J O I N T   A N N U A L   R E P O R T
on environment monitoring
in 2015

according to the “Agreement between the Government of the Slovak Republic and the Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and Mosoni branch of the Danube”, signed on April 19, 1995

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PREFACE

Antecedents

The Joint Annual Report on environment monitoring in 2015 is the twenty-first report since signing the intergovernmental Agreement concerning certain temporary technical measures and discharges in the Danube and Mosoni branch of the Danube - hereinafter the Agreement. This Agreement was signed by the Governments of the Slovak Republic and the Republic of Hungary on April 19, 1995[1] in Budapest (**Appendix A.1**). In the Agreement the monitoring of environmental impact of the increased discharges into the Danube and Mosoni branch of the Danube, and the water supply into the right-side river branch system is defined. The environmental monitoring is coordinated by Nominated Monitoring Agents of both Parties, whose activities are described in the Statute signed on May 29, 1995 in Gabčíkovo[2] (**Appendix A.2**) - hereinafter the Statute.

The validity of the Agreement, which was to expire after the judgment of the International Court of Justice in the Haag in the case concerning the Gabčíkovo - Nagymaros Project, have been prolonged by the Slovak Republic on October 23, 1997, through a letter from the Ministry for Foreign Affairs, and by the Republic of Hungary with the Resolution of Hungarian Government from December 17, 1997. The validity of the Agreement was prolonged until an agreement on implementation of the Judgement of International Court of Justice, declared on September 25, 1997, is reached.

Nominated Monitoring Agents on April 25, 2007 have agreed on the Statute modification (**Appendix A.3**). The modification reflected changes in the water quality monitoring according to the Water Framework Directive (2000/60/EC) and defined changes in the time schedule for elaboration of the National and Joint Reports. Certain modifications were also in monitoring sites, observed parameters and the frequency of measurements. Currently discussion on monitoring optimisation going on, which should result in further Statute modification.

The Slovak Party has undertaken in the Agreement to supply an annual average of 400 $m^3.s^{-1}$ of water into the Danube downstream of Čunovo dam, in the case of an annual average flow rate of 2025 $m^3.s^{-1}$ in the Danube at Bratislava-Devín gauging station, and another 43 m^3s^{-1} into the Mosoni branch of the Danube and the right-side seepage canal. Both discharges are subject to hydrological and technical conditions described in Appendices No. 1 and 2 of the Agreement. The Hungarian Party, according to the Agreement, built up the submerged weir in the common section of the Danube at rkm 1843, and put it into operation in June 1995. This weir enables the water supply into the right-side river branches in the inundation area on the Hungarian territory. The water

[1] Agreement between the Government of the Slovak Republic and Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and Mosoni branch of the Danube, signed on April 19, 1995.

[2] Statute on the Activities of the Nominated Monitoring Agents envisaged in the "Agreement between the Government of the Slovak Republic and Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and Mosoni branch of the Danube", signed on May 29, 1995, modified on April 25, 2007.

discharged into the Mosoni branch of the Danube ensures the water supply of the Mosoni Danube and river branches in the Hungarian flood-protected area.

With respect to the Article 4 of the Agreement the Parties are obliged to mutually exchange and evaluate data obtained by the environmental monitoring on both, Slovak and Hungarian sides of the Danube. These data serve for an assessment of impacts of the increased flow rate in the Danube and the water supply on the Hungarian territory. Technical details of the environmental monitoring – the determination of influenced area, the specification of sampling and measuring points, the frequency of measurements, the list of exchanged parameters, the frequency of data exchange, etc. – are described in the Statute (Appendices A.2 and A.3) and other relevant documents.

According to the Article 3 of the Agreement the observation results and the measured data in tabular and graphical form, together with their evaluation, constitute the National Annual Reports prepared by the Parties themselves. The Joint Annual Report is elaborated jointly and is based on approved and mutually exchanged National Annual Reports.

The present Joint Annual Report on environmental monitoring gives an evaluation concerning the year 2015. The evaluation of the Slovak side is based on data collected by the Slovak Hydrometeorological Institute (SHMÚ), Slovak Water Management State Enterprise (SVP-BA), Water Research Institute (VÚVH), Western Slovakia Water Company (ZsVS), Bratislava Water Company (BVS), National Agricultural and Food Centre - Soil Science and Conservation Research Institute (NPPC-VÚPOP), National Forest Centre - Forest Research Institute (NLC-LVÚ), Slovak Academy of Sciences (SAV), Faculty of Natural Sciences of the Comenius University (PriF UK) and Ground Water Consulting Ltd. (GWC). The data exchange and the evaluation of monitoring under the frame of joint monitoring were co-ordinated by the Plenipotentiary of the Government of the Slovak Republic for Construction and Operation of Gabčíkovo - Nagymaros Project at the Ministry of Transport, Construction and Regional Development of the Slovak Republic.

The evaluation of the Hungarian side is based on data collected by the Győr-Moson-Sopron County Government Office (GYMSMKH), Department of Environment Protection and Nature Conservation (former North-Transdanubian Inspectorate of Environment and Water (ÉDUKTVF)), North-Transdanubian Water Directorate (ÉDUVIZIG), Regional Water Companies, Faculty of Agricultural and Food Sciences of the University of West Hungary (NYME-MÉK), Forest Research Institute (ERTI), Hungarian Natural History Museum (MTM), Hungarian Academy of Sciences (MTA) and Eötvös Lóránd University (ELTE). The data exchange and the evaluation of monitoring were co-ordinated by the Deputy State Secretary for Environmental Affairs at the Ministry of Agriculture of the Hungary.

Goals of the Joint Monitoring

The main goal of the joint Slovak-Hungarian monitoring, in accordance to the intergovernmental Agreement, is to observe, record and jointly evaluate the quantitative and qualitative changes of surface and groundwater bodies and water dependent natural environment in connection to the realised measures and the water supply. The water supply into the right-side river branches on the Hungarian territory is assured by the submerged weir at rkm 1843 in the Danube old riverbed, which increases the water level upstream of the weir.

The evaluation includes changes in hydrological regimes of surface and ground water, changes in surface and ground water quality, changes in soil moisture and changes in forest stands and biota.

The goal of mutual data exchange is to provide information on monitoring results (measurements, analyses, observations), about development of parameters included in the data exchange, and about environmental changes in the influenced area of both Parties. The basic condition of exchanged data evaluation is the usage of equal or similar methods of measurements and analyses and application of agreed methods of interpretation.

The final goal of the Joint Annual Report is to submit joint evaluation of monitoring results and joint recommendations for monitoring improvement and environment protection activities to the respective governments.

Joint monitoring activities in the year 2015

During the year 2015 all monitoring activities continued mostly in accordance with the intergovernmental Agreement and the modified Statute. As usual, the monitoring consisted of surface and ground water regime observations, surface and ground water quality monitoring, measurements of soil moisture content, monitoring of forest stands and biological observations. However, like in the previous year, the Hungarian Party did not performed the soil moisture content measurements and biological observations in 2015.

On May 12, 2015, in accordance with the Statute on monitoring, both Parties, Slovak and Hungarian, mutually handed over the monitoring data for the year 2014 in Győr (**Appendix A.4**). Following the evaluation of data, the electronic versions of National Annual Reports on the joint Slovak-Hungarian monitoring in the year 2014 were mutually handed over on July 7, 2014 in Győr. In October 2015 the Slovak Party, in accordance with the recommendation adopted in the Joint Annual Report on Environment Monitoring in 2014, completed its „Proposal on optimisation of monitoring of the natural environment according to the 1995 Agreement“. Meeting of Nominated Monitoring Agents, due to unsuccessful harmonization of available dates, was not realized in 2015. The meeting, on which the printed version of the National reports were mutually exchanged, the Joint Annual Report on environment monitoring in 2014 was approved and signed, and the Slovak „Proposal on optimisation of monitoring of the natural environment according to the 1995 Agreement“ was handed over to the Hungarian Party, was held on January 27, 2016 in Budapest.

