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REPORT ON THE STATE OF WATER MANAGEMENT IN THE CZECH REPUBLIC

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by December 31, 2003

■ Ministry of Agriculture
■ Ministry of the Environment

Dear readers,

This is now the seventh year when you have received the "Report on the State of Water Management in the Czech Republic", called the Blue Report for short, which records, amongst other things, the many measures implemented after new and, from the aspect of water management, crucial legal regulations came into force.

This publication follows on from similar material prepared for the years 1997 to 2002, which the Ministry of Agriculture publishes every year. It is summarised information material concerning all the areas of activities in water management for the year 2003, and it contains, in particular, a description of the state in the main indicators complemented by development trends in selected areas. The report appraises the overall amount of water and quantifies its most important factors in the area of rainfall, outflow conditions and the groundwater regime. Following on from previous years, it covers outputs of the water management balance, administration of watercourses, measures to lessen the negative impacts of hydrological phenomena, the area of public water supply and sewerage systems, sources of water pollution, the protection of water and financial support for investments in water management and improvement in the state of the countryside. The following parts of the report focus on new legislative measures, international relations, fisheries and fishpond management, and research and development in water management, and in a separate chapter, there is an evaluation of the performance of the requirements of European Community legislation.

One area where expansion has been required since last year is the field of water management planning, which is given a separate chapter as a result of the initiation of the complex process of planning in the field of water. As a result of the accession of the Czech Republic to the European Union, planning in the field of water will be the main instrument for applying water policy in order to improve water protection from the aspect of quantity and quality, for supporting sustainable use of water, for resolving problems in cross-border waters, for the protection of aquatic and related non-aquatic ecosystems and wetlands and for protection from floods and other harmful effects of water.

Introduction

As in 2002, 2003 did not follow the long-term norm in terms of the amount of rainfall. But in contrast with 2002, 2003 was distinguished by the opposite extreme – the period had below-normal rainfall. The results and conclusions arising from an analysis of the drought on the territory of the Czech Republic in 2003 show that there was both a meteorological and soil drought on the territory of the Czech Republic. For these reasons, this area was given special importance.

A significant part of the report concentrates on the project Evaluation of Catastrophic Floods in August 2002, which was processed under the direction of the Ministry of the Environment and was discussed by the government in 2003. This evaluation is reported in its entirety in a separate appendix which you will find on the CD enclosed with this report.

There is detailed data on the supply of drinking water from water supply systems for the public needs and about the removal and treatment of municipal waste water in the material "Water supply systems and sewerage systems in the Czech Republic 2003" prepared by the Ministry of Agriculture in June 2004. There is more detailed information about the quality of surface water and groundwater, sources of pollution and water protection measures in the "Report on the state of protection of water from pollution," prepared by the Ministry of the Environment.

I hope that this year's publication will serve not only water management professionals, but that it will satisfy the common demand of the general public for water management information.

Mr. Jaroslav Palas
Minister of Agriculture of the Czech Republic

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River Elbe at Špindlerův Mlýn - Elbe river basin

1.

STATE OF SURFACE WATER AND GROUNDWATER

1.1 Hydrological balance

The year 2003 was extremely below normal for the territory of the Czech Republic in terms of rainfall, and for the territory it was the driest in the last 30 years.

The average total rainfall on our entire territory reached only 507 mm, which represents 76 % of the rainfall standard. When comparing the preceding wet year, on average 357 mm less of rainfall fell on the territory of the republic this year, and it was thus a full 54 % of the rainfall standard drier. The average rainfall in Bohemia (487 mm) was even 27 % less than the long-term average. In Moravia and Silesia, the situation was somewhat better, and the annual total of 547 mm corresponds to 83 % of the standard. In view of this, the year 2003 was the second driest year over the preceding 32 years in this part of the republic after 1973, when on average 11 mm less fell.

In the calendar year 2003, a total of 11 900 million m³ of surface water flowed out from the territory of the Czech Republic. This year, in most of the republic's basins, the outflow was below normal, and it can be characterised as a dry year.

The hydrological drought from June to October was the most significant phenomenon of the year. The average annual outflows generally reached 65 to 85 % of Q_a. The basins of the Odra and Bečva had the least water (53 and 55 %), and the basin with the most water in relative terms was that of the Berounka with 101 % Q_a.

The first quarter of the year had significant water. The higher outflows were maintained by the flood situation at the end of January and, to a lesser extent, in March. After initial fluctuations, levels dropped for the entire quarter with only transitory increases in March. At the end of the period, average or above average water levels were maintained only in the basins of the Orlice, Jizera, Otava, Berounka, lower Vltava and Elbe. In the basin of the Odra and the Morava, flows were below average.

In the second quarter, the downward trend continued. Most rivers had flows at the level of 45 to 82 % of Q_m. There was a quite clear trend towards a hydrological drought in the month of June, when monthly average flows reached only 40 to 60 % of Q_m.

In the third quarter, the downward trend continued with no greater fluctuations until mid September, when it started to very slowly bottom out. The greatest relative deterio-

Table 1.1.1 Renewable sources of water in years 1994–2003 in millions of m³

Item	Annual values									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Rainfall	52 287	61 514	54 890	57 809	56 153	49 291	54 733	63 960	71 298	40 695
Evapotranspiration	37 683	43 950	37 461	39 859	42 750	35 381	40 353	48 537	48 533	29 319
Annual inflow 1)	553	645	825	653	541	550	573	761	1 341	524
Annual outflow 2)	15 157	18 209	18 254	18 603	13 944	14 460	14 953	16 184	24 106	11 900
Sources of surface water 3)	4 247	5 840	7 086	6 200	4 825	4 875	4 789	6 600	6,506	3 758
Usable sources of groundwater	1 140	1 400	1 380	1 430	1 330	1 390	1 204	1 440	1 625	1 195 4)

Source: CHMI
1) Annual inflow on territory of Czech Republic from neighbouring states
2) Annual outflow from territory of Czech Republic
3) Designated as flow in main basins with 95% securing
4) A qualified estimate, it will be realistically possible to make it more accurate in the 2nd half of 2004

Římov water reservoir - Vltava river basin ration of the situation occurred in this period in the basin of the Orlice, where there was a drop from 49 % to 24 % of Q_m, and in the basin of the Sázava from 79 % to 24 % Q_m. Average monthly flows at the end of the period were generally 20 % to 45 % Q_m, in the basin of the Lužnice they were only 12 % Q_m, and in the basin of the Bečva, 17 % Q_m.

At the start of the fourth quarter, a significant number of rivers still had low water levels. The significant rainfall on 6th and 8th October (in southern Bohemia, in the Giant Mountains and in Beskydy) caused increases in levels which in individual cases lead to flood states. The average monthly flows in November and December fluctuated between 40 to 60 % Q_m.

One badly affected region was southern Bohemia (to be more precise, the basin of the Otava and Lužnice) and the region of the north east of the republic (in extreme, the basins of the Orlice, Stěnava and upper Morava). In the basin of the Otava, in three profiles of actual flow (Sušice, Katovice, Písek) and in the Skalice, the lowest flows since monitoring began were recorded. From the aspect of the possibility of repeat, the significance of the drought in these areas was evaluated as a fifty-year drought. There was only a slightly less serious situation in the basin of the Lužnice and Studená Vltava. The extreme nature of the phenomenon was evaluated as a twenty-five-year drought. The lowest levels over the period of monitoring were reached in the basin of the upper Morava. In the basin of the Desná, the second lowest state was recorded, and in the basin of the upper Odra in Odry, levels were achieved in mid August which were comparable with the values in the years 1951, 1952, 1962 and 1973. In addition, in Krnov in the Opavice, the second lowest state was recorded (only 1994 was drier). The probability of the repeat of drought in other rivers, in particular in the south west and south east of the republic, did not exceed the regular 2 to 10 years.

Kamenička water reservoir - Ohře river basin

The hydrological drought for the year 2003 can be evaluated as a republic-wide matter. Rivers in southern and south-east Bohemia had extremely small flows, as did small rivers in the west of the country. The rivers in northern Moravia originating in the Jeseníky area were affected in a similar manner.

