MINISTRY OF AGRICULTURE
OF THE CZECH REPUBLIC

Ministerstvo životního prostředí

REPORT ON WATER MANAGEMENT IN THE CZECH REPUBLIC IN 2020

REPORT ON WATER MANAGEMENT IN THE CZECH REPUBLIC IN 2020

Ministry of Agriculture of the Czech Republic
Ministry of the Environment of the Czech Republic

Contents

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1. HYDROLOGICAL BALANCE

1.1 Temperature and precipitation

In terms of temperature, 2020 was strongly above the average in the Czech Republic with the mean air temperature of 9.1°C exceeding the long-term average of 1981–2010 by 1.2°C. Together with 2000 and 2007, the year of 2020 was 5th–7th warmest since 1961. The previous two years of 2018 and 2019 were warmer with the mean annual temperature of 9.6 and 9.5°C

Only two months in 2020 had negative deviation from the long-term average air temperature of 1981–2010: May (deviation -2.1°C) and July (deviation -0.1°C). May was a strongly below-average month in terms of temperature, whereas March, June, July, October and November were average. 2020 had 5 above-average months: January (deviation +2.3°C), April (deviation +1.3°C), August (deviation) +1.5°C), September (deviation +1.2°C) and December (deviation +2.6°C). February with its exceptionally above average temperatures had the highest deviation from the long-term average (+4.6°C) – together with February 1966 it was the warmest February in terms of average monthly temperature.

Terezín (Source: Povodí Ohře)

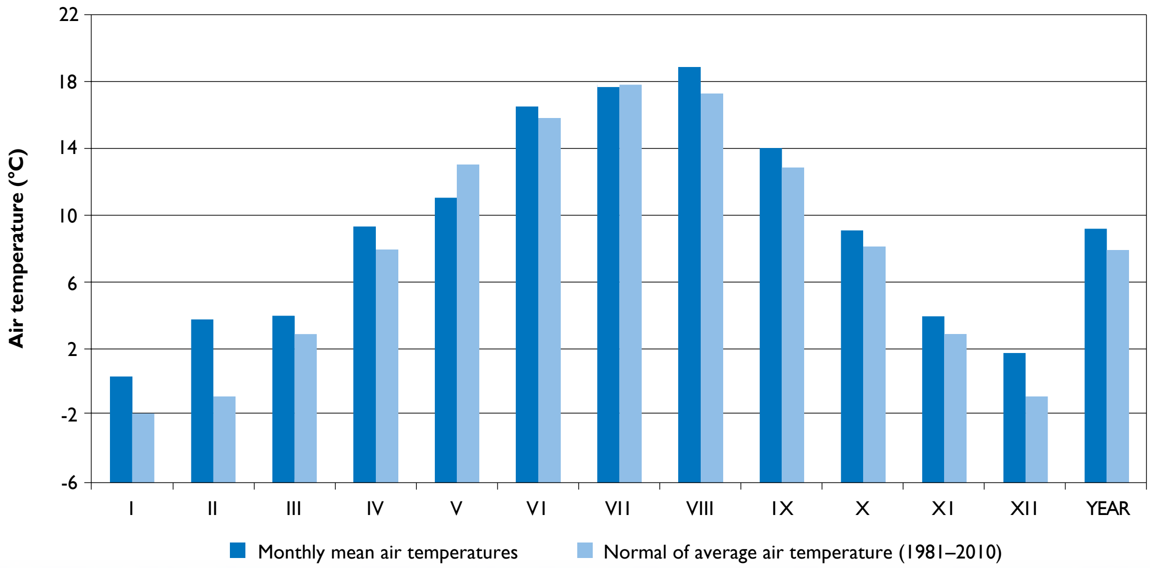
Interval limits for assessing normality (or abnormality) are defined for every single month, which means that the limits may vary month by month. The table below shows what the intervals mean and how they are defined. Abnormality of a phenomenon is, generally speaking, defined using Qp quantile values, for which the following is true P(X ≤ Qp) = p (meaning that the likelihood that a phenomenon achieves the value of a Qp quantile is lower or equals p). Temperature and precipitation are assessed in accordance with the classification in Table 1.1.1.

Table 1.1.1
Interval limits for assessing normality (abnormality)

Degree	Interval limits by quantiles	Exceedance probability (in %)
Exceptionally below average	$< Q_{0,02}$	>98
Strongly below average	$<Q_{0,02} , Q_{0,10})$	(90, 98>
Below average	$<Q_{0,1}0 , Q_{0,25})$	(75, 90>
Average	$<Q_{0,25} , Q_{0,75}>$	<25, 75>
Above average	$(Q_{0,75} , Q_{0,90}>$	<10, 25)
Strongly above average	$(Q_{0,90} , Q_{0,98}>$	<2, 10)
Exceptionally above average	$> Q_{0,98}$	< 2

Source: CHIM

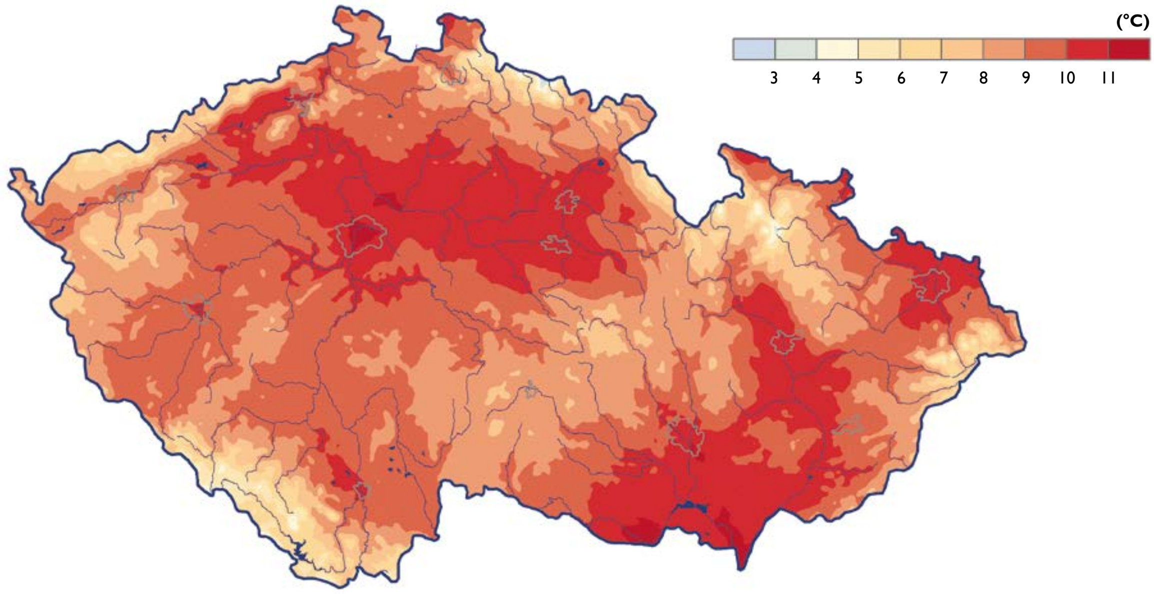
Chart 1.1.1
Average monthly air temperature in the Czech Republic in 2020 in comparison with the long-term average of 1981–2010



Source: CHMI

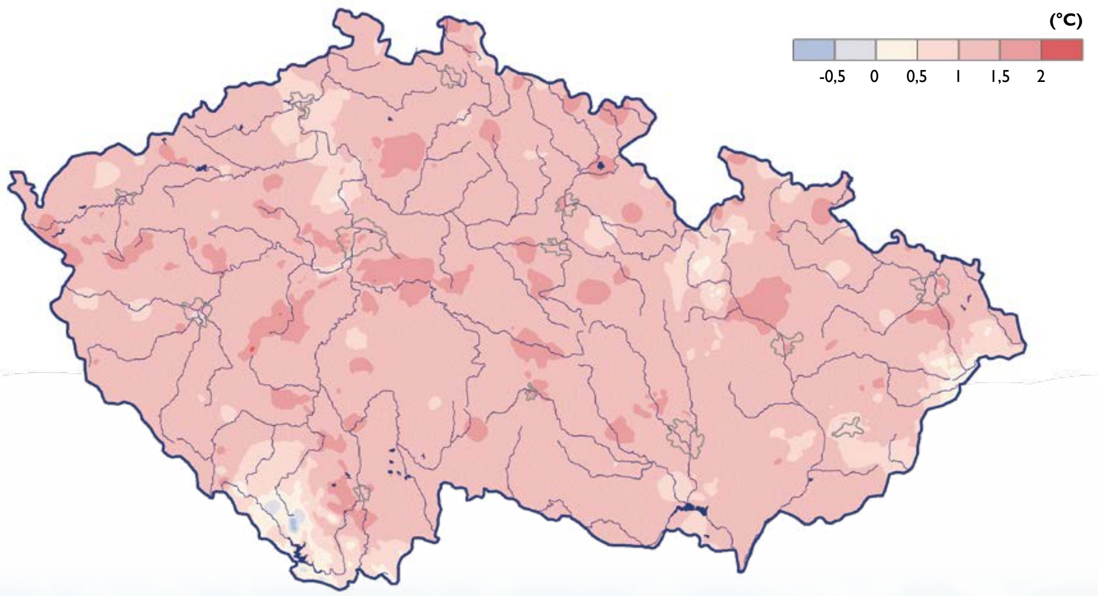
Winter 2018/2020 seen as a whole was quite warm in the Czech Republic. The mean air temperature in winter season (2.0°C) was 3.3°C above the long-term average of 1981–2010. The particularly warm months were December 2019 and January 2020 with the deviation of the average monthly air temperature of +2.8°C and +2.3°C, February was extraordinarily exceptional with deviation of +4.6°C from the long-term average. This makes the winter season 2019/2020 the second warmest since 1961, the only warmest winter being the 2006/2007 winter season with mean air temperature in the Czech Republic of 2.7°C. The spring seasons with the average air temperature in the Czech Republic of 8.0°C, seen as a whole, was about average (with deviation +0.1°C from the long-term average of 1981–2010. However, temperature in spring months varied significantly. Summer 2020 can be considered as average in terms of temperature, with average temperature in summer months in the Czech Republic being 17.6°C (deviation +0.6°C from the long-term average). Temperatures in June and July were average in the Czech Republic (with deviations from the long-term average of +0.6 and -0.1°C). August was above average with average temperature of 18.8°C and deviation from the long-term average of +1.5°C. The first summer temperature of 2020 was recorded on 13 June 2020 with maximums exceeding 30°C at 80 stations of the CHMI network. The highest air temperature (35.5°C) of the year was recorded on 28 July at the Dobřichovice station. Autumn 2020 with average temperature of 9.0°C in the Czech Republic was by 1.1°C warmer than the long-term average of 1981–2010. All autumn months in the Czech Republic had a positive deviation of air temperature from the long-term normal. The last month of the year, December, was above-average in the Czech Republic, its mean air temperature of 1.7°C exceeding the long-term average by 2.6°C.

Figure 1.1.1
Average air temperature in the Czech Republic in 2020



Source: CHMI

Figure 1.1.2
Deviation from the average air temperature in 2020 from the long-term average of 1981–2010



Source: CHMI

In terms of precipitation, 2020 in the Czech Republic was an above-average year, the mean precipitation amount of 766 mm corresponds with 112% of the long-term precipitation average of 1981–2010. 2020 had the tenth highest total of precipitation since 1961.

The high total precipitation was due mainly to exceptionally above-average June with total precipitation of 152 mm (192% of the long-term average). February (205% of the long-term average) and October (214% of the long-term average) were also strongly above-average. August and September were above-average months in terms of precipitation (with 139% and 128% of the long-term average). By contrast, three months of 2020 were strongly below-average in terms of precipitation: January (43% of the long-term average), April (43% of the long-term average) and November (45% of the long-term average). July (69% of the long-term average) and December (56% of the long-term average) were below-average in terms of precipitation. Only March (75% of the long-term average) and May (109% of the long-term average) can be considered as average in terms of precipitation.

Territorial distribution of total annual precipitation was uneven. The mean precipitation in Moravia and Silesia was 868 mm (126% of the long-term average), whereas in Bohemia precipitation only amounted to 716 mm (105% of the long-term average). The lowest amount of rainfall in comparison with the long-term average was recorded in the north-west part of the country: in the Liberec, Ústí and Karlovy Vary regions (90% of the long-term average and less). By contrast, most precipitation was recorded in the Moravia-Silesia region (132% of the long-term average) and Pardubice region (128% of the long-term average).

January was strongly below-average in terms of precipitation in the Czech Republic with the mean total of rainfall (19 mm) being 43% of the long-term average. By contrast, February was rather rich in rainfall, its 78 mm being 205% of the long-term average. More precipitation fell in Bohemia (221% of the long-term average) than in Moravia and Silesia (172% of the long-term average).

Table 1.1.2

Renewable water resources in 2014–2020

Item	Annual values (in millions of m^3)						
	2014	2015	2016	2017	2018	2019	2020
Precipitation	51,815	41,957	50,240	53,868	41,170	50,004	60,411
Evapotranspiration	41,542	32,165	40,223	43,424	33,305	40,369	47,477
Annual inflow to the Czech Republic from neighbouring countries	388	398	402	339	320	405	840
Annual outflow from the Czech Republic	10,661	10,190	10,419	10,783	8,185	10,040	13,774
Sources of surface waters,[1)]	5,273	3,591	4,421	4,258	3,355	3,732	5,000
Usable sources ofgroundwaters,[2)]	1,077	939	925	911	765	789	978

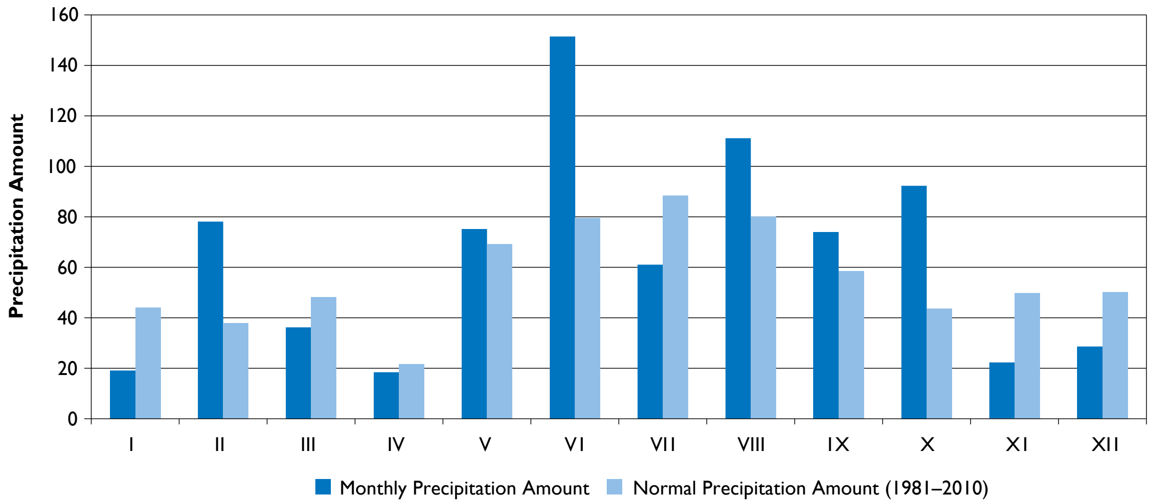
Source: CHMI

Note: [1)] Determined as the flow in the main catchment areas with 95% exceedance probability.

[2)] A qualified estimate, more detailed specifications are published by the CHMI in the second half of 2021.

Chart 1.1.2

Average monthly precipitation in the Czech Republic in 2020 in comparison with the average of 1981–2010



Source: CHMI

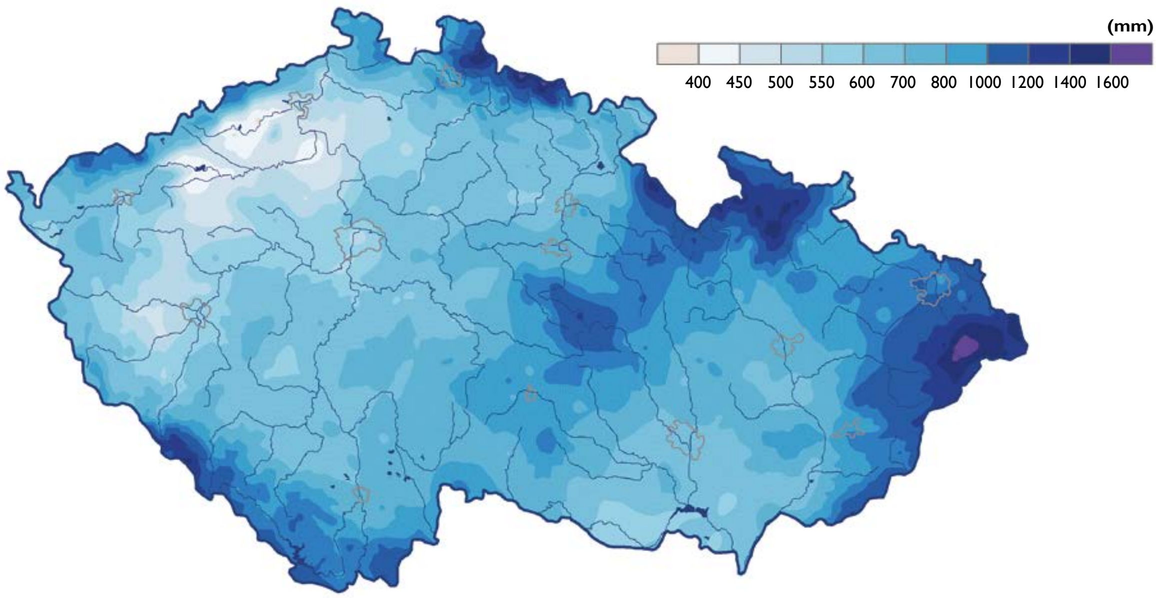
The spring months were rather poor in terms of precipitation. While March was considered an average month, its monthly total of 36 mm only accounted for 75% of the long-term average in the Czech Republic. April was strongly below-average with a total of mere 18 mm (43% of the long-term average) and May was considered average (75 mm, 109% of the long-term average).

In terms of precipitation, June was exceptionally above-average in the Czech Republic with its total rainfall of 152 mm being 192% of the long-term average 1981–2010. A total of 142 mm precipitation was recorded in Bohemia (187% of the long-term average) and 171 mm in Moravia and Silesia (204% of the long-term average) in June. Precipitation occurred in the Czech Republic throughout the entire month of June, daily rainfall often exceeding 50 mm. Highest total were 129.1 mm (19/06 Bílý Potok, Smědava in the Liberec District), 128.9 mm (14/06 Konárovice in the Kolín District) and 117.6 mm (18/06 Rychnov nad Kněžnou). Subsequently, July was below-average with total precipitation of 61 mm being 69% of the long-term average. Total precipitation in Moravia and Silesia (86 mm, 98% of the long-term average) was significantly higher than in Bohemia (49 mm, 56% of the long-term average). By contrast, August was an above-average month in the Czech Republic with 111 mm of rainfall, which is 139% of the long-term average. Precipitation occurred in the Czech Republic throughout the entire month of August.

While September was above-average in terms of precipitation in the Czech Republic (74 mm, 128% of the long-term average) and October even strongly above-average (92 mm, 214% of the long-term average), we consider November as a strongly below-average month (22 mm, 45% of the long-term average). The total September precipitation in Moravia and Silesia (98 mm, 158% of the long-term average) was significantly higher than in Bohemia (62 mm, 113% of the long-term average). In October, total precipitation was again significantly higher in the east part of the Czech Republic. Whereas the mean value of precipitation was 129 mm (307% of the long-term average) in Moravia and Silesia, the mean value in Bohemia was 73 mm (170% of the long-term average). A particularly significant rainfall episode occurred between 10 and 14 October, which led to flood situation in the country. The highest precipitation totals were recorded on 13 October when more than 22 mm of rainfall was recorded in the Czech Republic. Higher precipitation totals (exceeding 30 mm) occurred mainly in the eastern part of the country (Moravia, Silesia and East Bohemia) and in the Krkonoše Mountains, Jizera Mountains and Krušné Mountains. Over 100 mm of rainfall was recorded on that day at the Heřmanovice station at the Bruntál District (116.5 mm), at Jeseník (108.3 mm) and Pomezní boudy (Border Huts), Horní Malá Úpa in the Trutnov District (107.7 mm).

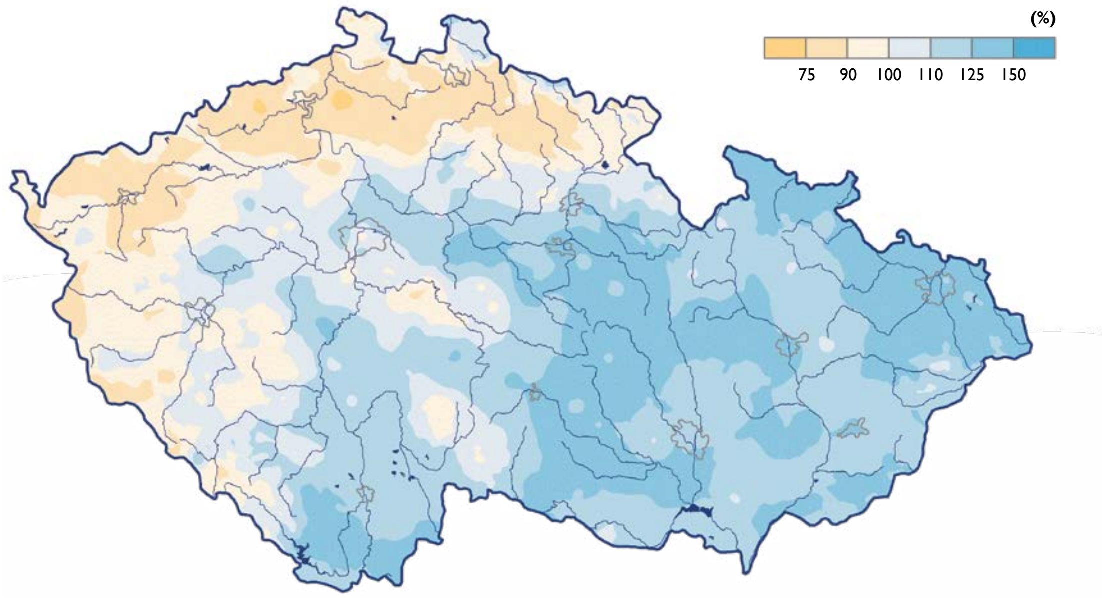
December was also rather poor with total precipitation in the Czech Republic being 28 mm, which is 56% of the long-term average. Less rainfall was recorded in Bohemia (24 mm, 47% of the long-term average) than in Moravia and Silesia (36 mm, 75% of the long-term average).

Figure 1.1.3
Total precipitation in 2020



Source: CHMI

Figure 1.1.4
Total precipitation compared with the average of 1981–2010 (in %) in 2020



Source: CHMI

1.2 Runoff

Seen from the hydrological aspect, 2020 was a very varied year. From January to May, all monitored river basins showed mainly below-average runoff values, they only increased in February due to rainfall and snow melting, reaching average values, sometimes slightly exceeding them. In terms of hydrological drought, the situation was most serious in April and at the beginning of May when average runoffs dropped to very low values and it seemed that the drought known from previous years would continue. However, the situation started improving significantly from the end of May. Thanks to abundant precipitation that continued throughout June and also in other summer months the hydrological situation improved significantly. After a prolonged period of drought, June saw regionally significant floods and runoffs in subsequent months were either above-average or at least average. The second significant flood situation occurred in October. Since then, runoff values in all river basins decreased gradually, returning to below-average values in December.

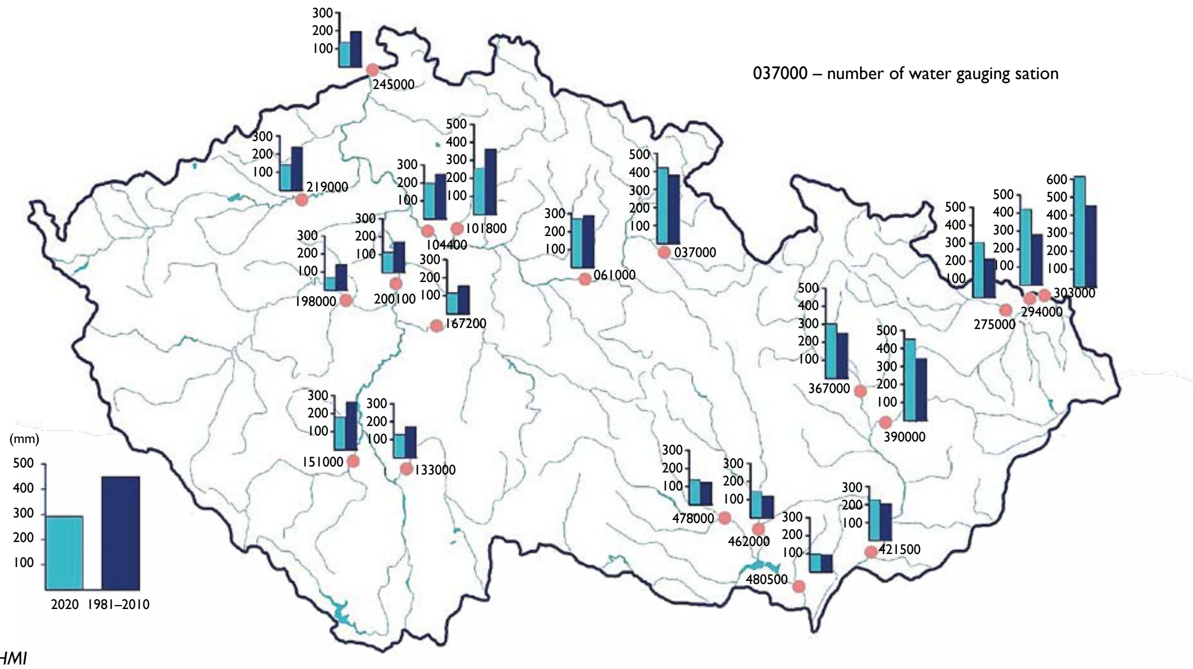
The winter months (January, February) were very different in terms of runoff. Whereas January was below-average, February saw average and slightly above-average values. Watercourse flow rates varied rather a lot with temporary increases in river levels caused mainly by snow melting and rainfall.

In January, almost all rivers monitored had lower runoff than the long-term January average is (from 25 to 60% Q_I). Average water yield ranged in January within Q_{330d} and Q_{150d}. At the end of the first beginning of the second decade, due to quite high temperatures and some rainfalls, mountain and submountain streams received water from melting snow. Levels of the monitored watercourses remained stable or varied only very slightly in the second half of the month. February was something between an average and slightly above-average month with runoff mostly between 60% and 160% Q_{II}. Higher values around 250% Q_{II} were mainly reached by mountain and submountain watercourses. Mean water levels ranged in majority of river basins typically between Q_{240d} and Q_{90d}. In the half of the first week, water levels increased due to rainfall and snow melting in the mountains and first and second flood degree activity (hereinafter "FAD") were exceeded in the Upper Otava River Basin.

The spring months (March, April and May) were below-average and strongly below-average in terms of runoff. At the beginning of spring, runoff values were slightly above-average, which was due to precipitation and snow melting in the mountains. April and first half of May were strongly below-average, the situation improved in the second half of May due to abundant precipitation and water levels increased slightly.

In March, flow rates of the monitored watercourses were typically below-average or average, ranging mainly between 35 and 100% Q_{III}. Water yields, due to a lack of more significant rainfalls decreased and reached values between Q_{270d} and Q_{90d}. Average and slightly above-average water yields were in watercourses draining mountainous regions with snow, by contrast, the lowest water levels were in some watercourses in the Dyje River Basin and Middle Elbe River Basin. In the first half of month, more significant rises were recorded on several occasions, due to precipitation and/or snow melting, some almost reaching first FAD. In the second half of March, watercourses were mainly stable or varied only slightly depending on daily temperatures and snow melting. Seen from the aspect of hydrological drought, the situation kept deteriorating in April, which was due to low volumes of rainfall. Mean water yield kept decreasing until they were between Q_{300d} and Q_{210d} by the end of the month.

Figure 1.2.1
Annual runoff in comparison with the long-term average of 1981–2010



Source: CHMI

The decreasing trend prevailed until the first decade of May. Even though the situation slightly improved in May due to precipitation, mean monthly runoff remained below-average and ranged typically between 20 and 80% Q_V, at the terminal profiles of main river basins they stayed merely between 31 and 38% Q_V. Slightly above-average flow rates were recorded in watercourses in the Olše and Ostravice River Basins (up to 120% Q_V). The end of May saw several significant rainfalls resulting in general increase of watercourse levels, occasionally even exceeding first and second FAD.

When compared with 2019, the 2020 summer months (June, July and August) were absolutely different. Due to abundant rainfalls that occurred particularly throughout June, but also in the following months, the flow rate was above-average, at the beginning of summer even strongly above-average. After a prolonged and rather dry period in June, quite vast floods occurred exceeding higher FADs.

Mean flow rates were still rather low at the beginning of June, ranging typically between 35 and 75% Q_{VI}, corresponding with water yield between Q_{300d} and Q_{180d}. The exception were waterflows in the Oder and Olše River Basins where mean flow rates ranged mostly between 40 and 160% Q_{VI}, and Q_{270d} and Q_{30d}, respectively, which was due to precipitation at the end of the previous month. First very abundant rainfalls occurred in the first month of June. It was particularly river levels in the Morava and Dyje River Basins that rose most significantly, often exceeding third FAD, with from Q_5 to Q_{20}. Another wave of heavy rainfall occurred at the end of the first half of June and affected mainly tributaries of the Middle Elbe (with $Q_{10\text{-}20}$ exceeding third FAD at several places), the Upper Sázava River Basin (second FAD), Czech section of the Oder River Basin (second FAD) and also the Upper Svratka River Basin (some rivers exceeding even third FAD). Another wave of increased levels resulted from precipitation from the second decade of June when it was particularly levels of

The Jelení Dry Reservoir (Source: Odra River Board) rivers draining the Orlické Mountains, tributaries of the Middle Elbe and also rivers draining the Beskids, Jeseníky and Jizera Mountains, leading again to exceeding third FAD at some places. Due to a further period of abundant and prolonged rainfalls and given the high soil saturation, river levels rose especially in the Upper Vltava, Upper Elbe, Oder and Morava River Basins (third FAD being exceeded with values between Q_2 and Q_{10}). Total mean monthly flow rates at monitored rivers ranged typically between 100 and 400% Q_{VI}. Rivers whose flow rates lagged behind average values were particularly in the southwest part of Bohemia in the Berounka, Otava, Upper Vltava and Ohře River Basins. At the beginning of July, flow rates and water yields were stable, thanks to previous rainfalls, still significantly above-average with flow rates between 50 and 200% Q_{VII} and water yield between Q_{330d} and Q_{150d}. In July, levels of most rivers varied a little, mostly in a decreasing, some remained stable. More significant decreases were recorded due to torrential rain at the beginning of the second decade when first FAD was exceeded in the Upper Sázava and Svratka River Basins. Other rises occurred at the turn of the second and third decade when first and second FAD was exceeded at the Middle Elbe and in the Czech section of the Oder River Basin. Above-average flow rates remained in the Morava and Oder River Basins even in August, however, in the Elbe River Basin the flow rates had a decreasing trend, making August rather an average/below-average month in terms of runoff. Mean monthly flow rates in most of the monitored rivers had a wide range of 45 to 160% Q_{VIII}, rivers draining the Novohradské Mountains, Bohemian-Moravian Highlands, the Jeseníky Mountains and the Beskids were twofold and even threefold higher when compared with the long-term average. Levels of most rivers fluctuated in August, depending on precipitation. Heavy rainfall occurred in most of the Czech Republic in the first decade, resulting in sudden level increases exceeding first and second FAD in the south of Bohemia and Moravia. It rained constantly in the second decade in Beskids, which increased levels in the Lubina and Ostravice River Boards with frequent exceeding of first FAD, in the Bečva and Olše even exceeding second FAD on several occasions. First and second FAD was sporadically exceeded at some places due to storm activity by the end of August (23/08 Brtnice, 28/08 Botič and 30/08 Jihlava).

The autumn months (September, October and November) as a total were above-average in terms of runoff. Watercourse levels fluctuated or rose slightly due to frequent rainfalls with many FAD exceedances. In the first half of October, we witnessed the second vast flood situation of 2020.

September was an average/above-average month in terms of runoff. Flow rates ranged widely between 35 and 300% Q_{IX}, which corresponded with water yields between Q_{330d} and Q_{90d}, in the Oder and Morava River Basins between Q_{120d} and Q_{30d}. Lowest water yields in September were recorded in some watercourses in the Lower Elbe and Ohře River Basins (Q_{364d} to Q_{270d}). Levels of most watercourses fluctuated slightly depending on precipitation. highest decreases were recorded in the first decade, when first FAD and at some places second FAD were exceeded in the east and north-east of the Czech Republic, namely in the Oder, Middle Elbe and Jihlava River Basins. Other watercourse level rises were due to abundant rainfalls in the last decade of September. The most runoff reaction was recorded in watercourses in the Upper Oder and Bečva River Basins (at some places exceeding first and second FAD). Clearly highest yields of 2020 were in October with one of the most significant flood situations of 2020. October was between slightly and significantly above-average in terms of runoff in all river basins with flow rates ranging typically between 100 and 500% Q_X, in the Oder and Morava River Basins even up to 800% Q_X. Due to abundant rainfalls in the second decade of October, water yields increased in most of the country and achieved highest values in the Morava, Dyje and Upper Elbe River Basins (typically between Q_{60d} and Q_{30d}). Lowest levels remained even in October in the Ohře and Lower Elbe River Basins (Q_{300d} to Q_{150d}). Abundant rainfalls occurred in the first decade, one of them being significantly above-average. Watercourse levels responded with increases to first and second FAD (watercourses draining the Beskids and Jeseníky Mountains and also those in the Upper Elbe River Basin), the achieved water yield did not exceed $Q_{<2}$. In the second decade of October, rainfalls occurred every day and first and second FAD were exceeded in many profiles, at some even third FAD was exceeded. The most significant runoff response was in the Middle Elbe tributaries and in watercourses in the Oder and Morava River Basins. Highest water yields were recorded in the Lower Morava River Basin, which was due to the vast extent of floods where the level culminated in Strážnice with Q_{20-50} on 14 October. In the last decade of October, increased watercourse levels dropped sharply. At the end of October, watercourses rose again fluctuated. Also November was a rather above-average month in terms of runoff. Between 130 and 250% Q_{XI} was reached in most of the watercourses monitored. Lower water yields remained in the Lower Elbe and Ohře River Basins (typically between 40 and 60% Q_{XI}). Watercourse yields in the Vltava River Basin ranged between Q_{300d} and Q_{120d}, and between Q_{240d} and Q_{60d} in the Oder and Morava River Basins. The most significant runoff responses were recorded in the end of October due to abundant rainfalls that occurred in most of the country, while soil was still very saturated since September and most watercourses responded with slight increases of their levels.

December was rather an average/below-average month. Mean monthly flow rates in most of the watercourses monitored typically ranged between 45 and 115% Q_{XII} with sporadic occurrence of higher values: 1.5fold to 4-fold. Due to a period with very low amount of precipitation, water levels were stable or decreased very slightly until the second decade of December. Water levels fluctuated or rose temporarily at the beginning of the third decade when it rained in most of the country. Soil was very saturated, so the response to further precipitation that occurred at the end of December in the east of the Czech Republic was sudden and watercourse levels especially in the Bečva, Olšava and Velička rose fast. First and second FADs were exceeded at several profiles, third FAD was reached for a brief period of time in the Velička River at Strážnice on 29 December with Q_{10} i third FAD.

Table 1.2.1
Runoff in 2020 as percentage of the long-term average monthly runoff

River	Profile	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		[%]											
Orlice	Týniště nad Orlicí	38	164	71	24	32	326	168	96	108	324	209	68
Labe	Přelouč	38	119	70	29	34	208	133	79	96	259	179	65
Jizera	Tuřice-Předměřice	48	155	80	32	57	138	54	51	44	96	75	52
Labe	Kostelec nad Labem	34	107	67	27	38	176	113	66	75	200	142	54
Lužnice	Bechyně	24	67	30	12	22	135	140	104	109	151	188	70
Otava	Písek	35	128	62	30	39	104	62	92	70	102	88	56
Sázava	Nespeky	25	61	44	23	38	132	121	81	100	221	219	77
Berounka	Beroun	22	67	53	25	33	88	37	46	63	80	56	34
Vltava	Praha-Chuchle	29	46	33	24	37	104	102	80	88	156	156	59
Ohře	Louny	45	78	102	34	30	88	44	38	76	65	53	47
Labe	Hřensko	35	73	58	29	40	116	97	70	79	146	125	56
Opava	Děhylov	87	137	65	33	38	203	168	114	172	823	204	76
Odra	Bohumín	67	126	57	27	52	289	132	138	199	807	205	76
Olše	Věřňovice	65	128	58	21	87	277	138	165	128	596	147	74
Morava	Olomouc-Nové Sady	53	172	86	33	36	139	155	157	145	448	229	123
Bečva	Dluhonice	52	179	54	18	44	262	73	118	181	798	189	103
Morava	Strážnice	47	141	63	24	32	157	110	111	137	552	210	118
Svratka	Židlochovice	47	87	49	31	45	167	161	209	167	392	256	143
Jihlava	Ivančice	39	55	27	19	23	191	209	254	243	291	265	150
Dyje	Ladná	40	56	39	18	32	157	160	184	218	305	229	145

Source: CHMI

1.3 Groundwater regime

Shallow circulation of groundwaters represented by shallow wells and most of the springs was strongly unusual in 2020. Spring, which normally sees annual maximum of groundwaters, was very dry. By contrast, in summer, when water levels usually drop, the situation improved significantly in 2020. Year maximum was recorded in autumn. The first half of 2020 was the dries period in terms of groundwaters and water in shallow wells since 1971. In June and July, the situation improved significantly, reaching normal levels that persisted until September. October saw another significant improvement to strongly above-average (shallow wells) and slightly above-average values (springs), reaching year-highs.

However, the situation was not the same in the whole of the Czech Republic. In north Moravia (the Upper Oder) above-average levels lasted from June until the end of the year. In the last quarter of 2020, shallow well levels and spring yield were even above-average in the whole of Moravia (the exception being average level of a section of the Upper Oder River Basin in December). By contrast, drought persisted in northwest Bohemia (Ohře River, Lower Elbe River and other Elbe tributaries) for almost the entire year.

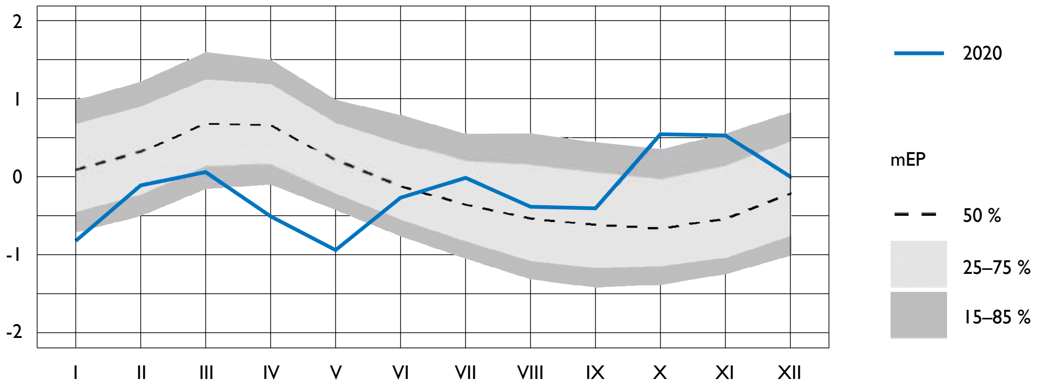
Drought from 2019 persisted in deep wells in most of Bohemia, although on a smaller scale. Levels of some parts of hydrogeological regions (HGR) in Bohemia was strongly and/or exceptionally below-level throughout the year. The most affected area by drought was the North Bohemian Cretaceous (area between the Jizera River and Lower Elbe River) with exceptionally below-average level prevailing the entire year. By contrast, the situation concerning deep wells in east Bohemia and Moravia improved since July, meaning the situation of a part of the East Bohemian Cretaceous, permo-carbon in East Bohemia and Moravian Tertiary was between slightly and exceptionally above-average from October to December.

Shallow wells

The beginning of 2020 was strongly below-average and even the usual spring maximum that has shifted from March and April to February and March in the last couple of years, was very low (Chart 1.3.1). Water levels oscillated around the low values of the long-term average (68% mEP – monthly exceedance probability curve) in February and they became slightly below-average in March (77% mEP). With the start of spring and the growing season levels fell significantly and levels of more than half of shallow wells (53%) was strongly/exceptionally below-average by the end of March. In Aril, shallow well levels further decreased in the whole of the Czech Republic and became strongly below-average. The worst situation was in the first half of May, when 83% of shallow wells corresponded with strong or exceptional drought. May was an exceptionally below-average month (96% mEP) with levels reaching all-year lows.

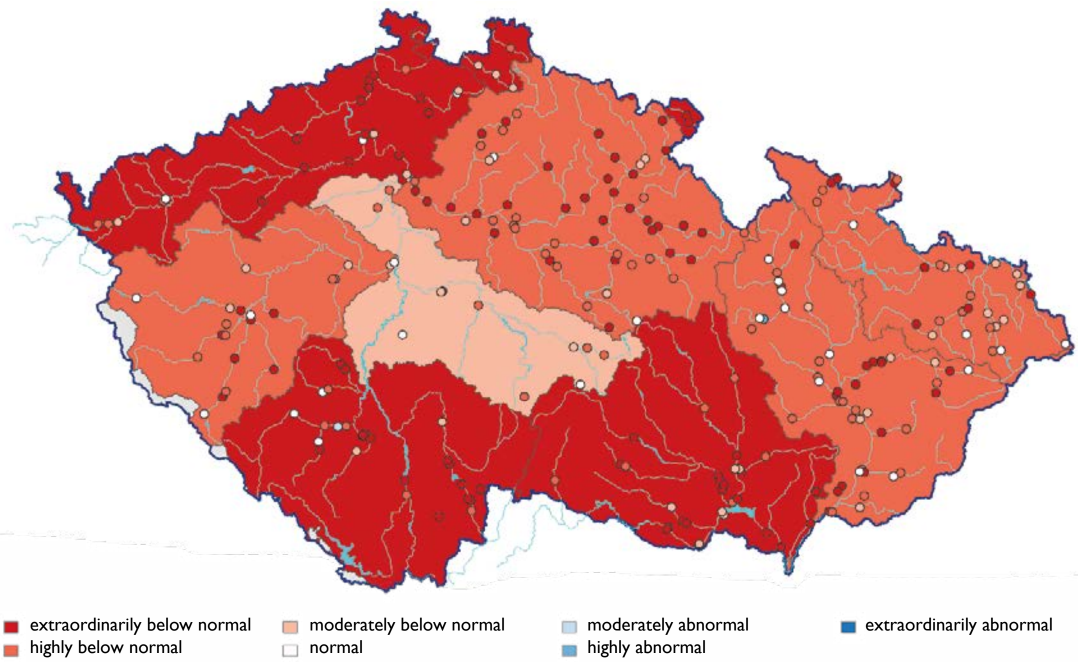
With the exception of slightly below-average partial river basin of the Lower Vltava, the level was strongly or exceptionally below-average in the whole of the country (Figure 1.3.1). Strongly and exceptionally below-average was recorded in 71% of wells in May. In June, the situation concerning groundwaters improved and was average in the most of the Czech Republic with the exception of some sections of the Ohře and Lower Elbe River Basins and other Elbe tributaries (slightly below-average), Lusatian Neisse and other tributaries of the Oder and Dyje River (strongly below-average). Despite ongoing growing season when waters typically decrease in summer, water levels actually kept rising in July and reached above-average values in July in the Czech Republic. July even surpassed maximums from spring and the situation in northern Moravia (the Upper Oder) was strongly above-average. Nevertheless, water levels were slightly below-average in the west of Bohemia (the Berounka and Ohře River, the Lower Elbe and other tributaries to the Elbe). In August and September, levels were rather stagnating and were about the average in the most of the country with the exception of some sections of the Ohře and Lower Elbe River Basins and other tributaries to the Elbe and the Lusatian Neisse and other tributaries to the Oder River and slightly above-average section of the Upper Oder River Basin (in August).

Chart 1.3.1
Average standardised water level of groundwaters in shallow wells in the monitoring network of the Czech Republic in 2020 (blue) in comparison with the long-term average values of 1981–2010



Source: CHMI
Note: The Chart also shows quantiles of monthly exceedance probability curves (mEP)
The vertical line marks the standard deviation

Figure 1.3.1
Groundwater levels in shallow wells in May 2020



Source: CHMI

In October, water levels rose significantly and although autumn is typically a period when year-lows are recorded, levels in 2020 were strongly above-average achieving highest values of the year. Strongly and exceptionally below-average levels were only recorded in 6% of wells in October, while strongly and exceptionally above-average level was in 54% of wells. In sections of the Upper Oder and Morava River Basins and tributaries of the Váh River, the levels even reached exceptionally above-average values. Levels kept rising until the beginning of November. In the first week of November, 60% of wells reached strongly and exceptionally above-average values, even though a part of the country in the area of the Lower Ohře River Basin remained strongly below-average. In the rest of November and in December, levels fell slightly, in the northwest Bohemia (the Ohře, Lower Elbe River Basins and in other tributaries to the Elbe), shallow well levels deteriorated in December reaching strongly below-average levels. In other parts of Bohemia and in north Moravia (the Upper Oder), the situation was average, while it was slightly above-average in the rest of Moravia (the Morava River and tributaries to the Váh and Dyje Rivers) (see Table 1.3.1).

Table 1.3.1
Probability of exceeding average groundwater levels in 2020 expressed in % of the monthly exceedance probability curve (for 1981–2010) for the river basins

River Basin	Water level with respect to the monthly exceedance probability curve in %											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Upper and Middle Elbe	94	73	73	94	94	53	24	44	46	18	18	47
Upper Vltava	94	87	92	97	97	52	34	38	45	21	19	43
Berounka	92	75	84	93	91	70	82	68	69	48	51	71
Lower Vltava	89	63	69	90	79	41	36	43	44	22	21	48
Lower Elbe	90	67	66	92	97	79	83	86	79	62	62	86
Oder	67	55	75	94	90	33	11	28	15	3	8	48
Morava	91	65	68	93	95	83	51	85	83	35	36	69
Dyje	69	49	68	87	89	56	26	32	32	4	7	19
Lusatian Neisse	82	80	86	92	96	86	44	40	35	13	12	21
Czech Republic	87	68	77	93	96	58	35	44	42	13	16	43

Source: CHMI
Note: The scale of colours corresponds with categories of slightly (75–85%), strongly (85–95%) and exceptionally (95–100%) below-average levels.

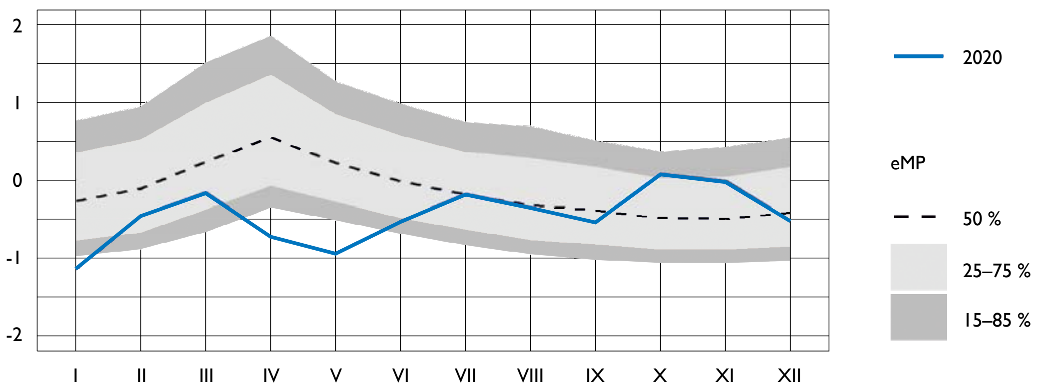
The Morava Stream, January 2020 (Author: Dostálová Martina)

Springs

Springs were strongly below average (91% mEP) and yield was at its minimum in January (Chart 1.3.2). Yield was strongly or exceptionally below-average in most of the country with the exception of average yield in the partial river basin of the Upper Oder and slightly below-average yield in the partial river basin of the Dyje River. Subsequently, yield improved to highest values in March that were within the average limits (65% mEP). Yield started decreasing significantly in April, making April strongly below-average, in partial river basins of the Upper and Middle Elbe and Upper Vltava even exceptionally below-average. The situation went on deteriorating in May and exceptionally below-average prevailed in most of the country (95% mEP), spring yield of 79% being strongly and exceptionally below-average, which made May the driest month of 2020 (Chart 1.3.2).

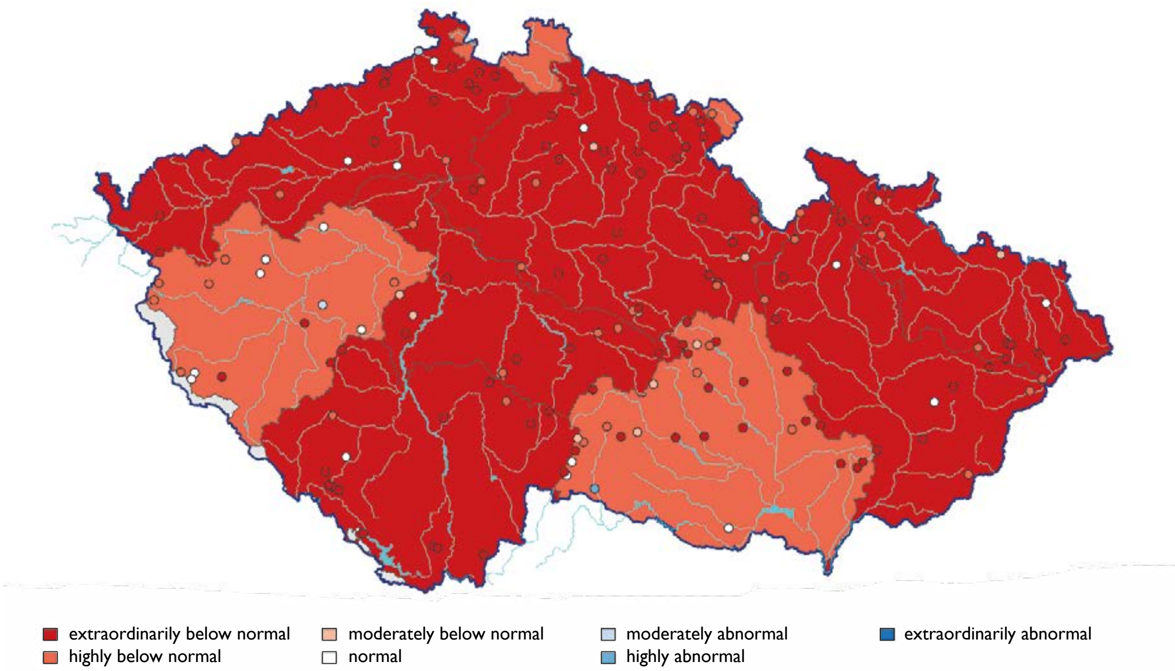
Yield of the springs increased in June. Yield often encompasses even deeper circulation, so the improvement was slower than in the case of shallow wells; below-average situation in most of the country also in June with the exception of average values in partial river basins of the upper Oder and Dyje, while partial river basin of the Ohře, Lower Elbe and other tributaries to the Elbe with even exceptionally below-average values. Yield volumes increased in July when the situation became average and achieved

Chart 1.3.2
Average standardized spring yield in the monitoring network of the Czech Republic in 2020 (blue) in comparison with the long-term average of 1981–2010



Source: CHMI
Note: The Chart also shows quantiles of monthly exceedance curves (monthly EP curve).
The vertical line marks the standard deviation.

Figure 1.3.2
Spring yield in May 2020



Source: CHMI

almost values of highest values from the spring. In summer, yield decreased. However, the situation differed significantly be regions: while in the northwest Bohemia (the Ohře, Lower Elbe and other tributaries to the Elbe) the situation was exceptionally below-average in August, in Morava (the Dyje River) yield was slightly above-average. Similarly, while the situation in north Moravia (the Upper Oder) improved to strongly above-average, the yield in West Bohemia, in the partial river basin of the Berounka River deteriorated to strongly below-average and the situation remained exceptionally below-average in the partial river basin of the Ohře, Lower Elbe and other tributaries to the Elbe, in the partial river basin of the Lusatian Neisse and other tributaries to the Oder deteriorated to exceptionally below-average. In October, the situation in the whole country improved and became slightly above-average and spring yield achieved year-high values. Only 25% of the springs had a strongly/ exceptionally below-average yield, by contrast, 34% of the springs had a strongly/exceptionally above-average yield. The situation differed by regions again: while the whole of Moravia was strongly/exceptionally above-average (the Upper Oder), the situation in west Bohemia only improved to slightly below-average (Berounka) a strongly below-average (Ohře, Lower Elbe and other tributaries to the Elbe). By the end of the year, the yield dropped to slightly above-average values in Moravia and strongly/exceptionally below-average value in west Bohemia (the Berounka, Ohře, Lower Elbe and other tributaries to the Elbe), while average values prevailed in the rest of the country (Table 1.3.2).

Table 1.3.2
Probability of exceeding spring yield in 2020 in river basins in % with respect to the monthly exceedance probability curve of 1981–2010

River Basin	Water yield values at eMP in %											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Upper and Middle Elbe	96	75	71	95	97	89	62	76	78	51	44	69
Upper Vltava	94	78	77	96	97	77	51	42	59	45	26	48
Berounka	89	64	59	84	85	77	83	82	86	77	81	89
Lower Vltava	97	80	71	94	95	89	57	73	78	47	32	63
Lower Elbe	93	77	80	94	97	95	94	97	97	92	94	97
Oder	74	39	52	89	95	30	23	27	13	3	5	22
Morava	85	75	61	86	90	86	90	92	97	71	50	75
Dyje	86	39	46	90	96	85	37	37	44	5	9	23
Lusatian Neisse	84	53	62	90	93	52	15	15	20	8	9	24
Czech Republic	91	65	65	92	95	77	49	51	58	23	27	56

Source: CHMI
Note: The scale of colours corresponds with categories of slightly (75–85%), strongly (85–95%) and exceptionally (95–100%) below-average levels.

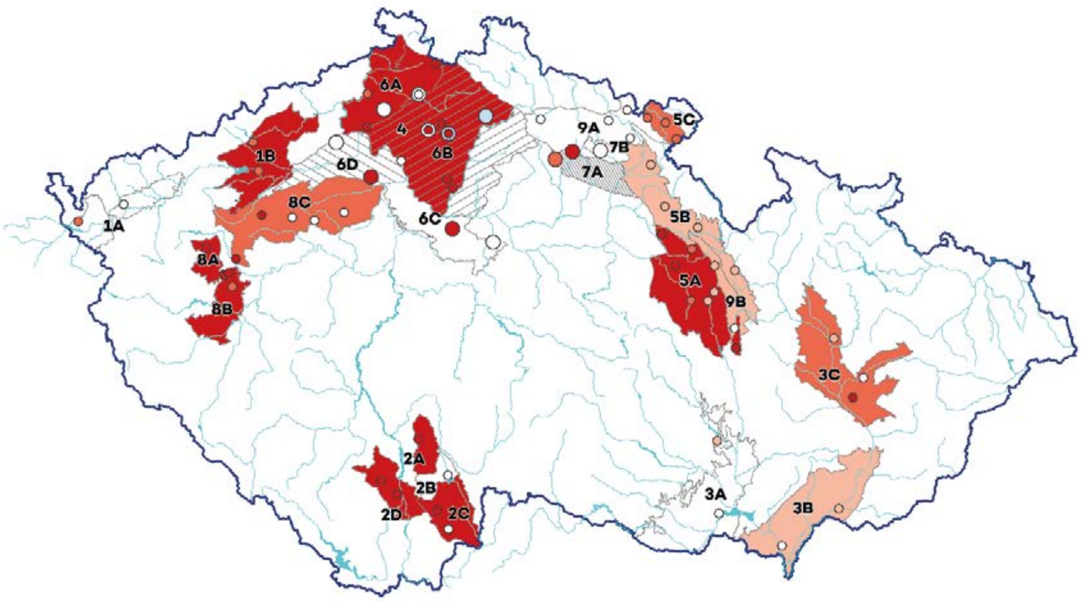
Vyšní Lhoty (Source: Odra River Board)

Deep wells

Levels of deep wells in some sections of hydrogeological regions was strongly or exceptionally below-average throughout the entire year. The region most affected by drought was North Bohemian Cretaceous (group HGR 4) with exceptionally below-average levels throughout the year. In the permo-carbon regions in Central and West Bohemia (8A, 8B) and South Bohemian Basins (2A, 2D) levels were strongly/exceptionally below-average for the entire year. All-year mostly strongly below-average levels where in the Cenomanian of North Bohemian Creteaceous (7A). Levels between slightly and exceptionally below-average values were in the first half of 2020 also in the East Bohemian Cretaceous (5A). By contrast, other groups of HGRs in East Bohemia were mostly average. The situation was better in the first half of 2020 in the Moravian Tertiary with mainly average values with the exception of April and May when a part of the Tertiary was slightly and strongly below-average. The level of deep wells started improving in July, especially in East Bohemia and Moravia, so the level of East Bohemian Cretaceous (5A, 5B), permo-carbon in East Bohemia (9B) and Moravian Tertiary (3B, 3C) was between slightly and exceptionally above-average from October to December. The situation improved and became average also in other HGR groups with the exception of North Bohemian Cretaceous (4), a part of the permo-carbon in Central and West Bohemia (8A, 8B) and South Bohemian Basins (2A, 2D). The situation improved and became average in the Cenomanian North Bohemian Cretaceous (6C, 6D). The situation of a part of permo-carbon in East Bohemia (9A) remained average for the entire year, a part of East Bohemian Cretaceous (5C) improved at the end of the year. In a part of the Cenomanian of North Bohemian Cretaceous (6B) that has significantly multi-year cycle, the level was slightly above-average throughout the year.

With respect to the usual annual regime concerning levels of deep wells, the situation was worst in May when 50% of deep wells were either strongly or exceptionally below-average, wells with average levels were 32%, while there were almost no wells with above-average levels (Fig. 1.3.3). The best situation concerning deep wells was recorded in November when levels of 25% deep wells were strongly or exceptionally below-average, wells with levels with the average limits were 37%, while 13% of well levels were strongly or exceptionally above-average.

Figure 1.3.3
Groundwater levels in deep wells in May 2020



HGR – Basic

- extraordinarily below normal
- highly below normal
- moderately below normal
- normal
- moderately abnormal
- highly abnormal
- extraordinarily abnormal

HGR – cenoman

- extraordinarily below normal
- highly below normal
- moderately below normal
- normal
- moderately abnormal
- highly abnormal
- extraordinarily abnormal

Group HGR

1 – Podkrušnohorské basin
2 – South Bohemian basin
3 – Morava terciér
4 – Severočeská basin
5 – Východočeská basin
6 – Severočeská basin – cenoman
7 – Východočeská cretaceous – basin
8 – Permocarbon Western and central Bohemia
9 – Permocarbon Estern Bohemia

Wells

- HGR basic
- HGR cenoman

Source: CHMI

Ballda (Source: www.shutterstock.com)

2. HYDROLOGICAL EXTREMES

2.1 Flood situations

Looking at 2020 from the perspective of flood situation, it was quite a rich and varied year. Floods occurred as result of a combination of rain and melting snow, standard and torrential rainfalls and every month, with the exception of January and April, had a runoff episode exceeding a flood activity degree. The largest floods (affecting the largest area and also in terms of culmination runoff) in 2020 occurred in June and October, the June floods being first regionally large floods after a prolonged period of drought.

First significant watercourse level rises achieving any of the three flood activity degrees (hereinafter referred to as the "FAD") were recorded in 2020 at the beginning of February particularly in mountain regions in Bohemia and Moravia due to rainfalls (daily totals by 3 February were 15 mm in mountainous regions, in the Šumava around 30 mm) and snow melting. The watercourse levels that rose most significantly on 2–3 February included watercourses in the Otava River Basin with first FAD being exceeded in the Křemelná Stream in Stodůlky and second FAD in the Vydra River at the Modrava profile with Q_2 and in the Otava River at the Rejštejn (Q_2) and Sušice ($Q_{<<2}$) profiles. On 4 February, other significant rises were recorded in watercourses in the Lower Morava and Bečva River Basin with second FAD being exceeded in the Velká Stanovnice at Karolinka under the reservoir and in the Bystřička at the profile above the reservoir (both $Q_{<<2}$) and in the Luhačovický Stream at the Luhačovice water structure profile with Q_{10}. First FAD was exceeded in the period between 4 and 6 February at several other profiles in the Bečva River Basin, in the Svratka at Dalečín and in some tributaries to the Morava River and directly in the Morava River. Similarly, watercourses exceeded first FAD (with $Q_{<<2}$) in the Ohře River at the WS Skalka profile and in the Upper and Middle Elbe. River Basin: at the Vestřev profile in the Elbe and at Čermná in the Tichá Orlice River, at Úhřetice in the Novohradka Stream, at Přemilov in the Chrudimka River and at Železný Brod in the Jizera River. Other abundant rainfalls linked with snow melting occurred on 23–24 February and had impact primarily on watercourses draining the Krkonoše, Jizera Mountains, Orlické Mountains and Šumava. Second FAD with $Q_{<2}$ was exceeded in the Elbe River at Vestřev and in the Otava River at Rejštejn, first FAD being exceeded at several other profiles in the Upper Elbe, Orlice, Jizera and Upper Otava River Basins, and at the spring section of the Vltava River.

V In 3-4 March, due to manipulation at the WS Nové Mlýny in the Dyje River, first FAD was temporarily exceeded at the section under the reservoir and at the Břeclav-Ladná profile. River levels rose again on 11–12 March due to snow melting and abundant rainfalls when 5–20 mm in most of the country with maximums of 30 mm/24 hours. It was particularly tributaries to

The Second Level of Flood Activity, The Orlice Stream, Hradec Králové (Source: Elbe River Board) the Middle Elbe that rose and exceeded first FAD: the Doubrava River at Žleby, the Jizera River at Železný Brod together with watercourses in the Upper Otava River Basin and in the Upper Ohře River Basin. The water yield ranged from $Q_{<<2}$ to $Q_{<2}$ with the exception of the Svatava River where two-year high flow rate was recorded at the Svatava profile.

After April that was extremely poor in terms of precipitation, first significant rainfalls occurred 10–11 May when 10–30 mm of precipitation fell in Bohemia with maximum value of 60 mm. Watercourses responded with elevated levels, most significantly in the Botič Stream at Jesenice and Nusle and in the Rokytka Stream at Vysočany where first FAD was exceeded. The Botič Stream at Nusle and the Rokytka Stream at Vysočany reached two-year high flow rate. Further rainfalls occurred when a weather front passed over the country on 13–14 May resulting to second FAD being temporarily exceeded in the Maršovský Stream under the Hubenov WS with Q_2 on 14 May. At the very end of the month, rainfalls were abundant in the north-east part of Bohemia with 15 to 30 mm of precipitation, occasionally even 42 mm. Due to the rainfalls, the Lučina Stream exceeded first FAD at Horní Domaslavice (Q_2), in the Ropičanka at the Řeka profile ($Q_{<<2}$), in the Stonávka at Hradiště ($Q_{<<2}$) on 31 May and water level culminated above first FAD also in the Morávka Stream at Vyšní Lhoty on 1 June ($Q_{<2}$).

Floods caused by torrential rains in June 2020 occurred in four episodes, evenly distributed in the whole month. The areas most affected by floods were the Upper and Middle Elbe, Lusatian Neisse, Oder, Bečva, Morava and Dyje River Basins. The highest values of culmination flow rates were achieved in the Velička River at the Velká nad Veličkou and Strážnice profiles with intervals of $Q_{20\text{-}50}$ and in the Oslava River at the Dlouhá Loučka profile with interval of Q_{50}.

First flood episode was a response to abundant rainfalls from the night of 07/08 June when between 35 to 50 mm, occasionally even 100 mm fell in 24 hours in a narrow belt stretching from South Bohemia to Bohemian-Moravian Highlands to the Jeseníky Mountains. The highest rises were recorded on 7 June shortly before midnight in smaller watercourses draining the Jeseníky: third FAD was exceeded in the Desná River at Kouty with water yield of Q_5, in the Merta Stream at Sobotín with Q_{10} and in the Oslava River at Dlouhá Loučka with Q_{50}. During the Monday morning on 8 June, third FAD was exceeded also in the Oskava at Uničov with Q_{20}. Second FAD was exceeded in the Moravice River at Velká Štáhle, first FAD was exceeded in many other watercourses in the affected area. In the Dyje River Basin, level of the Želetavka River at Jemnice rose on 7 June shortly before midnight, with Q_5 reaching second FAD, first FAD was also exceeded in the Jihlava, Balinka, Svratka, Loučka and in the Austrian part of the Dyje River. River levels fluctuated due to recurring rainfalls also in the Vltava River Basin, in the Blanice at the Blanický Mlýn and Podedvory profiles reaching at times first FAD.