Due to low flow rates in the Danube the artificial flooding of the right-side river branch system in the year 2015 was performed.

The present Joint Annual Report in 2015 was elaborated on the basis of Slovak and Hungarian data, that were mutually exchanged on May 12, 2015. The mutual exchange of electronic versions of National Annual Reports on environmental monitoring in 2015 was realized on August 15, 2016 in Győr.

Fulfilment of recommendations in the Joint Annual Report 2014

1. The Slovak Party shall submit the Hungarian Party a proposal on optimisation of the monitoring, which is carried out under the intergovernmental Agreement of 1995.

   The Slovak Party in October 2015 completed the elaboration of the „Proposal on optimisation of monitoring of the natural environment according to the 1995 Agreement“ and this proposal, as a basis for negotiation of experts, handed over to the Hungarian Party at the meeting of Monitoring Agents on January 27, 2016 in Budapest.

PART 1

Surface water levels and flow rates

Monitoring of surface water levels and flow rates in the year 2015 continued without changes. The list of gauging stations on the Slovak and the Hungarian territories, where water levels are observed, is given in the **Table 1-1**. The observation network is presented in **Fig. 1-1a, b**. The data from these stations were mutually exchanged by the Parties for the purpose of evaluation of the surface water level and flow rate regimes. At selected gauging stations (10 gauging stations on each side) common flow rate measurements were performed and time series data were compiled. Mutually agreed data form the basis for joint assessment of measures and water supply taken under Articles 1-3 of the Agreement. The assessment of surface water in this joint report covers the calendar year (period from January 1 to December 31 of the reported year).

Table 1-1: List of gauging stations

No.	Country	Station No.	Location and station name
Slovak side			
1	**Slovakia**	**1250**	Danube, Bratislava-Devín
2	**Slovakia**	**2545**	Danube, Hamuliakovo
3	**Slovakia**	**2558**	Danube, Dobrohošť
4	**Slovakia**	**1251**	Danube, Gabčíkovo
5	**Slovakia**	**1252**	Danube, Medveďov
6	**Slovakia**	**1600**	Danube, Komárno
7	**Slovakia**	**2848**	reservoir, Čunovo - dam
8	**Slovakia**	**2552**	Danube, Čunovo - downstream from the Čunovo dam
9	**Slovakia**	**2851**	Mosoni branch of the Danube, intake at Čunovo
10	**Slovakia**	**3126**	left-side river arm system, intake at Dobrohošť
11	**Slovakia**	**2849**	power canal, Gabčíkovo Power Plant
12	**Slovakia**	**2850**	tail-race canal, Gabčíkovo Power Plant
13	**Slovakia**	**3124**	seepage canal - upper water level, Čunovo
14	**Slovakia**	**3125**	seepage canal - lower water level, Čunovo
15	**Slovakia**	**1653**	Little Danube, Malé Pálenisko
16	**Slovakia**	**4045**	left-side river arm system, A-1
17	**Slovakia**	**4046**	left-side river arm system, B-1
18	**Slovakia**	**4047**	left-side river arm system, B-2
19	**Slovakia**	**4048**	left-side river arm system, C-1
20	**Slovakia**	**4049**	left-side river arm system, D-1
21	**Slovakia**	**4050**	left-side river arm system, E-2
22	**Slovakia**	**4051**	left-side river arm system, F-1
23	**Slovakia**	**4052**	left-side river arm system, F-3
24	**Slovakia**	**4053**	left-side river arm system, G-1
25	**Slovakia**	**4054**	left-side river arm system, H-1
26	**Slovakia**	**4055**	left-side river arm system, H-3
27	**Slovakia**	**4056**	left-side river arm system, J-1
28	**Slovakia**	**4057**	left-side river arm system, lake B (former gravel dredging pit)

No.	Country	Station No.	Location and station name
Hungarian side			
1	**Hungary**	**000001**	Danube, Rajka
2	**Hungary**	**004515**	Danube, Doborgaz
3	**Hungary**	**000002**	Danube, Dunaremete
4	**Hungary**	**000005**	Danube, Komárom
5	**Hungary**	**000017**	Mosoni Danube, Mecsér
6	**Hungary**	**000018**	Mosoni Danube, Bácsa
7	**Hungary**	**003939**	Danube, submerged weir
8	**Hungary**	**004516**	right-side river arm system, Helena
9	**Hungary**	**003873**	seepage canal, lock No. I.
10	**Hungary**	**003875**	seepage canal, lock No. II.
11	**Hungary**	**003940**	seepage canal, lock No. V.
12	**Hungary**	**003871**	seepage canal, lock No. VI.
13	**Hungary**	**110106**	Zátonyi Danube, Dunakiliti, Gyümölcsös út
14	**Hungary**	**110113**	right-side river arm system, Z-1
15	**Hungary**	**110127**	right-side river arm system, Doborgaz-15
16	**Hungary**	**110115**	right-side river arm system, B-2
17	**Hungary**	**110117**	right-side river arm system, B-3
18	**Hungary**	**110170**	right-side river arm system, Z-6
19	**Hungary**	**110152**	right-side river arm system, Z-8
20	**Hungary**	**110119**	right-side river arm system, B-4
21	**Hungary**	**110129**	right-side river arm system, B-5
22	**Hungary**	**110162**	right-side river arm system, B-6
23	**Hungary**	**110138**	right-side river arm system, B-7
24	**Hungary**	**110198**	right-side river arm system, B-8
25	**Hungary**	**110131**	right-side river arm system, B-9
26	**Hungary**	**110133**	right-side river arm system, B-11
27	**Hungary**	**110142**	right-side river arm system, Z-12
28	**Hungary**	**110155**	right-side river arm system, Z-10
29	**Hungary**	**110157**	right-side river arm system, Gatya enclosure

The intergovernmental Agreement, signed on 19th April 1995, set up a temporary water management regime. Parties have agreed that in case of an average annual flow rate of 2025 $m^3.s^{-1}$ in the Danube at gauging station Bratislava-Devín an annual average of 400 $m^3.s^{-1}$ of water should be discharged into the Danube old riverbed downstream of the Čunovo dam. Actual daily amount of water is governed by the flow rate coming into the Bratislava-Devín cross-section, taking into consideration the rules of operation set out in Annex 2 of the Agreement (**Appendix A.1**). The average daily flow rate in the vegetation period (between April 1 and August 31), depending on the hydrological conditions, should fluctuate between 400 and 600 $m^3.s^{-1}$; in non-vegetation period (between September 1 and March 31) the average daily flow rate should not be less than 250 $m^3.s^{-1}$. According to the methodology agreed in the Joint Annual Report in 2004, in case of flow rates over 5400 $m^3.s^{-1}$ the water amount over 600 $m^3.s^{-1}$ discharged through the Čunovo dam is not taken into consideration when the annual average is calculated for the purpose of this evaluation. In the Joint Annual Report in 2011 the methodology for calculating the annual average was adjusted further. Modification relates to flow rates over 600 $m^3.s^{-1}$ discharged through the Čunovo dam during maintenance works. In such cases, for the purpose of calculation an annual average, the higher flow rates will be reduced to an amount corresponding to flow rates as defined in the Annex 2 of the Agreement.

Besides this, another 43 $m^3.s^{-1}$ of water was agreed in the Agreement to be discharged into the Mosoni branch of the Danube and into the right-side seepage canal. Discharges are dependent on hydrological and technical conditions.

The gauging station Bratislava-Devín plays a key role in determining the current amount of water to be released into the Danube old riverbed downstream of Čunovo dam. The basic monthly characteristics of flow rate in the Danube for the year 2015 are given in the **Table 1-2**. The *Minimum* and the *Maximum* values represent the lowest and the highest recorded data. The *Avg. min* and the *Avg. max* represent the lowest and the highest average daily values. The *Average* is calculated from average daily values.

