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The Environment

in the Czech Republic 1989–2004

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Contents

Introductory word

Fifteen years – is it a short or a long period of time? It always depends on the frame of reference. Sub speciae aeternitatis a year is a drop in the ocean of time or a long time period, during which a lot can be achieved.

From the environmental point of view the last fifteen years have been long enough for us to become a standard European country, whose inhabitants can breathe relatively fresh air and drink quality water. On the other hand this time period has not been long enough for forests to become healthy and for soil to be cleared of an abundance of pesticides and pollutants.

The youngest generation of people, who still remember yellow fog in the surroundings of the North Bohemian power plants and who used to go to "curative stays" away from their homes, is not even in their thirties yet. Their children do not know such fog, which means that the positive environment changes that have occurred from their childhood up until now can undoubtedly be evaluated as having been quick, fundamental and visible.

In the past fifteen years we have had the chance to witness or take part in the process concerning environmental protection, the creation of the basic conceptual and legal framework for this environmental protection and its enforcing at home as well as in terms of international cooperation. We know that it was not easy to achieve this and to put through good ideas. Not all of the work performed with good intent had adequate effect. Nevertheless this publication proves that the huge amount of energy invested in the environmental protection has paid off. The Czech Republic is no longer the "grimy heart of Europe" or, in the parlance of the nineties the "country of the Black Triangle". People can see and feel it. Besides, the impact of the improved environment on the quality and length of their lives is provable.

Everyone who has taken part in this achievement deserves our thanks.

Libor Ambrozek
Minister of Environment

Although protection of the environment has existed as an individual field of study only approximately since the mid-20th century, protection (and regulation) of some environmental elements has a very long tradition. This especially includes water and water law, forests and forest law, mineral resources and mining law which are clearly related to the development of human civilisation and the need to regulate the management of these vitally and economically important commodities. Pollution of some parts of the environment was not a problem back in history and original regulatory measures were aimed at preserving these commodities as to their quantity or quality for economic reasons.

Things changed as industrial production developed and it became obvious that the absorption capacity of the atmosphere and surface water was not unlimited and that pollution was harmful, especially to public health. An increasing number of produced and consumed goods resulted in an increasing problem with waste.

The advent of industrial civilisation also caused bigger territorial demands – agricultural and forest lands were required and the habitats of animal and plant species were getting smaller. In addition, the demand for mobility of people and goods grew, and it was necessary to build a transportation infrastructure which would hold an increasing number of vehicles.

The development of scientific research and new technologies brought new phenomena – artificial radioactivity, chemicals not found in nature, and later also non-existing-in-the-nature living organisms (genetically modified organisms – GMO).

The anthropogenic influence started to be visible at the end of the 19th and in the mid-20th centuries, and active and systematic protection of the environment as a whole became a necessity.

The most favourable conditions of environmental protection were in the developed countries of Western Europe and North America. Although these countries were the biggest producers of pollution, they also expended the most resources on remedying the pollution and their citizens showed the greatest interest in living in a healthy environment. In the second half of the 20th century these countries started to adopt environmental protection laws, implemented them and initiated international activities, international conventions and related protocols.

Conditions in today's Czech Republic were influenced by the geo-political situation in Europe after 1945. Czechoslovakia, one of the most developed countries in the world with a strong manufacturing industry before WWII, was forced to shift its orientation within the Soviet bloc to heavy industry, especially metallurgy, steel industry, coal carbonisation, heavy chemical industry and mechanical engineering. The enormous energy demands of heavy industry were satisfied by electricity produced mainly in brown coal-fired power plants, emitting extremely large amounts of pollutants and affecting a big part of the country with strip mining.

The objective of this publication is to evaluate the development of the environment in the Czech Republic over the past 15 years. However, if we want to understand the situation of the late 1980s we have to look at a broader historical context.

The Soviet-type socialistic farming had a similarly adverse impact on agricultural landscape (land reallotment, melioration) followed by excessive use of fertilizers and chemical pest control.

Although some of the environmental elements were formally protected (water law, forest law, laws on the state protection of nature and agricultural land, measures against air pollution), the development of industrial and agricultural production was always a priority. Environmental problems were often addressed by issuing saving clause (this often applied to the discharge of industrial waste waters). On one hand there was a national park and nature reserves, on the other hand none of the brown coal-fired power plants had desulphurisation equipment and forests including those in protected areas were damaged by air pollution.

Adverse effects of the pollution became very visible during the 1970s and 1980s. Anybody passing through the Ore Mountains (Krušné hory) had to have noticed dead trees and visitors to Usti nad Labem in Northern Bohemia could not miss the unnatural colour of the river water; the areas of strip mining were called "moonscape". The life expectancy of people living in polluted regions of North-Western Bohemia and Northern Moravia was significantly lower than the national average, which itself was much lower than the average in Western Europe. In response to this situation, a number of professional and civic environmentalist activities emerged, some of which were tolerated by the communist regime, some of which were banned and their members punished, sometimes imprisoned. In the late 1980s, the importance of the problem was evident and "solutions" were put into practice, e.g. environmental committees of the communist party representations were established, and the Ministry of the Interior was changed to the Ministry of the Interior and Environment. Some tangible measures were taken as well. For example fly-ash separators were installed in power plants.

In the second half of 1990s the vast majority of citizens became conscious of the fact that the environment was not in good order. Environmental protection became a recognized priority in society after November 1989. In quick succession ...

... but you can read more about what happened in this publication.

Founding Period (1989–1992)

The Founding Period started with the so-called Rainbow Program, a political document focused on preparation and approval of new environmental laws (especially new laws on waste, air, nature and landscape protection and environmental impact assessment) and amendment of some laws from the previous period. New regulations struggled to achieve the best possible improvement of the environment in the shortest time and contained a number of transformation features (e.g. very strict rules of trans-border waste shipments, temporary emission limit values or temporary unsecured landfills). The assessment of resulting economic impact was not a priority. It was a period of economic transformation which made the economic impact assessment almost impossible. Old public administration institutions were transformed and new institutions were established (especially the Ministry of the Environment and the Czech Environmental Inspectorate) as well as supportive organisations (such as the State Environmental Fund of the Czech Republic or the Czech Environmental Institute). The public interest in the environment was high. The condition of the environmental elements was getting better, which was caused mainly by the economic transformation (restrictions or shut-downs of many energy-intensive and polluting industries).

Implementation Period (1993–1998)

The first wave of new legislation was followed by the Implementation Period. The environmental laws had been drafted and their implementation started. Unsafe landfills were closed, purification devices were installed in power plants and other pollution-producing facilities, gas pipelines were installed in cities and in the country within a global programe, and waste water treatment plants and sewer systems were built in some places. The environmental impact assessment (EIA) became a common practice. Annual investment costs made up between 2 and 2.4% of the GDP. The condition of basic environmental elements, namely air and water, started to improve fast (values of some pollution indicators were decreasing by more than 10% a year). On the other hand, the public interest in the environment was receding. In 1995, after long political debates, a new national environmental policy was approved with the aim to achieve the same level of the environmental quality as the EU15 average by 2005. In 1994 the Czech Republic entered into negotiations with the OECD which resulted both in a certain liberalisation of existing laws (especially as far as waste management was concerned) and preparation of new laws (especially on chemical substances and preparations).

The development of environmental protection in the Czech Republic from 1989 to the present can be divided into four stages characterised by different events leading to changes in the environment. The period between 1989 and 1992 is called the Founding Period, followed by the Implementation Period from 1993 to 1998, the Pre-Accession Period until 2003 and the European Period from 1 May 2004.

Pre-Accession Period (1999–2003)

The main objective of the Pre-Accession Period was to prepare the Czech Republic for accession to the European Union. Upon the screening of European regulations a second generation of environmental legislation was prepared and passed. Virtually all existing legal regulations were replaced by new ones and issues which had not been dealt with (e.g. GMO, industrial accident prevention, integrated pollution prevention and control – IPPC, packaging and package waste, and access to environmental information) were newly regulated. The whole process of environmental acquis transposition finished in June 2003. The European Commission provided the Czech Republic with three transition periods (concerning directive on packaging and packaging waste, directive on urban waste water treatment and the deadline of emission limits for sulphur dioxide from two large combustion plants). The condition of environmental elements was stabilised at the level of "worse EU average", the investment in environmental protection dropped to 0,7 % of GDP and the public interest remained quite low.

The new 1999 national environmental policy, fully compatible with the environmental policy of the European Communities (the 6th Environment Action Programme) was updated in 2001. Further development was substantially influenced by the public administration reform where many powers were transferred to the new regions (13 regions and the capital).

European Period (from 2004)

The European Period meant basically a continuation of trends which had started in the previous period, i.e. stabilisation of the environment, investment of 1 % of GDP, low public interest. The legislation was amended continuously with respect to the development of European regulations and on the basis of existing experience with the implementation. In 2004 a new national environmental policy of the Czech Republic was approved with effect until 2010.

Components of the Environment

Climate

The fragile climate system of the Earth which is generally understood as the biggest global environmental issue of these days was only a secondary issue in the Czech Republic during the 1990s as more attention was paid to urgent issues such as air and water pollution or waste management. At the beginning of the pre-accession period when most of the pressing problems had been solved, climate protection became more important and currently it is the issue number one in common with the rest of the European Union. The development of greenhouse gas emissions in the Czech Republic between 1990 and 2003 is shown in the following table:

Table 2.1

Total GHG emissions from 1990 to 2003 [mil. t CO_{2eqv}]

	1990	1992	1994	1996	1997	1998	1999	2000	2001	2002	2003
CO_2	161,9	133,3	125,9	128,3	132,7	124,5	117,7	123,9	123,6	118,6	123,3
of which CO_2 emissions	164	139,8	130,6	132,8	137,3	128,3	121,1	127,9	128	123,1	127,1
of which CO_2 sink LUCF	-2,1	-6,5	-4,7	-4,5	-4,6	-3,8	-3,4	-4	-4,4	-4,5	-3,8
of which CO_2 from road transport	6,7	6,5	7,5	9,6	10,3	9,9	10,7	11,2	11,8	11,0	13,095
CH_4	16,8	14,4	13	12,6	12,1	11,4	10,7	10,7	10,5	10,4	10,2
N_2O	11,3	9,2	8,3	9,2	8,8	8,4	8,1	8,2	8,3	8,2	8,2
F – gases	–	–	0,2	0,3	0,6	0,5	0,5	0,9	1,3	1,3	1,7
Total	**190**	**156,9**	**147,2**	**150,4**	**154,2**	**144,8**	**137**	**143,7**	**143,7**	**138,5**	**143,4**
in % of 1990	100	82,6	77,5	79,2	81,2	76,3	72,2	75,7	75,7	72,9	75,5

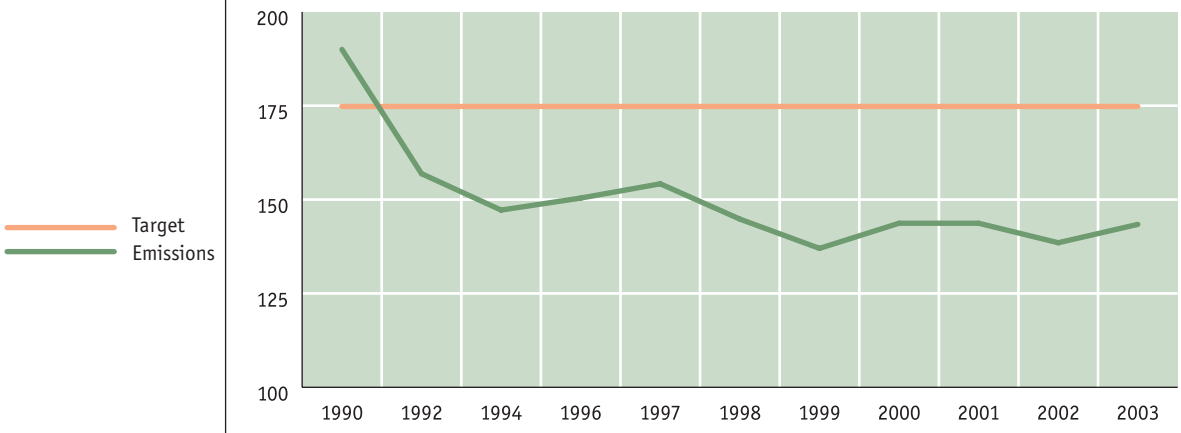
Source: Czech Hydrometeorological Institute, CO_2 from road transport Transport Research Centre in Brno

The aggregated CO_{2eqv} emissions were calculated using the radiation potential values of the greenhouse gases according to valid methods (e.g. for $CO_2 = 1$, $CH_4 = 21$, $N_2O = 310$). It means that e.g. methane is 21 times more harmful to the Earth's climate system than carbon dioxide. The enumeration includes also emission sink caused by changes in landscape use and forestry (LUCF – Land-Use Change and Forestry). Emissions from international air transport are provided separately.