Second significant runoff episode occurred on 13 and 14 June when torrential rain and storms hit most of the country on 13 June with highest precipitation of 30–40 mm/hour. The most significant rises were recorded in the Chrudimka and Novohradka River Basins. Third FAD was exceeded in the Novohradka at Luž on 14 June with $Q_{10\text{-}20}$, second FAD was reached by the Krounka at Otradov with $Q_{10\text{-}20}$ and in the morning of 15 June also in the Novohradka at Úhřetice with $Q_{2\text{-}5}$. First FAD was exceeded in the Loučná and Doubrava. Some swollen watercourses in the Upper Sázava River Basin reached second FAD on 13 and 14 June with Q_2 (the Sázava River at Žďár and at Sázava), first FAD was exceeded in Prague and Central Bohemia (Botič at Jesenice-Kocanda, Červený Stream at Hořovice). Watercourse levels rose significantly also in the Bohemian section of the Oder River Basin where second FAD was exceeded on 13 June with Q_2 in the Lusatian Neisse at the Proseč nad Nisou profile and first FAD at Liberec and in the Řasnice at Frýdlant-Fügnerova. The Upper Svratka was the river with highest yield in the Dyje River Basin, some of its watercourses exceeding third FAD on 14 and 15 June (the Svratka River at Borovnice with Q_2, second FAD at Dalečín with $Q_{<2}$, the Loučka/Bobrůvka at Skryje exceeded second FAD with $Q_{<5}$ and at Dolní Loučky with $Q_{<2}$). Also, levels of watercourses in the Morava River Basin hit by torrential rains rose sharply exceeding first FAD in the Olšava River Basin at several profiles (the Olšava at Uherský Brod, the Luhačovický Stream at Polichno and the Haná at Vyškov).

Third June flood episode was a response to rainfalls lasting from 18 to 20 June, when it rained in the whole of the country and daily totals for the Czech Republic oscillated around 15 mm. This led to increases in watercourses draining the Orlické Mountains, significant rises were also recorded in tributaries to the Middle Elbe and watercourses draining the Beskids, Jeseníky and Jizera Mountains. On 18 June, third FAD was exceeded in the Novohradka at the Luže profile with Q_2 and second FAD was exceeded at the Úhřetice profile with $Q_{2\text{-}5}$, in the Chrudimcka River at the Hamry profile (Q_2), in the Mrlina Stream at Vestec ($Q_{<2}$) and in the Kněžná at the Rychnov nad Kněžnou profile (Q_2). On 21 June, there were further level rises, especially in watercourses draining the Orlické Mountains and in tributaries to the Middle Elbe. The Orlice at the Týniště nad Orlicí culminated on 21 June reaching second FAD ($Q_{<2}$) and in the Novohradka River at Luži reaching third FAD with Q_{10}. 22 June saw culmination of the Novohradka River at Úhřetice (third FAD with Q_5), the Chrudimka River at Nemošice (third FAD with Q_2) and the Tichá Orlice River at Čermné (second FAD with Q_2). Also, in the Sázava and Malše River Basins, levels rose reaching second FAD at the following profiles: Černovický Stream at Tučapy, Černá at Ličov with $Q_{<2}$ and Malše at Pořešín with $Q_{<2}$). The highest runoff response in the Oder River Basin was in the Jičínka River at Nový Jičín where third FAD was exceeded on 19 June with Q_2. On 20 June, the highest amount of precipitation of up to 100 mm fell in the Czech part of the Oder River Basin in the Jizera Mountains region. Third FAD was exceeded in the Smědá at the following profiles: Bílý Potok (water yield Q_2), Frýdlant (Q_2), Višňová (Q_5) and Předlánka (Q_2) and in the Řasnice Stream at the Frýdlant profile (Q_2). Due to incessant rainfall watercourse levels kept rising repeatedly, especially those draining the Beskids and north side of the Jeseníky, second FAD was exceeded in the Černý Stream at Velká Kraš (Q_2) and in the Černá Opava at Mnichov (Q_5). Watercourse levels rose also in the Morava River Basin, particularly in the Velička and Upper Bečva River Basins. Third FAD was reached in the Velička River at Velká nad Veličkou with Q_{20} on 20 June and on 21 June at Strážnice with Q_{10} and in the Bystřička River at the Bystřička above reservoir profile with Q_2. The level at Bystřička under reservoir exceeded second FAD with $Q_{<2}$.

The last flood episode in June lasted from 22 to 30 June when levels, due to rainfalls and previous high saturation, rose quickly especially in the Upper Vltava, Upper Elbe, Oder and Morava River Basin. The richest day in terms of precipitation was 29 June when between 5 and 30 mm fell in 24 hours in the Bohemian-Moravian Highlands and, at some places even 30–55 mm. On 29 June, third FAD was exceeded in the Novohradka at Luž (culmination of Q_5) and in the Doubrava at Pařížov (Q_2), second FAD was exceeded in the Loučná at Cerekvice (Q_2) and in the Divoká Orlice at Orlické Záhoří and in the Kněžná at Rychnov nad Kněžnou (both with Q_2). On 30 June, third FAD was exceeded in the Tichá Orlice at Čermná nad Orlicí and in the Orlice at Týniště nad Orlicí with Q_2. Second FAD was exceeded in the Novohradka at Úhřetice (Q_2) and in the Chrudimka at Nemošice ($Q_{<2}$). Level of the Loučná culminated at Dašicích reaching second FAD with Q_2 in the morning of 1 July. First FAD was exceeded at several other profiles in tributaries to the Middle Elbe and in the Elbe at Přelouč. Similarly, first FAD was reached by watercourse levels in the Malše River Basin, second FAD was exceeded in the Černovický Stream River Basin at the Tučapy profile. Second FAD was reached by the Sázava at the Žďár nad Sázavou and Sázava profiles where levels kept rising until 30 June when second FAD was exceeded in the Želivka at the Želiv profile with $Q_{<2}$. Between 20 and 40 mm fell in the Oder River Basin with highest values of 80 mm on 26 June. On the night of 26/27 June, second FAD was exceeded by the Porubka at the Vřesina profile (with Q_{10}) and the Řasnice at Frýdlant ($Q_{<2}$), first FAD was exceeded at several other profiles in the Oder River Basin. On 26 and 27 June, third FAD was reached by the Brodečka at Otaslavice (Q_2), by the Romže at Polkovice (Q_2) and by the Velká Haná at Vrchoslavice, second FAD was reached by the Haná at Vyškov (Q_2) in the Morava River Basin. On 29 June, third FAD was exceeded in the Třebůvka at the Mezihoří (Q_{10}) and Hraničky (Q_5) profiles and in the Svratka at the Borovnice and Dalečín (both Q_2), second FAD was exceeded by the Jevíčka at Chornice with Q_{10} and at many other profiles. Watercourse levels culminated at some profiles due to peak flood wave flowing through on 30 June, when third FAD was exceeded in the Třebůvka at Loštice with Q_2, in the Morava at Moravičany with $Q_{<2}$ and in the Romže (Valové) at Polkovice with $Q_{<2}$. First or second FAD was exceeded in many other watercourses.

In July, significant watercourse increases occurred due to torrential rain in 10–11 July when first FAD (with yields from $Q_{<<2}$ to $Q_{<2}$, the level of the Jevíčka at Chornice culminated with Q_2) was exceeded in the Upper Sázava River Basin at the Žďár nad Sázavou profile and at some places of the Svratka River Basin. Other increases occurred also on 19 and 20 July due to severe local storms. First FAD was exceeded by the level of the Loučná at the Litomyšl profile (with $_{Q2}$) and at Cerekvice nad Loučnou ($Q_{<2}$), second FAD was briefly exceeded by the Polečnice at Český Krumlov with $Q_{<2}$, first FAD was repeatedly exceeded in the Lusatian Neisse at Liberec and Proseč nad Nisou (with $Q_{<<2}$). Watercourse levels rose due to abundant rainfalls also on 26 July, first FAD being exceeded in the Tichá Orlice at the Lichkov profile.

Watercourse levels of rose due to repeated rains and storms also in August, some exceeding FADs. On 3 August, between 30 and 50 mm fell during 24 hours with maximums around 70 mm in the belt stretching from South Bohemia to south-east part of the Bohemian-Moravian Highlands to Orlické Mountains and to the Jeseníky Mountains. On 4 August, second FAD was exceeded by the Černá at Ličov with $Q_{<2}$ and by the Lužnice at Nová Ves nad Lužnicí. Second FAD was also reached on 5 August by the culminating Lužnice River at the Pilař profile with Q_2 and by the Svratka River at the Brno-Poříčí profile ($Q_{<2}$). First FAD was exceeded at a large number of other profiles in the watercourses draining the Šumava and its foothills, Novohradské Mountains ant east part of the Bohemian-Moravian Highlands with $Q_{<<2}$ and Q_2. On 14 and 15 August, watercourse levels rose mainly on the north edge of the Bohemian-Moravian Highlands in the Novohradka, Třebůvka and Bělá River Basins and in the Jihlava River Basin and in the Šumava foothills in the Blanice River Basin exceeding first FAD. Sudden swollen level exceeding second FAD was recorded on in the Botič Stream at Prague-Nusle with Q_2 14 August. On 17 August, heavy rains in the south-east Bohemia led in combination with previous high saturation of the river basin in the Šumava and its foothills to a local rise of some watercourse levels: first FAD was exceeded by the Křemelná and Křemžský Stream. The highest rise of a level was recorded in the Zlatý Stream where the level culminated at the Hracholusky profile exceeding third FAD with Q_{20}. On the night of 18/19 August it rained heavily, especially in the east of the Czech Republic and in the Beskids region, mean total precipitation in 24 hours was 35 mm with highest values of approximately 100 mm. The precipitation resulted in sudden watercourse level rises, the most significant being in the Lubina, Ostravice, Olše and Bečva River Basins with first FAD being exceeded at many profiles. Level of the Lomná culminated at Jablunkov with Q_5. In the Morávka at Vyšní Lhoty, in the Vsetínská Bečva at Velké Karlovice, in the Olše at Český Těšín and at Dětmarovice and in the Krasovka at Radim levels reached at their peak second FAD with Q_2. At the end of the month, second FAD was exceeded in the Botič Stream at Prague-Nusle with Q_2, which was due to local storms accompanied with torrential rains.

In September, highest rises were recorded at the very beginning of the month (1–2 September) after long-lasting rainfalls in watercourses in the Orlické Mountains, Bohemian-Moravian Highlands, Jeseníky and Beskids where first FAD was exceeded at several profiles. Second FAD was exceeded in the Novohradka at Luž (with Q_2) and at Úhřetice ($Q_{<<2}$), in the Černý Stream at Velká Kraš (Q_2), in the Svratka at Borovnice ($Q_{<<2}$) and briefly also in the Jihlava River at Brasouzy ($Q_{<<2}$). First FAD was occasionally approached by watercourse levels in the Lower Dyje and Middle Morava River Basins (Blata, Dyje and Třebůvka) after abundant rainfalls at the end of the first September week. At the end of the month, watercourse levels rose in the Upper Oder and Bečva River Basins with a mean precipitation value of 40–60 mm in 24 hours with peak values over 70 mm. On 26 September, first FAD was exceeded at many profiles in the Bečva River Basin, second FAD was reached by the culminated level of the Bystřička at the profiles above reservoir and under reservoir with $Q_{<2}$ and in the Jičínka at Nový Jičín (Q_2).

As the case was in June, even October floods affected primarily the Upper and Middle Elbe, Lusatian Neisse and Stěnava River Basins and in the Oder, Bečva and Morava River Basins in Moravia. The highest values of culmination flow rates seen from the perspective of repetition were achieved in the Morava River Basin in the Lower Morava River at the Strážnice profile ($Q_{20\text{-}50}$).

The first October wee k was strongly above-average in terms of precipitation, especially in the east of the country. On 2 October, levels of watercourses draining the Beskids and Jeseníky rose, first FAD was reached (with $Q_{<<2}$ to $Q_{<2}$) in the Ropičanka, Lubina, Oder, Morávka, Opava and Krasovka. Furhter level rises occurred in the region on 3 and 4 October when second FAD ($Q_{<2}$) was reached by the Bystřička at the Bystřička above reservoir profile and in the Velká Stanovnice at the Karolinka under reservoir profile together with several profiles in the Bečva River Basin exceeding first FAD. In the week from 12 do 18 October, rainfalls occurred every day, thei highest 24-hour totals were recorded on 13 October and ranged between 10 and 60 mm, reaching up to 100 mm in the north and north-east of the country. The most affected regions in Bohemia included the Upper Elbe, Jizera and Orlice River Basin and tributaries to the Middle Elbe. Third FAD was exceeded in the Loučná, Novohradka, Chrudimka and Doubrava with yields from Q_2 to Q_{10} (in the Novohradka up to Q_{20}). Second FAD was exceeded in the Třebovka, Tichá Orlice, Upper Chrudimka and Jizera, while first FAD was reached at many other profiles including in the Elbe at Kostelec nad Labem. Second FAD was also exceeded in the Sázava River Basin at the Žďár nad Sázavou and Sázava profiles and first FAD was exceeded at many profiles in the Sázava River Basin. Neverhtless, the river basins most affected by rainfalls in the period from 13 October were the Oder and Morava River Basins. The highest rises were recorded in the Oder River at the Oder profile, the Krasovka at Radim, the Opava at Opava and Děhylov, the Řasnice at Frýdlant, the Smědá at Višňová and at Předlánky and the Stěnava at Meziměstí where third FAD was exceeded with yields between $Q_{<<2}$ and $Q_{<2}$. Other profiles of the Oder, Opavice, Moravice, Jičínka, Porubka, Stonávka, Olše, Osoblaha and Černý Stream recorded exceeding of second FAD, while first FAD was exceeded at numerous other profiles. In the Morava River Basin the most significant rises of the Morava River were at Moravičany, Spytihněv, Strážnice and Lanžhot, rises of the Třebůvka at Mezihoří, Hraničky and Loštice, rises of the Jevíčka at Chornice, the Olešnice at Kokory, the Bystřička at above the reservoir, the Bečva at Teplice and Dluhonice, the Blata at Klopotovice, the Romže at Polkovice, the Moštěnka at Prusy, the Luhačovický Stream at Polichno and the Velička at Strážnice, third FAD being exceeded with yields between Q_2 and Q_{10}, occasionally reaching up to Q_{20}. Third FAD was also exceeded in the Dyje River Basin in the Svratka River at Dalečín and at Židlochovice and in the Bělá at Boskovice with yields between Q_2 to Q_{10}. With respect to the large-scale of the floods, the highest yield due to peak flood wave flowing through was recorded in the Lower Morava where the level culminated at Strážnice on 14 October with $Q_{20\text{-}50}$. Second FAD was frequently exceeded (the Bečva River Basin, tributaries to the Morava, the Morava River, the Svitava, the Svratka, the Litava, the Dyje) as well as first FAD. Further rises were reported by the end of October, when the most significant increases occurred in watercourses draining mountanious regions in North Bohemia, the Czech-Bohemian Highlands and the Beskids on 31 October. Third FAD ($Q_{<2}$) was exceeded in the Smědá at the Višňová profile and first FAD at Bílý Potok, Předlánky and in the Řasnice at Frýdlantu (all with $Q_{<2}$). Occasional exceeding of first FAD ($Q_{<2}$) was also recorded in the Upper Jizera River, in the Loučná, Doubrava and Svratka Rivers at Borovnice and Dalečín.

In November, watercourse levels rose to FAD at the very beginning of the month due to abundant rainfalls in the Czech-Bohemian Highlands. On 4–5 November, first FAD was exceeded by watercourse levels at several profiles in the Orlice River Basin, in tributaries to the Middle Elbe and in the Upper Sázava, Svratka and Třebůvka River Basin (mostly with $Q_{<<2}$ to $Q_{<2}$). Second FAD was exceeded in the Novohradka at Luže (with Q_2) and Úhřetice ($Q_{<2}$) and in the Loučná at Dašice ($Q_{<2}$). Level exceeding first FAD persisted in the Loučná at Dašice until 9 November.

The end of December saw heavy rains in the east of the country in the White Carpathians and Beskids, which led in combination with strongly saturated soil to sudden watercourse level increases on 29/30 December. Watercourses at many profiles of the Bečva River Basin exceeded first FAD. The Velička River exceeded briefly third FAD at Strážnice on 29 December with Q_{10}, second FAD was exceeded in the Velička at Velká nad Veličkou (Q_{10}), in the Kolelač under the WS Bojkovice (Q_5), in the Olšava at Uherský Brod (Q_2) and in the Vlára at Popov (Q_2).

2.2 Remedying flood damage

The Ministry of Agriculture (hereinafter referred to as the "MoA") administers grant programmes 129 284 "Remedying Damage at Fishponds and Water Reservoirs" and 129 320 "Support for Remedying Flood Damage to the Infrastructure of Water Supply and Sewerage Systems II" that are used in case of flood events. Since no significant floods occurred in 2020, the programmes were not activated and no support from them was provided.

The Ministry of the Environment (hereinafter referred to as the "MoE") continued administering programme 115 273 "Remedying Damage Caused by Natural Disasters in 2014" that was conceived in response to the landslides in South Moravia in 2014.

For more detailed information including funding see Chapter 9 Financial Support for Water Management.

2.3 Drought situation

The Czech Republic has been beset by drought since 2014, the driest years being 2015 and 2018. It is due to low amount of precipitation when only 2017 reached and 2020 exceeded the nation-wide annual precipitation long-term average for 1981–2010, all the other years were below-average in terms of precipitation.

Another negative factor is above-average air temperature that manifests, especially in the growing season, with larger water losses by evaporation and transpiration. 2020 in the Czech Republic is assessed as strongly above-average in terms of air temperature, the mean annual air temperature (9.1°C) being 1.2°C higher than the long-term average of 1981–2010. 2020 ranks, alongside with 2000 and 2007, as the 5-th-7th warmest year since 1961. The two previous years, 2018 and 2019, were warmer with mean annual air temperature of 9.6 a 9.5°C.

Only two months of 2020 had a negative deviation from the mean monthly temperature from the long-term average 1981–2010: May (deviation -2.1°C) and July (deviation) -0.1°C). May was assessed as a strongly below-average month. The following months were considered as average in terms of temperature: March, June, July, October and November. Five months had above-average mean temperature: January (deviation +2.3°C), April (deviation +1.3°C), August (deviation +1.5°C), September (deviation +1.2°C) and December (deviation) +2.6°C).

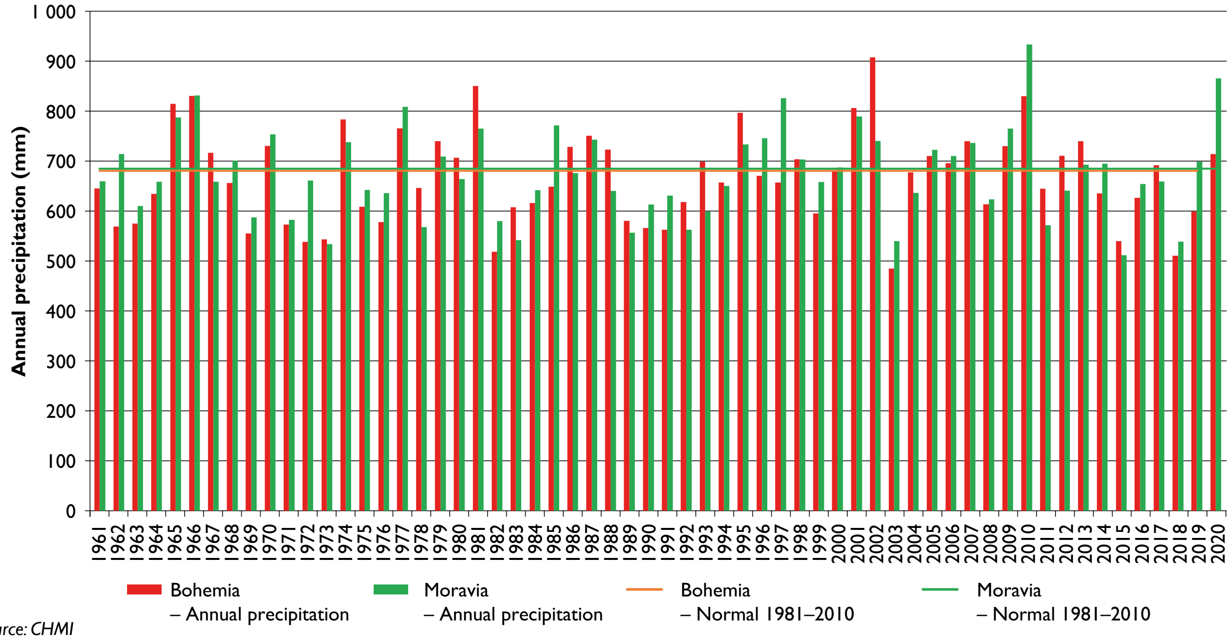
The most significant deviation from the long-term average (+4.6°C) was recorded in exceptionally above-average February. Together with February 1966 it was the warmest February in terms of mean monthly temperature.

2020 was above-average in terms of precipitation (compared with the 1981–2010 average), the mean annual precipitation differing significantly in Bohemia and Moravia. In Bohemia, the precipitation was 105% of the long-term average, whereas in Moravia it was 126% of the long-term average. When compared with nation-wide annual precipitation monitored since 1961, 2020 ranks as the second highest year with its annual precipitation in Moravia (after 2010) as Chart 2.3.1 shows.

The precipitation deficit that cumulated in the Czech Republic since 2014 ended in 2019 and the previous precipitation deficit started to decrease in 2020, as the case was after 6-year deficit periods in 1971–1976 and 1989–1994 (see Chart 2.3.2).

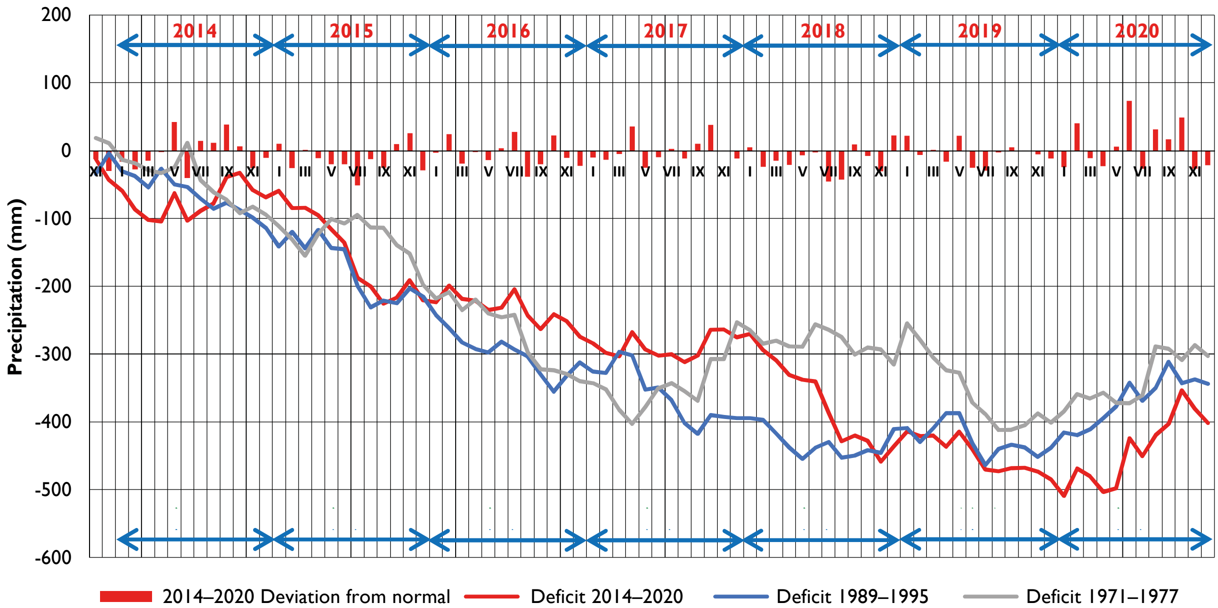
Comparing the precipitation deficit in Bohemia and Moravia we can observe that the deficit period started in Bohemia in

Chart 2.3.1
Annual precipitation in the Czech Republic in 1961–2020



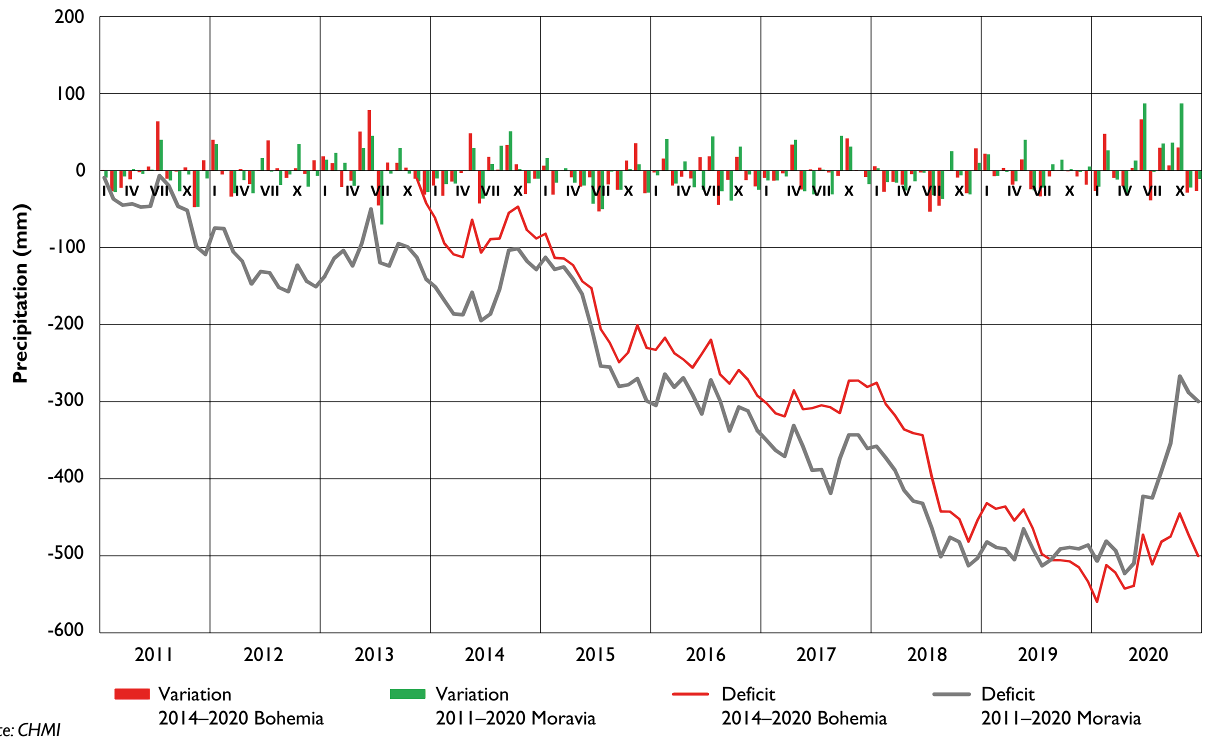
Source: CHMI

Chart 2.3.2
Mean precipitation in the Czech Republic in 2014–2020



Source: CHMI

Chart 2.3.3
Precipitation deficit in Bohemia and Moravia in 2011–2020



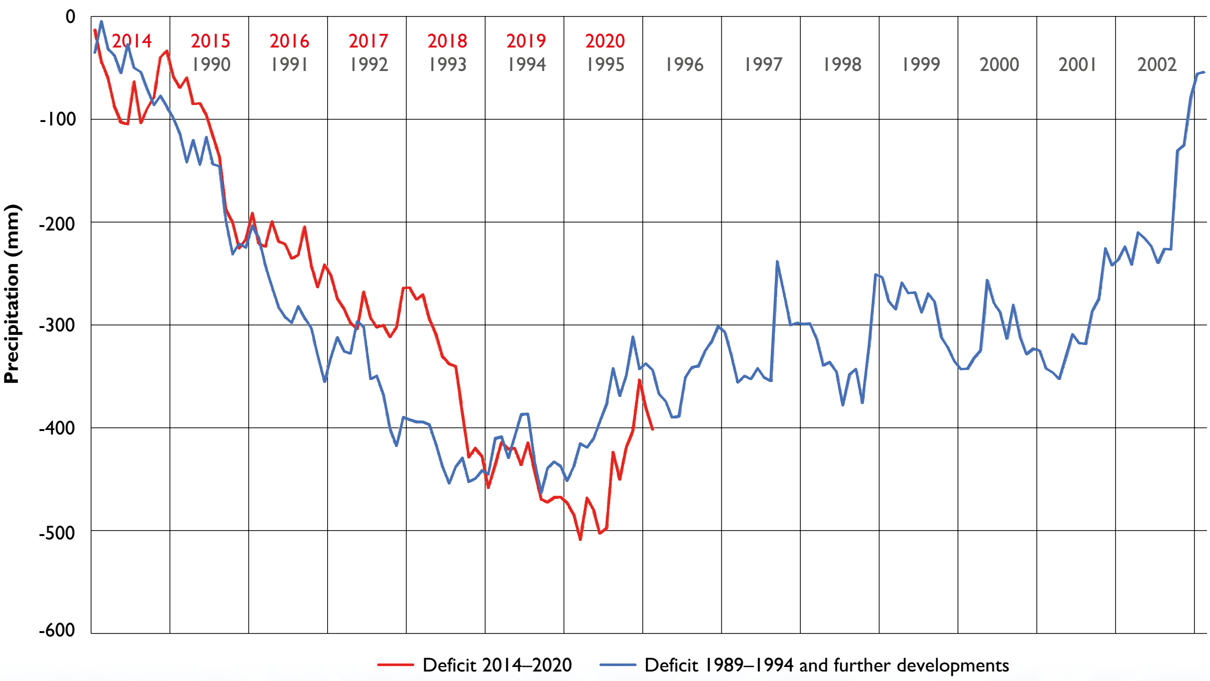
Source: CHMI

2014, whereas in Moravia in 2011 already. The deficit reached the lowest values in Bohemia in January 2020 with the deficit of 560 mm. The deficit did not grow significantly in Moravia since November 2018 deficit and only fluctuated around 500 mm with a maximum of 523 mm in April 2020. The different regional course of precipitation in 2020 manifested in the speed of decreasing the deficit in Bohemia to 500 mm (calculated since 2014) and in Moravia to 300 mm (calculated since 2011) as Chart 2.3.3 shows.

The course of precipitation deficit in the Czech Republic in 2014–2020 and its further development can be compared with a similar deficit period of 1989–1994 and its further development until 2002, when the deficit returned to zero with respect to flood precipitation (see Chart 2.3.4).

Hydrological drought is defined as a lack of surface water and groundwater resources. The following part is dedicated to drought concerning surface waters that is assessed using

Chart 2.3.3
Precipitation deficit in Bohemia and Moravia in 2011–2020



Source: CHMI

The Morava Stream, The Weir Nedakonice, The Lock Chamber (Source: Morava River Board)

three aspects: the number of profiles with flow rates below 25% of the monthly average (<25% Q_m), number of profiles with flow rates below Q_{355d} (i.e. flow rate that was reached or exceeded at a given profile for 355 days a year, failure to reach it is an indicator of hydrological drought) and number of profiles with flow rates below Q_{364d} (flow rate that was reached or exceeded at a given profile for the entire year).

In terms of runoff, 2020 can be assessed from the perspective of two different periods of time. Whereas in the first five months of 2020 most of the profiles monitored showed below-average (some even strongly below-average) flow rates, the second half of the year was only average or slightly above-average in terms of runoff. The exception was December, when all main river basins, except for the Morava and Dyje River Basins had significantly below-average flow rates again.

First weeks of 2020 were accompanied with a period of prolonged drought that started in 2014. At the beginning of the year, almost a quarter of monitored profiles reported flow rate below 25% Q_I, the highest in tributaries to the Middle Elbe and in the Berounka River Basin. 10% of the monitored profiles were below the hydrological drought limit of Q_{355d}. Due to thawing accompanied with rainfall at the end of January the situation improved and none of the profiles monitored dropped below the hydrological drought threshold (Q_{355d}) since mid-March, see Chart 2.3.5.

From mid-March to the end of April, the share of profiles with flow rates below 25% Q_m grew sharply, which was due to a prolonged period with low precipitation, reaching the highest number at the end of April / beginning of May. Almost two thirds of the total number of monitored profiles had flow rate below 25% Qm. Water yields below the hydrological drought limit (Q_{355d}) were reported for 14% of the profiles. The most affected areas by drought were the Middle Elbe, Orlice, Ohře, Ploučnice, Kamenice, Upper Vltava, Morava and Oder River Basin where some watercourses reached all-time lows (see Figure 2.3.1). When compared with the previous year of 2019, the number of profiles with indication of hydrological drought in April 2020 was approximately twofold.

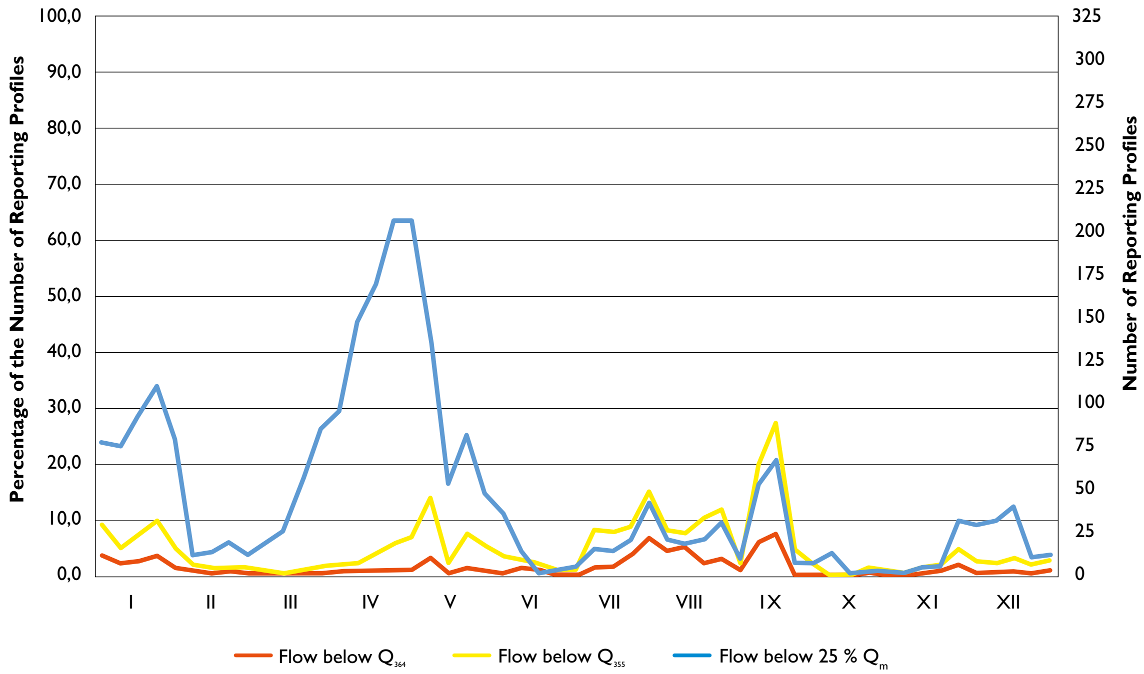
The situation started improving thanks to precipitation since mid-May and in June the Czech Republic was affected by regionally significant floods that hit most of the river boards in the country and thus interrupted the prolonged period of drought. Thanks to the floods, there were almost no profiles below 25% Q_{VI} or profiles indicating hydrological drought (Q_{355d}) by mid-June.

In the following summer months, the number of profiles indicating hydrological drought increased slightly, however, the number in 2020 was half (occasionally even third) when compared with the previous year. The highest share of profiles (27% of the total of monitored profiles) with flow rates below the hydrological drought limit (Q_{355d}) was recorded in mid-September (7.5% of the total number of profiles had flow rates below Q_{364d}), while the river basins most affected by drought were the Lower Elbe and Berounka River Basins.

After the end of September and especially October that were rich in precipitation (with several flood episodes), there were almost no profiles indicating hydrological drought (Q_{355d} and Q_{364d}) or with flow rates below 25% Q_m until the end of the year. Only in a short period at the end of November and in two first decades of December, the number of profiles with flow rates below 25% Q_m increased slightly to approximately 10%, most of them being in the Lower Elbe and Ohře River Basins.

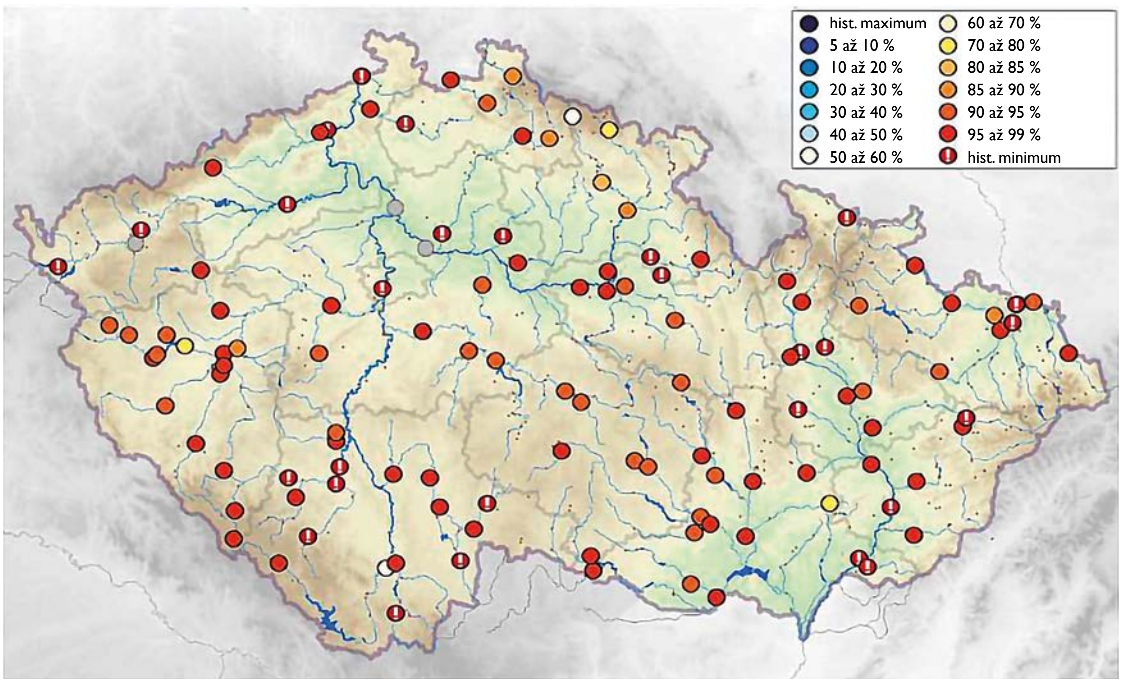
Levels of groundwater with shallow circulation was affected at the beginning of 2020 by strong deficit from the previous dry year. Shallow water levels were the lowest in spring 2020 since 1971. Year-low values, with levels being exceptionally below-average, was reached in May. In June and July, the situation improved significantly to average values that lasted until September. In October, there was another improvement to strongly above-average values and shallow well levels reached year-high values. Nevertheless, the situation was not the same in the whole of the Czech Republic. In North Moravia the situation was above-average from June until the end of the year. In the last quarter, shallow water levels were even above-average in the whole of Moravia (with the exception of average level in December in the partial river basin of the Upper Oder). By contrast, in northwest Bohemia (the Ohře, Lower Elbe River Basins and other tributaries to the Elbe) the drought persisted for almost the entire year.

Chart 2.3.5
Changes in mean flow rate at monitored profiles in the Czech Republic in 2020



Source: CHMI

Figure 2.3.1
Probability of exceeding daily flow rates at selected profiles on 29 April 2020



Source: CHMI

2.4 Interdepartmental commission WATER-DROUGHT

In 2020, members of the Interdepartmental commission WATER-DROUGHT monitored situation concerning the implementation of measures and prepared the "Schedule of financial needs for implementing measures aimed at protection against drought and lack of water until 2030".

In 2020, the executive committee of the Commission met five times on the following dates: 15 January, 29 July and 24 August at the T. G. Masaryk Water Research Institute, 22 June at the Vltava River Board with the participation of Mgr. Richard Brabec, the Minister of the Environment, and Ing. Miroslav Toman, CSc., the Minister of Agriculture, and 14 September in online videoconference in connection with the COVID-19 pandemic.

Besides preparation of the Position Report on progress when performing tasks arising from the Concept of Protection Against Drought Impacts in the Czech Republic in 2020, the ministries involved prepared materials for the "Schedule of financial needs for implementing measures aimed at protection against drought and lack of water until 2030" (hereinafter the "Schedule"). The Schedule maintains the structure and classification of the measures identified in the Concept and was prepared for the period of 2021-2030. Large projects such as construction of water reservoirs and large irrigation systems at specific locations are identified independently in the Schedule. Sets or measures aimed at improving availability in the form of interconnecting and extending water pipeline groups, water transfers and artificial infiltration are presented in a summarizing manner. Other types of measures are smaller projects that shall be implemented at different locations, which is why the Schedule includes them as totals under costs of implementing measures covered by certain financial mechanisms that are currently available. The Commission shall present the final Report on performing under the Concept to government members under Resolution No. 528/2017 by 31 December 2022.

Website www.suchovkrajine.cz is dedicated to the Interdepartmental commission WATER-DROUGHT, Concept of protection against consequences of drought in the Czech Republic and the 2019 Position Report.

The Low Water Level at the Orlik Dam (Source: Vltava River Board)

Allexxandar (Source: www.shutterstock.com)

3. QUALITY OF SURFACE WATERS AND GROUNDWATERS

3.1 Surface water quality

Current surface water quality under ČSN 75 7221 in comparison with the 1991–1992 period

The map of the quality of waters in selected watercourses of the Czech Republic was first produced for the 1991–1992 period under ČSN 75 72221 standard Water Quality – Classification of Surface Water Quality. Since this biennium, the Report on Water Management in the Czech Republic has annually included analogical maps so that they can be compared with the current water quality. With regard to the scope of indicators monitored in the 1990s, only a basic classification could be used for this comparison. As of 1 December 2017, an amendment to ČSN 75 7221 standard Water Quality – Classification of Surface Water Quality entered into force having replaced (ČSN 75 7221 Water Quality – Classification of Surface Water Quality) a standard that was in force for the previous 19 years.

The m of the standard was to take into consideration requirements concerning the current state in surface water protection in terms of pollution indicators as well as the degree of acceptable pollution. Monitored indicators and limit values of quality classes were reviewed. That is why a new map of the quality of surface waters was produced for 1991–1992 (Figure 3.1.1) under the amended ČSN 75 7221 for the sake of objective comparison.

COD_{Cr}, BO_{D5}, N-NH_4, N-NO_3 and P_{total} were used as indicators for assessment of surface waters and as Figure 3.1.2 shows, water quality has improved over the past 25 years, however, there are still watercourse sections with surface water quality of Class V. Most watercourses are classified in Class III – polluted water. The number of watercourse sections in Classes I and II keeps growing.

To produce the above presented map of quality of surface water of the Czech Republic for the period 2018–2020 in accordance with ČSN 75 7221, the resulting evaluation from selected profiles of the water quality monitoring network provided by the Czech Hydrometeorological Institute (from primary data sent by the individual River Boards, s.e.). The respective monitored hydrometric profiles are classified in the following water contamination quality classes under the amended ČSN 75 7221 standard:

Class I unpolluted water – surface water status that was not significantly affected by human activity, with water quality indicators do not exceed values corresponding to the common natural background

The Svitavka Stream, The Revitalization (Source: Ohře River Board) of the respective watercourse,

Class II slightly polluted water – surface water status that was affected by human activity to an extent that water quality indicators attain values allowing for the existence of a rich, balanced and sustainable ecosystem,

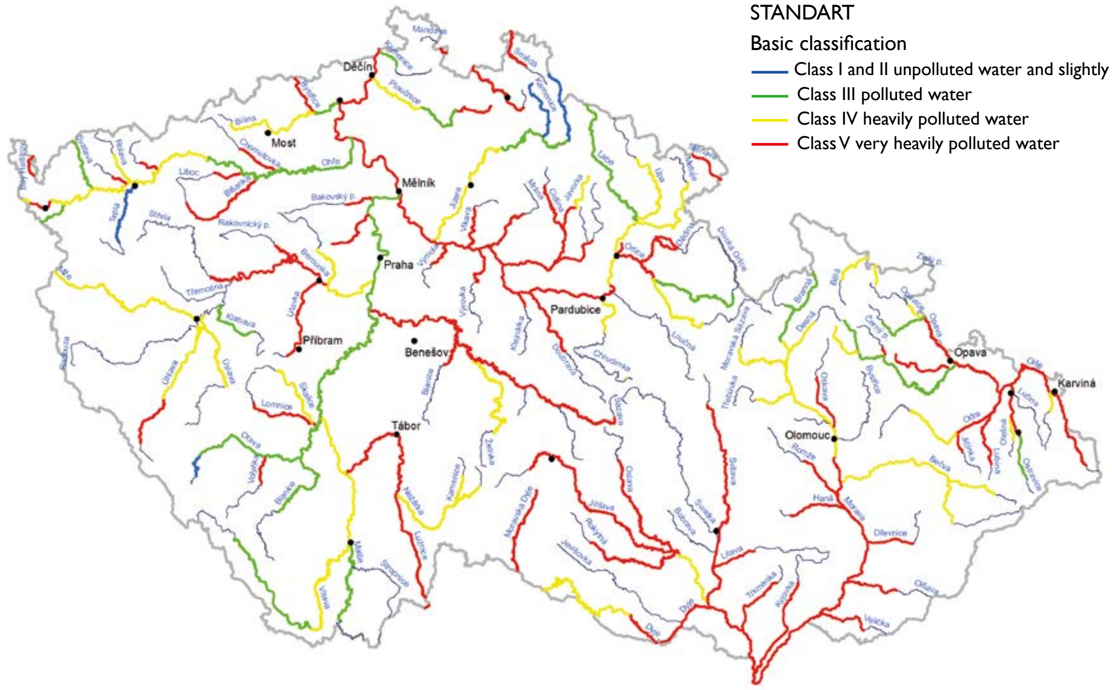
Class III polluted water – surface water status that was affected by human activity to an extent that water quality indicators attain values that may not be conducive to conditions allowing for the existence of a rich, balanced and sustainable ecosystem,

Class IV heavily polluted water – surface water status that was affected by human activity to an extent that water quality indicators attain values that are conductive to conditions allowing for the existence of only an unbalanced ecosystem,

Class V very heavily polluted water – surface water status that was affected by human activity to an extent that water quality indicators attain values that are conductive to conditions allowing for the existence of only a heavily unbalanced ecosystem.

Figure 3.1.1
Quality of surface waters in the Czech Republic in 1991–1992

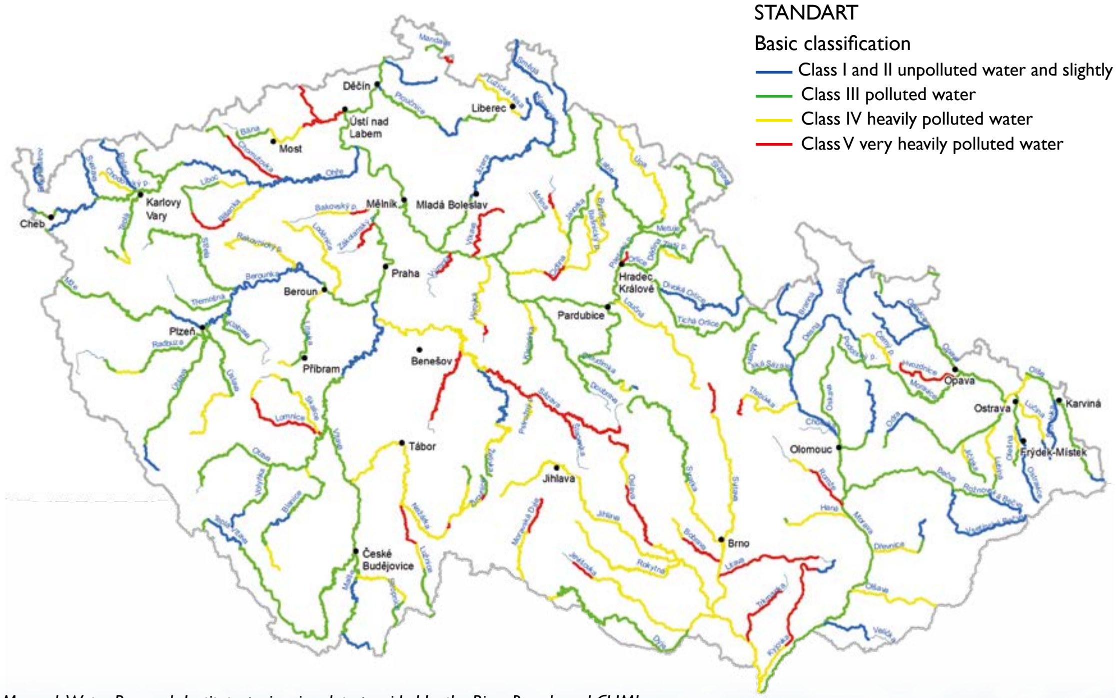
CLASSIFICATION UNDER CSN 75 7221
STANDART
Basic classification
- Class I and II unpolluted water and slightly polluted water
- Class III polluted water
- Class IV heavily polluted water
- Class V very heavily polluted water



Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the CHMI

Figure 3.1.2
Quality of surface waters in the Czech Republic in 2019–2020

CLASSIFICATION UNDER CSN 75 7221
STANDART
Basic classification
- Class I and II unpolluted water and slightly polluted water
- Class III polluted water
- Class IV heavily polluted water
- Class V very heavily polluted water



Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards and CHMI

Radioactivity

In surface waters, radiological indicators are monitored on a long-term basis in selected hydrometric profiles of the monitoring network. These profiles are situated at locations of nuclear facilities and in watercourse stretches affected by the discharge of mine waters and by the seepage from refuse dumps at locations where uranium ores were formerly mined or treated.

In surface water of the Vltava River (significant watercourse) at the Vltava Solenice profile (river km 144) below the Temelín Nuclear Power Station wastewater outfall, the annual mean volume activity of tritium in 2020 was 26.8 Bq/l with highest values of 49.8 Bq/l, the annual mean value at the Vltava Štěchovice (river km 82.7) was 23.1 Bq/l with highest values of 36.8 Bq/l, at the Vltava Prague Podolí profile (river km 56.2) it was 15.0 Bq/l, with peak of 24.7 Bq/l and before the outfall to the Elbe River at the Vltava Zelčín profile (river km 4.5) the annual mean value was 14.2 Bq/l with peak value of 22.0 Bq/l. The values comply with acceptable pollution in surface waters under the environmental quality standard (hereinafter the "EQS") as per Government Resolution No. 401/2015 Coll., on indicators and values of permissible surface water and wastewater pollution, details of the permit to discharge wastewater into surface water and sewage systems, and sensitive areas. The total alpha and beta volume activity was also detected in values that completely comply with the acceptable pollution. No other activation and fission by-products from operation of nuclear power plants were detected. Low-volume activities of Strontium-90 and Cesium-137 were detected: such activities are comparable to residual contamination after atmospheric nuclear weapon tests and the Chernobyl nuclear reactor explosion in the past century.

In the vicinity of uranium ore deposits, elevated values of radiologic indicators are detected every year in surface waters of the upper Kocába Stream at the Višňová profile (river km 38.5) and Štěchovice (river km 0.7) and in the Drásovský Stream at the Drásov profile (ř. km 0.2). At the Kocába Štěchovice profile the water quality falls under Class IV – heavily polluted water, at the Kocába Višňová profile and in the Drásovský Stream at the Drásov profile the water quality in terms of radiologic indicators falls under Class IV – very heavily polluted water (as per ČSN 75 7221). The acceptable pollution values as per Government Resolution No. 401/2015 Coll. are exceeded in the indicators "total alpha volume activity" at all the three profiles monitored and the total beta volume activity is exceeded at the Kocába Višňová profile.

The mean volume activity of tritium below the Dukovany Nuclear Power Station in 2019–2020 at the Jihlava – Mohelno profile was 159.9 Bq/l and at the Jihlava – Ivančice profile below 76.1 Bq/l. The concentrations of tritium comply with values of acceptable pollution in surface waters expressed by annual average or maximum values as per Government Resolution No. 401/2015 Coll. Total volume activity beta was also detected in concentrations that comply completely with values of acceptable pollution. Under assessment per ČSN 75 7221, the characteristic values of tritium were classified in Class III in both profiles, values of total volume beta after correction to 40K in Class I and total volume activity beta ranked the watercourse at the Jihlava – Mohelno profile in Class I and at the Jihlava – Ivančice profile in Class II of water quality. When compared with the previous two years, we can state a slight decline in the mean values.

From the perspective of the total alpha volume activity and total beta volume activity, EQS values defined by the Government Resolution No. 401/2015 Coll., as amended, were not exceeded at the Stráž pod Ralskem profile, even though there was a slight increase in radioactivity in the A-VCA indicator at the monitored profile compared with 2019, which led to reclassification to Class III. The statistic values of the parameters monitored at the Ploučnice Česká Lípa profile were classified under ČSN 75 7221 in Class I and III.

The highest activity of Radium-226 isotope amounting to 1,123 mBq/l was measured at the Loket profile in the Stoke surface watercourse. In the West Bohemian region of the country with uranium ores, i.e. at the locations where radioactive material was once mined and processed, pollution with radioactive substances persists at the Jáchymov region in the Bystřice Stream in Ostrov nad Ohří as well as in its tributary: the Jáchymovský Stream. The surface water quality as per the volume alpha activity corresponds with Class V – very heavily polluted water. In the Hamerský Stream in the Tachov region, the quality of surface waters is affected by radium-226 isotope and total alpha volume activity. Judging on the basis of lower activities of the radium-226 isotope not exceeding 25 mBq/, the surface water is classified under ČSN 75 7221 in Class II – slightly polluted water.

Surface water pollution by uranium and the increased volume alpha activity that exceeds limit indicators for annual mean and maximum EQS values under Government Resolution No. 401/2015 Coll. persists at the Nekrasín profile in the Račí Stream in the Jindřichův Hradec region where uranium was once mined. The total alpha volume activity in surface waters near the Okrouhlá Radouň mine in the Jindřichův Hradec region achieves values up to 1,500 mBq/l, the measured activity of Radium-226 isotope was below 52 mBq/l and uranium contents did not exceed 70 μg/l. At the Licoměřice ore mine at the Kurvice Stream at the Ronov profile, the total alpha volume remains at levels up to 703 mBq/l.

Once in three months, samples of raw water are analysed and its radioactivity is assessed on the basis of the total volume alpha and beta activity at several water treatment plants. The highest total volume alpha activity of up to 627 mBq/l was detected at the Merklín wastewater treatment plant on the Eliáš Stream. This value of alpha activity exceeds the highest as well as mean annual threshold value of acceptable pollution as per Government Resolution No. 401/2015 Coll. The highest total volume beta activity in monitored samples of raw water was detected in raw water from the Vrchlice Stream and raw water for the Hulice water treatment plant at the Želivka achieves at most the activity of 170 mBq/l. Activity of raw water from the Kamenice Stream for the Josefův Důl water structure and activity of raw water from the Černá Desná for the Souš Water Reservoir in the Jizera Mountains achieves 51 mBq/l at most. Total volume beta activity in waters used for public water supply purposes did not exceed acceptable pollution values. Total volume alpha activity in raw water intended for the Hulice water treatment plant in Hulice was below detection limits. Total volume alpha activity meets the condition of mean annual EQS as required by Government Resolution No. 401/2015 Coll. regulating use of surface water for treatment for drinkable water.

Water quality in water supply reservoirs and other reservoirs

In connection with the ongoing climatic change there is a risk of more pronounced eutrophication (an increased content of mineral nutrients, particularly phosphorus compounds), especially in the sphere of oxygen regime, recycling of nutrients deposited in sediments and an increase in the intensity of late summer cyanobacterial water bloom. Such impacts can be prevented in a single way: continual limitation of phosphorus supply from the catchment area. This consists primarily of minimising phosphorus emissions and of support for self-cleaning procedures and phosphorus retention in the river basins (proper pond management, watercourse rehabilitation, support of water retention in the landscape in general).

At the beginning of spring, water reservoirs administered by the Elbe River Board, s.e., were sufficiently filled in accordance with the valid manipulation set of rules, with the exception of the Vrchlice Water Reservoir. In the growing season, water inflows to the reservoirs in the Krkonoše and Jizera Mountains were average until November 2020, inflows to other reservoirs were above-average. In terms of temperatures, 2020 was another above-average year, even though the temperature indicators used were significantly lower when compared with the previous three years. The long-term trend of increasing water temperature and related fact that the season with elevated temperatures is becoming longer and longer has impact on evaporation from the water level and chemistry in reservoirs. Consequences of eutrophication were intensely evident at the Křižanovice, Vrchlice and Hamry Water Reservoirs. The quality of raw water at the Hamry Reservoir was improved again by biomanipulation through influencing the composition of fish species. Repeated distinct oxygen stratification linked with development of elevated manganese concentrations in deeper oxygen-free layers of the reservoir was detected at the Vrchlice WS. Also in 2020, problems with primary production were revealed (maximum values of chlorophyl of 190 µg/l in August in the inflow section). In order to perform sample-taking from wastewater treatment in optimal time horizons, regular inspections of microscopic screening in situ in front of the water structure dam were introduced. Monitoring the movement of xenobiotics (especially pesticides) in the tributaries as well as in the reservoir itself was intense throughout the year. The data obtained became important evidence for negotiations with farmers farming in the area above water abstraction. The quality was stabilized at the Josefův Důl and Souš Water Structures. Concentrations of chlorophyll were only several micrograms. From water supply perspective, these two water structures are almost problem-free sources of raw water. At the Labská Water Reservoir the water quality was impaired. Transparency dropped from 450 cm in April to 80 cm in September. In summer, primary production developed heavily. Water quality in this water reservoir keeps gradually deteriorating. The Seč Water Reservoir suffered from negative impact of eutrophication that lasted throughout the entire growing season. Under monitoring of surface waters intended for bathing conducted by hygienic service authorities, it was detected that water in this water reservoir had deteriorated, the same applies to the Pastviny Water Reservoir and the Sedmihorky Lido: the main deterioration factor in both cases being excessive development of cyanobacteria. At the Mšeno Water Reservoir a trial sonar device was installed with the aim of improving water quality. Its impact on water quality can only be objectively assessed after several seasons. It is currently being considered whether a device reducing phosphorus at an important incoming resource for the Mšeno Water Reservoir in Loučná shall be installed. Water quality development at this type of reservoirs was similar to previous years. Water at the Bedřichov Water Reservoir was traditionally of good quality. Water at the Fojtka Water Reservoir was of deteriorated quality (transparency less than 200 cm). The worst quality in the water reservoirs monitored was at Les Království. However, this water reservoir is not used for water abstraction and its water is not intended for bathing.

After a streak of dry years, 2020 was approximately an average year in terms of water reservoirs in the Vltava River Basin, with highest amounts of incoming water in the second half of March. This meant a high supply of nutrients at the very beginning of the growing season and thus supported spring brown vegetation turbidity of diatoms and golden algae. In the following course of the growing season, no significant rainfall/runoff episodes that would affect hydrologic situation in the state-owned water reservoirs administered by Vltava River Board, s.e., did not occur, meaning there was no massive supply of phosphorus compounds either. Nevertheless, point sources of pollution were detected in terms of constant emissions as well as episodic inputs during local or temporary rainfall/runoff situations. In general, water is still threatened, and at some places affected, by eutrophication (i.e. excessively intense growth of algae and in particular cyanobacteria) that is caused by excessive supply of phosphorus compounds from the river basin, especially from point sources of pollution. In some partial river basins, e.g. in the Orlík Water Reservoir or the Hracholusky Water Reservoir Basins, influence of strongly eutrophic ponds is evident. Influence of intake of material washed from deforested areas after the death of spruce monocultures (humus, needles, twigs) has recently been recorded, especially in the case of the Karhov reservoir and the Zhejral Water Reservoir above it. This effect must also be taken into account in the Vysočina Region in the catchment area of the Švihov reservoir, and especially in its forebay. As to water quality being jeopardized and/or affected by pesticide substances and their decomposition products, the situation remains unfavourable at the Švihov Water Reservoir. Another persisting impact is also represented by supply of erosion materials from agricultural land. While it has no connection with eutrophication, it results in soil sedimentation in upper parts of water reservoirs. Water quality in vast majority of still waters has been more or less stable for many years, with year-on-year fluctuation caused primarily by variability in supply of phosphorus compounds, meaning in connection with water yield of a given year that defines flow rate of every water reservoir. Dry years show that water reservoirs are more vulnerable by eutrophication processes during them. In order to preserve at least the current water quality in the future, it is necessary to work systematically on restricting inflow of phosphorus emissions to the water environment. Water treatability is regularly deteriorated by eutrophication effects at the following water reservoirs: Lučina, Žlutice, partially also Římov and Karhov, while the Švihov is significantly threatened, however, constant improvement is expected after reconstruction of the WWTP Pelhřimov that collects even much higher share of wastewaters from rainfall/runoff episodes. At other water reservoirs such as Orlík, Lipno, Hracholusky and České údolí, eutrophication deteriorates their usability for bathing/recreation. The climatic change, as we can see its consequences in the territory administered by the Vltava River Board, s.e., causes changes in reactions in ponds that are transformation units of substance flows through river basins. Generally speaking, ponds have tendency to smaller retention capacity of phosphorus, which means an increased risk of eutrophication even for water reservoirs situated further downstream in a river basin. That is why it is necessary to pay thorough attention to pond management.

Water reservoirs in the area administered by the Ohře River Boards, s.e. are most often situated at the upper parts of watercourses in the Krušné Mountains. Given the smaller population density, it is restricted to intake of pollution (mainly nutrients) from municipality wastewaters. Pollution of tributaries of water reservoirs is in most cases caused by natural conditions in the given river basin, typically by iron, manganese and humic substances. Such substances regularly exceed limits defined in Government Resolution No. 401/2015 Coll., and threshold limits of raw water treatability to drinkable water of category A3 as per Decree No. 428/2001 Coll., as amended. Such natural pollution can be avoided, in rare cases, by transferring polluted water from peatbogs outside the reservoir river basin as the case is with the Kamenička Water Reservoir. The Křímov Water Reservoir, which is not supplied with water from peatbogs has a higher speed of revitalization. Due to an improved hydrological situation in 2020, water quality in tributaries of water reservoirs improved slightly when compared with previous years when high concentrations of pollution flew in and when even high values of microbiological indicators linked with municipality WWTP were detected in the river basins of the Myslivna, Stanovice, Podhora and Chřibská Water Reservoirs. Problems with many-year-old bed sediments are frequent, for instance, at the Myslivna, Křímov and Horka Water Reservoirs: sediments influencing water turbidity lead to oxygen decrease at around the bottom, thus releasing pollution from sediments (increasing values of iron and manganese).

The largest reservoirs not intended for public water use in the Ohře River Basin include the Skalka, Jesenice and Nechranice Water Reservoir and in the Ploučnice River Basin it is Mácha Lake and Stráž pod Ralskem Water Reservoir. Most of them are strongly affected by municipal and agricultural pollution. These reservoirs are affected primarily by phosphorus, pesticides, halogens, etc., but their overall water quality is good. In 2020, the Regional Hygienic Station issued ban on bathing in the Skalka Water Reservoir due to occurrence of blue-green alga, chlorophyll-a and water bloom. Due to high concentration of mercury, it is banned to consume fish from this reservoir. The situation with reservoirs that were created by flooding after brown coal surface mining is quite specific. Such reservoirs have no natural inflow or outflow. Management (especially concerning fish management) is strictly regulated and their water quality is thus very high. They show indicators of natural pollution. Medard Lake contains manganese and iron, in Barbora Lake it is phosphorus and arsenic and in Milada Lake, halogens are literally omnipresent.

The Morava River Basin had a totally different course in terms of meteorology in 2020 when compared with the five previous years. After a very dry winter and spring, it started raining heavily since May, while no tropical temperatures, which were common in the recent past: this led to, among others, to a significant drop in water temperature in the production layer of epilimnion. In the water column in most of public water use and recreational reservoirs prevailed conditions that favoured diatoms, dinoflagellates, cryptomonads and other algae rather than mass blue-green alga water bloom. The worst hypertrophic reservoirs in 2020 included Jevišovice, Výrovice, Nové Mlýny – Middle Reservoir, Moravská Třebová, Podhradský Pond and the Farářka profile at the Vranov Reservoir. Strongly eutrophic, almost hypertrophic, were the reservoirs of Fryšták, Znojmo and Luhačovice. Most reservoirs were eutrophic including Brno, Vír, Hubenov, Bystřička, Boskovice, Upper Bečva, Upper and Lower Reservoir in Nové Mlýny, Plumlov, Bidelec Pond and again deteriorated Opatovice and Nová Říše. Mezzotrophic, but partly rather slightly eutrophic reservoirs included Slušovice, Koryčany, Landštejn, Vranov–dam, Dalešice, Mohelno and Bojkovice. Only the Karolinka Reservoir was oligotrophic in 2020. In general, the mean volume of phytoplancton biomass decreased and – with some exceptions – other groups of algae than blue-green algae made their way forward, even thou blue-green algae multiplied significantly at the water reservoirs of Jevišovice, Podhradský Pond, Vranov–Farářka and partly also Moravská Třebová and Výrovice.

Raw water quality in water reservoirs intended for public water supply administered by the Oder River Basin, i.e. Šance and Kružberk, was very similar to 2019 in 2020, meaning very good quality that did not require complex treatment to make the water drinkable. Temporary deterioration was detected at the Kružberk Reservoir, which was due to higher abundance of phytoplankton. The Morávka Reservoir confirmed the trend from 2019 when strong growth of cyanobacteria was recorded during the growing season, culminating with occurrence of water bloom and resulted in deteriorated water quality. A possible trigger of the situation may have been higher phosphorus mobility due to higher flow rates. After the previous dry period, phosphorus may have been supplied to the reservoir in greater amounts which led to water quality impairment. As to reservoirs with water not intended for public use, only water impairment in the Těrlicko Reservoir was detected in 2020, however, it was not because of the occurrence of water bloom but because of occurrence of cercariae. In other reservoirs with water not intended for water supply use administered by Oder River Board, s.e., water was assessed under methodology of Regional Hygienic Stations and classified as Class I and/or Class II, meaning water suitable for bathing or, alternatively, water suitable for bathing with deteriorated properties perceptible by human senses.