Table 1-2: Monthly characteristics of flow rate in the Danube at Bratislava-Devín gauging station in the year 2015

Year	**2015**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	1088	1211	1364	1841	2025	2042	1243	958	898	837	794	789	**789**
Avg. min	1124	1238	1396	1873	2051	2104	1304	1020	935	855	830	810	**810**
Average	2302	1425	1627	2291	3003	2445	1524	1263	1145	1182	990	1181	**1700**
Maximum	5262	1741	2794	3130	5240	3091	2042	1711	1733	1977	1719	2987	**5262**
Avg. max	5050	1693	2520	3020	4871	2935	2004	1590	1636	1851	1643	2580	**5050**

In the year 2015 (**Table 1-2**) the minimal annual flow rate of 789 $m^3.s^{-1}$ occurred at the end of the year on December 31, 2015, when the lowest average daily flow rate of 810 $m^3.s^{-1}$ was also recorded. The highest annual flow rate unusually occurred at the beginning of the year on January 11, 2015, when it reached 5262 $m^3.s^{-1}$ at culmination, and the highest average daily flow rate was 5050 $m^3.s^{-1}$. The average annual flow rate at this station in the year 2015 reached 1700 $m^3.s^{-1}$, what represents the second lowest average annual flow rate (**Table 1-3**). Lower average annual flow rate was recorded in the year 2003 only (1646 $m^3.s^{-1}$) and in the year 2011 the same average annual flow rate was recorded.

The flow regime of the Danube in the year 2015 did not have a typical course. After the decline of flow rates at the end of the year 2014 to around 1100-1200 $m^3.s^{-1}$, the flow rate on the Danube early in January temporarily increased due to precipitation and positive air temperatures (culmination on January 5, 2015 at 2792 $m^3.s^{-1}$). After a short decrease, due to more rainfall, strong warming and snow melting significant discharge wave occurred at the beginning of the second decade of January, which culminated on January 11, 2015 with the annual maximum of 5262 $m^3.s^{-1}$, and with the highest average daily flow rate of 5050 $m^3.s^{-1}$. The subsequent gradual decrease of flow rates lasted until the end of the first decade of February. Since the beginning of the second decade of February the flow rate of the Danube, with the exception of two moderate increases, fluctuated up to the beginning of April in the range from 1300 to 1700 $m^3.s^{-1}$. At the turn of March and April the flow rate rapidly increased due to strong warming and abundant rainfall in late March, and it culminated on April 2, 2015 at 3130 $m^3.s^{-1}$. Then the flow rate until the end of the month ranged around 2000 $m^3.s^{-1}$. Quite abundant rainfall at the beginning of May evoked a significant increase of flow rates, which peaked on May 7, 2015 at 3781 $m^3.s^{-1}$. After their temporary decline to around 2500 $m^3.s^{-1}$ heavy rains occurred in the Danube basin, which caused a significant discharge wave. The discharge wave culminated in the mid of the third decade of May, when it reached 5240 $m^3.s^{-1}$ on May 24, 2015, which was the second highest flow rate in 2015. After passing the discharge wave, the flow rate decreased rapidly and at the end of the month it moved around 2500 $m^3.s^{-1}$. In June the flow rate in the Danube fluctuated in the range between 2000 and 3000 $m^3.s^{-1}$, and there occurred two another small discharge waves, which at culmination tightly exceeded 3000 $m^3.s^{-1}$. At the end of the month the flow rate declined to 2000 $m^3.s^{-1}$. The decline continued also during July and in the first half of August, when the flow rate decreased below 1100 $m^3.s^{-1}$. At the beginning of the second half of August and in early September slight increases of flow rate occurred due to richer precipitation, but they did not exceeded 1800 $m^3.s^{-1}$ at culmination. Flow rates continued to decline almost to the end of the first decade of October, when they fell below 850 $m^3.s^{-1}$. In the second half of the first decade of October sharp increase of flow rate occurred due to abundant rainfall in the German and Austrian Danube basin, with culmination on October 9, 2015 at 1977 $m^3.s^{-1}$. The flow rate, however, rapidly decreased to 1000 $m^3.s^{-1}$. There were two more slight increases of flow rate during October, but at the end of the month the flow rate decreased back to 1000 $m^3.s^{-1}$. In November the decrease of flow rates continued and at the end of the second decade the flow rate fell to 837 $m^3.s^{-1}$. At the beginning of the third decade of November another small discharge wave occurred caused by rainfall, but it culminated just over 1700 $m^3.s^{-1}$. Rainfall in late November and early December evoked a significant increase of flow rate at the beginning of December, which culminated on December 2, 2015 at 2987 $m^3.s^{-1}$. The discharge wave declined rapidly and flow rates continued to decrease until the end of the year and in the last week of December fell below 1000 $m^3.s^{-1}$. The annual minimum occurred at the end of the year, when the flow rate on December 31, 2015 dropped to 789 $m^3.s^{-1}$.

Based on the above assessment it can be concluded, that the flow rate regime of the Danube in 2015 did not have a typical course. At the beginning of the year rather significant discharge wave occurred and the flow rates in February and March have not decreased below 1200 $m^3.s^{-1}$. Increased flow rates, which were so far typical for summer months, occurred from April to June. Flow rates in the Danube since the end of the first decade of July until the end of the second decade of November ranged mainly at the level of long-term minimum values occurring during these months. Overall it can be stated, that the average daily flow rates in the Danube most of the year, excluding the discharge waves in January, at the beginning of April, in May and at the beginning of December, fluctuated significantly below the long-term average daily flow rates. Discharge waves at the beginning of March, in the middle of April, in June, in October and at the end of December reached or only slightly exceeded the long-term average daily values.

When comparing the average daily flow rates measured at gauging stations No. 1250 – Bratislava-Devín, 1252 – Medveďov and 1600 – Komárno it can be stated that even in the year 2015, these flow rates have not showed significant changes. (**Fig. 1-2**). Larger differences between those stations occurred during the discharge waves in January, May and December, when at the station Bratislava-Devín higher daily average flow rates were recorded than at the other two stations in Medveďov and Komárno. Some difference was observed in Komárno station where the flow rate, mainly in February 2015, was higher than in the other two stations, which can be attributed to the impact of increased flow rates in the tributaries of the Danube. The difference between the stations Bratislava-Devín and Medveďov largely corresponds to the water amount discharged to the Little Danube and Mosoni Danube, which returns to the Danube downstream from the Medveďov gauging station.

Table 1-3: Average annual flow rates

Station No.	Period	Average annual flow rate in the hydrological year[3] ($m^3.s^{-1}$)	% of average flow rate	Average annual flow rate in the calendar year ($m^3.s^{-1}$)	% of average flow rate
1249[4]	**1901-2000**	**2050**	**-**	**2050**	**-**
1250	**1990-2014**	**2038**	**-**	**2038**	**-**
1250	1990	1711	84.5	1721	85.0
1250	1991	1752	86.5	1737	85.8
1250	1992	1775	87.7	1934	95.5
1250	1993	2030	100.2	1909	94.3
1250	1994	1908	94.2	1866	92.1
	Agreement	**2025**	**100.0**	**2025**	**100.0**
1250	1995	2278	112.5	2329	115.0
1250	1996	1993	98.4	2015	99.5
1250	1997	2094	103.4	2031	100.3
1250	1998	1723	85.1	1921	94.9
1250	1999	2582	127.5	2387	117.9
1250	2000	2393	118.2	2379	117.5
1250	2001	2170	107.2	2232	110.2
1250	2002	2458	121.4	2683	132.5
1250	2003	2001	98.8	1646	81.3
1250	2004	1807	89.2	1852	91.5
1250	2005	2128	105.1	2097	103.6
1250	2006	2152	106.3	2186	108.0
1250	2007	1768	87.3	1916	94.6
1250	2008	2014	99.5	1876	92.6
1250	2009	2163	106.8	2186	108.0
1250	2010	2098	103.6	2130	105.2
1250	2011	1782	88.0	1700	84.0
1250	2012	2018	99.7	2121	104.7
1250	2013	2444	120.7	2417	119.4
1250	2014	1809	89.3	1788	88.3
1250	**2015**	**1768**	**87.3**	**1700**	**84.0**

1.1. Discharge into the Danube downstream of the Čunovo dam

The average daily amount of water released into the Danube downstream of Čunovo dam is based on average daily flow rates determined at gauging stations Doborgaz and Helena (**Fig. 1-3**). At these stations joint flow rate measurements are performed to determine the flow rate supplied into the Danube old riverbed. The basic monthly characteristics of flow rate in the Danube downstream of the Čunovo dam (consisting of the sum of flow rates at gauging stations at Doborgaz and Helena) for the year 2015 are given in **Table 1-4**. The *Minimum* and the *Maximum* values represent the lowest and the highest recorded data. The *Avg. min* and the *Avg. max* represent the lowest and the highest average daily values. The *Average* is calculated from average daily values.

