• 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).

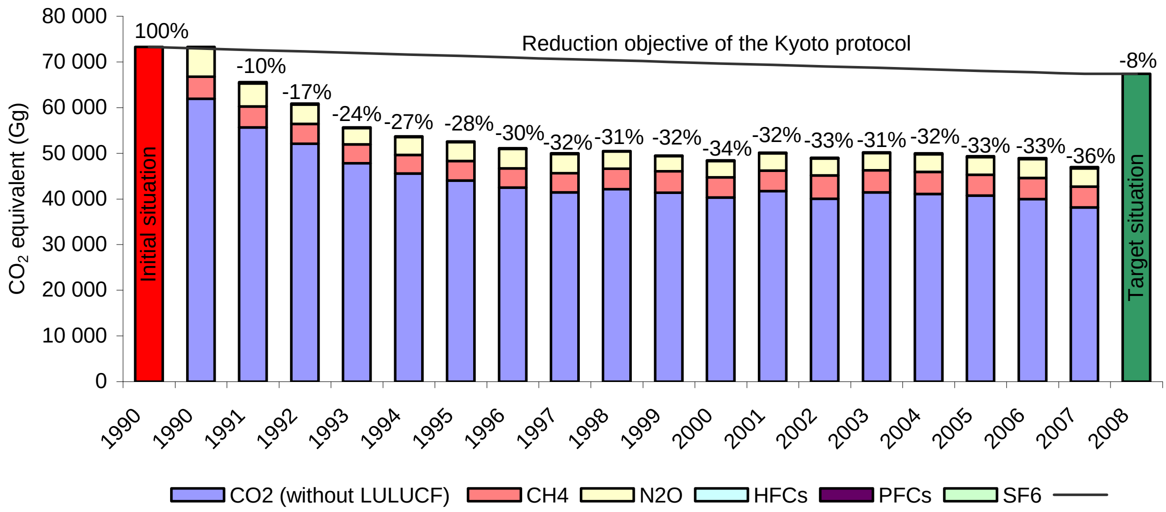
Special attention is given to characteristics of climate variability, especially **precipitation balances.** Over the last 7 years, there was a significant increase in the occurrence of extreme daily precipitation figures, which consequently produced a significant increase in local floods in various 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_2 equivalent) did not exceed the level of 1990 (73 255 Gg CO_2 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 90th 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_2 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_6) 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_2 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_2 equivalent, calculated through the GWP 100 (Global warming potential). In 2007, CO_2 emissions represent more than 81.2 %, CH_4 emissions (GWP = 21) are on the level over 9.7 %, while N_2O emissions (GWP = 310) contribute 8.5 %, and the share of the F-gases (HFC, PFC, and SF_6) 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.

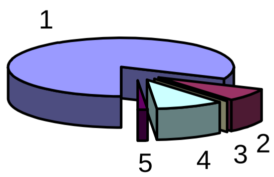
Aggregated emissions of greenhouse gases (Tg) in CO_2 equivalents

Rok	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007
Net CO_2	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_2*	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_4	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_2O	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_6	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_2)	**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

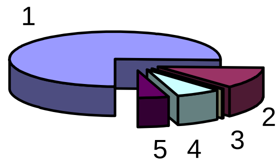
Share of individual sources on greenhouse gases emissions

1990



1990	Source	2007
81.7 %	1. Power Industry	75.7 %
7.2 %	2. Industry Processes	12.4 %
0.02 %	3. Using solvents	0.2 %
9.6 %	4. Agriculture	6.9 %
1.4 %	5. Waste	4.8 %