Quality of water used for bathing during the 2020 bathing season

During the 2020 recreational season a large part of bathing sites encountered problems particularly with excessive growth of phytoplankton – cyanobacteria, which was the main reason for issuing a ban on bathing. Cyanobacteria occur due to surface water pollution mainly due to the phosphorus content which – under increased temperature and duration of sunshine – contributes to their excessive development. Elimination of the developed cyanobacterial bloom is very expensive and it does not have a long-term effect. The priority should be to restrict nutrient (especially phosphorus) dotation in surface waters, which can only be ensured by thorough completion of the third level of wastewater purification in all current wastewater treatment plants and by building new wastewater treatment plants in all cities and municipalities that do not treat wastewaters at the moment.

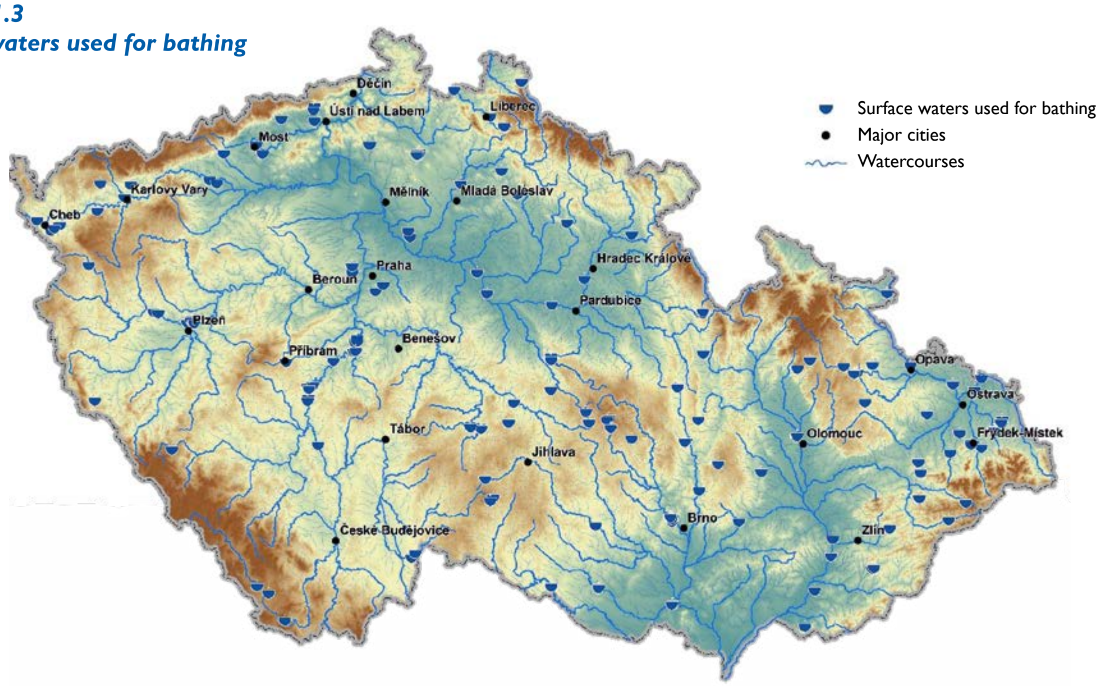
Act No. 258/2000 Coll., on the protection of public health, as amended, regulates the rights and obligations of natural and legal persons, which must be met in the area of protection and promotion of public health; the Act further establishes a system of public health protection bodies, their scope of activity and authority. One of the areas that is protected by this Act, is outdoor bathing, operation of outdoor bathing pools, artificial bathing pools, swimming pools and saunas. Decree No. 238/2011 Coll. regulates the equipment of outdoor bathing pools and the requirements for the sampling method and frequency of inspection and also bathing water quality requirements.

Before the beginning of the recreational season the Ministry of Health proposes annually a list of locations where water quality shall be monitored with respect to bathing. The proposal of the list is published before the beginning of the recreational season on the website of all regional hygiene stations and of the Ministry of Health for the general public to submit any observations. Once the observations are taken into account, the list is adjusted and published.

In the 2020 bathing season, public health protection bodies monitored 286 sites for bathing, of which 167 open air bathing pools and 119 bathing locations. Public health protection bodies took 1010 control samples and conducted laboratory tests, whereas operators took 891 samples. On the basis of the laboratory tests, public health protection bodies issued bans on bathing at 8 locations (black symbol) in the 2020 recreational season in the Czech Republic. Water quality that was assessed as unsuitable for bathing (red symbol), was detected at 31 locations, meaning that a total of 39 locations were considered unsuitable for bathing, which accounts for 13.6% of all bathing facilities monitored. Also in the 2020 bathing season, many bathing sites faced problems primarily with excessive phytoplankton growth, i.e. cyanobacteria, which was the main reason why bans on bathing were issued. Cyanobacteria occur in waters in the Czech Republic due to water surface pollution identified primarily through the presence of phosphorus that contributes to their excessive growth at elevated temperatures and prolonged length of sunshine. Another problem factor that some regions faced was the occurrence of cercarial dermatitis (swimmer's itch). Cercarial dermatitis is an allergic immune reaction to parasites that demonstrates in humans with formation of stains, blisters and skin reddening. It is accompanied with intense itching. CD occurred at 9 locations in the Czech Republic in the 2020 bathing season.

The number of bathing facilities and water surfaces intended for bathing monitored by regional hygienic stations did not change much in comparison with previous years. More and

Figure 3.1.3
Surface waters used for bathing



Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards, s.e., MoA and ©ZABAGED more bathing sites with a system of natural water purification (so-called biotopes) are built and open to public. Water quality at such locations is typically very good throughout the entire recreational season: 27 biotopes were in operation in the Czech Republic in 2020. According to information from the Czech Hydrometeorological Institute, summer weather conditions were average in terms of temperature and precipitation.

Quality of suspended matters and sediments

The chemical state of solid components of the water ecosystem, i.e. suspended matters (insolvable substances transported by the flow in suspended matters) and river sediments is monitored by the Czech Hydrometeorological Institute under its nation-wide water quality monitoring. Many chemical pollutants cumulate primarily in river suspended matters and sediments and their analyses thus provide us with valuable information about the presence of such substances in the water ecosystem. EU regulations require that long-term trends are monitored in a set of twenty selected priority hazardous substances. Contents of such priority substances in sediments shall not increase for the sake of achieving good chemical conditions.

In 2020, monitoring of the chemical state of solid components and sediments was performed, in accordance with the General Monitoring Plan at 48 profiles of significant watercourses with special attention on contents of heavy metals, metalloids and specific organic substances with the emphasis on priority dangerous substances in the sphere of water policy under European directives 2000/60/EC (hereinafter referred to as the "Water Framework Directive"), 2008/105/EC and 2013/39/EU, totalling 130 chemical substances. The monitoring results were assessed in accordance with Government Resolution No. 401/2015 Coll. on the basis of an analysis of long-term trends in concentrations of selected priority matters that may cumulate in sediments and suspended matters. The degree of contamination was assessed using foreign quality limits.

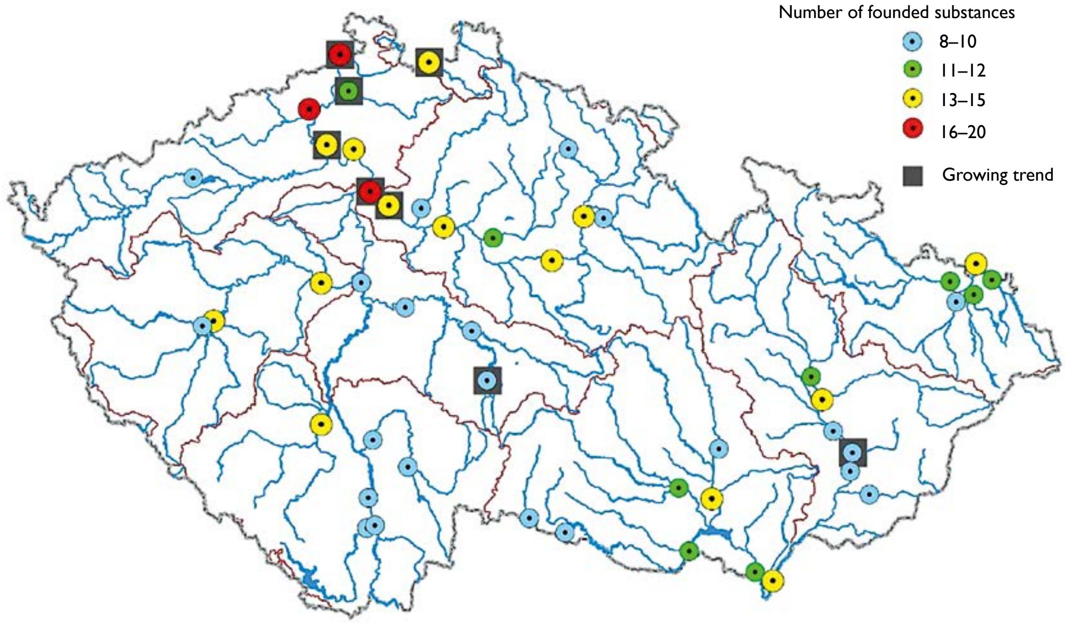
Year-on-year comparison shows that suspended matters and sediments are constantly contaminated, to a various degree, by some priority substances as well as other potentially dangerous substances. Overview of priority substances found in measurable values is shown in Figure 3.1.4. Out of twenty-five priority substances monitored, substances from the group of polyaromatic hydrocarbons (PAH) and phthalates (DEHP) were detected nation-wide and in highest concentrations. Concentrations of polyaromatic hydrocarbons fluctuate in annual comparisons, but in many profiles, particularly in the partial river basin of the Upper Oder, Dyje and Morava they constantly reach high values exceeding quality limits in the following indicators: anthracene, fluoranthene and sum of 5 PAHs (i.e. a sum of benzo(a)pyrene with carcinogenic effects, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k) fluoranthene and indeno(1,2,3-cd)pyrene. Concentrations of DEHP, a substance used as a softener in plastics does not exceed quality limits in any of the places where detected. Other priority organic substances such as hexachlorobenzene, hexachlorobutadiene, tributyltin, chloroalkanes C10-13, perfluorinated substances, heptachlor, hexabromcyklododekan and polybrominated diphenyl ethers were detected only locally depending on the source of contamination and anthropogenic burden in concentrations lower by an order of magnitude (see Chart 3.1.1). The exception if finds of extreme contents of hexachlorobenzene (up to 11,000 µg/kg) in sediments of the Bílina River at Ústí nad Labem that were probably due to revelation of an old burden in the watercourse. Similar finds in this area repeat episodically. Higher contents of the aforementioned substances that are at the same time identified as priority dangerous substances were detected, in addition to the Bílina River at Ústí nad Labem, also in sediments in the Svratka River at Židlochovice (downstream from Brno), in the Elbe River (downstream from Děčín) and in suspended matters in the Lusatian Neisse at Hrádek nad Nisou. The highest totals of summary concentration of priority organic substances were in the Bílina River at Ústí nad Labem where higher contents or polyaromatic hydrocarbons and the mentioned hexachlorobenzene than in 2019 were measured. The most significant pollution with dioxins, furans and PCBs with dioxin effect was detected (in terms of cases above MS and summary concentrations of toxic equivalents) in the Bílina River in Ústí nad Labem, in the Berounka River downstream from Pilsen, in the Olše River in Věřňovice and in the Elbe River in Hradec Králové. Quality limit for dioxins and furans defined by the International Commission for the Protection of the Elbe River (ICPER) for Elbe sediments were exceeded at all aforementioned locations.

A wide range of pollutants with elevated concentrations of heavy metals, chloroalkanes C10-13, tributytin and many other potentially harmful substances (bisphenol A, triclosan, methyl triclosan, galaxolide, tonalide) is repeatedly measured in suspended matters and sediments in watercourses with less water in sections near big urban agglomerations (the Lusatian Neisse in Hrádek n. Nisou, the Svratka in Židlochovice, downstream from Brno. Other harmful substances, outside the priority substances group, that were repeatedly measured were, e.g., exceptionally high concentrations of organochlorinated pesticides DDT in the Bílina River in Ústí nad Labem (sum of DDT and its metabolite DDD reached up to 4,380 µg/kg) and in the Elbe River downstream from Děčín that significantly exceed the quality limit defined by the ICPER for sediments in the Elbe River Basin. Other pesticides whose applications is regulated and whose presence was detected, same as in 2019, in most suspended matters and in more than 50% of sediment samples is pesticide glyphosate, while its metabolite AMPA was detected in all samples, with highest concentrations in the Middle Elbe in Lysá nad Labem.

As the analysis of long-term trends shows, 8 locations exhibit a growing trend, meaning statistically meaningful increase in concentrations of a priority substance in sediments in the 2000–2020 period and in sedimentable suspended matters for 2013–2020 (see Figure 3.1.4). The growth in concentrations can be typically seen in the case of polyaromatic hydrocarbons and anthracene (Lusatian Neisse – Hrádek nad Nisou, Elbe – Lysá, Želivka – above Švihov WS, Dřevnice – Otrokovice), fluoranthene (Vltava – Zelčín) and sum of 5 PAHs (Dřevnice – Otrokovice). As to metals, a growing trend was noticed in cadmium (Ploučnice – Březiny, Elbe – Schmilka, Ohře – Terezín) and lead (Dřevnice – Otrokovice).

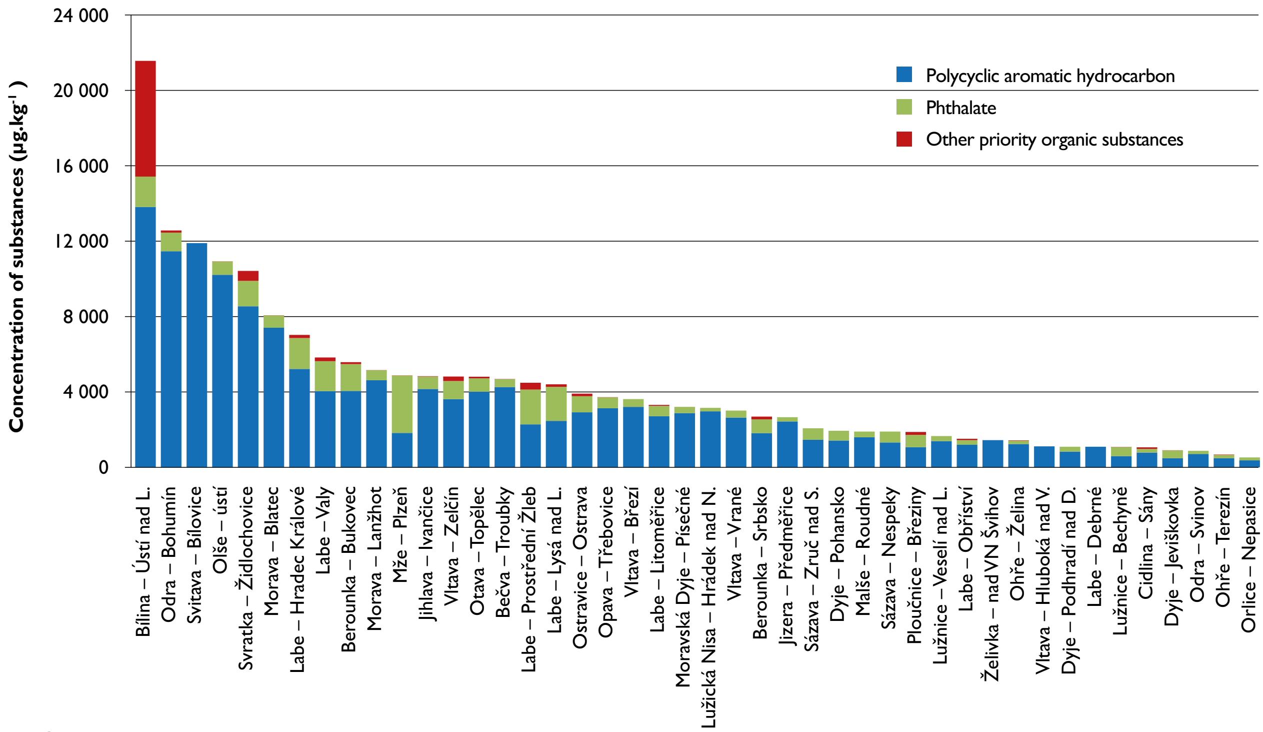
Generally speaking, areas most affected by chemical substances have permanently been watercourses in regions with high industry concentration, long-term anthropogenic burden and/or existence of old burdens (the Bílina, Ohře, Lower and Middle Elbe Rivers). Specific contamination of mostly polyaromatic hydrocarbons has long been evidenced in many profiles in the Upper Oder River Basin in the Ostrava-Karviná agglomeration, at the Middle and Lower Morava River and in watercourses in the partial river basins of the Dyje (Svitava, Svratka).

Figure 3.1.4
Number of profiles with findings of priority substances and detected growth trend in 2020



Source: CHMI

Chart 3.1.1
Summary concentrations of priority organic substances in sediments in 2020



Source: CHMI

Raw water quality

Raw water quality in 2020 was assessed using data from 2,992 points of raw water abstraction (of which 132 points of surface water abstraction and 2,860 points of groundwater abstraction. Raw water treatability was assessed and classified in four categories of treatability as per Decree No. 428/2001 Coll.

CIn total, more than 70% of abstraction points had quality corresponding with the A2 category and better in 2020, surface sources of raw water are usually of worse quality than groundwater sources, which explains the higher share of surface water points of abstraction with worse treatability categories (only approximately 40% of surface points of abstraction fall with their water quality into the A2 or better category) – see Figure 3.1.5. When comparing the quality of raw water by regions, it can be concluded that the highest raw water quality in 2020 was in sources in the Ústí Region and worst in the Zlín Region.

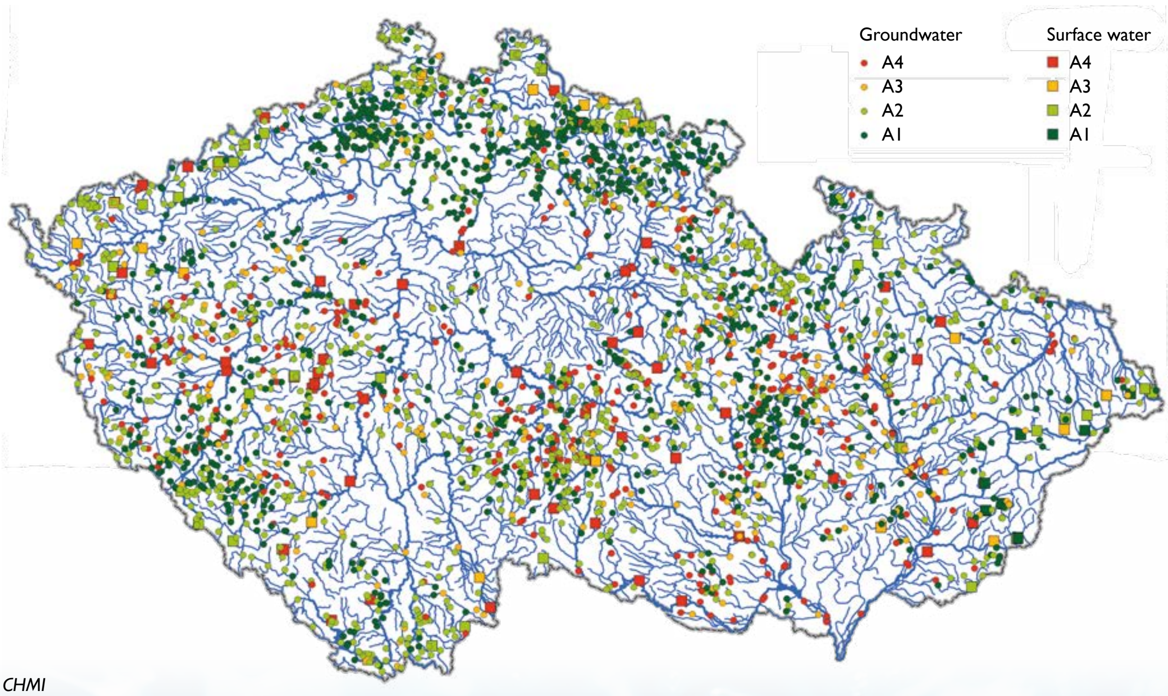
The most problematic for the quality of raw surface waters are microbiological indicators, total organic carbon, adsorbable

Table 3.1.1
Categories of raw water treatability and relevant types of treatments

Category	Type of treatment
A1	Raw water adjustment, possibly with added disinfection for removing compounds and elements that may affect its further use, aimed particularly at decreasing aggressiveness against the water supply system materials including household installations (chemical and mechanical de-acidification) together with elimination of smell and gas compounds by aerification. Simple filtration for removal of dissolvable matters and increasing quality.
A2	Raw water requires simpler treatment, e.g. coagulation filtration, single-degree de-ironing, demanganization or infiltration, slow biological filtration, treatment in rock environment together with final disinfection. Water stabilization is suitable for enhancing water quality.
A3	Raw water treatment requires two- or multi-degree treatment through clearing, oxidation, de-ironing and demanganization with final disinfection or a combination of such processes. Other suitable methods include, e.g., use of ozone, active charcoal, auxiliary flocculants, flotation. More expensive methods (e.g. sorption to special materials, ion exchange, membrane processes) are only used exceptionally.
A4	Water of this quality can exceptionally be supplied as drinkable water upon receiving exception by the relevant regional office. In order to become drinkable, such water needs to be treated through technologically demanding processes consisting in a combination of water treatments defined for the A3 category, while it is necessary to ensure stable quality of the water produced. Nevertheless, the preferred solution in such cases is the elimination of pollution causes or finding a new water resource.

Source: CHMI

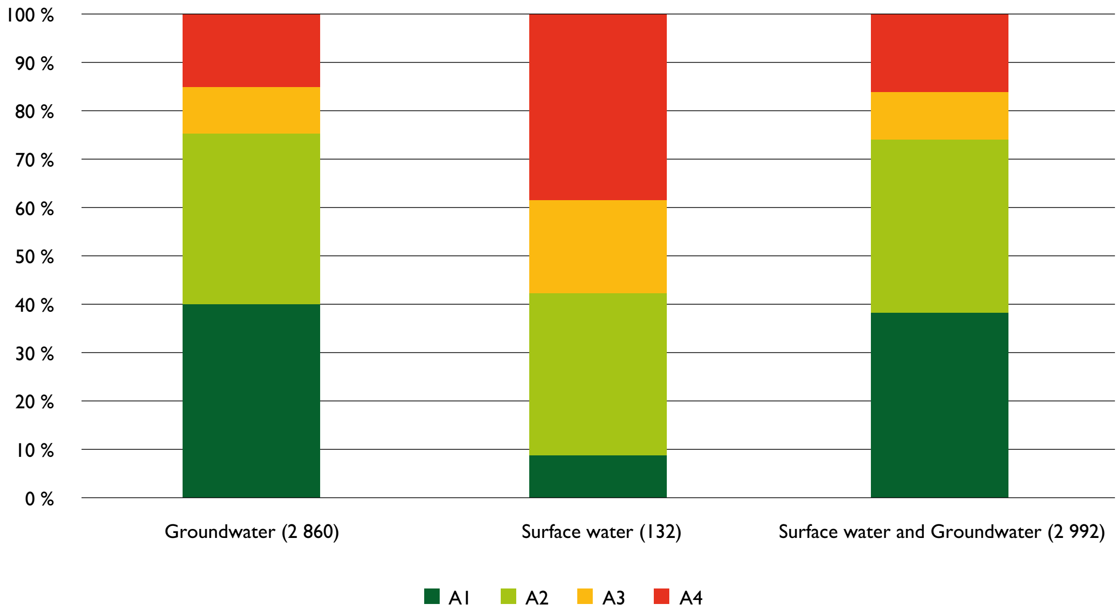
Figure 3.1.5
Raw water treatability categories at points of abstraction in 2020



Source: CHMI

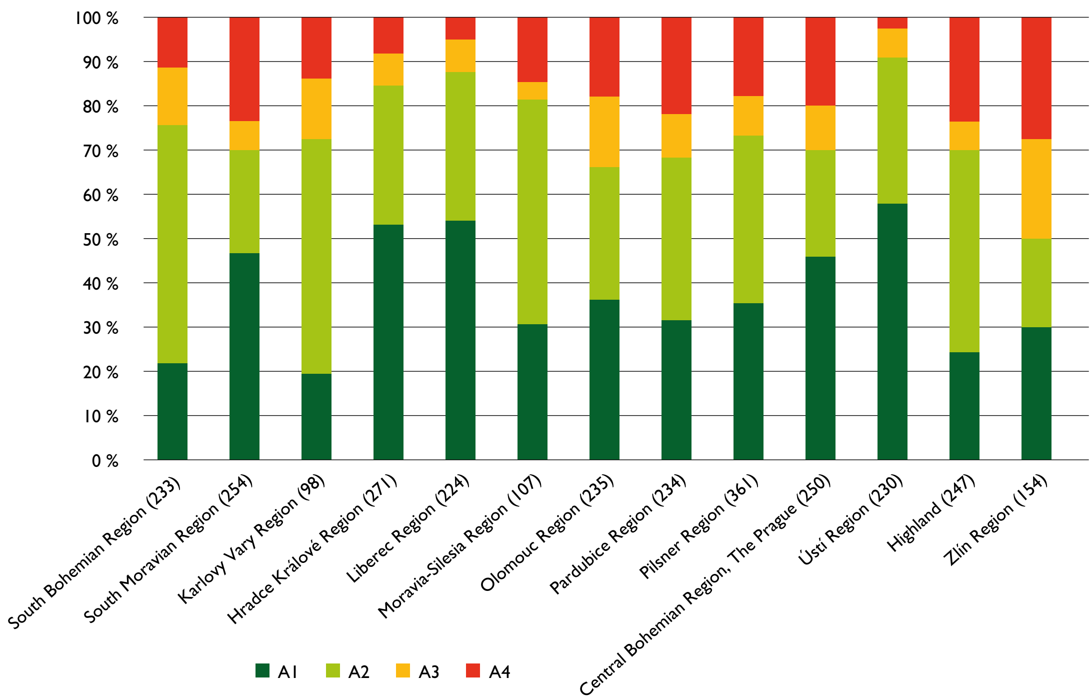
organically bound halogens (AOX), COD-Mn, metals such as iron and manganese, humic substances, pesticides such as metazachlor ESA and metazachlor OA (herbicide metabolites of herbicide metazachlor used for treating rape), AMPA (metabolite of total herbicide glyphosate) and total pesticides. In the case of groundwaters, the most compromising are adsorbable organically bound halogens (AOX), iron and manganese, pesticides such as chloridazon-desphenyl (metabolite of the herbicide chloridazon used for treating beetroot), alachlor ESA (metabolite of the now banned herbicide alachlor used for treating rape), metazachlor ESA (metabolite of the herbicide metazachlor used for treating rape) and total pesticides.

Chart 3.1.2
Categories of treatability for types of raw water sources



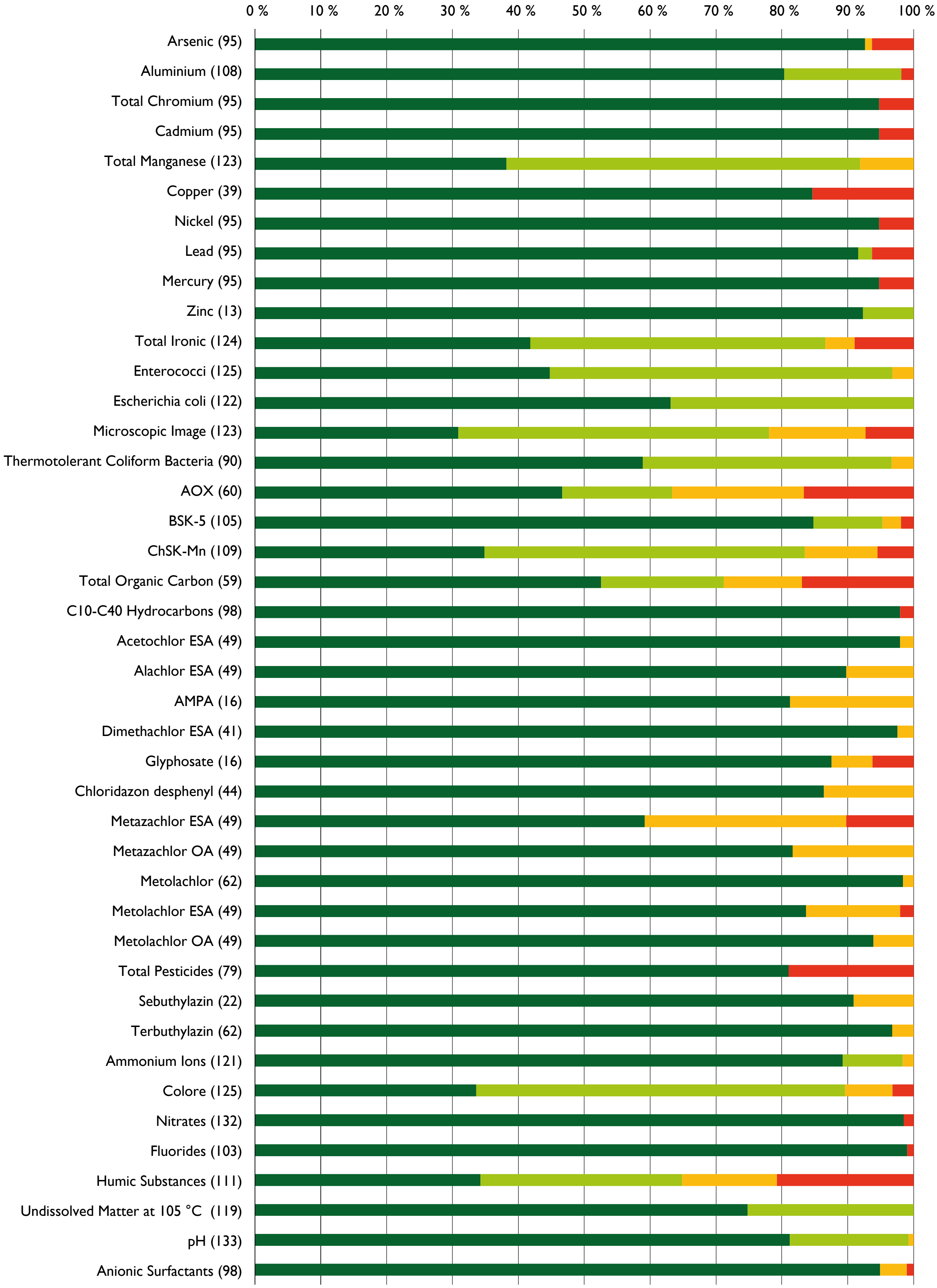
Source: CHMI
Note: Number of points of abstraction are in the brackets.

Chart 3.1.3
Categories of treatability by regions



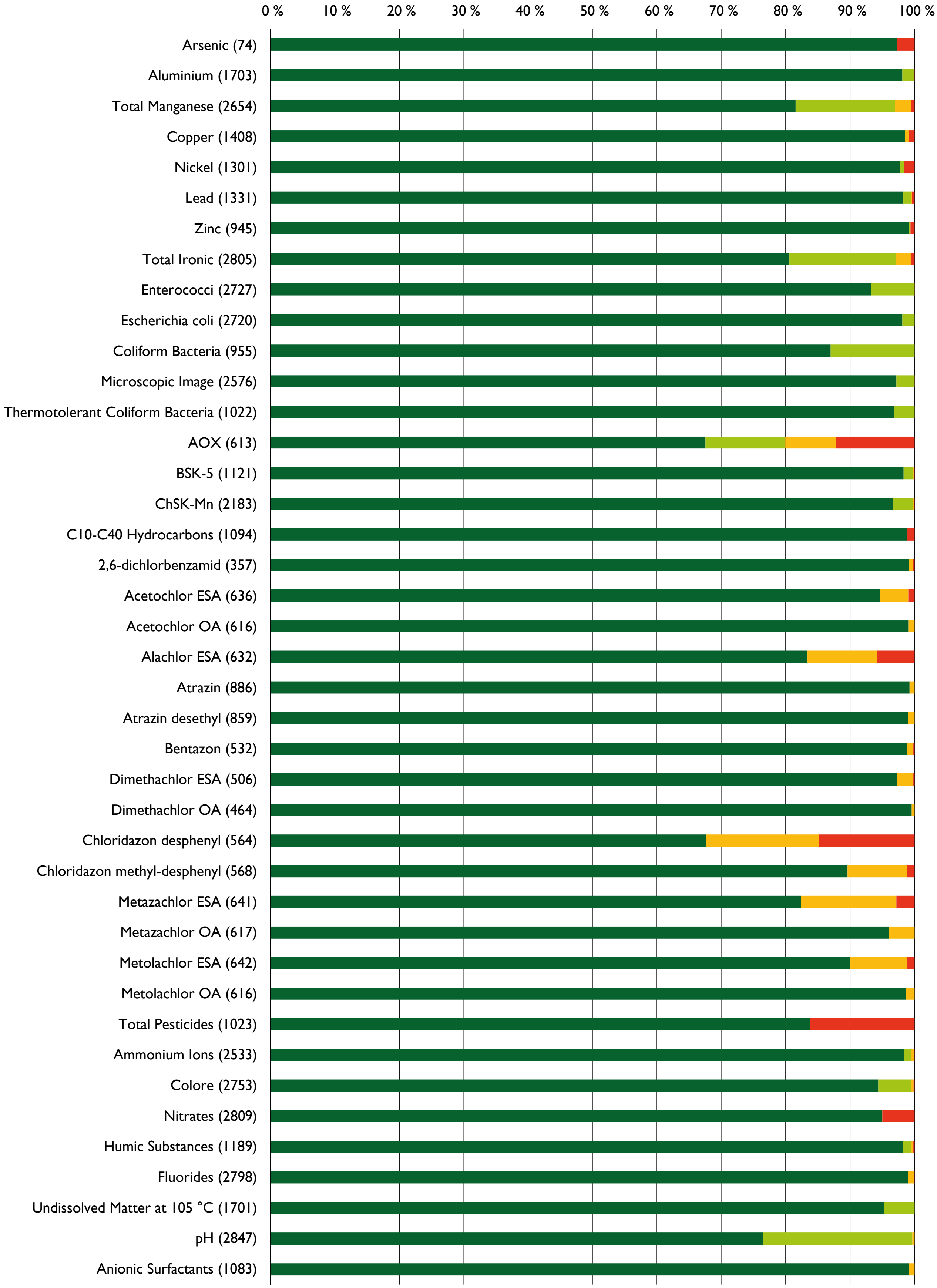
Source: CHMI
Note: Number of points of abstraction are in the brackets.

Chart 3.1.4
Categories of surface water treatability for indicators most affecting their quality



Source: CHMI
Note: Number of points of abstraction are in the brackets.

Chart 3.1.5
Categories of groundwater treatability for indicators most affecting their quality



Source: CHMI
Note: Number of points of abstraction are in the brackets.

Microcontaminants in surface waters

Microcontaminants in surface water can nowadays be found in the whole of the Czech Republic. They include, in particular, residues of pesticides, pharmaceuticals, roentgendiagnostic substances, anti-corrosives and other specific substances linked with wastewater discharge. Occurrence of the two most significant groups of such substances, i.e. pesticides and pharmaceuticals in surface waters in 2020 was assessed.

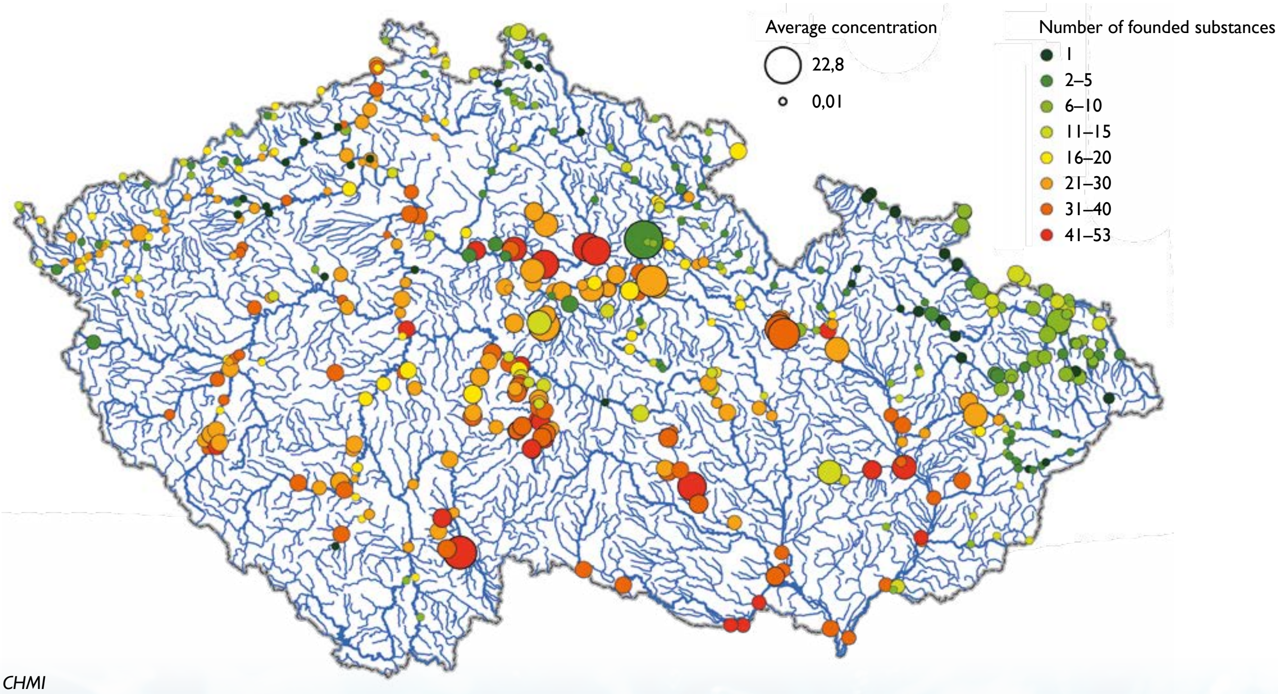
Pesticides

Water management laboratories of river Boards, s.e., monitor closely pesticide substances and their metabolites that get to surface waters particularly from agricultural activity. In 2020, results from 525 profiles (a total of 4,950 samples) for 261 analytes were processed. Pesticides were found at 493 profiles (93.9% of the monitored profiles), in 4,059 samples (i.e. in 82% of the samples). In 2020, a total of 161 pesticides and their metabolites were found in surface waters, out of which 42 substances were found in more than 5% of the samples.

The results correspond with monitoring of the substances by the individual River Boards, s.e. Where a wider spectrum of substances is monitored, pesticides are found more often. Most frequently found substances are herbicide metabolites used for treating rape, at present allowed substances: metazachlor, dimethachlor, pethoxamide and banned ones: alachlor, acetochlor), corn (allowed: metolachlor, terbuthylazine, pethoxamide and banned: atrazine, acetochlor), beetroot (chloridazon), and glyphosate (total herbicide) and its metabolite AMPA. The most frequently detected fungicide was a substance called ETU (mancozebe metabolite), in this regard it should be noted that it was monitored only at a limited number of profiles in the territory administered by the Vltava River Board, s.e. Most substances were found at the following profiles: Bezměrov – Haná and Zruč nad Sázavou – Sázava (53 substances), Hevlín – Dyje (50 substances), Pelhřimov - Bělá (48 substances), Luková – Cidlina (47 substances), Sány – Cidlina (46 substances), Nymburk – Mrlina, Brtná – Trnava, Pikovice – Sázava, Dřevnovice – Haná, Dyjákovice – Dyje and above Olšava – Morava (44 substances). Highest summary concentrations of pesticides were detected at the following profiles: 3796 Hradec Králové – Piletický Stream (maximum 199.7 µg/l, average concentration 22.8 µg/l), PVL_2585 above the Káňov Pond – Káňovský Stream (maximum 33.1 µg/l, average concentration 10.9 µg/l), PLA_628 Kladina – Zadní Lodrantka, (maximum 12.7 µg/l, average concentration 6.7 µg/l), ZVHS_509-003 Rychnov na Moravě – Rychnovský Stream (maximum 19.6 µg/l, average concentration 6.3 µg/l), CHMI_4002 Sány – Cidlina (maximum 15.5 µg/l, average concentration 5.6 µg/l), PMO_JPPPO027 Tasov – Polomina (maximum 13.8 µg/l, average concentration 5.2 µg/l), CHMI_3136 Luková – Cidlina (maximum 20.4 µg/l, average concentration 5.2 µg/l), ZVHS_509-001 Luková – Lukovský Stream (maximum 15.8 µg/l, average concentration 5 µg/l and CHMI_3145 Kosičky – Bystřice (maximum 11.1 µg/l, average concentration 5 µg/l).

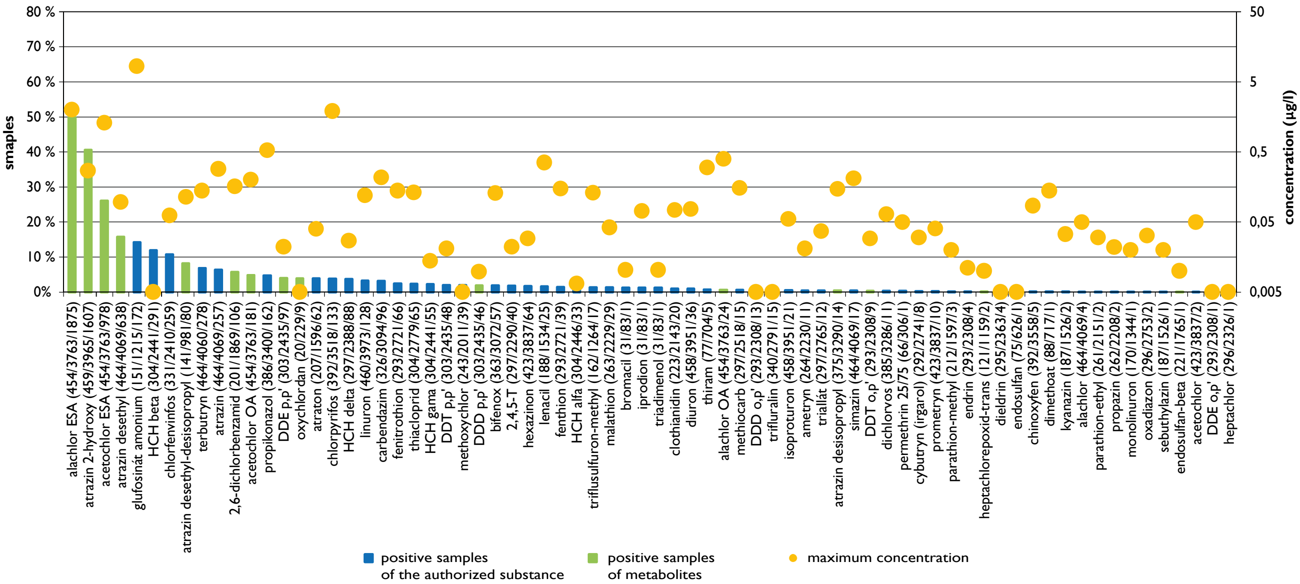
btwcapture (Source: www.shutterstock.com)

Figure 3.1.6
Pesticides in the Czech Republic by number and concentration in 2020



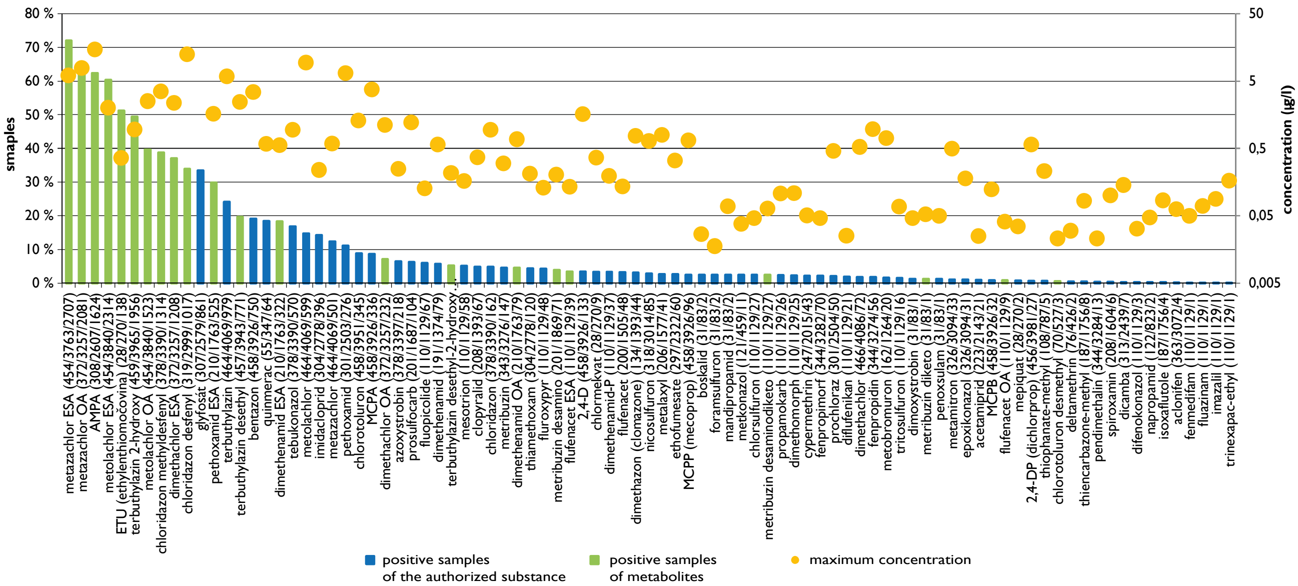
Source: CHMI

Chart 3.1.6
Monitoring banned pesticide substances in the Czech Republic in 2020



Source: CHMI
Note: Figures in brackets indicate the number of profiles / number of samples / number of positive samples

Chart 3.1.7
Monitoring of allowed pesticide substances in the Czech Republic in 2020



Source: CHMI
Note: Figures in brackets indicate the number of profiles/number of samples/number of positive samples

The Jordán Pond, The Sampling (Source: Vltava River Board)

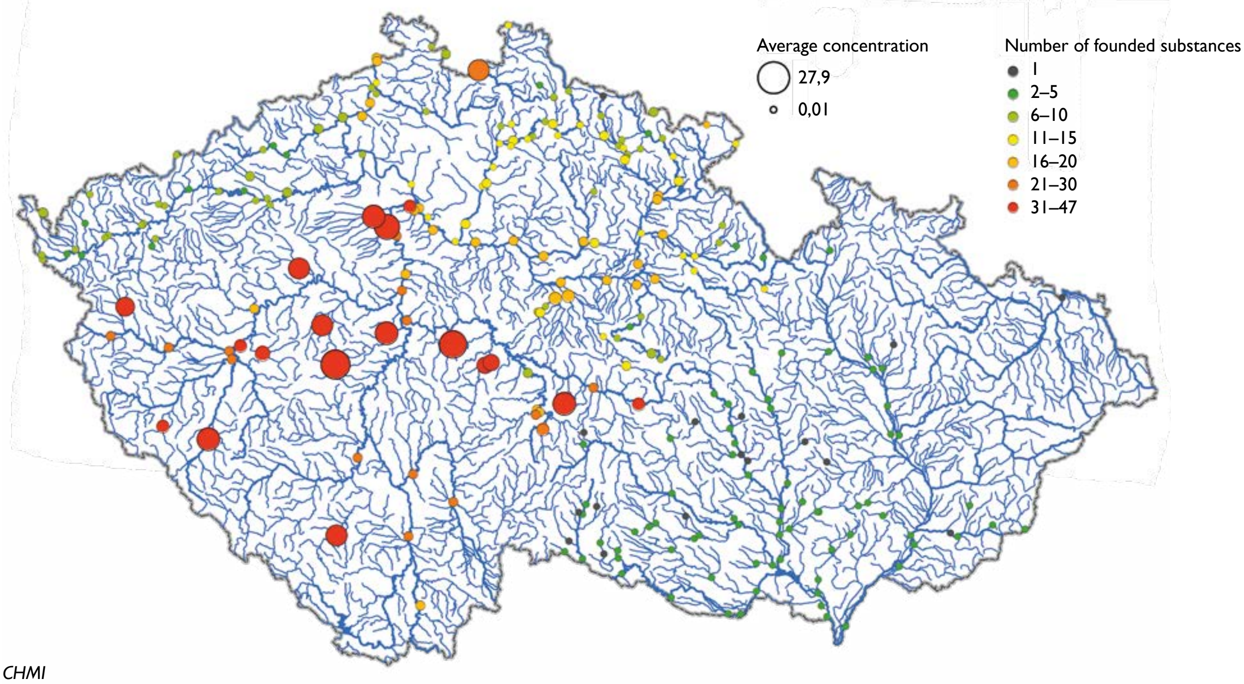
The Dehtár Pond, The Mensuration (Source: Vltava River Board)

The Lužnice Small Water Reservoir, sediment removal (Source: Vltava River Board)

Pharmaceuticals

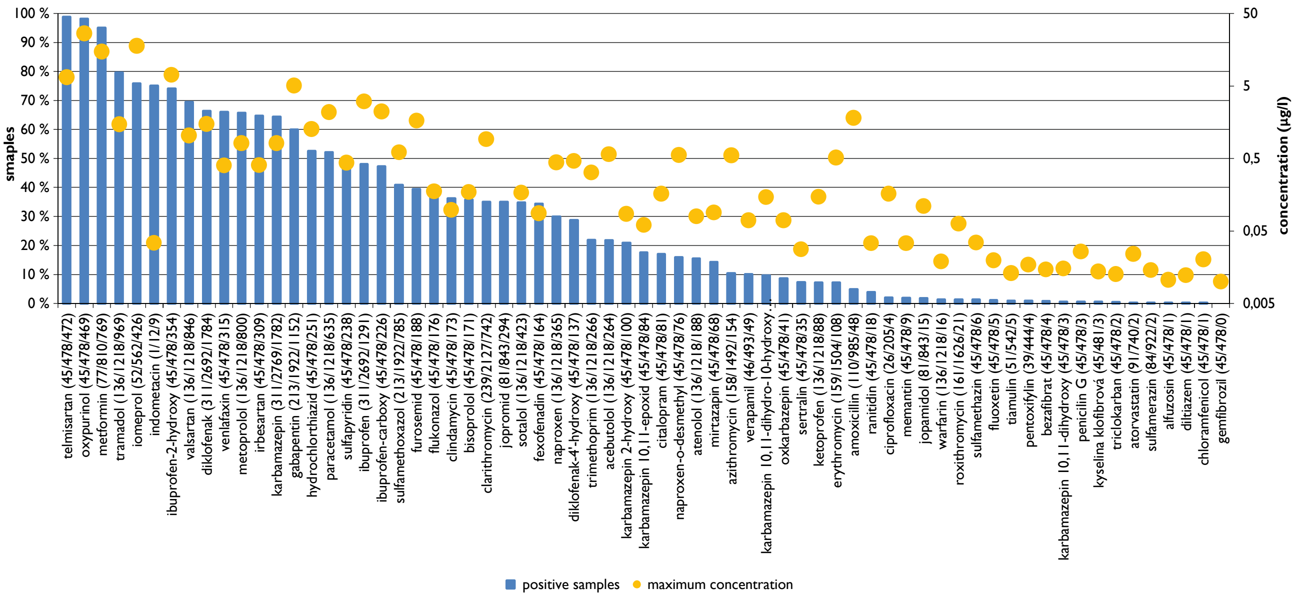
Z Considerable amounts of pharmaceuticals and their metabolites get to surface waters from municipal sources, results from 315 profiles (totalling to 2,818 samples) were processed for 67 analytes in 2020, the results partly reflect how monitoring of these substances is set by individual River Boards. Where a wider range of substances are monitored, pharmaceuticals are found more frequently. Similar to 2019, the occurrence of pharmaceuticals was most prominent in smaller streams that drain large urban areas. Pharmaceuticals were found at 294 profiles (93.3% of profiles monitored) in a total of 2,286 samples (81.1% of samples). The most frequently found substances were telmisartan (antihypertensive), oxypurinol (gout drug), metformin (diabetes drug), tramadol (analgesic), iomeprol (contrast agent), indomethacin (analgesic, antiphlogistic, antirheumatic), 2-hydroxy metabolite of ibuprofen (analgesic, antipyretic, antiphlogistic), valsartan (antihypertensive), diclofenac (antirheumatic), venlafaxine (antidepressant), metoprolol (antihypertensive), irbesartan (antihypertensive), carbamazepine (antiepileptic) and gabapentin (antiepileptic, analgesic). Most drugs were found at the profiles of Velvary – Červený Stream (52), Trhové Dušníky – Příbram Stream (47 substances), Vlašim – Blanice (47 substances), Klatovy - Drnový Stream (46 substances), Humpolec – Pstružný Stream (46 substances), Benešov – Benešovský Stream (45 substances), Dolní Chlum – Rakovnický Stream (45 substances), Senešnice – Novoveský Stream (43 substances), Kotopeky – Červený Stream (42 substances), Rokycany – Klabava (42 substances) and Kralupy nad Vltavou – Zákolanský Stream (41 substances). Highest summary concentrations of pharmaceuticals were found at the profiles of Trhové Dušníky - Příbramský Stream (maximum 92.5 µg/l, average concentration 37.8 µg/l), Kotopeky – Červený Stream Stream (maximum 91.8 µg/l, average concentration 16.2 µg/l), Benešov – Benešovský Stream (maximum 59.6 µg/l, average concentration 19.1 µg/l), Dolní Chlum – Rakovnický Stream (maximum 43.2 µg/l, average concentration 13:5 µg/l), Senešnice – Novoveský Stream (maximum 41.5 µg/l, average concentration 18.2 µg/l), Kralupy nad Vltavou – Zákolanský Stream (maximum 39.6 µg/l, average concentration 20.6 µg/l), Humpolec – Pstružný Stream (maximum 37.4 µg/l, average concentration 15.2 µg/l) and Velvary – Červený Stream (maximum 29.5 µg/l, average concentration 13 µg/l).

Figure 3.1.7
Pharmaceuticals detected in the Czech Republic by number and concentration in 2020



Source: CHMI
Note: The results of the monitoring are affected by the fact that each River Board, s.e., monitors a different range of pharmaceuticals and a differing number of profiles.

Chart 3.1.8
Monitoring effective substances in pharmaceuticals in the Czech Republic in 2020



Source: CHMI
Note: Figures in brackets indicate the number of profiles / number of samples / number of positive samples

The Orlík Dam Low Level (Source: Vltava River Board)

Accumulation biomonitoring of surface waters

The programme of bio-accumulation monitoring allows to comprehensively determine the status of the sites in question and it significantly contributes to an increase in knowledge of the state of contamination by biota. Monitoring uses not only fish and fry, but also other suitable matrices accumulating poisonous pollutants in connection with the manner of feeding and type of habitat. In 2020, aquatic organism contamination by dangerous substances was monitored at 25 river profiles of significant Czech and Moravian rivers covered by surface water situational monitoring.

The programme monitors occurrence of dangerous substances whose content in water samples is usually below detection limits and which cumulate well in water organisms. Monitoring focused on fish (Squalius cephalus), fish fry, benthic organisms (in most cases larvae of Hydropsyche sp.), leech (Erpobdella sp.), crustacean (Gammarus sp.) and in biofilm growth.

Eight hazardous substances were selected for evaluation and analysed in the fish fry. They are polychlorinated biphenyls (sum of congeners PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153, PCB-180), DDT as a representative of chlorinated pesticides (DDT and its metabolites, with the dominant metabolite DDE), polybrominated diphenyl ethers (sum of PBDE congeners 28, 47, 99, 100, 153, 154), di(2-ethylhexyl) phthalate (DEHP), perfluorooctane sulfonate (PFOS), of the polyaromatic hydrocarbons (PAHs) fluoranthene and benzo(a) pyrene. For metals, mercury (Hg) was assessed, see Chart 3.1.9.

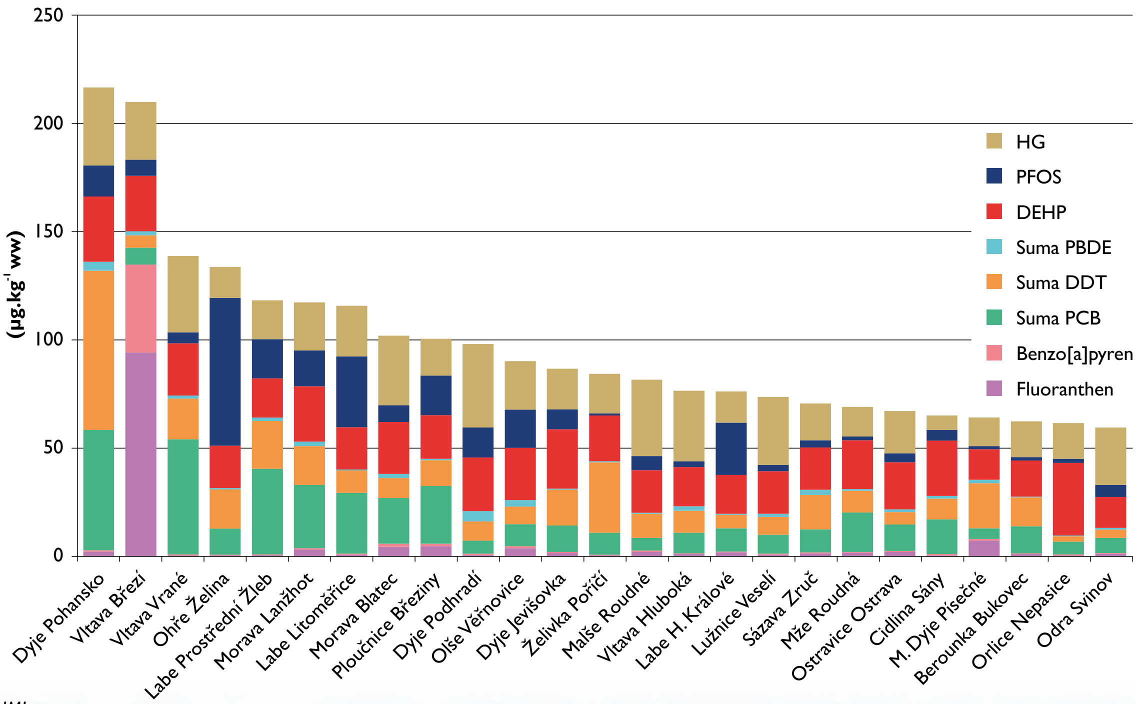
Indicators with EQS values defined in Government Resolution No. 401/2015 Coll. were compared with the relevant standards.

The highest total concentration of monitored organic substances was detected at the Dyje Pohansko (with highest values of DDT and PCB) and at the Vltava Březí (highest values of PAH, where the EQS value (30 µg/kg) of fluoranthene was exceeded three times and the EQS value (5 µg/kg) of benzo (a)pyrene eight times). Concentrations of PFOS exceeded the EQS value (9,1 µg/kg) at 40% of the profiles with highest values at the Ohře Želina profile. PBDE concentrations exceeded, as the case was in the past couple of years the EQS value (0.0085 µg/kg) by several orders of magnitude at all profiles. Mercury concentrations exceeded the EQS value (20 µg/kg) at 44% of the profiles with highest values at the Dyje Podhradí profile.

Monitoring aquatic organisms provides us with information that is impossible to find out by the means of water sample analysis and results from several matrices confirm general pollution of the water ecosystem. The information obtained is used when assessing water bodies and when deciding on measures to be taken with the view of improving the situation of water bodies.

ZayacSK (surce: www.shutterstock.com)

Chart 3.1.9
Finds of hazardous organic substances in fish fry in 2020



Source: CHMI

3.2 Groundwater quality

A total of 695 sites were monitored in the national groundwater quality monitoring network in 2020. They comprised 201 springs, 224 shallows wells and 270 deep wells. A total of 366 quality indicators were analysed. Indicators from three major groups (basic indicators, metals, polar pesticides and pharmaceuticals) were monitored at most of the sites. Other groups of indicators were analysed at a selected lower number of locations. The number of groundwater bodies exceeding limit values of monitored substances in 2020 was similar to 2010 values.

Monitoring of springs documents natural drainage of groundwaters, in particularly from the basement and local drainage of chalk structures. Shallow wells are concentrated mostly in the alluviums of the Elbe, Orlice, Jizera, Ohře, Dyje, Morava, Bečva, Oder and Opava Rivers – these groundwaters are harm-prone due to their higher hydraulic conductivity and thus with fast progress of pollution. Deep wells are concentrated particularly in the areas of the Bohemian Cretaceous Basin, České Budějovice Basin and Třeboň Basin and they monitor quality of groundwaters with deep water circulation.

The results concerning groundwater quality in 2020 were assessed by comparing values of groundwater quality indicators with liminal values for groundwater in accordance with Decree No. 5/2011 Coll., as amended, and in accordance with Regulation of the European Parliament and of the Council 2006/118/EC – Annex I. The assessment was performed in the form of tables and maps, especially for indicators that occurred in concentrations exceeding the given criteria in groundwaters at least in one monitored location in 2020.

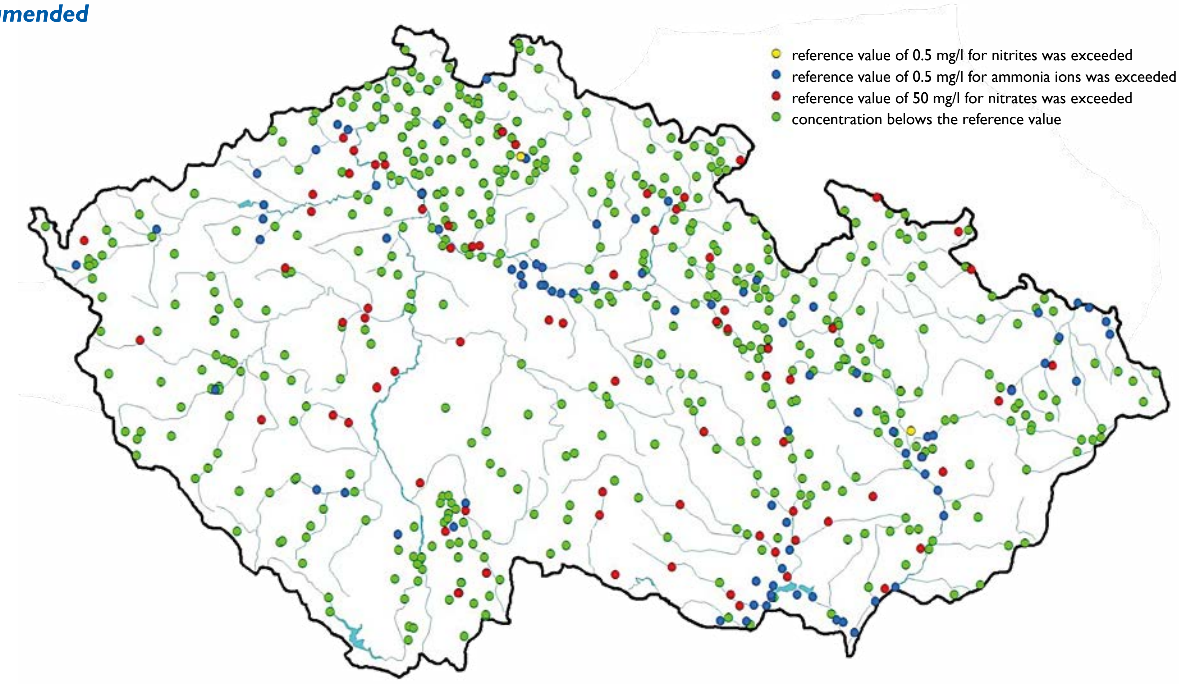
The most distinct indicators of groundwater pollution when compared with limit values are pesticides, in particular metabolites of herbicides used mainly for treating crops such as beetroot, rape and corn (metabolites of chloridazon, metazachlor, alachlor, dimethachlor, acetochlor and metolachlor), inorganic substances (ammonia ions, nitrates and phosphates), organic substances (CODMn and DOC), metals (barium, manganese, arsenic and cobalt), VOC (1,2-cis-dichlorethen and toluene) and PAH (phenanthrene and chrysene).