An absolute majority of the main greenhouse gas, i.e. carbon dioxide, comes from fossil fuel combustion in power industry (fossil fuels make up almost 90% of primary domestic energy sources), and also from transportation where the amount of emissions is increasing. The decrease in emissions between 1990 and 1992 was without any doubt caused by a drop in industrial production and the economic transformation which resulted in a reduction or a complete shutdown of some energy-intensive productions.

Graph 2.1

GHG emissions in the Czech Republic compared to the Kyoto Protocol target



Source: http://indikatory.env.cz

During the 1990s more than 2000 MW of installed output in coal-fired power plants was closed, smaller sources changed fuel (to natural gas) and increasing industrial production has been caused by modern and energy efficient installations. Since 1998 the emissions have stabilised

at about 76 % of the base year 1990, while there are some y-o-y deviations. The current problem results from comparison of specific carbon dioxide emissions per capita and year. The approximate value of 11.6 tons for the Czech Republic exceeds both the OECD average (10.9 t) and the EU15 average (approximately 8.2 t). A positive fact is that the Czech Republic by far complies with the Kyoto Protocol target to keep the GHG emissions 8 % below the 1990 level.

Ozone Layer of the Earth

The risk of the depletion of the Earth ozone layer is also viewed as a serious global problem, however, unlike climate change it has been successfully handled at the international level. This problem was first addressed in the Czech Republic in the early 1990s. Appropriate legal regulations based on relevant international treaties (the Vienna Convention and the Montreal Protocol and its amendments) were passed and implemented.

In the early 1990s the annual use of ozone depleting substances in the Czech Republic was over 5,000 tons. Due to legislative measures this number has considerably dropped. Effective from 1 January 1996, the production and import of "CFCs" were outlawed and restrictions were gradually placed on other categories of regulated substances. The basic use of ozone depleting substances is currently covered by imports and does not exceed 200 tons per year.

The Czech Republic meets duly its obligations resulting from the Montreal Protocol and its amendments.

Since all the required measures have been taken, the Czech Republic can not do more for the ozone layer in terms of the Earth improvement.

Air

Air pollution was the most pressing issue at the beginning of the Founding Period both from the subjective and the objective point of view. National emissions of most major pollutants, especially suspended particular matter, sulphur dioxide and nitrogen oxides, were one of the highest in the world and the air pollution of some regions (especially in North-Western Bohemia and Northern Moravia) was causing serious health problems and large forest damage. The first generation of new comprehensive legal regulations of air protection, passed in 1991, was focused on the biggest air pollution decrease possible in the shortest time. It featured a whole number of transformation elements. The deadline for implementation of the emission decreasing measures was the end of 1998. Based on the approved regulations the Czech Republic implemented an extensive and, as far as speed is concerned, a unique program of emission reduction. In the late 1990s the emission and pollution levels were more or less stable and more attention was paid to the transposition of EC regulations which was finished in 2002 when a new law on air protection and implementing regulations was passed. The general public believes that the issue of air pollution has been largely solved, which is not fully true.

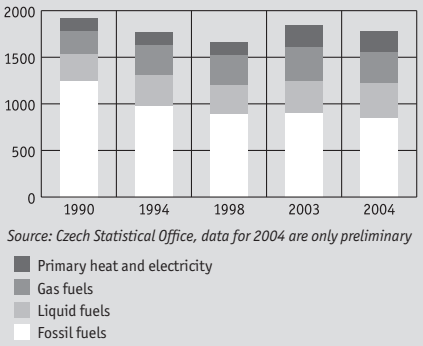
Air protection can be divided in two areas: emissions (emission of pollutants into the air) and air pollution levels (concentration of air pollutants in the air).

POLLUTANT EMISSIONS INTO THE AIR

The trend of emissions of main pollutants (dust, sulphur dioxide, carbon monooxide, volatile organic compounds – VOC, ammonia, cadmium, mercury, lead, polycyclic aromatic hydrocarbons – PAH, polychlorinated biphenyls – PCB and polychlorinated dibenzo-dioxines/dibenzofuranes – PCDD) in the air of the Czech Republic for 1990 – 2004 is described in Table 2.2.

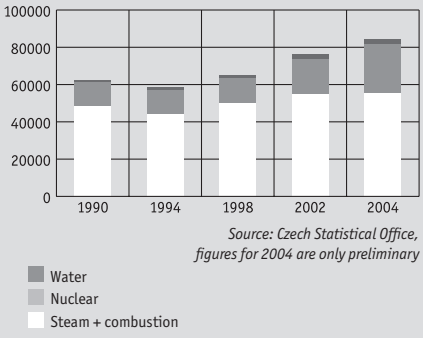
As results from the table, emissions of all monitored pollutants dropped between 1990 and 1998. Like with GHG emissions, the main reason during the Founding Period was economic transformation which resulted in cuts or shutdowns in some energy-intensive and polluting productions. Between 1993-1998 the decrease in air pollution was caused by the implementation of emission reduction measures like the introduction of dust filters, desulphurisation units or primary measures to reduce nitrogen oxides emission in the case of large and medium sized pollution sources. The emission reduction of dust and sulphur dioxide can be taken as unique.

Energy Balance of the Czech Republic (PJ)



Source: Czech Statistical Office, data for 2004 are only preliminary

Structure of Power Generation in the Czech Republic (GWh)



Source: Czech Statistical Office, figures for 2004 are only preliminary

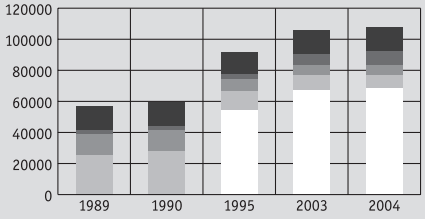
Table 2.2 **Emissions of main pollutants 1990–2004**

Year	Dust (kt)	SO_2 (kt)	NO_x (kt)	CO (kt)	VOC (kt)	NH_3 (kt)	Cd (t)	Hg (t)	Pb (t)	PAH (t)	PCB (kg)	PCDD (kg)
1990	565	1 850	551	1 275	441	156	4.3	7.5	241			
1991	524	1 749	527	1 197	394	134	3.9	7.4	215			
1992	425	1 495	499	1 141	366	115	3.6	7.3	249			
1993	367	1 366	459	1 055	346	99	3.5	7.5	228			
1994	258	1 205	378	1 036	310	91	3.5	7.2	222			
1995	211	1 103	370	1 043	292	86	3.6	7.4	204			
1996	178	944	366	1 012	293	81	2.9	5.9	181			
1997	127	697	349	944	277	81	3.0	5.5	171			
1998	84	438	321	765	242	80	2.7	5.2	151			
1999	66	268	313	716	234	75	2.7	3.7	146			
2000	57	264	326	648	227	74	2.9	3.8	106			
2001	54	251	332	649	220	77	2.6	3.3	47	36.7	96.1	0.19
2002	59	237	318	546	203	84	2.7	2.8	47	24.4	82.5	0.18
2003	79	231	333	576	204	82	2.3	1.8	39	26.7	84.6	0.19
2004	76	229	339	581	199	81	2.5	2.0	40	27.0	85.0	0.19

Source: Czech Hydrometeorological Institute (CHMI), Czech Environmental Inspectorate (CEI), Transport Research Centre, Research Institute of Agricultural Machinery, Czech Statistical Office (CSO)

PCDD = polychlorinated dibenzodioxines/ dibenzofuranes
VOC = volatile organic compounds
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls

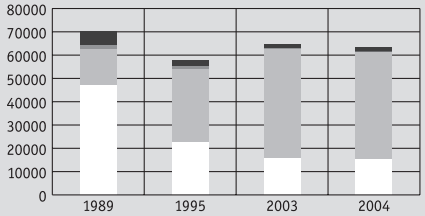
Conveying capacity of different types of passenger transport in the Czech Republic (mil. people.km)



Source: Statistical yearbooks, Transport yearbook

- Public city transport
- Air transport
- Railway transport
- Road – public transport (includes line buses)
- Road – ICT (= individual car transportation has been monitored since 1995)

Conveying capacity of different types of freight traffic in the Czech Republic (mil. tonnes.km)



Source: Statistical yearbooks, Transportation yearbook, CENIA recalculation. Due to changes in methodology the data comparability is valid from 2000.

- Pneumatic transport
- Air transport
- Water transport
- Road transport
- Railway transport

As far as nitrogen oxides are concerned, the change is less distinct which might be explained by simultaneous action of antagonistic influences: the positive influence of measures striving for emission reduction in stationary sources was partially compensated with a transport increase. The number of vehicles and related conveying capacity is increasing, although it is partly moderated by fast car enhancement (there was an increase in the number of cars with catalysers from zero in 1990 to approximately 47.5 % in 2004).

After 1998 the emission reduction slowed down and at the moment we can talk rather about stabilisation. The only exception is the 50 % y-o-y drop in lead emissions caused by the prohibition of leaded petrol distribution effective from 1 January 2001. The growth in emission of solid particular matter in 2002 and 2003 and the growth of ammonia emissions in 2 003 were not real but were caused by changes in methodology (the emission inventory was extended by other air pollution sources).

In the international context the Czech Republic undertook to comply with national emission ceilings in 2010 and the following years.

The most pressing emission problem of the Czech Republic is a high emission of dust and nitrogen oxides. While the emission of dust is reflected in exceeding limit values for human health protection for suspended particulate matter PM_{10}, the values of nitrogen oxides are so high that the national emission ceiling might not be complied within 2010.

Table 2.3 **Comparison of emissions of sulphur oxide, nitrogen oxides, ammonia and VOC between 2001 and 2004 with the national emission ceilings to be achieved in 2010 (kt)**

All figures for 2004 are only preliminary

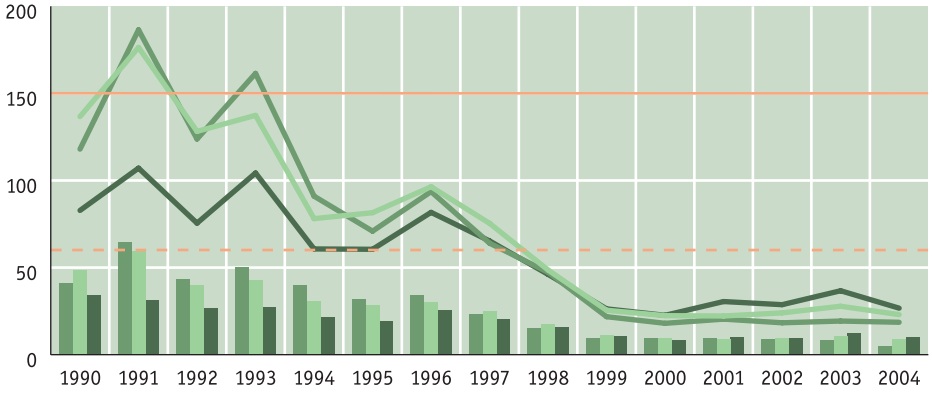
	Emissions 2001	Emissions 2002	Emissions 2003	Emissions 2004	Valid ceilings
Sulphur dioxide	251	237	232	229	265
Nitrogen oxides	332	318	329	339	286
Ammonia	77	72	84	81	80
VOC	220	203	200	199	220

Source: CHMI

AIR QUALITY – POLLUTION

The following graphs show the pollution trends of sulphur dioxide, suspended particulate matter (SPM) and nitrogen oxides in three most exposed areas of the country – Prague, North-West Bohemia Region and Ostrava (Moravian-Silesian Region).