2007



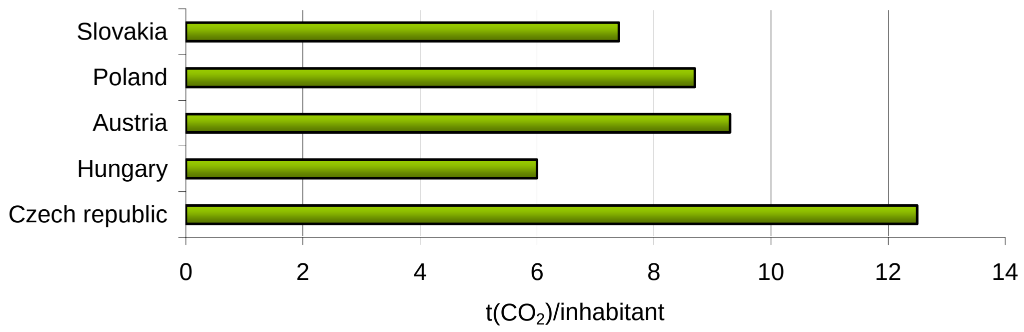
Emission were assessed by 15.04.2008 Source: SHMI

Aggregated emissions of greenhouse gases (Tg) by sectors in CO_2 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_2 emissions as set forth in the Protocol (compared to the reference year of 1980) include:

Obligation to reduce SO_2 emission pursuant to Protocol on further reduction of sulphur emissions

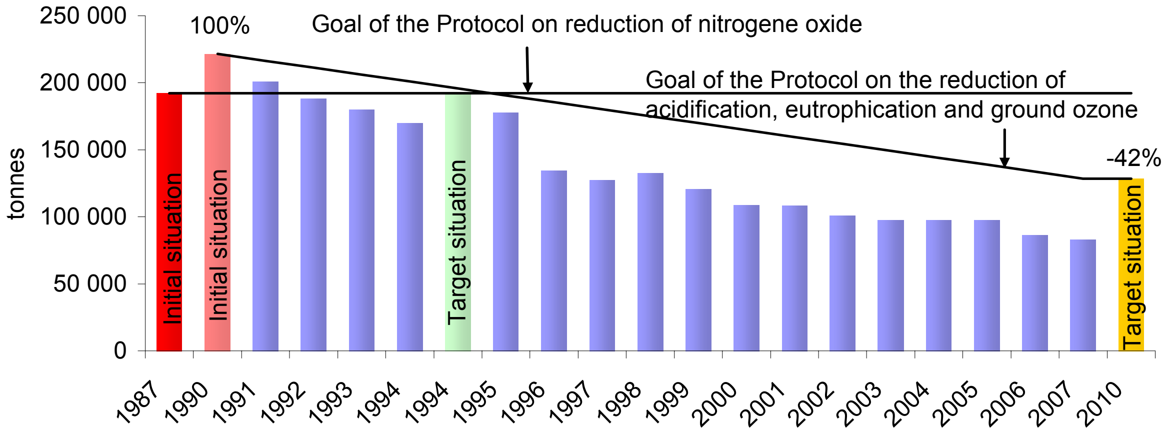
Year	1980 (initial year)	2000	2005	2010
SO_2 emission (thous. t)	843	337	295	240
SO_2 emission reduction (%)	100	60	65	72

Slovakia met one of its Protocol objectives to reduce the SO_2 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***

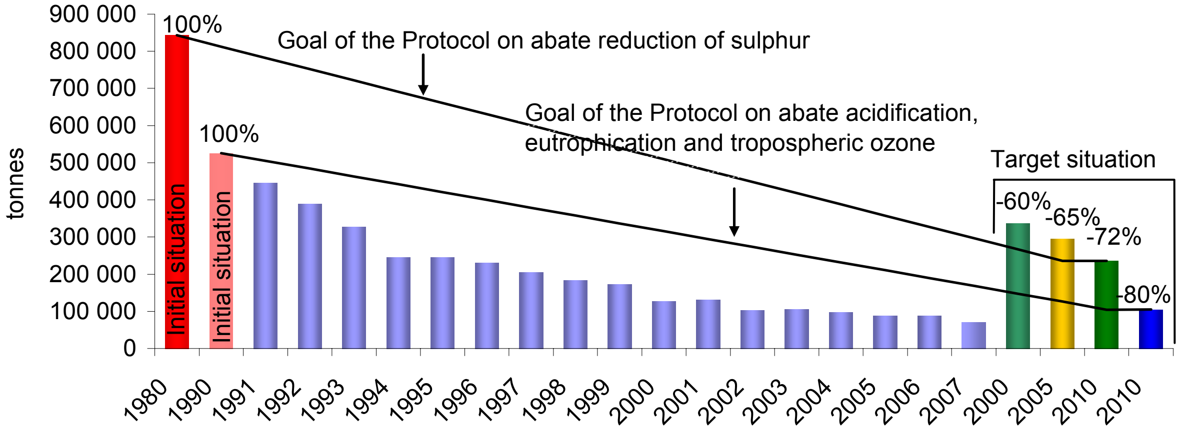
The protocol was signed in Göteborg in 1999. Slovakia signed the protocol in 1999 and ratified in 2005. Slovakia obliged itself to reduce the SO_2 emissions by 2010 by 80 %, the NO_2 emissions by 2010 by 42 %, the NH_3 emissions by 2010 by 37 % and the VOC emissions by 2010 by 6 % in comparison to the year 1990. Slovakia has the potential to fulfill this obligation.