Table 3.2.1
Number of sites exceeding limits for groundwater in at least one indicator in 2020, compared with 2019 and 2018

Sites	No. of sites	No. of sites exceeding limits for groundwater	% of sites exceeding limits for groundwater		
			2020	2019	2018
Shallow wells	224	214	95,5	96,0	95,5
Deep wells and springs	471	359	76,2	78,4	77,8
All sites	**695**	**573**	**82,4**	**84,1**	**83,5**

Source: CHMI

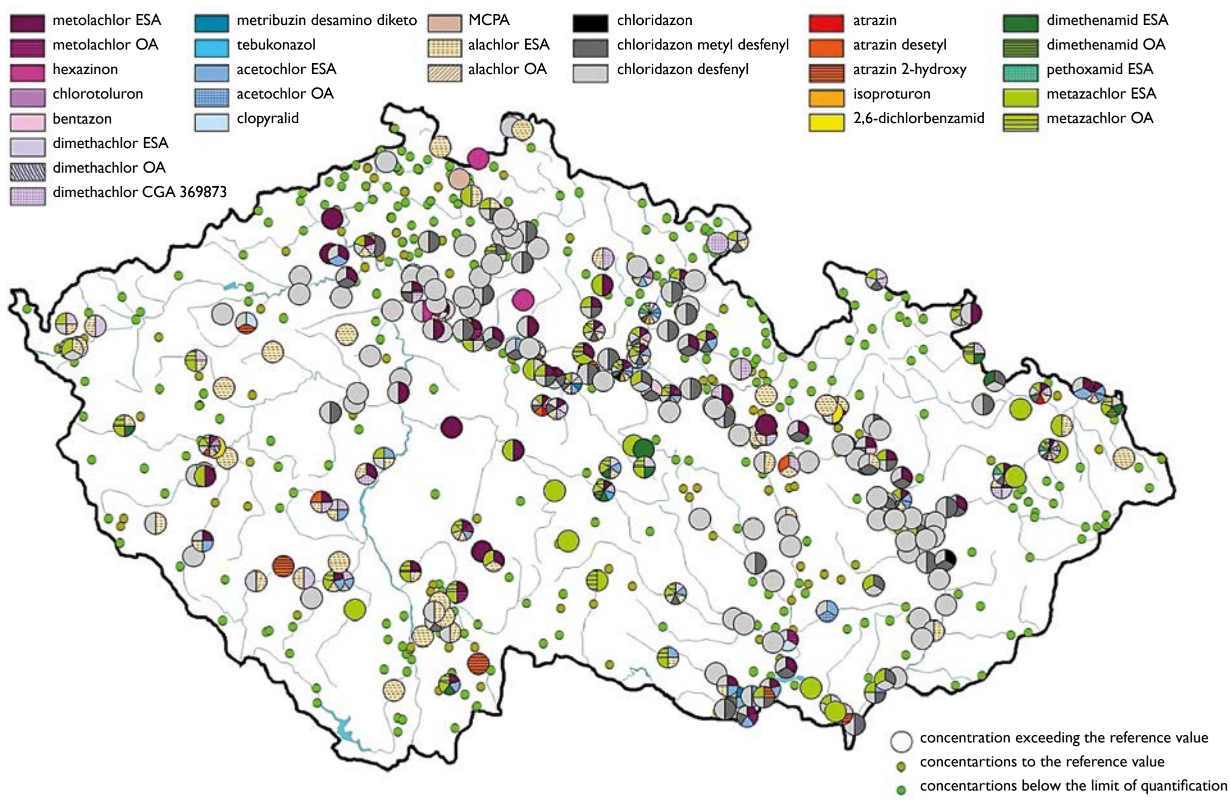
Figure 3.2.1
Concentrations of nitrogenous substances in groundwaters in 2020, exceeding limits set forth by Decree No. 5/2011 Coll., as amended



Source: CHMI

Assessment of groundwater quality in 2020, with respect to the most frequently occurring monitored substances of each group only confirm results from the past years. The percentage of exceeding limits for the substances is affected by the extent of groundwater quality monitoring. Operational monitoring in 2019 and 2020 is a follow-up to the broader situational monitoring from 2017 and 2018: it only monitors groups of indicators with scarcer occurrence at structures where values above the detection limit were measured in the past. Nevertheless, the change in the manner of monitoring did not affect significantly total assessment of groundwater quality. Groundwater quality in terms of foreign substances was only slightly better in 2020 when compared with 2019 and 2018. In general, indicator values exceeding limits occur more often in shallow well groundwaters oriented to river alluviums that are most affected by anthropogenic activity.

Figure 3.2.2
Concentrations of pesticides in groundwaters (substances exceeding limit values at two and more sites) in 2020



Source: CHMI
Note: Exceeded limit values under Decree No. 5/2011 Coll. as amended by Regulation of the European Parliament and of the Council 2006/118/EC.

The Březová Water Reservoir (Source: Ohře River Board)

Montypeter (Source: www.shutterstock.com)

4. WATER USE

The monitoring of data on groundwater and surface water abstractions and on discharged waters is governed by Decree No. 431/2001 Coll., on the Content of water balance, the method of its compilation and on data for the water balance. 2020 saw a decrease in the amount of surface water and groundwater abstraction as well as in the volume of discharged water.

Pursuant to the provision in Section 10 of this Decree, the scope of reported data changed after 2001, so that now the registered abstractions (as well as waste water and mine water discharges) only include abstractions exceeding 6,000 m^3 per year or 500 m^3 per month. The source documents for retrieving the data are the reports submitted to the Czech Statistical Office (CSO) by the respective river basin administrators before the deadline of 31 March of the following year. The data for 2020 were classified based on the CZ-NACE according to Eurostat. The comparison of data for 2019 and 2020 was based on final official data of the Czech Statistical Office (www.czso.cz). Table 4.1 shows detailed information about classification of surface water and groundwater abstractions wastewater and mine water discharge in surface waters under the CZ-NACE. The classification also applies to Tables 4.1.1, 4.2.1 and 4.3.1 below.

Table 4.1
Classification of users in groups under the CZ-NACE classification

Public water supply networks	CZ-NACE 36
Public sewerage systems (excl. transfers)	CZ-NACE 37
Agriculture (incl. irrigation), forestry and fishing	CZ-NACE 01 – 03
Energy sector (electricity and heat generation and distribution)	CZ-NACE 35
Industry (incl. extraction of mineral resources – excl. energy sector)	CZ-NACE 05 – 33
Other (incl. construction industry)	CZ-NACE 38 – 96
Total (excl. fishponds and transfers)	CZ-NACE 01 – 96

Source: CSO

The Podhájský Pond (Author: Hubalová Petra)

4.1 Surface water abstractions

From the longer-term perspective, the annual volume of surface water abstracted has decreased every year since 2016. In 2020, the total volume of surface water abstracted dropped year-on-year from 1,147.7 million m^3 ton an all-time low of 1,011.1 million m^3.

In 2020, all categories experienced a year-on-year decrease in surface water abstractions. Abstractions for public water supply decreased by 4.3%. Abstractions for industry fell to all-time low low with 198.7 million m^3 (down by 9.3%) and energy sector with 461.4 million m^3 (down by 17.4%). This decrease is mainly due to a reduction in consumption because of switching to circulating cooling at the Mělník – Horní Počaply and Opatovice power plants (by a total of 68.5 million m^3). Agriculture recorded a decrease of 14.3%, while the category of other abstractions including construction, decreased by 0.8%.

All River Boards, s.e., recorded a decrease in the volume of registered surface water abstractions in 2020. The steepest year-on-year drop was in the Elbe River Basin (by 19%), followed by the Ohře River Basin (by 11.3%), the Morava River Basin (by 7.6%), the Oder River Basin (by 6.3%) and the Vltava River Basin (by 4.1%).

The Zadní Žďár Water Reservoir (Source: Forests of the Czech Republic)

Exploitation of water sources dropped significantly at all levels after 1990 when valuation of water management services was rectified and the structure of industrial and agricultural production changed. This trend can be seen in Chart 4.1.1. Surface water abstractions for public water supply networks dropped from 744,9 million m^3 in 1990 to 326.2 million m^3 in 2020, which means in 2020 was consumed only 43.8% of the abstraction in 1990.Abstractions in agriculture decreased from 97.2 million m^3 in 1990 to 27.3 million m^3 in 2020, i.e. only 28.1% of the abstraction in 1990.The most significant drop was in industry from 830.1 million m^3 in 1990 to 219 million m^3, i.e. only 26.4% of the abstraction in 1990. In comparison with 1990, abstractions fell also in the energy sector: from 1,060.9 million m^3 in 1990 to all-time low 562.1 million m^3, i.e. 53%.
After 1990, as a result of the adjustment of value relations for water management services and change in the structure of industrial and agricultural production, there was a significant decline in the rate of exploitation of water resources in all areas of water use. This trend can be seen in Chart 4.1.1. Surface water abstractions in 2020 for public water supply decreased from 744.9 million m^3 in 1990 to 312.3 million m^3, which was only 41.9% of the 1990 volume. There was also a decrease in abstractions for agriculture from 97.2 million m^3 to 23.4 million m^3, i.e. 24.1% of the 1990 volume. There was a significant decrease in the industrial sector from 830.1 million m^3 to 198.7 million m^3, i.e. to 23.9% of 1990 values. The energy sector also experienced a decrease compared to 1990, with consumption falling from 1,060.9 million m^3 to an all-tim-e low of 464.4 million m^3, i.e. to 43.8%.

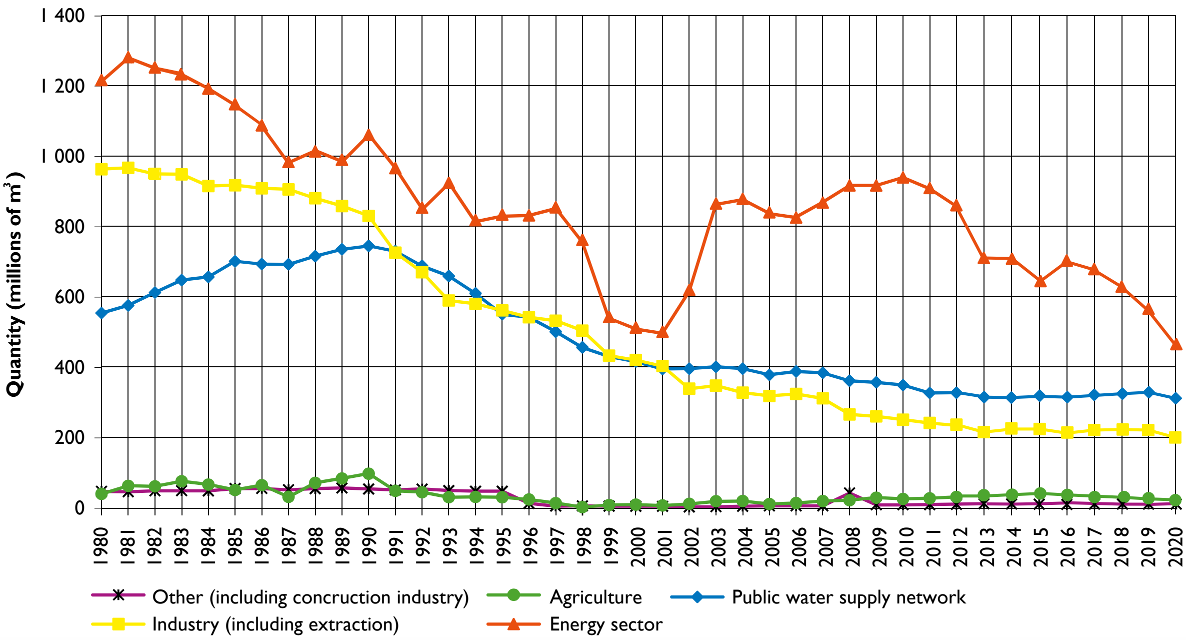
Nevertheless, the abovementioned facts do not imply lower anthropogenic influence of water sources. For instance, so-called "irrecoverable consumption" (difference between abstracted and discharged volumes caused by evaporation in cooling towers of thermal and nuclear plants) in the energy sector grew (with respect to increasing production of electricity in the Czech Republic).Annual assessment of water source influencing is conducted as part of water balance compiled under Decree No. 431/2001 Coll., whose principle is overall assessment of requirements for maintaining the minimum balance flow rate with flow rates at monitoring profiles that include all activities linked with water management.

Table 4.1.1
Surface water abstractions by clients exceeding 6,000 m^3/year or 500 m^3/month in millions of m^3 in 2020

River Board, s.e.	Public water supply networks		Agriculture incl. irrigation		Energy sector		Industry incl. extraction		Others incl. construction and public sewerage systems		Total	
	Volume	Number	Volume	Number	Volume	Number	Volume	Number	Volume	Number	Volume	Number
Elbe	36.2	25	8.3	57	255.7	11	82.4	65	2.2	91	**384.8**	**249**
Vltava	134.9	41	2.2	19	53.0	11	26.8	55	7.7	70	**224.6**	**196**
Ohře	43.1	21	1.5	42	33.5	9	33.0	44	0.7	29	**111.8**	**145**
Oder	59.8	24	0.0	0	6.2	15	46.4	34	0.6	33	**113.0**	**106**
Morava	38.3	36	11.4	43	116.0	9	10.1	53	1.1	59	**176.9**	**200**
Total	**312.3**	**147**	**23.4**	**161**	**464.4**	**55**	**198.7**	**251**	**12.3**	**282**	**1,011.1**	**896**

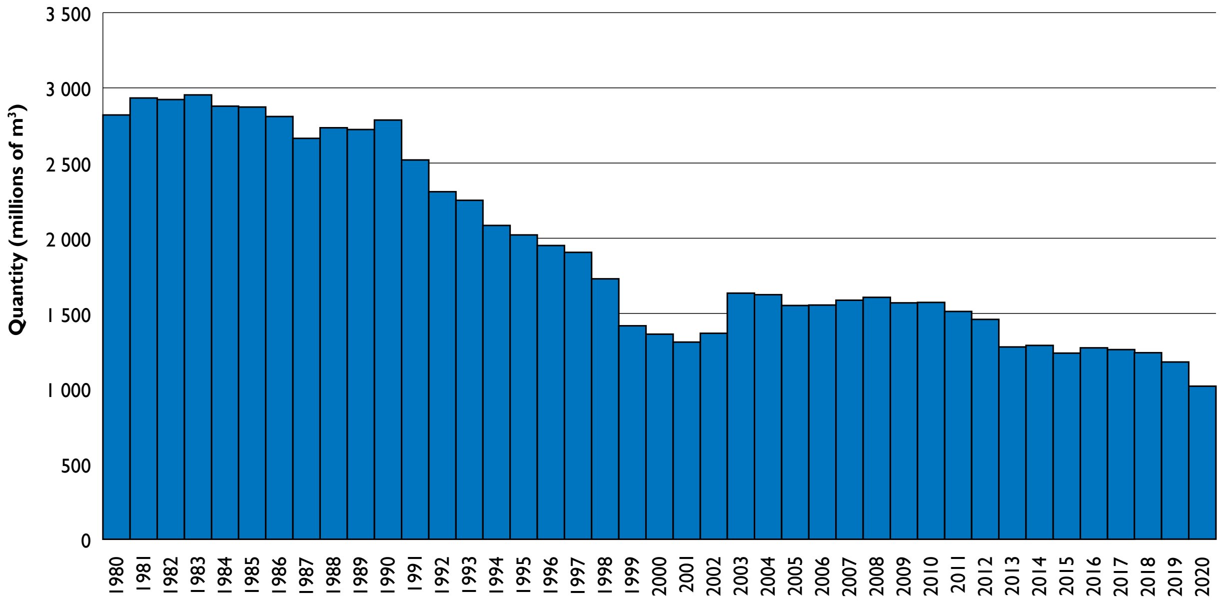
Source: River Boards, s.e.

Chart 4.1.1
Surface water abstractions in the Czech Republic by industry in 1980–2020



Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards, s.e.

Chart 4.1.2
Surface water abstractions in the Czech Republic in 1980–2020



Source: MoA using data provided by the T. G. Masaryk Water Research Institute, p.r.i., and River Boards, s.

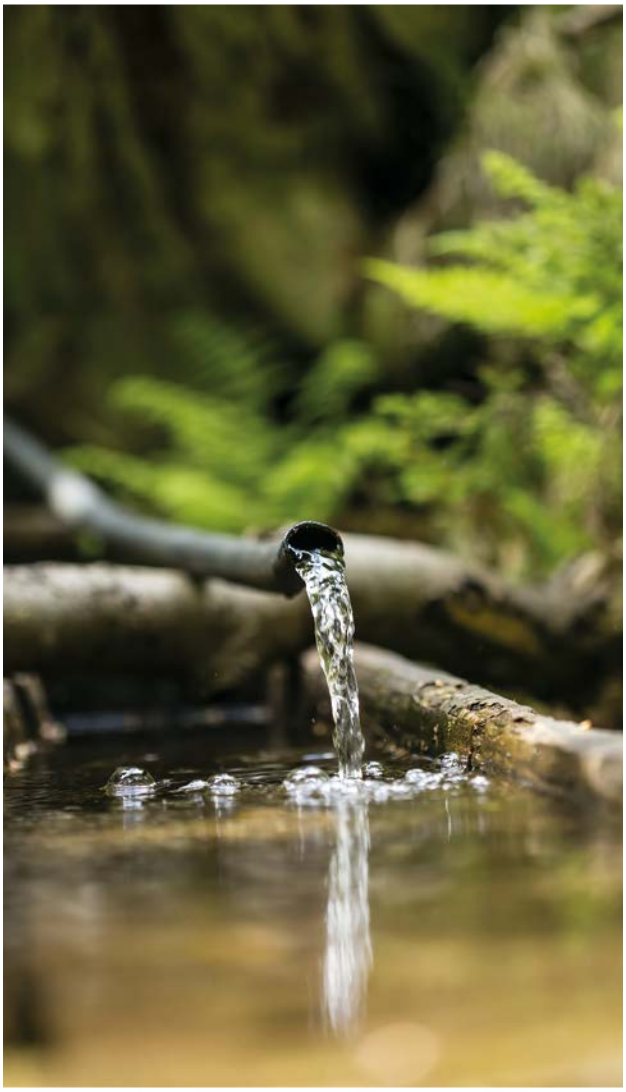
From the longer-term perspective, there has been a significant drop in the volume of surface water abstracted since 1990, which is due to economic and environmental factors, modernisation of production which has lower water demand, and cutting losses in the water distribution network. 2020 was significantly affected by the COVID-19 pandemic, when public life was restricted. These restrictions impacted all spheres of the national economy.

Table 4.1.2 shows water abstractions for technical snowing with more than 6,000 m^3/year or 500 m^3/month by each River Board, state enterprises.

Table 4.1.2
Surface water abstractions by clients exceeding 6,000 m^3/year or 500 m^3/month for snowmaking in 2020

River Board, s.e.	Snowmaking*)	
	Volume in thousands of m^3	Number
Elbe	1,856.30	67
Vltava	368.66	14
Ohře	418.73	14
Oder	364.75	19
Morava	879.75	41
Total	**3,888.19**	**155**

Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards, s.e.
*Note: *) Ascertained using internal code VHB "260410 – snowmaking of technical snow" used by the River Boards, s.e., or by the name of the abstraction.*



Photosampler (Source: www.shutterstock.com)

4.2 Groundwater abstractions

Groundwater abstractions decreased in 2020 when compared with 2016–2018 when they were on a slight rise. The volume of groundwater abstracted in 2020 was lowest in history, only 354.9 million m³. In 2019, 359.3 million m³ of groundwater was abstracted.

Groundwater volumes fell year-on-year almost in all categories in 2020: abstractions for industry by 6%, other abstractions including construction by 8.2%, for public supply by 0.4%. The energy sector abstracted by 5.6% more water than in 2019 and abstractions for agriculture increased by 1.3%.

The highest share of total groundwater abstractions was in the Morava River Board (33.3%), the lowest in the Oder River Board (5.4%).

From the perspective of the volumes of groundwater abstractions, an increase was only recorded in an area administered by the Oder River Board (by 4.4%) and a very slight increase in an area administered by the Morava River Board by 0.1%. Other River Boards, s.e., saw a year-on-year decrease in their administered territories: the Ohře River Board by 5.4, the Vltava River Board by 2.4% and the Elbe River Board by 0.7%.

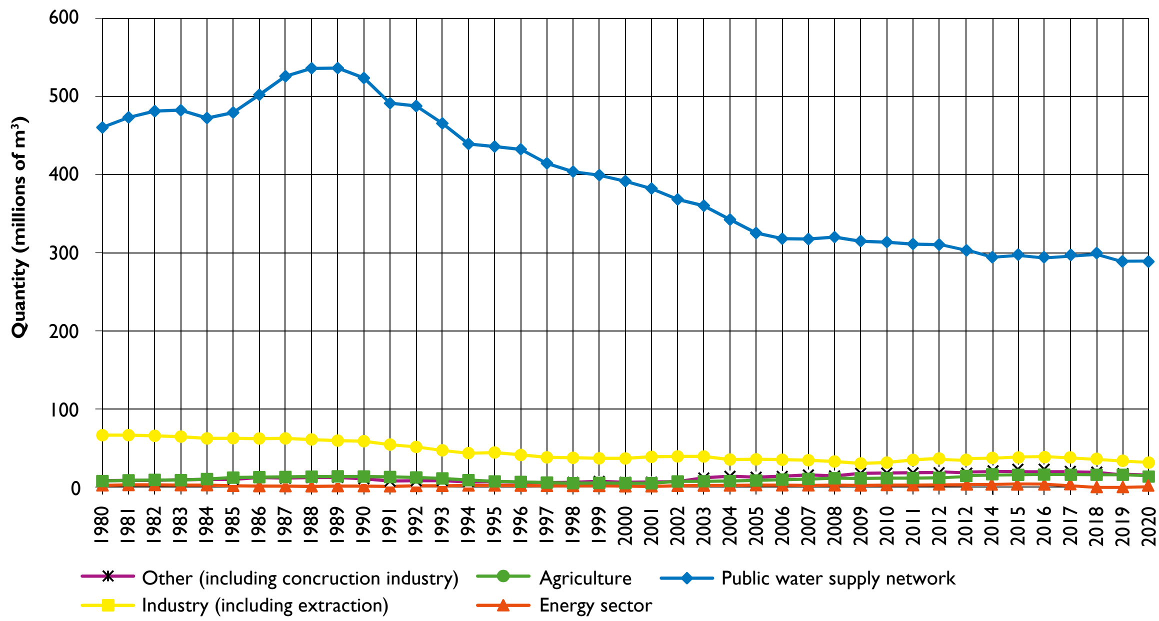
Comparison from the long-term perspective shows that the highest volumes of groundwater were abstracted in 1988 and 1989, since then the volumes have been decreasing. The volumes of groundwaters have been rather stable since 2006. 2020 continued in the decreasing trend from 2019 and reached all-time lows, which could have been partly due to restrictions resulting from the COVID-19 pandemic (same as in the volume of surface water abstracted) and also by the low volume of groundwater in 2020 and throughout the entire year in northwest Bohemia.

Table 4.2.1
Groundwater abstractions in milion of m³ by users exceeding 6,000 m³/year or 500 m³/month in 2020

River Board, s.e.	Public water supply networks		Agriculture incl. irrigation		Energy sector		Industry incl. extraction		Others incl. construction industry and sewerage systems		Total	
	Volume	Number	Volume	Number	Volume	Number	Volume	Number	Volume	Number	Volume	Number
Elbe	93.4	694	3.1	222	0.7	8	7.5	127	2.3	91	**107.0**	**1,142**
Vltava	32.1	579	5.5	356	0.3	11	9.4	113	9.1	445	**56.4**	**1,504**
Ohře	43.0	312	0.7	30	0.8	5	7.9	115	1.7	31	**54.1**	**493**
Oder	17.3	151	0.5	26	0.0	0	1.0	26	0.3	20	**19.1**	**223**
Morava	103.1	693	5.7	339	0.1	8	7.1	159	2.3	91	**118.3**	**1,290**
Total	**288.9**	**2,429**	**15.5**	**973**	**1.9**	**32**	**32.9**	**540**	**15.7**	**678**	**354.9**	**4,652**

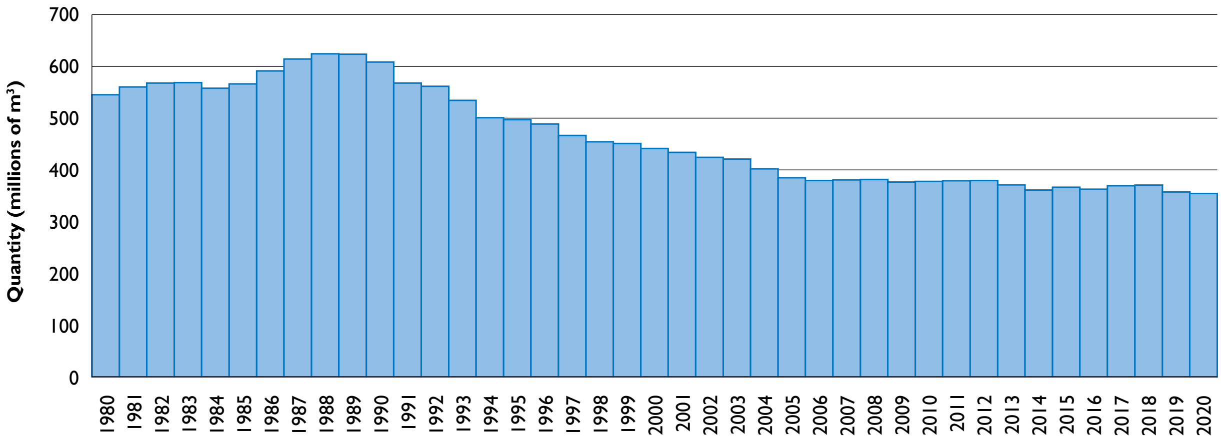
Source: River Boards, s.e.

Chart 4.2.1
Groundwater abstractions in the Czech Republic by industry in 1980–2020



Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards, s.e.

Chart 4.2.2
Groundwater abstractions in the Czech Republic in 1980–2020



Source: MoA using data provided by T. G. Masaryk Water Research , p.r.i., and River Boards, s.e.

Table 4.2.2 shows reported groundwater abstractions for technical snowmaking exceeding 6,000 m^3/year or 500 m^3/month in thousands of m^3 in the Elbe and Vltava River Boards, state enterprises.

Table 4.2.2
Groundwater abstractions (in millions of m^3) exceeding 6,000 m^3/year or 500 m^3/month in 2020

River Boards, s.e.	Snowmaking *)	
	Volume in thousands of m^3	Number
Elbe	10.06	1
Vltava	2.79	1
Total	**12.85**	**2**

Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards, s.e.
*Note: *) Ascertained using internal code VHB "260410 – snowmaking of technical snow" used by the River Boards, or by the name of the abstraction*

The Velehrad Shelter, The Konventní Pond (Author: Hubalová Petra)

4.3 Wastewater discharges

In 2020, a total of 1,502.3 million m^3 of wastewaters and mine waters were discharged into watercourses, which means a year-on-year decrease by 1.3%. The volume of discharged waters is the lowest in history.

For the sake of uniformity, the total volume did not include water discharged from fishpond systems as the case was in the previous years.

The most significant decrease in the volume of discharged waters in 2020 was in agriculture (by 36.6%) and energy sector (by 18.5%). A lower volume of discharged wastewaters, as compared with 2019, was also in industry (by 2%) and others including construction (by 0.3%). By contrast, there was an increase in discharged waters in public sewerage system (by 8.4%).

From the perspective of discharged wastewater volumes, the highest increase was in the area administered by the Oder River Board (by 13.1%), by the Morava River Board (by 6.1%) and by the Vltava River Board (by 2.7%). Other River Boards, s.e., showed a decrease in discharged wastewaters: the Elbe River Board (by 10.8%) and the Ohře River Board (by 5.6%).

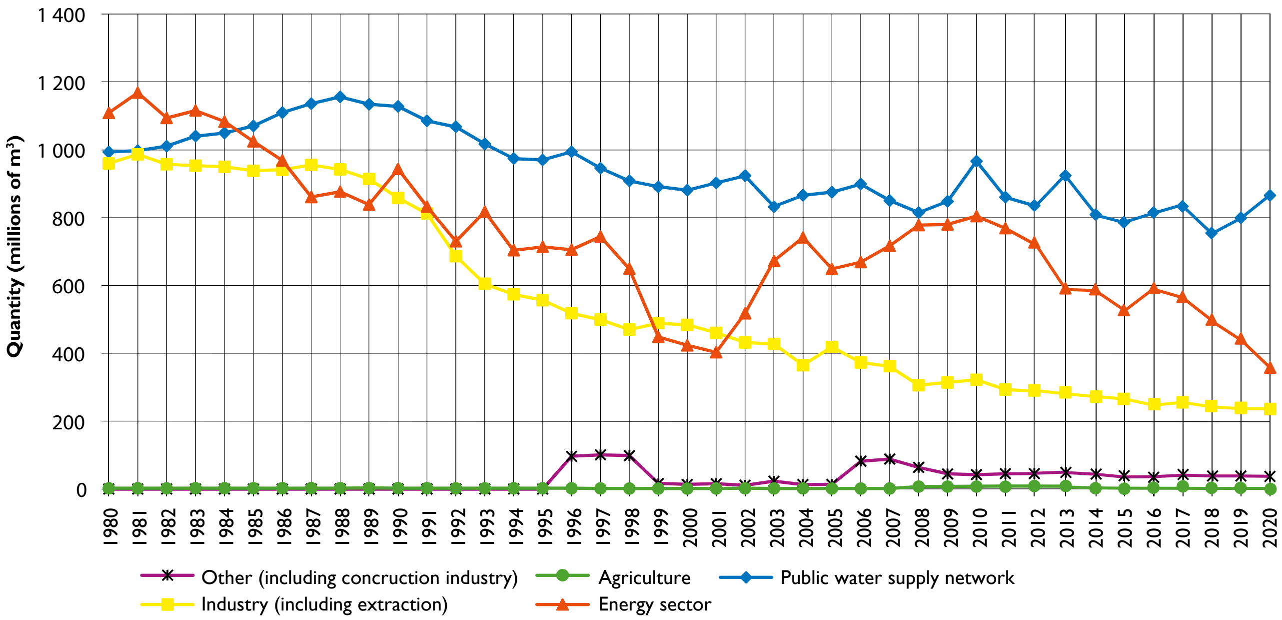
The long-term development of wastewater and mine water discharges shows a slight decrease in recorded discharges. This is mainly due to the system of reporting discharges, where previously free discharges directly to surface waters without connection to the WWTP prevailed and discharges were mostly estimated from invoiced water consumption. By extending the sewerage system, construction of new WWTPs with accurate discharge measurement and the adoption of new water act in 2001 led to more accurate reporting of discharges.

Table 4.3.1
Discharges of wastewaters and mine waters (in millions of m³) into surface waters from sources exceeding 6,000 m³/year or 500 m³/month in 2020

River Board. s.e.	Public water supply networks		Agriculture incl. irrigation		Energy sector		Industry incl. extraction		Others incl. construction industry and public sewerage systems		Total	
	Volume	Number	Volume	Number	Volume	Number	Volume	Number	Volume	Number	Volume	Number
Elbe	180.4	732	0.0	2	231.9	23	74.4	156	2.3	77	**489.0**	**990**
Vltava	267.9	791	0.9	5	19.2	23	31.6	145	29.0	716	**348.6**	**1,680**
Ohře	74.6	289	0.7	2	15.0	23	63.1	142	1.3	24	**154.7**	**480**
Oder	110.3	316	0.0	2	9.2	15	50.3	72	4.1	60	**173.9**	**465**
Morava	232.5	1,178	0.3	5	82.2	16	18.1	139	3.0	97	**336.1**	**1,435**
Total	**865.7**	**3,306**	**1.9**	**16**	**357.5**	**100**	**237.5**	**654**	**39.7**	**974**	**1,502.3**	**5,050**

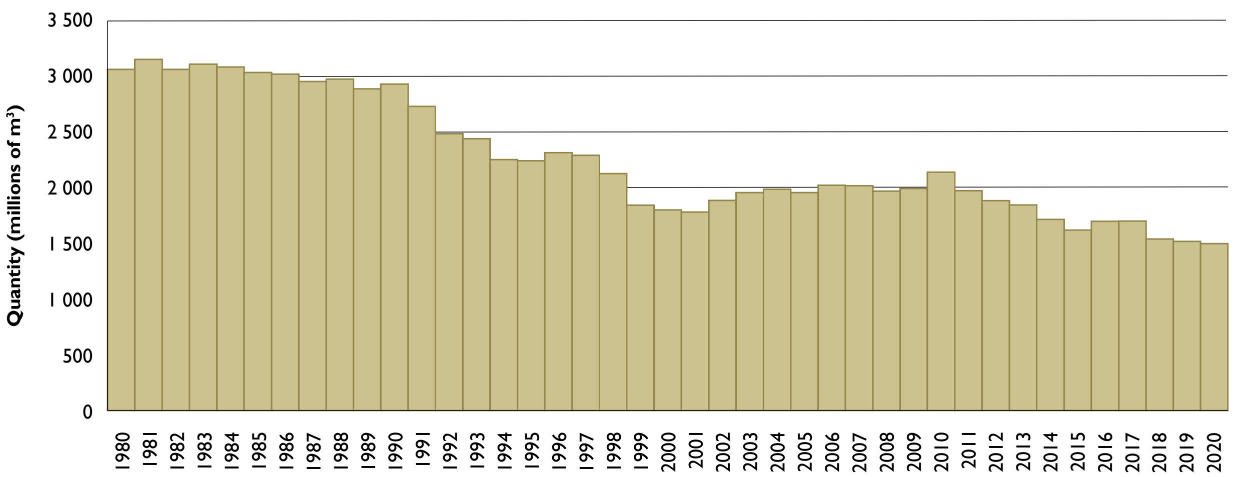
Source: River Boards, s.e.

Chart 4.3.1
Discharge of wastewaters in the Czech Republic by industry in 1980–2020



Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the River Boards, s.e.

Chart 4.3.2
Discharge of wastewaters in the Czech Republic in 1980–2020



Source: MoA using data provided by T. G. Masaryk Water Research Institute, p.r.i., and River Boards, s.e.

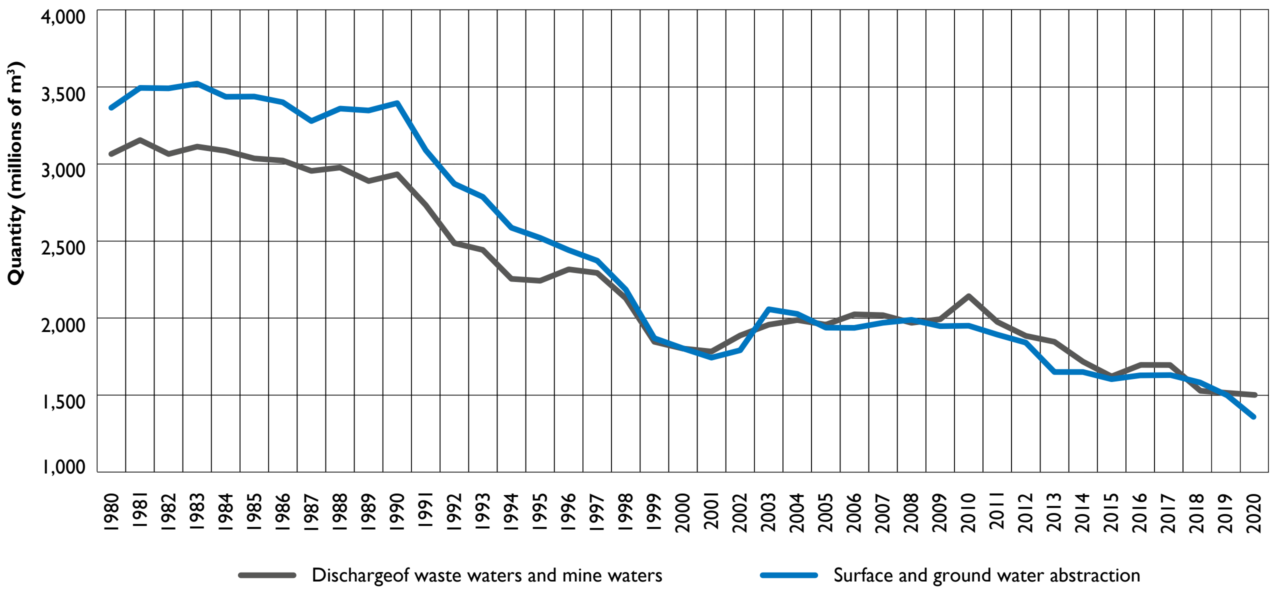
4.4 Overall comparison of water management

In 1980–2018 there was a very significant decrease in water abstractions and discharging after 1990, whereas since 2001 there was a slight growth, however, after 2010 we saw another decrease in the volume of abstractions and discharging. The volumes of abstracted and discharged water in 2020 reached all-time lowest values, as the case was in 2019. Unlike 2019, the volume of discharged water was again slightly higher than the volume of abstracted water, even though the difference was rather insignificant.

After 1990, there was a significant drop in the volumes of abstracted and discharged water. The difference between the abstracted and discharged volumes of water before 1995 can be attributed to the different method of reporting discharge, higher leakage from water supply systems and non-uniform sewerage network in many smaller towns (agglomerations with more than 2,000 equivalent citizens were only furnished with sewerage systems after the Czech Republic joining the EU in 2004).

In dry years, the values of abstracted and discharged volumes of water are similar, in more abundant years we notice higher volumes of discharged water than water abstracted which is linked with streaming a part of rainwater into the sewerage system above the volume of measured consumption in the water supply system.

Chart 4.4.1
Water abstractions and discharges in the Czech Republic in 1980–2020

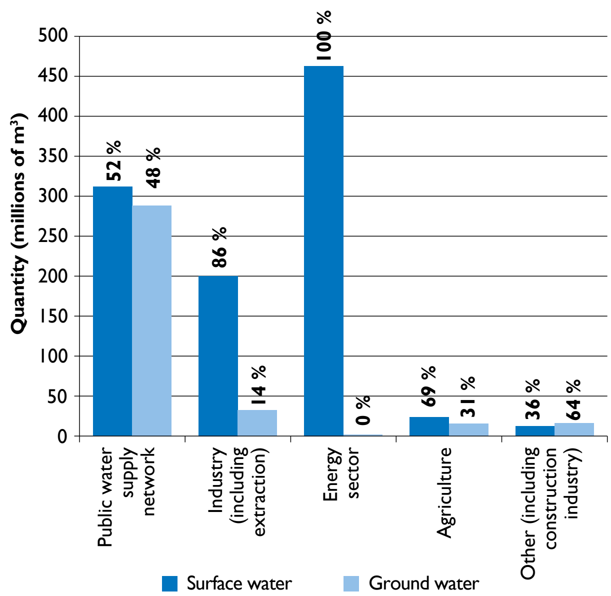


Source: MoA using data provided by T. G. Masaryk Water Research Institute, p.r.i., and River Boards, s.e.

With respect to the fact that 2020 had more precipitation than 2019, the volume of water discharge is higher than of water abstracted. A total of 1.50 billion m³ of waters were discharged, whereas, the volume of surface water abstractions amounted to 1.36 billion m³.

When comparing groundwater and surface water abstractions by industries, we can conclude that abstractions for water supply are almost identical, whereas majority of other industries uses mainly surface water.

Chart 4.4.2
Comparison of surface water and groundwater abstractions by industry in 2020



Source: MoA using data provided by T. G. Masaryk Water Research Institute, p.r.i., and River Boards, s.e.

In 2020, public water supply systems abstracted (as the case was in 2019) more water from surface sources, which was given by the prolonged period of drought and decreasing level of groundwaters. The water used by the energy sector is almost 100% surface water, which is also the case in other industries. Agriculture covers its needs with almost two thirds of surface water. The only industry – others incl. construction – abstracts larger volumes of groundwaters than surface waters. This is probably given also by the price of groundwater that is significantly lower than the price of the surface water.

girishlal m p (Source: www.shutterstock.com)

5. SOURCES OF POLLUTION

5.1 Point sources of pollution

Surface water quality is affected primarily by point sources of pollution such as municipalities, industrial plants and farms with intensive agricultural animal production. The level of water protection against pollution is most often assessed based on the development of the produced and discharged pollution.

The term "produced pollution" refers to the volume of pollution contained in produced (untreated) wastewaters. In line with EU requirements, the Czech Republic pays increased attention to data collection and analysis of the situation concerning pollution. In particular, data are collected from a larger number of reporting entities under so-called water balance in line with requirements of Decree No. 431/2001 Coll., on Content of Water Balance, Kind of its Compilation and on Data for Water Balance.

In comparison with 2019, the produced pollution improved in four indicators: BOD_5 (by 3.6%), COD_{Cr} (by 3%), P_{total} (by 1.4%), NM (non-dissolved matters dried at 105°C) – by 0.1%. Volume of DIS (dissolved inorganic salts) increased by 3.1% and N_{inorg} by 0.3%.

The pollution discharged in surface waters decreased in 2020 in two indicators (out of six): BOD_5 (by 1.5%) and COD_{Cr} (by 0.5%), whereas all other indicators increased: Ptotal (by 6.3%), NM (by 3.7%), DIS (by 3.6%), N_{inorg} (by 1.8%). Values of the indicators in the discharged (and charged for) pollution since 1990 is shown in Table 5.1.1.

Between 1990 and 2020 there was a drop in the amount of discharged pollution as shown by the following indicators: BOD_5 by 96.5%, COD_{Cr} by 90.8% and NM by 95.2%. At the same time, there was a decrease in the volume of COD dangerous and extraordinarily harmful substances. There was also a significant drop in macronutrients (nitrogen, phosphorus) that was due to the introduction of biological removal of nitrogen and biological or chemical removal of phosphorus in wastewater treatment technologies applied in new and intensified WWTP.

Underwater Life Guard, December 2020, The Svratka Stream, Brněnská Water Reservoir (Author: Husák Vladimír)

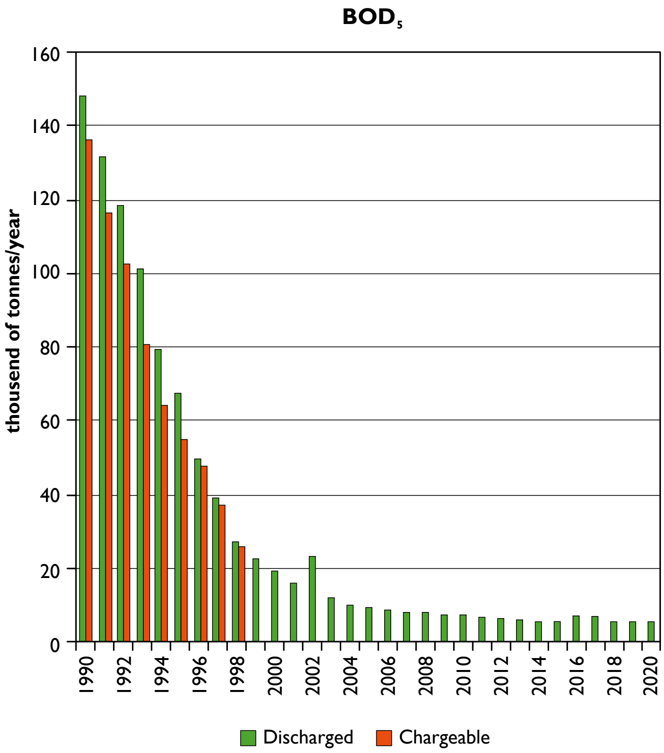
Chart 5.1.1 shows that monitored values DIS of discharged pollution under the territorial scope of the Vltava River Board and the Oder River Board, state enterprises, are higher than produced pollution. The deviation in the resulting value of discharged pollution may be due to doses of salt used when reducing phosphorous chemically or when adding defoaming salts. Furthermore, indicators in the inflow and outflow to/from WWTPs are not monitored with the same frequency and/or not in the same type of sample, or the data about produced pollution might not be complete.

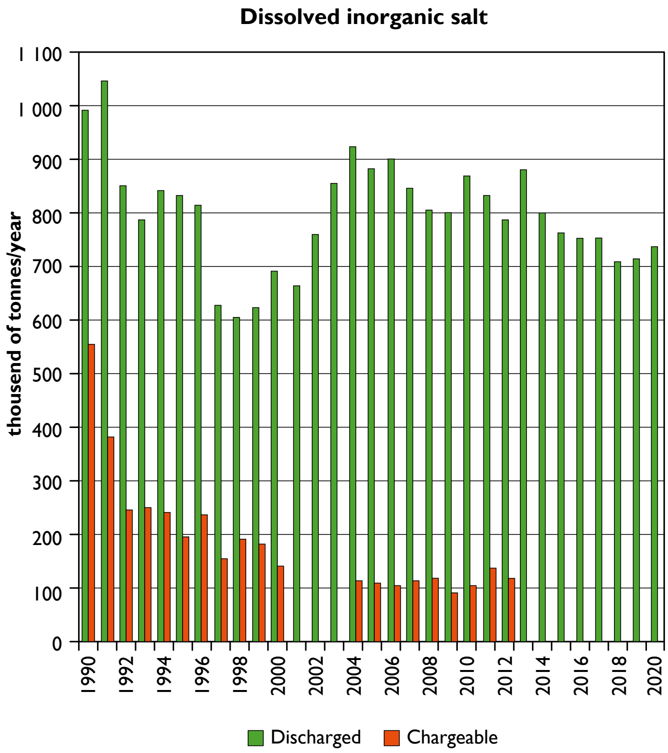
Table 5.1.1
Produced and discharged pollution in 2020

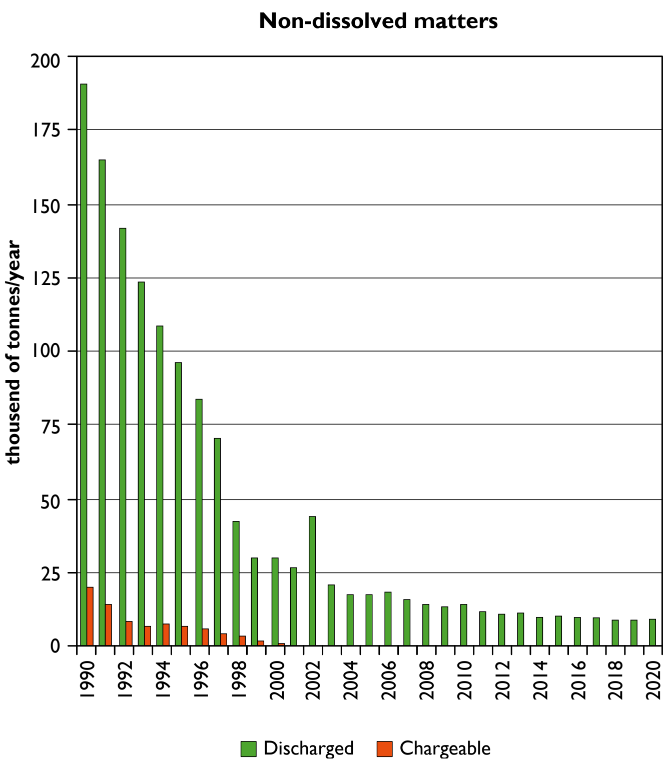
River Boards, s.e.	Produced pollution in tonnes/year						Discharged pollution in tonnes/year					
	BOD_5	COD	NM	DIS	N_{inorg}	P_{total}	BOD_5	COD	NM	DIS	N_{inorg}	P_{total}
Elbe *)	53,688	131,608	53,329	200,908	7,972	1,234	1,327	10,915	2,639	195,779	2,220	224
Vltava	85,982	203,350	90,552	107,434	9,033	2,312	1,390	9,786	2,291	111,598	2,318	258
Ohře *)	20,480	41,697	19,674	97,113	2,560	836	419	3,168	1,150	95,285	1,422	279
Oder *)	31,517	63,964	25,975	175,697	3,637	606	644	5,566	1,594	192,452	1,178	131
Morava *)	68,605	174,164	88,053	148,802	8,176	1,866	1,256	7,903	1,701	142,922	2,330	221

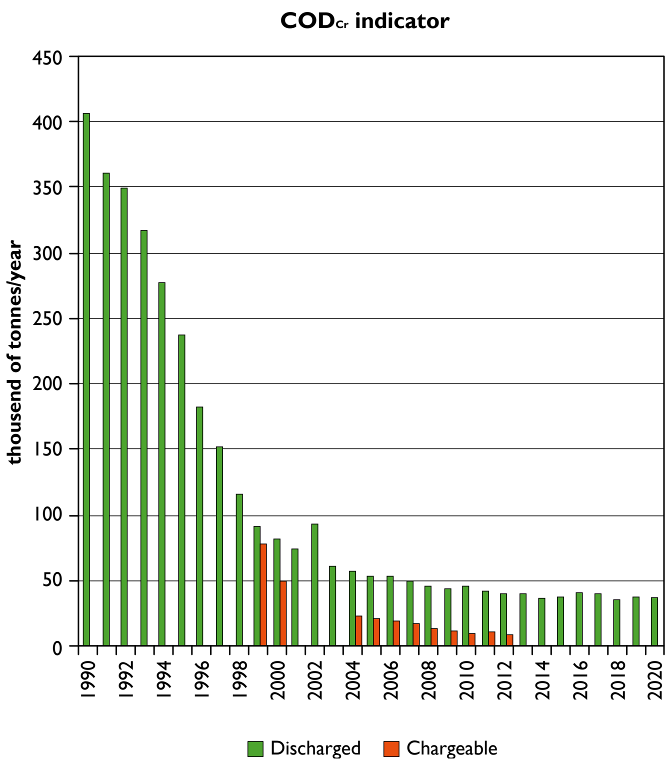
Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the CSO and River Boards, s.e.
*Note: *) Some values in produced pollution were calculated using the volume of discharged pollution due to some notifiers' failure to report produced pollution.*

Chart 5.1.1
Discharged pollution and pollution on which charges were imposed in 1990–2020









Source: T. G. Masaryk Water Research Institute, p.r.i., using data provided by the CSO and River Boards, s.e.

The Nechranice Water Reservoir (Source: Ohře River Board)

5.2 Area sources of pollution

Surface water and groundwater quality is also significantly affected by area sources of pollution – such as pollution from farming, from atmospheric deposition and from erosive runoff of the landscape. While pollution from point sources keeps decreasing, the contribution of area pollution is on the rise. Surface water and groundwater quality is most significantly affected by nitrates, pesticides and acidification and also by phosphorous, though not so much.

The most important measures aimed at decreasing area pollution of water from agricultural sources are Government Regulation No. 262/2012 Coll., on the Designation of Vulnerable Areas and the Action Programme, as amended. This legal regulation defines (reviews) so-called vulnerable areas and initiates an action programme.

Direct funding and some subsidies from the Rural Development Programme (hereinafter referred to as the "RDP") and support intended for restructuring and transformation of vineyards under the joint organization of the wine market is conditioned by maintaining soil in "Good Agricultural and Environmental Condition" (hereinafter referred to as the "GAEC") and adhering to "Compulsory Requirements for Farming" (hereinafter referred to as the "CRF") in the sphere of Environment, Climate Change and Good Agricultural and Environmental Condition of Soil, Public Health, Health of Animals and Plants and Good Life Conditions for Animals.

In case a support applicant fails to meet with the requirements at any time of the calendar year in which they file the application for payment, the subsidy may be decreased or refused.

Conditions related to water pollution are CRF 1 – and GAEC 1 standards – unfertilized belts alongside watercourses, protection distances for application of plant protection preparations with the aim of protecting aquatic organisms and GAEC 3 – handling with harmful substances.

Water erosion of land

The Czech Republic, as the case is with other countries, is more and more often exposed to hydrological extremes, which is due to the climate change. It can be expected that regions affected by such extremes will expand significantly in the future. One of the key factors that can mitigate the impact of the climate change is suitable farming on agricultural land. In 2020, monitoring of water erosion recorded damage to 12% of water bodies.

The occurrence of water erosion in the Czech Republic is significantly affected by many factors, particularly by the fact that the blocks of soils are the largest in the EU soil plots, the lack of organic matter in the soil, very low share of landscape elements with soil protective (anti erosion) function and inconvenient relation of farming subjects to the farmland. Water erosion results in soil loss and loss of topsoil and clogging of watercourse and reservoir beds. During prolonged periods of drought, sediments in watercourses may be subject to accelerated mineralization and once the water levels increase, water quality is deteriorated. This means that water erosion deteriorates water quality, contributes to eutrophication and complicates the use of water. Together with some extensive single-functional drainage systems, water erosion decreases water retention and accumulation in the land.

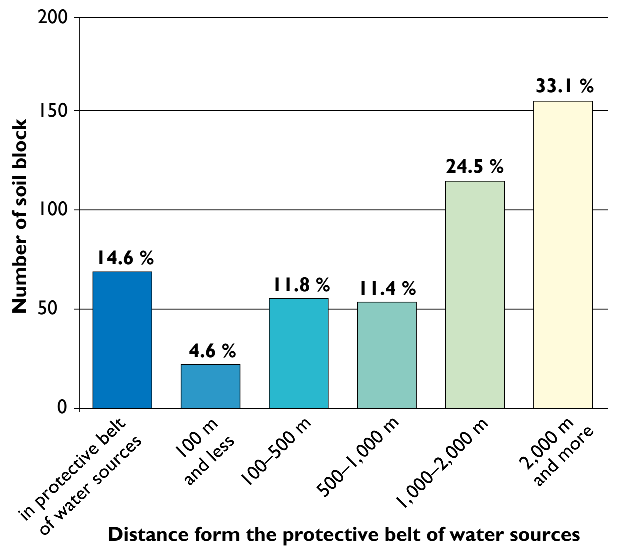
Since 2012, Research Institute for Soil and Water Conservation, p.r.i. (hereinafter referred to as the "Research Institute for Soil and Water Conservation") has been monitoring farmland erosion (https://me.vumop.cz) with the aim of gathering relevant background materials about the extent of farmland erosion, causes of erosion, ascertaining whether the current policies in the field of fighting erosion are correctly aimed and about effectiveness (or ineffectiveness) of some anti erosion measures.

Monitored events in 2020 showed damage to water bodies in 12% of the cases, which means a year-on-year drop by more than 12%. This favourable decline cannot be considered a trend at least not yet, and might eventually be confirmed in the years to come. The amount and distribution of erosion events is influenced, among others, by the course and distribution of precipitation in the country and in a given year. Monitoring identified especially visible damage such as sediments. Runoff of erosion sediments carry other substances (pesticides, fertilizers, nutrients, etc.) that may get through the hydrographic network to water sources, meaning the negative impact of erosion events on water source quality has several levels.

As Chart 5.2.1 shows, almost 30% of affected soil blocks are within 500 m from water source protection belts and 14.6% of the blocks are inside the belts, meaning there was a slight increase in the threat to the protection belts. This long-term assessment displays year-on-year decrease in single-digit percent.

Due to runoff of erosion sediments (according to the analyses, about 1.4 million m^3 of sediments from the agricultural land fund gets to watercourses) and intake of other substances (pesticides, nutrients) that get to water sources through hydrographic network and drainage systems affects adversely the water source quality. Major part of erosion events has negative impact on the water source quality, the same applies

Chart 5.2.1
Recorded erosion events by distance from the protective belt of water sources in 2020

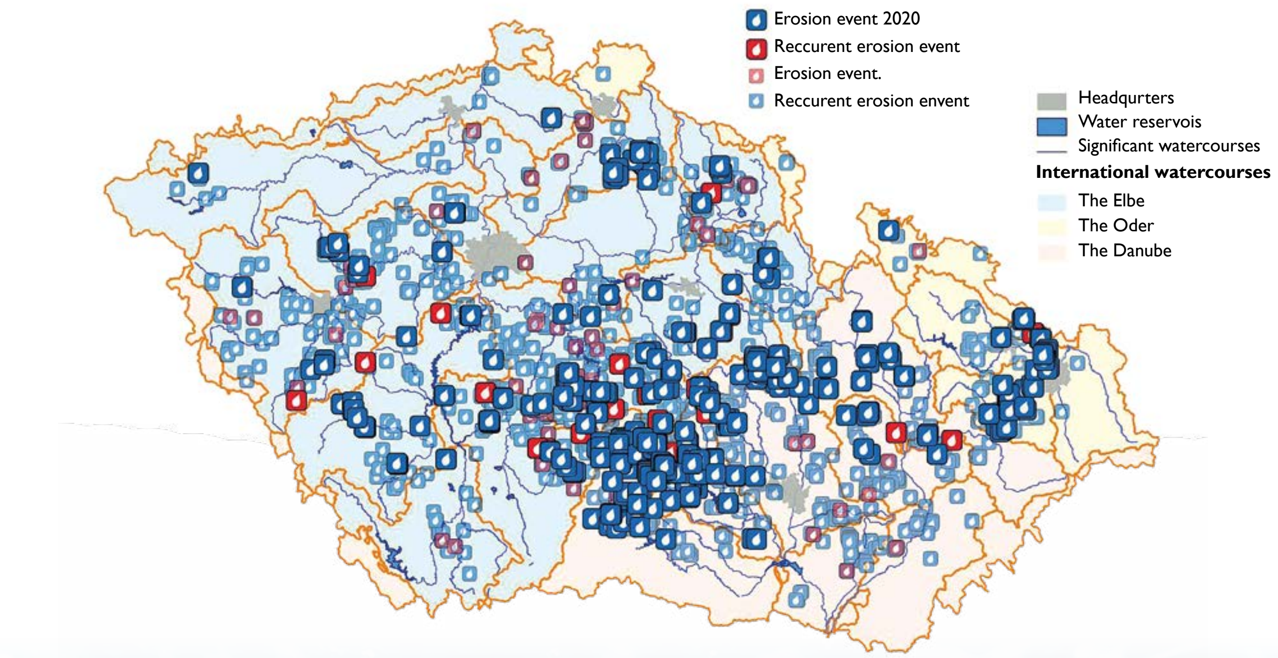


Source: Research Institute for Soil and Water Conservation
Note: Number of soil block units affected = number of soil block units where erosion was detected

to pollution through drainage: the amount of N-NO3 offtake from arable drained land in the long-term average is approximately 30 kg.ha^{-1}.rok^{-1}. Episodic contributions of pesticide to waters from drainages are also far from negligible.

In order to mitigate impacts and effects of hydrological extremes in the landscape, it is necessary to adapt farming methods and use of agricultural landscape. Hydro amelioration, especially drainage structures, affecting hydrological and hydro-chemical processes of agricultural soils, or individual plots and entire catchments (water bodies), represent a significant

Figure 5.2.1
Overview of erosion events in 2020



Source: Research Institute for Soil and Water Conservation potential. Although possible adaptation measures at drainage systems (regulating, eliminating, combined, often merely maintenance and repairs) require, due to the large area scale of each structure, adjustment of the relevant legislation to current user-ownership relations, many can be conceptually and factually addressed now. The Research Institute for Soil and Water Conservation operates and develops the Information System for Amelioration Structures (https://meliorace.vumop.cz/?core=app) and provides intensive advisory and other services in this area. It does not, however, conduct an area-based, systematic research of the extent and condition of drainage structures. In the future, it is planned to use the portal as a signpost for comprehensive expert data and for optimising the ownership-user relations concerning hydro amelioration structures on a local and regional scale. These documents are useful and necessary beyond land consolidation processes.

5.3 Accidental pollution

Surface water and groundwater quality is also affected by adverse impacts of accidental pollution. In 2020, the Czech Environmental Inspection registered a total of 118 accidental releases of harmful substances into surface waters, four accidental releases into groundwaters and one into both surface/groundwaters. The Inspection imposed 401 fines totalling 16 million CZK in the sphere of water management.

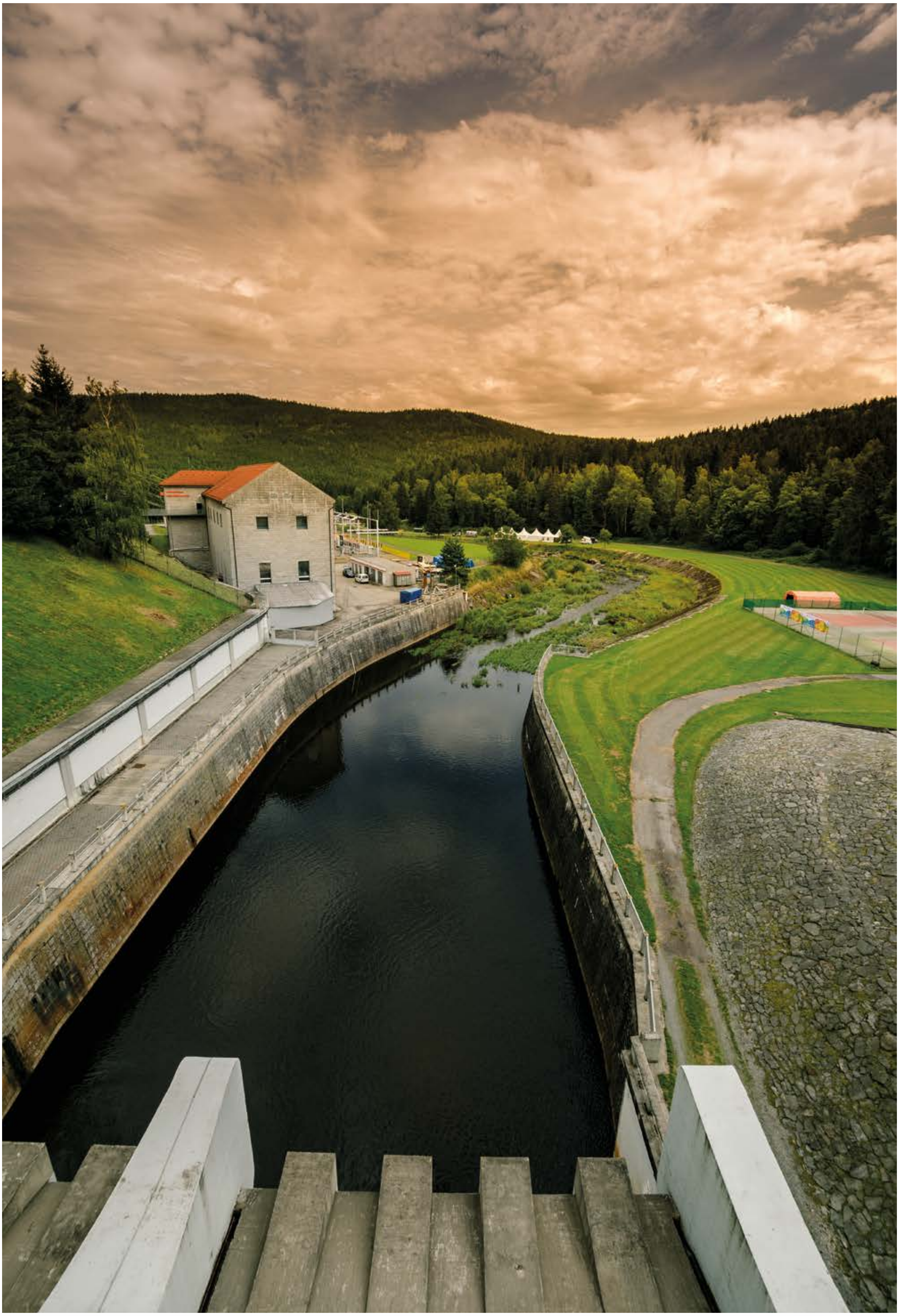
Pursuant to the Water Act, the Czech Environmental Inspection (hereinafter referred to as the "CEI") has kept central records of accidents since 2002. In 2020, the CEI registered a total of 194 accidents that met the definition of accidents under Section 40 of Act No. 254/2001 Coll., the Water Act. Additional accidents were reported to the CEI in 2020 that were not included in the central records of accidents because of their negligible impact on water quality. Frequent accidents continue to be those caused by transport. In 2020, 42 such accidents were registered, which accounts for 22% of the total number of accidents. In comparison with 2019, the number of accidents caused by transport fell by 11%. 14 accidents were accompanied by fish kill in 2020, which accounts for 14% of the total number of accidents. Three accidents resulted in groundwater pollution, while one accident resulted also in surface water pollution. The inflictors of pollution were known in 95 cases.

Out of the total number of 194 recorded cases, the most numerous group of pollutants was oil products: 109 of the total number of registered cases, which accounts for 56.2%, followed by other substances (10.3%) and chemical substances excluding heavy metals (9.8%). The type of pollutants was not identified in 16 accidents (8.2%).

Classified by the cause (inflictor) of the accident (CZ-NACE), the most numerous were accidents falling under group H – transport and storage (26.3%), followed by accidents in section A – agriculture, forestry and fishery (6.2%) and accidents in section C – manufacturing industry (5.7%). The industry of inflictors could not be identified in 52.6% of the cases.

In 2020, the CEI imposed 401 penalties for breaching legal regulations in water management, of which 364 penalties became fully effective as of 31 December 2020. The fines totalled CZK 16 million.

The Podhora Water Reservoir (Source: Ohře River Board)



Sisvorka (Source: www.shutterstock.com)

6. WATERCOURSE MANAGEMENT

6.1 Professional management of watercourses

The inland position of the Czech Republic at the heart of Central Europe predetermines its relation to the European river network. The basic hydrographic system is constituted by more than 100,000 km of watercourses with both natural and regulated watercourse beds. Watercourses in the Czech Republic are divided according to the Water Act into two categories: significant watercourses and minor watercourses. Professional management of watercourses is carried out in accordance with the provisions of Section 47 of the Water Act.

Important watercourse administrators under the MoA are River Boards, state enterprises, namely: Elbe River Boards, s.e., Morava River Boards, s.e., Oder River Boards, s.e., Vltava River Boards, s.e., and Forests of the Czech Republic, s.e. These administrators administer almost 95% of total watercourse length in the Czech Republic. The remaining 5.5% of watercourse lengths are administered by other administrators (the Ministry of Defence, national park administrators, municipalities, other natural persons and legal entities).

Table 6.1.1

Professional management of watercourses

Category	Administrator	Length of watercourses (km)	
		2019	**2020**
Significant watercourses	Elbe River Board, s.e.	3,589	3,589
	Vltava River Board, s.e.	5,539	5,539
	Ohře River Board, s.e.	2,377	2,377
	Oder River Board, s.e.	1,111	1,111
	Morava River Board, s.e.	3,761	3,762
	River Boards in total	**16,377**	**16,378**
Minor watercourses	Forests of the Czech Republic, s.e.	38,416	38,439
	River Boards, s.e., in total	38,866	38,897
	Other administrators 1)	5,449	5,227
		82,731	**82,563**
Watercourses in total		**99,108**	**98,941**

Source: MoA

Note: Digital lengths of watercourses from the Central Register of Watercourses are presented. 1) Including National Park Administrations, the Ministry of Defence (authorities of military districts), municipalities and other natural and legal persons.

All significant watercourses are listed in Annex No. 1 to Decree No. 178/2012 Coll. that defines a list of significant watercourses and methods for conducting activities linked with watercourse administration. It is an overview of 819 watercourses including their identifiers (watercourse ID); the overview also includes small watercourses that are so-called "border" watercourses. Significant watercourses with total length of 16,378 km are administered by the respective River Boards, s.e., under the provision of Section 4 of Act No. 305/2000 Coll., on River Basins. The backbone watercourses are the Elbe River (370 km), the Vltava River (431 km) and the Ohře River (254 km) in Bohemia, the Morava River (269 km) and the Dyje River (194 km) in the south of Moravia and the Oder River (135 km) and the Opava River (131 km) in the north of Moravia and Silesia.