For the evaluation of the amount of groundwater, data was used which was measured in the objects of the monitoring network for groundwater, in particular in objects of the reporting network, which contains 110 springs and 165 wells. 2003 was distinguished by low levels of groundwater, and in some parts of the republic there was a shortage in spite of the fact that the situation was relatively good at the start of the year.

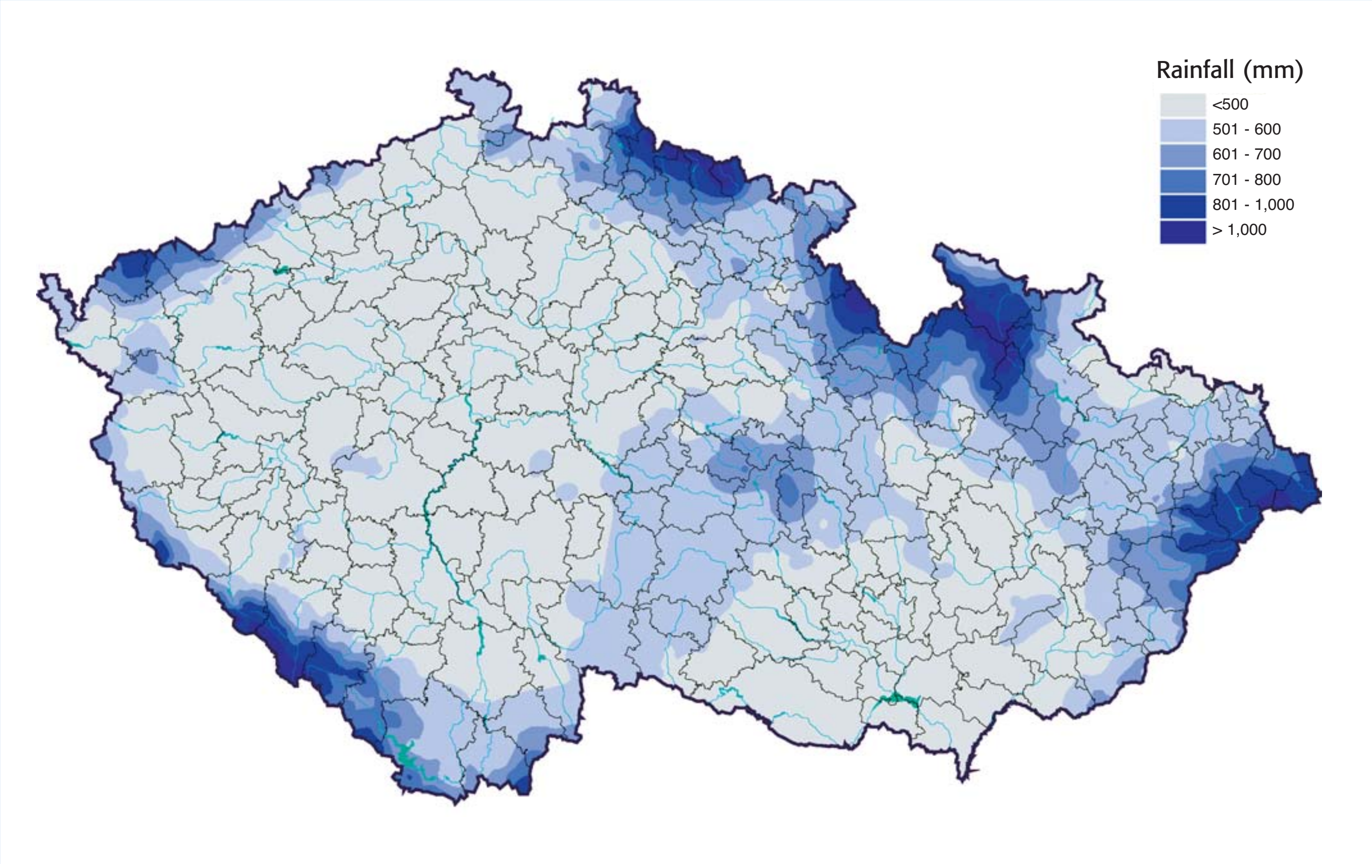
The above average rainfall in the second half of the year 2003 filled up the amount of groundwater on most of the territory above the long-term average, and in riverine zones in particular the levels of groundwater were significantly higher. In virtually all monitored objects, in November 2002 the measured values exceeded the long-term averages. After an insignificant drop in December, the levels in most wells in riverine zones increased in January to a level which was the highest in 2003, and the yield of springs also displayed corresponding results.

The subsequent drop in spring yield and in levels of groundwater had a more lasting character. It was only interrupted for a short period and generally not significantly by the March thaw. The above average rainfall totals in places in May only had a small and, moreover, local influence, because vegetation at this time prevented it soaking into the ground. And so the May rainfall did not change the overall downward trend, but only slowed it.

In May and June the level of groundwater and yield of springs was below the level of long-term averages, and the drop continued. In Moravia, this situation lasted until September, and in Bohemia, on most territory, until October and November. On the territory of Moravia, in October 2003, the situation improved slightly. In the other months, the yield of springs on the entire territory of the republic tended to stagnate, and neither did the levels of wells in the Odra basin display significant fluctuations. A slight increase in levels was recorded in the basin of the Morava and the Dyje; in Bohemia there was a slight improvement in December.

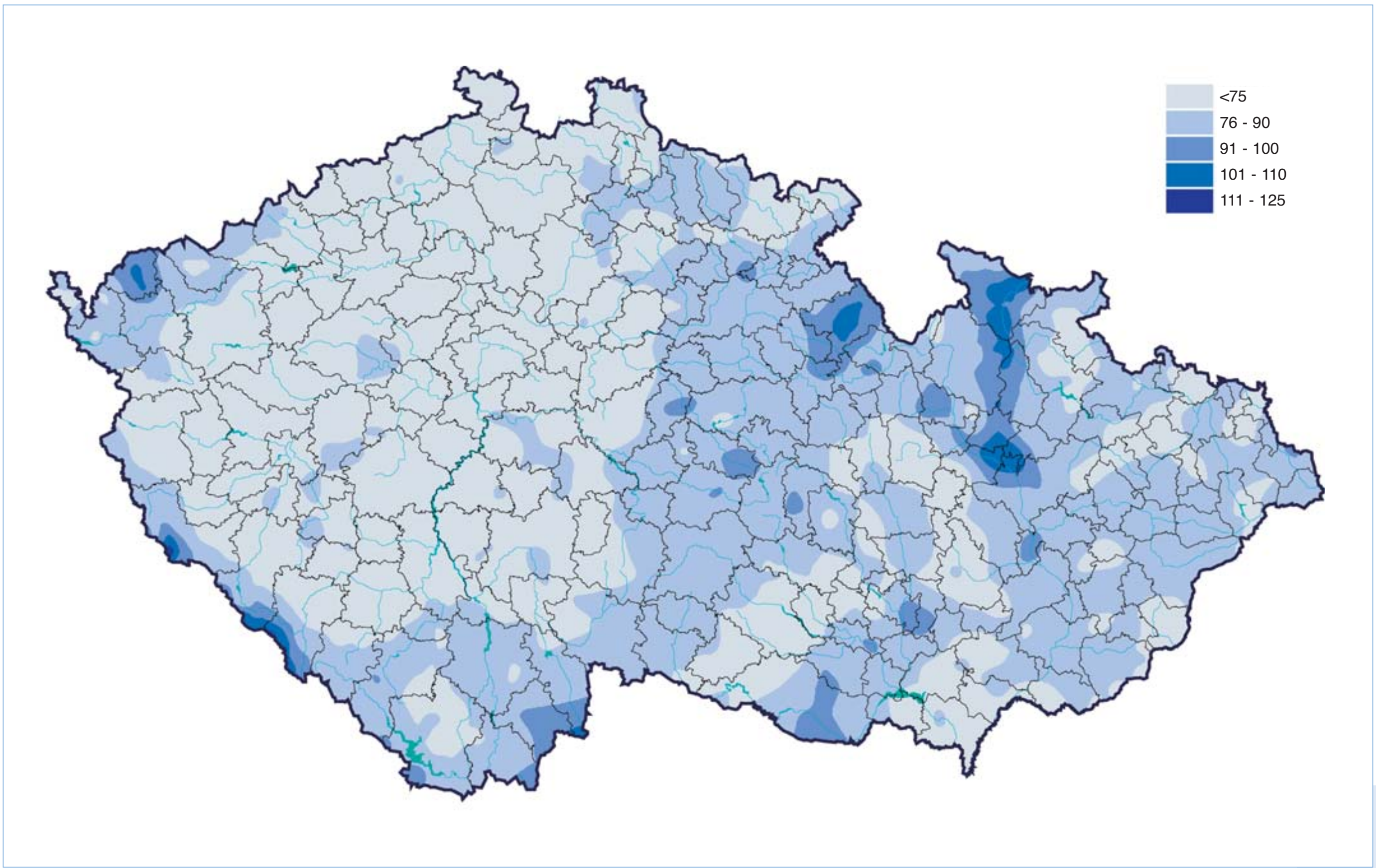
The addition to groundwater in the course of the year was insufficient, and, moreover, differences were expressed in different areas,