Trend in NO_x emission with regard to following the outcomes of international agreements



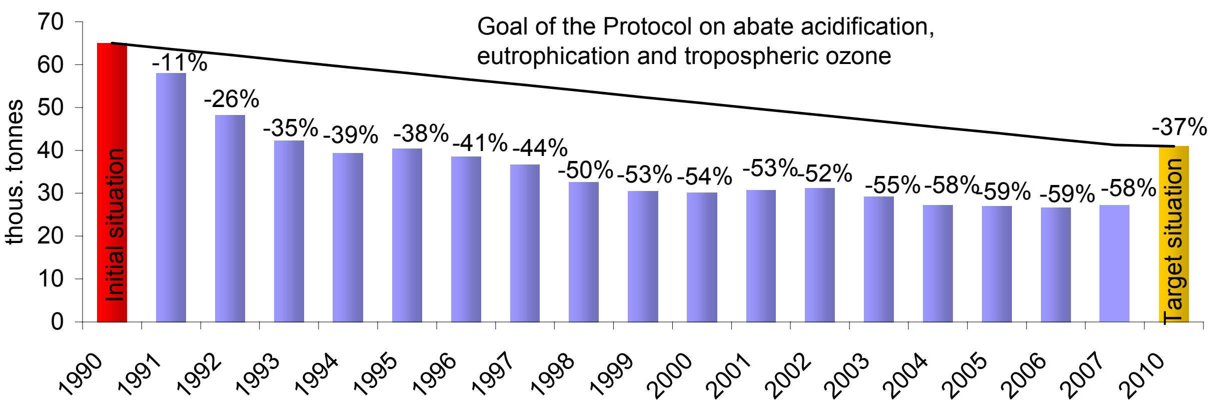
Source: SHMI

Trend in SO_2 emission with regards to following the outcomes of international agreements



Source: SHMI

Trend in NH_3 emission with regard to following the outcomes of international agreements



Source: SHMI

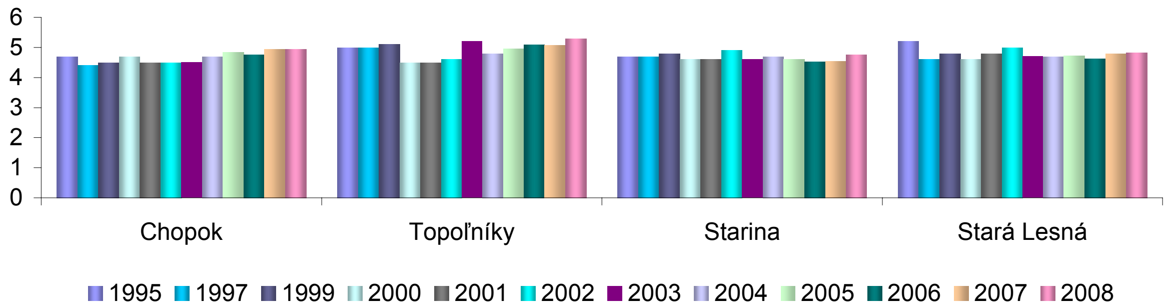
During the period of the years 1990-2007 in case of SO_2 and HN_3 the recorded reduction in emissions was obvious (with slight deviations in some years). Nitrogen oxides emissions showed a slight decrease only in 1995 and 1998 their increase was caused by increased natural gas consumption by retail consumers.