[3] The hydrological year runs from 1st November of the previous year to 31st October of the current year.

[4] Data from gauging stations No. 1249 - Bratislava (until 23.10.1992) and 1250 - Bratislava-Devín were used in the average annual flow rate calculation for the period 1901-2000.

Table 1-4: Monthly characteristics of flow rate in the Danube downstream of the Čunovo weir in the year 2015

Year	2015												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	201	221	208	364	456	550	367	362	201	221	205	222	**201**
Avg. min	216	224	226	396	522	567	410	377	224	223	238	226	**216**
Average	293	230	250	473	583	587	448	400	252	233	246	241	**354**
Maximum	779	254	463	617	622	639	568	444	397	276	285	265	**779**
Avg. max	657	240	343	584	602	616	532	427	338	254	259	252	**657**

In the year 2015 (**Table 1-4**) the total average annual flow rate released into the Danube downstream of the Čunovo dam was 354 $m^3.s^{-1}$, what represents 105.4 % of the agreed water amount. The minimal annual flow rate of 201 $m^3.s^{-1}$ was recorded on January 20, 2015, while the lowest average daily flow rate of 216 $m^3.s^{-1}$ occurred on January 26, 2016. The highest annual flow rate occurred on January 12, 2015, when it reached 779 $m^3.s^{-1}$ at culmination, and the highest average daily flow rate of 657 $m^3.s^{-1}$ was also recorded. Taking into consideration the obligations envisaged in the intergovernmental Agreement, the Slovak Party, in the case of average annual flow rate of 1700 $m^3.s^{-1}$ at Bratislava-Devín, was obliged to release an average annual discharge of 336 $m^3.s^{-1}$ into the Danube riverbed downstream of Čunovo dam.

During the assessed year 2015 did not occurred such a situation, when it would be necessary to release increased discharges (over 600 $m^3.s^{-1}$) into the Danube old riverbed, due to higher flow rates in the Danube (over 5400 $m^3.s^{-1}$). But during the discharge wave in January 2015 flow rate over 600 $m^3.s^{-1}$ was released for two days. If we would apply the reduction in terms of methodology for calculating the average annual discharge, in connection with the higher amount of water released into the Danube old riverbed, we would get an average annual discharge of 353 $m^3.s^{-1}$ (105,1 %), which is still slightly higher than the agreed amount. In the year 2015 no artificial flooding took place due to low flow rates in the Danube.

Some deficiencies were encountered as regards the compliance with the minimal discharges during the non-vegetation period, when the deficit of discharge exceeded the acceptable deviation of ± 7 %. Based on the jointly accepted flow rate data the deficit in 2015 was higher than the acceptable deviation in January for seventeen days, in February for twenty-five days, during March for eight days, in September for twelve days, during October for twenty-one days and in December for six days. In the case of minimal values in the vegetation period it can be stated that in the year 2015 flow rates less than 400 $m^3.s^{-1}$ did not occurred, taking into account the acceptable deviation. Based on the above it can be concluded that the flow regime in the summer has been followed. The deficiencies in the winter period have no significant impact on the biota of the area affected.

Based on the above evaluation it can be stated that the Slovak Party has fulfilled the average annual discharge jointly agreed in the intergovernmental Agreement. Taking into consideration the minimal values prescribed in the Agreement (in the winter period not less than 250 $m^3.s^{-1}$, in the vegetation period at least 400 $m^3.s^{-1}$) and the acceptable deviation (±7 %) it can be stated that flow rates below 250 $m^3.s^{-1}$ occurred 89 times (difference max to 33.9 $m^3.s^{-1}$). Flow rate below 400 $m^3.s^{-1}$ in the summer period did not occurred.

1.2. Discharge into the Mosoni branch of the Danube

According to the intergovernmental Agreement from April 1995 the flow rate into the Mosoni Danube, which consist of flow rate released into the Mosoni branch of the Danube through the intake structure at Čunovo and flow rate through the seepage canal, should be 43 $m^3.s^{-1}$.

Discharge measurements in the Mosoni branch of the Danube are carried out downstream of intake structure on the Slovak territory at 0.160 rkm and also upstream of lock No. I on the Hungarian territory. Average daily flow rates were agreed upon joint evaluation of common discharge measurements performed at both profiles.

Regarding the discharge released into the Mosoni branch of the Danube data measured downstream of intake structure were considered in this evaluation (**Fig. 1-4, Table 1-6**.

Table 1-6: Monthly characteristics of water amount released into the Mosoni branch of the Danube through the intake at Čunovo in the year 2015

Year	**2015**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	10.2	23.4	21.5	15.9	20.2	23.8	23.5	28.0	16.3	15.1	13.8	13.1	**10.2**
Avg. min	23.3	23.7	21.9	31.4	27.9	31.9	31.6	29.2	29.0	29.6	21.6	19.0	**19.0**
Average	39.5	24.2	28.9	33.6	32.9	32.8	32.3	30.7	29.6	30.7	25.2	22.7	**30.3**
Maximum	44.5	25.0	40.3	34.6	34.8	34.8	33.5	32.5	31.0	32.9	31.6	25.3	**44.5**
Avg. max	44.2	24.7	33.8	34.5	34.5	34.3	33.2	32.1	30.9	32.0	31.3	24.2	**44.2**

In the year 2015 (**Table 1-6**) the average annual discharge released into the Mosoni branch of the Danube through the intake at Čunovo was 30.3 $m^3.s^{-1}$. The minimal annual discharge of 10.2 $m^3.s^{-1}$ occurred on January 30, 2015, while the lowest average daily discharge of 19.0 $m^3.s^{-1}$ was recorded on December 6, 2015. The highest annual discharge of 44.3 $m^3.s^{-1}$ occurred on January 2, 2015, when the highest average daily discharge of 44.2 $m^3.s^{-1}$ was recorded as well.

The flow rate in the right-side seepage canal was also measured at two sites. The first is on the Slovak territory at Čunovo; the second is on the Hungarian territory upstream of the Lock No. II. In this evaluation the data observed at the Lock No. II were considered (**Table 1-7**).

Table 1-7: Monthly characteristics of flow rate determined at the Lock No. II in the year 2015

Year	**2015**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	1.37	2.22	2.22	1.20	1.46	2.33	2.11	1.73	2.77	2.90	2.65	2.33	**1.20**
Avg. min	1.41	2.26	2.28	1.25	1.54	2.47	2.17	2.55	2.86	2.97	2.77	2.33	**1.25**
Average	2.37	2.40	2.52	2.71	2.83	2.70	2.66	3.25	3.26	3.20	2.90	2.61	**2.79**
Maximum	2.90	2.54	2.77	3.41	3.41	3.02	3.15	3.56	3.70	3.56	3.15	3.15	**3.70**
Avg. max	2.83	2.49	2.65	3.26	3.41	3.02	3.06	3.44	3.58	3.50	3.03	3.11	**3.58**

In the year 2015 (**Table 1-7**) the average annual flow rate in the right-side seepage canal at Lock. No. II was 2.79 $m^3.s^{-1}$. The minimal annual flow rate of 1.20 $m^3.s^{-1}$ occurred on April 4, 2015, when also the lowest average daily flow rate of 1.25 $m^3.s^{-1}$ was determined. The highest annual flow rate of 3.70 $m^3.s^{-1}$ occurred on September 17, 2015, when the highest average daily flow rate of 3.58 $m^3.s^{-1}$ was recorded as well.