Figure 1.1.1 Total rainfall in the Czech Republic in 2003 in millimeters



Source: CHMI

Figure 1.1.2 Total rainfall in the Czech Republic in 2003 in % of average 1961-1990



Source: CHMI

which was caused by the differing properties of hydrogeological structures and thus also the differing initial state. The uneven distribution of rainfall in three locations differing in terms of surface area also had an influence: southern and south-western Bohemia, northern and north-eastern Bohemia and Moravia, with the exception of the riverine zones in the basin of the Dyje.

The initial state of reserves of groundwater in riverine zones was significantly higher than in the area outside these zones, but the stocks in these zones dropped faster. The decrease in stocks of groundwater was expressed most markedly in southern and south-western Bohemia. There was also a difference between the regime of levels of groundwater and yield of springs. In basin structures such as the Czech Chalk Basin and the Southern-Bohemia Basin (Třeboňská and Budějovická), reserves of water fell below the long-term average in July or August, and the subsequent slight drop did not represent a significant change. In contrast with this, in territories with shallow fissure circulation, reserves of groundwater were emptied far faster, which was expressed by a faster drop in the levels in wells and drop in the yield of springs.

The period with an insufficient addition of groundwater in 2003 followed a period when the levels of groundwater and yield of springs as an expression of the size of reserves were higher or significantly higher than the long-term average. More significant expressions of the shortage of groundwater were given primarily by local conditions. In terms of the annual average, neither the levels in wells nor the yield of springs fell below the level of 1990 to 1993. And so it is not possible to consider the year 2003 to be extremely dry from the aspect of groundwater.

1.2 Quality of surface water

In general it is possible to state that in the long-term context, the quality of surface water in watercourses has improved significantly, which also applies for developments in the year 2003.

For evaluating pollution, the classification of quality of surface water according to CTS 75 7221 was used, data is taken from the state network monitoring the quality of surface water operated by the Czech Hydrometeorological Institute (referred to hereinafter as the „CHMI“). Data for the pairs of years 1991 – 1992 and 2002 – 2003 was evaluated using basic classification, this means by a joint evaluation of six indicators – BCO_5, $CHCO_{Cr}$, $N\text{-}NH_4$, $N\text{-}NO_3$, P_{total} and the saprobic index of macrozoobenthos.

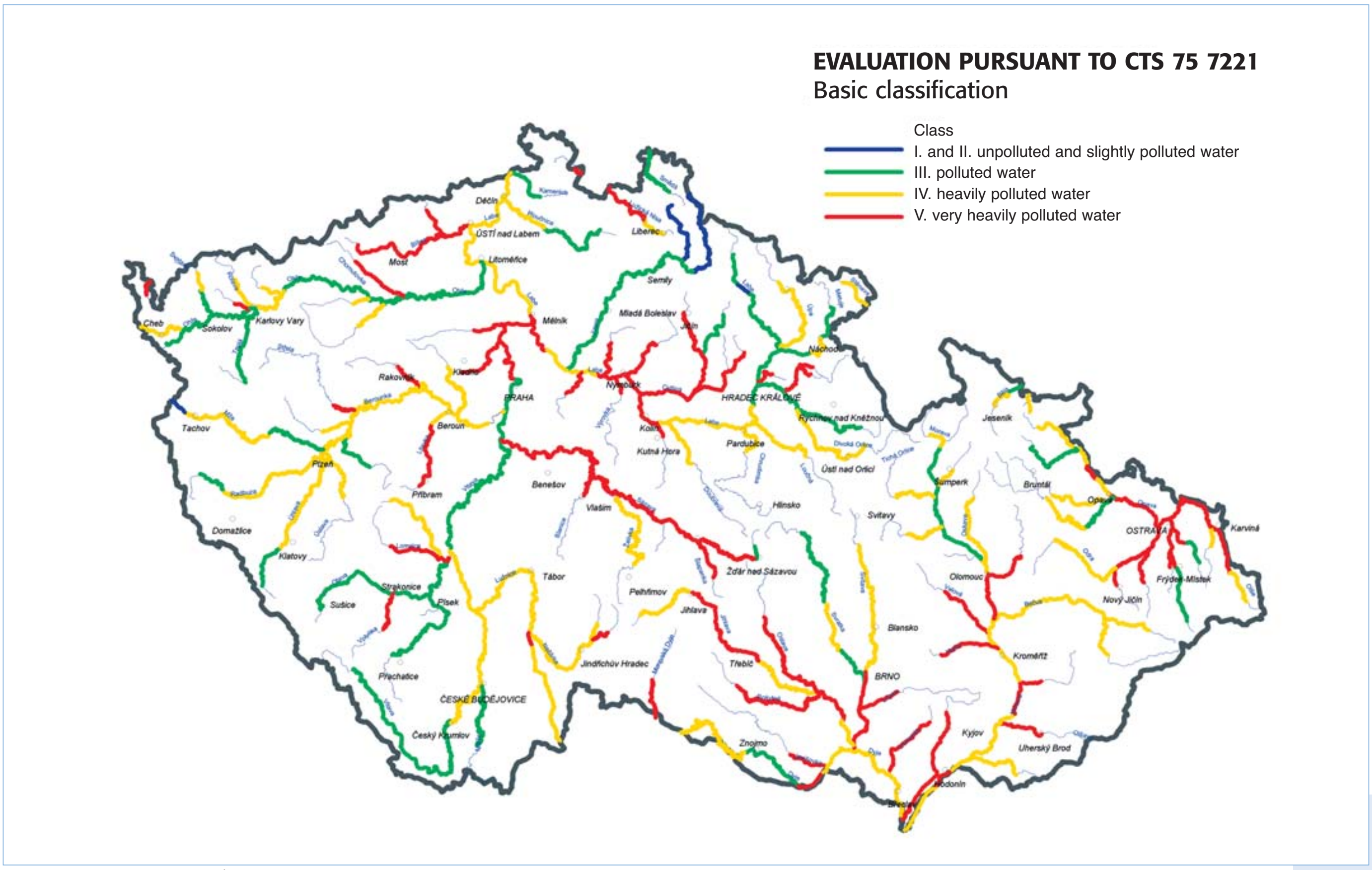
The share of the number of monitored profiles in watercourses in which unfavourable classes of water quality V and IV were detected dropped significantly.

Since 1991, V class water (very heavily polluted) has been eliminated on both the main rivers (the Elbe, Vltava, Morava and Odra) and on most of their significant tributaries. In the pair of years 2002-2003, the main rivers referred to generally achieved III class, with the exception of the Odra below Jičínka, the section of the Vltava below Prague and the Morava before the state border. In the smaller rivers, class V water pollution became class IV (Cidlina, Chomutovka, Lužická Nisa, Lomnice, Litavka, Rokytná, Oslava, Valová and others), or even class III (sections of the Sázava, sections of the Olše, Střela, Volyňka, Šlapanka, Klejnarka, Ostravice and others).