Long-term trend of annual sulphur dioxide pollution (µg/ m³)



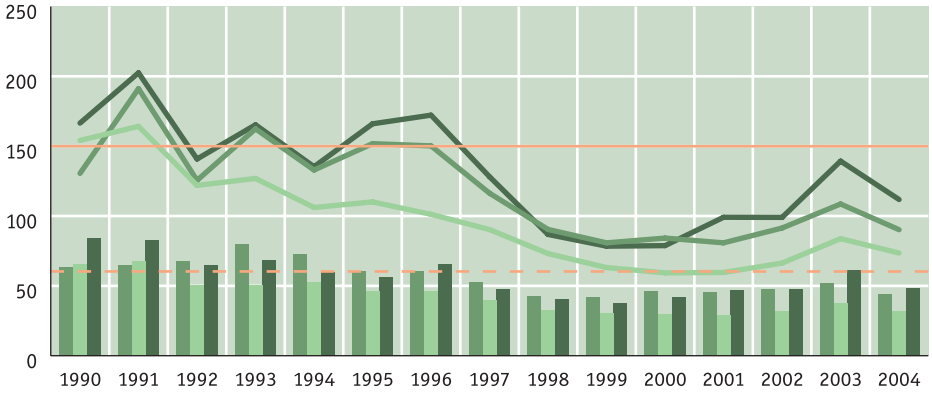
Source: CHMI

Graph 2.2

IH_d = daily limit value
IH_r = annual limit value
Moravian-Silesian Region – 95% percentile
North-West Bohemia Region – 95% percentile
Prague – 95% percentile
Moravian-Silesian Region – annual average
North-West Bohemia Region – annual average
Prague –annual average

IH_d and IH_r values are binding according to the legal regulations.

Long-term trend of annual SPM pollution (µ/m³)



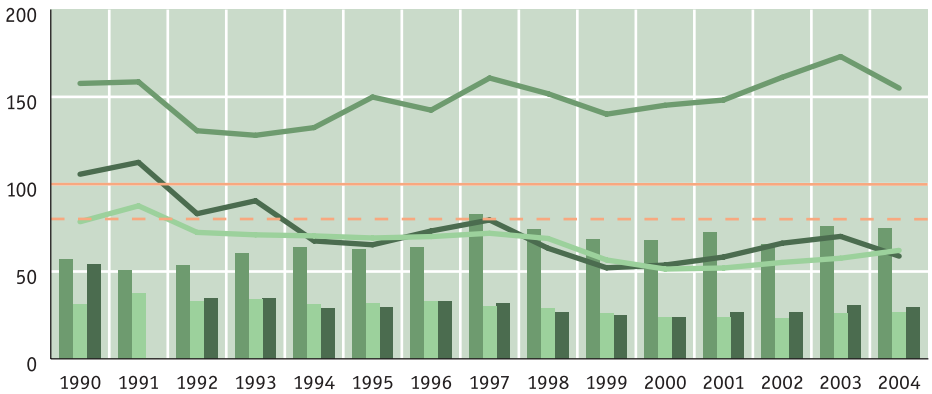
Source: CHMI

Graph 2.3

IH_d = daily limit value
IH_r = annual limit value
Moravian-Silesian Region – 95% percentile
North-West Bohemia Region – 95% percentile
Prague – 95% percentile
Moravian-Silesian Region – annual average
North-West Bohemia Region – annual average
Prague – annual average

IH_d and IH_r values are binding according to the legal regulations.

Long-term trend of annual nitrogen oxide pollution (µ/m³)



Source: CHMI

Graph 2.4

IH_d = daily limit value
IH_r = annual limit value
Moravian-Silesian Region – 95% percentile
North-West Bohemia Region – 95% percentile
Prague – 95% percentile
Moravian-Silesian Region – annual average
North-West Bohemia Region – annual average
Prague – annual average

IH_d and IH_r values are binding according to the legal regulations.

As results from the above graph the concentration of SPM and sulphur dioxide has substantially decreased. Initially the main reason was the economic transformation which resulted in cuts or shutdowns in some energy-intensive and polluting production entities.

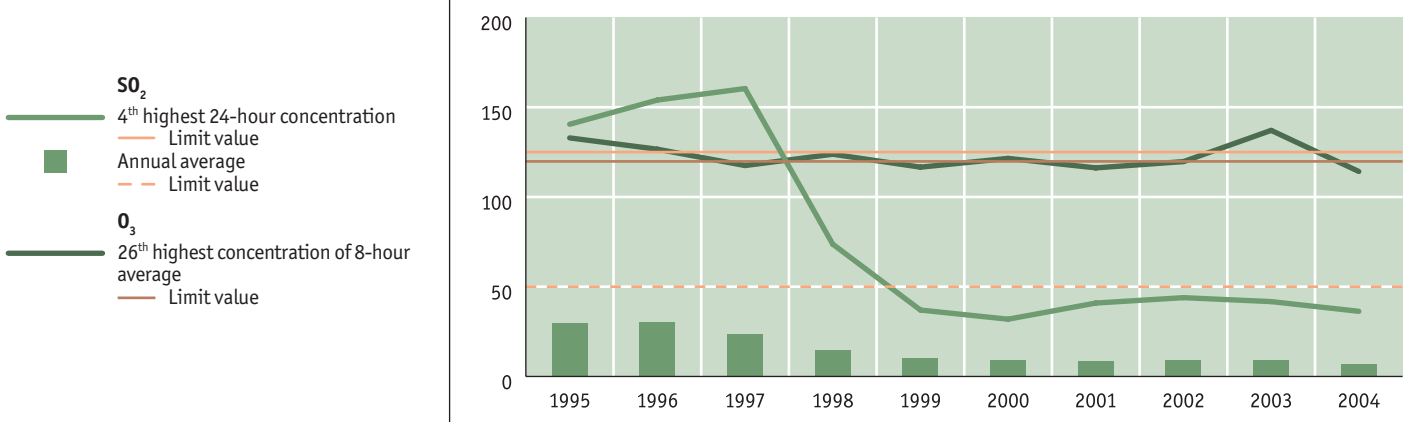
Compliance with new air protection regulations, approved in the early 1990s, became more influential in the mid 1990s. These regulations resulted in installation of dust filters and desulphurisation devices in major energy sources, installation of gas pipelines in cities and villages and implementation of protective measures in industrial pollution sources. The installation of smog warning and regulation systems was important as well.

The new limit values established by EU for the quality of ambient air regulations were transposed in 2002. Apart from the limit values set for human health protection, limit values for eco-system and vegetation protection were set separately.

Pollution trends of sulphur dioxide, PM_{10} and nitrogen dioxide from 1995 to 2004, as specified by new "European" limit values, are provided in the following graphs.

Graph 2.5

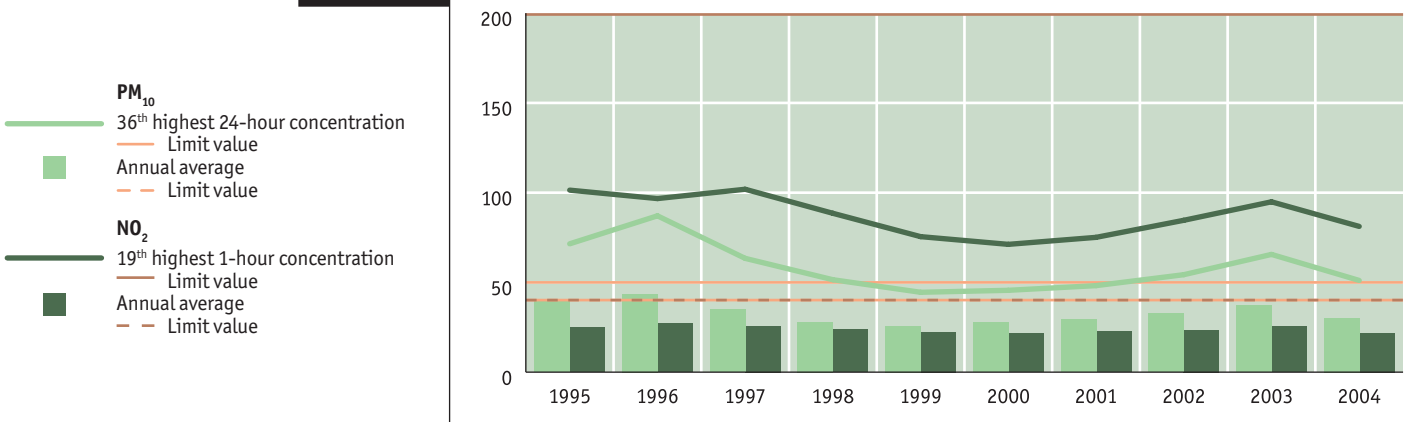
Trends of air pollution characteristics of sulphur dioxide and ozone (µg/m³)



Source: CHMI

Graph 2.6

Trends of air pollution characteristics of PM1 0 and nitrogen dioxide (µg/m³)



Source: CHMI

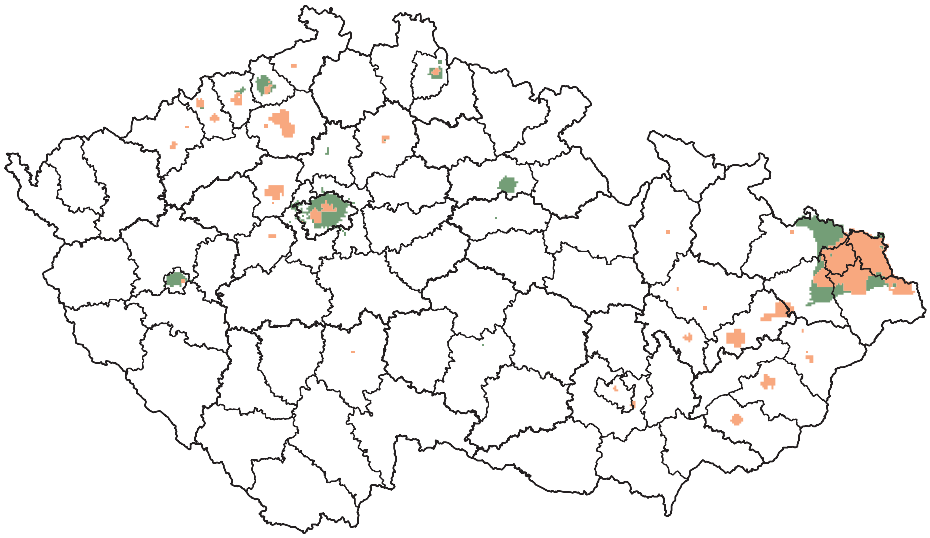
While in the North/Western Bohemia and Moravian-Silesian Regions where air pollution is mainly caused by stationary sources, the air quality was improved, the situation in Prague is still bad due to heavy transport intensity.

As results from the above graphs only the level of sulphur dioxide has decreased substantially since 1995; since 2000 the trend has got worse.

An announcement of zones with worse air quality has been given since 2003 (i.e. areas where the new pollution limit values were exceeded). The areas of higher pollution levels (exc. ozone) are shown in the following figure:

Areas of exceeded limit values of regulated pollutants excluding ozone in 2004

Fig. 2.1



Area with the excedance of LV

Area with the excedance of LV+MT

LV = limit value

MT = margin of tolerance

Compliance with the limit values following the legal regulations means a duty to prepare plans for improvement of the air quality.