The total flow rate into the Mosoni Danube consist of flow rate released into the Mosoni branch of the Danube through the intake structure at Čunovo and flow rate through the right-side seepage canal, determined at Lock. No. II.

Table 1-8: Monthly characteristics of flow rate released into the Mosoni Danube in the year 2015 (average daily values)

Year	**2015**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Avg. min	25.8	26.1	24.5	34.5	31.1	34.4	34.2	32.5	32.2	32.6	24.5	21.6	**21.6**
Average	41.9	26.6	31.4	36.4	35.8	35.5	35.0	33.9	32.8	33.9	28.1	25.3	**33.1**
Avg. max	46.9	27.2	36.4	37.7	37.2	37.0	36.1	35.0	34.3	35.3	34.2	26.8	**46.9**

In the year 2015 (**Table 1-8**) the average annual discharge released into the Mosoni Danube was 33.1 $m^3.s^{-1}$. The lowest average daily flow rate of 21.6 $m^3.s^{-1}$ was recorded on December 6, 2015. The highest average daily flow rate of 46.9 $m^3.s^{-1}$ occurred on January 17, 2015.

In the year 2015, technical maintenance of turbines was carried out from late January to early March (44 days) and due to the ongoing construction works on the small hydro-power plant enlargement almost all year round the idle outlets have been alternately closed (**Fig. 1-8**). For these reasons the released water amount, during the technical maintenance and during the construction works, usually ranged from 20 to 34 $m^3.s^{-1}$. The average annual discharge into the Mosoni Danube in the year 2015 was 33.1 $m^3.s^{-1}$, which is 77 % of the agreed amount. With respect to the above mentioned limitations, the total amount of water discharged into the Mosoni Danube was lower than the water amount set out in the intergovernmental Agreement. The Hungarian Party have been informed about the exceptional water discharge into the Mosoni Danube during the construction works by Slovak party at the negotiations of the Nominated Monitoring Agents on December 11, 2014 and in a letter dated April 15, 2015.

1.3. Water distribution on the Hungarian territory

The water discharged to the Hungarian side is distributed between the Danube old riverbed, the river branches in the inundation area, the river branches on the flood-protected area and the Mosoni Danube. The distribution of water on the Hungarian territory is regulated by the Operation rules, depending on the incoming flow rate in the Bratislava-Devín cross-section and the season.

1.3.1. Water supply into the inundation area

River branches in the inundation area on the Hungarian territory are supplied with water from two sources:

a) from the Danube old riverbed through three openings in the riverbank by manipulating the water level impounded by the submerged weir and the Dunakiliti dam;

b) from the right-side seepage canal through the lock No. V.

These two sources are summed to determine the total amount.

The water distribution was set up according to the criteria of the reference status, to be achieved. The reference status was determined at the end of the nineties with participation of stakeholders. Taking various needs into consideration the water distribution reflects the hydrological regime of the fifties. In the river branches in the inundation area, water levels characteristic for this period are targeted. The daily flow rate is determined as a function of flow rate entering the Bratislava - Devín cross-section. Environmental status of Szigetköz in the reference period was determined as the most similar to a state that can be sustainable on a long run, and provides sufficient information on riverbed morphology and hydro-geological regime for determining the reference status.

The total water amount inflowing through the three openings in the Danube riverbank upstream of the submerged weir is determined at the Helena gauging station. Joint flow rate measurements at this gauging station were performed by both Parties. Measurements were jointly evaluated and average daily flow rate data were adopted (**Table 1-9**).

Table 1-9: Monthly characteristics of flow rate determined at the Helena gauging station in the year 2015

Year	**2015**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	9.60	23.8	18.6	18.6	41.0	107	69.8	44.7	33.4	26.7	23.2	31.7	**9.6**
Avg. min	13.3	24.1	18.8	21.8	44.9	111	72.4	57.1	38.2	29.8	24.4	33.8	**3.3**
Average	18.0	26.8	25.6	38.2	119	124	87.8	75.0	44.1	34.5	38.2	40.6	**56.2**
Maximum	38.0	35.1	48.8	102	172	167	120	102	96.3	42.4	80.6	56.5	**172**
Avg. max	28.9	30.7	33.1	95.9	164	162	114	100	89.1	39.9	79.3	56.5	**164**

In the year 2015 (**Table 1-9**) the average annual discharge into the right-side river branches at Helena gauging station was 56.2 $m^3.s^{-1}$. The minimal annual flow rate of 9.60 $m^3.s^{-1}$ was recorded on January 17, 2015, when the lowest average daily flow rate of 13.3 $m^3.s^{-1}$ was also determined. The highest annual flow rate of 172 $m^3.s^{-1}$ occurred on May 25, 2015, when also the highest average daily flow rate of 164 $m^3.s^{-1}$ was recorded.

The water amount inflowing from the right-side seepage canal is determined at the Lock No. V. The residual amount of water from the Mosoni Danube supply is released through this object.

Table 1-10: Monthly characteristics of flow rate determined at the Lock No. V in the year 2015

Year	2015												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	4.30	15.3	11.2	6.60	0.00	0.10	0.10	0.00	0.70	8.50	8.00	0.00	**0.00**
Avg. min	15.7	15.7	12.6	18.1	0.30	0.12	0.16	0.00	6.34	8.84	9.40	8.33	**0.00**
Average	26.5	16.0	17.9	21.3	2.88	0.53	0.49	0.33	8.22	17.9	16.3	12.1	**11.7**
Maximum	29.7	16.4	22.8	23.1	21.5	1.10	1.00	22.6	11.6	23.1	23.8	17.0	**29.7**
Avg. max	29.5	16.1	22.6	22.2	20.0	0.85	0.79	1.04	9.68	21.8	22.9	16.5	**29.5**

In the year 2015 the average annual flow rate through the Lock. No. V was 11.7 $m^3.s^{-1}$ (**Table 1-10**). The minimal annual flow rate was 0.00 $m^3.s^{-1}$ and it occurred several times in May, August and December 2015, while the lowest average daily flow rate of 0.00 $m^3.s^{-1}$ was recorded several times in August only. The highest annual flow rate of 29.7 $m^3.s^{-1}$ was recorded on January 25, 2015, when also the highest average daily flow rate of 29.5 $m^3.s^{-1}$ occurred as well.

The total flow rate inflowing to the inundation area consist of water amount flowing through the Helena cross-section and water amount flowing through the Lock No. V in the right-side seepage canal (**Fig. 1-5, Table 1-11**).

Table 1-11: Monthly characteristics of total water amount released into the inundation area in the year 2015 (average daily values)

Year	2015												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Avg. min	39.1	40.0	36.0	43.2	62.9	112	72.7	57.6	46.8	47.7	47.0	48.8	**36.0**
Average	44.5	42.7	43.6	59.5	122	124	88.3	75.3	52.4	52.4	54.5	52.7	**67.9**
Avg. max	56.8	46.7	54.1	114	165	163	115	100	98.5	58.8	93.0	65.2	**165**

Concerning the total flow rate in the right-side river branch system in the year 2015 (**Table 1-11**) the average annual value was 67.9 $m^3.s^{-1}$. The lowest average daily flow rate of 36.0 $m^3.s^{-1}$ was recorded on February 9, 2015, the highest average daily flow rate of 165 $m^3.s^{-1}$ occurred on May 25, 2015, during the culmination of the second discharge wave.

The artificial flooding in the year 2015 was not performed, because of low flow rates in the Danube.