All the other watercourses are classified as minor watercourses pursuant to Section 43 of the Water Act; they are administered based on the respective appointment by the MoA (provision of Section 48(2) of the Water Act). If no administration of a minor watercourse is appointed, such a watercourse is administered in accordance with the provision of Section 48(4) of the Water Act, by the administrator of the recipient into which such a watercourse flows. It is administered by such an authority until watercourse administrator is appointed in accordance with Section 48(4) of the Water Act. Minor watercourses may be administered by municipalities through which minor watercourses flow, natural persons or legal entities or organizational body that either use such a minor watercourse or is related to their activity. The template and content of an application to appoint the administrator of a minor watercourse is specified in detail in the abovementioned Decree No. 178/2012 Coll. According to the Central Register of Watercourses (hereinafter referred to as the "CRW"), the total length of minor watercourses is 82,563 km. The process of reassessment, refining and reclassification of the mapping of the designated minor watercourses continues to be underway.

Public administration bodies and the general public can find detailed information on the administration of watercourse in a CRW online application which is available at the website of the Ministry of Agriculture (www.eagri.cz) and on the Water Management Information Portal (www.voda.gov.cz).

Watercourse administrators under the Ministry of Agriculture expended on significant and minor watercourse administration funds totalling to CZK 3.2 billion, i.e. a similar amount to the previous year.

Activities of river supervisors in the Vltava River Basin (Source: Vltava River Board)

Table 6.1.2
Money spent on watercourse management in 2020

Watercourse administrator	Significant watercourses	Minor watercourses	Total
	in millions of CZK		
Elbe River Board	333.4	52.1	385.5
Vltava River Board	316.4	148.7	465.1
Ohře River Board	333.6	18.7	352.3
Oder River Board	303.9	85.3	389.2
Morava River Board	830.0	175.0	1,005.0
River Boards in total	**2,117.3**	**479.8**	**2,597.1**
Forests of the Czech Republic *)	-	568.5	568.5
Total	**2,117.3**	**1,048.3**	**3,165.6**

Source: MoA
*Note: *) The item includes funds intended for watercourse and reservoir management*

The purchase value of fixed assets linked with watercourses rose year-on-year by CZK 1.16 billion in 2020 to CZK 54.9 billion.

The year-on-year growth is mainly caused by the increase in the non-current tangible assets generated by the renewal and planned development of entrusted property in the form of routine investment construction and by entries of the assets taken over and the completed hydraulic structures in the accounting records. In 2020, none of the administrators of watercourses completed, approved or took over a hydraulic structure that would significantly influence the indicators expressing the acquisition value of the non-current tangible assets.

Table 6.1.3
Purchase value of fixed assets related to watercourse management

Watercourse administrator	2019	2020
	in billions of CZK	
Elbe River Board	10.70	10.79
Vltava River Board	11.38	11.78
Ohře River Board	10.40	10.58
Oder River Board	6.39	6.43
Morava River Board	8.78	8.93
River Boards in total	**47.65**	**48.51**
Forests of the Czech Republic	6.10	6.40
Total	**53.75**	**54.91**

Source: MoA

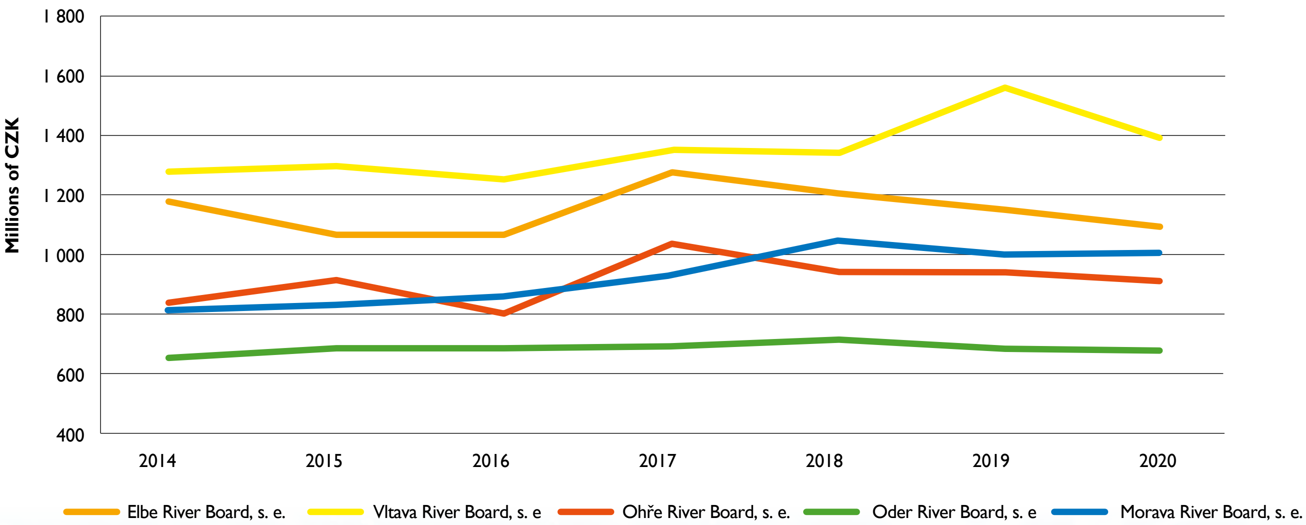
6.2 River Boards, state enterprises

In 2020, the total revenues generated by the River Boards, state enterprises, amounted to CZK 5.1 billion, which means a year-on-year decrease of almost CZK 276 million, i.e. by 5.2%. The biggest increase by 10.7% was in revenue from electric power generation, while the biggest drop of 8.1% was in other revenues.

The year-on-year decrease in revenues of River Boards, s.e., was given by a significant drop in payments for surface water abstractions (down by 6.3%, i.e. CZK 242 million) and also by a decrease in special-purpose noninvestment grants (by almost 65 million). The "other revenues" item also dropped (by 8%, i.e. CZK 32 million). Th only increase was in revenues from electric power generation (up by almost 11%, i.e. by almost CZK 68 million. The drop in revenues was partly due to the pandemic situation.

Chart 6.2.1 shows the development of revenues generated by the individual River Boards, s.e., over a longer period of time. While the revenues in the Elbe, Ohře, Morava and Oder River Boards have quite a gradual development, the revenues of the Vltava River Board are rather volatile.

Chart 6.2.1
Revenues of River Boards in 2014–2020



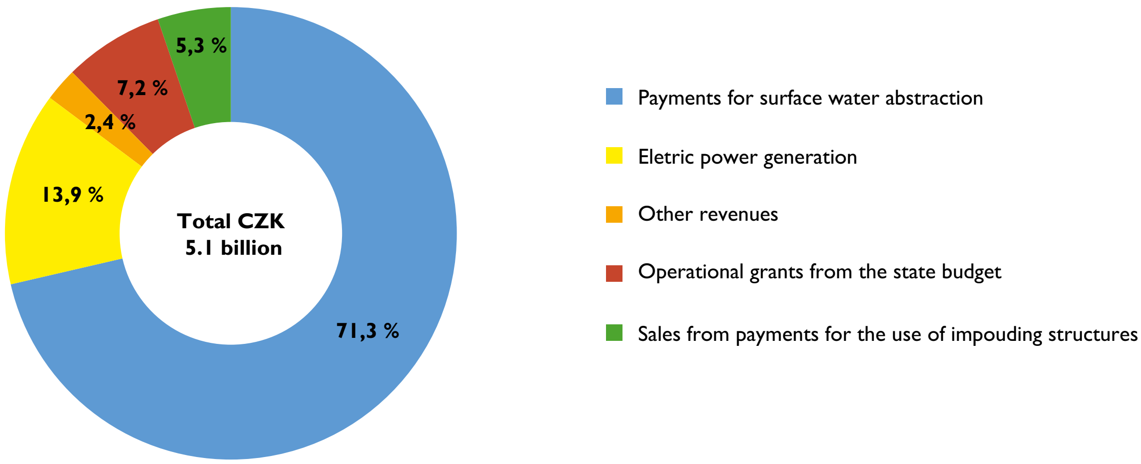
Source: MoA

Table 6.2.1
Revenues of River Boards, s.e., in 2013–2020

Indicator	River Boards, s.e.					Total
	Elbe	Vltava	Ohře	Oder	Morava	
	in thousands of CZK					
Payments for surface water abstractions	881,552	838,469	567,918	540,016	785,874	**3,613,829**
Electric power generation	76,807	283,769	214,671[*)]	89,112	38,744	**703,103**
Revenues from the use of weirs	6,914	109,089	1,415	0	4,956	**122,374**
Other revenues	69,515	96,952	111,563	34,989	52,585	**365,604**
Special-purpose non-investments grants [1)]	54,875	64,384	13,220	9,777	124,746	**267,002**
River Boards in total	**1,089,663**	**1,392,663**	**908,787**	**673,894**	**1,006,905**	**5,071,912**

Source: River Boards, s.e.
Note: [*)] The item includes revenue from photovoltaic power plants.
[1)] Includes all special-purpose non-investment grants for minor watercourses, grants from the STIF and other non-investment grants.

Chart 6.2.2
Structure of the revenues of River Boards, state enterprises, in 2020



Source: MoA

Table 6.2.2
Surface water supplies charged for administered by River Boards, state enterprises, in 2014–2020

River Board, s.e.		2014	2015	2016	2017	2018	2019	2020
		in thousands of m³						
Elbe	a)	609,118	547,658	614,377	583,838	526,598	460,970	372,872
	b)	36,022	37,271	37,707	38,873	39,017	38,861	35,806
Vltava	a)	211,473	213,944	204,885	219,138	224,819	224,871	216,160
	b)	130,214	134,544	134,333	139,485	142,813	140,292	135,106
Ohře	a)	118,390	120,352	119,384	122,837	124,054	122,628	109,849
	b)	40,583	40,777	40,305	40,953	40,919	42,243	42,955
Oder	a)	135,223	136,832	127,995	124,144	125,379	115,696	108,655
	b)	64,920	65,045	62,306	60,592	60,901	60,204	57,150
Morava	a)	162,058	160,288	151,857	156,666	168,582	176,873	162,369
	b)	32,262	32,975	32,816	35,763	37,715	39,478	37,144
River Boards, s.e. in total	**a)**	**1,236,262**	**1,179,074**	**1,218,498**	**1,206,623**	**1,169,432**	**1,101,038**	**969,905**
		304,001	**310,612**	**307,467**	**315,666**	**321,365**	**321,078**	**308,161**

Source: River Boards, s.e.
Note: a) charged for in total,
b) of which for public water supply systems

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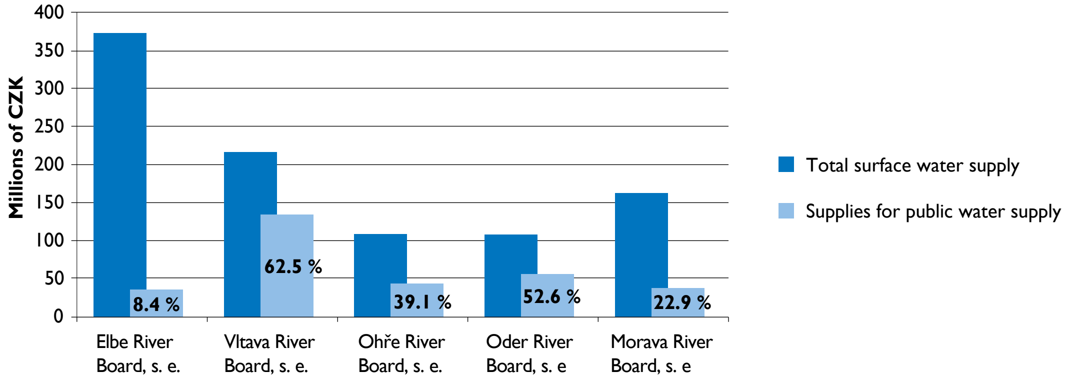
Chart 6.2.3
Surface water supplies charged for administered by River Boards, state enterprises, by purpose in 2020



Source: River Boards, s.e

Average price for other surface water abstractions per m³ in 2020 was CZK 5.1, which means a year-on-year increase of 2.6%. It is a "factually regulated price" that may only include justified costs, reasonable profit and tax pursuant to the relevant tax regulations.

In addition to flow cooling and other abstractions, abstraction levels and prices of surface water intended for charged agricultural irrigation and flooding of artificial depressions in the landscape have been monitored since 2003. Water for agricultural irrigation was abstracted in 2020 in areas administered by all the River Boards, s.e. with the exception of the Oder River Board. These abstractions amounted to a total of 199 thousand m³, which means a year-on-year decrease by 6.4%. Surface water abstractions intended for flooding artificial depressions in the landscape were not reported by any River Board, s.e., in 2020.

In the current approach the current prices reflect the costs of the River Boards linked with administering the river basins, not the value of surface water. The current prices are subject to regulation pursuant to Act No. 526/1990 Coll., on prices, and the rules stipulated by the decisions of the Ministry of Finance on price regulation, i.e. by the relevant notifications issuing the list of goods with regulated prices which are published in the Price Bulletin.

Revenues from surface water abstraction are the most significant source of income. They fell year-on-year in 2020 by 6.3%, i.e. by CZK 242 million, amounting to CZK 3.61 billion.

Table 6.2.3
Price for abstractions used for flow cooling in 2014–2020

River Board, s.e	2014	2015	2016	2017	2018	2019	2020
	CZK/m³						
Elbe	0.68	0.70	0.72	0.74	0.77	0.79	0.82
Vltava	1.25	1.25	1.27	1.32	1.32	1.34	1.37
Morava	1.15	1.19	1.21	1.22	1.23	1.25	1.28

Source: River Boards, s.e.
Note: The unit price per m³ does not include value added tax.

Table 6.2.4
Price for other surface water abstractions in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
	CZK/m³						
Elbe	4.29	4.39	4.49	4.58	4.72	4.82	4.99
Vltava	3.55	3.62	3.69	3.84	3.84	3.9	3.98
Ohře	4.34	4.51	4.69	4.92	4.97	5.07	5.17
Oder	4.09	4.21	4.33	4.46	4.62	4.78	4.97
Morava	6.39	6.52	6.65	6.68	6.69	6.79	6.93
Average price in all River Boards, s.e. *)	**4.25**	**4.34**	**4.64**	**4.77**	**4.88**	**4.97**	**5.10**

Source: River Boards, s.e.
Note: The unit price per m³ does not include value added tax.
**) Calculated using weighted average.*

Table 6.2.5
Payments for surface water abstractions in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
	in millions of CZK						
Elbe	882	860	996	1 001	1 027	993	882
Vltava	739	759	745	832	852	861	838
Ohře	514	543	560	604	617	622	568
Oder	553	576	554	554	579	553	540
Morava	639	637	672	715	804	827	786
River Board, s.e. in total	**3,327**	**3,375**	**3,527**	**3,706**	**3,879**	**3,856**	**3,614**

Source: River Boards, s.e.

The second highest source of revenues of the River Boards, s.e., is electric power generation: it accounts for more than 13% of the total revenues. The number of small hydroelectric plants in operation increased year-on-year by two to a total of 104. The total revenues from electric power generation rose by more than 09% and exceeded CZK 700 million.

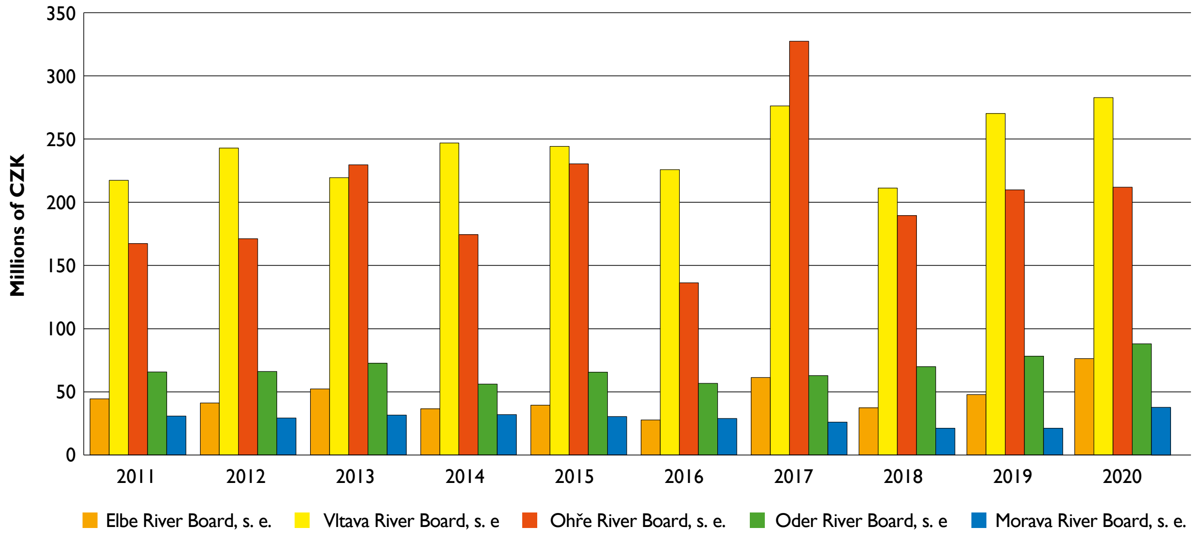
The highest revenues for electric power generation have been repeatedly achieved by the Vltava River Board, s.e., and Ohře River Board, s.e. Details about small hydroelectric plants owned by the respective River Boards, s.e., are shown in Table 6.2.6 and Chart 6.2.4.

Table 6.2.6
Number of small hydroelectric power plants owned by River Boards, state enterprises, in 2014–2020

River Board, s.e.	Indicator	2014	2015	2016	2017	2018	2019	2020
Elbe	Number of small hydroelectric plants	20	20	20	20	20	20	20
	Installed capacity in kW	6,438	6,438	6,795	6,819	6,819	6,989	7,001
	Electric power generation in MWh	16,349	15,880	12,288	22,440	13,835	16,327	24,796
	Sales in thousands of CZK	36,532	39,390	27,754	61,268	38,012	48,758	76,808
Vltava	Number of small hydroelectric plants	19	19	19	19	20	20	21
	Installed capacity in kW	22,016	22,016	22,128	22,128	22,328	22,328	21,950
	Electric power generation in MWh	92,102	88,474	99,497	77,475	77,922	91,123	91,693
	Sales in thousands of CZK	246,837	244,146	225,704	276,114	211,048	271,244	283,769
Ohře	Number of small hydroelectric plants	21	21	21	22	22	22	22
	Installed capacity in kW	16,966	16,966	16,966	17,091	17,091	17,091	17,091
	Electric power generation in MWh	67,371	84,954	84,910	84,244	72,908	76,484	67,024
	Sales in thousands of CZK	174,342	230,236	136,223	327,221	189,511	211,005	212,222
Oder	Number of small hydroelectric plants	16	16	23	23	26	25	26
	Installed capacity in kW	5,809	5,809	6,236	6,236	6,352	6,262	6,524
	Electric power generation in MWh	20,656	24,535	21,569	23,181	25,073	27,612	29,943
	Sales in thousands of CZK	56,006	65,509	56,669	62,942	69,487	79,630	89,112
Morava	Number of small hydroelectric plants	15	15	15	15	15	15	15
	Installed capacity in kW	3,497	3,497	3,497	3,497	3,497	3,551	3,635
	Electric power generation in MWh	12,343	11,535	11,008	9,609	8,239	7,566	14,614
		32,014	30432	28,812	26,039	22,279	22,215	38,744
Total	**Number of small hydroelectric plants**	**91**	**91**	**98**	**99**	**103**	**102**	**104**
	Installed capacity in kW	**54,726**	**54,726**	**55,622**	**55,771**	**56,087**	**56,221**	**56,201**
	Electric power generation in MWh	**208,821**	**225,378**	**229,272**	**216,949**	**197,977**	**219,112**	**228,070**
	Sales in thousands of CZK	**545,731**	**609,713**	**475,162**	**753,455**	**530,337**	**632,852**	**700,655**

Source: River Boards, s.e

Chart 6.2.4
Development of revenues of small hydroelectric power plants owned by River Boards in 2011–2020



Source: River Boards, s.e

The Reconstruction of the Boskovice Reservoir (Source: Morava River Board)

The Confluence of the Elbe and the Orlice in Hradec Králové (Source: Elbe River Board)

Other revenues of the River Boards, s.e., dropped in 2020 year-on-year by more than CZK 32 billion, totalling to more than CZK 365 million.

The "other revenues" item is a sum of less significant items such as leas of land, non-residential premises and water areas and other business activities. The most significant items are revenue from the performance of machines and road haulage, performance of laboratories and for designing and engineering work. Other revenues are often significantly affected by a number of unplanned items such as insurance payments, increased interest rates received and also the number of transfers of certain specified sales from previous periods but were only effectuated in the monitored year. As such unplanned items cannot be always anticipated, they may show considerable year-on-year fluctuations.

Table 6.2.7
Other revenues of River Boards, state enterprises, in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
	in thousands of CZK						
Elbe	147,863	86,346	73,388	149,163*)	91,122	86,446	69,515
Vltava	92,183	93,132	71,409	78,738	120,231	108,072	96,952
Ohře	107,668	79,965	75,702	85,264	108,496	96,623	111,563
Oder	43,802	43,221	41,191	49,013	61,595	45,375	34,989
Morava	53,933	57,799	56,462	48,295	130,084	61,124	52,585
Total	**445,449**	**360,463**	**318,152**	**410,473**	**511,528**	**397,640**	**365,604**

Source: River Boards, s.e.

The Štrbice Polder (Source: Ohře River Board)

In order to ensure crucial activities of the River Boards, various purpose non-investment and investment grants are used every year. The total amount of grants provided in 2020 rose by almost 26% to CZK 1.78 billion.

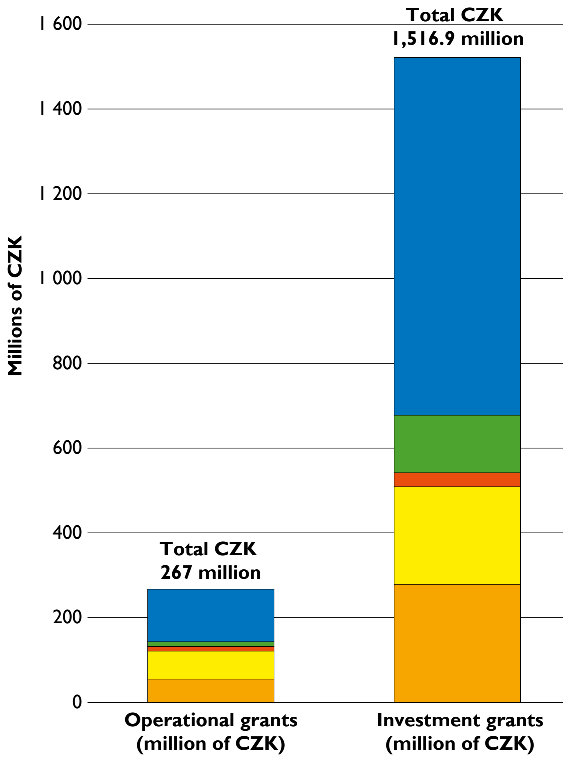
State subsidies are necessary for systematic activities allowing for implementation of flood control measures, defining inundation areas, producing conceptual studies, remedying consequences of floods etc. In 2020, investment subsidies grew year-on-year by 55% (i.e. an increase of CZK 428 million). By contrast, specific non-investment subsidies decreased by 19% (i.e. by CZK 64 million).

Grants were allocated for programmes focusing both on prevention and remedying of flood damage from previous years. The grants were provided from the budge of the MoA, the Operational Programme Environment (hereinafter referred to as the "OPE"), the EU Solidarity Fund (hereinafter referred to as the "SF"), European Regional Development Fund (hereinafter referred to as the "ERDF"), flood control measures were also co-funded by some regional offices and municipalities.

Total costs of River Boards decreased by 5.1% to CZK 4.9 billion in 2020.The greatest increase was in financial costs (more than 7.8%), by contrast, repairs dropped significantly (by 24.7%).

Costs increased in only two items: financial costs (by CZK 0.7 million, i.e. by 7.8%) and personnel costs (by CZK 91.3 million, i.e. by 4.2%), financial costs (by CZK 0.4 million, i.e. by 18.4%), energy and fuel (by CZK 5.7 million, i.e. by 5.1%, while maintenance costs dropped sharply (by almost 25%, i.e. CZK 318.4 million). Another significant decrease was in the cost of material (by almost CZK 12 million, i.e. by 7.5%).

Chart 6.2.5
Grants used by River Boards, state enterprises, in 2020



	Operational grants (million of CZK)	Investment grants (million of CZK)
Morava River Board, s. e.	124.746	841.078
Oder River Board, s. e.	9.777	135.867
Ohře River Board, s. e.	13.220	33.462
Vltava River Board, s. e.	64.384	227.658
Elbe River Board, s. e.	54.875	278.837

Source: MoA, River Boards, s.e.

Table 6.2.6
Number of small hydroelectric power plants owned by River Boards, state enterprises, in 2014–2020

Type of costs	Year	River Board, s.e.					Total
		Elbe	Vltava	Ohře	Oder	Morava	
		in millions of CZK					
Depreciation	2019	199.1	337.9	192.5	150.5	164.2	**1,044.1**
	2020	196.2	345.7	183.8	149.0	167.4	**1,042.0**
Repair	2019	185.3	433.1	161.3	214.1	292.9	**1,286.8**
	2020	148.9	263.9	166.9	105.1	283.7	**968.4**
Material	2019	34.7	28.0	18.7	30.6	47.8	**159.8**
	2020	33.1	25.2	16.9	30.6	42.1	**147.9**
Energy and fuel	2019	36.3	37.0	24.0	6.0	13.9	**117.2**
	2020	33.9	33.4	21.8	4.9	15.8	**109.8**
Personnel costs	2019	549.9	506.9	412.4	288.2	424.8	**2,182.2**
	2020	580.7	527.7	421.3	296.5	447.1	**2,273.4**
Services	2019	71.5	79.9	46.4	30.4	30.9	**259.0**
	2020	59.3	73.5	53.2	30.3	37.7	**254.0**
Financial costs	2019	0.4	1.1	0.4	0.2	0.3	**2.1**
	2020	0.4	0.4	0.1	0.2	1.1	**2.3**
Other costs	2019	59.7	72.1	44.8	-44.9*)	18.6	**150.2**
	2020	27.6	48.5	19.3	42.5	3.4	**141.2**
Total costs	**2019**	**1,137.0**	**1,495.9**	**900.4**	**675.1**	**993.4**	**5,201.9**
		1,080.1	**1,318.2**	**883.4**	**659.1**	**998.3**	**4,939.1**

Source: River Boards, s.e.
*Note: *) The negative value is due to accounting for the reserve for the repair of the Morávka-Žermanice Feeder, completed in 2019*

In 2020, investments of River Boards rose by 12% amounting to CZK 2.6 billion, with 57% from external sources and almost 43% used from its own sources.

In 2020, River Boards, s.e., spent CZK 285 million more than in 2019. External funds for investment construction were CZK 1.5 billion, of which 94% came from the state budget and 6% from other sources. "Other sources" mean funds from the OPE, SF, ERDF, regions, municipalities and free transfers. Own sources intended for investment accounted for CZK 1.1 billion.

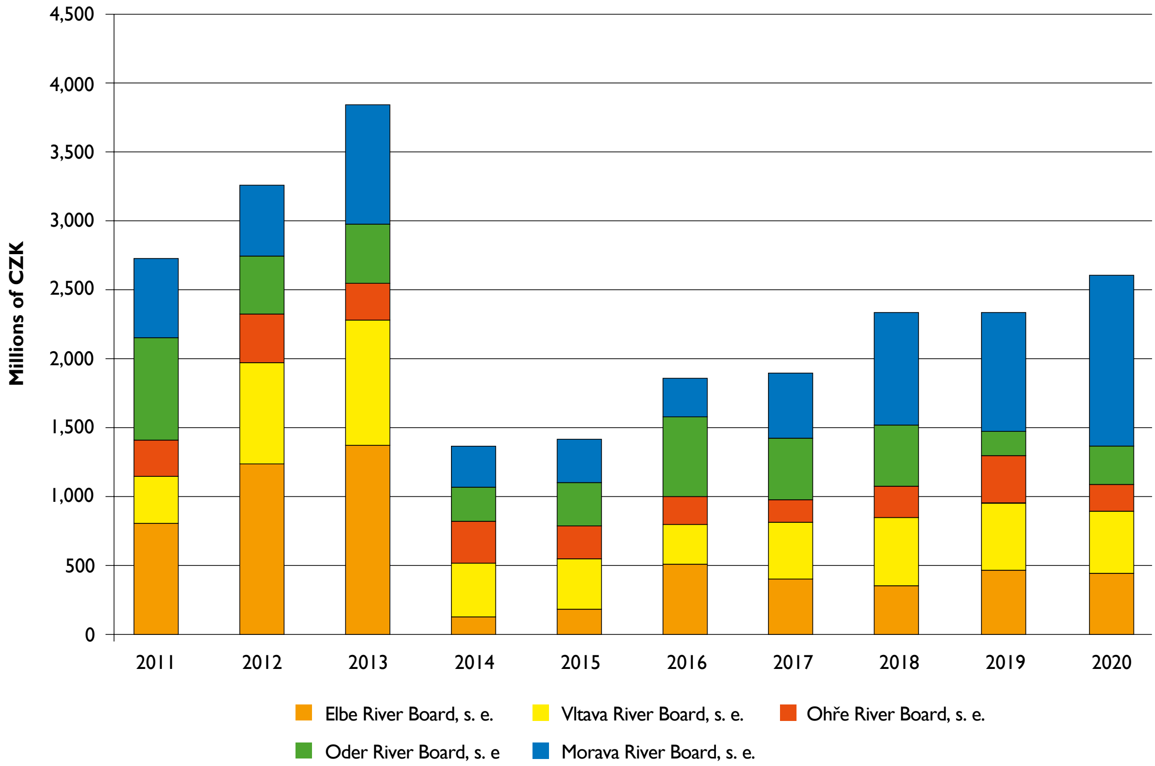
The largest volume of investment costs in 2020 was reported, same as the previous year, by the Morava River Board. A significant year-on-year increase in investment was in the Oder River Board (up 61%, by CZK 108 million) and in the Morava River Board (up 46%, by CZK 391 million). Other River Boards, s.e., reported a decrease in investment, the sharpest being in the Ohře River Board (by 45%, i.e. by CZK 157 million).

Table 6.2.9
Investments made by River Boards, state enterprises, in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
	in millions of CZK						
Elbe	132.6	189.9	514.6	401.2	360.000	461.6	447.9
Vltava	386.7	361.5	286	410.9	493.000	495.3	452.8
Ohře	306.7	242.5	210.7	161.6	221.200	346.1	188.8
Oder	248.4	313.7	568.2	453.4	445.500	176.2	284.2
Morava	290.4	314.45	283.66	468	823.700	851.7	1,243.0
Total	**1,364.8**	**1,422.05**	**1,863.16**	**1,895.1**	**2,343.4**	**2,330.9**	**2,616.7**

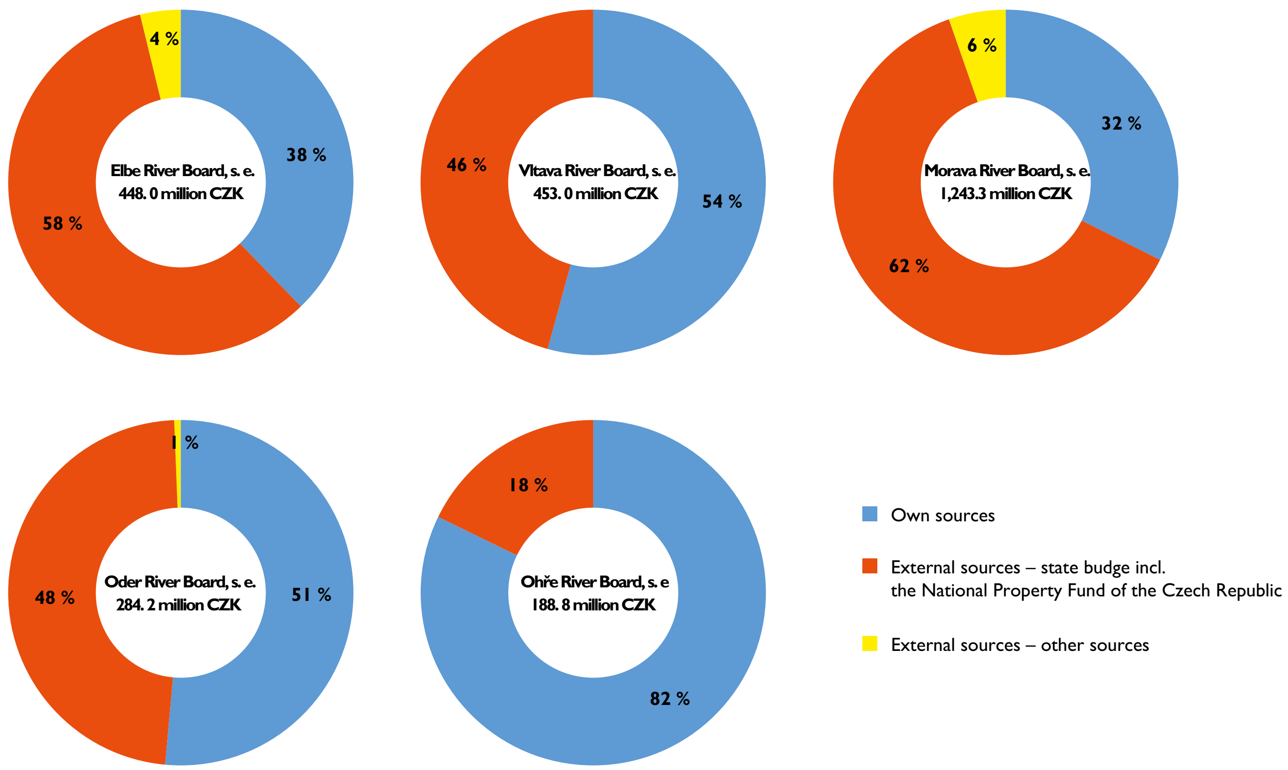
Source: River Boards, s.e

Chart 6.2.6
Development of investment construction in River Boards, state enterprises, in 2011–2020



Source: MoA, River Boards, s.e.

Chart 6.2.7
Structure of the use of investment funds by resource types in River Boards, state enterprises, in 2020



Source: MoA, River Boards, s.e.

The financial results reached by all River Boards, state enterprises, were in black figures with a total profit of almost CZK 133 million in 2020, which means another year-on-year drop, this time by 8.9%, i.e. by CZK 13.1 million. The drop in 2020 was partly due t the COVID-19 pandemic, as the case was in many other industries.

Exceptionally high profits in 2016–2018 by River Boards, s.e., were caused by extraordinary circumstances that will not repeat: final payments for green bonuses, settlement under Section 59(a) of the Water Act, sale of water structures from the Agricultural Water Management Administration, financial gifts, revenue from sale of securities, cancellation of a high reserve for a court dispute and minor repairs funded by own sources.

Only two River Boards, s.e. grew in 2020: the Oder River Board (year-on-year increase of approximately CZK 5 million, i.e. by 56% and, and the Vltava River Board (profit increased by almost CZK 7 million, i.e. by 11%. All other River Boards, s.e., saw a decrease in their profits, a decrease of about 40% was reported by the Elbe and Ohře River Boards, the Morava River Board decreased by 30%.

Only comparison with 2019 the number of employees decreased by 23, meaning a total of 3,546 employees worked for River Boards, state enterprises, in 2020.

Table 6.2.10
Economic results of River Boards, state enterprises, (profit, loss) in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
	in thousands of CZK						
Elbe	12,100	16,471	22,026	60,276	22,880	15,631	9,534
Vltava	16,022	16,038	13,711	73,880	49,221	67,123	74,489
Ohře	13,008	20,300	27,422	169,652	73,346	41,380	25,387
Oder	13,718	12,495	20,845	22,291	53,053	9,503	14,826
Morava	7,786	18,830	112,916	11,721	17,875	12,300	8,619
Total	**62,634**	**84,134**	**196,920**	**337,820**	**216,375**	**145,937**	**132,855**

Source: River Boards, s.e.

Table 6.2.11
Allocation of profit of River Boards, state enterprises, for 2020

River Board, s.e.	Profit	Allocation of profit or loss					
		Reserve Fund	Social Welfare Fund	Investment Fund	Social Fund	Remuneration Fund	Accumulated losses from previous years
	in thousands of CZK						
Elbe	**9,534**	0	9,519	0	15	0	0
Vltava	**74,489**	34,459	20,000	0	30	20,000	0
Ohře	**25,387**	0	16,048	0	0	0	0
Oder	**14,826**	0	6,516	0	310	8,000	0
Morava	**8,619**	862	6,451	0	0	1,306	0

Source: River Boards, s.e.

Table 6.2.12
Number of employees of River Boards, state enterprises, in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
Elbe	925	919	904	894	884	878	874
Vltava	853	852	855	861	867	873	865
Ohře	618	619	614	605	617	614	611
Oder	464	462	465	463	464	458	452
Morava	693	713	737	742	739	746	744
Total	**3,552**	**3,564**	**3,575**	**3,565**	**3,571**	**3,569**	**3,546**

Source: River Boards, s.e.
Note: Average recalculated numbers, rounded up to whole numbers.

The average monthly salary in the River Boards, state enterprises, grew on average by 4.7% to CZK 38,094 in 2020.

The year-on-year growth of the average monthly salary in the River Boards, state enterprises, was CZK 1,711, whereas the growth in the Elbe River Board exceeded CZK 2,000. In other River Boards the rise was lower. The salary in the Ohře River Board has been the highest over the long term, the lowest is in the Morava River Board.

Activity of the River Boards, s.e., is regularly inspected by relevant inspection bodies. In 2020, only 61 inspections were conducted due to the COVID-19 pandemic and related measures, which was about a half the total from previous years.

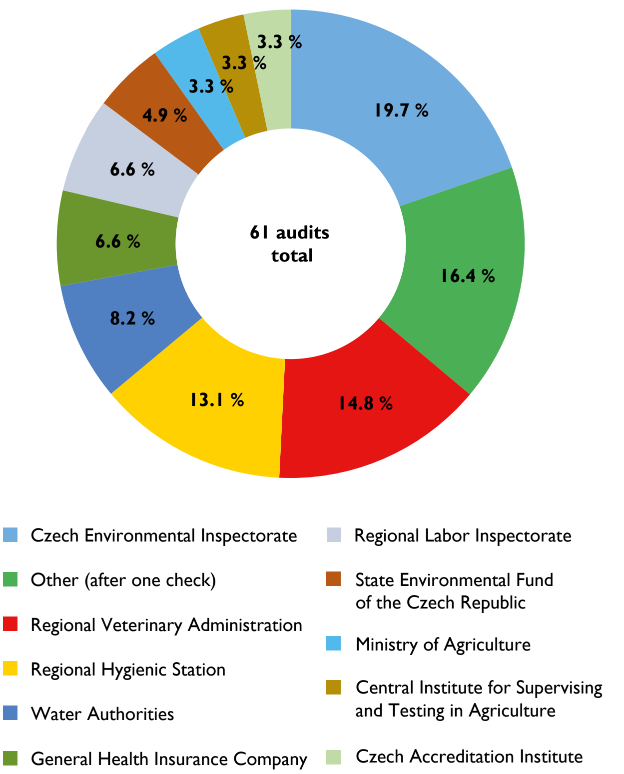
Other inspection bodies include those that performed one inspection in the given year such as Office for Standards, Metrology and Testing, Social Security Administration, Financial Administration, Fire Rescue Service, Ministry of the Environment, Energy Regulatory Office, Czech Telecommunication Office, Customs Office, Police of the Czech Republic and the Trade Union of Workers of Wood Processing Industries in Forest and Water Management of the Czech Republic. No serious shortcomings were found by the inspections.

Table 6.2.13
Average salaries in River Boards, state enterprises, in 2014–2020

River Board, s.e.	2014	2015	2016	2017	2018	2019	2020
	CZK/month						
Elbe	30,823	31,596	32,538	33,653	35,050	37,472	39,074
Vltava	29,809	30,398	31,087	31,550	32,740	35,017	37,131
Ohře	32,312	33,242	33,505	34,541	37,079	38,365	39,683
Oder	30,083	31,133	31,787	32,629	34,409	36,695	38,232
Morava	26,668	27,167	28,392	29,782	32,464	34,981	36,674
Average monthly salary in River Boards*)	**29,932**	**30,650**	**31,497**	**32,357**	**34,221**	**36,383**	**38,094**

Source: River Boards, s.e.
*Note: *) Calculated using weighted average.*

Chart 6.2.8
Auditing bodies performing audits at the River Boards, state enterprises, in 2020



Source: River Boards, s.e

The Summer idyll 2020, The Nová Říše Reservoir (Author: Kopřivová Zuzana)

6.3 Forests of the Czech Republic, state enterprise

Forests of the Czech Republic, state enterprise, carries out the management of specified minor watercourses and torrents as one of non-production forest functions. In 2020, Forests of the Czech Republic administered more than 38.4 thousand km of watercourses and 1,088 of small water reservoirs.

Watercourse management carried out by Forests of the Czech Republic, s.e. includes the management of assets relating to watercourses, with acquisition value of CZK 6.4 billion (especially watercourse regulation, torrent and ravine control, flood control measures and water reservoirs). Watercourse management was performed by seven watercourse administrators with territorial responsibility according to the respective river basin districts.

In 2020, activities performed by Forests of the Czech Republic in the field of water management focused in particular on the following:

- implementation of both capital investment projects and non-investment projects aimed at flood control measures, river channel stabilization and erosion control measures,
- construction, restoration and repairs of water reservoirs, pools and marshland with the aim of decelerating surface runoff and retention of water in the landscape and preparation of other projects aimed at mitigating negative impacts of drought and lack of water in the Czech Republic,
- carrying out repairs and maintenance of property,
- other activities aimed at riparian stand management, revitalization of watercourses which were improperly adjusted in the past, non-productive forest functions, support for endangered species, elimination of non-indigenous invasive plant species, etc.,
- administering the Central Register of Watercourses and Water Reservoirs and inventory of assets.

Watercourse management, preparation and implementation of measures (repairs, rehabilitation and new investments) were mainly financed from the organization's own resources and from grants and subsidies. As regards subsidies, the funds were aimed at support for measures carried out in the public interest pursuant to Section 35 of the Forest Act and financial resources from the state budget allocated for programmes of the Ministry of Agriculture pursuant to Section 102 of the Water Act, namely "Support for Prevention Against Floods" and "Support for Measures at Minor Watercourses and Minor Water Reservoirs" and from the EU Funds (the "Operational Programme Environment" and the "Rural Development Programme"). Activities linked with watercourse management are of a non-commercial nature and they generate virtually no profit with respect to the funds expended.

In connection with the management of watercourses and water reservoirs, Forests of the Czech Republic, s.e., disbursed in 2020 a total of CZK 598.3 million, including expenditures of capital investment nature amounting to CZK 255.1 million; the amount includes investments in construction as well as in purchase of land necessary for ensuring care of watercourses. Its own funds used for these investments amounted to CZK 80.3 million. In total CZK 343.2 million, of which CZK 309.3 million of own funds, was used to perform management of defined minor watercourses and repairs and maintenance of the relevant fixed assets. A total of CZK 42.4 million, of which CZK 28.0 million of own funds, was expended on remedying flood damage. The abovementioned amounts include all costs relating to watercourse and water reservoir management. The funding structure is shown in Table 6.3.1.

Table 6.3.1
Funding structure – water management in 2020 (total costs)

Projects	Total	Own sources	Grants	Of which flood damage	
				Own sources	Own sources
	in millions of CZK				
Investment	255.1	80.3	174.8	12.0	2.5
Non-investment	343.2	309.3	33.9	2.4	25.5
Total	**598.3**	**389.6**	**208.7**	**14.4**	**28.0**

Source: Forests of the Czech Republic

The Hájnický Pond, Bruntálsko (Source: Forests of the Czech Republic)

Revenues from surface water abstractions intended for covering costs of watercourse management amounted to CZK 14.9 million in 2020. The development of revenues from surface water abstractions and unit prices are shown in Table 6.3.2.

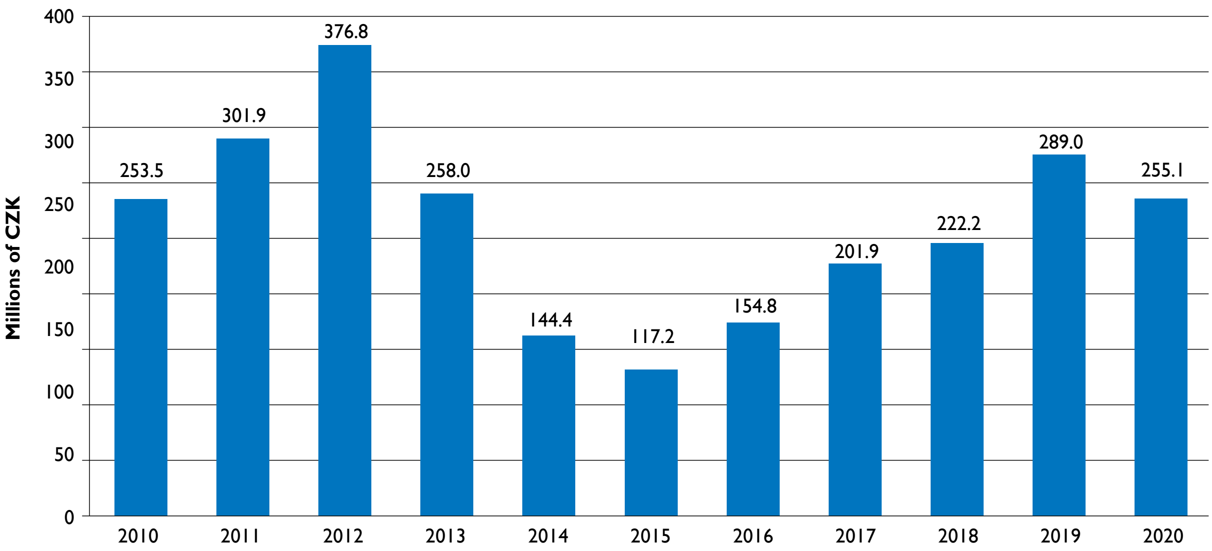
Charts 6.3.1 and 6.3.2 show total investment costs of water management and funds spent on repairs and maintenance of water management assets of the Forests of the Czech Republic over a longer period of time.

Table 6.3.2
Revenues from surface water in 2010–2020

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	in thousands of CZK										
Revenues	11,239	12,969	13,679	12,211	11,544	10,682	13,192	15,106	15,481	15,610	14,946
Price per m³ *)	1.6	1.9	1.96	2.00	2.05	2.06	2.26	2.52	2.65	3.06	3.47

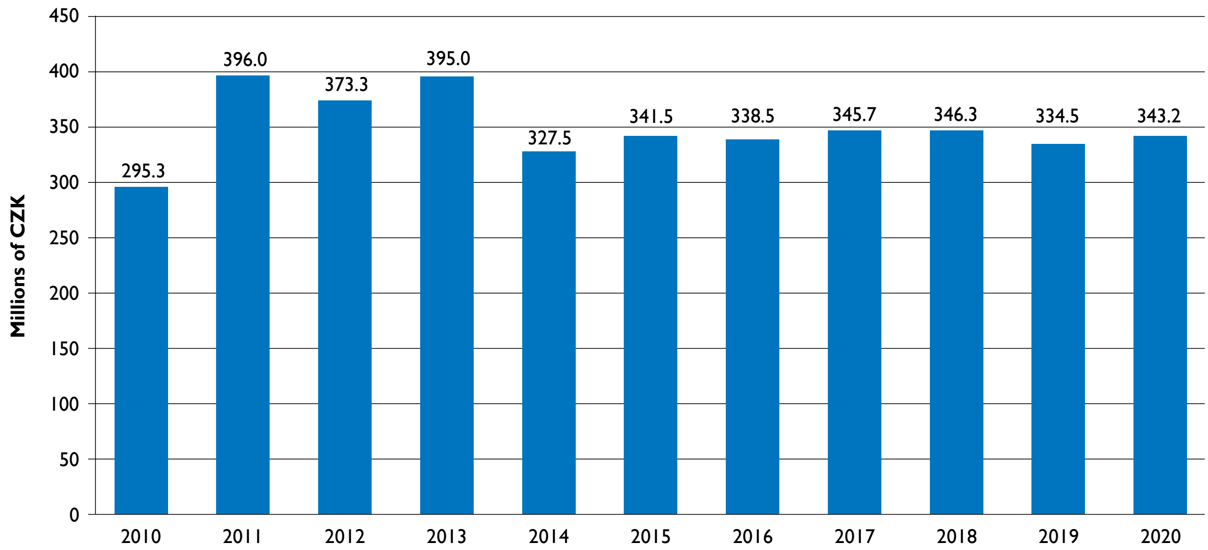
Source: Forests of the Czech Republic
*Note: *) Unit price per m³ excluding VAT in CZK.*

Chart 6.3.1
Investment costs in 2020 – water management



Source: Forests of the Czech Republic

Chart 6.3.2
Expenses in 2010–2020 – repairing and maintenance of watercourses and water reservoirs (total costs)



Source: Forests of the Czech Republic

Two waves of flood events were recorded in 2020. In June, intense rainfalls caused local flood damage first in the Uničov and Šumperk Regions, followed by floods in the White Carpathians, Pardubice District, Kolín District, Vysočina Region, Jizera Mountains and Beskids. In particular, fortification of watercourse channels was damaged and they were blocked by debris. The most affected watercourses were the Dražůvka Stream in the municipality of Šumvald and the Oskava Stream in the municipality of Oskava, where, besides damage to property, there were also casualties. In October, elevated flow rates affected again the Morava River Basin. Most of the damage was remedied by immediate security work in cooperation with municipalities.

In connection with the ongoing climate change, the programme "Returning Water to the Forest" was initiated contributing to water retention in the landscape. The objective of the programme is implementation of measures aimed at mitigating negative impacts of drought and lack of water. The aims are focused primarily on decelerating surface runoff (renovation of forest technological ameliorations) and creation and restoration of water elements in the landscape (e.g. ponds, wetlands and small water reservoirs). In total, 80 constructions were built under the project together with 80 minor measures in the landscape and 50 constructions were initiated while preparatory and design works of other projects continued.

Major completed constructions by river basins:

Watercourse administration for the Oder River Basin District completed flood protection measures in the Děrenský Stream watercourse in the municipality of Kujavy in the Nový Jičín District and the "Mušlov" Project, i.e. adjustment of the watercourse in the municipality of Pitárne in the Osoblažsko District. Completed projects include restoration of the water reservoirs "U Kamenné budky" in the Opava region, "Hájnický horní rybník" in the Krnov District and "WS Kobylský" in the Jeseník District. The Kobylí Stream was revitalised in the Bruntál urban area with the main objective of improving the ecological function of the watercourse in the urbanised landscape.

Watercourse administration for the Dyje River Basin District completed the action "LP Radonínský Stream", where sediments were removed and the channel was stabilized with stone fortification. Two new retention reservoirs "WS Kralická obora" were built at a tributary to the Oslava River in the urban area of Náměšť nad Oslavou with the main purpose of retaining water in the landscape to improve biodiversity. The "Bělečský Stream" Project consists in restoration of dams near Tišnov. Other implemented projects included the water retention measure "Kančík" pool as part of the Natural Park and site of European importance Chřiby.

Watercourse administration for the Elbe River Basin District completed the "Počátecký Stream Flood Measures" Project near the town of Seč, which resulted in a nature-friendly flood protection of the local site of Počátky. The meandering channel was renovated in the dry reservoir and the capacity of the watercourse flowing through the village's urban area was increased. Another completed project is the "Babice Ponds" near Říčany, where three reservoirs were completely reconstructed, including de-mudding in order to increase water retention and accumulation in the landscape and to improve their technical condition. Near the village of Jaroslav in the Pardubice District, two smaller, defunct ponds (the Jaroslav and Mařenka Water Reservoirs) were reconstructed and a new wetland created. The Kunštát Revitalisation project was aimed at revitalising the formerly inappropriately modified Kunštát watercourse in the village of Orlické Záhoří in order to support the natural functions of the watercourse and its meadow.

Babické Ponds, Říčany (Source: Forests of the Czech Republic)

Watercourse administration for the Vltava River Basin District implemented the "Barborka" construction project in the Pelhřimov District. It was the reconstruction of a damaged fortification of the watercourse channel in the urban area of the municipality of Těchobuz. As part of the "Small Water Reservoir Zlatěšovice" project in the České Budějovice district, sediment was removed from the reservoir floodplain and necessary modifications to the dam and reconstruction of functional objects were subsequently carried out. The objective of the repairs to the original historical dam at the Jahodový Stream in the Příbram District was to remove degraded parts of the masonry and to prevent water from flowing into the dam body. In the Jindřichův Hradec District, the "Revitalisation of the Hladovský Stream" was carried out. As part of the construction, the existing fortification of the regulated watercourse and amelioration adjustments and the watercourse channel was loosened in direction and shape. The implementation of the area-wide peatbog revitalisation at Hrdlořezy Novohradsko District continued with the completion of Stage II of the damming of drainage channels affecting 73 hectares of forest land.

Watercourse administration for the Berounka River Basin district restored a small water reservoir "Přestáňský Horní" near the town of Karlovy Vary. The dam body of this historic water structure was completely reconstructed and its technical elements were restored. In land allocated for land adjustments in the Tachov District, under the "Dlouhý Újezd – RVT U křížku" measure, a piped watercourse was revitalized and the water regime was optimized in the valley meadow. The "HB Semošický potok" project in the forest complex Stará obora – Podražice near Horšovský Týn contributed to reducing intake of suspended matters to the municipality of Semošice by building dams on the stream and in the adjacent ravines.

Watercourse administration for the Ohře River Basin District repaired the "Býčkovice - Luční Stream" water structure in the Litoměřice District by removing sediments and restoring functional objects. The water reservoir "Zelené Dolíky" in the Rakovník District near Nové Strašecí was also reconstructed and the "Březinský Stream" project was implemented, where sediments were removed from the retention area of the dam and its structure was repaired together with the channel fortification.

Watercourse administration for the Morava River Basin District reconstructed the weir dam "Svodnice - Milokošť dam" near Veselí nad Moravou. The "Reconstruction of the Rychtářský les Retention Reservoir" project involved total reconstruction of two non-functioning flow-through water reservoirs in a forest complex near Lanškroun. The "Zděchovka v Zděchově" in the Vsetín District and the "Černý potok v Kašavě" in the Zlín District were also completed, both aimed at repairing fortification of streams with the view of securing the road and adjacent real estate. Within the framework of the "Returning water to the forest" programme, measures were implemented in the Hodonín District ("Tůně Hlavinky"), near the state border with Slovakia ("Tůň Dolec") and near Uherské Hradiště near the Morava River ("Tůně Lesopark"), with beneficial effect of influencing the water regime in the riparian forest.

6.4 Land consolidation and structures used for amelioration

Land consolidation

Long-term retention of water in the landscape and anti-erosion protection, i.e. building ponds, small water reservoirs, marshes and elements ensuring anti-erosion protection, is currently the main priority of land consolidation. Since 1991, land consolidation encompassed implementation of water management measures on an area of 699.5 ha and anti-erosion measures on an area of approximately 834.6 ha. Water management measures for CZK 151.7 million and anti-erosion measures for almost CZK 25 million were implemented as part of land consolidation in 2020.

Transport and green infrastructure were developed, i.e. measures ensuring access to plots and environmental measures. Such measures (referred to as "joint structures") are typically designed as polyfunctional: unpaved roads have draining and retaining ditches, newly designed plots of land are divided by balks, swales and anti-erosion dikes complemented with planting of shrubs and trees, green vegetation is also planted around water reservoirs under construction and alongside paths/roads. In addition to the transport and environmental function, such measures serve the purpose of soil protection and improve water management in the landscape. A total of CZK 1.104 million was expended on joint structures in 2020.

In order to allow for building such measures in the landscape, it is first necessary to have suitable plots. The most effective instrument for new arrangement of plots in the landscape is land consolidation that rearranges ownership of land and creates conditions so that land owners can manage them rationally. At the same time, land consolidation provides conditions for improving the environment, protection and reclamation of land resources, forest and water management, particularly in reducing adverse effects of floods and drought and addressing runoff conditions and improving the ecological stability of the landscape.

The authority competent for conducting land consolidation under No. 139/2002 Coll., on land consolidation and land offices, and amending Act No. 229/1991 Coll.,
regulating the ownership of land and other agricultural property, as amended, and by implementing Decree No. 13/2014 Coll., is the State Land Office (hereinafter referred to as the "SLO").

Land consolidation is carried out either as comprehensive or simple consolidation. Currently, simple and comprehensive land consolidation has been completed for almost 37% of total agricultural land resources, while land consolidation is underway in 12% of agricultural land. Over CZK 446 million was spent on designing land consolidation including non-investment activities in 2020.

One of the main outputs of comprehensive land consolidation, in addition to the new digital cadastral map, is the plan of the aforementioned joint structures that is closely linked with municipality land-use plans. It is subject to approval by municipal councils and ownership of land designated for placement of joint structures is typically transferred to the given municipality.

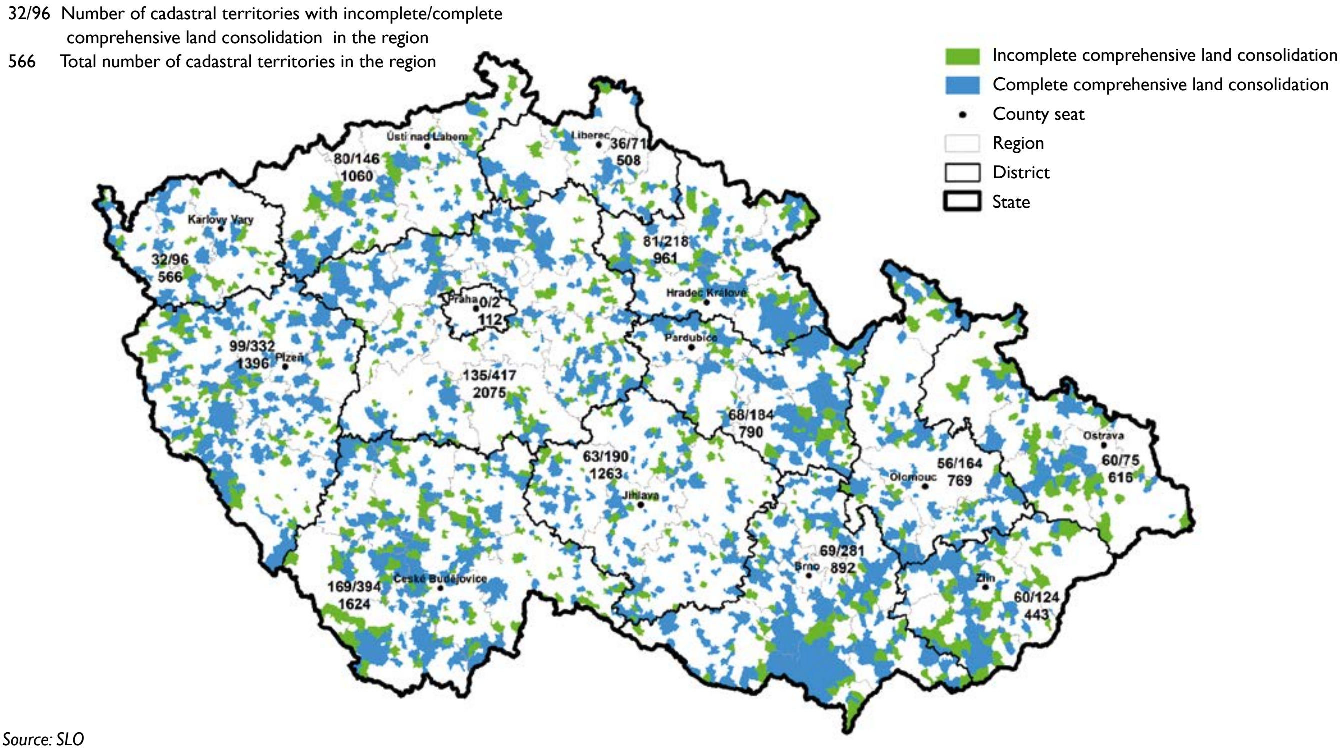
Thanks to land consolidation and clearly defined ownership, the SLO may subsequently implement the proposed measures. The SLO ensures proposals of land consolidation and implementation of joint structures through funds from the General Treasures Management, SLO budget, relevant EU funds (RDP, OPE) and others (Road and Motorway Directorate, budgets of municipalities and towns, private entities) For the 2014–2020 programme period, the SLO defined use of funds from the RDP so that projects contributing to mitigating negative effects of the climate change have priority. Similarly, use of funds from the European funds for land consolidations is designed for the following programme period of 2021–2027.

Table 6.4.1
Use of funds for land consolidation measures in 2020

Non-investment activities		Implementation						Non-investment activities and implementation in total
			of which					
Total	of which land consolidation proposals	Total	roads	erosion control measures	water management measures	environmental measures	other *)	
thousands of CZK								
446,643	380,943	1,103,981	870,743	24,752	151,730	21,013	35,743	1,550,624

Source: SLO
*Note: *) Operational and technical activities*

Figure 6.4.1
Overview of comprehensive land consolidation measures by region on 31/12 2020



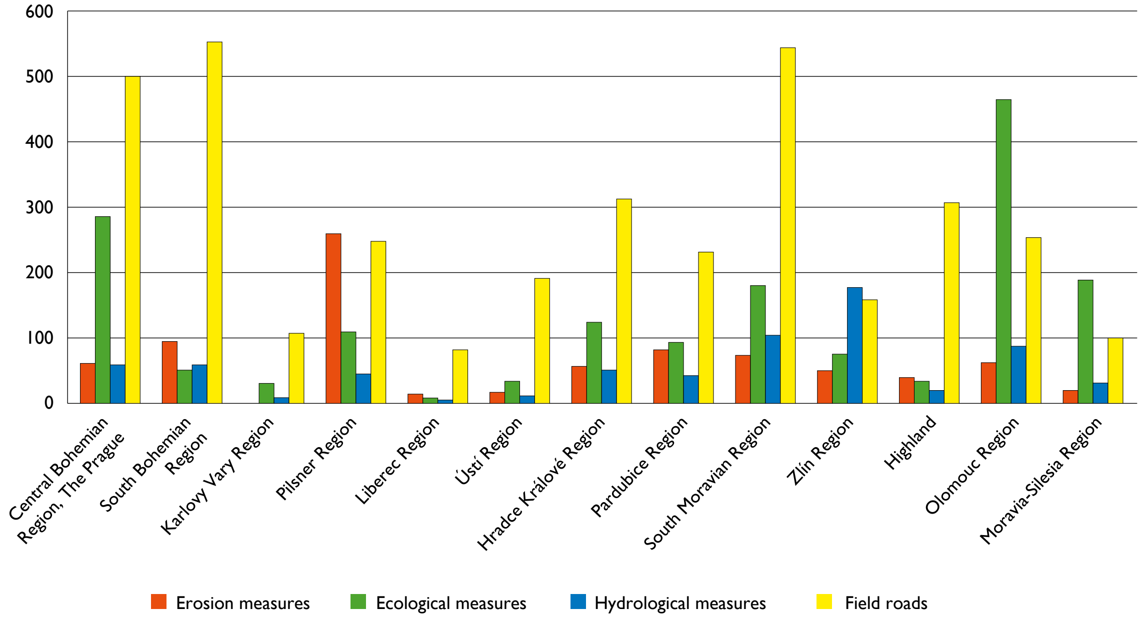
Source: SLO

Table 6.4.2.
Implemented joint measures in total – in the Czech Republic by 31/12 20200

Measure	Erosion control measures	Environmental measures	Water management measures	Roads
	ha			km
Total	834.67	1,682.35	699.53	3,578.65

Source: SLO

Chart 6.4.1
Implemented joint measures in land adjustment by regions by 31/12 2020



Source: SLO

Structures used for amelioration

In 2020, the State Land Office expended CZK 45.5 million from the MoA state budget section on management, maintenance and operation of amelioration structures of state-owned land and the authority to carry out the management. Maintenance and repair costs reached a total of CZK 13.3 million, costs for ensuring the operation and repair of pumping stations (drainage and irrigation) including consumption of electric power were CZK 32 million.

The State Land Office is authorized to administer structures used for amelioration of land and related hydraulic structures pursuant to Section 56 (6) of Act No. 254/2001 Coll., the Water Act, as amended, and Section 4 (2) of Act No. 503/2012 Coll., on State Land Office and on the amendment to some relevant acts, as amended. The State Land Office thus ensures management, maintenance, repairs and operation of major drainage facilities, major irrigation facilities and erosion control measures. On 31 December 2020, the total acquisition value of the property administered by the State Land Office amounted to CZK 2,573 billion, consisting of 18,963 items, of which 8,927.965 km of channels (5,165.159 km of open channels and 3,762.806 of piped channels), 21 water reservoirs and 130 pumping stations.

The Revitalization measures of Drslavice - pool, Ekostavby Brno, a. s., 2020 (Source: SLO)

Agendas linked with administration of structures used for land amelioration are ensured by the Department of Water Management Structures of the State Land Office. In addition to the routine operation, activities of the employees of the Department focused on modernization of the current irrigation systems and building new ones. Modernization of irrigation systems administered by the State Land Office is funded through MoA programme 129 310 "Support for Competitiveness of Agri-food Complex – Irrigate – Stage II" and sub-programme 129 313 "Support for Optimization of Irrigation Networks Administered by the State Land Office" from which funds totalling to CZK 3.013 million were used for 5 projects (2 project documentations and 3 implementations) in 2020.