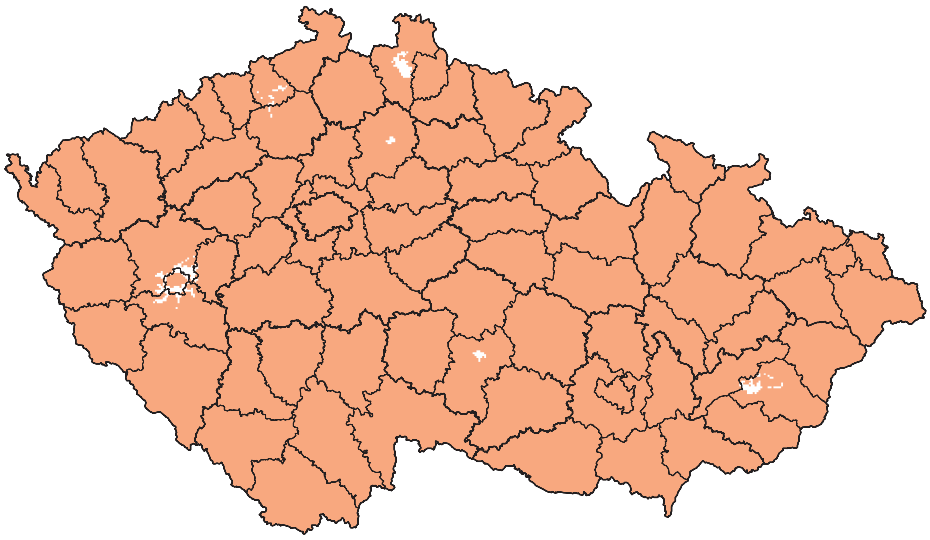
Source: CHMI

Most exceeded areas concern PM_{10}. Other limit values are exceeded only in very limited but densily populated areas, especially in Prague and Ostrava. Regardless the fact that the zones with worse air quality represent only 3.5 % of the CR area more than 34 % of population live there.

A major problem of air quality is the pollution with tropospheric ozone. The areas with exceeded limit values including ozone target limit values are shown in the following figure:

Areas of exceeded limit values of regulated pollutants including ozone in 2004

Fig. 2.2



Area with the excedance of limit values

Source: CHMI

As results from the figure, at least one pollution limit value (usually the target limit value for ozone) is exceeded in most places of the Czech Republic.

A topical problem of the Czech Republic (and of a number of other states) concerning air pollution is the non-compliance with ambient air quality standards for suspended particulate matter PM_{10}. These standards do not comply with mainly in the Moravian-Silesian region, in Prague and in parts of the Central Bohemia and Usti nad Labem regions.

The biggest proportion of air pollution comes from local furnaces burning solid fuels and from traffic (not only exhaust fumes, but also abrasion of tyres and brakes and road surface). Another group of major air pollutants are "secondary particles" from gas precursors (sulphur dioxide, nitrogen oxides, VOC and ammonia). This means that even if hypothetically there was zero emission of dust, the pollution due to suspended particles would not be zero as emissions of some precursors are an inevitable accompanying phenomenon of present energy and transport technologies. Taking into account the health impact, fine $PM_{2.5}$ suspended particulate matter (or smaller ones) present the biggest hazard. The EU has been considering regulations concerning these particles.

A long-term problem of the whole Europe is pollution caused by tropospheric ("ground") ozone which comes from photochemical reactions between gas precursors (nitrogen oxides and VOC). Since the main sources of the precursors are combustion engines, it is very difficult to reduce the emissions.

One positive fact is that the limit values for sulphur dioxide in the whole country are complied with and the limit values for nitrogen dioxide are exceeded only in Prague. The Czech Republic complies with its international commitments for air protection (the UN ECE Convention on Long-Range Trans-Boundary Air Pollution and 8 related protocols).

Water

At the beginning of the 1990s water pollution was considered the second most pressing issue of the Czech environment. Most important watercourses belonged to the category of polluted or heavily polluted and the contamination of groundwater was also high. Unlike with air pollution no new legal regulations were prepared and the situation was addressed by amendments to the law passed in the 1970s. Attention was focused mainly on pollution discharged into surface water, i.e. construction, rebuilding and intensification of waste water treatment plants (mainly large plants) and construction of sewer systems. Cuts or shutdowns of some big industrial production entities brought also an important decrease in pollution from point sources. E.g. an extremely fast decrease in pollution by oil substances can be attributed to industrial production entities which were granted an exemption from the water law. Some of the productions were phased out and all the exemptions from the water law were cancelled in 1990. Old environmental damages which were remedied, such as groundwater purification, resulted in a better quality of underground water. At the beginning of the Pre-Accession Period the quality of surface water was significantly improved and the quality of groundwater stabilised. More attention was paid to the transposition of EC legal regulations which culminated when new comprehensive regulations concerning water were approved.

Water protection focuses on two areas: emissions (water contamination, especially surface water) and water quality (both surface and underground water sources).

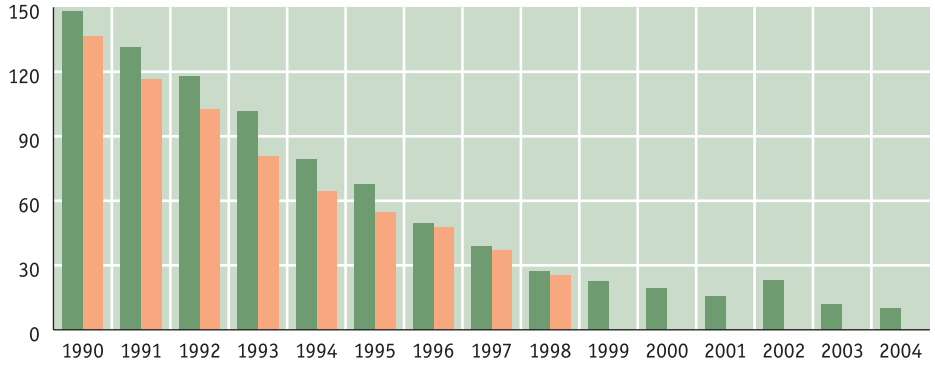
SURFACE WATER POLLUTION

Surface water pollution comes from point sources (municipal waste water and industrial waste water) and diffused sources (washing of mineral fertilizers and plant protection agents from soil).

The development of pollution discharged into surface water according to BOD_5 (biochemical oxygen demand), COD_{Cr} (chemical oxygen demand) and insoluble substances between 1990 and 2004 is provided in the following graphs:

Development of pollution discharged from point sources – BOD_5 indicator (thous.t/year)

Graph 2.7



Source: CSO, CEI, Water Research Institute (WRI T.G.M.), CENIA

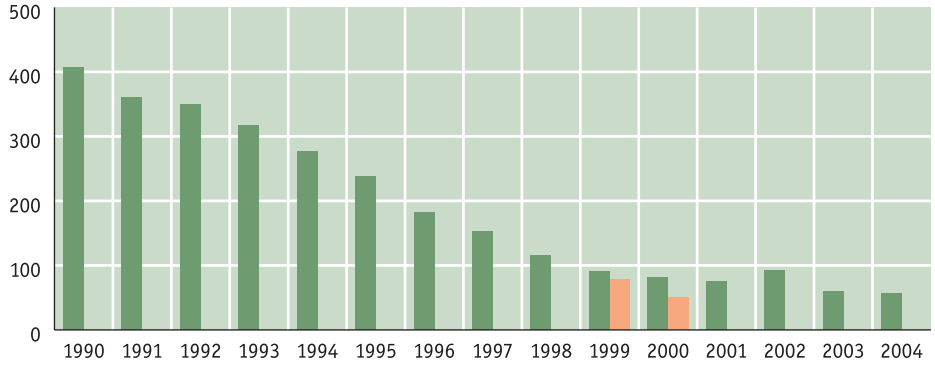
The source of biodegradable organic pollution are the municipal sources as well as installations of paper, textile and food industries.

Water pollution according to the BOD_5 indicator was charged until 1998.

As result from the development of the above indicator organic pollutants especially from urban waste water have decreased seven times since 1990.

Development of pollution discharged from point sources – COD_{Cr} indicator (thous.t/year)

Graph 2.8



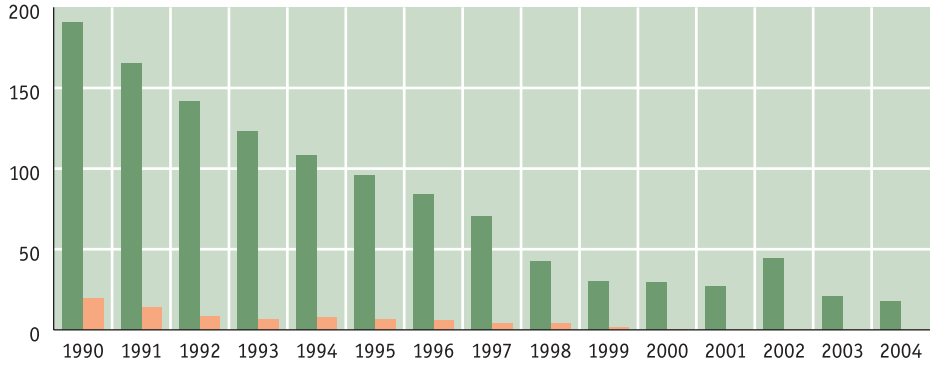
Source: CSO, CEI, WRI T.G.M., CENIA

Water pollution according to COD_{Cr} indicator has been charged since 1999, since 2001 it is not centrally monitored.

The indicator shows that since 1990 industrial water strain has decreased more than four times during ten years. This fact is also confirmed by a lower number of insoluble water pollutants which has decreased more than six times.

Development of pollution discharged from point resources – insoluble substances (thous.t/year)

Graph 2.9



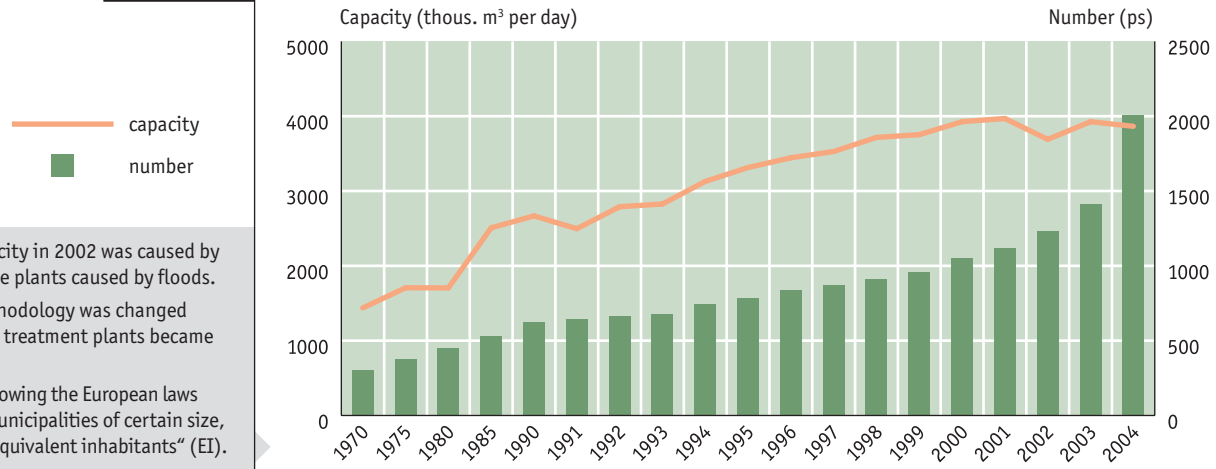
Source: CSO, CEI, WRI T.G.M., CENIA

The above data show that the pollution discharged into surface water between 1990 and 2004 was substantially decreased. At first the main reason was the transformation of the national economy which resulted in cuts or shutdowns of some production entities, or a decrease in water consumption and waste water production.

In the mid 1990s new and rebuilt/enlarged waste water plants started to influence the quality of water. The number of waste water treatment plants increased by more than 800 (to the total number of 1,400) from 1990 to 2003. The total capacity increased by 50 % – see the graph below. The water strain was at its peak during the 1990s when waste water in all major cities started to be treated. In 2000 waste water treatment plants were built in all places with more than 10,000 people.

Graph 2.10

Waste water treatment plants 1990–2004



Source: CSO, WRI T.G.M., CENIA

The decrease in capacity in 2002 was caused by the shutdown of some plants caused by floods.

In 2004 the CSO methodology was changed (smaller waste water treatment plants became a part of statistics).

The commitments following the European laws are determined for municipalities of certain size, which is defined in „equivalent inhabitants" (EI).

An equivalent inhabitant is an average value of organic pollution produced by one inhabitant per day, expressed in the pollution index BOD_5 (60 g BOD_5/day).

The capacity of waste water treatment plants given in equivalent inhabitants is not monitored by CSO.

The number of households connected to sewer systems was increasing too, from 72.6 % (of which 71.2 % was treated) in 1990 to 78.8 % (of which 93.8 % was treated) in 2004.