Based on the above mentioned it can be concluded that the water supply in 2015 followed the water regime of the Danube, taking into account stakeholder requirements and the seasonal variability. However, the water supply for a large part of the assessed period has been adjusted due to ongoing rehabilitation interventions.

1.3.2. Water supply into the Mosoni Danube

The water supply into the Mosoni Danube is realized from the right-side seepage canal through the Lock No. VI (**Fig. 1-6**). The flow rate is measured at the cross-section downstream of the lock (**Table 1-12**).

Table 1-12: Monthly characteristics of flow rate discharged into the Mosoni Danube through the Lock No. VI in the year 2015

Year	2015												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	6.46	9.40	7.11	6.98	8.85	27.8	26.7	27.8	15.8	5.36	6.33	6.85	**5.36**
Avg. min	7.60	9.40	8.55	8.06	8.90	29.5	29.3	29.0	19.5	8.40	7.36	6.99	**6.99**
Average	8.96	9.78	9.73	9.01	26.8	31.1	31.1	30.5	21.5	12.2	8.86	9.88	**17.5**
Maximum	11.0	10.2	15.8	9.80	32.4	33.3	33.8	32.7	30.4	22.8	13.6	16.3	**33.8**
Avg. max	9.82	10.0	11.2	9.71	31.7	32.8	33.0	32.0	25.2	22.5	12.3	14.0	**33.0**

In the year 2015 (**Table 1-12**) the average annual discharge released through the Lock No. VI into the Mosoni Danube was 17.5 $m^3.s^{-1}$. The minimal annual flow rate of 5.36 $m^3.s^{-1}$ occurred on October 29, 2015, when also the lowest average daily flow rate of 8.40 $m^3.s^{-1}$ was recorded. The highest annual flow rate of 33.8 $m^3.s^{-1}$ occurred on June 5, 2015, when the highest average daily flow rate of 33.0 $m^3.s^{-1}$ was recorded as well.

The water supply regime is controlled by the rules of operation and follows the Danube’s water regime, similarly to the river branch water supply. In the non-vegetation period a low water period was simulated in the Mosoni Danube. This was realised by redirecting of a greater part of water into the inundation area.

1.4. The Danube water level characteristics on Čunovo-Vámosszabadi stretch

Concerning water levels in the Danube old riverbed the stretch between Čunovo and Vámosszabadi is divided, for the purpose of this evaluation, into four different sections according to the prevailing influence. These sections can be characterised by data obtained from following gauging stations: Rajka and Hamuliakovo, Dunakiliti, Doborgaz and Dobrohošť, Dunaremete and Gabčíkovo, Vámosszabadi and Medveďov.

Characteristics of the four sections on Čunovo - Vámosszabadi stretch in the year 2015 are as follows:

a) Section Čunovo - Dunakiliti. Since construction the submerged weir the water level in this section is impounded. From this impounded section the water flows into the right-side river branch system. The amount of water flowing into the river branch system is determined by water level regulation at the Dunakiliti dam. Since introducing the submerged weir into operation the water level is maintained in the mid-water riverbed. Flow velocities measured in the Rajka profile in 2015 fluctuated in the range between 0.29-0.68 $m.s^{-1}$ (223-595 $m^3.s^{-1}$). Flow rates exceeding 600 $m^3.s^{-1}$ in 2015 occurred only exceptionally.
In the year 2015 the average daily water level at the Hamuliakovo gauging station (rkm 1850) fluctuated from 122.55 to 123.52 m a. s. l. (122.47-124.80 m a. s. l. in the year 2014) and the average annual water level was 122.95 m a. s. l (122.93 m a. s. l. in 2014). The average daily water level in the Rajka profile (rkm 1848.4) fluctuated from 122.53 to 123.51 m a. s. l. (122.46-124.75 m a. s. l. in 2014) and the average annual water level was 122.93 m a. s. l. (122.92 m a. s. l. in 2014) (**Fig. 1-7**). Compared with the previous year the minimal water levels in the year 2015 were higher by 0.08 m and

0.07 m respectively, and the maximal water levels were lower by 1.28 m and 1.24 m respectively. The average annual water levels were higher by 0.02 and 0.01 respectively.

b) Section between Dunakiliti and Dunaremete. This section of the Danube is not influenced by any measures and the water level is determined only by flow rate in this stretch of the river. In the upper part of this section the water level in the river branches is about 3 m higher than the water level in the main riverbed. In the year 2015 the average daily water level at the Dobrohošť gauging station (rkm 1838.6) fluctuated in the range from 117.08 to 118.69 m a. s. l. (117.09-121.82 m a. s. l. in the year 2014) and the average annual water level was 117.60 m a. s. l. (117.76 in 2014). The average daily water level at the Dunaremete profile (1825.5) fluctuated from 113.36 to 115.22 m a. s. l. (113.47-117.95 m a. s. l. in 2014) and the average annual water level was 113.87 m a. s. l. (114.06 in 2014) (**Fig. 1-8**). Flow velocities measured in the Dunaremete profile fluctuated in the range between 0.68-1.15 $m.s^{-1}$ (219-494 $m^3.s^{-1}$). Compared with the previous year the minimal water level in 2015 at Dobrohošť was lower by 0.01 m, at Dunaremete by 0.11 m. The maximal water levels were lower by 3.13 m and 2.73 m respectively. The average annual water levels were lower by 0,16 m and 0,19 m respectively.

c) Section between Dunaremete and Sap. The water level in this section is influenced by backwater effect from the confluence of the tailrace canal and the Danube old riverbed (rkm 1811). The water level changes, especially in the lower part of this section, are influenced by the flow rates in the tailrace canal. Length of the upstream section influenced by backwater effect depends on the actual flow rate distribution between the hydropower plant and the Danube old riverbed. In normal operation it can be stated that the backwater effect reaches the Dunaremete profile (rkm 1825.5) at flow rates exceeding 2500 $m^3.s^{-1}$ at Medveďov. In the year 2015 the average daily water level at Gabčíkovo gauging station (rkm 1819) fluctuated in the range from 111.60 to 114.48 m a. s. l. (111.67-115.81 in the year 2014) and the average annual water level was 112.10 m a. s. l. (112.25 m a. s. l. in 2014) (**Fig. 1-9**). Daily water level fluctuation at Gabčíkovo gauging station in the Danube old riverbed can reach about 0.20 m as a consequence of hydropower plant operation. Compared with the previous year the minimal water level in 2015 was lower by 0.07 m and the maximal water level was lower by 1.33 m. The average annual water level was lower by 0.15 m.

d) Section Sap - Vámosszabadi. Daily water level fluctuation at this stretch (up to 0.30 m) depends on the hydropower plant operation. Major changes occur at low flow rates in the Danube due to the ratio of total flow rate and the capacity of one turbine, which may be put into operation or stopped. The average annual flow rate at Vámosszabadi - Medveďov profile in the year 2015 was 1630 $m^3.s^{-1}$. In the year 2015 the average daily water level at Medveďov profile (rkm 1806.3) fluctuated in the range from 107.85 to 113.43 m a. s. l. (108.18-113.56 in the year 2014) and the average annual water level was 109.68 m a. s. l. (109.49 m a. s. l. in the year 2014) (**Fig. 1-10**). Flow velocities measured during flow rate measurements fluctuated in the range between 0.93-1.69 $m.s^{-1}$ (799-4338 $m^3.s^{-1}$). Compared with the previous year the minimal water level in 2015 was lower by 0.33 m and the maximal water level was lower by 0.13 m. The average annual water level in 2015 was higher by 0.19 m.