The long-term improvement in water quality was primarily the result of the construction or intensification of decisive waste water treatment plants, and the halting or the restriction in production of many industrial plants and reduction in the use of fertilisers in agriculture.

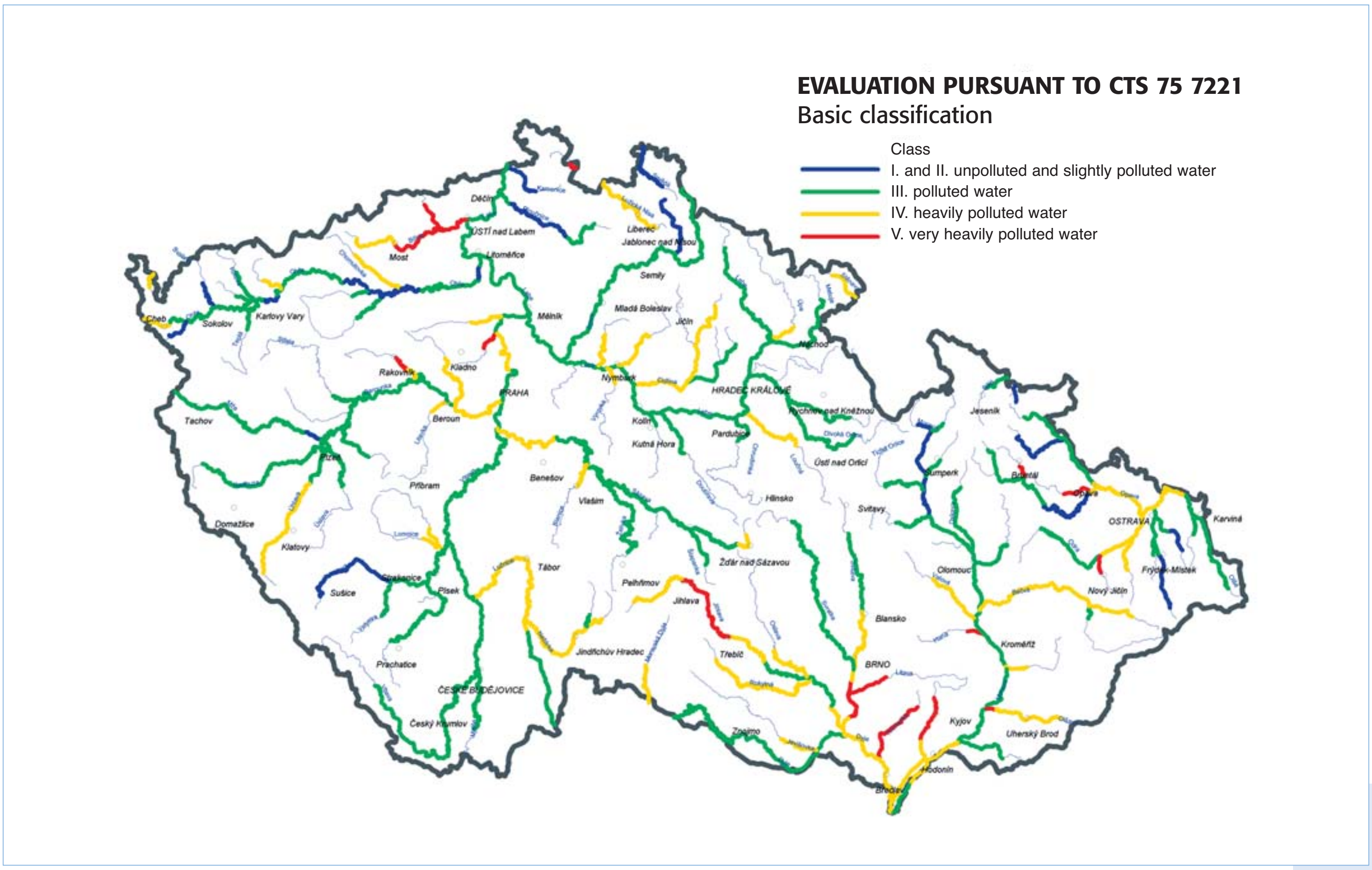
Despite the improvement achieved, the current situation cannot be regarded as satisfactory; the sections of rivers with lower