A current issue of surface water pollution is the non-existence of sewer system and waste water treatment plants for places with 2,000 to 5,000 inhabitants (some parts of the sewerage system are not connected to any waste water treatment plant at all). Pursuant to the relevant Directive 91/271/EEC waste water is supposed to be treated in all places with more than 2,000 inhabitants effective from 2005. The Czech Republic is not able to keep the deadline for economic reasons and therefore a transition period was agreed on with the European Commission to meet this obligation by 2010.

While treatment of waste water from point sources is technically feasible, although the costs would be high, surface sources are a pressing problem. This is caused by the impossibility to reduce soil fertilization and plant treatment under a certain level and the fact that the fertilizers are washed out from the soil very slowly.

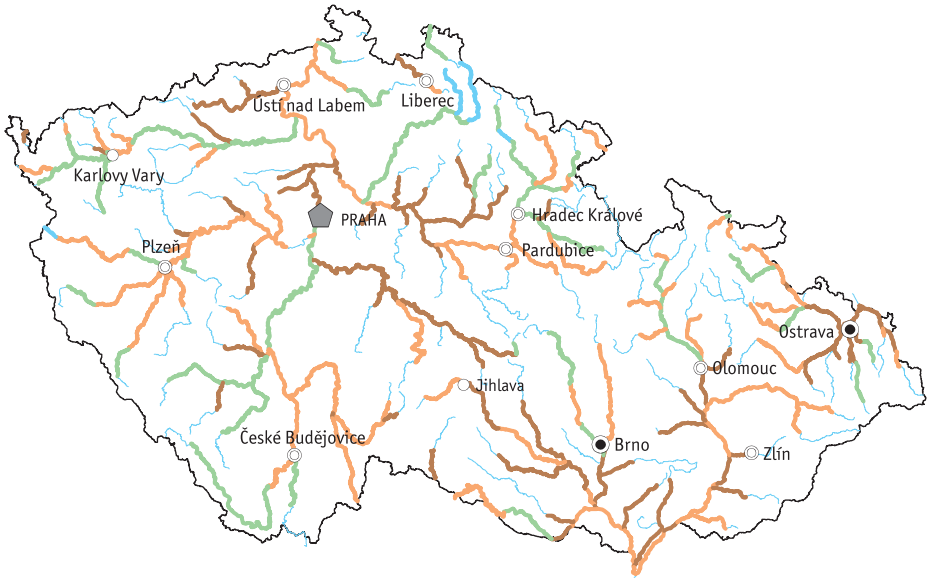
SURFACE WATER QUALITY

The decrease in pollutants discharged into water resulted in a better quality of surface water. While in the early 1990s most large watercourses belonged to categories IV and V (extremely or very polluted water), in 2003 and 2004 the worse watercourses belonged to category III (polluted water), most of them to categories I or II.

A current problem is the contamination of some parts of watercourses with specific pollutants (hazardous chemicals, radioactive substances) and the risk of eutrophication of water reservoirs, caused mainly by nitrates and phosphates from sewage water (from point sources without a third step of water treatment for phosphorus and nitrate elimination) and by denudation of cultivated land (from diffusive sources). As all watercourses flow out of the Czech Republic and there is no water fed into the country, the whole Czech Republic was defined as a "sensitive area" in the EU terminology. Such a sensitive area is subject to stricter parameters for treated sewage water.

Quality of surface water in the Czech Republic 1991–1992

Fig. 2.3

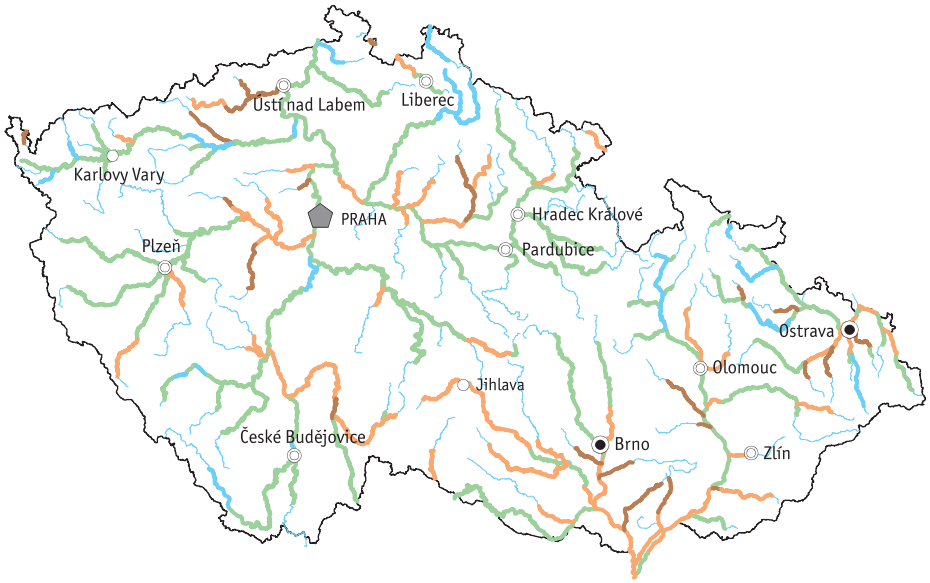


Class	Classification
I and II	Non-polluted and slightly polluted water
III	Polluted water
IV	Strongly polluted water
V.	Heavily polluted water

Source: WRI T.G.M. on the base of CHMI data

Quality of surface water in the Czech Republic 2003–2004

Fig. 2.4



Class	Classification
I and II	Non-polluted and slightly polluted water
III	Polluted water
IV	Strongly polluted water
V.	Heavily polluted water

Source: WRI T.G.M. on the base of CHMI data

The problem with the quality of surface water is that the great part of water reservoirs have a high nutrient level, which leads to eutrophisation, in other words the water can not be used for most purposes (drinking water production, bathing).

One of the sustainability indicators is the average life expectancy of inhabitants. In the Czech Republic it had the lowest value in 1970 - for men it was 66 years and for women 73 years. Until 1990 these figures were fluctuating, since 1990 they have been growing steadily. In 2003 the average life expectancy for women was 78.5 years and for men 72 years.

See http://indikatory.env.cz

GROUNDWATER

The present quality of groundwater can be considered stabilised and more or less satisfactory. There is a certain risk of "old environmental load" (old waste landfills, contaminated industrial zones, e.g. former areas of underground uranium leaching in Northern Bohemia, heavy impact on the third aquifer of cretaceous areas in Northern Bohemia caused by radioactivity from Ralsko). Groundwater pollution, e.g. ammoniated ions from agriculture, which existed in the early 1990s, has been removed.

DRINKING WATER

The number of inhabitants connected to the public water supply lines increased from 83.2 % in 1990 to 89.8 % in 2004. The quality of supplied drinking water is mostly sufficient. The lowest percentage of households connected to the public system is in Central Bohemia. Drinking water comes mainly from surface sources.

The problem is that more than 10 % people, connected to the public water piping, are not connected to a sewerage system.

Soil

The following table shows the changes in agricultural and forest land resources between 1990 and 2004:

Table 2.4

Changes in agricultural and forest land resources as of 31 December of a respective year (thousands ha)

Year	Agricultural land	Arable land	Arable land idle *)	Permanent grass	Forest land	Arability (%)
1990	4 288	3 219	3	833	2 630	75.07
1995	4 280	3 143	56	902	2 630	73.43
2000	4 280	3 082	71	961	2 637	72.01
2001	4 277	3 075	116	966	2 639	71.90
2002	4 273	3 068	128	968	2 643	71.80
2003	4 269	3 062	177	971	2 644	71.89
2004	4 265	3 055	–	972	2 646	–

*) as of 31 May of each year

Note: the area of the arable land is calculated by methods of the Czech Statistical Office

Source: CSO

The above data indicate that the decreasing of the farm land cultivation area is very slow. The cultivation of almost 72 % remains relatively high compared to the EU15 average (60.1 %). A new issue is uncultivated land which is idle and grows weeds. The Czech Statistical Office estimates the total volume of 300,000 ha of this land.

The quality of soil in the Czech Republic at the beginning of the Founding Period was affected by "socialist" agriculture (plant and animal large-scale production with a high use of fertilizers and pesticides) and by the atmospheric deposition due to high pollutant emissions into the air. The Implementation Period brought environmentally positive changes in agriculture, cuts in some agriculture productions and a decrease in the atmospheric contamination fall-out. Fast reduction of the negative impact on soil has a very slow response, although the Pre-Accession and European periods have brought mostly positive changes.

After 1990 there was a radical decrease in the use of mineral fertilizers and pesticides. The use of fertilizers decreased (use of NPK nutrients) from 196 kg/ha in 1990 to 99 kg/ha in 2004. The use of pesticides (insecticides, herbicides, fungicides and growth regulators) dropped from 8,812 tons in 1990 by half and in 2004 was approximately 1 kg/ha. The question is whether the decrease in calcium fertilizers is appropriate taking into account the ground acidity in the Czech Republic.

The content of risk elements in farm land (As, Be, Cd, Co, Cr, Cu, Mo, Ni, Pb, V, Zn) has been changing. In the early 1990s the content of cadmium and lead in the Central Bohemian region, the content of cadmium and mercury in Northern Moravia were above the threshold levels, and the content of chromium in Southern Moravia was occasionally high. At the moment the levels of monitored risk elements are mostly below the threshold levels. This can be explained by drop in use of mineral fertilizers and their quality and by lower atmospheric deposition.

Organic pollutants (polychlorinated biphenyls, polycyclic aromatic hydrocarbons and organic chlorinated pesticides) exceed the threshold levels occasionally. These substances were used in large uncontrolled amounts in past and due to their persistence they are only slowly eliminated.

A very pressing problem is erosion, especially water erosion. That is the result of long time intensive exploitation of soil.

Potential risk to farm land from water and wind erosions (%)

Table 2.5

Risk category	Water erosion	Wind erosion
Not endangered	4.2	77.5
Prone	27.9	9.3
Slightly endangered	25.9	5.7
Endangered	18.1	5.4
Strongly endangered	10.0	1.8
Most endangered	13.9	0.3

Source: Environmental Report of the Czech Republic 2004

The above data show that water erosion is an important pressing problem, visible especially during floods.

Other soil-related issues include compacting caused by heavy machinery and subsequent water retention and worse plant growth.

Geological Environment

The geological environment of the Czech Republic was affected by strip and underground mining of coal and other mineral materials. Large-scale uranium leaching was used in Northern Bohemia. This resulted in vast landscape devastation, especially in Northern Bohemia, and some parts of the areas are undermined and have an imminent risk of land slip and large surface water contamination. Approximately 68,000 ha of soil are used for mining and extraction (0.9 % of the whole area of the country). Black and brown coal mining was substantially decreased in the 1990s when ore extraction was discontinued completely. The decrease in black coal mining was related mainly to the transformation of the national economy and a slump in metallurgy. The decrease in brown coal mining was also caused by the transformation of industry, but especially by lower power generation in coal-fired power plants (about a 25 % decrease). Also a number of heating plants started to use different fuels (mostly natural gas) and more than 2,000 municipalities were connected to the gas distribution system. Ore extraction was unsustainable both for environmental and for economic reasons. Uranium extraction will be finished for similar reasons, too. Changes in extraction of main commodities between 1977 and 2004 are shown in the graphs 2.11 and 2.12.

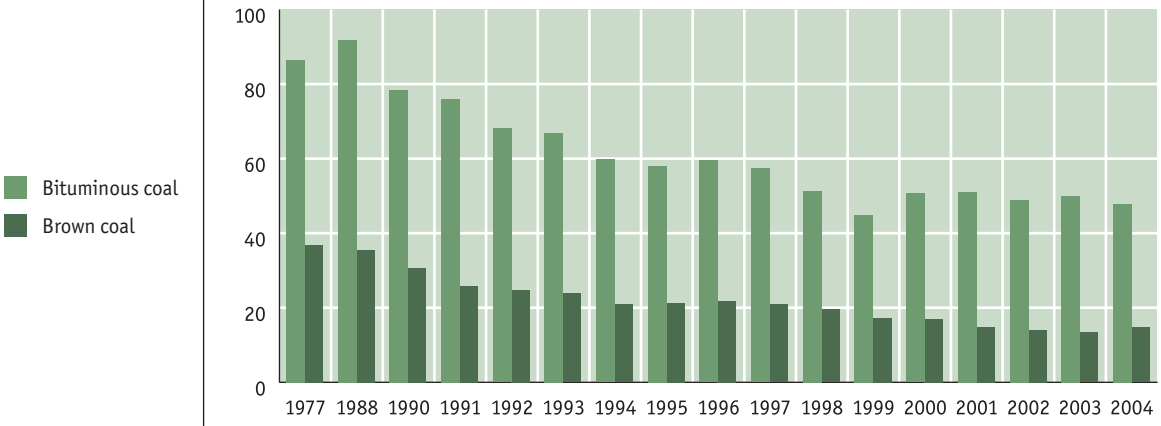
Land reclamation has been faster since the early 1990s. Pursuant to Act No. 44/1988 Coll. a mining company has to restore the land using resources from the extracted mineral. Faster land reclamation was also supported by the state budget and from resources of the National Property Fund.