Fig. 1-1a

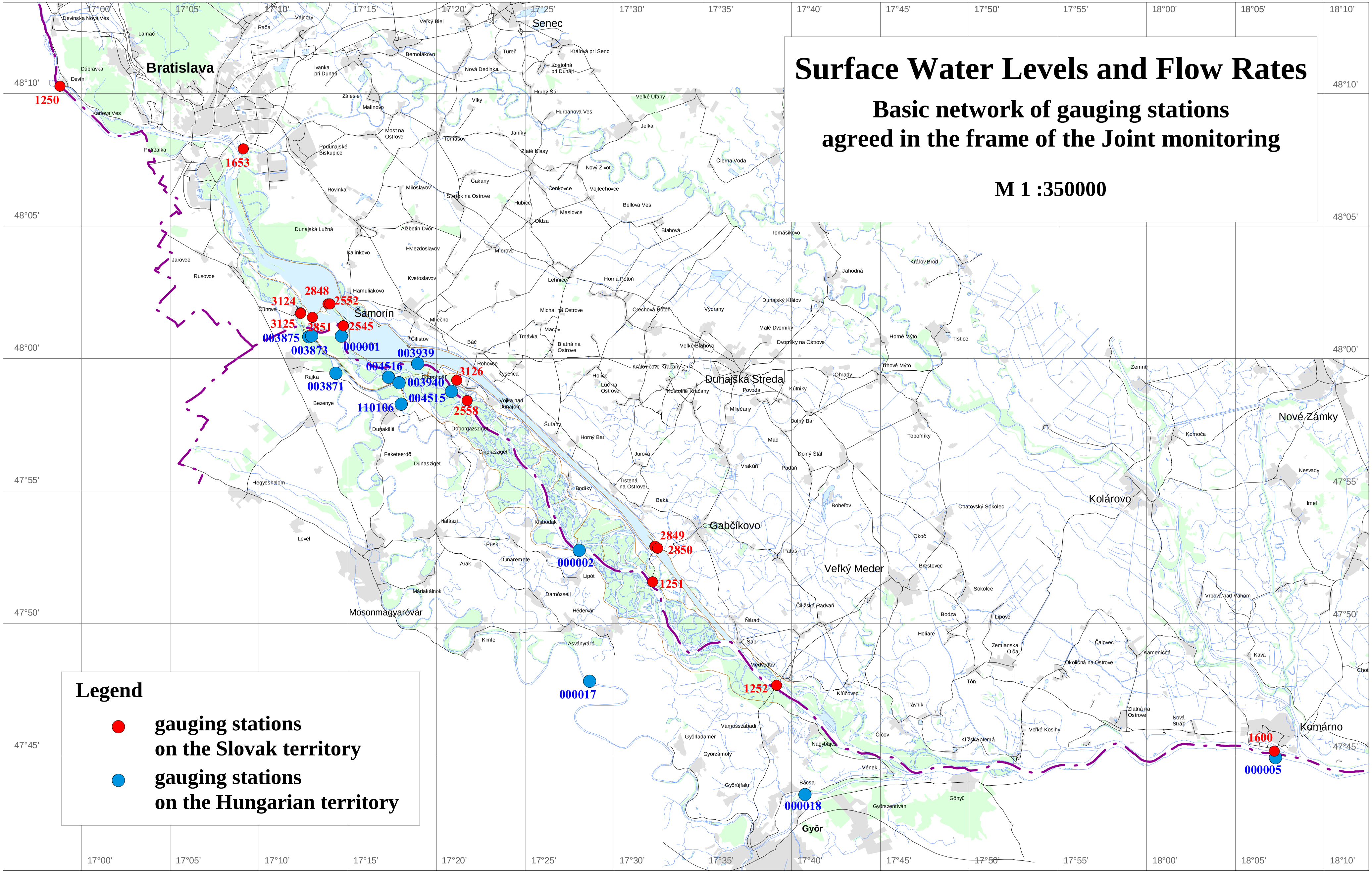
Surface Water Levels and Flow Rates
Basic network of gauging stations
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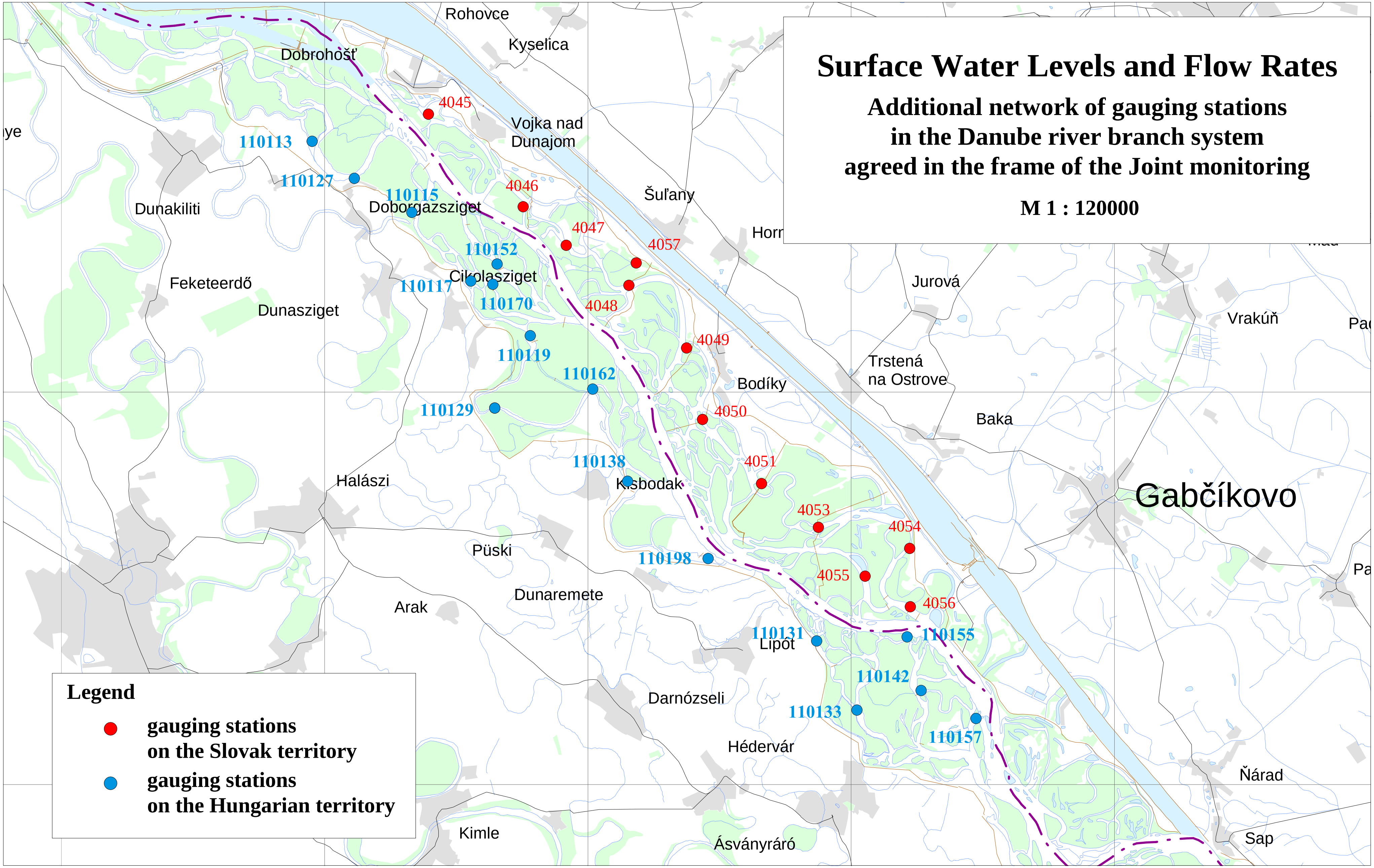
Fig. 1-1b


Surface Water Levels and Flow Rates
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in the Danube river branch system
agreed in the frame of the Joint monitoring
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Kyselica
Dobrohošť
Vojka nad
Dunajom
Šuľany
Horr
Jurová
Vrakúň
Trstená
na Ostrove
Bodíky
Baka
Gabčíkovo
Ňárad
Sap
Dunakiliti
Doborgazsziget
Feketeerdő
Dunasziget
Cikolasziget
Halászi
Kisbodak
Püski
Dunaremete
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Fig. 1-2