Figure 1.2.1 Quality of water in watercourses of the Czech Republic 1991-1992



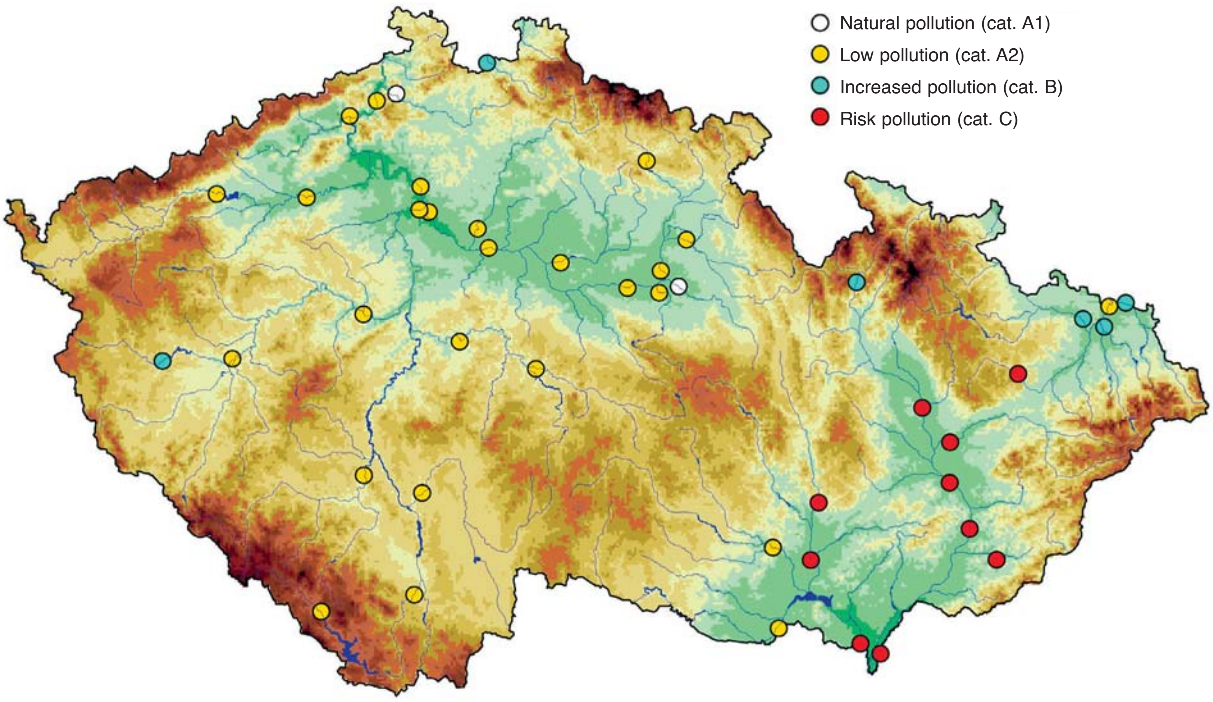
Source: WMRI T.G.M. from data of CHMI

Figure 1.2.2 Quality of water in watercourses of the Czech Republic 2002-2003



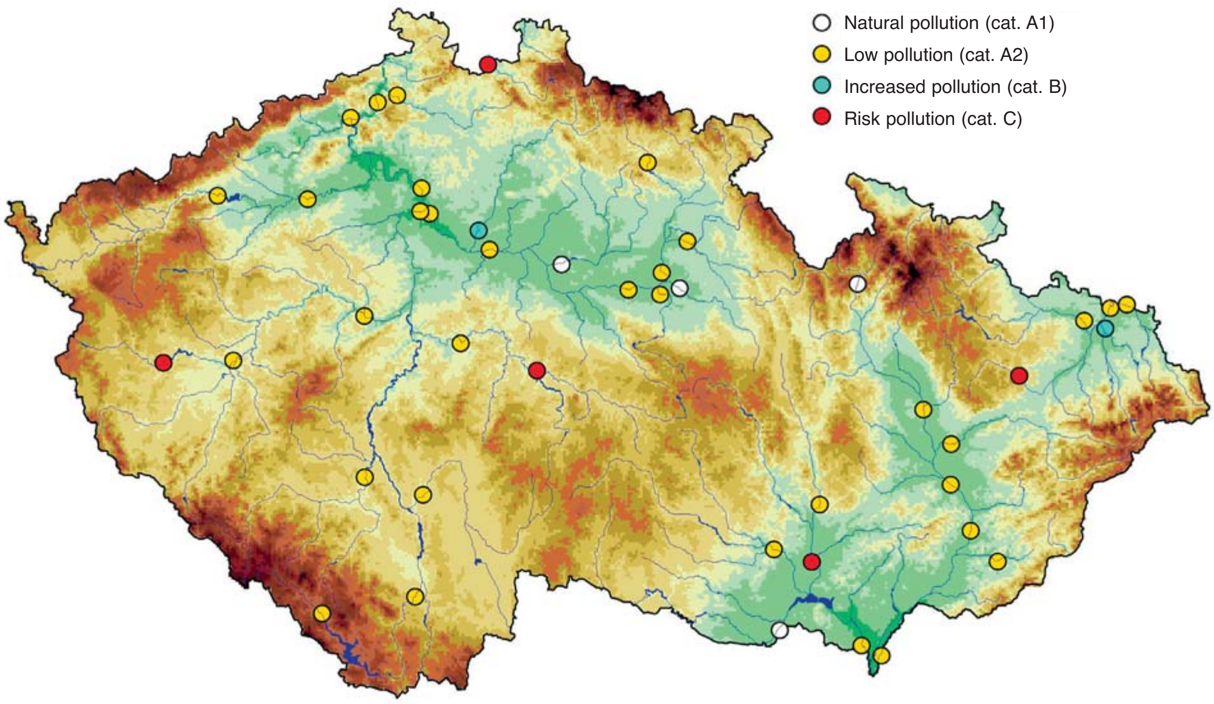
Source: WMRI T.G.M. from data of CHMI

Figure 1.2.3 Nickle pollution in water in 2003



Source: CHMI

Figure 1.2.4 Leed pollution in water 2003



Source: CHMI

volumes of water and a higher concentration of pollution sources are particularly problematic. The worst water quality was recorded in the Bílina; this small river was principally affected by the industrial sources of Chemopetrol, Inc., Litvínov and Spolek pro chemickou a hutní výrobu, Inc., Ústí nad Labem (Spolchemie). In the future, it is possible to anticipate an improvement in water quality in the Bílina in the section before it flows into the Elbe, because in the 4th quarter of 2002 the waste water from the Spolek pro chemickou a hutní výrobu was connected to the municipal waste water treatment plant (referred to hereinafter as the "WWTP") in Ústí nad Labem. Other rivers in which very heavy water pollution has been identified are: Rakovnický stream, Zákolanský stream (tributary of Vltava below Prague), Bystřice (tributary of Bílina), Jičínka, Mandava, Černý stream (Karlovec), Hvozdnice, Haná, Olšava, Litava, Svratka (section below Brno), Jihlava (upper section), Kyjovka and Trkmanka. It is necessary to continue giving exceptional attention to these rivers and their basins. For some polluted rivers, such as the Mandava, which crosses the border with Federal Republic of Germany (referred to hereinafter as the „FRG") several times, in compliance with EU regulations it is necessary to deepen cross-border cooperation in the field of planning and implementation of water protection measures.

In the attempt to achieve a good ecological state of surface water, at present the target requirements for chemical state (quality of surface water) are being tightened up. It is necessary to adapt both the method of evaluation of state and the comprehensive protective measures to this common European goal – attaining a good ecological state.

Šance water reservoir - Odra river basin

Microbial pollution of watercourses is a significant factor, in particular in the preparation of surface water for drinking water and the use of surface water for swimming. An evaluation of the relevant indicators in the profiles of the state network indicate that the microbial pollution of rivers in the Czech Republic is high; it comes primarily from communal sources of pollution. The vast majority of rivers (with the exception of reservoirs) are considered unsuitable for swimming.

In cooperation with the Ministry of the Environment (referred to hereinafter as the „MoE"), the Ministry of Health (referred to hereinafter as the „MoH") has issued decree No. 159/2003 Coll., which designates the surface water used for swimming; these are mostly localities in reservoirs and recreational fishponds. If the surface water in these localities does not correspond to the requirements for the quality of water for swimming, the relevant measures will be taken for improvements, and the flow of information about these localities is ensured for the system of public administration.

In 2003, the quality goals for concentration of selected dangerous substances in surface water which are given in EU Council Directive concerning dangerous substances were achieved in our rivers.

Now it is necessary to identify further realistic target values which it is necessary to achieve in surface water and thus also identify the commensurate criteria for the evaluation of the chemical state of surface water. The Czech Republic ensures the gradual regulation of polluted surface water by means of emission standards and criteria for surface water – emission standards designated in government order No. 61/2003 Coll. Pollution of surface water by dangerous substances is becoming all the more important as the danger of these substances is gradually ascertained and the contaminated localities are identified.

The pollution is characterised by the summary indicator AOX (Adsobable Organic Halogens), which primarily includes more volatile chlorinated substances; it is typical for industrial agglomerations. It is at the highest level in the Bílina at its discharge into the Elbe, the Olše and the Ostravice.

Amongst the other rivers polluted by these substances, it is necessary to name the Divoká Orlice, contaminated by tricholoroethane (contamination from local industry).

On average, in the year 2002, the concentration of hexachlorobenzene in the Bílina in the Ústí nad Labem profile exceeded the EU quality goal (30 ng.l^{-1}); in 2003, it was reduced as a result of the connection of the waste water system of the Spolek pro chemickou a hutní výrobu, Inc. (Spolchemie) to the WWTP in Ústí nad Labem.

Polychlorobiphenyls (PCB) and dichlorodiphenyltrichloroethane (DDT) come from the earlier environmental burden. PCBs are a problem for the Elbe below Pardubice and also for the Olšava (Uherský Brod) and Morava according to earlier identifications. DDT contamination at the point where the Bílina flows into the Elbe is caused by polluted soil in the complex of Spolchemie in Ústí nad Labem.

Pollution by polyaromatic hydrocarbons (PAH), the most important of which are considered to be fluoranthene and benzo(a)pyrene, comes from the extraction of coal, the coking industry and certain production processes, for example, the creosoting of wood (sleepers, posts). The most serious pollution by these substances was ascertained in the Úhlava and Jizeřa (water management collections) and in the Odra before the state border.

In recent years, the content of mercury in the Bílina, which in the past was wholly unsatisfactory in the lower section, has been reduced significantly – by two orders of magnitude – as a result of the implementation of measures in Spolchemie; in 2003, satisfactory results were achieved. Increased concentrations of cadmium were ascertained in the Ostrava area in the Olše and the Odra; they primarily come from industrial emissions of the Ostrava agglomeration. In the Litavce, cadmium pollution comes from old burden and mine water and from the manufacture of non-ferrous metals. Increased concentrations of lead were ascertained in the Svatava in Sokolov, the Litavka (mills manufacturing non-ferrous metals, old burden, mine water), the Nise below Jablonec nad Nisou (as a result of industrial emissions), where there is also an increased concentration of nickel, copper and zinc. The highest concentration of arsenic in our country is in the rivers around Sokolov – in the Bystřice in Ostrov nad Ohří and in the Chodov stream (Sokolovská uhelná Inc.).

