic
MoEC SR	Ministry of Economy of the Slovak Republic
MoED SR	Ministry of Education of the Slovak Republic
MoF SR	Ministry of Finance of the Slovak Republic
MoFA SR	Ministry of Foreign Affairs of the Slovak Republic
MoH SR	Ministry of Health of the Slovak Republic
MoI SR	Ministry of Interior of the Slovak Republic
MoJ SR	Ministry of Justice of the Slovak Republic
MoLSAF SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
MoTPT SR	Ministry of Transport, Posts and Telecommunications of the Slovak Republic
MR	Monument Reserve
MW	Municipal Waste, MegaWatt
NATO	North Atlantic Treaty Organisation
NC SR	National Council of the Slovak Republic
NCM	National Cultural Monument
NE	Not Evaluated Taxon
NEHAP III	National Environmental and Health Action Plan for the Slovak Republic III
NEIS	National Emission Inventory System
NEL	Non -polar Extractable Substances
NES <sub>UV</sub>	Non-polar Extracting Substances
NFC	National Forest Centre
NFC	Non-refundable Financial Contribution
NFC - FRI	National Forest Centre – Forest Research Institute

NM	Nature Monument
NM VOC	Non-Methane Volatile Organic Compounds
NMSKO	National Monitoring Air Quality Network
NNM	National Nature Monument
NNR	National Nature Reserve
No.	Number
NP	National Park
NPP	Nuclear Power Plants
NR	Nature Reserve
NRA SR	Nuclear Regulatory Authority of the SR
NUTS	Nomenclature of Units for Territorial Statistics
OECD	Organisation for Economic Co-operation and Development
PA	Protected Area
PAH	Polycyclic Aromatic Hydrocarbons
PC	Primary circuit
PCB	Polychlorinated Biphenyl
pcs	Pieces
PES	Primary Energy Sources
PG	Permanent Grassland
pH	Acidity in pH
PJ	Peta Joule ( $10^{15}$ J)
PLA	Protected Landscape Area
PLF	Protected Landscape Fragment
PM	Particulate Matter
PM <sub>2,5</sub>	Particulate Matter to 2.5 micrometers in size
PM <sub>10</sub>	Particulate Matter between 2.5 and 10 micrometers in size
PMA	Permanent Monitoring Areas
PMS	Partial Monitoring System
PMS-S	Partial Monitoring System - Soil
PMS- F	Partial Monitoring System - Forests
POPs	Persistent Organic Pollutants
ppb	Parts per Billion
PPP	Purchase Power Parity
PS	Protected Site
pSCI	Proposed Sites of Community Importance
pSPA	Proposed Special Protected Area
PZ	Protective Zone
RAW	Radioactive waste
REACH	European Community Regulation on Chemicals and their Safe Use (EC 1907/2006) (Registration, Evaluation, Authorization and Restriction of Chemical Substances)
RES	Renewable Energy Sources
RIAP	Research Institute for Animal Production
RIPP	Research Institute of Plant Production
RISO	Regional Waste Information System
SAICM	Strategic Approach to International Chemicals Management
SCI	Sites of Community Importance
SD	Sustainable Development
SEA	Slovak Environmental Agency
SEA	Strategic Impact Assessment
SEI	Slovak Environmental Inspection
SFA	Slovak Fishing Association
SGI DS	State Geological Institute of Dionýz Štúr
SHMI	Slovak Hydrometeorological Institute
SKK	Slovak Crowns
SMM	Slovak Mining Museum

SMNPaS	The Slovak Museum of Nature Protection and Speleology
SNC SR	State Nature Conservancy of the Slovak Republic
SO SR	Statistical Office of the Slovak Republic
SPA	Special Protected Area
SR	Slovak Republic
SR GO	SR Governance Ordinance
SSCRI	Soil Science and Conservation Research Institute
SSPA	Small-size Protected Areas
STN	Slovak Technical Standard
Sv	Physics. SI unit sievert
SVA SR	State Veterinary Administration of SR
SWME	State Water Management Enterprise Inc. Žilina
TANAP	Tatras National Park
Tg	Tera grams of CO <sub>2</sub>
TJ	Tera Joule
TWh	Tera Watt Hour
UN	United Nations
UNECE	UN Economic Commission for Europe
UN EEC	
UNEP	United Nations Environment Programme
UNESCO-MaB	The United Nations Educational, Scientific and Cultural Organization – Man and the Biosphere
ÚPD	Physical-planning Documentation
V4	Visegrad group (4 Central European Countries: Czech Rep., Slovakia, Hungary, Poland)
VOC	Volatile Organic Compounds
VRP	Village Renewal Program
VU	Vulnerable Taxon
WFD	Water Framework Directive
WH	World Heritage
WHO	World Health Organization
WQEDA	Water Quality Endangerment and Deterioration Accidents
WRI	Water Research Institute
WWTP	Waste Water Treatment Plants

**STATE REGISTRATION NUMBER OF THE DISTRICTS IN THE SR**

**Bratislava region**

Bratislava I.-V	BA,BL
Malacky	MA
Pezinok	PK
Senec	SC

Rimavská Sobota	RS
Veľký Krtíš	VK
Zvolen	ZV
Žarnovica	ZC
Žiar nad Hronom	ZH

**Trnava region**

Trnava	TT,TA
Dunajská Streda	DS
Galanta	GA
Hlohovec	HC
Piešťany	PN
Senica	SE
Skalica	SI

**Prešov region**

Prešov	PO,PV
Bardejov	BJ
Humenné	HE
Kežmarok	KK
Levoča	LE
Medzilaborce	ML
Poprad	PP

**Trenčín region**

Trenčín	TN,TC
Bánovce nad Bebravou	BN
Ilava	IL
Myjava	MY
Nové Mesto nad Váhom	NM

Sabinov	SB
Snina	SV
Stará Ľubovňa	SL
Stropkov	SP
Svidník	SK
Vranov nad Topľou	VT

**Partizánske**

Partizánske	PE
Považská Bystrica	PB
Prievidza	PD
Púchov	PU

**Košice region**

Košice I.až IV	KE,KI
Košice okolie	KS
Gelnica	GL

**Nitra region**

Nitra	NR,NI
Komárno	KO
Levice	LV
Nové Zámky	NZ
Šaľa	SA
Topoľčany	TO
Zlaté Moravce	ZM

Michalovce	MI
Rožňava	RV
Sobrance	SO
Spišská Nová Ves	SN
Trebišov	TV

**Žilina region**

Žilina	ZA,ZI
Bytča	BY
Čadča	CA
Dolný Kubín	DK
Kysucké Nové Mesto	KM
Liptovský Mikuláš	LM
Martin	MT
Námestovo	NO
Ružomberok	RK
Turčianske Teplice	TR
Tvrdošín	TS

**Banská Bystrica region**

Banská Bystrica	BB,BC
Banská Štiavnica	BS
Brezno	BR
Lučenec	LC
Detva	DT
Krupina	KA
Poltár	PT