In the second half of the 20th century the landscape in basin districts in the North of Bohemia and in the surroundings of the town of Sokolov was so devastated that you could hardly speak about nature. To experience it, you can get on the train in Usti nad Labem ... and watch the smoking stacks in the middle of a moonscape, with falling fly ash and feel the smell of burning coal...

In the name of increased coal mining 116 villages in four basin districts (Most, Teplice, Chomutov, Usti nad Labem) fell victim to large-area mining. Also the town of Most with imposing medieval architecture had to make way for mining. Accompanied by spectacular media propaganda controlled by the communist party, a new town of Most was built: a cluster of panel buildings and communication crossings. Its inhabitants lost the feeling of home ...

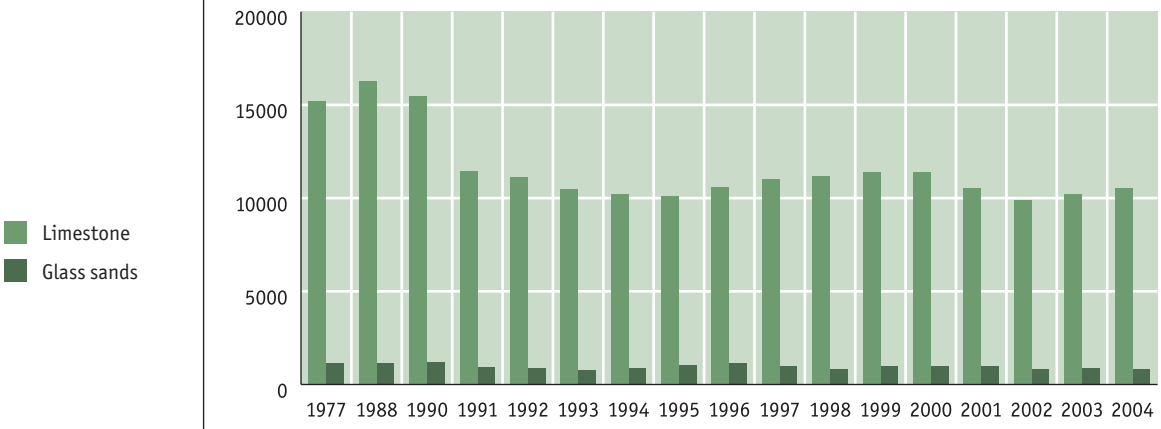
Miroslav Vanek: It was impossible to breathe here

Graph 2.11 **Bituminous and brown coal mining in 1977, 1988, 1990–2004 (mil. t)**



Source: Ministry of Industry and Trade (MIT), MoE, CENIA

Graph 2.12 **Limestone and glass sands mining in 1977, 1988, 1990–2004 (thous. t)**



Source: MIT, Ministry of the Environment (MoE), CENIA

The current issues of geological environment protection in the Czech Republic are the high proportion of limestone mining in nature reserves (Cesky kras and Moravsky kras), the groundwater contamination after uranium extraction in the region of Ceska Lipa and the risk of landfall and methane bleeding in the Moravian-Silesian Region.

Forests

The catastrophic condition of forests in 1989 was the best-known symptom of the bad environment of the Czech Republic. The main reason was air pollution affecting particularly spruce mono--cultures. Weakened vegetation was easily affected by pestilence. In spite of the fact that impact of pollutant emissions on forests were decreasing ("passive measures"), like liming, fertilization and artificial forest reproduction, including gradual changes in forest composition, the condition of the forests was not improved. In the mid 1990s new comprehensive regulations concerning forests were approved. Since then the regulations have been amended several times.

The Czech Republic is a country with an average forest area (the forest percentage is 34.1 %, the OECD average was 34.4 % in 2000), although it is the 8th most wooded OECD country in Europe.

Changes in the forest percentage of the Czech Republic between 1920 and 2004 are provided in the following table:

Changes in the forest area (thousands ha)

Table 2.6

	1920	1930	1945	1950	1960	1970	1980	1990	2000	2001	2002	2003	2004
Area	2 369	2 354	2 420	2 479	2 574	2 607	2 624	2 630	2 637	2 639	2 643	2 644	2 646

Source: CSO

More than 28 % of the area in south-west and northern Bohemia and north-east Moravia is covered with forests. The smallest forest area (less than 14 %) is in Prague, and a slightly bigger forest percentage is in eastern Bohemia and southern Moravia (about 14–28 %).

The main problem is the health of forests areas which has been assessed in the Czech Republic since 1986 in monitored areas within the UN EEC and EU ICP programme – Forest. The basic parameter of this assessment is the defoliation rate expressed in a percentage with precision of 5 %. Over the last fifteen years before the forest load was decreased, the defoliation rate went up and the health of coniferous and deciduous trees assessed according to this parameter is getting slightly worse.

Forest health is a chronic problem of the Czech Republic and logically solving this problem will take a long time. Concerning the environmental protection and forest functions outside production, the age, species and spatial structure is not good. More than 75 % of the forest areas are agricultural forests, the percentage of forests not used primarily for agriculture is growing very slowly. An urgent, periodically repeated problem is bark beetle damage resulting in random logging. Random logging accounted for 73.7 % of total logging in 1990 and 34.5 % in 2004. A significant improvement in forest health can be expected on the long-term horizon.

Nature and Landscape

The area of nature and landscape involves landscape and species protections. At the beginning of the Founding period the condition of nature and landscape was equivalent to the condition of fundamental environmental elements – air and water. The landscape infrastructure was disturbed (in particular the retention capacity) and the biological diversity was decreasing. The only national park established before 1989 was in the Giant Mountains (1963). There were 20 protected nature areas. This type of protection covered 12 % of the country´s territory. Act No. 114/1992 Coll., on Nature Protection, was passed in 1992 to serve as a comprehensive regulation for nature and landscape protection, which has been amended a couple of times and supported by partial laws (e.g. Act No. 16/1997 Coll., on the Conditions for Exports and Imports of Endangered Species, or Act No. 115/2000 Coll., on Compensation for Damages Caused by Protected Species).

GENERAL LANDSCAPE PROTECTION

The Czech Republic is a relatively densely populated country with extensive linear infrastructure which divides the landscape into fragments and limits the natural species migration. Because of disturbed landscape infrastructure large parts of the territory are endangered by water erosion and are easily affected by floods (a limited retention capacity). A hot issue is the conflict of interests between the land required for the building of transport infrastructure and utility buildings and the effort to improve the landscape condition.

LANDSCAPE PROTECTION – PROTECTED AREAS

The summary of specially protected areas is provided in the following table:

Table 2.7

Specially protected areas as of 31 December 2004

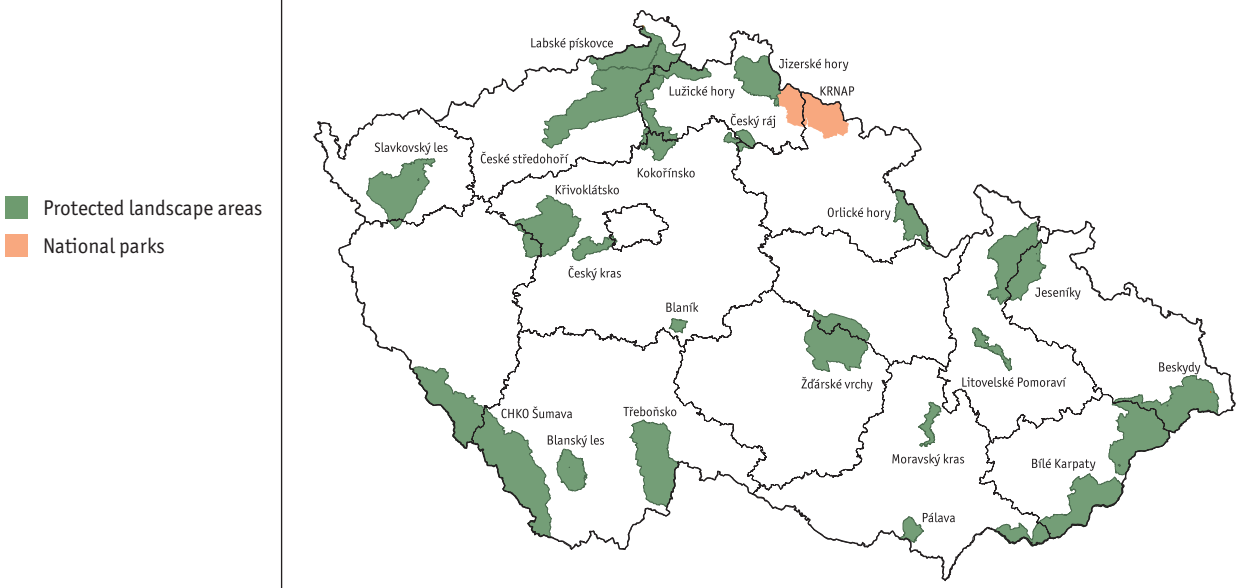
Category	National Parks	Protected Landscape Areas	National Natural Reserves	Natural Reserves	National Natural Monuments	Natural Monuments
Number	4	24	110	713	101	1 123
Area (thous. ha)	119,02	1 040,12	27,87	34,26	2,69	27,02
% of territory of the Czech Republic	1,51	13,19	0,35	0,43	0,03	0,34
Forest cover (%)	87	54	82	44	59	70

Source: Agency for Nature Conservation and Landscape Protection of the Czech Republic (ANCLP CR)

The actual locations and territory of protected areas are shown in the next pictures. The area of specially protected areas has increased by 30 % during the last 15 years.

Obr. 2.5

Large specially protected areas in 1990



Source: ANCLP CR, CENIA

As of 1 August 2005 Cesky les was proclaimed the twenty fifth protected landscape area.

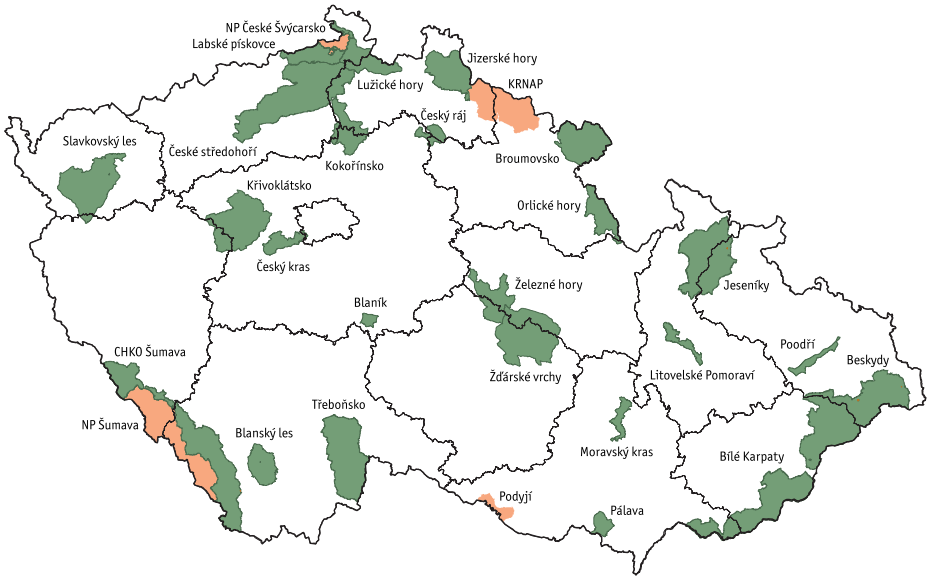
The percentage of specially protected areas in the Czech Republic (15.9 %) is slightly above the EU 15 average (12.1 %) and the OECD average (12.4 %). Three quarters of the existing national parks (Sumava, Podyji and Ceske Svycarsko) and 5 out of the 25 existing protected landscape areas (Broumovsko, Litovelske Pomoravi, Poodri, Zelezne hory and Cesky les) were proclaimed after 1989.