In 2003, radioactive substances were monitored in 81 profiles of the state network in indicators of total volume of alpha activity, total volume of beta activity, total volume of beta activity after correction ^{40}K, volume activity of radium 226 and concentration of natural uranium.

In selected profiles, in connection with checking the influence of nuclear facilities, the volume activity of tritium was measured. In 2003, as part of the expansion of the state network, in 44 profiles, the volume activity of radionuclides was measured in suspended sediments and river-bottom sediments. From the results of the monitoring, it is evident that there is a persistent influence from former extraction of uranium ores in the profiles below the mine water outlets and in the sections of the rivers influenced by seepage from waste heaps and settling ponds. In the monitored profiles, higher concentrations of uranium in particular were ascertained. When evaluating the changes in content of radioactive substances in surface water for the period 1990–2003 it is possible to state that in the course of this period there was a significant improvement in water quality

Skalka water reservoir - Ohře river basin

Mostiště water resorvoir - Morava river basin

and other elements of the water environment, in particular in the basin of the Ploučnice and, at the end of the evaluated period, in the basin of the Mže, Litávka and in the Loučka.

In 2003, in many reservoirs eutrophication occurred (caused by an increased content of mineral nutrients, primarily by compounds of phosphorous and nitrogen in water).

Significant problems with water quality in reservoirs occurred during the summer in the waterworks reservoirs Lučina, Vrchlice, Hamry, Křižanovice, Souš, Stanovice, Znojmo, Opatovice, Mostiště, Nová Říše, Fryšták, Bojkovice and Boskovice a and in the non-waterworks reservoirs: Seč, Harcov, Labská, Rozkoš, Mšeno, Pařížov, Les Království, Lipno, Orlík, Hracholusky, České Údolí, Všechlapy, Újezd, Skalka, Nechranice, Březová, Stráž pod Ralskem, Jevišovice, Luhačovice, Vranov, Nové Mlýny I, II, III and Letovice. For abstractions of surface water for treatment as drinking water and for abstractions for technological purposes in certain reservoirs (such as, for example, Lipno, Římov and Karhov), increased pollution by humic substances was noted, but this did not cause significant problems with the water's purification ability. In the overall evaluation it is possible to state that the poorer quality of water in 2003 was handled sufficiently from the operational aspect; supplies of water to citizens were not restricted, but there was a significant restriction in water recreation (for example, in the reservoirs Seč, Mšeno, Nechranice, Skalka). The aerial liming carried out over several years has had a positive effect on the development of water quality in the Souš reservoir.

Monitoring of surface water of the Agricultural Water Management Administration has been carried out on the entire territory of the Czech Republic since 1993; in 2003 it was carried out within the framework of the monitoring networks of five monitoring programmes.

The profiles on small rivers were monitored in the monitoring for the state network of water quality (CHMI) and the monitoring of significant point sources of pollution (BOD). Selected profiles of monitored reservoirs were monitored in the programme for the monitoring of small reservoirs. Nitrates were monitored for the purposes of EU Council Directive 91/676/EEC from 12th December 1991, Concerning the Protection of Water from Pollution by Nitrates from Agricultural Sources. In 2003, hydrobiological monitoring (BIO) was carried out. In contrast with the year 2002, no monitoring of the chemical state of sediments (SED) was carried out in 2003. The monitoring of the Agricultural Water Management Administration (referred to hereinafter as the „AWMA“) in 2003 included 318 small rivers and 76 small reservoirs. Samples were taken from small rivers every month throughout the entire year, but were taken from small reservoirs only in the period April to September 2003. The financing of all monitoring programmes was ensured by the Ministry of Agriculture (referred to hereinafter as the "MoA").

In selected profiles, the small rivers monitored by the AWMA were affected in particular by communal pollution. The extent of agricultural non-point pollution dropped significantly in comparison with 2002.

From the aspect of the standard CTS 75 7221, the worst values for rivers were for the indicators of orthophosphates and overall phosphorous and for indicators characterising the extent of faecal pollution caused by fertilisers, and washing and cleaning detergents. For the indicator of overall phosphorous, 52,5 % of analyses exceeded limit value of the lower boundary for class V at least once; the worst results are from the area of the Morava basin. Enterococcus bacterial pollution was higher in particular in the area of the Vltava basin. In this area significant pollution characterised by the summary indicators of the oxygen system (CHCO) was also recorded. Ammoniacal nitrogen also played a significant role in the pollution of surface water. The incidence of

Elbe river-bed at Špindlerův Mlýn - Labe river basin

higher concentrations of heavy metals was recorded in particular for cadmium in the basin of the Elbe. In the area of the Vltava basin, increased values for arsenic were ascertained. The indicators for the content of organic substances PCBs and PAHs were only in the range of I to IV quality class. Overall in the republic, the worst state was for indicators of orthophosphate phosphorous, with 10,36 % of values coming in the class V.

Within the context of the evaluations pursuant to government order No. 61/2003 Coll., the worst results were recorded in the area of the Morava basin, these being results for total phosphor (85,4 % of samples taken exceeded the limit value) and indicators for ammoniacal nitrogen (61,4 % of samples). Through a comparison of the results gained for the period 2000–2003, an improvement was noted in the quality of small rivers caused by elimination for the indicators of cadmium, nickel, all chrome, PCBs and chlorophyll. In comparison with the year 2002, the state of small watercourses improved in the parameters CHCO, ammoniacal nitrogen, arsenic and PAH. A negative trend was ascertained for the parameter of orthophosphate phosphorous.

The burden of sediments and suspended sediments is evaluated on the basis of a comparison of contents or their characteristic annual values with the limits of the Methodological Instruction of the Ecological Damage Department of the Ministry of the Environment – criteria for pollution of soils and groundwater from the year 1996.

An exceeding of the limit values of category B of this standard is considered to be pollution which may have a negative effect on the health of a person and the individual elements of the environment. In the requirements of directive 76/464/EEC and 2000/60/EC it is stated that the contents of dangerous substances in solid materials (sediments and suspended sediments) must not over time display an increasing trend. In the year 2003 a slight drop in comparison with 2002 was recorded in anthropogenic pollution of solid substances in many rivers, in particular in regions affected by industry.

In comparison with the year 2002, it is possible to state that even in sediments there was an improvement in the percentage representation of cases with an exceeding of the limit B and C. In suspended sediments, a lower number of cases where there was an exceeding of the limit of risk pollution was noted only for mercury, lead and benzo(a)pyrene, and indeed, a slight worsening occurred in the fields of arsenic, cadmium and substances from the group PAH (benzo(b)fluoranthene, benzo(a) anthracene) and chlorphenols.

In the year 2003, there was a continuation in the monitoring of contamination of biomass of harmful substances in the state network operated by the Czech Hydrometeorological Institute at seventeen selected concluding profiles of main rivers of the Czech Republic.

Within the context of accumulation biomonitoring, out of benthic organisms, the indicator types Asellus aquaticus and Eerpobdella octoculata where analysed, as were caddis flies of the genus Hydropsyche. In contrast with the preceding years, analyses of small molluscs (Sphaerium corneum and Bithynia tentaculata) were not performed where, after 4 years of monitoring, values were found for the monitored substances which were very often below the level of measurability or which had a very low concentration. The freshwater chub was analysed. Heavy metals (lead, cadmium, mercury and arsenic) were analysed in organisms, as were the indicator congeners PCB (PCB-28, PCB-52, PCB-101, PCB-138, PCB-153 and PCB-180) from specific organic substances, and there was monitoring of chlorinated pesticides (p,p isomers DDT, DDD and DDE).

1.3 Quality of groundwater

In the field of quality of groundwater, in 2003 there was an improvement in comparison with 2002 not only in shallow wells, but there was also a significant improvement in the group of objects of deep wells and springs.