In 2020, the SLO together with MoA and Research Institute for Soil and Water Conservation participated in the preparation of the Plan of Measures for Drought Management through Land Improvement and Adaptation of Hydraulic Improvement within the 2030 Horizon, by which the SLO was assigned tasks concerning mapping the actual state of drainage in the field as part of the land adjustment process and implementation of adjustment of major drainage facilities retaining water in the landscape.

Furthermore, the SLO took over the Feasibility Study of Irrigation System in the Hustopeče District - Stage I, aimed at examining the possibility of constructing a significant irrigation system in selected cadastral units in the Břeclav District and Brno-Country District with documented interest of end users in irrigation.The outcome of the Study is a demonstrable feasibility of constructing the irrigation system from technical and economic aspects.

The Poldr on The Šumický Stream, Pohořelice nad Jihlavou - Fortification of the Aerial Heel of the Pohořelice Pond and Planting (Source: SLO)

6.5 Waterways

Pursuant to Act No. 114/1995 Coll., on Inland Navigation, as amended, the management of the development and modernization of waterways of importance to shipping is in the competence of the Ministry of Transport. This activity concerns, in particular, the management of the development of the Elbe-Vltava waterway, which is the most important waterway system in the Czech Republic and is the only navigable connection between the Czech Republic and the West European waterway system.

Under the "European Agreement on Main Inland Waterways of International Importance (AGN)" the E 20 main European waterway on the Elbe and its branch E 20-06 on the Vltava River, is a waterway of international importance. As defined in Regulation No. 1315/2013 the European Parliament and of the Council of 11 December 2013 on the main trends of the European Union for the development of trans-European transport network, the entire Elbe waterway from the state border between the Czech Republic and Germany to Pardubice and the Vltava waterway from Mělník to Třebenice is included in the system TEN-T. In Annex I, Part I of this Regulation, this waterway is included in the "Eastern and Eastern-Mediterranean" corridor and into predetermined projects "Hamburg – Dresden – Prague – Pardubice" – "work on better navigability and modernization". From this perspective, it is a project of highest importance. The necessity to increase parameters is also documented by the Corridor Study of December 2014 prepared for the European Commission and by the work schedule of the European coordinator for this corridor that identifies as critical for the Elbe and the Vltava Waterways the fact that their parameters fail to meet the requirements for class IV of waterways.

From the Ústí nad Labem hydraulic structure in Střekov to Přelouč in the Elbe River and to Třebenice in the Vltava River, navigability is ensured by a system of hydraulic structures constituting a fully operational transport system, independent of external natural conditions. Navigation traffic in the regulated stretch from Střekov down the stream to the Czech Republic/Germany state border depends, however, on water levels based on the current flows and on the overall water situation in the entire Elbe and the Vltava River Basins. In order to ensure trouble-free navigation on the Elbe-Vltava Waterway, it is essential to improve the navigation conditions in the 40 km long stretch between Ústí nad Labem and the state border.

Strategic material of the Ministry of Transport called "Waterway Transport Concept for 2016–2023" has been discussed on a long-term basis. Currently, a research, development and innovation project entitled "Analysis and evaluation of the possibilities of creating and expanding the 3270 site of the Natura 2000 system in the conditions of the Lower Elbe while respecting the current use and development of the waterway" is being assigned for the needs of the state administration BETA2 under the Technology Agency of the Czech Republic. Outputs of the independent research will be used for approval of compensation measures for the Waterway Transport Concept.

Operation and maintenance of waterways including operation of lock chambers is ensured by the Vltava, Elbe and Morava River Boards, s.e. For more detailed information including funding see Chapter 9.1 herein.

Newly Installed Navigation Markings on the Waterway Baťa Canal, Babice (Source: Morava River Board)

John Kasawa (Source: www.shutterstock.com)

7. PUBLIC WATER SUPPLY AND SEWERAGE SYSTEMS

7.1 Drinking water supply

In 2020, water supply systems supplied water to 10.13 million inhabitants in the Czech Republic, i. e. 94.6% of the total population.

All water supply systems produced a total 589.4 million m³ of drinking water. 479.0 million m³ of drinking water was supplied and charged for (invoiced), including 337.5 million m³ of drinking water for households. Drinking water losses amounted to 87.8 million m³, i.e. 15.1% of water intended for consumption.

The data provided by the Czech Statistical Office were collected on the basis of information provided by 1,603 reporting units, i.e. 310 professional water supply and sewerage system operators and a selected set of 1,293 municipalities operating the water management infrastructure on their own. The figures published for regions and for the Czech Republic were calculated.

In 2020, water consumption decreased. Specific quantity of water invoiced in total decreased by 4.6 l/person/day to 129.2 l/person/day, whereas water invoiced to households increased by 0.5 l/person/day to 91.1 l/person/day.

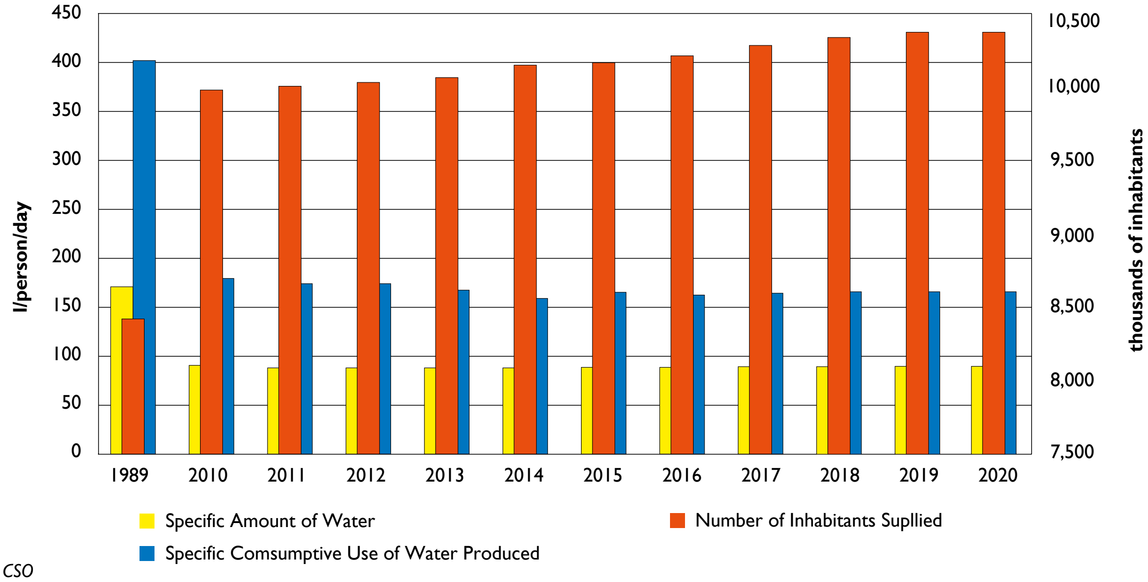
Mělník (Source: MoA)

Table 7.1.1
Water supply from water supply systems in 1989 and 2015–2020

Indicator	Measurement unit	1989	2015	2016	2017	2018	2019	2020
Inhabitants (mean)	thousand inhabitants	10,364	10,543	10,565	10,584	10,626	10,669	10,700
Inhabitants actually supplied with water from water supply systems	thousand inhabitants	8,537.0	9,929.7	9,972.5	10,027.4	10,064.1	10,090.1	10,126.3
	%	82.4	94.2	94.4	94.7	94.7	94.6	94.6
Water produced by water supply systems	million m³/year	1,251.0	599.6	593.3	603.8	609.7	602.4	589.4
	% as of 1989	100.0	47.9	47.4	48.3	48.7	48.2	47.2
Water invoiced in total	million m³/year	929.4	476.8	478.9	482.0	490.4	492.6	479.0
	% as of 1989	100.0	51.3	51.5	51.9	52.8	53.0	51.5
Specific consumptive use of water produced	l/person/day	401.0	165.4	162.5	164.9	165.9	163.5	159.5
	% as of 1989	100.0	41.2	40.5	41.1	41.4	40.8	39.8
Specific quantity of water invoiced in total	l/person/day	298.0	131.5	131.2	131.7	133.5	133.8	129.2
	% as of 1989	100.0	44.1	44.0	44.2	44.7	44.9	43.4
SSpecific quantity of water invoiced for households	l/person/day	171.0	87.9	88.3	88.7	89.2	90.6	91.1
	% as of 1989	100.0	51.4	51.6	51.8	52.2	52.3	52.6
Water losses per 1 km of water mains	l/km/day	16,842.0*)	3,519.3	3,167.9	3,409.4	3,303.5	2,993.5	3,042.3
Water losses per 1 inhabitant supplied	l/person/day	90.0*)	27.3	24.7	26.7	25.8	23.4	23.8

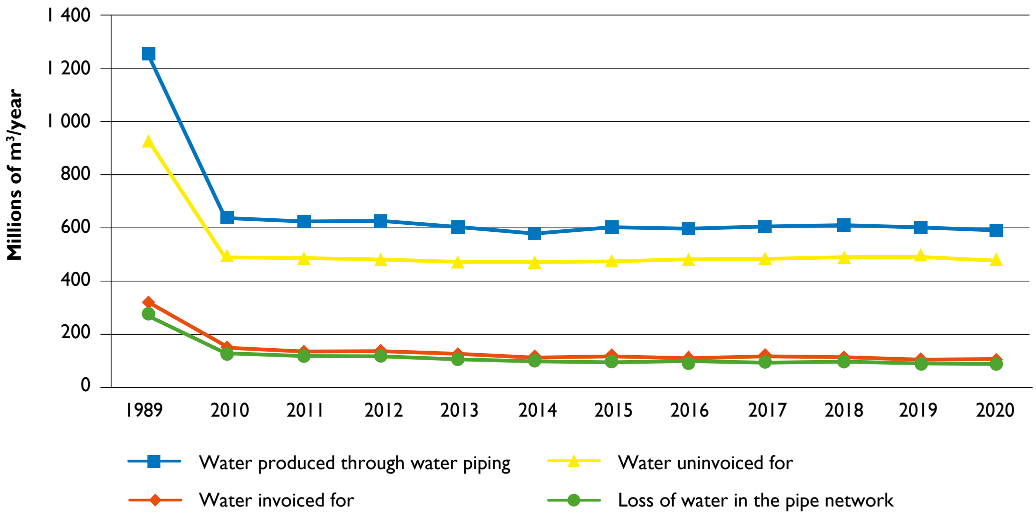
Source: CSO
*Note: *) Data for water supply systems run by the main operators.*

Chart 7.1.1
Development in the number of population supplied with water, specific needs for water produced and specific amount of water invoiced to households in 1989 and 2010–2020



Source: CSO

Chart 7.1.2
Development in the quantity of water produced in water supply systems and water invoiced in total in 1989 and 2010–2020



Source: CSO

The Stanovice Dam (Source: Povodí Ohře)

The highest percentage of population supplied with drinking water from water supply systems in 2020 was recorded in the Karlovy Vary Region (100%), in the Capital City of Prague (100%) and in the Moravian-Silesian Region (99.9%), the lowest percentage of inhabitants supplied with drinking water was recorded in the Pilsen Region (85.7%) and in the Central Bohemian Region (85.9%).

In 2020, the length of water supply network was extended by 121 km and reached the total length of 79,104 km. Construction of new water supply systems and completion of the existing ones thus resulted in an increase in the number of inhabitants supplied by water by 36,295. The length of water supply network per one inhabitant supplied was 7.81 m.

The number of water supply connections increased by 25,005 and amounted to 2,206,798. The number of water meters installed increased by 26,577 and amounted to 2,207,253. The number of connected inhabitants per one water supply connection is almost five. Markedly shown in these figures are the results of rather intense building of family houses.

Table 7.1.2
Population supplied, production and supply of water from the water supply system in 2020

Region	Population		Water from water supply system	Water invoiced for	
	supplied with water from water supply system	share of population supplied with water		Total	of which for households
	(number)	(%)	(thousands of m³)		
City of Prague	1,327,272	100.0	99,817	77,930	54,665
Central Bohemia	1,195,780	85.9	59,272	55,090	39,405
South Bohemia	576,230	89.5	33,411	25,930	17,423
Pilsen	506,344	85.7	30,187	24,604	16,177
Karlovy Vary	294,187	100.0	18,455	13,693	9,579
Ústí	804,086	98.1	48,432	37,174	27,407
Liberec	413,518	93.3	25,689	18,793	13,694
Hradec Králové	522,389	94.7	31,187	23,767	16,372
Pardubice	505,410	96.6	26,850	22,511	15,059
Vysočina	491,431	96.4	23,937	21,126	14,493
South Moravia	1,141,970	95.6	62,746	54,761	38,964
Olomouc	592,835	93.8	28,617	25,272	18,058
Zlín	558,971	96.1	28,256	23,036	16,359
Moravia–Silesia	1,195,872	99.9	72,547	55,325	39,842
Czech Republic	**10,126,295**	**94.6**	**589,402**	**479,010**	**337,495**

Source: CSO

7.2 Discharge and treatment of municipal wastewaters

In 2020, a total of 9.111 million people in the Czech Republic lived in buildings connected to sewerage systems, i.e. 86.1% of the total population. In total, 450.5 million m³ of wastewaters (excluding rainwater charged for) were discharged into sewerage systems. Out of this quantity, 97.5% of wastewaters were treated (excluding rainwater), which amounts to 439.3 million m³.

The number of inhabitants connected to the sewerage system rose year-on-year by 90,455. The volume of wastewater discharged in the sewerage system excluding rainwater declined year-on-year by 10.6 million m³. The share of wastewater treated excluding rainwater decreased by 0.2% in 2020.

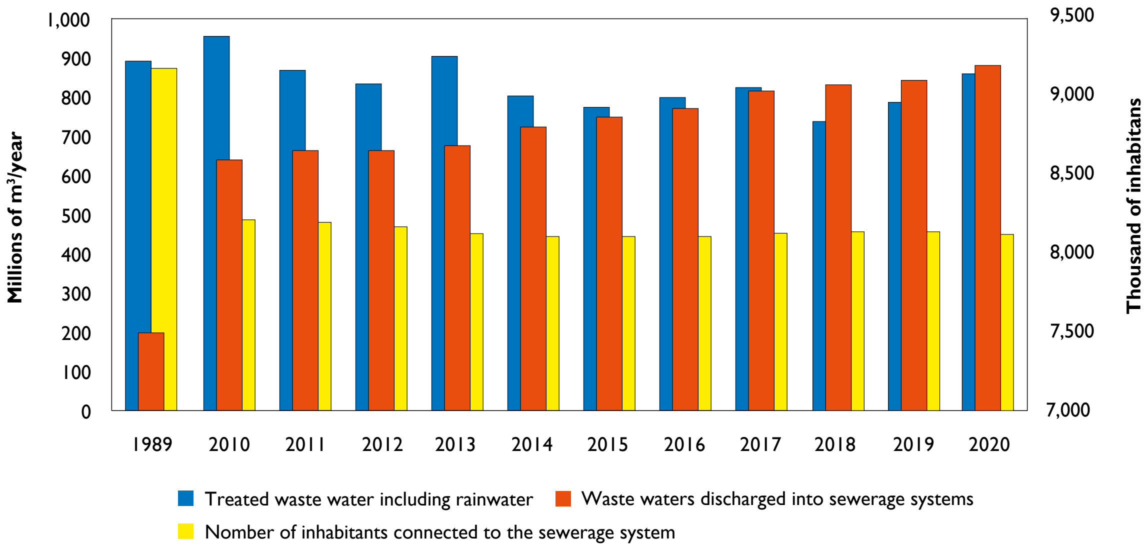
The highest share of inhabitants connected to the sewerage system in 2020 was in the Karlovy Vary Region (100.0%) and in the City of Prague (99.1%), the lowest share was in the Liberec Region (73.9%) and in the Pardubice Region (74.7%).

Chart 7.2.1
Development in the number of inhabitants living in buildings connected to sewerage systems and the quantity of discharged and treated wastewaters in 1989 and 2010–2020

Indicator	Measurement unit	1989	2015	2016	2017	2018	2019	2020
Inhabitants (mean)	thousands of inhabitants	10,364	10,543	10,565	10,584	10,626	10,669	10,700
Inhabitants living in buildings connected to sewerage systems	thousands of inhabitants	7,501	8,882	8,944	9,052	9,090	9,120	9,211
	%	72.4	84.2	84.7	85.5	85.5	85.5	86.1
Wastewaters discharged to sewerage systems (excluding rainwater charged for) in total	million m³	877.8	445.5	446.9	453.3	457.3	461.1	450.5
	% as of 1989	100.0	50.8	50.9	51.6	52.1	52.5	51.3
Treated wastewaters including rainwater [1)]	million m³	897.4	779.0	803.4	826.2	743.6	792.6	863.0
Treated wastewaters in total excluding rainwater	million m³	627.6	432.0	434.9	442.2	446.3	450.3	439.3
	% as of 1989	100.0	68.8	69.3	70.5	71.1	71.7	69.9
Percentage of treated wastewaters excluding rainwater [2)]	%	71.5	97.0	97.3	97.5	97.6	97.7	97.5

Source: CSO
Note: [1)] In 1989, the data related to sewerage systems run by the main operators.
[2)] This percentage relates to waters discharged to sewerage systems (excluding rainwater charged for).

Chart 7.2.1
Development in the number of inhabitants living in buildings connected to sewerage systems and the quantity of discharged and treated wastewaters in 1989 and 2010–2020



Source: CSO

Table 7.2.2
Number of inhabitants living in buildings connected to sewerage systems and the quantity of discharged and treated wastewaters in 2020

Region	Inhabitants living permanently in buildings connected to the sewerage system		Water discharged to sewerage systems (excluding rainfall charged for)	Treated wastewaters (excluding rainwater)	
	Total	Share of total population in the region	Total	Total	Share
	(number)	(%)	(thousands of m³)	(thousands of m³)	(%)
City of Prague	1,315,061	99.1	77,401	77,401	100.0
Central Bohemia	1,041,044	74.8	51,705	51,573	99.7
South Bohemia	554,716	86.2	27,014	26,026	96.3
Pilsen	502,376	85.0	26,149	25,011	95.7
Karlovy Vary	294,187	100.0	12,486	12,479	99.9
Ústí	711,603	86.8	29,942	29,270	97.8
Liberec	327,456	73.9	14,393	14,087	97.9
Hradec Králové	438,902	79.6	20,684	19,767	95.6
Pardubice	391,019	74.7	18,282	18,170	99.4
Vysočina	444,785	87.2	19,551	17,782	91.0
South Moravia	1,086,031	91.0	52,496	51,921	98.9
Olomouc	544,071	86.1	27,382	26,950	98.4
Zlín	558,003	96.0	26,849	25,003	93.1
Moravia–Silesia	1,001,263	83.6	46,149	43,863	95.0
Czech Republic	**9,210,517**	**86.1**	**450,484**	**439,304**	**97.5**

Source: CSO

The length of sewerage network was extended by 531 km in 2020 and now it is 49,680 km long. According to the Czech Statistical Office, the total number of WWTPs increased by 64 plants to 2,795 WWTPs in the Czech Republic.

7.3 Development of water and sewerage charges

Based on the survey carried out by the Czech Statistical Office, the average price of water charge excluding VAT amounted to 41.40 CZK/m^3 and the average price of sewerage charge amounted to 36.50 CZK/m^3 in 2020.

Before the amendment to Act No. 76/2006 Coll. entered into force in 2006, information about the average price of water and sewerage charges were defined on the basis of data that selected water supply and sewerage system operators sent upon request to the MoA. The amendment now requires owners (or operators authorized by owners) to send to the MoA annually by 30 April of the following year detailed information about comparing all items in price calculation in accordance with price regulation for water and sewerage. charges and actual numbers from the previous year pursuant to the provision of Section 36(5) of Act No. 274/2001 Coll., on Water supply and sewerage systems for public use and on amendments to certain acts (act on water supply and sewerage systems). The MoA receives information about the prices including VAT through inquiry, mean values are obtained through weighted average. With respect to the deadline for filing the comparisons it was impossible to include and assess the date in this publication. For this reason, we only present data ascertained by an inquiry of the Czech Statistical Office such as share in revenue from customers and the amount of drinkable volume supplied and wastewaters discharged (since 2013 including rainwater charged for). The overall data obtained by the Czech Statistical Office concerning the Czech Republic are not a weighted average and they thus cannot be compared with data from MoA materials.

Based on the survey carried out by the Czech Statistical Office, the highest average price (46 CZK/m^3) of water charge was in the Ústí Region, exceeding the nationwide average by 11.1%. The highest average price of sewerage charge was in the Liberec Region: 44.4 CZK/m^3, exceeding the national average by 21.6%. By contrast, the lowest average price of water charge (35.8 CZK/m^3) was in the Olomouc Region. The lowest average price of sewerage charge (30.2 CZK/m^3) was in the Vysočina Region.

Table 7.3.1
Strike prices of water and sewerage charges in 2019 and 2020

Indicator	Measurement unit	2019	2020	Index 2020/2019
Water rates in total	millions of CZK	19,367	19,850	1.05
Water invoiced in total	millions of m^3/year	492.6	479.0	0.97
Average price of water rate	CZK/m^3 excl. VAT	39.3	41.4	1.05
Sewerage charges in total	millions of CZK	18,353	19,023	1.04
Wastewaters discharged to sewerage systems*	millions of m^3/year	529.6	521.5	98.47
Average price of sewerage rate	CZK/m^3 excl. VAT	34.7	36.5	1.05

Source: CSO
Note:) Since 2013 including rainwater charged for.*

The Lysá nad Labem Lock (Source: Elbe River Board)

Table 7.3.2
Water consumption, average prices of water and sewerage charges excluding VAT in 2020

Region	Specific quantity of water invoiced in total	Specific quantity of water invoiced to households	Average price of water rate	Average price of sewerage charge
	(l/person/day)		(CZK/m³ excl. VAT)	
City of Prague	160.4	112.5	45.2	38.8
Central Bohemia	125.9	90.0	45.1	36.6
South Bohemia	122.9	82.6	39.2	30.9
Pilsen	132.8	87.3	43.6	31.8
Karlovy Vary	127.2	89.0	41.9	37.8
Ústí	126.3	93.1	46.0	43.0
Liberec	124.2	90.5	45.6	44.4
Hradec Králové	124.3	85.6	37.4	37.2
Pardubice	121.7	81.4	37.4	38.6
Vysočina	117.5	80.6	40.1	30.2
South Moravia	131.0	93.2	39.4	37.2
Olomouc	116.5	83.2	35.8	35.5
Zlín	112.6	80.0	38.3	33.4
Moravia–Silesia	126.4	91.0	37.9	34.7
Czech Republic	**129.2**	**91.1**	**41.4**	**36.5**

Source: CSO

Cleaning the shore of the Orlík Dam (Source: Vltava River Board)

7.4 Regulation in water supply and sewerage systems

Auditing activity of the Ministry of Agriculture performed by the department of the main regulator and supreme supervision of the W&S sector focused in 2020, similarly to previous years, on performance of W&S owners and operators resulting from Act No. 274/2001 Coll., on Water supply and sewerage systems for public use and on amendments to certain relevant acts, as amended, and from Decree No. 428/2001 Coll. A total of 20 audits of W&S owners and operators were performed in 2020.

The Ministry of Agriculture sees the main objectives of regulation in public water supply and sewerage systems particularly in the following four spheres: 1) supervision over long-term sustainability of the W&S for public use, especially with respect to renovation funding planning and its implementation; 2) increasing transparency of price regulation of water and sewerage rates; 3) continual improvement of customer protection; and 4) gathering background materials for proposals of legislation adjustment in the sphere of public water supply and sewerage systems and customer protection.

Auditing activities and, in particular, the number of controlled subjects, were adversely affected by the COVID-19 pandemic in 2020. The planned auditing activities had to be interrupted in the spring and autumn. For this reason, the MoA focused more on identifying W&S owners and operators who reported water losses in 2019 in values significantly different from the "usual" range or on those owners and operators who had either never started or stopped sending mandatory data.

Audits focused primarily on water system infrastructure owners" and operators" performance of basic duties such as permit to operate a facility and whether selected information from operational records are in line with selected details from asset records of the managed property with relevant permits, operation agreements concluded with owners and operators of the water supply and sewerage systems, written agreements of the owners concerning water supply and sewerage systems related in terms of operation, contractual agreement between operators and expert representatives, template customer agreements, calculation of the water supply and sewerage rates, comparison of all items in price calculation for water supply and sewerage rates and actual state (hereinafter referred to as the "comparison") including the duty to report and submit to the MoA, tax documents issued for water supply and sewerage rates and whether they are in line with the published price, cost compensation concerning material for detour and closure of a water supply connection, sewerage lines and documents confirming their approval by a relevant water authority, complaint procedures defined, renovation funding plans and plans for making financial reserves for water supply and sewerage system renovations and documents how such funds were expended on such purposes.

In case of finding any shortcomings, the MoA required remedial actions. The most serious and repeated shortcomings include, e.g., complete lack of wrong keeping of renovation funding plan, lack of calculation of water supply and sewerage rates and incompliance with rules for calculation defined by Decree No. 428/2001 Coll., lack of comparison or non-compliance with rules defined by Decree No. 428/2001 Coll. for its preparation, customer agreements non-compliant with requirements of the Act on water supply and sewerage systems, non-compliance of VÚME (Selected data from Public Water Supply and Sewerage Systems Registry) and VÚPE (Selected data from Public Water Supply and Sewerage Systems Operational Registry) with issued operation permits, wrongly defined volumes of drinkable water supplied or wastewater discharged for invoicing water supply and sewerage rates to consumers, lack of agreements between owners of water supply and sewerage systems linked in terms of operation, etc.

Table 7.4.1
Number of audits carried out at W&S owners and operators in 2020

Entities audited	Number of audits
Water supply and sewerage system owners	6
– of which towns and municipalities	5
Water supply and sewerage system owners that are also operators	10
– of which towns and municipalities in the mode of independent operation	10
Water supply and sewerage system operators	4
– of which towns and municipalities in the mode of independent operation	2
Audits in total	**20**

Source: MoA

The MoA finds great differences between the entities audited. Some municipalities being public water supply and sewerage system owners consider the sphere, which is rather complex, as marginal (regardless of the fact whether they leased the infrastructure or they operate at their own expense). This concerns particularly setting of the water supply and sewerage rate and in maintaining and managing assets, e.g. in terms of water losses. Typically, small and medium-sized municipalities prefer lower water supply and sewerage rates (below the level of actual total costs) which often results in incomplete or distorted values in price calculation items and their subsequent comparison. Moreover, the MoA found in many cases absence of an expert representative and/or lack of existing contractual relation with an expert representative when auditing such entities (i.e. water supply and/or sewerage system operators). The institute of expert representative is meant to safeguard that water supply and sewerage systems are operated in accordance with the valid legislation and technical and operational requirements concerning the given infrastructure. The MoA repeatedly found that expert representatives often perform their job rather formally, either because of low remuneration or because of insufficient number of competent experts in some regions of the Czech Republic. The MoA provides such entities, as part of their audit, with certain educational aid. On the basis of the aforementioned experience, the MoA gathers and assesses background materials aimed at particularizing valid legislation.

Due to the COVID-19 pandemic in the Czech Republic that affected adversely almost the entire year of 2020, the Department of the Chief Regulator and Superintendent of the W&S Sector took advantage of this situation to carry out activities aimed at contributing to the constant improvement of the condition of the W&S sector, as well as to disseminate objective information resulting from analytical activities of evaluating data from the W&S sector as a whole. A campaign has been launched with the aim to identify any W&S owners who did not keep ownership and operational records for WSS for a long time and who can be reasonably expected to be in breach of other obligations under the Act on Water Supply and Sewerage Systems.

Data analysis was performed for more than 2 thousand municipalities, where no cadastre is included in the VÚME, VÚPE or in a comparison and a total of 216 subjects were identified. They have been invited to comment on the matter and in case they do not document that they are not W&S owners, these facts will be further investigated in order to find a remedy.

A campaign has also been launched to address reported water losses in the waterpipe network. On the basis of data analysis of selected data from the W&S operational records from the calendar year of 2019, water supply systems were identified (represented by the relevant identification number of the operational records) which reported water losses in the waterpipe network at zero or, on the contrary, water losses exceeding the threshold set at 30%, which is approximately twice the mean value in the Czech Republic. A total of 728 registered operators of such water supply systems were contacted and invited to send their observations on the reasons for the reported situation. This targeted group of operators represented about 9.2% of the total amount of invoiced drinking water in the Czech Republic in 2019, about 1 million people were supplied by these water supply systems (i.e. 10.4% of the total number of people supplied in the Czech Republic). The results will be processed in the subsequent period.

2020 was the fourth consecutive year when two independent projects were underway: Benchmarking for the owners for 2019 and Benchmarking for the operators - 2019. The analysis included and linked data for more than 95% of the market with drinkable water and wastewaters in 2020 (calculated from the volume of invoiced water in consumer comparisons sent). Results of the two projects are summed up in the Benchmarking report for 2019 that presents a summary of results achieved, values of the most important economic and operating indicators, describes the anomalies detected together with problematic spheres, assesses the measures taken and proposes further regulatory measures. The report and results of the two projects are published at the MoA website in the section Water – Water supply and sewerage systems – W&S benchmarking.

An integral part of benchmarking is the process of improving input data quality. As in previous years, the MoA communicated continuously with authors of the reports, mainly about corrections and additions to the reported data, clarification of the report content and context. This increases awareness of correct reporting of the required data not only on the part of authors, but also provides the MoA with information on the causes that led to shortcomings and errors. Since 2015, the trend in collection of comparison data has been very positive. The entire communication process contributes significantly to enhancing the quality of W&S data.

Each year, the benchmarking procedure is reviewed and adjusted based on changes in legislation, comments received, especially from the expert public, experience gained from previous analyses and with the view of increasing the information value of the results. In other words, the approved methodology is continuously updated in order to be conform to the regulatory needs.

The analyses repeatedly confirm that the most significant shortcomings in the sector consist in insufficient creation of funds for restoration on the part of some owners, the apparent poor condition of some parts of the infrastructure (indicated, for example, by the failure rate), but also unbalanced business relationships between owners and operators and the fact that business results of many of the owners and operators are in red numbers. From the regulator's perspective, these are the most important data monitored in the owner benchmarking project focused on self-funding and sustainability of the infrastructure.

The theoretic creation of funds for restoration of the infrastructural assets has been assessed in all the projects so far. Deficit of the aforementioned funds for 2016–2019 totals CZK 5.6 billion. Property owners failed to generate such a large amount from revenues received from water and/or sewerages charges. Table 7.4.2 shows that this amount has increased by more than CZK 1.5 billion in the last two years. The amount is a volume of funds that owners need to get each year from other sources than water and sewerage charges.

Table 7.4.2
Missing funds for restoration in 2016–2019

Missing funds for restoration	2016	2017	2018	2019
	millions of CZK/year			
Drinkable water	456.46	460.21	532.36	507.84
Wastewaters	758.85	808.21	1,045.56	1,033.58
Total per year	1,215.31	1,268.42	1,577.92	1,541.42
Total	**5,603.07**			

Source: MoA

The project of benchmarking of operators is mainly focused on the quality of services, environmental protection and pricing. The regulator's interest lies primarily in the sphere of drinking water losses and uninvoiced water, particularly in the context of generating sufficient funds for renovation of infrastructure from water and sewerage charges. Results of the benchmarking projects show that there is a relatively large group of operators that do not track, report or misreport water losses and uninvoiced water. This reduces the information value of the reported data and consequently the benchmarking results as such. Given the importance of the drinking water loss issue, all operators that reported either zero or high drinking water losses in their 2019 reports were contacted. The investigation focused, among other things, on identifying the reasons that led to these shortfalls.

A significant setback of the W&S sector, which is reflected across all related processes and in the provision of services to citizens, is the high degree of market atomisation. Even the results of the analyses conducted under both benchmarking projects in 2020 indicate problems linked typically with smaller owners and/or operators who suffer the consequences of their lower expertise, unsystematic care of water infrastructure assets and the inability to meet duly the obligations arising from the Act on Water Supply and Sewerage Act and Decree No. 428/2001 Coll.

It should be stressed that the problems described above may be exacerbated with the increasing volume of missing funds for the renewal of infrastructure assets. In particular, the deteriorating state of infrastructure, which has a higher failure rate and higher losses of drinking water, and consequently high costs of dealing with breakdowns and accidents, unless renewed. The lack of funds for renewal can be considered the most serious shortcoming in the sector and is indicative of a failure to meet the regulatory objective of making the infrastructure self-sufficient and sustainable. It affects a large number of particularly small entities with a smaller market share, but still significant enough for regulation to address it intensively.

Panoramas below the Pálava, October 2020, The Nové Mlýny Reservoir (Author: Šimečková Veronika)

Rostislav Stefanek (Source: www.shutterstock.com)

8. FISHERIES AND FISHPOND MANAGEMENT

At present, there are approximately 24 thousand fishponds and water reservoirs with total surface area of approximately 52 thousand ha in the Czech Republic. 20,4 tonnes of marketable fish were caught in the Czech Republic in 2020.

Czech fisheries include fish farming and recreation fishing, both regulated by Act No. 99/2004 Coll., on fish farming, performance of fishing right, fishing inspection, protection of marine fishing resources and on amendments to some acts (the Act on Fishing), and its implementing Decree No. 197/2004 Coll. Fish farming for production is a traditional part of agricultural production.

Fish is farmed at more than 41 hectares of fishponds and water reservoirs in the Czech Republic with more than 180 significant fish producers (i.e. companies producing more than 5 tonnes of fish per year) and several hundreds of minor breeders. Big producers of fish and waterfowl, fish processors, fish research and education institutes and fish associations are associated under the Czech Fish Farmers Association of the Czech Republic seated in České Budějovice.

There are more than 2,000 official fishery districts in the Czech Republic with total area of approximately 42,000 hectares and around 350,000 recreation fishermen registered. Fishery districts are classified as either extra-trout-fishing waters or trout-fishing waters. The greatest users of fishery districts in the Czech Republic are the Czech Fishing Union, interest association, and Moravian Fishing Union, interest association. Recreation fishermen catch every year in fishery districts around 3–4 thousand tonnes of fish, the most caught fish is common carp.

Czech fishery has been facing many negative factors on a long-term basis. One of the main problems that interferes with production and recreation fishing is an increased pressure from fish-eating predators such as heron, otter and cormorant. Damage caused by such predators is hundreds of millions CZK every year. Fishery is also affected by the ongoing climate change which manifests in fish production as well as in fish population in fishing districts. Another adverse factor that complicates fish production is restriction of farming with respect to requirements concerning nature preservation and it desirable to find a compromise between interests of nature preservation and fish production.

The total fish production in 2020 included 19.3 thousand tonnes of fish from fishponds, 1,1 thousand tonnes from special facilities (mainly from flow systems with salmonoid fish and from recirculatory aquacultural systems) and 24 tonnes from dams.

The Domaslavičky Water Reservoir (Source: Forests of the Czech Republic)

Table 8.1.1
Market production of fish from the Czech Republic in 2012–2020

Species	2012	2013	2014	2015	2016	2017	2018	2019	2020
	tonnes								
Carp	17,972	16,809	17,833	17,860	18,354	18,460	18,430	17,945	17,370
Total	**20,763**	**19,358**	**20,135**	**20,200**	**20,952**	**21,685**	**21,751**	**20,986**	**20,401**

Source: MoA and Czech Fish Farmers Association

In 2020, 7,627 tonnes of live fish were delivered to the Czech market, which means a year-on-year decrease by 837 tonnes. Export of live fish was 9,232 tonnes, which means a decrease by 1,065 tonnes. 2.4 thousand tonnes of fish were processed in live weight, which accounts for 12% of the total of fish caught.

The species composition of marketable fish is relatively stable and has not changed significantly, compared to the previous years. Of the total volume of harvested fish, carp accounted for 85.1%, salmonids 4.9%, herbivorous fish 5.2%, tench 0.7% and predatory fish accounted for 1.2% of the total harvested quantity. The domestic market continued to prefer supplies in the form of live fish, which in the past three years accounted for 37–40% of the production obtained by fish farming. Exports of live fish corresponded during the three previous years with 47% of the total catch and displayed stable interest in fish produced mainly by member organizations of the professional association. Fish processing plants processed into products 10–12% of the freshwater marketable fish produced.

The consumption of freshwater fish produced by fish farming in 2020 reached the value of 1.2 kg/person/year. To calculate the total consumption of freshwater fish per capita in 2020, population number of 10,701,777 as of 31 December 2020 was considered.

Rožmberk (Author: Hubalová Petra)

The Finkův Pond (Source: Ohře River Board)

Table 8.1.2
Use of marketable fish produced by fish farming in the Czech Republic in 2012–2020

Year	Total production	of which *)		
		sale of live fish in the Czech market	processed fish (live weight)	export of live fish
	thousands of tonnes			
2012	20.8	9.5	2.3	8.6
2013	19.4	9.0	2.4	8.4
2014	20.1	8.5	2.1	8.4
2015	20.2	9.2	1.9	9.9
2016	21.0	8.3	2.5	11.0
2017	21.7	8.2	2.4	11.1
2018	21.8	8.4	2.2	10.3
2019	21.0	8.5	2.4	10.3
2020	20.4	7.6	2.4	9.2

Source: MoA and Czech Fish Farmers Association
*Note: *) Including inventory at the beginning and at the end of the year, losses and import of live freshwater fish.*

Table 8.1.3
Fish consumption in the Czech Republic in 2012–2020

Species	2012	2013	2014	2015	2016	2017	2018	2019	2020
	kg/person/year								
Fish in total	**5.7**	**5.3**	**5.4**	**5.5**	**5.1**	**5.4**	**5.6**	**5.6**	*)
of which freshwater fish produced and caught in the Czech Republic	1.5	1.4	1.3	1.4	1.3	1.3	1.3	1.3	1.2

Source: CSO and Czech Fish Farmers Association
*Note: *) Data for 2020 not available.*

Martin Mehes (Source: www.shutterstock.com)

9. FINANCIAL SUPPORT FOR WATER MANAGEMENT

9.1 Financial support

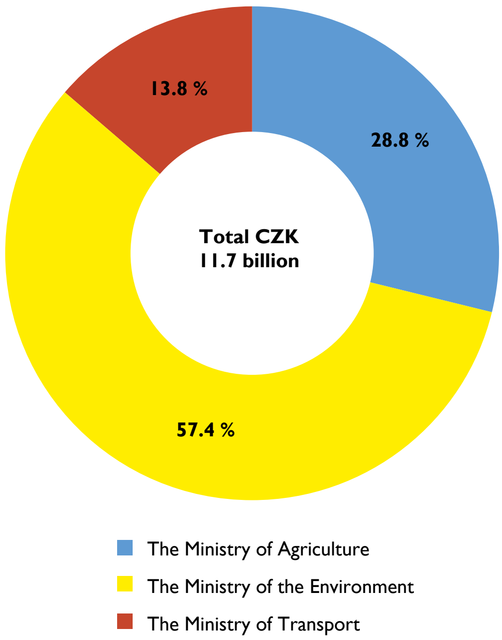
Financial support for water management includes selected national and transnational grant programmes linked with water management. In 2020, this support exceeded CZK 11.7 billion with the Ministry of Agriculture contributing to the sum with 29% (subsidies amounting to CZK 3.4 billion), the Ministry of the Environment with 57% (i.e. CZK 6.7 billion) and the Ministry of Transport with 14% (CZK 1.6 billion).

Table 9.1.1
Crucial support in water management in 2020

Ministry	Total funds in millions of CZK
Ministry of Agriculture	3,377.9
Ministry of the Environment	6,715.2
Ministry of Transport	1,610.5
Total	**11,703.6**

Source: MoA using data of the Ministry of the Environment and the Ministry of Transport

Chart 9.1.1
Financial support for water management by ministries in 2020



Source: MoA using data of the Ministry of the Environment and the Ministry of Transport

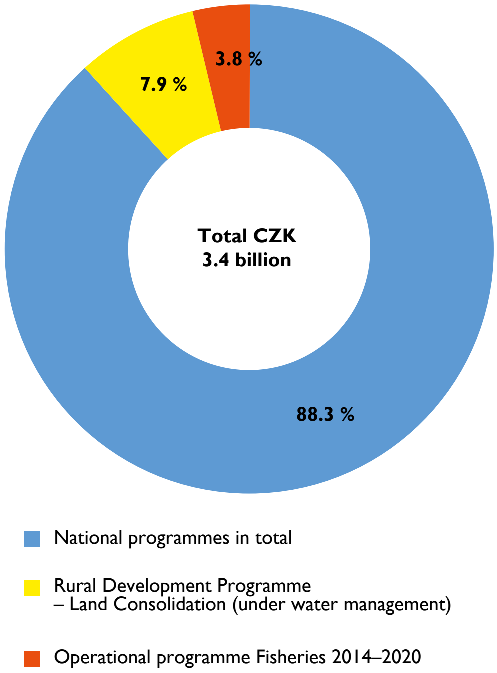
The Knínický Stream, Veverské Knínice, The Revitalization Measures (Source: Morava River Board)

9.1.1 Financial support provided by the Ministry of Agriculture

The Ministry of Agriculture administered 16 grant programmes focused on water management in 2020. 14 programmes were national and two were funded from national and transnational funds. The funds used amounted to a total of CZK 3.4 billion.

The Doubický Stream (Source: Forests of the Czech Republic)

Chart 9.1.1.1
Use of funds under the Ministry of Agriculture in 2020



Source: MoA

Table 9.1.1.1
Funds provided for water management by the Ministry of Agriculture in 2020

Programme No.	Name of the programme	Programme expenditures in millions of CZK
129 300	Support for Construction and Technical Betterment of Water Supply and Sewerage System Infrastructure II	1,008.8
129 400	Support for Measures Aimed at Mitigating Negative Impacts of Drought and Lack of Water	76.2
	Dotation of parts of interests from commercial loans	2.3
129 260	Flood Prevention III	152.3
129 360	Flood Prevention IV	687.1
129 290	Support for Measures at Minor Watercourses and Small Water Reservoirs	400.0
129 390	Support for Measures at Minor Watercourses and Small Water Reservoirs – Stage II	150.1
129 280	Support for Water Retention in the Landscape – Fishponds and Water Reservoirs	60.1
129 310	Support for Competitiveness of Agriculture and Food Processing – Irrigations – Stage II	103.2
129 330	Vlachovice – Settling rights to immovable property affected by the planned construction of a water structure	120.0
129 340	Settling rights to immovable property affected by the planned implementation of comprehensive drought measures in the Rakovník District	33.0
	Skalička – Settling rights to immovable property affected by the planned construction of a water structure	120.0
17	Support for Extra-production Functions of Fishing Grounds	22.2
OPVZ Švihov	Measures Aimed at Decreasing the Impact of Primary Agricultural Production in the Protective Belt of the Švihov Water Reservoir at the Želivka River	49.0
National programmes in total		2,984.3
	Rural Development Programme – Land Consolidation (under water management)	266.0
	Operational programme Fisheries 2014–2020	127.6
Total		**3,377.9**

Source: MoA

Ensuring quality of surface water sources

As part of decreasing the impacts of primary agricultural production in the protective belt of the Švihov Water Reservoir on the Želivka River the sum of CZK 49.017 million was paid in 2020.

The sum was intended for mitigating erosion and restricting application of plant protection agents on agricultural land and in protective belts of the Švihov Water Reservoir as intense farming results in an increased occurrence of pesticides and their metabolites in the Švihov Water Reservoir.

Water supply and sewerage systems

In 2020, investors received support in the form of grants as well as "subsidised loans". Under programmes of the Ministry of Agriculture 129 300 "Support for Construction and Technical Betterment of Water Supply and Sewerage System Infrastructure II" aimed at implementation of measures to meet the directives of the EU in the field of water supply and sewerage systems and at the development of this sector, the Ministry of Agriculture provided grants amounting to CZK 1 billion. Grant programme 129 300 is approved for 2017–2022. Furthermore, two new grant programmes, 129 400 "Support for Measures Aimed at Mitigating Negative Impacts of Drought and Lack of Water" and 129 420 "Support for Purchase and Unification of the W&S Infrastructure" were approved and shall be in force until the end of 2025, while funds amounting to approximately CZK 0.08 billion were provided under programme 129 400.

In 2020, funds from the state budget supported a total of 49 projects amounting to approximately CZK 404 million under sub-programme 129 302 (measures aimed at water supply systems) and 73 projects amounting to CZK 564 million under sub-programme 129 303 (measures aimed at sewerage systems).

Under sub-programme 129 304 (measures aimed at tackling consequences of the intended mining extension of the brown coal mine Turów in the Czech Republic) one project received funds from the state budget amounting to approximately CZK 0.6 million in 2020.

"Discounted loans" were provided for projects under programmes 129 180 and 229 310 that were terminated. The loans were provided in the form of payments against parts of interests on commercial loans in 102 projects from 2008–2013 that were demanding in terms of investments with loan agreements totalling approximately CZK 1,578 million not exceeding ten-year maturity. In 2020, a part of unsettled interests in 47 outstanding loans was paid off totalling approximately to CZK 2.3 million. These were non-investment funds that are not considered as funding under the programme. In 2020, funds amounting to approximately CZK 76.2 million were provided to third parties' projects under programme of the Ministry of Agriculture 129 400 "Support for Measures Aimed at Mitigating Negative Impacts of Drought and Lack of Water" focused on implementing measures aimed at supporting restoration and protection of water supply systems.

Table 9.1.1.2
State budget funds provided under programmes 129 300 and 129 40 of the Ministry of Agriculture including subsidy for a part of interest on commercial loans in 2020

Form of support	Water supply systems and water treatment plants	Sewerage systems and wastewater treatment plants	Renovation of water supply systems and sewerage systems after floods	Total
	in millions of CZK			
Subsidies under MoA programmes	526.279	558.740	0	1,085.019
Subsidies for a part of interest on commercial loans	0.415	1.870	0	2.285
Subsidies in total	**526.694**	**560.610**	**0**	**1,087.304**
Refundable financial support	0	0	0	0
Total	**526.694**	**560.610**	**0**	**1,087,304**

Source: MoA

Table 9.1.1.3
Development of the state support for construction of water supply systems, water treatment plants, sewerage systems and wastewater treatment plants in 2015–2020 provided by the Ministry of Agriculture

Financial source	2016	2017	2018	2019	2020
	in millions of CZK				
Refundable financial support	0	0	0	0	0
State budget subsidies	1,883	1,683	597	974	1,087
Support from the state budget	**1,883**	**1,683**	**597**	**974**	**1,087**
Subsidised loan (EIB and CEB)	0	0	0	0	0
Total support	**1,883**	**1,683**	**597**	**974**	**1,087**

Source: MoA

New programme 129 420 "Support for Purchase and Unification of the W&S Infrastructure" with allocation of CZK 300 million was approved on 23 December 2020 with the purpose of unifying assets and transferring ownership rights to towns and municipalities of the Czech Republic.

No funds were expended from Chapter 397 of the Operations with State Financial Assets.

Flood control

In 2020, programme 129 260 "Support for Flood Prevention III" continued to be implemented. The programme is a follow-up to the previous stage, while its emphasis is on the implementation of measures with retentive effects. In 2020, one project was funded from the state budget under this programme with funds expended amounting to CZK 152.3 million.

The programme is divided in four sub-programmes focused on support for preparatory design works for significant constructions, support for flood measures with retention and support for flood measures along watercourses.

Sub-programmes 129 262 "Support for Design documentation for Zoning Proceedings" and 129 263 "Support for Design Documentation for Construction Proceedings" are aimed at support for design documentations for significant constructions of flood measures that shall subsequently be implemented under further sub-programmes and for pre-project preparation of projects prepared on the basis of Government Resolution of 29 February 2016 No. 171 on initiating preparations of water reservoir constructions in regions affected by drought and jeopardized by water insufficiency.

Sub-programme 129 264 "Support for Flood Prevention with Retention" is aimed at constructing new retention areas, adjustments at existing water reservoirs with retention effect in order to increase protection against floods, measures against flood spilling and support for water retention in dry reservoirs in minor watercourses.

Sub-programme 129 265 "Support for Flood Measures Along Watercourses" is primarily aimed at construction of protective dykes and stabilization and increasing capacity of watercourse beds (especially in built-up areas).

Same as in previous year, programme 129 260 is implemented by watercourse administrators (i.e. River Boards, s.e., and Forests of the Czech Republic and minor watercourse administrators appointed by the MoA pursuant to Section 48(2) of the Water Act. Municipalities participate actively in the programme as applicants for subsidies for construction of local measures aimed at reducing flood risk of torrential rain and in minor watercourses.

The programme allowed municipalities and associations of municipalities, towns- and regions to participate in the procedure of designing flood measures through the institute of so-called "proposer"; measures designed by proposers are subsequently implemented by watercourse administrators.

Table 9.1.1.4
Use of funds for significant projects under programme 129 260 of the Ministry of Agriculture in 2020

Watercourse administrator	Project	Date	Total costs	Funds in 2020
			in millions of CZK	
Morava River Board	Morava, Olomouc – increasing the channel capacity, stage II	11/2017 – 09/2022	735.563	152.305

Source: MoA

Table 9.1.1.5
Use of funds of the state budget in 2020 under programme 129 260 of the Ministry of Agriculture by watercourse administrators

Owners and administrators	Investment	Non-investment
	in millions of CZK	
Elbe River Board	0	0
Vltava River Board	0	0
Ohře River Board	0	0
Oder River Board	0	0
Morava River Board	152.305	0
Forests of the Czech Republic	0	0
Municipalities	0	0
Total	**152.305**	**0**

Source: MoA

In 2020, the Ministry of Agriculture initiated funding projects under 129 360 programme "Support for Remedying Flood Damage IV". The programme is a follow-up to previous stages and it emphasises implementation of measures with retention effects. Immediate implementation of significant projects after the launching of the programme was possible thanks to previously processed design preparation conducted during Stage III. 23 projects totalling to CZK 687.1 million were funded in 2020.

The programme is divided in four sub-programmes focused on preparation of design works for significant constructions, support for flood measures with retention, support for flood measures along watercourses and also on preparation and implementation of selected construction related to the construction of the Nové Heřminovy Water Structure.

Sub-programme 129 363 "Support for Design Documentation" is aimed at support for design documentations for significant constructions of flood measures that shall subsequently be implemented under further sub-programmes and for pre-project preparation of projects prepared on the basis of Government Resolution No. 243 of 18 April 2018 No. 243 on preparations of water reservoir constructions in regions affected by drought as an effective measure of reducing water insufficiency and proposal of their funding and funding of other significant water structures.

Sub-programme 129 364 "Support for Flood Prevention with Retention" is aimed at constructing new retention areas, adjustments at existing water reservoirs with retention effect in order to increase protection against floods, measures against flood spilling and building and renovating polders including other related measures.

Sub-programme 129 365 "Support for Flood Measures Along Watercourses" is primarily aimed at construction of protective dykes and stabilization and increasing capacity of watercourse beds (especially in built-up areas).

In 2019, the programme was extended by new sub-programme 129 366 "Support for Preparation and Implementation of Investments and Constructions Resulting from the Construction of the Nové Heřminovy Water Structures" aimed at adjusting the location for the intended construction of a new water structure through conducting preparatory works and technical measures. The programme is performance of Government Resolution No. 386 of 3 June 2020 No. 386 concerning the Report on the state of preparation and implementation of measures aimed at reducing flood risks at the Upper Opava River including a proposal of funding the preparation and implementation of investment and constructions resulting from the "Measures at the Upper Opava" intent.

As in previous years, programme 129 360 is implemented by watercourse administrators (i.e. River Boards, s.e., and Forests of the Czech Republic and minor watercourse administrators appointed by the MoA pursuant to Section 48(2) of the Water Act. Municipalities participate actively in the programme as applicants for subsidies for construction of local measures aimed at reducing flood risk of torrential rain and in minor watercourses.

Table 9.1.1.6
Use of funds for selected significant projects under programme 129 360 of the Ministry of Agriculture in 2020

Watercourse administrator	Project	Date	Total costs	Funds in 2020
			in millions of CZK	
Ohře River Board	ŠP Chuderovský Stream – construction	08/19–10/21	5.875	2.861
Vltava River Board	WS Hněvkovice – protection of the WS against floods	03/20–12/22	268.490	48.000
Elbe River Board	Třebovka, Třebovice – Č. Třebová, adjustment – construction	01/19–12/21	458.564	190.100
Oder River Board	Opatření Holasovice, flood protection of the right bank area	08/19–02/22	106.263	62.551
Morava River Board	Olšava, Kunovice, flood protection of the town	04/19–12/21	320.066	150.400
Forests of the Czech Republic	Rusava in section 26,317–28,525 km	03/20–12/22	58.256	13.846

Source: MoA

Table 9.1.1.7
Use of state budge funds under programme 129 360 of the Ministry of Agriculture by watercourse administrators in 2020

Owners and administrators	Investment	Non-investment
	in millions of CZK	
Elbe River Board	205.899	0
Vltava River Board	48.000	0
Ohře River Board	2.861	0
Oder River Board	124.828	0
Morava River Board	277.307	0
Forests of the Czech Republic	22.044	2.405
Municipalities	3.756	0
Total	**684.695**	**2.405**

Source: MoA

The Knínický Stream, Veverské Knínice, The Revitalization Measures (Source: Morava River Board)

Also, this programme allows municipalities and associations of municipalities, towns and regions to participate in the procedure of designing flood measures through the institute of so-called "proposer"; measures designed by proposers are subsequently implemented by watercourse administrators.

In the sphere of remedying flood damage, the Ministry of Agriculture registers programme 129 270 "Remedying Flood Damage to State-owned Water Management Property II", sub-programme 129 272 "Remedying the Impacts of Floods in 2013" that was implemented in 2013–2017 and assessed in 2017. Further use of this programme depends on occurrence of any flood damage to watercourse beds including relevant facilities, water structures and bank vegetation owned by the state. The grant applicants may be River Boards and Forests of the Czech Republic, s.e.

Minor watercourses and small water reservoirs

In 2020, programme 129 290 "Support for Measures at Minor Reservoirs and Small Water Reservoirs" continued to be implemented. It is divided in two sub-programmes: 129 292 and 129 293. A total of 259 projects were supported with funds amounting to a total of CZK 400 million.

Podprogram Sub-programme 129 292 "Support for Measures at Minor watercourses, Fishponds and Small Water Reservoirs" is intended for River Boards and Forests of the Czech Republic, s.e. In 2020, funds totalling to CZK 108 million were allocated to 50 projects.

Sub-programme 129 293 "Support for Measures at Fishponds and Small Water Reservoirs Owned by

The Hněvkovice Reservoir, Securing the Reservoir from the Effects of Large Waters

Table 9.1.1.8
Use of state budget funds and number of projects funded under programme 129 390 in 2020

Owners and administrators	Use of funds			No. of funded projects
	Investment	Non-investment	Total	
	in millions of CZK			
Ohře River Board	0.000	0.000	**0.000**	0
Forests of the Czech Republic	16.548	12.443	**28.991**	23
Morava River Board	13.644	1.996	**15.640**	6
Vltava River Board	16.524	12.818	**29.342**	12
Oder River Board	3.336	9.525	**12.861**	2
Elbe River Board	8.481	12.711	**21.192**	6
Total 129 392	**58.534**	**49.494**	**108.028**	**50**
Total 129 393 – Municipalities	**255.748**	**36.178**	**291.927**	**209**
Total 129 390	**314.282**	**85.672**	**399.955**	**259**

Source: MoA

Municipalities" is intended for municipalities and associations of municipalities. Funds amounting to CZK 291 million were allocated to 209 projects under this Subprogramme in 2020.

Furthermore, the Ministry of Agriculture launched in 2020 programme 129 390 "Support for Measures at Minor Watercourses and Small Water Reservoirs – Stage II" that is divided in two sub-programmes: 129 392 and 129 393. A total of 108 projects were funded totalling to CZK 150 million.

Sub-programme 129 393 "Support for Measures at Minor Watercourses, Ponds and Small Water Reservoirs – Stage II" is intended for municipalities and unions of municipalities. A total of 30 projects totalling to CZK 32.7 million were supported under the sub-programme in 2020.

Table 9.1.1.9
Use of state budget funds and number of projects funded under programme 129 390 in 2020

Owners and administrators	Use of funds			No. of funded projects
	Investment	Non-investment	Total	
	in millions of CZK			
Ohře River Board	0.000	0.000	**0.000**	0
Forests of the Czech Republic	16.593	11.504	**28.097**	50
Morava River Board	17.73	38.463	**56.193**	22
Vltava River Board	12.000	13.182	**25.182**	5
Oder River Board	7.655	0.251	**7.906**	1
Elbe River Board	0.000	0.000	**0.000**	0
Total 129 392	**53.978**	**63.402**	**117.380**	**78**
Total 129 393 – Municipalities	**28.284**	**4.445**	**32.729**	**30**
Total 129 390	**82.262**	**67.847**	**150.109**	**108**

Source: MoA

The Skalka Reservoir (Source: Ohře River Board)

Water in the landscape

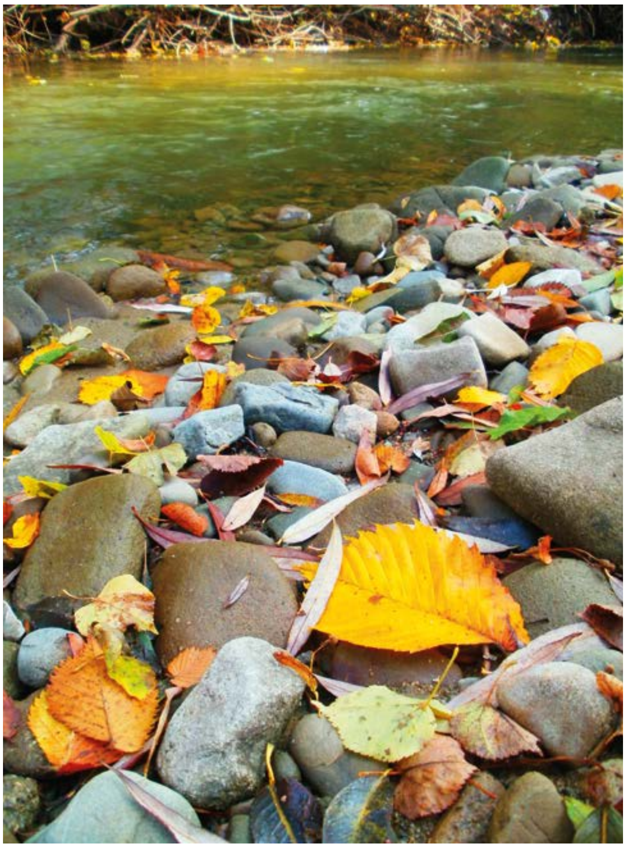
In 2020, the Ministry of Agriculture continued to administer programme 129 280 "Support for Water Retention in the Landscape – Fishponds and Water Reservoirs" funded between 2016 and 2021. The funds expended in 2020 supported 15 projects totalling to CZK 60 million.

Programme 129 280 is divided in three sub-programmes: sub-programme 129 282 "Support for Construction, Rehabilitation, renovation and De-mudding of Fishponds and Water reservoirs", sub-programme 129 283 "Remedying of Emergency Situations at Fishponds and Water reservoirs" and Sub-programme 129 284 "Remedying of Flood Damage at Fishponds and Water reservoirs".

Table 9.1.1.10
Use of state budget funds under programme 129 280 of the Ministry of Agriculture in 2020

Sub-programme	No. of projects	Funds
		in millions of CZK
129 282	12	44.907
129 283	3	15.203
129 284	0	0
Total	**15**	**60.110**

Source: MoA



Colors of Autumn (Author: Šimečková Veronika)

Table 9.1.1.11
Use of state budget funds for selected significant projects under programme 129 280 of the Ministry of Agriculture in 2020

Total	Project	Date	Total costs	Funds in 2020
			in millions of CZK	
Josef Pancner	Klím Pond	11/19–12/20	8.199	6.657
Rybářství Hodonín, s.r.o.	Construction of the Prakšický Dolní Pond	7/19–10/20	16.671	13.336
Klatovské rybářství – správa, a.s.	Demudding and renovation of the dam and structures at the Mlýnský Pond, Chocenický Újezd cadastre	2/19–2/20	14.974	11.979

Source: MoA

In 2020, funds under sub-programme 129 282 supported 12 projects with a total amount of CZK 44.91 million; three projects were supported under sub-programme 129 283 with CZK 15.2 million.

In 2020, programme 129 310 "Support for Competitiveness of Agrifood Industry – Irrigations – Stage II" continued at the Ministry of Agriculture. Financial support amounting to CZK 103 million was allocated to 55 projects under the programme.

The objective of programme 129 310 is to decrease the need for water and irrigation, energy demandingness of irrigation and use of positive environmental and extra-economic effects of irrigations as a measure of adopting to the climate change and thus increasing competitiveness of agricultural entities and stabilization of farming production. Programme 129 310 is divided in two sub-programmes: sub-programme 129 312 "Support for Renewal and Construction of Irrigation Detail and Optimization of Irrigation Systems – Stage II" is intended as a support for restoration and building irrigation detail and support for restoration, building and optimization of irrigation networks. Sub-programme 129 313 "Support for Optimization of Irrigation Networks Administered by the State Land Office" is aimed at the support for restoration, building and optimization of irrigation networks.

Table 9.1.1.12
Use of state budget funds under programme 129 310 of the Ministry of Agriculture in 2020

Sub-programme	Number of projects	Funds
		in millions of CZK
129 312	50	100.475
129 313	5	2.734
Total	**55**	**103.209**

Source: MoA

Table 9.1.1.13
Use of state budge funds for selected significant projects under programme 129 310 of the Ministry of Agriculture in 2020

Applicant	Projects	Date	Total costs	Funds in 2020
			in millions of CZK	
Sady Leopoldov s.r.o.	Leopoldov Retention Irrigation Reservoir	2/20–10/20	1.556	1.089
Vltava VII, s.r.o.	Reconstruction of the Lounky Pumping Station	7/20–11/20	1.452	0.726
Ing. Michal Ondra	Belt irrigators	7/20–12/20	0.531	0.371

Source: MoA

Preparation of water structure construction

In 2020, the Ministry of Agriculture administered three dotation programmes focused on purchase of real estate affected by preparation for construction of significant water structures. The following water structures are concerned: Skalička, Vlachovice and all-embracing measure aimed at drought in the Rakovník District (water reservoirs of Kryry, Senomaty, Šenov and water feeders).

In 2020, the Ministry of Agriculture administered programme 129 330 "Vlachovice – Settling rights to immovable property affected by the planned construction of a water structure". Funds totalling to CZK 120 million were used under the programme in 2020.

The aim of the programme is to implement the task arising from Government Resolution No. 257 of 15 April 2019, which approved the Principles for Settling rights to immovable property affected by the planned construction of the Vlachovice water structure. The main purpose of the programme is to settle the property rights of all owners affected by the future construction of the Vlachovice water structure in accordance with the approved incentive compensations by 2023. The programme includes one sub-programme 129 332 "Vlachovice – Settling rights to immovable property affected by the planned construction of the Vlachovice water structure", through which the actual property rights will be settled. The beneficiary of the subsidy is the Morava River Board.

The Vlachovice water structure is to be the key resource of drinking water for the Zlín District and will be able to supply water to the adjacent parts of the South Moravian and Olomouc Regions through joint water supply systems. It is one of the most important measures aimed at mitigating effects of the climate change in the Czech Republic.

In 2020, the Ministry of Agriculture launched programme 129 340 «Settling of rights to immovable property affected by the planned implementation of a comprehensive drought solution in Rakovník». In 2020, funds amounting to EUR 33 million were used.

Government Resolution No. 971 of 5 October 2020 approved the Principles for the settlement of rights to immovable property affected by the planned implementation of the complex drought in Rakovník - Stage I and approved funding totalling to CZK 485 million in 2020–2025. In the first stage, immovable property affected by the implementation of the Kryry, Senomaty and Šanov water structures is settled. Programme 129 340 is divided into two sub-programmes, namely sub-programme 129 342 "WS Kryry – Settling rights to immovable property affected by the planned implementation of the water structures", where the Ohře River Board is the beneficiary of the subsidy, and sub-programme 129 343 "Senomaty and Šanov – Settling rights to immovable property affected by the planned implementation of water supply structures", where the Vltava River Board is the beneficiary of the subsidy.

The Kryry Water Structure is a crucial element in the planned system of measures aimed at addressing drought in the Rakovník District. Together with the small water reservoirs of Senomaty and Šanov in the Rakovnický Stream Basin and its feeders, it is an effective solution to enhancing water resources and mitigating water deficit in the area.

In 2020, land purchases under the future Skalička Water Structure continued and funds amounting to CZK 120 million were used.

The Bečva River Basin is one of the most exposed areas in the Czech Republic in terms of flood risks, which is why the Principles for the settlement of rights to immovable property affected by the planned implementation of the Skalička water structure were approved in 2017 on the basis of Government Resolution No. 274 of 10 April 2017.

Preparation and construction of flood protection in the Bečva River Basin is divided into two stages. The total amount of funds intended for the purchase of immovable property affected by the construction of the Skalička water structure is CZK 1.24 billion. So far, property worth CZK 690 million has been bought in Stage I, the recipient of the subsidy is the Morava River Board. The Skalička water structure will be built in Stage II. Land purchases for the Skalička water structure will be completed in 2023. With respect to the climate change and the need to ensure sufficient water resources, different versions of the water structure technical design are being assessed so that the water structure addresses both hydrological extremes, i.e. floods and drought.