At the moment the Czech Republic is building a part of the European network of protected areas known as NATURA 2000. The parameters of protection were implemented into the Czech legal system by amended Act No. 114/1992 Coll. in 2004.

As far as the landscape protection is concerned, the Czech Republic is dealing with frequent conflicts of interests concerning economic and especially infrastructure development.

Large specially protected areas in 2005

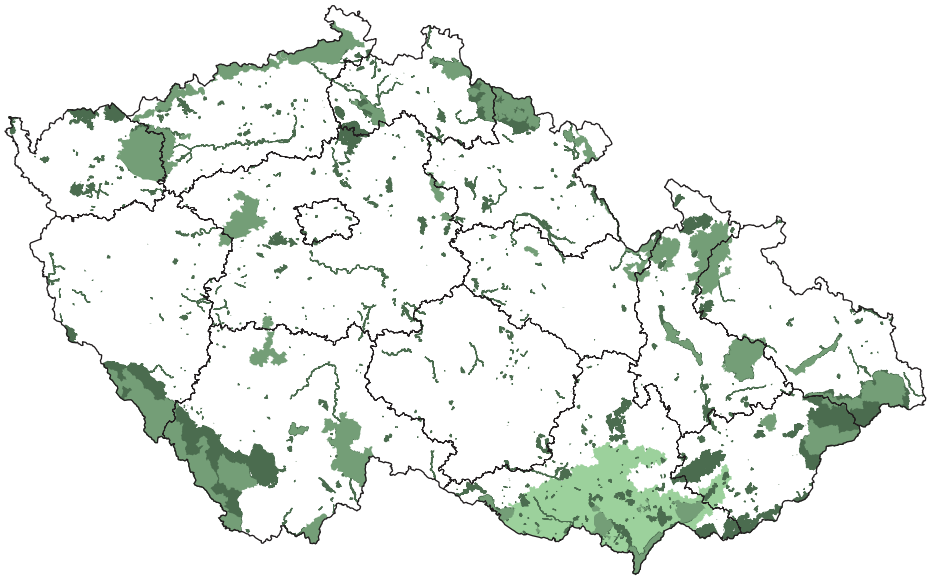
Fig. 2.6



Source: ANCLP CR, CENIA

NATURA 2000 in the Czech Republic

Fig. 2.7



Source: ANCLP CR, CENIA

NATURA 2000 system includes Pannonia areas (4.3 % of the CR territory), birds protection areas (8.8 %) and zones of European importance (9.2 %). The total of the specially protected areas including NATURA 2000 is about 18.6 % of the whole territory of the Czech Republic.

SPECIES PROTECTION

The list of endangered animal and plant species is provided in the following tables:

Table 2.8 **Specially protected animal species as of 31 December 2004**

Fauna	Mammals	Birds	Reptiles	Amphibians	Fish	Cyclostomata
Total number of species in CR	81	222 *)	11	21	59	2
Critically endangered species	8	35	3	9	4	2
Highly endangered species	12	58	5	7	3	0
Endangered species	10	30	1	4	10	0

*) nesting

Source: MoE

The above table shows that the level of danger for specially protected animal species ranges from 29 % (fish) to 95 % (amphibians), with the exception of Cyclostomata, and has changed very little over the past 15 years.

Tab. 2.9 **Specially protected plant species as of 31 December 2004**

Plants and fungi	Higher vascular	Bryophyte	Lichens	Fungi
Total number of species in CR	3 600	860	1 500	5–6 000
Critically endangered species	246	0	0	27
Highly endangered species	143	0	0	13
Endangered species	92	0	0	6

Source: MoE

The situation of specially protected plant species is evidently better and the percentage of endangered species in the worst group (higher vascular plants) is lower than 2 %.

The Czech Republic is dealing with quite frequent conflicts of interests between plant species protection and economic and infrastructure development.

A recent issue of species protection is the genetically modified organisms (GMO) which might threaten the natural biological safety if they spread without control, in other words they might disturb the balance among natural species. Regulations concerning GMO were passed in the late 1990s.

Waste

As far as waste management is concerned, there were illegal landfills, a lack of legislative interest in waste management issues and very little information about waste, its disposal and landfills in the Czech Republic before 1989. Waste disposal has changed significantly over the last 15 years. The first generation of legal regulations from 1991 contained a number of time-limited transformation elements (e.g. stricter rules of trans-border waste shipment, temporary unsecured landfills). In the early 1990s un-secure landfills were closed down (approximately 8,000 landfills) and new landfills were built, complying with the relevant environmental safety parameters and European regulations. At present the capacity of secured landfills is sufficient for decades. In 1997 a second generation of legal regulations was approved influenced especially by the OECD requirements and in compliance with the Basel Convention on trans-boundary shipment of hazardous waste, which brought a certain liberalisation of the waste movements (coloured lists of wastes according to their risk level) and termination of waste management programmes. During the Pre-Accession period a third generation of legal regulations was approved.

These regulations are in compliance with the EC requirements. The disposal of selected waste commodities was changed in a comprehensive manner (electrical scrap, wrecked cars, batteries and accumulators, sludge, etc.), packaging disposal and return of some products.

On one hand, waste disposal is closely related to environmental protection; on the other hand it is an industry with important turnover. Three generations of regulations show that to set parameters in this industry is very difficult, and this area has to be further developed including a detailed enumeration of the types and volume of produced waste. Decisions are based on information regarding the volume and movement of waste, however this information has not reached a sufficient level in the Czech Republic.

Waste production in the Czech Republic between 1998 and 2004 (t)

Table 2.10

Category	1998	1999	2000	2001	2002	2003	2004
Hazardous	3 399 468	2 380 171	2 603 337	2 785 128	1 289 912	1 194 619	1 424 022
Total	44 121 739	38 088 463	40 162 871	42 655 501	24 959 160	25 172 816	26 583 877

Source: CSO

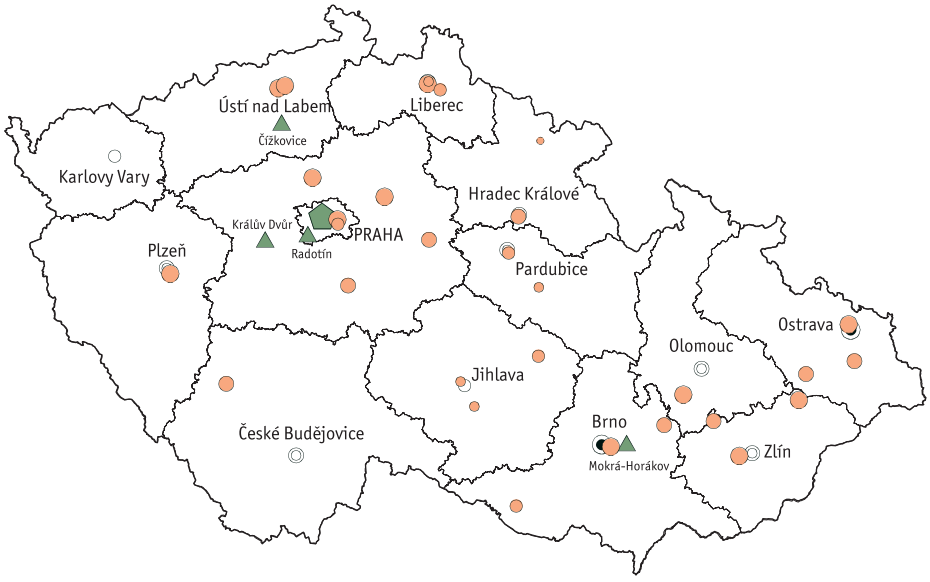
During the 1990s the production of hazardous waste decreased. The present volume of municipal waste is at 400–500 kg per capita/year, which is more or less the same as in other developed European countries. Waste monitoring was in the 1990s rather difficult.

Taking into account the waste disposal, the increased waste recycling and the use of waste as secondary raw material are very positive. At the moment there are 298 landfills, 33 of them with the possibility of depositing hazardous waste. The municipal waste is incinerated in three incineration plants (Prague, Brno and Liberec). The number of incineration plants for hazardous waste has been decreasing (67 in 2001,24 in 2004). The nominal capacity is about 160 thousand tons. The total amount of waste incinerated and used in the energy sector in 2004 was ca 9.1 % of municipal waste and 10.2 % of hazardous waste.

While the location of landfills is basically homogenous, there are many differences in incineration plants (see the picture below).

Location of incineration plants including cement works using waste in technology in 2004

Fig. 2.8



Source: CHMI, CENIA

Compared to most European countries, the percentage of waste deposited in landfills is still quite high in the Czech Republic. This is the main issue as a major part of the landfill waste is decomposable and produces methane emission (a green-house gas).

Old Environmental Burdens

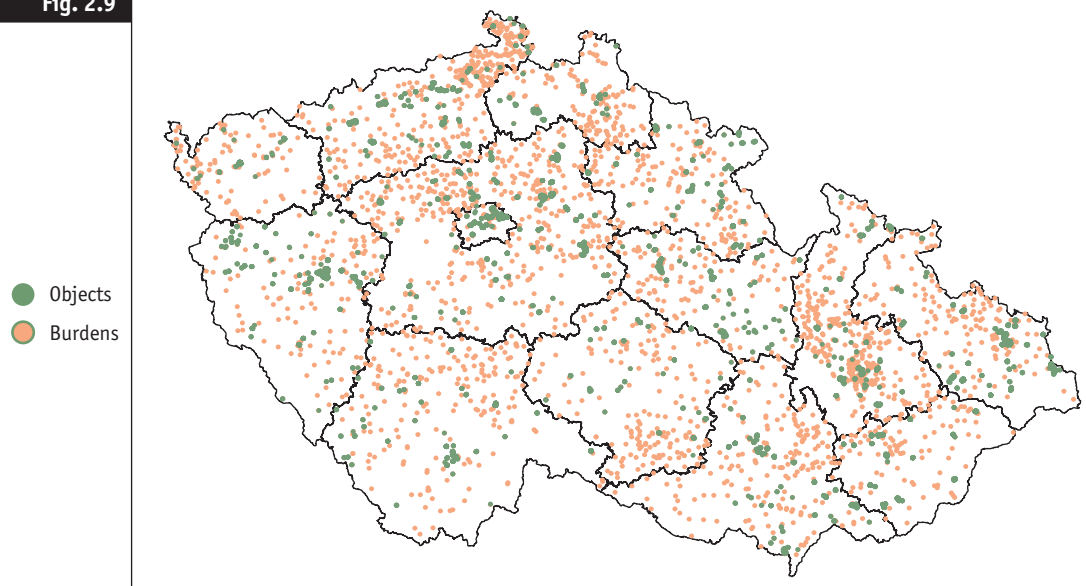
Polluted areas (soil and water) which are part of privatised industries are the greatest group affected by old environmental burdens. Their remediation is paid for especially by the National Property Fund. From 1994 to 2004, 269 environmental contracts were made between the Fund and new owners of privatized companies, with a total guarantee amounting to CZK 138 billion. Actual resources used for remediation were increased from about CZK 800 million in 1995 to CZK 2.6 billion in 2004 and amounted to almost CZK 24 billion as of 1 May 2005.

A specific issue are former Soviet military bases in the Czech Republic. Their remediation was supposed to be paid from the state budget and finished by 2012, and the total costs were estimated to amount CZK 1.5 billion. The remediation involves mainly disposal of oil products and unfired ammunition.

More attention has been paid to the reuse of brown fields, abandoned industrial zones, often inside cities.

Old environmental burdens in the Czech Republic

Fig. 2.9



Source: MoE, CENIA

Physical Fields

The problems of physical fields involve the impacts of radiation (including radon), noise, non-ionizing radiation and electric and magnetic fields on human health and nature.