In the year 2003, in the state monitoring network for the quality of groundwater, 463 objects were monitored consisting of 137 springs (the monitoring of springs documents the natural drainage of groundwater, especially in the area of the crystalline complex and local drainage of chalk structures), 148 shallow wells (these objects are concentrated primarily in the alluvia of the Elbe, the Orlice, the Jizera, the Ohře, the Dyje, the Morava, the Bečva, the Odra and the Opava – this groundwater is highly susceptible to harm, with a high coefficient of filtration and rapid progress of pollution) and 178 deep wells (the objects are concentrated primarily in the areas of the Czech chalk basin, the České Budějovice and Třeboň basin, and they monitor the deep circulation of groundwater – the direct susceptibility of this water is not too great, because contamination is expressed here after a long period of time). A total of 120 indicators were designated with a frequency of twice a year in the spring and autumn. An analysis of specific dangerous substances was carried out only for the spring collection of samples.

In view of the requirements of the outline directive 2000/60/ES, the evaluation of results for the quality of groundwater for 2003 focussed in particular on dangerous substances. In the CHMI, a comparison was carried out of measured values of indicators for the quality of groundwater with the values of limits of measurability, the values of criteria A, B and C pursuant to the methodological instruction of the MoE from the year 1996, and the limits for drinking water according to the decree of the MoH No. 376/2000 Coll., which designates the requirements for drinking water and the scope and frequency of its checking (for indicators which do not have a limit designated in this decree, the limit designated by the standard CTS 75 7111 Drinking Water was used). From the aspect of comparing the quality indicators against the year 2002, it is possible to state that in shallow wells there was an improvement in the percentage representation of objects with an exceeding of limits B or C (according to the methodological instruction of the MoE from 15.9.1996 part 2 – Criteria for pollution of soils and groundwater). There was a significant improvement in the group of objects of deep wells and springs.

From the aspect of the comparison of quality indicators of groundwater with the requirements for drinking water, the most frequently above the limit values were the indicators for nitrates (13,6 % of above-the-limit samples), chemical consumption of oxygen by permanganate (12,2 % above-the-limit samples), ammonium ions (11,7 % above-the-limit samples), sulphates (8,8 % above-the-limit samples) and aluminium (7,7 % above-the-limit samples). Less frequently the limits were exceeded in indicators of nickel (3,9 % above-the-limit samples), fluorides (2,4 % above-the-limit samples), chlorides (1,7 % above-the-limit samples), atrazin (1,7 % above-the-limit samples) and desethylatrazin (1,5 % above-the-limit samples). All of these above-the-limit substances (with the exception of fluorides) are represented in a greater proportion in the groundwater of shallow wells.

Lhotka weir - Odra river basin

Table 1.3.1 Overview of numbers of objects with exceeding of standards B, C at least in one indicator for the year 2003

Objects	Number of objects	Number of objects with exceeding of B or C	% of objects with exceeding of B or C
Shallow wells	148	63	42,6 (39,0 in the year 2002)
Deep wells and springs	315	59	18,7 (16,8 in the year 2002)
All objects	**463**	**122**	**26,3 (23,9 in the year 2002)**

Source: AWMA

Weir at Morávka river - Odra river basin

2. Water Balance Assessment – Handling Water

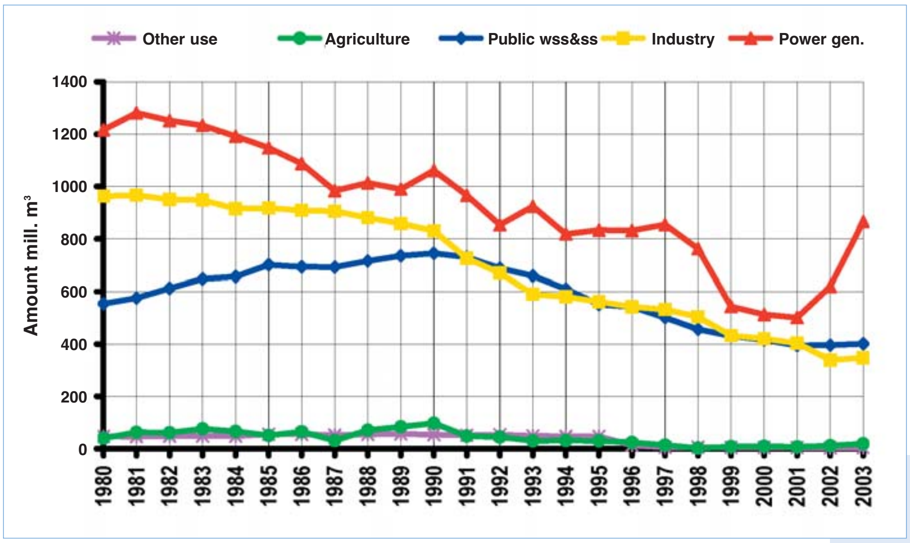
2.1 Abstractions of surface water

The overall upward trend in abstractions of surface water between the years 1990 and 2001 has come to an end. In the years 2002 and 2003 there was a year-on-year increase of 19,6 %, the increase since the year 2001 was 24,9 %. The overall drop in comparison with the year 1990 is thus 41,3 %.

In 2003, 828 abstractions of surface water from rivers and reservoirs were recorded with an abstraction of 1 635,9 million m³. These were abstractions in excess of 6 000 m³ per year or 500 m³ per month. In order to unify data from the individual river board corporations, transfers of water in the Ohře basin and abstractions for fishponds in the Odra basin are not included. The structure of recorded water abstractions in the individual river boards in 2003 is shown in table 2.1.1.

There was an increase in abstractions in all categories of water use. The most significant proportion consists of overall abstractions for the power industry, including generation of thermal energy, which was 39,6 % higher. The greatest increase in this category was in the basin of the Elbe by 52,8 %, where there was an increase in abstractions for the through cooling of the power station Kolín. The overall abstractions in the category of public waterworks increased by 1,3%. A reduction in the abstractions in this category was noted only in the basin of the Elbe by 11,6 %. Abstractions for industry increased by 2,6 %. The greatest increase in comparison with the year 2002 was evaluated in the category of agriculture (64,9 %) and in the category of other use (30,8 %). The overall development in abstractions of surface water since 1980 is represented in the graph.

Graph 2.1.1 Abstractions of surface water in Czech Republic in years 1980–2003



Source: WMRI T.G.M.

More detailed information about BRANCHES shown:		
Public WSS&SS	Public waterworks and sewers	BCEE: 41 and 90 excluding 410010
Agriculture	Agriculture, excluding fish farming	BCEE: 01 - 05 excluding 050200
Power	Generation and distribution of electricity and heat	BCEE: 401 and 403
Industry	Industry-excluding power and waterworks	BCEE: 10 - 45, excluding 401, 403 and 41
Other	Other activities – excluding public sewers	BCEE: 50 - 93, excluding 90
Total	Total data (excluding fishponds and transfers)	BCEE: 01 - 93, excluding 050200 and 410010

Source: CSO

Table 2.1.1 Abstractions of surface water in 2003 in millions of m³ by consumers above 6,000 m³/year or above 500 m³/month

River Board enterp.	Group of users											
	Waterworks		Agriculture		Electricity generation		Industry		Other		Total	
	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number
Elbe River Board, s.e.	3,,3	32	11,9	41	626,5	12	135,3	127	0,2	10	**811,2**	**222**
Vltava River Board, s.e.	175,9	45	0,1	10	55,7	13	57,8	90	2,1	28	**291.6**	**186**
Ohře River Board, s.e.	59,5	26	0,3	17	59,8	7	44,0	59	0,1	6	**163,7**	**115**
Odra River Board, s.e.	79,1	15	0,1	6	9,8	8	91,1	65	0,4	19	**180,5**	**113**
Morava River Board, s.e.	49,2	41	6,4	25	113,4	15	19,2	96	0,6	15	**188,8**	**192**
Czech Republic	**401,0**	**159**	**18,8**	**99**	**865,2**	**55**	**347,4**	**437**	**3,4**	**78**	**1 635,8**	**828**