Fisheries

The Ministry of Agriculture established for support extra-production functions of fishing districts, pursuant to provisions of Art. 1, 2 and 2(d) of Act No. 252/1997, on Agriculture, as amended, national grant programme DT17 "Support for Extra-production functions of Fishing Districts". In 2020, funds amounting to CZK 22 million supported 50 applicants.

The grant programme was launched by the MoA in 2015 with the view of supporting biological diversity in fish populations in surface waters intended for users of fishing districts. The subside is counted per one hectare of fishing districts. Funds from the grant may only be used to cover costs of introducing fish species in accordance with the predefined fish breeding of the relevant authority under state fishing administration.

Table 9.1.1.14

Use of state budget funds under programme DT17 of the Ministry of Agriculture in 2020

Program	Number of received applications	Number of projects funded	Funds in millions of CZK
DT17	50	50	22.2

Source: MoA

Maximillian cabinet (Source: www.shutterstock.com)

Operational programme Fisheries 2014–2020

The Ministry of Agriculture provided from the Operational programme 2014–2020 funds to 140 projects totalling to almost CZK 128 million in 2020.

Fishers may use funds under the Operational programme Fisheries 2014–2020 from the European Marine and Fishing Fund under Priority Axis 2 – Support for knowledge-based environmentally sustainable, innovative and competitive aquaculture, support for new breeders and introduction of European eel (Anguilla anguilla) in selected fishing districts in the Elbe and Oder River Basins. Under EU Priority Axis 3 – Support for common fishing policy promotes data gathering and monitoring of fishing and aquaculture products. Under EU Priority Axis 5 – Support for new introductions to the market and processing, the grant concerns promotion and investment in fish processing.

Table 9.1.1.15

Operational programme Fisheries 2014–2020 – use of funds in 2020

EU priority	No. of measure	Project	Number of projects	Funds provided in millions CZK
2 – Support for knowledge-based environmentally sustainable, innovative and competitive aquaculture using resources efficiently	2.1	Innovation	2	2.41
	2.2	Productive investment in aquaculture	104	105.64
	2.3	Support for new fish farmers	3	0.90
	2.4	Recirculatory devices and flow systems with additional purification	1	3.02
	2.5	Aquaculture providing environmental services	3	4.40
Total EU Priority 2			**113**	**116.37**
3 – Support for implementation of common fishing policy	3.1	Data gathering	-	-
	3.2	Product traceability	-	-
Total EU Priority 3			**-**	**-**
5 – Support for introduction to the market and processing	5.1	Production plans		-
	5.2	Introducing products to the market	7	1.24
	5.3	Investments in product processing	13	5.79
Total EU Priority 5			**20**	**7.03**
		Technical assistance	7	4.20
Total			**140**	**127.60**

Source: MoA

Rural Development Programme

The Rural Development Programme of the Czech Republic for 2014–2020 is based on the Joint Strategic Plan, Partnership Agreement and other strategic documents and it was designed in accordance with Regulation of the European Parliament and of the Council No. 1305/2013. Water management is partially concerned by this programme by its Land consolidation. In 2020, funds amounting to almost CZK 266 million were expended under Operation 4.3.1 Land consolidation.

Grants from RDP are co-funded from the European Agricultural Fund for Rural Development (hereinafter referred to as the EAFRD) and from the state budget. The support from the EAFRD for 2014–2020 is EUR 2.3 billion (CZK 63 billion), Furthermore, EUR 1.2 billion (approximately CZK 32 billion) will be paid from the state budget of the Czech Republic. RDP 2014–2020 funding is prefunded from the state budget, meaning all payments to recipients go first from national funds.

The RDP 2014–2020 supports Land consolidation with a single grant recipient defined: the State Land Office and its branches of regional land offices. The programme is a follow-up to previous RDP 2007–2013.

100% of eligible costs are funded. Funds from the EAFRD cover 49.5% of public costs, funds from the state budged of the Czech Republic cover 50.5% of public costs. EUR 130 million (approximately CZK 3.4 billion), was allocated for 2014–2020 applications were received on a continual basis from 22 February 2016.

Under the RDP 2014–2020, operation 4.3.1 Land Consolidation, 346 applications for grants amounting to CZK 3.5 billion were registered with 333 applications totalling CZK 3.2 billion approved and CZK 2.9 billion actually paid to 298 projects by 31 December 2020.

Table 9.1.1.16
Use of funds under Operation 4.3.1 Land Consolidation in 2020

Operation 4.3.1 Land consolidation	Unit	Intent a) Geodetic work	Intent b) Implementing plans of joint structures	Total	Of which allocated to water management
No. of projects registered	pcs	0	2	**2**	**2**
Amount for projects registered	millions of CZK	-	43.6	**43.6**	**43.6**
No. of approved projects	pcs	0	52	**52**	**18**
Amount for projects approved	millions of CZK	-	581	**581**	**204**
Funded projects	pcs	3	76	**79**	**14**
Funded	millions of CZK	4.9	944	**948.9**	**266**

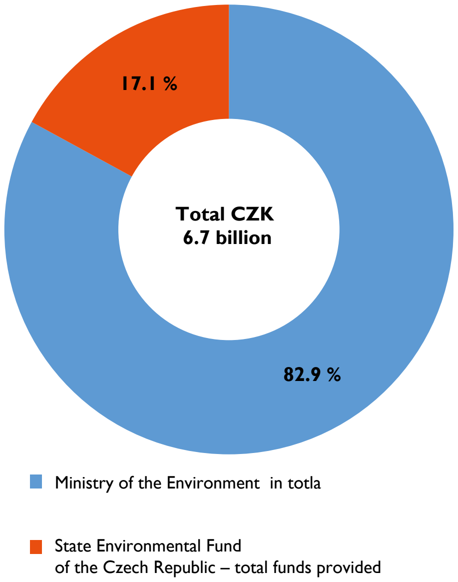
Source: MoA

9.1.2 Financial support provided by the Ministry of the Environment

The Ministry of the Environment provided financial support under transnational and national grants in 2020. Financial support from the state budget amounted to CZK 5.6 billion, funds from the State Environmental Fund of the Czech Republic was CZK 1.2 billion. Funds provided under the Ministry of the Environment for water management totalled to CZK 6.7 billion.

KUK, Around the reservoir Landštejn
(Author: Soukup Petr)

Chart 9.1.2.1
Funds provided for water management by the Ministry of the Environment in 2020



Source: MoE, SEF

Table 9.1.2.1
Funds provided for water management by the Ministry of the Environment in 2020

Name of the programme	Programme expenditures in millions of CZK
Operational programme Environment 2014–2020	5,561.4
Programme 115 270 "MoE Remedying Flood Damage"	5.7
Ministry of the Environment – total	**5,567.1**
National programme Environment	1,004.0
Call No. 2/2016 PU/Call No. 1/2019 PU in accordance with Directive of the Ministry of the Environment No. 8/2017 – loans from the State Environmental Fund	144.1
State Environmental Fund of the Czech Republic – total funds provided	**1,148.1**
Total funds provided by the Ministry of the Environment	**6,715.2**

Source: MoE, SEF

Operational Programme Environment 2014–2020

The Ministry of the Environment provides financial support under programmes co-funded from the European Union grants through the Operational Programme Environment. In 2020, funds from the Cohesion Fund and European Regional Development Fund were provided for priority axes 1 and 4 for water management and for care and protection of nature and landscape, totalling to CZK 5.56 billion.

The programme document for OPE 2014–2020 was approved by the European Commission on 30 April 2015. The funds started to be used in December 2015. The OPE 2014–2020 is a follow-up to the OPE 2007–2013. In comparison with the previous programme, there is a decrease in the number of activities supported by so-called priority axes. In 2014–2020, support from the programme may be received in one of the following priority axes:

1) Improving water quality and decreasing the risk of floods,
2) Improving air quality in urban areas,
3) Waster and material flows, ecological burden and risks,
4) Protection and care of the nature and landscape,
5) Energy savings.

Under Priority Axis 1 – Improving water quality and decreasing the risk of floods – 243 projects were approved for funding with contribution from the EU of CZK 875.5 million, and legal act confirming future grant provision with contribution from the EU amounting to CZK 932.5 million was issued for 243 projects in 2020. Funds used from the Cohesion Fund amounted to CZK 4,670.8 million in 2020.
Under Priority Axis 4 – Protection and care of the nature and landscape (specific objective 4.3 – To strengthen natural landscape functions and 4.4 – To improve quality of the environment in residential areas) including measures against drought, 741 projects were approved for funding with contribution from the EU of CZK 2,990.8 million and legal act confirming future provision of CZK 3,201.8 million was issued for 801 projects in 2020. Funds used from the ERDF amounted to CZK 890.6 million in 2020.

In 2020, applications for grants from the Operational Programme "Environment 2014–2020" for water management and protection and care of landscape were received under 9 calls (of which 7 under specific objectives 1.1 to 1.4 and 2 calls under specific objectives 4.3 and 4.4). A total of 15 calls were opened in 2020.

The Lubeň II – The Osek nad Bečvou (Source: Morava River Board)

Table 9.1.2.2
Projects approved to receive funds under the Operational Programme "Environment 2014–2020" in 2020

Priority axis	Area of support	Number	Total costs	Total eligible costs	EU grant
			in millions of CZK		
1	1.2	1	722.31	296.78	189.20
	1.3	93	590.73	488.16	406.61
	1.4	149	398.34	395.42	279.65
Priority axis 1 in total		**243**	**1,711.39**	**1,180.37**	**875.45**
4	4.3	545	3,203.56	2,959.27	2,750.17
	4.4	196	495.26	362.24	240.66
Priority axis 4 in total		**741**	**3,698.82**	**3,321.51**	**2,990.83**
Total		**984**	**5,410.21**	**4,501.88**	**3,866.28**

Source: Monitoring System of European Structural and Investment Funds for 2014–2020
Note: Project approved for funding is a project approved by the Selection Committee of the Managing Body of the Operational Programme Environment.

Table 9.1.2.3
Projects with an issued legal act on providing support from the Operational Programme "Environment 2014–2020" in Water Management in 2020

Priority axis	Area of support	Number	Total costs	Total eligible costs	EU grant
			in millions of CZK		
1	1.1	1	129.58	103.95	66.27
	1.2	1	722.31	296.78	189.20
	1.3	92	564.24	456.43	378.43
	1.4	149	423.93	416.93	298.59
Priority axis 1 in total		**243**	**1,840.05**	**1,274.10**	**932.49**
4	4.3	586	3,410.53	3,129.75	2,910.71
	4.4	215	571.19	427.25	291.10
Priority axis 4 in total		801	3 981.72	3,557.00	3,201.81
Total		**1044**	**5,821.77**	**4,831.10**	**4,134.30**

Source: Monitoring System of European Structural and Investment Funds for 2014–2020
Note: Project with an issued permit is a project with a Project registration and Decision on Grant Provision.

Table 9.1.2.4
Use of funds from the Operational Programme "Environment 2014–2020" in 2020

Area of support	EU grants in millions of CZK
1.1 To reduce the amount of pollution discharged into surface and ground water from municipal sources and the input of pollutants into surface and groundwater	2,796.15
1.2 To ensure the supply of drinking water of an adequate quality and quantity	1,217.68
1.3 To ensure flood protection of urban areas	260.93
1.4 To promote flood prevention measures	396.03
Priority axis 1 in total	**4,670.80**
4.3 To strengthen natural landscape functions	842.53
4.4 To improve quality of the environment in residential areas	48.03
Priority axis 4 in total (4.3, 4.4)	**890.56**
Total	**5,561.36**

Source: Monitoring System of European Structural and Investment Funds for 2014–2020

Table 9.1.2.5
Calls of the Operational programme Environment 2014–2020 in the field of water management in 2020

Call No.	Call and No. of specific objective	Allocation of EU funds e in millions of CZK	Applications received from	Deadline for filing applications
52	4.3 Strengthening natural landscape functions	40	3. 4. 2017	31. 8. 2020
88	4.3 Strengthening natural landscape functions	160	16. 1. 2017	2. 1. 2020
115	4.4 Improving quality of the environment in residential areas	119	1. 8. 2018	31. 8. 2020
127	4.3 Strengthening natural landscape functions	310	1. 10. 2018	6. 1. 2020
128	4.4 Improving quality of the environment in residential areas	610	1. 10. 2018	6. 1. 2020
119	1.3 Ensuring flood protection of urban areas	1 000	4. 2. 2019	13. 1. 2020
140	4.3 Strengthening natural landscape functions	300	2. 3. 2020	3. 8. 2020
141	4.4 Improving quality of the environment in residential areas	100	3. 2. 2020	2. 11. 2020
143	1.3 Ensuring flood protection of urban areas	50	3. 2. 2020	7. 5. 2020
144	1.3 Ensuring flood protection of urban areas	1 000	3. 2. 2020	1. 3. 2021
145	1.4 Promoting flood prevention measures	50	3. 2. 2020	7. 5 .2020
147	1.4 Promoting flood prevention measures	100	1. 4. 2020	30. 9. 2020
148	1.3 Ensuring flood protection of urban areas	50	15. 10. 2020	1. 3. 2021
149	1.4 Promoting flood prevention measures	50	15. 10. 2020	1. 3. 2021
151	1.1 To reducing the amount of pollution discharged into surface and ground water from municipal sources and the input of pollutants into surface and groundwater	39	1. 9. 2020	25. 2. 2021

Source: Monitoring System of European Structural and Investment Funds for 2014–2020

The State Environmental Fund of the Czech Republic

The State Environmental Fund (SEF) of the Czech Republic established by Act No. 388/1991 Coll., is a specifically oriented institution which is an important financial resource for support for implementation of measures aimed at protecting and improving the status of the environment in its respective compartments. On 31 December 2020, the revenue part of its budget amounted to CZK 1.97 billion.

The revenues of the State Environmental Fund of the Czech Republic ("SEF") included collected charges for environmental pollution of CZK 1,285 million. Revenues from fines and financial penalties amounted to CZK 38.9 million. In the sphere of the protection of waters they comprise a charge for wastewater discharges into surface waters and a charge for abstracted groundwater as shown in Table 9.1.2.6.

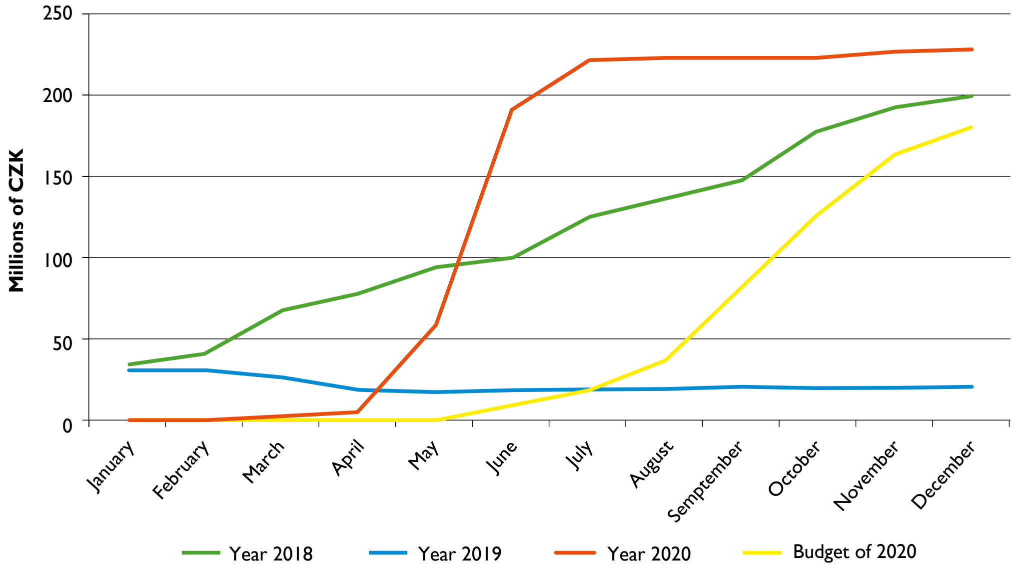
Living Mirror, The Luční Stream, Kuřim (Author: Nejezchleb Martin)

Table 9.1.2.6
The State Environmental Fund – Structure of the revenue part of the budged (only water-related) in 2020

Item (water protection)	Budget for 2020	Revenue as of 31/12 2020	Payments	Difference
	in millions of CZK		%	in millions of CZK
Wastewater	180.0	227.2	126.2	47.2
Groundwater	300.0	355.3	118.4	55.3

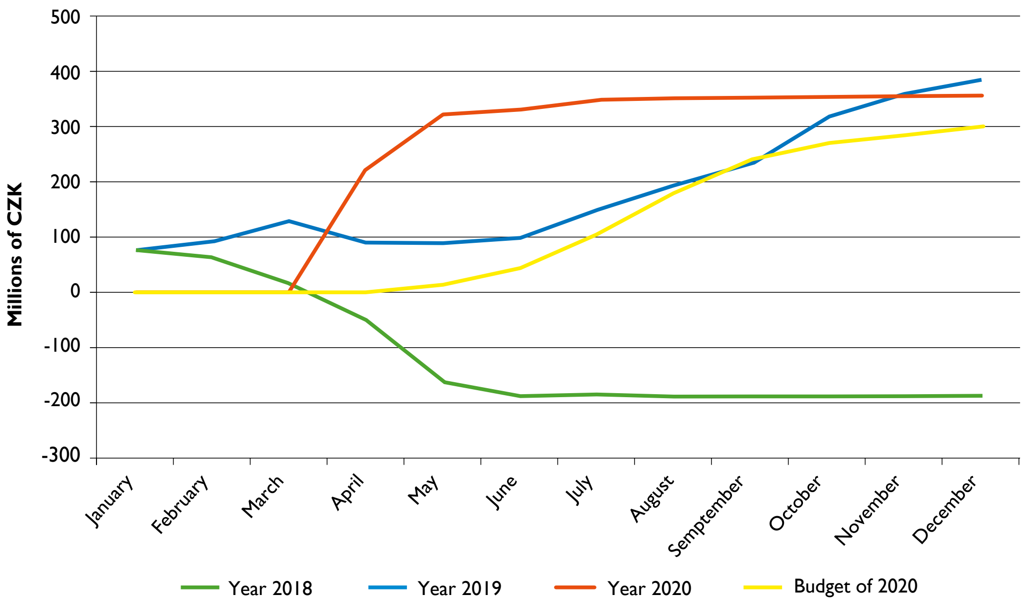
Source: SEF

Chart 9.1.2.2
The State Environmental Fund – Development of revenues from charges for wastewater in 2018–2020



Source: SEF

Chart 9.1.2.3
The State Environmental Fund – Development of revenues from charges for groundwater in 2018–2020



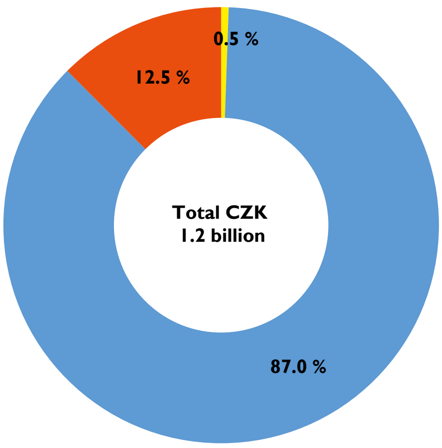
Source: SEF

Antelope (Source: Ohře River Board)

National programmes administered by the State Environmental Fund of the Czech Republic

The State Environmental Fund of the Czech Republic administered in 2020 three programmes under which approximately CZK 1,154 million was paid.

Chart 9.1.2.4
State Environmental Fund of the Czech Republic – administered national programmes (water management) – use of funds in 2020



Source: SEF

The Svitavka Stream, The Revitalization (Source: Ohře River Board)

Programme 115 270 "MoE Remedying Damage Caused by Natural Disasters" – funds from the state budget

Under programme 115 270, the State Environmental Fund administered sub-programme 115 273 "Remedying Damage Caused by Natural Disasters in 2014". Only 3 applicants participated in sub-programme 115 272, whereas the State Environmental Fund administered only one application (the other two being closed in 2019). Funds totalling to CZK 5.7 million were used under the sub-programme in 2020.

National programme Environment

The National Programme Environment supports projects aimed at protecting and improving the environment in the Czech Republic using national funds. It is intended particularly for towns and smaller municipalities. It uses funds of the State Environmental Fund obtained from environmental feels and it complements other grants, particularly OPE and the New Green Savings programme.

The State Environmental Fund administered under this programme 17 applications and one application outside the programme in 2020 – see Table 9.1.2.7. 3,666 applications totalling to CZK1,004 million were paid under the calls.

Table 9.1.2.7
Calls administered under the National Programme Environment in 2020

Call No.	Name of the call	Applications received		Applications approved		Applications paid	
		No.	grants millions of CZK	No.	grants millions of CZK	No.	grants millions of CZK
8/2016	Research, intensification and construction of drinkable water resources	0	0.0	0	0.0	44	45.5
10/2016	Green vegetation for towns and municipalities	0	0.0	0	0.0	23	3.9
11/2016	Domestic wastewater treatment plants	0	0.0	0	0.0	9	35.0
6/2017	Rainwater	0	0.0	20	1.1	20	1.1
12/2017	Support for municipalities in national parks - application selection	3,588	142.0	3,112	115.4	3,070	113.9
15/2017 – application selection	Domestic wastewater treatment plants	0	0.0	0	0.0	7	2.5

17/2017	Green vegetation for towns and municipalities	0	0.0	0	0.0	8	22.1
18/2017	Liquidation of unnecessary drills	0	0.0	0	0.0	41	15.5
20/2017	Drinkable water resources	0	0.0	3	3.3	4	1.2
2/2018	Eco-innovation – application selection	270	404.8	187	266.8	110	104.6
3/2018 – application selection	WWTPs and sewerage systems	0	0.0	1	15.6	0	0.0
8/2018	Water supply and sewerage systems	0	0.0	0	0.0	36	462.1
4/2019	Rainwater	286	8,077.0	288	8,092.0	39	154.5
9/2019	Tree planting	684	124.4	312	49.8	254	40.4
12/2019	Household wastewater treatment plants	10	42.0	6	28.8	0	0.0
3/2020	Project preparation – water management projects	92	115.3	69	86.1	0	0.0
6/2020	Project preparation – drought and floods	2	5.5	1	5.0	0	0.0
beyond the call	Czech geological service (Turów – Exploratory Stage II)	0	0.0	0	0.0	1	1.5
Total		**4,932**	**8,911.1**	**3,999**	**8,663.9**	**3,666**	**1,004.0**

Source: SEF

Calls No. 2/2016 PU and No 1/2019 PU as per Directive of the Ministry of the Environment No. 8/2017 – loans granted by the State Environmental Fund

Call No. 2/2016 PU was made in 2016 with the objective of enhancing own sources expended on implementing projects supported under OPE 2014–2020, Priority Axis I, specific objectives 1.1 and 1.2 with the intent of improving quality of drinkable water for the population. Applications were received from 17 October 2016 until 31 December 2018 and CZK 690 million was allocated. In 2020, almost CZK 110.2 million was paid. Call No. 1/2019 PU was made in 2019 with total allocation of funds amounting to CZK 500 million in Priority Axis I with applications received from 2 January 2020 to 20 June 2020.

Table 9.1.2.8

Overview of terminated Call No. 2/2016 PU and Call No. 1/2019 PU for loans for implementors of water management projects under the Operational Programme Environment on 31 December 2020

Call	Maturity in years	Allocation	Applications filed	Applications administered	Applications with issued Decision of the Minister	Contracts concluded with receivers	Paid to recipients
		in millions of CZK					
2/2016	max. 10	690	728.1	0	12.7	661.7	596.4
1/2019	max. 10	500	342.5	0	239.1	103.4	33.9

Source: SEF

The Kadaň Reservoir, The Revitalization (Source: Ohře River Board)

Norwegian funds – the Programme Environment, Ecosystems and Climate Change

The programme is funded from the Norwegian Financial Mechanism for 2014–2021, the State Environmental Fund co-funds the programme with 15%. The programme is focused on improving the state of ecosystems, decreasing air and water pollution including monitoring and on adoption and mitigation measures linked with the climate change.

In the field of waters, the programme focuses on enhancing substance monitoring in accordance with the Water Framework Directive (list of priority substances and list of monitored substances – "watchlist") and on implementing projects aimed at reducing pharmaceutical pollution in surface waters.

In 2020, 4 calls focused on implementation of adaptation measures, air quality monitoring, protection of biotopes and protected animal and plant species and raising awareness and conducting information activities with a total allocation of CZK 278.2 million were announced. Calls in the field of water protection shall be announced in the first half of 2021.

9.1.3 Financial support of the Ministry of Transport

The State Transport Infrastructure Fund was established with Act No. 104/2000 Coll., on the State Transport Infrastructure Fund of 4 April 2000 with effect as of 1 July 2000. The purpose of the fund in water management is to fund construction, modernization, repairs and maintenance of significant national waterways.

Funds of the State Transport Infrastructure Fund were expended on development, modernization and maintenance of waterways significant in terms of transport in 2020 through the Waterways Directorate of the Czech Republic amounting almost to CZK 1,393 million. Financial participation from funds under the programme Connecting Europe Facility amounted to CZK 19 million.

Waterways Directorate of the Czech Republic

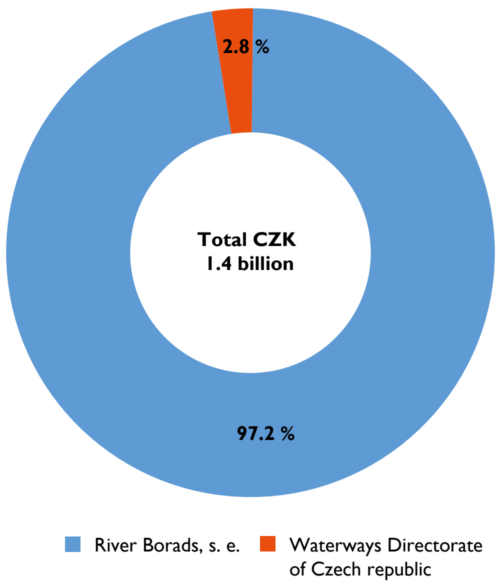
Waterways Directorate of the Czech Republic is the investing entity of the Ministry of Transport and Communication of the Czech Republic. It was established on 1 April 1998 as a managing organization of the state whose core activities consist in developing waterways infrastructure in the Czech Republic using funds from the State Transport Infrastructure Fund.

In 2020, the Directorate of Waterways spent a total of CZK 1,392.66 million (used from the STIF funds) on development, modernisation and maintenance of waterways significant in terms of transport. Of this amount, investment expenditures amounted to CZK 1,353.87 million and non-investment expenditures to CZK 38.79 million. Funds amounting to CZK 19.26 million were used from the Connecting Europe Facility (hereinafter referred to as the "CEF"), of which CZK 8.00 million for the project "Adjustment of the head of the Hořín Lock" and CZK 11.26 million for the RIS COMEX project).

In 2020, funds from the STIF and the CEF programme were primarily allocated to a set of investment projects aimed at general increase of the parameters of the Vltava Waterway between Mělník, i.e. the ongoing implementation of the project "Adjustment of the head of the Hořín Lock" in the amount of CZK 214.06 million, "Underpass Clearance Increase in the Vltava Waterway" in the amount of CZK 821.85 million, "Draught Increase in the Vltava Waterway" in the amount of CZK 42.53 million and the completed investment project "Modernisation of the Štvanice Lock" in the amount of CZK 13.22 million CZK. Furthermore, the investment project "Road Bridge Over the Elbe between Valy and Mělice" was successfully completed with costs totalling to CZK 123.65 million, while implementation of the investment project "Veselí nad Moravou Recreational Marine" continued and required an amount of CZK 33.27 million. CZK 42.17 million was spent under the general item "Investment projects with budgets below CZK 30 million in 2020.

Significant funds were also spent on intensive preparation of other investment projects aimed at general development of the entire network of transport significant waterways. The main obstacle to the ongoing preparation of investment projects was the unresolved issue of the use of lands by River Boards, s.e. needed for construction, while in the case of the Děčín Weir it is necessary that the SEA assessment of the Water Transport Concept is first completed. Other project proceeded, e.g., by obtaining building permits as the case was with "Děčín – Smetanovo nábřeží Wharf" and "Brandýs nad Labem Wharf" and completion of project documentation for other waterway infrastructure development projects.

Chart 9.1.3.1
Waterways Directorate – use of funds in 2020



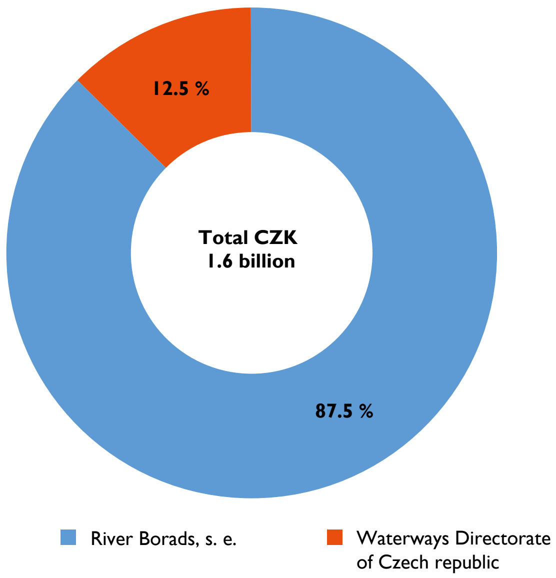
Source: MoA using data provided by the Ministry of Transport and River Boards, s.e.

The RIS COMEX project, a joint project of 13 European countries for implementation of harmonised corridor-based River Information Services, continued with the intensive implementation of national services connected to the central VisuRIS COMEX system and the new ERI CEERIS portal. Implementation of the upgrade of navigational charts and their display on the common D4D portal and the AIS coastal network was completed. Furthermore, other projects were underway such as implementation of the CAS emergency management support system, new navigational tool of reporting navigational conditions, the new united national ESB data collector transferring RIS data and launch of AIS ASM messages including shuttle ferry equipment.

River Boards, s.e., expended on operation and maintenance of water ways funds amounting to CZK 254 million in 2020, of which CZK 55 million was from their own sources and the remaining CZK 199 million from grants. The grants were in their entirety allocated from the State Transport Infrastructure Fund.

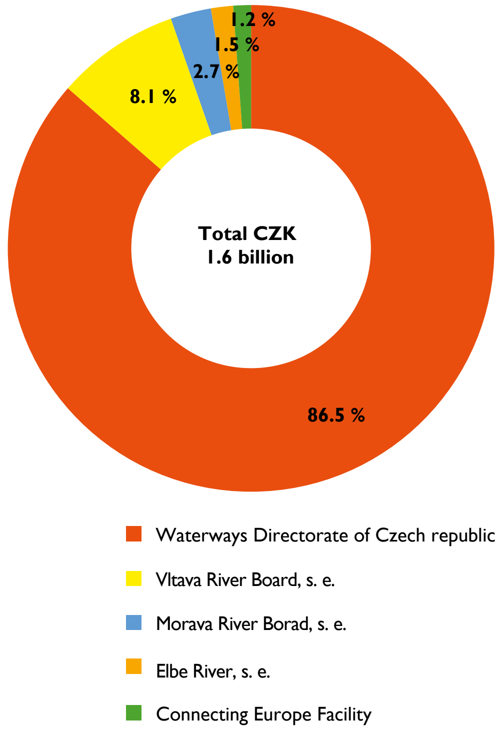
The Vltava, Elbe and Morava River Boards, s.e., also used funds for renovation, operation and maintenance of waterways under their authority. The funds from the STIF were of investment as well as of special-purpose non-investment nature. Non-investment funds amounted to CZK 209.5 million and investment funds to CZK 113.7 million in 2020.

Chart 9.1.3.2
Use of funds from the State Transport Infrastructure Fund in 2020



Source: MoA using data of Ministry of Transport and River Boards, s.e.

Chart 9.1.3.3
Funds spent on waterways significant in terms of transport through the Ministry of Transport in 2020



Source: MoA using data of River Boards, s.e. and the Ministry of Transport

The Střekov Lock (Elbe River Board)

Table 9.1.3.1
Waterways – selected projects by River Boards, s.e., in 2020

River Board, s.e.	Project	Total costs in millions of CZK	Funded by
Elbe	WS Kostomlátky – repair of the lock bed	10.07	STIF + own resources
	WS Lysá nad Labem – repair of the lower head bed	4.72	STIF + own resources
	LVC – guardrail repainting	4.07	STIF + own resources
Vltava	Vltava, 217,665 - 218,000 river km, left bank - Purkarec – bank fortification stabilization	1.94	STIF
	WS Vrané – repair of construction and propulsion device at LC	17.50	STIF + own resources
	WS Kamýk – general overhaul of LC device	1.91	STIF + own resources
Morava	Baťa Canal, Vnorovy - Veselí n. Mor, km 14,895 - 17,825, corridor reinforcement	25.97	STIF
	Anchorage for service vessels: Vnorovy I, Vnorovy II, Veselí n. M.	12.98	STIF
	Kunovský Forest Wharf	3.42	STIF

Source: River Boards, s.e.

Table 9.1.3.2
Financial funds expended by River Boards, state enterprises, on repair, maintenance, building, reconstruction and modernization and waterways administered in 2020

River Board, s.e.	Own resources	Purpose non-investment grants *)	Investment grants	Grants in total	Own resources and grants in total
	in thousands of CZK				
Elbe	32,317	23,676	2,040	**25,716**	**58,033**
Vltava	18,571	38,000	92,843	**130,843**	**149,414**
Morava	3,652	23,990	18,779	**42,769**	**46,421**
Total	**54,540**	**85,666**	**113,662**	**199,328**	**253,868**

Source: River Boards, s.e.
*Note: *) Grant provider – STIF*

9.2 Financial support from international cooperation and the EU

Projects focused on the area of water management in 2014–2020

The programme period 2007–2013 ended and is successfully followed by new programme period for 2014–2020. It consists of the following nine independent programmes:

Cross-border cooperation
- Interreg IVC Czech Republic - Poland
- Interreg IVC Slovak Republic - Czech Republic
- Interreg IVC Austria - Czech Republic
- Programme of transboundary cooperation Czech Republic - Free State of Bavaria (under the Objective of European Territorial Cooperation 2014-2020)
- Programme of cooperation Free State of Saxony - Czech Republic 2014–2020

National and inter-regional cooperation
- Interreg CENTRAL EUROPE
- DANUBE
- Interreg EUROPE
- URBACT III

Under these nine programmes, projects that contribute to improving the environment (natural and technological risks including the climate change and influence on water management, etc.) were submitted, approved and subsequently funded. 2020 was a year of full implementation of all the projects, while still several new projects focusing on the abovementioned issues were approved.

I. Programme of transboundary cooperation Czech Republic - Free State of Bavaria (under the Objective of European Territorial Cooperation 2014–2020)

1) *Joint research of natural substances from blue algae as a mode of cross-border scientific partnership / Gemeinsame Erforschung von Naturstoffen aus Blaualgen als Entwicklungsmodell der grenzüberschreitenden wissenschaftlichen Partnerschaft*

No. of partner(s) on the Czech side: 1
Partner's budget: Institute of Microbiology of the CAS, p.r.i.: EUR 897,107.40

Objectives: The objective of the project is interconnecting two significant workplaces and innovations from the given region, i.e. the ALGATECH Centre of the Institute of Microbiology of the CAS in Třeboň and Wissenschaftszentrum Straubing in Bavaria. The project is focused on joint research of cyanobacteria seen as a source of precious substances (high value products) while using other parts of the biomass grown. The Czech party shall bring in the joint project know-how in the sphere of mass cultivation of suitable organisms, methods of increasing production and methods of extraction of precious substances, whereas the Bavarian part endows the project with their experience of substance testing, technologies linked with further processing and testing the application potential. The target groups are research institutions of the partners, researchers and students.

2) *Silva Gabreta Monitoring – Implementation of cross-border monitoring of biodiversity and water regime, Silva Gabreta Monitoring – Realisierung eines grenzübergreifenden Monitorings von Biodiversität und Wasserhaushalt*

No. of partner(s) on the Czech side: 3
Partner's budget:
– Šumava National Park Administration: EUR 513,674.10
– Czech University of Life Sciences Prague: EUR 79,215.00
– Masaryk University: EUR 53,955.00

Objectives: The objective of the project is to create functional infrastructure for a cross-border monitoring network and conduct, for the first time in history, monitoring of forest, moor and water biodiversity in both national parks using standardized modern methods. Additionally, the project will allow for sharing and assessing data from a joint biodiversity databank. The results will become an important basis for further steps aimed at building closer relations in conservational management in the shared area of Czech-Bavarian Šumava. Cross-border application of standard methodical processes will allow for compiling a unified dataset that will be a valuable basis for improving conservationist and scientific collaboration between the two neighbouring national parks.

3) *Green infrastructure measures from multi-purpose use of waste sediments (green IKK) through cross-border interregional cooperation / Green Infrastructure Maßnahmen aus Klärschlamm-Kaskadennutzung (green IKK) mittels grenzüberschreitender interregionaler Zusammenarbeit*

No. of partner(s) on the Czech side: 2
Partner's budget:
– CHEVAK Cheb, a.s.: EUR 47,584.00
– Forestry and Game Management Research Institute, p.r.i.: EUR 124,854.50

Objectives: Creating instructions for multi-purpose use, development of measures concerning green infrastructure/ecosystem services intended particularly for organizations and companies in the target regions (e.g. fertilizer development from sediment nutrients, elimination of harmful substances contained in waste sediments/ashes), development of options how nutrients contained in sediments/ashes can be utilized, use of trace elements through nutrient management while adhering to principles of water protection, environmental and legal requirements, instructions of use for the given region, etc.

Environment protection – support for sustainable energies – thanks to sustainable, efficient, regional, decentralized, energetic use of waste sediments. Ensuring/restoring water quality thanks to retention/regaining nutrients and retention/elimination of organic and inorganic noxious substances such as heavy metals, polymers and others from waste sediments and wastewaters as well as from energetic use of the management of environmental risks through targeted reclamation of nutrients, in particular phosphorus, and retaining noxious substances with the aim of protecting waters, soil and air.

4) *Measures in the Kössein and Röslau Rivers aimed at mitigating the problem with mercury at the Skalka Water Reservoir, project No. 214*

No. of partner(s) on the Czech side: 1
Partner's budget:
– Ohře River Board, s.e.: EUR 37,725.29

Objectives: Water, sediments and fish in the Kössein, Röslau and Ohře Rivers are contaminated with mercury of anthropogenic origin. Sediments contained with mercury are deposited in the Skalka Water Reservoir. It has not been conclusively ascertained to what degree such sediments have on food chain in the water reservoir and on human use of the reservoir. Outcomes of an inquiry aimed at answering such questions will be risk analysis that will be conducted by the Czech partner. The risk analysis will serve the Bavarian partner as a background material for discussing remedial measures and will allow for defining priority of selected measures. Under the project, the Bavarian partner shall examine all possible measures in a feasibility study. The measures shall be assessed in terms of their efficiency, sustainability, costs and feasibility (with respect to technical and legal aspects including compliance with the Water Framework Directive). In case of long-term measures consisting in reinforcing long riverbank belts and bedrock and measures in valley meadows we can expect restrictions as some of the sites are considered European Significant Locations (EVL – Natura 2000). That is the reason why four or five measures shall be first implemented during common watercourse maintenance, while it will be tested in close cooperation with nature conservation authorities whether such measures can be considered environment-friendly.

4) *Green infrastructure measures from multi-purpose use of waste sediments (green IKK) through cross-border interregional cooperation, project No. 70*

No. of partner(s) on the Czech side: 2
Partners budget:
1) CHEVAK Cheb a. s. – EUR 47,584.00
2) Forestry and Game Management Research Institute, p.r.i. – EUR 124,854.50

Objectives: Establishing cross-border cooperation in the sphere of substance and energy use of municipal waste sediments (multi-purpose use). New processes and measures of green infrastructure shall be initiated in management of landscape care, in particular through nutrient reclamation and use of phosphorus. Furthermore, the project shall contribute to decreasing costs linked with disposal of waste sediments and thus minimize the burden to local economies by lowering sewerage charges.

5) Water - Wasser 2020, project No. 287

No. of partner(s) on the Czech side: 1
Partner's budget:
- Zelený poklad (meaning "Green Treasure") Foundation: EUR 125,409.40

Objectives: To motivate positively the target group to change the situation concerning issues linked with inefficient rainwater management. At the same time, it is necessary to develop and put into operation as soon as possible strategies of groundwater protection as it is jeopardized by the climate change (extreme droughts with severe impacts on humans, environment and nature). The projects are aimed at contributing to positive motivation and promote education of teachers, municipality representatives, public administration and municipality employees to tackle the impeding threat of insufficient water reserves in the future.

6) Granite and Water, Project No. 307

Newly approved project
No. of partner(s) on the Czech side: 2
Partner's budget
- The town of Planá – EUR 6,974.33
- Sokolov Muzeum, c.o. of the Karlovy Vary Region – EUR 91,949.27

Project description: The project creates sustainable transboundary value by preserving, making accessible, enhancing and connecting several of the most valuable geological and mountain-historical monuments of the Czech-Bavarian borderland. Sustainability of the monuments is ensured on two levels through awareness-raising and research activities leading to information preservation and raising awareness of the value of geological monuments and through promotion of environment-friendly tourism. The monuments in question are located on the granite bedrock of the Moldanubik, which runs from Bohemia to Bavaria, and they represent different aspects of how the granite bedrock visibly influences life and economy in the area: Flossenbürg (granite mining / building material), the Jeroným Mine (granite, ore resource / establishment of mining settlements) and Planá (granite and groundwaters). The sites form an imaginary diagonal through the transboundary geopark area and thus connect the hitherto unappreciated peripheral areas of the geopark. The project will preserve both tangible industrial and cultural heritage and intangible heritage through studies of stonework and mines with the view of finding water.

I. Interreg V-A Austria – Czech Republic

1) Project No. ATCZ7 – Dyje 2020

No. of partner(s) on the Czech side: 2
Partner's budget:
- Morava River Board, s.e.: EUR 1,877,494.45
- T. G. Masaryk Water Research Institute, p.r.i.: EUR 55,250.00

Objectives: The main objective of the project is to create a scientific, methodological and personnel basis for coordinated development of the region and achieving the desired quality of environment and ecosystem services in the borderland region. Ten cross-border vehicles aimed at harmonizing monitoring and assessment of watercourse situation, support for fish population development and improvement of watercourse morphology shall be established.

2) Project No. ATCZ37 – Support for natural environment and occurrence of freshwater pearl mussel in the Malše River Basinlše

No. of partner(s) on the Czech side: 4
Partner's budget:
- Ministry of the Environment: EUR 220,150.00
- T.G. Masaryk Water Research Institute, p.r.i.: EUR 458,437.30
- Nature Conservation Agency of the Czech Republic: EUR 138,268.70
- South Bohemia: EUR 42,494.45

Objectives: The objective of the project is to enhance population of critically threatened freshwater pearl mussel in the borderline part of the Malše River by introducing young freshwater pearl mussels to the river, describing the exact causes why the animal does not reproduce successfully in the location and create conditions for improving water cleanness and reducing erosion in the entire international river basin.

3) Project No. ATCZ163 – Schwarzenberg Navigational Canal / Bavarian Water Meadow

No. of partner(s) on the Czech side: 3
Partner's budget:
- Military forests and assets of the Czech Republic, s.e.: EUR 2,038,369.32
- Forests of the Czech Republic: EUR 789,381.09
- Šumava National Park Administration – strategic partner

Objectives: The main outputs of the project will include assessment of a part of the Schwarzenberg Navigational Canal that is a heritage of international importance and improving its accessibility to the general public. Furthermore, the project will focus on improving accessibility to and potential of the Bavarian Water Meadow (a peat bog) and opening an educational wheelchair accessible trail to the Bavarian Water Meadow so that visitors have the chance to see the peat bog and the importance of environment conservation. Hydrological remediation of the peat bog will be necessary.

4) Project No. ATCZ167 – Hydrothermal potential of the region

No. of partner(s) on the Czech side: 2
Partner's budget:
- Masaryk University: EUR 738,662.00
- Ministry of the Environment – strategic partner Project under implementation.

Objectives: To describe occurrence of thermal waters in a comprehensive geoscientific model and assess their possible use together with conflicts in use. On the basis of achieving the best knowledge possible of the occurrence of thermal waters in the region, strategies and specific measures and/or tools for future management of such resources should be developed in cooperation with decision-making authorities and regional stakeholders. This includes harmonization of administrative procedures, proposals of establishing a joint legal framework and institutional tools. The project deals with the issue of origin, capacities and possible use of cross-border water in the Laa – Pasohlávky region.

5) *ATCZ86 – Innovative technologies for monitoring of water and microbiological parameters in the water ecosystem*

New project
No. of partner(s) on the Czech side: 2
Partner's budget:
- Brno University of Technology: EUR 267,403.91
- Regional Hygienic Station of the South Moravia Region in Brno – strategic partner

Objectives: Protection and improvement of the aquatic ecosystem by measures aimed at monitoring technical and microbiological parameters of water and improve water quality. To this end, necessary competencies and a basis for innovation will be created in the region. The innovative step consists in a more comprehensive use of real-time sensors for monitoring physical, chemical and microbiological parameters for water quality assessment.

6) *ATCZ236 – Impacts of the climate change on the Dyje River Basin*

New project no. of partner(s) on the Czech side: 4
Partner's budget:
- Czech Hydrometeorological Institute: EUR 39,253.51
- Institute of Global Change Research CAS of the Czech Republic, p.r.i.: EUR 52,875.00
- T. G. Masaryk Water Research Institute, p.r.i.: EUR 51,313.00
- Morava River Board, s.e.: EUR 31,010.88

Objective: Examine impacts of the climate change on the water balance in the Dyje River Basin until 2050 in order to develop a proposal for a mutually coordinated "emergency" management regulations based on the findings. In this respect, it is necessary to estimate the water balance and compare it with expected water demand in future. Based on the results, the project will develop dry season management measures in mutual agreement between the two parties.

Programme of cooperation Free State of Saxony - Czech Republic (under the Objective of European Territorial Cooperation 2014-2020)

1) *Project No. 100266035 – Vita-Min*

No. of partner(s) on the Czech side: 1
Partner's budget:
- Ústí: EUR 493,241.40

Objective: Improving water quality and situation concerning groundwaters and surface waters in the Bohemian-Saxony borderland. For this purpose, it is necessary to take measures in the sphere of monitoring and reduction of harmful substances and remediation of water bodies and soils.

2) *Project No. 100272124 – Flood measures in the Vilémovský Stream River Basin - Sebnitz – feasibility study*

No. of partner(s) on the Czech side: 1
Partner's budget:
- Ohře River Board, s.e.: EUR 124,196.90

Objective: Improving flood protection in the Vilémovský Stream River Basin near the town of Sebnitz. Such measures will protect population and material assets more effectively in case of floods. The study consists, in particular, in analysing and proposing measures aimed at protecting the town of Sebnitz and other areas near the watercourse in case of floods while taking nature conservation and economy into consideration.

3) *Project No. 100320948 – TraboRiMa – Cross-border integrated administration of the Mandava River*

No. of partner(s) on the Czech side: 2
Partner's budget:
- T. G. Masaryk Water Research Institute, p.r.i.: EUR 545,380.64
- Czech Technical University: EUR 174,906.00

Objective: Coming up with a proposal of a sophisticated system for administrating the Mandava River (a borderline watercourse) and its tributaries with a view of improving and creating new environmental habitats together with sustainable flood risk management. The project focuses on systemic implementation of the EU Water Framework Directive (2000/60/EC) and the EU Floods Directive (2007/60/EC) in the Mandava River and its tributaries.

Programme Interreg V-A Czech Republic – Poland

1) *CZ.11.2.45/0.0/0.0/15_003/0000266 – AQUA MINERALIS GLACENSIS*

No. of partner(s) on the Czech side: 2
Partner's budget:
- City of Náchod: EUR 622,917.00 from the ERDF
- City of Hronov: EUR 534,803.97 from the ERDF

Objective: Creating a Czech-Polish circuit trail capitalizing on the potential of unique mineral waters. The project addresses harnessing the potential of mineral waters through element renovation and relevant buildings in order to attract tourists and boosting economic growth and employment in the Kłodzko region that has very high occurrence of mineral and curative springs.

Program Interreg V-A Slovak Republic – Czech Republic

1) *D168 – Živé břehy "Live Riverbanks" – joint protection of river ecosystems*

No. of partner(s): 1
Partner's budget:
– Krok Kyjov, i.o.: EUR 211,034.41

Objectives:The project focuses on monitoring, research, protection and practical management of target animal species fixed to riverbanks and shores and to pollard willows. It concerns, in particular, the following protected species: sand martin, common kingfisher, common merganser and hermit beetle. These species are so-called "umbrella species", meaning their protection ensures protection of varied communities of other endangered species. The main objectives of the project lie primarily in detailed and profound understanding of the mentioned species and their biotopes. Appropriate biotope management will improve conditions for such species. The project strives for raising awareness of such species and their biotopes on the part of general public.

2) *S251 – Fighting together water erosion and wetland drying up*

Newly approved project no. of partners: 1
Partner's budget:
– Partner's budget: Czech Union for Nature Conservation, Valašské Meziříčí unit: EUR 160,519.88

Objectives: The project focuses on measures aimed at wetland protection by building an international expert team and on practical measures taken at dozens of locations in the Czech and Slovak Republic. Such measures are aimed at monitoring of the erosion process and compiling a joint plan of measures at the support and protection of wetlands.

Programme Interreg EUROPE

1) *Water Technology Innovation Roadmaps (PGI05062 – iWATERMAP)*

No. of partner(s) on the Czech side: 1
Partner's budget
– CREA Hydro&Energy, i. o.: EUR 122,650.00

Objectives: The project is focused on support for innovative policies in water management sectors and thus contributed to an increase in the critical amount of innovative ecosystems in partner regions. The general objective of the project is to improve innovative policies with the view of boosting critical mass development of innovative ecosystems in the field of water technologies.

2) *Water reuse policies advancement for resource efficient European regions (PGI05592 – AQUARES)*

No. of partner(s) on the Czech side: 1
Partner's budget:
– Partner's budget: Regional Development Agency of the Pardubice Region: EUR 143,860.00

Objectives: Water reuse is a key method of supporting the efficiency of water in parts of Europe where resources are rare and capitalize on opportunities linked with the expanding water market and thus mitigating pressure on wetlands and coastal regions of Europe. The strategic plan for European innovative partnership for water was introduced for the purpose of efficient water management in Europe where lack of water affects 11% of the population. In this connection AQUARES will support: determining of viable strategies for water reuse, dealing with inefficient use of water and others.

Programme Interreg DANUBE

1) *Reducing the flood risk through floodplain restoration along the Danube River and tributaries (DTP2-003-2.1Danube Floodplain)*

No. of partner(s) on the Czech side: 1
Partner's budget:
– Morava River Board, s.e.: EUR 151,407.50

Objectives: The main output of the project will be improvement and sustainability of supranational flood risk management in the Danube River Basin. The project will enhance a harmonized approach to the protection and restoration of riparian meadows, consensus of local stakeholders in the question of priority measures and broader public support for integrating flood management with protection and restoration of flood areas.

2) *Drought Risk in the Danube Region (DTP1-182-2.4 DriDanube);*

No. of partner(s) on the Czech side: 1
Partner's budged:
– Global Change Research Institute CAS, p.r.i.: EUR 179,000.00

Objectives: Lack of water and drought often affected the Danube Region and economy and wellbeing of the local people. Despite damage caused by drought in the past decades, it is still not considered a high-priority issue. The main objective of the projects is to increase the capacity of the Danube Region and tackling drought-related risks. The objective was identified as an answer to problems linked with the process of drought monitoring as well as in the actual systems of drought management.

Program Interreg CENTRAL EUROPE

1) *Integrated Approach to Management of Groundwater Quality in Functional Urban Areas (Amiiga - CE32)*

No. of partner(s) on the Czech side: 2
Partner's budget:
– City of Nový Bydžov: EUR 159,681.50
– Technical University of Liberec: EUR 235,219.60R

Objectives: The project addresses especially groundwater contamination from brownfields, an issue that states of Central Europe have in common. AMIIGA provides a well-balanced combination of technical, research, management and expert know-how that is shared and transferred in order to approach the issue of groundwater contamination in an all-embracing manner.

2) *Integrated Heavy Rain Risk Management (Rainman - CE968)*

No. of partner(s) on the Czech side: 2
Partner's budget:
– T. G. Masaryk Water Research Institute: EUR 201,170.00
– South Bohemia: EUR 72,380.99

Objectives: The main objective of the project is to improve integrated management capacities of public authorities with the aim of mitigating risks of heavy rains, implementation of warning infrastructure in the affected regions. Partners from six countries develop, in a joint effort, methods focused on actual situation and new tools of reducing casualties and damage caused by heavy/torrential rains.

3) *Increased renewable energy and energy efficiency by integrating, combining and empowering urban wastewater and organic waste management systems (CE946 – REEF 2W)*

No. of partner(s) on the Czech side: 2
Partner's budget:
- University of Chemistry and Technology: EUR 172,533.25
- VEOLIA: EUR 207,634.25

Objectives: The main purpose of the project is to increase energy efficiency and production of renewable energy in public infrastructures.

4) *Enhancing environmental management capacities for sustainable use of the natural heritage of Central European SPA towns and regions as the driver for local and regional development (CE1308 HealingPlaces)*

Newly approved project no. of partner(s) on the Czech side: 1
Partner's budget:
- Mendel University in Brno: EUR 22,948.38

Objectives: The project focuses on sustainable development of spa while protecting unique groundwater resources that form its core. The objective will be achieved by increasing knowledge and raising awareness of the impact that various factors have on groundwater reservoirs and by building multi-level and multi-territorial models for management of valuable natural spa resources. The decisive element of the project will be development of a joint, innovative online tool for assessing threats and pressures on mineral and hot water reservoirs. HealingPlaces will design, test and implement innovative solutions for sustainable management with mineral water in spas via various participatory models.

5) *Board for Detection and Assessment of Pharmaceutical Drug Residues in Drinking Water - Capacity Building for Water Management in CE (CE1412 boDEREC-CE)*

Newly approved project no. of partner(s) on the Czech side: 1
Partner's budget:
- Czech University of Life Sciences Prague: EUR 33,290.24

Objectives: Recent research has shown that the aquatic environment from which we produce drinking water in Europe contains anthropogenic substances that were unknown just a few years ago. The boDEREC-CE project defines an innovative approach by implementing pilot sites in Central European countries for monitoring emerging contaminants (ECs), mainly pharmaceuticals and personal care products (PPCPs). Thus, boDEREC-CE focuses not only on studying PPCP behaviour, but special attention is paid to assessment of mitigation effectiveness of this specific type of contamination by different types of technological treatments of drinking water: the main output are innovative decisions based on a model that can be used as an early warning tool with respect to future legal limits. This tool will be tested in waterworks under different conditions. At the same time, a campaign informing the general public about measures how to reduce (excessive) use of PPCPs will be launched.

The Flood Control Measures, polder (Source: Forests of the Czech Republic)

Jan Chain Krejci (Source: www.shutterstock.com)

10. LEGISLATIVE MEASURES

10.1 Water Act and implementing regulations

In 2020, the Water Act was amended by on direct and one indirect amendment.

Act No. 544/2020 Coll., amending Act No. 254/2001 Coll., on waters and amending some acts (the Water Act), as amended, and other relevant acts.

The direct amendment consists in Act No. 544/2020 Coll., amending Act No. 254/2001 Coll., on waters and amending some acts (the Water Act), as amended, and other relevant acts, promulgated in the Collection of Laws with effect as of 1 February 2021. The amendment amends in new Title X "Coping with drought and lack of water" operational management in periods of drought and lack of water.

The amendment defines terms "drought" and "water scarcity", introduces the obligation to draw up drought and water scarcity management plans for the Czech Republic and for its regions, defines content of the plan, priorities of water use for the purposes of the proposed measures and the method of preparing and discussing the plan. It also defines authorities responsible for drought and water scarcity management and their competences, establishes drought forecasting services and establishes the procedure for issuing measures in case of water scarcity. Drought and water scarcity management commissions (drought commissions) shall be established for regions and the whole of the Czech Republic. Regional drought commissions shall declare and call off a water shortage situation and issue measures. The central drought commission shall, in particular, coordinate measures whose impacts reach over regional boundaries.

Another significant change introduced by the amendment is that a licensee with the permit to abstract surface water or groundwater in a total volume of at least 1,000 m^3/year or 100 m^3/month will be obliged to measure the volume of water abstracted and submit the measurement results to the river basin administrator as of 2022. The provision concerning technical and safety supervision of water structures was complemented with rights and obligations/procedures that had previously been regulated only by methodological guidelines. New type of records of technical and safety monitoring was introduced together with the obligation to comply with it. Any non-functioning water structure can now be removed for the purpose of restoring the natural channel of a watercourse only upon the owner notifying the relevant water authority.

Act No. 544/2020 Coll. also amended several other laws. In addition to the amendment to the Water Supply and Sewerage Act, which is described in more detail in Chapter 10.2, they are the following:

Act No. 97/1993 Coll., on the competence of the Administration of State Material Reserves, as amended

The amendment regulates the conditions for provision and use of state material reserves in order to deal with emergencies in connection with declaration of a water shortage. The State Material Reserves Administration will be able to provide the state material reserves free of charge for the needs of an administrative authority, a territorial self-governing body or fire rescue service.

Act No. 240/2000 Coll., on the Crisis Procedure and the Amendments to Certain Acts (Crisis Act), as amended

If a state of emergency is declared during a water shortage period, the relevant crisis staff and the drought commission shall meet together; the powers of the drought commission not being affected by the declaration of a state of emergency. The same shall apply to the crisis staff and the flood commission during floods.

Act No. 334/1992 Coll., on Protection of Agricultural Land Resources, as amended

It is now stipulated that consent of an agricultural land resource protection authority is not required for withdrawal of agricultural land for a significant landscape element. It is complemented that levies for permanently withdrawn land are not required for retention basins and ponds.

Act No. 258/2000 Coll., Act No. 258/2000 Coll., on Protection of Public Health and the Amendments to Certain Related Acts, as amended

With effect as of 1 January 2022, definition of drinking water is introduced and methods of its use are specified. The implementing regulation, which the Ministry of Health is empowered to issue, shall determine the required degree of drinking water treatment and hygienic security and the method of proving it.

Act No. 403/2020 Coll., amending Act No. 416/2009 Coll., on Accelerating Construction of Transport, Water, Energy and Electronic Communications Infrastructure, as amended, and other related laws

This indirect amendment to the Water Act amended the provisions of Section 108 of the Water Act by extending the jurisdiction of the MoA and the MoE in issuing opinions concerning the land development plan.

10.2 Act on Public Water Supply and Sewerage Systems

In 2020, there was no direct amendment to Act No. 274/2001 Coll., on Water supply and sewerage systems for public use and on amendments to certain relevant acts (the Act on Water Supply and Sewerage Systems). An indirect amendment to the Act on Water Supply and Sewerage Act was made by Act No. 544/2020 Coll., amending Act No. 254/2001 Coll., on waters and amending some acts (Water Act), as amended, and other related acts.

The amendment expands the capacity of a water supply system operator to interrupt or restrict supply of drinking water without prior notice if, in a period of water shortage, the operator is regulated, restricted, or prohibited from using water by the drought commission. The drought commission, same as any water authority, may now temporarily restrict use of drinking water from the public water supply for public needs. In such a case, customers have the duty to allow their water suppliers access to their water meters. Penalties for breach of the new obligations are also stipulated.

Decree No. 428/2001 Coll., which implements the Water Supply and Sewerage Act, did not undergo any changes in 2020. With regard to the deferred entry into force of certain provisions of this Decree, Annexes No. 1 to 8 concerning property and operational records, Annex No. 18 regulating the Financing Plan for Renovation of Water Supply and Sewerage Systems and Annex No. 20 regulating the form "Comparison of all items of calculation of prices for water and sewerage for a calendar year and the actual prices achieved in the same year" entered into force as of 1 January 2020.

Methodological Instruction of the Ministry of Agriculture No. 9353/2020-15132 for the preparation and documentation of the implementation of the Financing Plan for Renovation of Water Supply and Sewerage Systems entered into force on 3 April 2020. The methodological instruction was prepared with a view of ensuring sustainability of water supply and sewerage systems for public use and is published on the MoA website. At the same time, an annex to this methodological guideline was published, namely a filled specimen of the Financing Plan for Renovation of Water Supply and Sewerage Systems as per Annex No. 18 of Decree No. 428/2001 Coll.

Methodological Instruction No. 14000/2020-15132-1 concerning indicators for calculating the purchase (updated) price of items for the Selected Data from the Property Register of Water Supply and Sewerage Systems, for the Water Supply and Sewerage System Development Plans and for the Financing Plan for Renovation of Water Supply and Sewerage System entered into force on 24 September 2020. This methodological instruction replaces Methodological Instruction for indicative indicators for the calculation of the acquisition (updated) price of objects No. 401/2010-15000 of 20 October 2010. The prices indicated in this Methodological Instruction are based on the 2019 price level, while the age of facilities is not reflected in the calculation of reproduction purchase price of assets. The Methodological Instruction is published on the website of the Ministry of Agriculture.

10.3 Audits of the execution of public administration in water management

The Ministry of Agriculture and the Ministry of the Environment are entrusted with the exercise of supreme state supervision by Act No. 2/1969 Coll., on Establishing Ministries and Other Institutions of Central Government of the Czech Republic, as amended, through the provisions of Section 111 of Act No. 254/2001 Coll., on waters and amending some acts (the Water Act), as amended, and other relevant acts.

Audits of regional authorities are conducted in accordance with Government Resolution No. 689 of 11 September 2013 on Planning, Assessment and Coordination of Audits of the Exercise of Delegated and Independent Competence of Territorial Self-Government Units by Central Administrative Authorities, Regional Authorities, the Prague City Hall and the Municipalities of Territorial Statutory Cities. The Ministry of the Interior of the Czech Republic prepared a three-year audit plan for regions and the Capital City of Prague for 2020–2022. The number of audits conducted in 2020 was significantly reduced compared to the plan due to the pandemic situation and related government measures.

Ministry of Agriculture

Auditing of the execution of delegated powers in water management is carried out within the organizational structure of the Ministry of Agriculture by the Department for State Administration in Water Management and for River Basin Administration as the central water authority. In 2020, the MoA conducted only eight audits (because of the COVID-19 pandemic), of which three at regional water authorities and five at municipal water authorities with extended powers.

Table 10.3.1

Audits of the execution of state administration carried out by the Ministry of Agriculture in 2020

Region	Date of audit
Central Bohemia	12/02 2020
Ústí	23/06 2020
Hradec Králové	30/06 2020

Source: MoA

Beyond the scheduled audits of regional water authorities that are performed outside the summer months, audits of the execution of the agenda of the water authorities of municipalities with extended powers were also carried out in the period from March – November. These audits inspected activities of 20 municipalities with extended powers performing the function of the water authority.

Audits carried out by the Ministry of Agriculture focus primarily on implementation of the Water Act in cases in which the powers of central water authority are exercised by the Ministry of Agriculture, and regulations issued pursuant to this Act; the Public Water Supply and Sewerage Act, as amended, and regulations issued pursuant to this Act; Act No. 106/1999 Coll. on Free Access to Information, as amended, Act No. 500/2004 Coll., Code of the Administrative Procedure, as amended; and Act No. 183/2006 Coll., on Land-Use Planning and Building Code (the Building Act), as amended, and its implementing legal regulations. Audits at regional offices focused on adherence to the provisions of

Section 67(1)(a,b,c and e) of Act No. 129/2000 Coll., on Regions (Establishment of Regions), as amended; and at regional offices with extended powers on adherence to the provisions of Section 61 of Act No. 128/2000 Coll., on Municipalities (Establishment of Municipalities), as amended.
Beyond the abovementioned scope, audits also focused on the way how water authorities operate, involving their personnel, material and organizational background, especially in terms of qualification and experience of their staff.

Randomly chosen files were examined during each audit. The MoA makes a report of each inspection, including description of any irregularities found. Based on audits carried out it can be concluded that the exercise of the delegated powers of regional authorities in the field of water management is consistently on a high level. Another positive aspect are the continuing efforts of regional water authorities to provide detailed methodological guidance for offices within their copin. None of the entities audited were required to adopt remedial actions, the shortcomings identified were mainly of formal nature and did not result in invalidity of the decisions vetted.

The Ministry of Agriculture uses findings from audits at water authorities as feedback that not only helps deepen mutual communication at all levels of administrative hierarchy, but it is very useful for the Ministry of Agriculture to become acquainted with the regional and local water management issues. Audit findings are subsequently applied in the methodological guidance for water authorities. Findings concerning the application of regulations within the competence of the Ministry of Agriculture together with water management issues are annually presented at a work meeting of the MoA Water Management Department with water authorities. Representatives of the MoA present their findings from audits also at meetings of regional offices with their subordinate water authorities.

Ministry of the Environment

Supervision of the execution of the delegated powers in water management sector is annually carried out, as part of supreme water management supervision, by the Ministry of the Environment as the central water authority through the Departments for Execution of State Administration. Only two audits were conducted in 2020: adherence to the plan was not possible due to restrictions resulting from the COVID-19 pandemic. One audit at a water authority and one at the Czech Environmental Inspection. Supervision at the Czech Environmental Inspection and at municipalities with extended powers (water authorities) was prepared in accordance with the supervision plan of the MoE OVSS I–IX for 2020.

Supervision activity is an essential element of verifying the level of state administration execution, its purpose is to supervise how lower administration authorities (regional authorities, water authorities and the CEI) carry out state administration in the entrusted sphere of water management, how they implement provisions of the Water Act and regulations issued under it. In particular, supervision focuses on correct application of legal regulations, relevant statutory provisions and compliance with Act No. 500/2004 Coll., the Administrative Procedure Code, as amended. Audits also focus on the way how performance of water authorities is ensured, officials' qualification and experience, work organisation and equipment of organisational units.