RADIOACTIVE RADIATION

Radioactive radiation of anthropogenic origin has not caused any major problems over the last 15 years as there has been no radioactive leak in the Czech Republic or in any neighbouring country.

NON-IONIZING RADIATION

Non-ionizing radiation or magnetic fields have not been viewed as a major issue in the Czech Republic. The exposure to radiation from cell phones (mobiles) is subject to scientific research. Specific issues are high voltage and very high voltage lines above residential areas which might negatively influence people's health.

RADON RISK

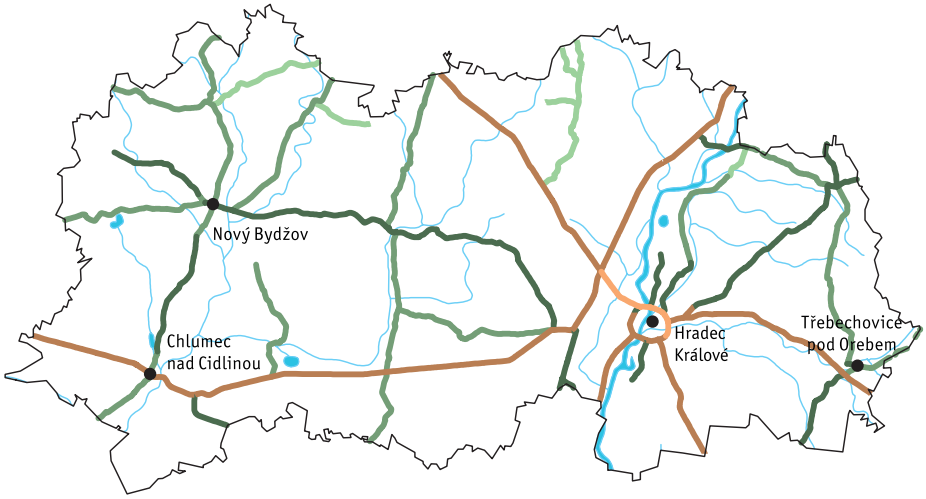
Radon risk was viewed as a major environmental problem in the 1990s, so the so-called Radon Programme was implemented. It was aimed at searching objects with a higher volume of radon and their products (buildings and drinking water sources). Anti-radon measures were adopted in these objects and water sources. From 1991 to 2004 more than 4,220 of anti-radon measures were taken amounting to state aid of CZK 1.26 billion.

NOISE POLLUTION

Noise pollution is a significant problem from the long-term point of view, especially in cities. Although this issue has been discussed in the EU for a long time, in the Czech Republic it was not a priority between 1990 and 1998 as the country had to deal with air and water pollution and waste disposal. Legal regulations for the noise pollution levels were passed in the Pre-Accession period, and regulations concerning noise pollution have been prepared since 2004.

Noise Map – Hradec Kralove district 2000 – example

Fig. 2.10



Source: CENIA

The above figure shows that the noise pollution concerns a significant part of the population in Hradec Kralove district. According to the measuring and calculations done so far it can be expected that people in many other cities and locations close to busy communications and traffic junctions (roads, airports) are affected in the same way. Therefore the noise pollution must be considered as topical issue.

Environmental Protection – Safety of Production Operations – Integrated Permitting

Environmental protection is closely related to economic activities and the disposal of hazardous substances of all kinds. The main objective is health protection.

Once the most pressing problems were solved during the 1990s, more attention was focused on important issues which were not among priorities during the first period – this concerned mainly the management of chemicals, GMO and accident prevention. Historically, the Czech Republic has had certain rules of operational safety, emergency plans, etc. (with the exception of GMO) and these issues were handled in a certain way, also from the environmental point of view.

Legal regulations regarding the management of chemical substances and the prevention of industrial accidents were prepared with respect to accession to the OECD and the EU. The disposal of chemicals was covered by legislation in 1998. At the turn of the Pre-Accession and European periods new regulations were passed. The law of industrial accidents prevention was adopted in 1999. The requirements of new regulations are gradually implemented. A law from 2000 stipulated rules for GMO, and a new law was prepared in 2004.

The process of integrated permitting implemented a new (integrated) approach to handling environmental impacts of economic activities. This process is significant for the regulation of the largest pollution sources.

Directive 96/61/EC on integrated pollution prevention and control (IPPC) is one of the most important but also most difficult EC regulations on the environment to interpret. Some interpretations put emphasis on an integrated (comprehensive) approach to pollution control, other interpretations prefer the implementation of the best available techniques (BAT). A very important part of the integrated control is flexibility, in other words the possibility to define individual requirements of facilities with respect to the local environment. The directive provides for individual emission limit values, e.g. air or water pollution. IPPC is also important in waste prevention, or the economical use of raw materials and energies as binding operating conditions given in the integrated permitting can also specify requirements of this kind.

About 1500 installations fall within the IPPC process in the Czech Republic. Category 6 (other installations) is represented the most, category 3 (mineral processing) the least.

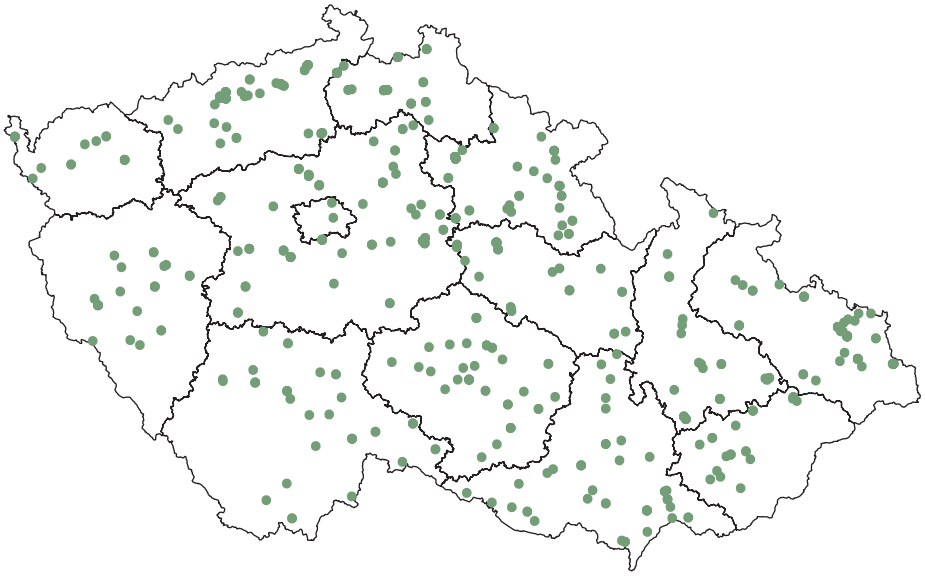
At present (30th June 2005) the most integrated permits are issued for category 6 (other installations), especially for slaughterhouses, milk treatment and processing, poultry and pig breeding, and surfacing. On the contrary industrial companies for cellulose production, pre-treatment and dyeing of fabrics or textiles and for leather and pelt tanning have not joined the IPPC process.

The biggest share of permitted installations in the total number of installations in a given category is in category 5 (waste management) and in category 3 (mineral processing).

The Act No. 76/2002 Coll., Annex 1, states 6 categories of installations, which can operate only with an integrated permit from the end of 2007 onwards.

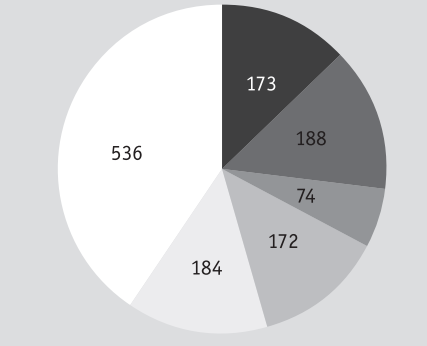
Fig. 2.11

Facilities authorized in accordance with IPPC (as of 30 June 2005):



Source: CENIA

Total number of IPPC installations (according to categories)



Other installations (Industrial wood processing, slaughterhouses, milk treatment and processing, poultry and pig breeding, surfacing)
Waste management
Chemical industry
Mineral processing
Production and processing of metals
Energy sector

15 Years Later ...

An evaluation and assessment of the environment in Czech Republic between 1990 and 2004 shows the following:

At the end of 1980s the environment of today's Czech Republic belonged to the worst in Europe and in some indicators the worst in the world. The north-west of the country together with nearby Saxony and Poland was called the Black Triangle. The communist regime did not publish any environmental information and the situation was considered more disastrous than it actually was. After the changes in 1989 a major priority was to achieve a better environment.

During the Founding Period (1989–1992) new regulations were passed quickly and new institutions to support environmental protection were established. The country also experienced economic transformation which resulted in lower emissions released into the air and water, reflecting more or less the lower economic performance expressed as the GDP.

During the Implementation Period (1993–1998) the effects of new legislation became visible and the country experienced so-called decoupling (separation of GDP which was growing again and pollution, which was decreasing). The Implementation Period finished with the improvement of all environmental elements which might have been improved over such a short period of time. Basic environmental indicators did not show any big differences from the EU 15 or OECD averages and became comparable.

The dynamics of positive changes compared to neighbouring countries are unique, some indicators improved by more than one order (e.g. emissions of dust into the air). The amount of funds invested into the environment is unique, too. Over the whole Implementation Period this sum was at 2 % of GDP and the total environmental costs reached more than EUR 10 billion between 1990 and 1998.

The dynamics of the changes were substantially slower in the Pre-Accession and European periods (1999–2004) and the environment was mostly stabilised. The changes were slower as everything that was technically and economically plausible in the short ten-year period had been done and further positive changes were either extremely expensive (cost curves of most measures show that the specific effect towards a unit of invested funds is decreasing) or impracticable in a short period of time (e.g. much better condition of the forests).

The current state of the Environment of the Czech Republic is still not satisfactory.

Recent analyses show exceeded target limit values for the protection of human health and vegetation regarding tropospheric ozone and limit values for human health protection for PM_{10}. This is not a specific Czech problem, many European countries are affected in this way, too. Other major problems are the high percentage of soil endangered by erosion, forest degradation, unsatisfactory forest condition and a high number of endangered species.

In the years to come we can expect lower pollution decreased by active measures aimed at air protection and natural evolution (car pool enhancement and technology updates). We can also expect increased qualities of surface and ground water due to implemented active measures and natural evolution (building and rebuilding of sewage water treatment plants, technology updates, implementation of good agricultural practices, eco-agriculture) and positive changes in waste management (leading to waste minimisation). Provided there are no unexpected natural disasters at global, European or national levels and the relevant legal regulations are amended and implemented, the quality of the environment in the Czech Republic will be gradually improved – with possible ups and downs caused by sudden or inappropriate interventions.

The integrated pollution prevention and control can be, and often really is, an effective regulation tool for the protection of the environmental elements, especially air and water.

Concerning air protection, the key provision of the directive seems to be flexibility as to the definition of emission limit values and other conditions of operating a specific large pollution source (in the meaning of Directive 96/61/EC and Act No.76/2002 Coll., on integrated prevention these sources are called installations) with respect to the local situation. It is not an accident that Directive 96/61/EC on IPPC was approved along with Directive 96/62/EC –Framework Directive on Air, implementing the concept of binding and time specified ambient air limit values. If it were not for a certain flexibility within IPPC, all regulated stationary pollution sources might observe specific emission limit values and other legal requirements, but the air quality limit values would be exceeded in their surroundings. This can be solved by more stringent generally binding emission limit values for a given category of pollution sources; on the other hand, this solution might require big investment not justified by a relevant emission reduction (actually only one or very few pollution sources may be concerned but the global reduction of emission limit values would cover all sources of a given category). The IPPC permit allows for the setting of conditions of a specific source within the specific emission limit values, customized to the local air quality, and therefore it requires an investment only if it is reasonable. The same method can be applied for the emission reduction where the objective is to decrease certain emission threshold levels. The emissions of some sources can be decreased relatively cheaply (e.g. by more efficient desulphurisation plants) and reflected in the conditions of integrated permits. The BAT concept controls aspects so that the requirements of a given source are not too benevolent or strict (i.e. technically or financially unrealistic).

A similar method can be applied in water protection where the requirements of waste water treatment can be customized with respect to the recipient watercourse.