Source: MoA, WMRI T.G.M., River Board enterprises

2.2 Abstractions of groundwater

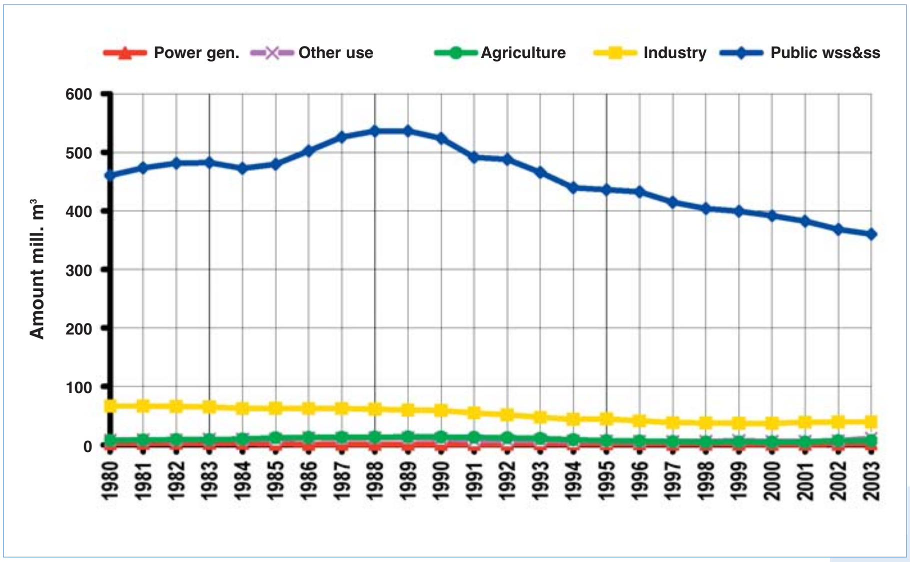
The total amount of groundwater abstracted in comparison with the year 2002 dropped slightly by 0,7 %; in comparison with the year 1990 this drop was by 30,8 %.

A drop was noted in the category of abstractions for public waterworks (by 2,2 %) in all basins. In the Vltava basin it was by 9,1 %, in the Odra basin it was by 9,4 %. In other categories, there was an increase in abstractions. The Vltava basin displayed an increase in abstractions in all categories (1,1 %), as did the Morava basin. An overall drop was recorded in the basin of the Odra (9,6 %).

The structure of recorded abstractions of water in the individual basins in 2003 is given in Table 2.2.1. In 2003, 3 370 abstractions of groundwater were recorded in an amount of 421 million m³. These were abstractions above 6 000 m³ per year or 500 m³.

The overall development of abstractions of groundwater since 1980 is shown in Graph 2.2.1.

Graph 2.2.1 Abstractions of groundwater in the Czech Republic in the years 1980-2003



Source: WMRI T.G.M.

Table 2.2.1 Abstractions of groundwater in 2003 in millions of m³ by consumers above 6,000 m³/year or above 500 m³/month

River Board enterp.	Group of users											
	Waterworks		Agriculture		Electricity generation		Industry		Other		Total	
	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number
Elbe River Board, s.e.	114,3	585	1,4	85	0.9	6	9,7	140	2,1	44	**128,4**	**860**
Vltava River Board, s.e.	33,8	466	2,3	146	0.1	2	11,5	122	5,8	188	**53,5**	**924**
Ohře River Board, s.e.	64,2	340	0,4	17	1.0	5	5,8	80	1,3	12	**72,7**	**454**
Odra River Board, s.e.	22,2	125	0,5	27	0.1	2	2,2	36	0,5	25	**25,5**	**215**
Morava River Board, s.e.	125,8	545	3,0	157	0.1	4	10,1	157	1,9	54	**140,9**	**917**
Czech Republic	**360,3**	**2 061**	**7,6**	**432**	**2.2**	**19**	**39,3**	**535**	**11,6**	**323**	**421,0**	**3 370**

Source: MoA, WMRI T.G.M. from data of River Board enterprises

Hracholusky water reservoir - Vltava river basin

2.3 Discharge of waste and mine water

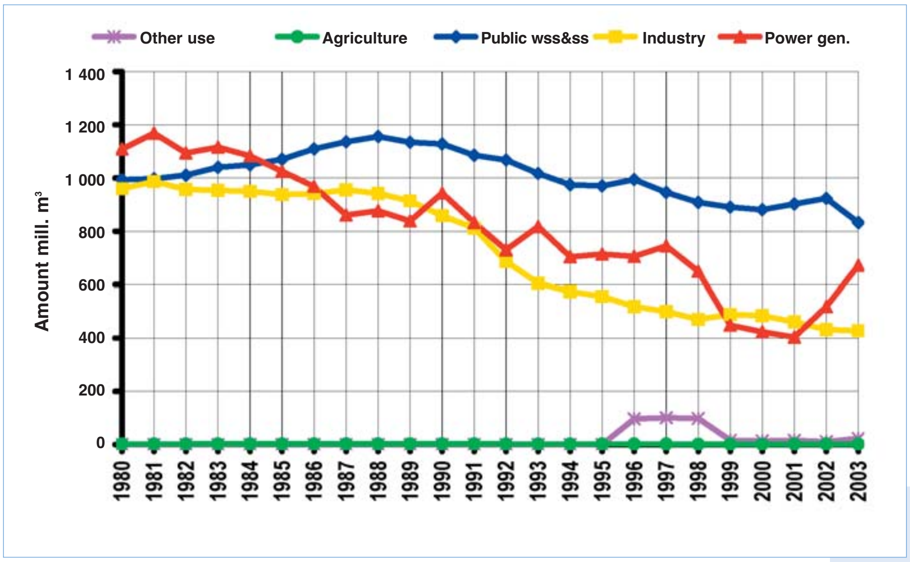
The amount of discharged waste and mine water in comparison with the year 2002 increased by 3,7 %. In comparison with the year 1990 it shows a constant drop by 33,3 %.

There was a significant increase in the discharged amount in the category of energy, including the generation of heat (by 29,8 %) as a result of the discharge of water from through cooling of the power station Kolín in the Elbe basin. In the category of public sewers, there was a reduction by 9,9 %. In the Elbe basin, the amount of water discharged from sewers dropped by 11,6 %. The other basins recorded an increase. In comparison with 2001, the volume of discharged waste and mine water increased by 5,8 %.

In 2003, 3 522 cases of discharge of waste and mine water into surface water were recorded with a volume of 1 957 million m³. These were sources above 6 000 m³ per year or 500 m³ per month. In order to unify the data from the individual river board corporations, transfers of water in the Ohře basin are not included.

The structure of recorded discharges in the individual basins in 2003 is shown in Table 2.3.1. The overall development of discharged water since 1980 is represented in Graph 2.3.1.

Graph 2.3.1 Discharge into surface water in the Czech Republic in the years 1980 - 2003



Source: WMRI T.G.M.

Table 2.3.1 Discharge of waste and mine water into surface water in 2003 in millions of m³ for sources above 6 000 m³/year or above 500 m³/month

River Board enterp.	Group of users											
	Waterworks		Agriculture		Electricity generation		Industry		Other		Total	
	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number
Elbe River Board, s.e.	176,4	413	0,0	2	592,5	21	117,6	198	1,8	56	**888,3**	**690**
Vltava River Board, s.e.	281,4	466	1,2	12	19,6	16	59,2	150	15,3	465	**376,7**	**1 109**
Ohře River Board, s.e.	81,0	257	0,3	1	37,5	21	92,5	163	1,8	17	**213,1**	**459**
Odra River Board, s.e.	109,1	260	0,0	0	3,1	8	77,0	97	1,9	40	**191,1**	**405**
Morava River Board, s.e.	184,4	645	0,3	4	19,5	9	81,5	155	2,1	46	**287,8**	**859**
Czech Republic	**832,3**	**2 041**	**1,8**	**19**	**672,2**	**75**	**427,8**	**763**	**22,9**	**624**	**1 957,0**	**3 522**

Source: MoA, WMRI T.G.M., River Board enterprises

Elbe at Děčín - Labe river basin

Karolinka water reservoir - Morava river basin