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 **atmopheric 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^{-1}. 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_2 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^{-1}. Ammonia ions also belong to the major ions, with their concentration interval representing 0.27-0.48 mg.l^{-1}.

Wet deposition of sulphates (g.S.m^{-2}.r^{-1}) - 2008

Station	Wet deposition of sulphates g.S.m^{-2}.r^{-1}
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

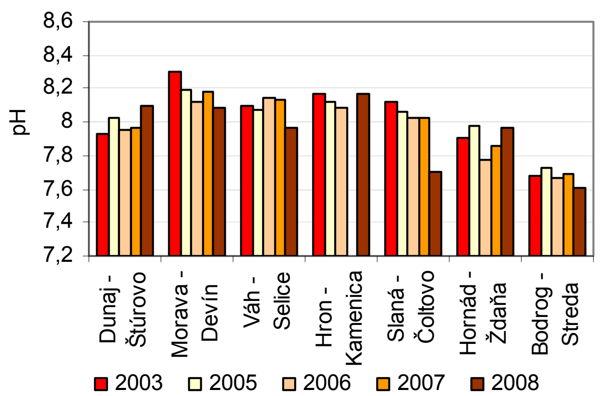
	Precip. mm	Pb µg/l	Cd µg/l	Cr µg/l	As µg/l	Cu µg/l	Zn µg/l	Ni µg/l
Chopok	1 159	3.39	0.09	0.22	0.17	1.41	20.92	0.64
Topoľníky	560	1.30	0.05	0.11	0.11	3.03	11.92	0.84
Starina	708	2.12	0.06	0.12	0.16	1.67	10.17	0.60
Stará Lesná	616	2.05	0.14	0.10	0.17	3.40	13.74	0.62
Bratislava	625	1.45	0.05	0.20	0.16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

Source: SHMI

Acidification of surface water

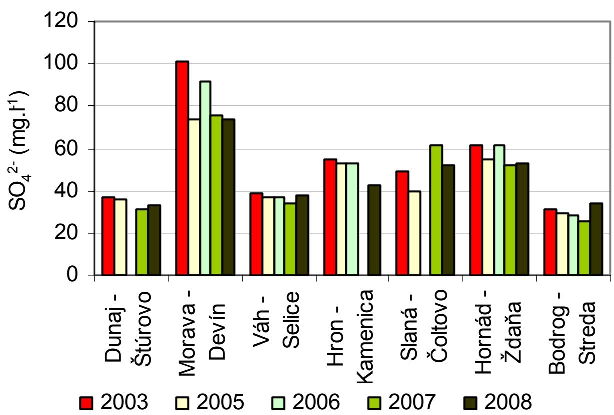
In general, considering the diversity of the rock aquifer, soil types, hydrological and climate conditions, general assessment of acidification renders itself difficult. Surface water acidification fluctuates depending on the season, especially in running water. Surface stream and lake water is most 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_2O	Al in $mg.kg^{-1}$	Al^{3+}/Ca^{2+}
		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
AI - freons	1 710.5	1.71[1)]	1.69[1)]	2.07	4.1	0.996	0.81	0.533	0.758	0.29	0.43	0.46
A II - halons	8.1	0	0	0	0	-	-	-	-	-	-	0
BI* - freons	0.1	0	0	0	0	-	-	-	-	-	-	0
B II* - CCl_4	91	0.07	0.08	0.022	0.03	0.01	0.009	0.047	0.258	0.045	0	0.016
BIII* - 1,1,1 trichloroethane	200.1	0	0	0	0	-	-	-	-	-	-	0
C I*	49.7	90.48	44.92	64.73	66.8	71.5	52.91	38.64	48.76	43.94	41.32	34.35
C II -	-	0	0	0	0	-	-	-	-	-	-	0

HBFC22B1												
E - CH_3Br**	10.0	10.20	0	0	0.48	0.48	0.48	0.48	0	0	0	0
Total	2 019.5	102.50	46.69	66.82	71.4	72.986	54.21	39.7	49.78	44.28	41.75	34.83

[#] Initial usage

Source: MoE SR

* Initial year 1989

** Initial year 1991

[1)] 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 A1. 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_3Br 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 $\mu g.m^{-3}$ 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 46-92 $\mu g.m^{-3}$. Greatest average annual ground ozone concentrations in 2008 were recorded at the Chopok station (92 $\mu g.m^{-3}$).