The purpose of supreme state supervision consists primarily in eliminating irregularities of a systemic nature. In individual cases, wrong decisions may be rectified by means of an extraordinary remedy (review of the decision in a review procedure, reopening of the proceedings).

Supervision of performance of delegated competences by regional water authorities in the field of water management was not conducted in 2020 due to pandemic restrictions and the four planned audits at regional authorities were postponed to 2021.

Auditing water authorities is a minor part of the inspection activities performed by the MoE. In 2020, only one audit of a municipality with extended powers was carried out. Audits detected only formal deficiencies which did not affect validity or lawfulness of the administrative acts issued and were discussed and remedied.

One audit was carried out by the CEI within the framework of supreme water administration supervision, which also found only formal deficiencies and no corrective measures had to be taken.

Based on the conclusions of the audits carried out within supreme water supervision by the departments for the execution of state administration under the MoE it can be concluded that the exercise of the delegated powers in the field of water protection performed by regional authorities, water authorities and the Czech Environmental Inspection audited in 2020 is at a very good level, the decisions issued contain the particulars required by the Code of the Administrative Procedure and references to the relevant provisions of the Water Act. The methodologies and guidelines of the Ministry of the Environment are respected in the proceedings and decision-making. Positively assessed are also supervisory activities of the regional authorities and methodical guidance provided to lower-level water authorities, which in turn is positively reflected in the fact that none of the water authorities audited in 2020 were imposed remedial measures.

The Stanovice Reservoir (Source: Ohře River Board)

Lonely in the Water (Author: Šimečková Veronika)

II. PRIORITY TASKS, PROGRAMMES AND KEY DOCUMENTS IN WATER MANAGEMENT

II.1 Planning concerning waters

In 2020, preparation of the third phase of river basin management planning for 2021–2027, consisting in review and update of existing river basin plans resulting to completion of new river basin plans, continued. Processing of draft plans for flood risk management continued under the second implementation cycle of the Floods Directive. At the same time, implementation of measures resulting from currently valid river basin plans and plans for flood risk management was underway.

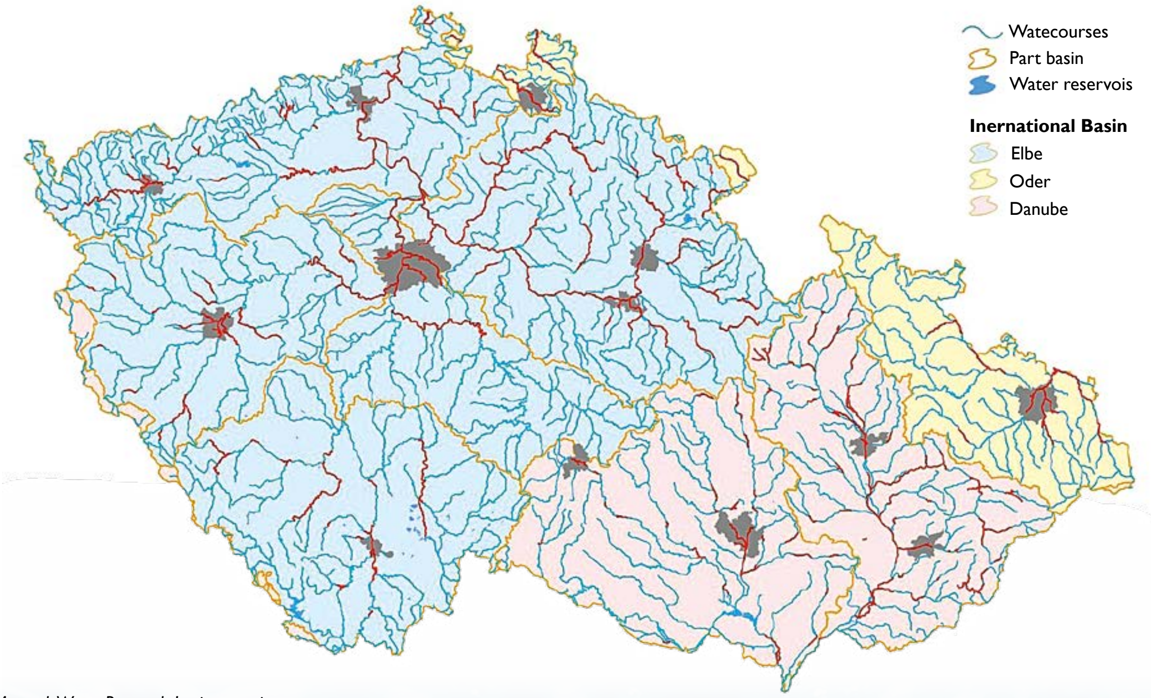
As part of the preparation of the third stage in water planning, the Preliminary Overview of Significant Water Management Problems identified in international parts of the Elbe/Oder/Danube River Basins in the Czech Republic was completed in accordance with legislative requirements. At the national level, three significant impacts of human activity, meaning significant problems concerning water management, were identified for surface waters (i.e. significant substance pollution, hydromorphological changes and drought and potential water scarcity) and two (three in the Elbe River Basin) for groundwaters (significant substance pollution, drought and potential water scarcity); additionally, a group of significant human activity impacts classified as "others" was identified in the Elbe River Basin that includes impacts of drilling, mining and non-water abstraction.

At the same time, significant advancement was made towards completion of the draft plans for flood risk management (the Elbe, Oder, Danube) as part of implementing the Floods Directive and completion of draft plans for national river basins (Elbe, Oder, Danube) together with draft plans for partial basins (Upper and Middle Elbe; Upper Vltava; Berounka; Lower Vltava; Ohře, Lower Elbe and other tributaries of the Elbe; Upper Oder; Lusatian Neisse and other tributaries to the Oder; Morava and tributaries to the Váh; Dyje; and other tributaries to the Danube), which were subsequently open for six months for any observations on the part of water use and the general public as of 18 December 2020 (until 18 June 2021).

The Orlík Reservoir, The Low Level (Source: Vltava River Board)

The current and general information about the process of planning in the field of waters, including materials and minutes from meetings of the Committee for Water Planning, is available to the general public on the website of the MoA (www.eagri.cz) with links to the MoE website and river basin administrators. For the purpose of implementing the Flood Guideline, the Flood Information System (www.povis.cz) is used as a communication platform.

Figure II.1.1
Defining areas with significant flood risk for the 2nd planning cycle under the Floods Directive



Source: T. G. Masaryk Water Research Institute, p.r.i.

Figure 11.1.2
Look at a map application showing flood risk

Source: MoE

11.2 Development plans for water supply and sewerage systems

The National Development Plan for Water Supply and Sewerage Systems in the Czech Republic, prepared pursuant to Section 29(1)(b) of Act No. 274/2001 Coll., on Water supply and sewerage systems for public use and on amendments to certain related laws, as amended, is placed on the website of the Ministry of Agriculture.

Development plans for water supply and sewerage systems in the Czech Republic (the National Development Plan for Water Supply and Sewerage Systems, the Regional Development Plans for Water Supply and Sewerage Systems) including their updates represent a medium-term, constantly updated concept in the sector of water supply and sewerage systems.
The Regional Development Plans for Water Supply and Sewerage Systems in the Czech Republic are the basis for the use of the European Community funds and national financial resources for the construction and renewal of water supply and sewerage system infrastructure. Therefore, one of the obligations of each applicant requesting the provision and use of the state financial support is to demonstrate the compliance of the submitted technical and economic solution with the valid Regional Development Plan for Water Supply and Sewerage Systems.

The National Development Plan for Water Supply and Sewerage Systems in the Czech Republic is based on a synthesis of information from the Regional Development Plans for Water Supply and Sewerage Systems, including their updates, which were prepared, discussed and approved by the councils of regional authorities. It follows up with other strategic documents and departmental policy documents and also respects the requirements resulting from the relevant regulations of the European Communities. The National Development Plan for Water Supply and Sewerage Systems in the Czech Republic also includes standpoints of the Ministry of Agriculture issued to each of the updates of the Regional Development Plans for Water Supply and Sewerage Systems.

The National Development Plans for Water Supply and Sewerage Systems in the Czech Republic also defines general objectives and main principles of government policy for ensuring long-term public interest in the field of water supply and sewerage system in the Czech Republic, i.e. sustainable use of water resources and water management while adhering to requirements for water management service (drinkable water supply, sewerage and cleaning of waste waters).

Pursuant to Section 29(1()c) of the aforementioned Act, the Ministry of Agriculture continued to issue statements for the approved and effective Development Plans for Water Supply and Sewerage Systems in the Regions of the Czech Republic, relating to the proposed updates of the technical solutions for drinking water supply and waste water sewerage and treatment.

In 2020, 248 statements were issued. In total for the period 2006–2020, the Ministry of Agriculture issued 8,231 statements, which accounts for approximately 48% of municipalities and local districts of municipalities in the Czech Republic out of 17,166 processed in the National Development Plan for Water Supply and Sewerage Systems in the Czech Republic and in the Regional Development Plans for Water Supply and Sewerage Systems.

In 2020, the National Development Plans for Water Supply and Sewerage Systems in the Czech Republic and in the Regional Development Plans for Water Supply and Sewerage Systems continued to be updated, focusing particularly on drought and that will contain possible proposals of specific measures implemented in the existing water management systems (namely reviews of the current capacities, proposal of new or extension of existing facilities, connecting existing and/or new facilities, proposal of drinkable water optimization in periods of drought) including costs calculation linked with such measures.

Such updates of the National Development Plans for Water Supply and Sewerage Systems in the Czech Republic were implemented in accordance with Government Resolution No. 620 of 29 July 2015 as performance of C3 task “Review of functionality of interconnection and ensuring new possible interconnections of water supply systems during drought”. In 2020, the second stage or works and activities focuses particularly on the SEA processed continued.

The National Development Plans for Water Supply and Sewerage Systems in the Czech Republic are used by the Ministry of Agriculture, the Ministry of the Environment, the regional authorities, municipalities with extended powers (water authorities), municipalities, owners and operators of water supply and sewerage systems as well as by special communities and the general public.

11.3 Programmes and measures aimed at reducing surface water pollution

Construction projects for water quality protection completed in 2020

The most significant projects concerning sources of pollution with more than 2,000 equivalent population, two new municipal wastewater treatment plants and one new industrial wastewater treatment plant were completed in 2020, while other wastewater treatment plants were reconstructed and/or expanded.

Table 11.3.1
New and renovated wastewater treatment plants with capacity over 2,000 PE (new, renovated or expanded in 2020)

State	Wastewater treatment plants	Location	Capacity	Nitrification	Denitrification	Chemical removal of phosphorus
				YES/NO	YES/NO	YES/NO
new	industrial	Leco&CO - Ing. Jiří Lenc, s.r.o., Jirny - WWTP	9,950	YES	YES	YES
	municipal	Mirotice	2,000	YES	YES	YES
		Nové Strašecí	7,000	YES	YES	YES
renovated/expanded	municipal	Nehvizdy **)	7,000	YES	YES	YES
		Králíky	5,665	YES	YES	YES
		Úpice	5,500	YES	YES	YES
		Bakov nad Jizerou	5,000	YES	YES	YES
		Dřísy	4,000	YES	YES	YES
		Jirny *)	3,300	YES	YES	YES
		Radim	2,500	YES	YES	YES
		Obříství	2,200	YES	YES	YES
		Bělkovice – Lašťany	2,600	YES	YES	YES
		Olšany u Prostějova *)	3,000	YES	YES	YES
		Lysice	2,500	YES	YES	YES
		Osnice	3,000	YES	YES	YES
		Bechyně*)	7,500	YES	YES	YES
		Nupaky	2,700	YES	YES	YES
		Unhošť	2,500	YES	YES	YES
		Řevnice	4,800	YES	YES	YES
		Holubice	2,762	YES	YES	YES
		Svazek obcí Cecemínsko *)	7,500	YES	YES	YES
		Čerčany *)	5,000	YES	YES	YES
		Měřín *)	3,565	YES	YES	YES
		Radim *)	2,500	YES	YES	YES
		Ronov nad Doubravou *)	2,500	YES	YES	YES
		Ruda nad Moravou *)	3,000	YES	YES	YES
		Smidary *)	2000	YES	YES	NE
	industrial	Huhtamaki	9,000	YES	YES	NE
		Praha - Miškovice subsidiary WWTP	31,650	YES	YES	YES
	industrial and municipal	Olšany nad Moravou, OP Papírna	38,000	YES	YES	NO

Source: SEF, River Boards, s.e.
*Note: *) WWTP with support from the SEF*
***) WWTP with support from the MoA*

Action Programme under Directive of the Council 91/676/EEC (Nitrates Directive)

In 1991, Council Directive 91/676/EEC on the protection of waters against pollution caused by nitrates from agricultural sources, the Nitrates Directive, was adopted. In the Czech Republic, this directive is implemented in the act on fertilizers, the water act and Government Resolution No. 262/2012 Coll., on defining vulnerable areas and the action programme. Vulnerable areas are locations where contamination of underground waters and surface waters with nitrates exceeded or could exceed the defined threshold of nitrate concentration of 50 mg/l. As required by the Nitrates Directive, vulnerable areas were identified in 2003 and are reviewed once in 4 years since. The latest, i.e. fourth, revision of the designation of vulnerable areas was carried out in 2019 and was announced by Government Resolution No. 277/2020 Coll., with effect as of 1 July 2020. Vulnerable areas containing nitrate-polluted waters cover 1.8 million hectares, i.e. more than half of the agricultural land used in the Czech Republic.

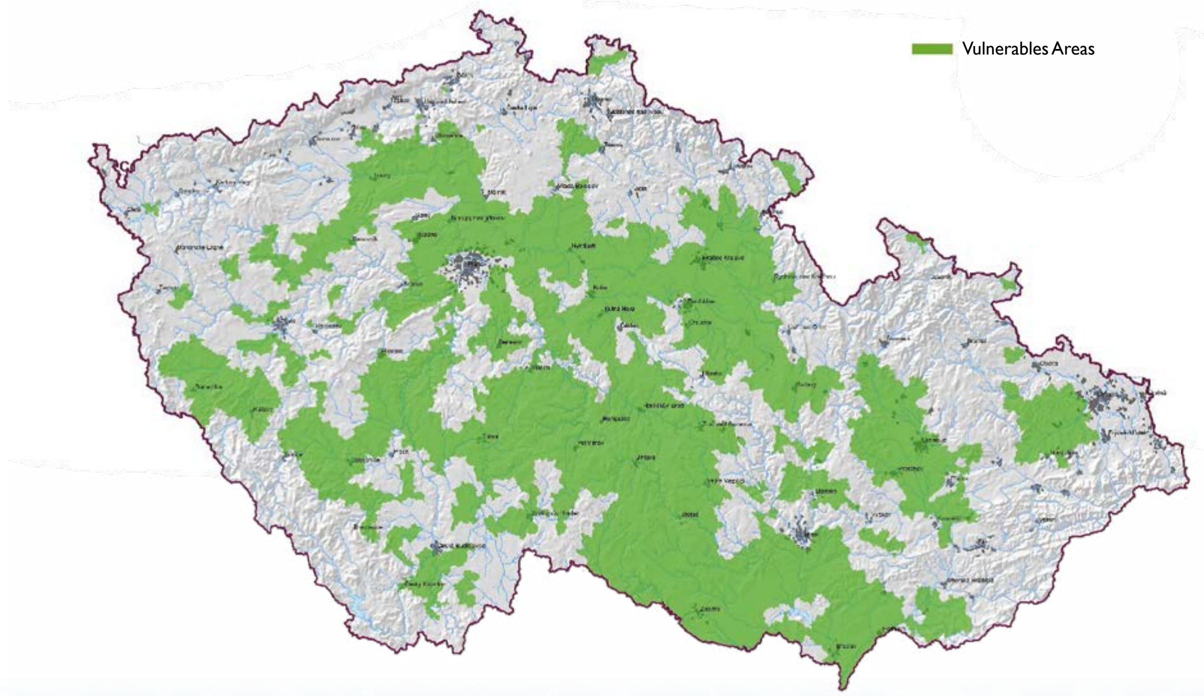
As of 1 July 2020, new conditions of the 5th Action Programme of the Nitrates Directive, set for the period 2020–2024, apply. The amendments are based on water monitoring and the Action Programme, research results, climate change and hands-on observations. The Action Programme is updated every four years and represents mandatory management practices in designated vulnerable areas aimed at reducing risk of nitrogen leaching to surface waters and groundwaters and is the most effective system of measures for implementing the Nitrates Directive. The rules of the 5th Action Programme are laid down in the amendment to Government Resolution No. 262/2012 Coll., on the designation of vulnerable areas and the Action Programme, published in the Collection of Laws under No. 277/2020 Coll. the Action Programme that is subject to review and adjustment every fourth year. It introduces compulsory farming methods in defined vulnerable areas aimed at reducing risk of washing nitrates out and to surface waters and groundwaters: it is the most efficient system of measures for implementation of the Nitrates Directive.

The Staroměstský degree (Oder River Board)

The main measures of the Action Programme include a period with a ban on fertilizing, fertilization limits according to crop yield levels, crop rotation - restriction of maize cultivation in 3rd application zone, storage of fertilizers, nitrogen balance farming on slopes and in the vicinity of surface water bodies. The measures included in the Action Programme have to guarantee that no entity using organic and/or organic-mineral fertilizers for farming in vulnerable areas exceeds the limit of 170kg nitrogen per hectare per year.

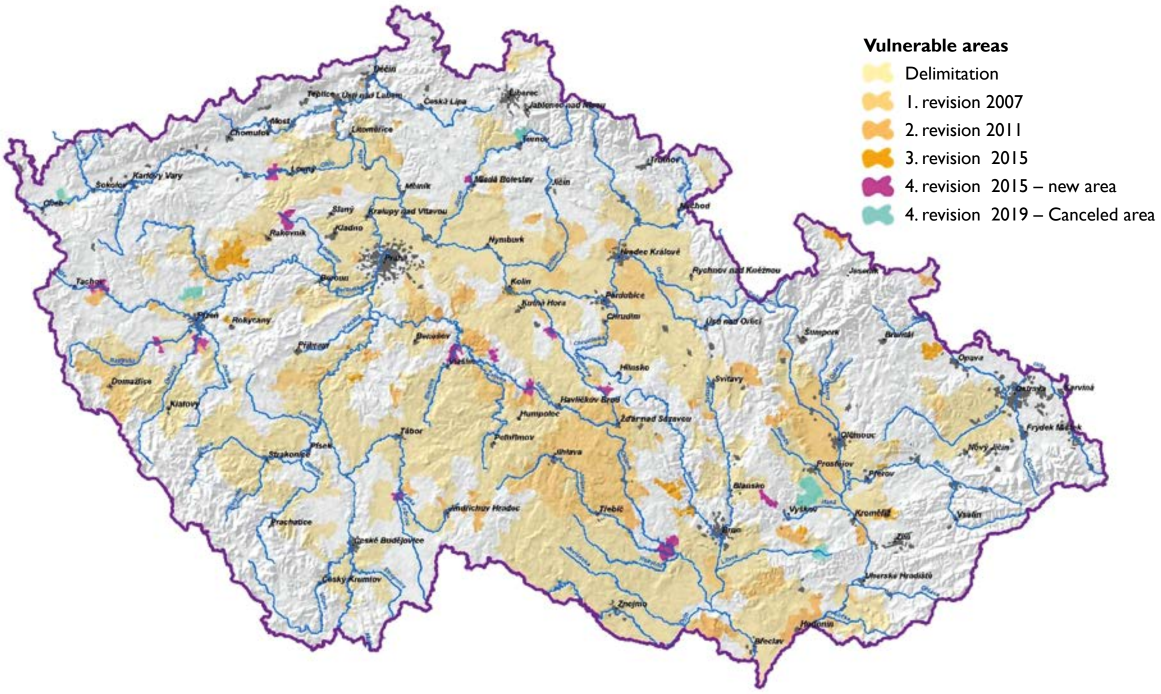
Figure 11.3.1

Map of vulnerable areas as per Government Resolution No. 262/2012 Coll., on defining vulnerable areas and the action programme – Amendment No. 277/2020 Coll.

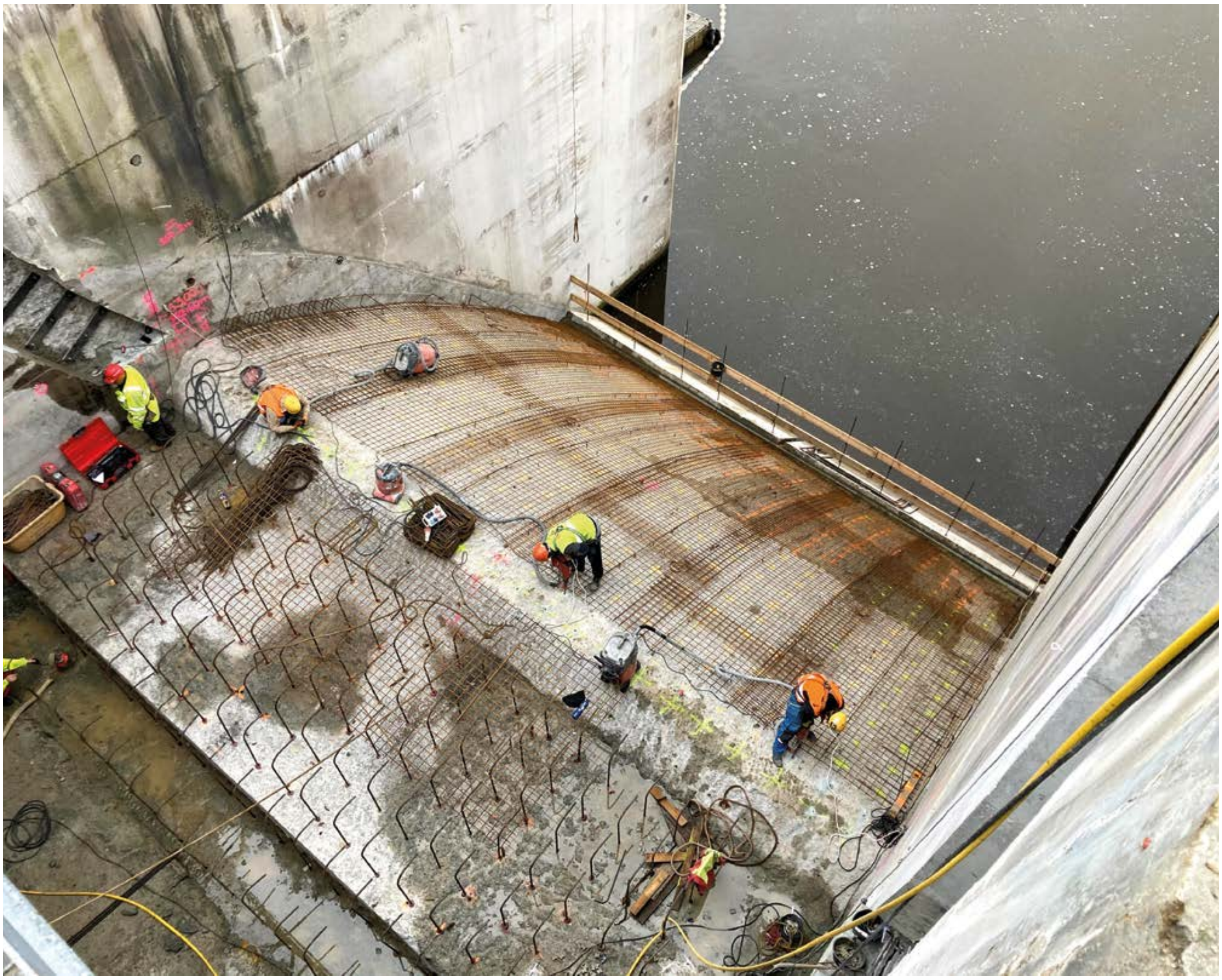


Source: T. G. Masaryk Water Research Institute, p.r.i.

Figure 11.3.2
Map of vulnerable areas in 2019



Source: T. G. Masaryk Water Research Institute, p.r.i..



The Hněvkovice Reservoir, Securing the Reservoir from the Effects of Large Waters (Source: Vltava River Board)

11.4 Accompanying strategic documents

Strategy of the Ministry of Agriculture of the Czech Republic with the outlook until 2030

It is a basic strategic document of the Ministry of Agriculture that was approved by Government Resolution No. 392 of 2 May 2016. In order to ensure transparent and effective management of this strategy, the Government approved the Implementation Plan of the Strategy of the Ministry of Agriculture for 2017–2020 in 2017.

The Implementation Plan contains a list of specified activities to be performed by the Ministry of Agriculture in order to implement the measures with the view of achieving objectives defined in the Strategy in 2017–2020. Seven indicators were defined and the Ministry of Agriculture assesses them annually in this yearbook in Chapters 7, 9.1 and 14.

11.5 Czech Republic's reporting to the EU

Reporting under Directive Council 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the Assessment and Management of Flood Risks.

In 2020, the European Commission was informed of the progress of the review and update of the flood hazard and flood risk maps (under Article 14) through reporting under Article 15 of the Floods Directive. Reporting was carried out in accordance with the documents "Floods Directive Reporting Guidance 2018", "Floods Directive GIS Guidance", "Reporting on the Floods Directive - a user manual". Following the experience with reporting from the first planning cycle, the European Commission adjusted data templates for data submission as well as the control process in the Eionet system.

The Czech Republic reported results of flood hazard and flood risk mapping from river floods for a scenario with medium probability of occurrence (Q100), including other required details for such a scenario (indicative number of potentially affected population; information on affected economic activities - housing, infrastructure, industry, agriculture and others; number of affected facilities that may cause accidental pollution in case of flooding, and number of affected protected areas listed in Annex IV(1)(I, III and V of Directive 2000/60/EC).

The main basis for reporting was the data stored in the central data warehouse, which includes a map portal (cds.mzp.cz) providing the expert and lay public with access to flood hazard and flood risk maps.

Reporting under Directive 91/676/EEC of 12 December 1991 on protection of waters against pollution caused by nitrates from agricultural sources.

In 2020, complete datasets were submitted to the European Commission as part of reporting under Article 10 and Annex V via the Eionet system, along with the Report of the Czech Republic on the status and development trends in the water environment and agricultural practices in 2016–2019.

As part of self-reporting, information on surface water and groundwater quality assessment concerning nitrate content was uploaded in the form of data on 3 September 2020 and the report itself on 21 September 2020, which was subsequently slightly complemented and modified on 1 March 2021.

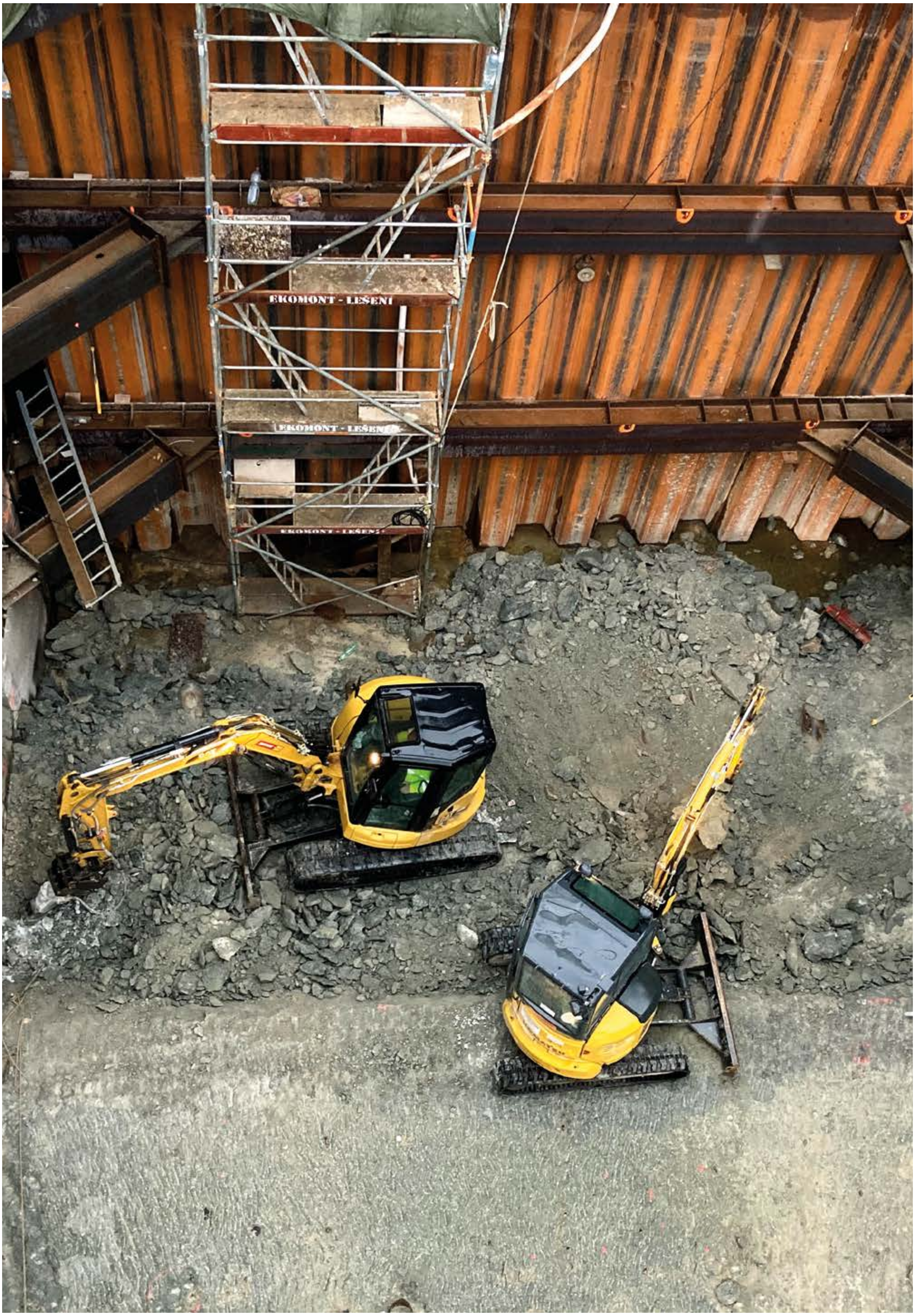
In the course of processing the datasets and the report, organisational problems occurred due to a combination of several adverse factors, e.g. problems in internal computer networks of some of the River Boards, s.e. and in the ARROW database, organisational issues linked with quarantine measures, etc., which caused a slight delay in delivery of the reporting data and the report. In spite of the above, the Czech Republic was one of a few EU countries that submitted the report including all datasets to the European Commission.

Reporting under Council Directive 91/271/EEC of 21 May 1991 on municipal waste water treatment.

Directive 91/271/EEC concerns collection, treatment and discharge of municipal wastewaters and treatment and discharge of wastewaters from selected types of industry.

In 2020, the MoE prepared and sent to the European Commission, via Eionet, reporting under Article 15 and Article 17 of Council Directive 91/271/EEC on municipal wastewater treatment for 2018. In order to comply with the reporting obligation, which takes place once every 2 years, data from property and operational records provided by the MoA were used. The report shows that there was an increase in the number of agglomerations that comply with the obligations set out in Article 3 of Directive 91/271/EEC (agglomerations with more than 2000 equivalent people having a municipal wastewater sewerage systems) to 79 agglomerations.

The central WWTP in Prague, which is not yet compliant with the requirements of Directive 91/271/EEC, is in the process of testing a new WWTP line, while reconstruction of the original WWTP is being prepared. Reconstruction of the original WWTP and launching permanent operation of the new line are scheduled for 2022. In 2018, a new exemption permit for discharging wastewaters into surface waters was issued; the permit has stricter limits for balance values at the outflow (the sum of both the new and the original WWTP) for two indicators (total nitrogen and total phosphorus), effective as of 1 January 2019. As a result of launching trial operation of the new WWTP, the quality of discharged wastewaters improved rapidly. Therefore, compliance with Directive 91/271/EEC can be expected in the near future.



The Hněvkovice Reservoir, Securing the Reservoir from the Effects of Large Waters (Source: Vltava River Board)

Maxim Tupikov (Source: www.shutterstock.com)

12. INTERNATIONAL RELATIONS

International cooperation of the Czech Republic in the field of water protection is based on the principles arising from the "UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, which the Czech Republic is a party to.

The roots of the involvement of the Czech Republic in international cooperation in the protection of waters date back to 1928, when the Joint Technical Commission was established between the former Czechoslovak Republic and Austria and dealt with technical issues in transboundary stretches of the Danube River, the Dyje River and the Morava River and also watercourses in the Malše River and the Lužnice River Basins. At present, the Czech Republic is a contractual party to nine international agreements concerning water protection.

12.1 Cooperation within the UN/UCE

UNITED NATIONS
ECONOMIC COMMISSION FOR EUROPE

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) is intended to strengthen national measures for the protection and ecologically sound management of transboundary surface waters and groundwaters. The Convention invites the contractual parties to prevention, monitoring and reduction of the transboundary influence and to using waters in a sustainable manner.

The basic principle is bilateral cooperation of neighbouring states in the field of water management, based on concluded international agreements, treaties and conventions. Emphasis is laid on mutual exchange of information, joint research and development (for example, through bilateral and multilateral projects, international commissions, etc.), improving warning and alarm systems, as well as access to information by the public.

The UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes

The UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (The Convention) entered into force on 6 October 1996. The Czech Republic has been a party to the Convention since 10 September 2000. Representatives of the Czech Republic participate in activities relating to the fields of integrated management of water resources and water ecosystems, protection of waters against accidental pollution from industrial sources, support for international cooperation on transboundary watercourses and in commissions for international river basins. Cooperation under the Convention also focuses on the relation between water quality and human health. The supreme body of the Convention is the Meeting of the Parties, held once every three years, next meeting takes place 29/09–01/10 2021.

Protocol on Water and Health

The Protocol was produced in cooperation between the World Health Organization (WHO) and focuses on the relation between water and human health. Although the Protocol entered into force in 2005, the Czech Republic has been a party to the Protocol since 2001 and set national targets under the Protocol in 2008: the national targets are updated within the Protocol. The administrator of the Protocol in the Czech Republic is the Ministry of Health. The Commission for Health and the Environment authorised a permanent working team composed of representatives from the Ministry of Health, MoE, MoA and State Health Institute to compile a proposal of national objectives and to supervise their implementation. Next meeting is planned for 2022.

More detailed information on the UN/ECE Convention and the Protocol on Water and Health is available at www.unece.org/env/water.

The Holiday on the Vír reservoir, October 2020, The Vír Reservoir on the Svratka Stream (Author: Straková Radka)

12.2 International cooperation of the Czech Republic in the integrated Elbe, Danube and Oder River Basins

Modern principles of water protection, based on the hydrological basins of large transboundary rivers, started to be applied in the Czech Republic in 1990 through launching cooperation in protection of the Elbe River in accordance with the Agreement on the International Commission for the Protection of the Elbe River. At that time, also the Agreement on the International Commission for the Protection of the Oder River against Pollution started to be prepared, later followed by preparation of the Convention on Cooperation for Protection and Sustainable Use of the Danube River.

International cooperation in protection of the main river basins in the Czech Republic is conducted through international commissions for protection of the Elbe, Danube and Oder Rivers and focuses primarily on the following:

- reducing the pollution load in the Elbe, Danube and Oder River,
- striving to achieve an ecosystem that is as close as possible to natural condition with a healthy diversity of species,
- allowing the use of water, especially the provision of drinking water from bank infiltration and the agricultural use of water and sediments,
- reducing pollution in the North Sea from the Elbe River Basin, in the Black Sea from the Danube River Basin and in the Baltic Sea from the Oder River Basin,
- flood control,
- coordinated implementation of the Water Framework Directive of the European Parliament and of the Council, establishing a framework for Community action in the field of water policy in integrated river basins.

Agreement on the International Commission for the Protection of the Elbe

Due to the COVID-19 pandemic, the 33rd meeting of the ICPER in October 2020 was held online. The discussed topics were, in particular, progress on and deadline for the proposal of update of the International Plan of the Elbe River Basin District (Part A) for 2022–2027 and deadline for assessment of observations on preliminary overview of significant water management issues under Article 14(1b) of the Water Framework Directive, its publication and achieved progress of work. Another discussed topic was progress on and deadline for the proposal of update of the International Elbe River Basin Management Plan, which was published for public observations on 18 December 2020.

Furthermore, preparation of the International Elbe Forum 2021, preparation of the Czech-German Workshop on implementation of the ICPER Concept for Sediment Management 2021 and preparation of the Magdeburg Workshop on Water Protection 2021 were discussed. The International Elbe River Measurement Programme 2021 was approved and expanded by additional pesticides and pharmaceuticals. The President of the ICPER concluded the 1st Amending Agreement to the agreement between the ICPER and the Federal Institute of Hydrology (BfG) on cooperation concerning the "Extension of the Elbe Alert Model (ALAMO) to the tributaries to the Vltava, Saale and Bílina Rivers in the period from 2018 to 2020", which extends the validity of the agreement until 31 December 2022.

In 2020, the extended four-year term of the Czech presidency of the ICPER ended. The ICPER thanked Mr. Petr Kubal for his work as President of the ICPER. Germany took over the chairmanship of the ICPER for the period from 1 January 2021 to 31 December 2023.

As part of its 30th anniversary, the ICPER thanked presidents, heads and members of delegations, chairpersons and members of working groups and expert groups and everybody else who had contributed to or otherwise supported the work of ICPER over the past 30 years.

The ICPER contributes significantly to organizing the Magdeburg Seminar on Water Protection that is held biannually in turns in the Czech Republic and in Germany. The 19th Seminar was postponed by a year and is to be held in October 2021.

For detailed information about activities of the ICPER SEE: www.ikse-mkol.org.

Convention on Cooperation for Protection and Sustainable Use of the Danube River

The Convention was established with the view of a coordinated approach to watercourse protection in the Danube River Basin. It was signed on 29 June and entered into force on 22 October 1998. The Czech Republic joined the Convention on 10 March 1995. The sustainable and fair use of waters from the Danube River Basin is ensured by the International Commission for the Protection of the Danuber River (ICPDR), consisting of 15 contractual parties.

Two meetings were held in 2020 at the level of the heads of delegation of the parties. The 18th ICPDR meeting of the steering group was held in June and the 23rd ICPDR plenary meeting was held in December. The most important topic discussed at the meetings were the preparation of river basin management plans for the third planning period and flood risk management plans for the second planning period, which were published for public observations in 2021. In 2020, data collection for these plans was updated and finalized. The meetings discussed, among other things, current issues concerning the EU Strategy for the Danube Region (EUSDR) in close cooperation with the EUSDR national coordinators. Main work on the final summary report of the Danube JDS4 survey was completed, the report was published at www.danubesurvey.org in 2021; it contains information about the survey as such, chemical analyses, microplastics present in waters and about environmental DNA testing. In addition, a summary report on wastewater treatment plants was finalised, the report was part of a monitoring campaign under the SOLUTIONS project. More details about the SOLUTIONS project can be found at www.solutions-project.eu.

More detailed information on the activities of the International Commission for the Protection of the Danube River can be found at www.icpdr.org.

Agreement on the International Commission for the Protection of the Oder River against Pollution

The International Commission for the Protection of the Oder River against Pollution (ICPORaP) was established by the international Agreement on the International Commission for the Protection of the Oder River against Pollution, which was concluded by the Government of the Czech Republic, the Government of the Republic of Poland, the Government of the Federal Republic of Germany and the European Community on 11 April 1996. The Agreement entered into force after ratification on 26 April 1999.

The activity of the International Commission for the Protection of the Oder River against Pollution is focused especially on international coordination of meeting the requirements of the Water Framework Directive, flood protection and prevention of water pollution. The work of the Commission is carried out in working groups focused mainly on flood protection, accidental pollution, legal issues, monitoring and data management.

In view of the epidemiological situation of COVID-19, the 23rd Plenary Meeting of the ICPORaP was held online in November 2020. The discussed topics were, in particular, the progress of the work on the update of the International Plan for the Oder River Basin District for 2022–2027 and of the International Plan for Flood Risk Management in the Oder River Basin District. The documents were published for observations by the end of March 2021. Furthermore, it was agreed at the meeting by the heads of the ICPO delegations that lignite mines in the International Oder Basin District would be recognised as a major water management issue of a interregional nature and that the ICPO would also address the issue of transboundary impacts of surface mines (such as Turów, Nochten, Jaenschwalde and other surface mines located in different countries interested) on groundwaters in the International Oder Basin District in further discussions. At the same time, issues concerning update of the document "Strategy for Implementation of Common Objectives for Significant Water Management Issues in the International Oder River Basin District" from 2019 were discussed. The document will be supplemented with a new significant water management issue concerning mining activities.

Detailed information on the activities of the International Commission for the Protection of the Oder River against Pollution is available at www.mkoo.pl.

The New Pond (Source: Ohře River Board)

12.3 International cooperation of the Czech Republic on transboundary waters

The total length of the state border of the Czech Republic with neighbouring states is 2,290 km, of which approximately a third is known as the "wet borderline", which means that approximately 740 km of the state border are constituted by watercourses and water surfaces. Under international cooperation on transboundary waters, the Czech Republic has international agreements with all neighbouring countries and it implements them through relevant commissions for transboundary waters.

Transboundary waters are watercourses and water bodies that are crossed by the state border as well as watercourses which criss-cross the state border and surface waters and groundwaters where the measures implemented on the territory of one party would substantially affect water management conditions on the territory of the other party. In order to avoid potential disputes with neighbouring states, the Czech Republic entered into international agreements with all neighbouring countries.

Through the relevant commissions for transboundary waters, the following issues are addressed at the level of bilateral cooperation: regulation and maintenance of transboundary watercourses including construction and operation of structures on these watercourses, water supply and amelioration of border reaching territories, the protection of transboundary waters against pollution (including the respective monitoring, joint monitoring of the quality of transboundary waters, exchange of data and organization of warning and alert service in case of emergency), hydrology and flood warning service (including monitoring, joint measurements, exchange of data and organization of warning and alert service in case of emergency), water management proceedings regarding transboundary waters, the protection of aquatic and littoral biotopes, the course of the state border on transboundary watercourses, etc.

Outcomes from sessions of the commissions are always included in the Protocols that are presented to involved ministries to issue a statement and they are subsequently approved by the Minister of the Environment.

Agreement between the Czech Republic and the Federal Republic of Germany on Cooperation on Transboundary Waters in the Field of Water Management

The Agreement was signed on 12 December 1995 and entered into force on 25 October 1997. The fulfilment of the Agreement takes places through the Czech-German Commission for Transboundary Waters. With regard to the territorial division of the Federal Republic of Germany, the cooperation is conducted through the Standing Committee Bavaria and the Standing Committee Saxony under the umbrella of the Czech-German Commission for Transboundary Waters.

In 2020, only the 22nd meeting of the Standing Committee Saxony was held in person. The 22nd meeting of the Standing Committee Bavaria and the 23rd meeting of the Commission were held by means of a provisional written procedure due to the COVID-19 pandemic. The working groups of the Standing Committees discussed, in particular, increased concentrations of mercury in sediments and sediments in the Röslau River (a transboundary watercourse) that sediment in the Skalka Water Reservoir, among others, were discussed. Such issues are addressed by the cross-border project "Measures in the Kössein and Röslau Rivers aimed at mitigating the problem with mercury at the Skalka Water Reservoir" under the "Programme of transboundary cooperation Czech Republic - Free State of Bavaria (under the Objective of European Territorial Cooperation 2014–2020). As the Czech side expressed the opinion that the project had not yet yielded the desired results and the "Feasibility Study", which is the task of the Bavarian party, did not contain sufficiently effective measures that would prevent intake of mercury into the Czech territory and the Skalka Reservoir, the Bavarian party will initiate, upon an agreement with the Czech party, an extension of the project for one year. The Bavarian feasibility study will be reviewed so that it takes into account the requirements of the Czech party and its conclusions will be incorporated into the forthcoming Bavarian river basin plans in the form of measures.

Other discussed issues included specific intents at transboundary waters concerning adjustments and repair, wastewater discharges, surface water and groundwater abstractions, small water power plants, etc. Other issues discussed included joint transboundary projects focused on improving the quality and quantity of surface waters, protection of the pearl mussel and thick shelled river mussel in transboundary watercourses and their river basins and implementation of the Water Framework Directive in transboundary waters. Both parties exchanged information concerning implementation of the Floods Directive at national levels. Warning systems alarming of pollution in transboundary waters between the Czech Republic and Germany and their updates were also discussed and assessed.

Agreement between the Czechoslovak Socialist Republic and the Republic of Austria on Regulation of Water Management Issues on Transboundary Waters

The Agreement was signed on 7 December 1967 and entered into force on 18 March 1970. The subject of the agreement is performed through the Czech-Austrian Commission for Transboundary Waters that addresses current issues in transboundary waters of the two countries.

In 2020, only meeting of Subcommission II was held. Due to COVID-19 pandemic, the 28th meeting of the Commission and Subcommission I was held remotely online. Regular meeting of authorized government representatives with the purpose of exchanging information on current problems in water management did not take place in 2020. Besides traditional issues (transboundary watercourse maintenance, quality monitoring), the main focus was again on the issue of the Dyje River being affected by an Austrian chemical plant in Pernhofen and the long period of drought affecting the Vranov Water Reservoir and runoff of water in the Dyje River to Austria.

Agreement between the Government of the Czech Republic and the Government of the Slovak Republic on Cooperation on Transboundary Waters

The Agreement was signed and entered into force on 16 December 1999. It is fulfilled through the Czech-Slovak Commission for transboundary waters (hereinafter referred to as the "Commission"). The Commission is divided in four work groups addressing technical aspects, hydrology, water protection and the Water Framework Directive.

In August 2020, the 20th meeting of the Commission was held in person. Besides issues concerning maintenance of the border watercourses, navigation issues (use of the Morava and Dyje Rivers for recreational navigation, expansion of the port capacity at the Hodonín Weir pool and of the Hodonín Lock) and joint cross-border projects at the Bata Canal were discussed. At the same time, the parties exchanged information on the Czech-Slovak monitoring of border watercourses and its assessment for 2019 and on groundwater monitoring facilities in border and near-border areas. Another topic discussed was implementation of the Water Framework Directive at border waters and the Floods Directive at national levels and the current legislation in the field of water management that had come into force since the last Commission meeting.

Convention between the Government of the Czech Republic and the Government of the Republic of Poland on Water Management on Transboundary Waters

The Agreement was signed on 20 April 2015 and entered into force on 5 October 2015. The Agreement is implemented through the Czech-Polish cooperation in transboundary waters. Within the framework of the Czech-Polish cooperation five standing working groups were established, focusing on investment plans, hydrology, hydrogeology, flood protection, regulation of watercourses, the protection of waters against pollution and the Water Framework Directive.

In 2020, due to the COVID-19 pandemic, the Commission did not hold a regular meeting. Information was exchanged remotely by electronic means at the level of heads of the Commission working groups. The exchanged information concerned results of cooperation in the field of water management planning on border waters, collaboration in the field of hydrology, hydrogeology and flood protection and collaboration in the field of border watercourse management and amelioration of border areas. Also, information on implementation of the Water Framework Directive to border waters and of the Floods Directive at national levels was also discussed.

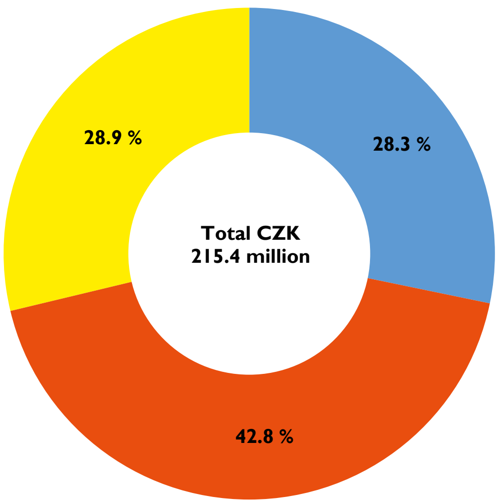
The Rožnov Open-Air Museum, Rolling Force - Wallachian cloth production (Author: Vřešťál Luboš)

The Chudobínská Pine (Source: Morava River Board)

13. RESEARCH AND DEVELOPMENT CONCERNING WATERS

A series of researches are being carried out. This chapter is intended to present briefly research and development in the field of waters within the scope of the Ministry of Agriculture, the Ministry of the Environment and the Ministry of Education, Youth and Sports that fund the central bodies either directly, in the form of institutional support or through Technology Agency of the Czech Republic. Publicly accessible data on R&D projects and granted institutional support for long-term conceptual development are available on the website of the Information System of Research, Experimental Development and Innovations at www.rvvi.cz (Central Register of R&D projects, Central Register of Activities). The information on the results obtained from research activities is available on the same website in the Information Register of R&D results. In 2020, funding totalling more than CZK 215 million was provided for research and development in water management.

Chart 13.1
Funds provided for research and development in water management in 2020



Source: MoA using data provided by the MoE and Ministry of Education, Youth and Sports

13.1 Research and development within the scope of the Ministry of Agriculture

In 2020, the Ministry of Agriculture provided special-purpose and institutional funding aimed at implementing research and development projects and long-term conceptual development of research organizations in the field of water management in the amount exceeding CZK 61 million.

In 2020, a total of CZK 50,502 thousand was spent on support of research and development projects. CZK. The R&D projects are mainly focused on soil and water conservation in sustainable development of the agricultural sector, creation, revitalisation and protection of cultural landscape, forests and water bodies and rationalisation of water management, including addressing the impacts of the climate change. An overview of current R&D projects shown in Table 13.1.

Water research and development projects carried out in 2020 were the result of public tenders held under the departmental research programme entitled "Applied Research Programme of the Ministry of Agriculture for the period of 2017–2025, EARTH" (hereinafter referred to as the "EARTH").

Specific objectives of the EARTH programme are defined by three key areas and nine research directions. The key area Sustainable Management with Natural Resources continues to be fulfilled, among others, by the research direction "Water". The aim of this research direction is to achieve a good ecological and chemical status of surface waters and a good chemical and quantitative status of groundwaters, to increase retention and accumulation of surface waters and groundwaters, to reduce pollution risk and to protect water resources against pollution from point and non-point sources, to reduce contamination by micropollutants (pesticides, pharmaceuticals and others including their metabolites), to apply new technologies in the field of water treatment and to recycle water in circulation. In addition, the Water research direction is focused on optimising water management with the view of eliminating manifestations of hydrological extremes and to design a system of adaptation measures to mitigate them.

Within the framework of long-term development concepts of research organisations, some research organisations addressed also the issue of water management. These are mainly the Research Institute for Soil and Water Conservation and to a lesser extent the Crop Research Institute, p.r.i., the Forestry and Game Management Research Institute, p.r.i., and the Research Institute of Agricultural Engineering, p.r.i. Institutions carrying out research in this sphere ware supported with a total amount of CZK 10 million in 2020.

Publicly accessible data on R&D projects and on institutional support for long-term conceptual development are available on the website of the Research, Development and Innovation Information System https://www.isvavai.cz/ (CEP - Central Evidence of Projects, CEA - Central Evidence of Activities). Data on research outputs from research activities are also available on the website in the Registry of Information about Results section (RIV).

Table 13. 1.
Research and development projects in water management funded from the budget section of the Ministry of Agriculture in 2020

Project No.	Name	From – to	Czech University of Life Sciences Prague	Funds (in thousands of CZK)
QK1710379	Safe use of mud from WWTPs on farmland using torefecation technology	1. 2. 2017 31. 12. 2021	Czech University of Life Sciences Prague	2,435
QK1810010	SMARTFIELD – Automatic system for collection and processing of temperature and humidity parameters of the microclimate and soil for conditions of precise agriculture in the Czech Republic on the principle of the Internet of Things (IoT)	1. 1. 2018 31. 12. 2022	Crop Research Institute, p.r.i.	3,850
QK1810186	Improving soil structure stability and increasing infiltration via agrotechnological procedures	1. 1. 2018 31. 12. 2022	Crop Research Institute, p.r.i.	3,393
QK1810415	Influence of wood plant composition and forest cover structure on the microclimate and hydrological situation in the landscape	1. 1. 2018 31. 12. 2022	Forestry and Game Management Research Institute, p.r.i.	3,621
QK1810463	Development of a new form of probiotic superabsorbent bedding with subsequent use for rainwater retention in soil	1. 1. 2018 31. 12. 2021	Veterinary Research Institute, p.r.i.	2,674
QK1910029	Previous saturation and design rainfall intensity as factors of runoff response in small river basins	1. 1. 2019 31. 12. 2022	Czech Technical University in Prague	3,520
QK1910086	Decreasing the burden by areal sources of agricultural pollution in surface waters when applying regulation of drainage outfall at current agriculture drainage structures	1. 1. 2019 31. 12. 2023	Research Institute for Soil and Water Conservation, p.r.i.	3,563
QK1910165	Modern methods in irrigation regime of fruit trees in conditions of water deficit	1. 1. 2019 31. 12. 2023	RESEARCH AND BREEDING INSTITUTE OF POMOLOGY HOLOVOUSY s.r.o.	4,017
QK1910282	Options of mitigating impacts of extreme rainfall-runoff phenomena in small river basins with respect to requirements for sustainable agricultural farming and fish production	1. 1. 2019 31. 12. 2023	Masaryk University	4,235
QK1910299	Sustainable management of natural resources with emphasis on non-productive and productive soil capacity	1. 1. 2019 31. 12. 2023	Czech University of Life Sciences Prague	3,292
QK1910334	Innovation of environment-friendly system of maize growing using undersow crops for limiting soil degradation and improving water management in conditions of changing climate	1. 1. 2019 31. 12. 2023	Mendel University in Brno	4,345
QK1910382	Innovation in technologies of growing root crop and vegetables for more efficient use rainwater and irrigation, better stability and quality of the production	1. 1. 2019 31. 12. 2023	Crop Research Institute, p.r.i.	3,665
QK1920011	Methodology of quantifying predatory fish species in water reservoirs for optimizing water ecosystem management	1. 1. 2019 31. 12. 2021	Biology Centre CAS,p.r.i.	3,275
QK1920214	Innovation in the system of potato growing in water resource protective belts with limited input of pesticides and fertilizers resulting in water pollution and maintaining potato farmers' competitiveness	1. 1. 2019 31. 12. 2021	Potato Research Institute Havlíčkův Brod, s.r.o.	4,617
Total				**50, 502**

Source: MoA

The Orlice Meanders (Source: Elbe River Board)

13.2 Research and development within the scope of the Ministry of the Environment

The Ministry of the Environment provided institutional support totalling to more than CZK 92 million in 2020 to its two research organizations in the sphere of waters: the T. G. Masaryk Water Research Institute, p.r.i., and the Czech Hydrometeorological Institute. Specifically, CZK 74 million was spent on the Czech Hydrometeorological Institute. The T. G. Masaryk Water Research Institute, p.r.i. received funds amounting to CZK 74 million and the Czech Hydrometeorological Institute received support in the amount of CZK 18 million. A total of 20 project proposals were supported.

In addition to institutional support, the Ministry of the Environment has administered since 2019 a research programme called "Environment for Life". The programme focuses on support for applied research, experimental development and innovations in the environment. The provider and implementor of the programme is the Technology Agency of the Czech Republic. The duration of the programme with total allocation of CZK 4.46 billion is 7 years, i.e. until 2026. Half of the total funds is intended for research relating with the climate change.

The programme is divided in three sub-programmes:

- Support for projects in public interest (hereinafter referred to as the "SP1")
- New procedures, environmental technologies, eco-innovation (hereinafter referred to as the "SP2")
- Long-term research (hereinafter referred to as the "SP3")

Third and a fourth calls for tenders were announced in 2020. The third tender was announced on 20 May 2020, with applications accepted until 22 July 2020. The total amount of CZK152 million was directed to PP1, which aims to simplify and streamline public administration and improve management and regulation in the field of water management. In the third tender, the MoE specified topics in 41 priority research objectives. Ten of them were directly focused on drought and other climate change issues, and another ten indirectly on sub-technical and social challenges of adaptation and mitigation, in other words on reducing human contribution to the climate change. In total, 259 project applications were submitted, 19 of them were supported. The supported projects in the field of water management are listed in Table 13.2.1.

The fourth tender (for PP3) was announced on 9 September 2020, with deadline for applications on 27 October 2020, with a total allocation of CZK 135 million. This tender was called only for the research topic "Socio-economic research in the field of the environment". Two project applications were submitted and one was supported.

In the field of research, the MoE also uses the "Public Procurement Programme in Applied Research and Innovation for the Needs of State Administration BETA2". Table 13.2.2 shows an overview of currently running research projects commissioned on the basis of the needs of the MoE.

Table 13.2.1

Research and development projects in water management supported by the Ministry of the Environment in 2020 under the third public tender of the Environment for Life Programme

Project No.	Project	Main implementor	Funds (in CZK)
SS03010277	System for monitoring cyanobacteria in water reservoirs using the Earth remote research method and artificial intelligence	University of South Bohemia, České Budějovice	5,682
SS03010146	Research and application of Water Information Management as a strategy of smart management with rainwater in urbanized areas of the Moravia-Silesia Region	VSB – Technical University of Ostrava	3,306
SS03010140	Use of effect-based methods for surface water assessment in the context of the Water Framework Directive	T. G. Masaryk Water Research Institute, p.r.i.	5,891
SS03010311	Optimization of properties and utilization of sediment-based recultivation substrates from WWTPs and other suitable waste materials in accordance with circular economy principles	VSB – Technical University of Ostrava	7,569
SS03010230	Addressing ponds and small water reservoirs from the perspective of complying with MoE and safety during floods	T. G. Masaryk Water Research Institute, p.r.i.	4,364
SS03010332	Modelling significance of phosphorus polluted resources and proposals of effective measures contributing to objectives of the Strategy of Decreasing Nutrient Content in Waters in the Elbe River Basin	T. G. Masaryk Water Research Institute, p.r.i.	9,929
SS03010080	Interdisciplinary approaches of efficient management with rainwater in developing areas of urbanized territories in the economic, social and environmental context	University of West Bohemia in Pilsen	8,457
SS03010167	Integrated system of low-cost retention elements in the landscape enhancing evapotranspiration with rapid execution potential	Jan Evangelista Purkyně University in Ústí nad Labem	6,901
Total			**52,099**

Source: Technology Agency of the Czech Republic

Table 13.2.2

Research and development projects in water management funded from the budget of the Technology Agency of the Czech Republic (BETA2) for the Ministry of the Environment in 2020

Project No.	Name	From–to	Coordinator	Funds (in thousands of CZK)
TITSMZP809	Influence of small water reservoirs on the groundwater level and total hydrological balance with emphasis on dry periods	1. 5. 2019 31. 12. 2021	Czech Technical University in Prague	9,731
TITSMZP720	Potential of dry reservoirs as part of water management in the landscape	1. 6. 2019 31. 12. 2021	T. G. Masaryk Water Research Institute, p.r.i.	4,898
TITSMZP707	Influence of technical snowing on biological components of the natural environment in the Krkonoše National Park and its protective belt	1. 5. 2018 31. 12. 2021	Masaryk University in Brno	10,492
TITSMZP703	Watercourse drying up and biodiversity of flowing waters: influence of natural conditions and anthropogenic interventions	1. 6. 2018 30. 11. 2021	Masaryk University in Brno	9,999
TITSMZP701	Methods of assessing the condition of protected areas as per the Water Framework Directive for protection of sites and species	1. 3. 2018 1. 6. 2020	Czech Technical University in Prague	2,996
Total				**38,116**

Source: Technology Agency of the Czech Republic

13.3 Research and development within the scope of the Ministry of Education, Youth and Sports

The Ministry of Education, Youth and Sports supports research and development in areas related to water management, in particular through support of large research infrastructure projects CzeCOS and CENAKVA and linked international collaboration projects of the Czech Republic in the sphere of research and development. A total of CZK 62 million was granted in 2020.

Large research infrastructures (www.vyzkumne-infrastruktury.cz) are unique research facilities of high knowledge and technological complexity with nation-wide impact in the Czech Republic with international overlap, accessible to any researcher under conditions of the open access regime. It includes experimental instruments such as laboratory equipment; knowledge resources such as archives and collections; and information and communication technologies necessary for carrying out knowledge-intensive research, development and innovation.

CzeCOS (www.czecos.cz) is a distributed research infrastructure focused on research of the global change in the atmosphere and most important ecosystems in Central Europe such as forests, agro-ecosystems, meadows, grasslands and wetlands. In 2020, 77 publications by authors from the host institution and 85 publications by external users of the CzeCOS were published. The most important publication of 2020 is the "Current\ European flood-rich period exceptional compared with past 500 years", which deals with flooding in Europe over the past 500 years, co-authored by top European scientists that was printed in the prestigious journal Nature.

CENAKVA (www.frov.jcu.cz) provides a wide range of users in the Czech Republic and abroad with an open experimental background focused on freshwater fish quality, biology, conservation and aquaculture of sturgeon, long-term sustainable fish farming and intensive aquaculture in the process of global environmental changes, biology and crayfish and other invertebrate protection, water and aquatic environment quality with equipment for extraction and management of experimental data. In 2020, CENAKVA was used for 42 research projects and 67 user publications and 8 publications aimed at developing this large research infrastructure were published.

Table 13.3.1

Research and development projects in water management funded from the budget of the Ministry of Education, Youth and Sports in 2020

Project No.	Acronym	Name of the project	Funds (in thousands of CZK)
LM2018099	CENAKVA	South Bohemian Research Centre for Aquaculture and Biodiversity of Hydrocenoses – large research infrastructure CENAKVA	17,554
LM2018123	CzeCOS	Large research infrastructure CzeCOS for implementation of international interdisciplinary research of the global change and its impacts on ecosystems	44,670
Total			**62,224**

Source: Ministry of Education, Youth and Sports

Třeboň (Source: Ministry of Education, Youth and Sports)

Interesting numbers from 2020

- Basic hydrological network: 98,941 km of watercourses

- Funds expended on watercourse management (River Boards, s.e., Forests of the Czech Republic, s.e.): CZK 3.2 billion

- River Boards, s.e.:
  - revenues: CZK 5.1 billion (down by 5.2%)
  - costs: CZK 4.9 billion (down by 5.1%)
  - investment: CZK 2.6 billion (up by 12%) – of which CZK 1.1 billion from own sources (43%)
  - grants: CZK 0.37 billion
  - number of small water power plants: 104 pcs

- Average price for 1 m^3 of surface water – CZK 5.10 (year-on-year increase by 2.6%)

- Land consolidation: CZK 1.1 billion, of which CZK 151.7 million for water management measures and CZK 25 million for anti-erosion measures

- Water and sewerage systems:
  - Population supplied with drinkable water: 10.09 million (94.6%), population connected to the sewerage system: 9.21 million (86.1%)
  - Water consumption (invoiced to households): 91.1 l/person/day (year-on-year increase by 0.5 l/person/day)
  - Total length of the water supply system: 79,104 km (extended by 121 km, compared to 2019)
  - Total length of the sewerage system: 49,680 km (extended by 531 km, compared to 2019)
  - Number of wastewater treatment plants: 2,795 (increase of 65, compared to 2019)
  - Water rate: average price: CZK 41.40 per m^3
  - Sewerage charge: average price: CZK 36.50 per m^3

- State financial support in water management: CZK 11.7 billion
  - Programmes of the Ministry of Agriculture: CZK 3.4 billion
    - o 14 national programmes (CZK 2.96 billion) + 2 international programmes (CZK 0.4 billion)
  - Programmes of the Ministry of the Environment: CZK 6.7 billion:
    - o Operational Programme "Environment 2014–2020" (water management): CZK 5.6 billion, 3 national programmes: CZK 1.2 billion
  - Support from the Ministry of Transport: CZK 1.6 billion:
    - o State Transport Infrastructure Fund (CZK 1.59 billion), Connecting Europe Facility (CZK 0.02 billion)

- Research and development in water management: CZK 215.4 billion
  - MoA CZK 61.0 million
  - MoE CZK 92.2 million
  - Ministry of Education, Youth and Sports CZK 62.2 million

Acronyms

BOD_5	biochemical five-day oxygen demand
CAS	Czech Academy of Sciences
CEF	Connecting Europe Facility
CEI	Czech Environmental Inspection
CHMI	Czech Hydrometeorological Institute
COD	chemical oxygen demand
CRF	Compulsory Requirements for Farming
CRW	Central Register of Watercourses
CSO	Czech Statistical Office
ČSN	Czech State Standard
DEHP	di(2-ethylhexyl)phthalate
DIS	dissolved inorganic salts
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EQS	Environmental Quality Standard
ERDF	European Regional Development Fund
EU	European Union
FAD	flood activity degree
GAEC	Good Agricultural and Environmental Condition
HGR	hydrogeological region
ICPDR	International Commission for the Protection of the Danube River
ICPER	International Commission for the Protection of the Elbe River
ICPORaP	International Commission for the Protection of the Oder River against Pollution
i.o.	interest organization
KPm	monthly exceedance probability curve (mEP)
MoA	Ministry of Agriculture
MoE	Ministry of the Environment
N_{inorg}	inorganic nitrogen
NACE	Nomenclature statistique des activités
NM	non-dissolved matters
OPE	Operational Programme Environment
PAH	polyaromatic hydrocarbons
PBDE	polybrominated diphenyl ethers
PCB	polychlorinated biphenyls
p.r.i.	public research institution
Ptotal	total phosphorus
RDP	Rural Development Programme
s.e.	state enterprise
SF	Solidarity Fund
SLO	State Land Office
STIF	State Transport Infrastructure Fund
VAT	value added tax
VÚME	Selected data from Public Water Supply and Sewerage Systems Registry
VÚPE	Selected data from Public Water Supply and Sewerage Systems Operational Registry
WS	water structure
WWTP	wastewater treatment

Report on Water Management in the Czech Republic in 2020
As of 31 December 2020

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A team of authors:
Eva Fousová, Lenka Jiroudová, Jana Koubová

T**ranslator:** Vít Prošek

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