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 $\mu g.m^{-3}$ (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 $\mu g.m^{-3}$) were no recorded in 2008. Two stations recorded figures that exceeded the information threshold (180 $\mu g.m^{-3}$) - 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 µg.m^{-3}.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 µg.m^{-3}.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.

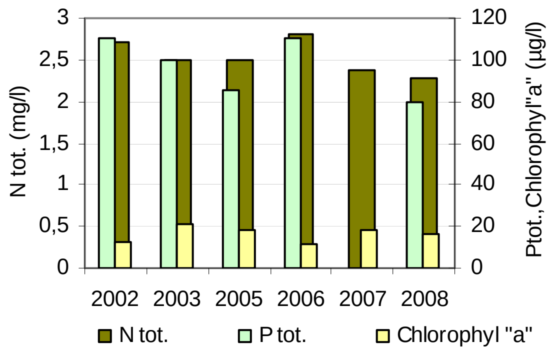
• EUTROPHICATION

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.

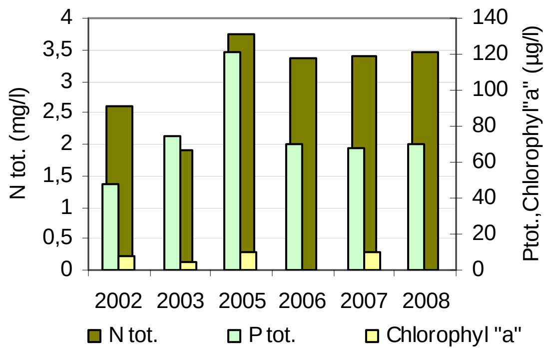
General requirements for the surface water quality are set forth in the Government Ordinance SR No. 296/2005 Coll. which introduces requirements on the quality and qualitative goals of surface water, as well as the limit indicator values for wastewater and special water contamination. Annex 1 of this Ordinance defines the recommended values for total nitrogen (9.0 mg.l^{-1}), total phosphorus (0.4 mg.l^{-1}), and chlorophyl „a“ (50.0 µg.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

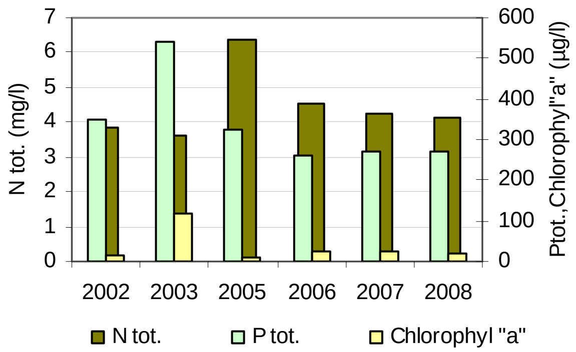
Dunaj – Komárno stred 1 768 km



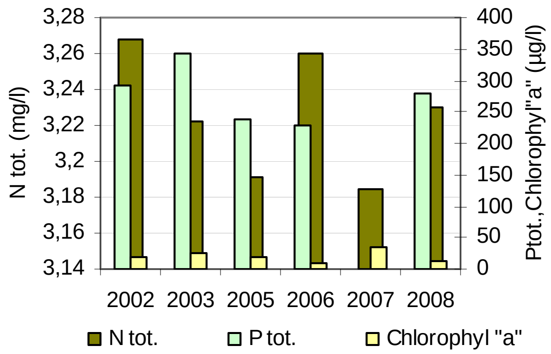
Váh – Selice 47.7 km



Nitra – Komoča 6.5 km



Ipeľ – Salka 12 km



Source: SHMI