Surface Water - Flow Rate

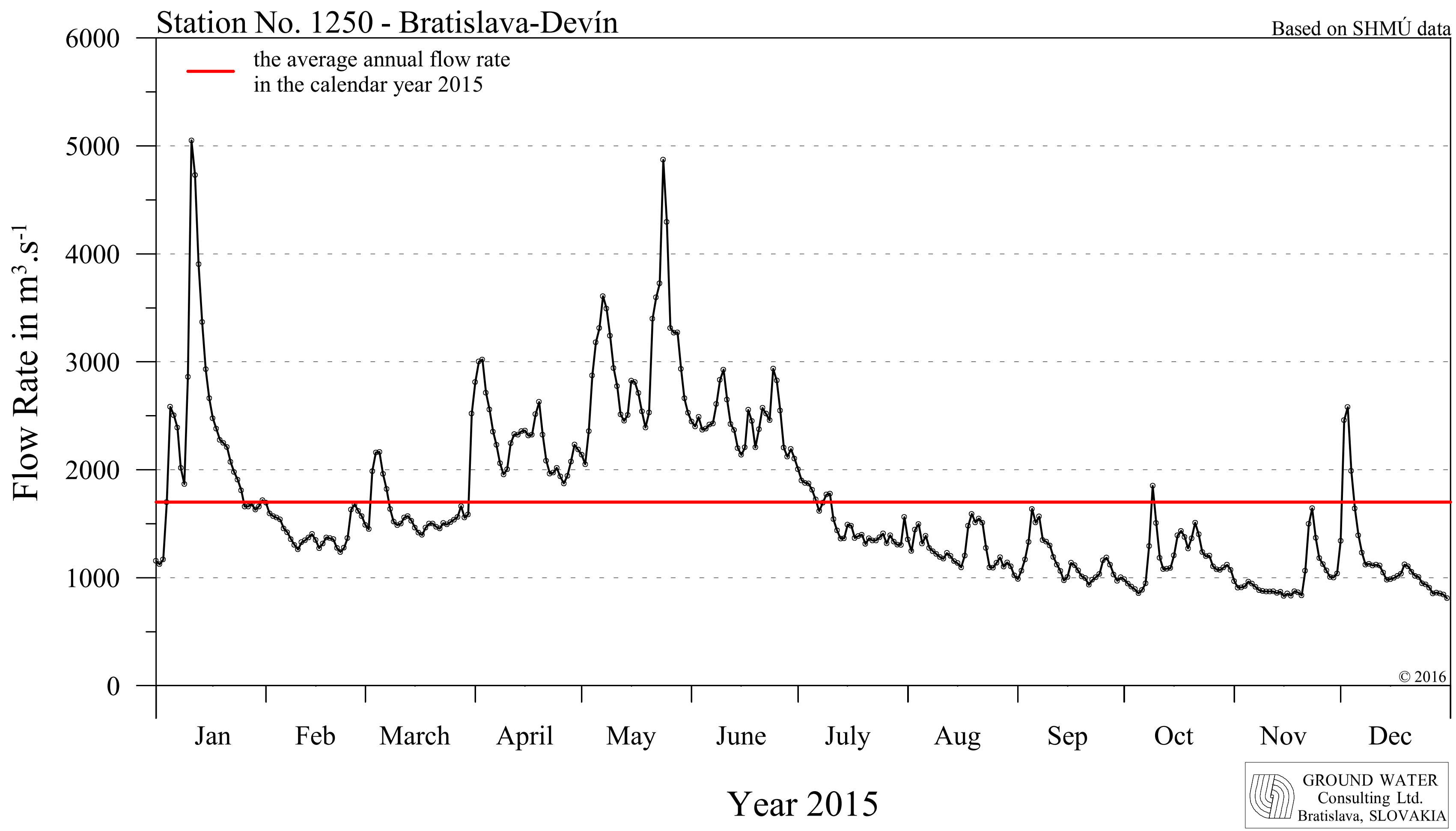


Fig. 1-3

Surface Water - Flow Rate

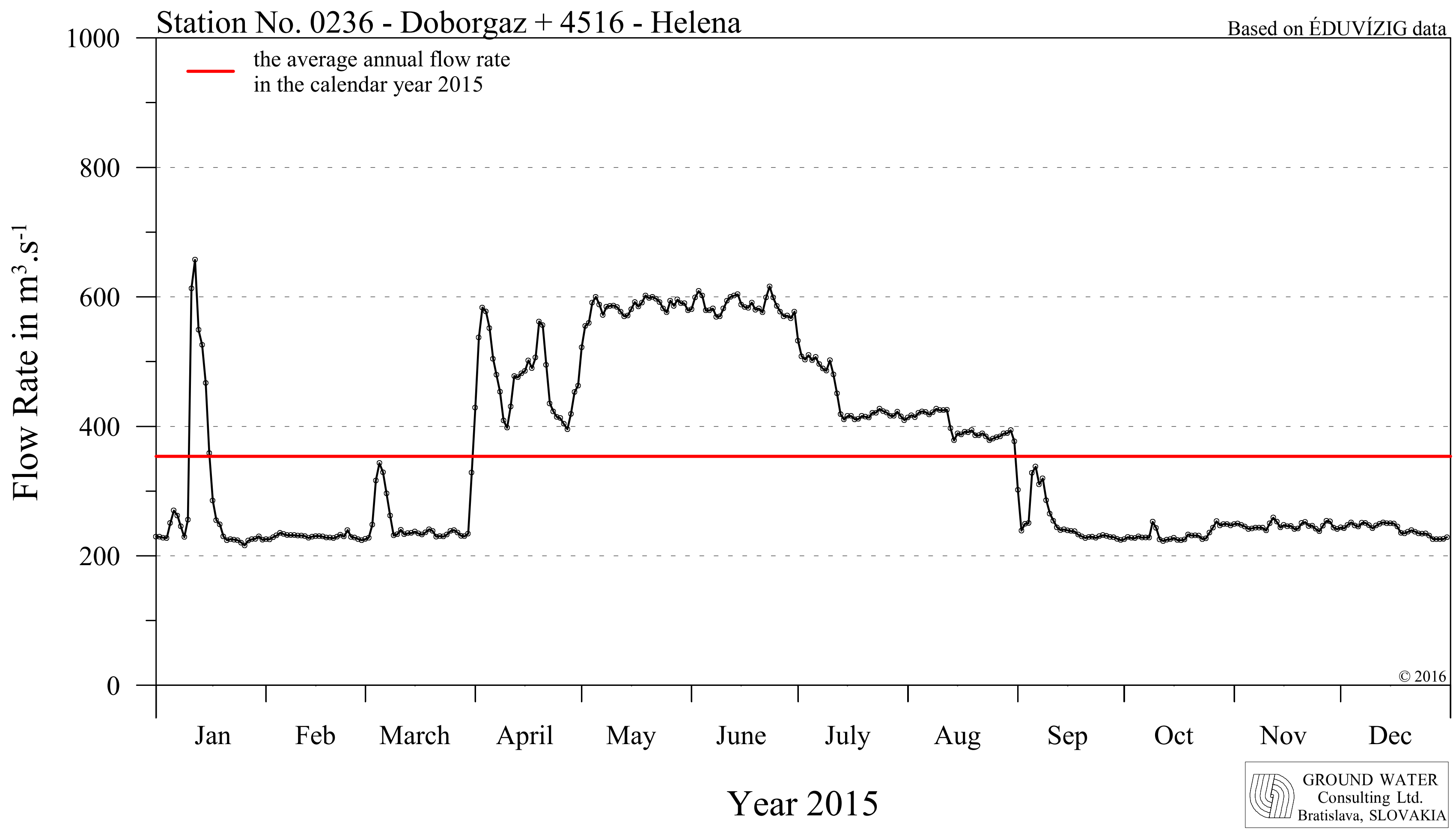


Fig. 1-4

Surface Water - Flow Rate

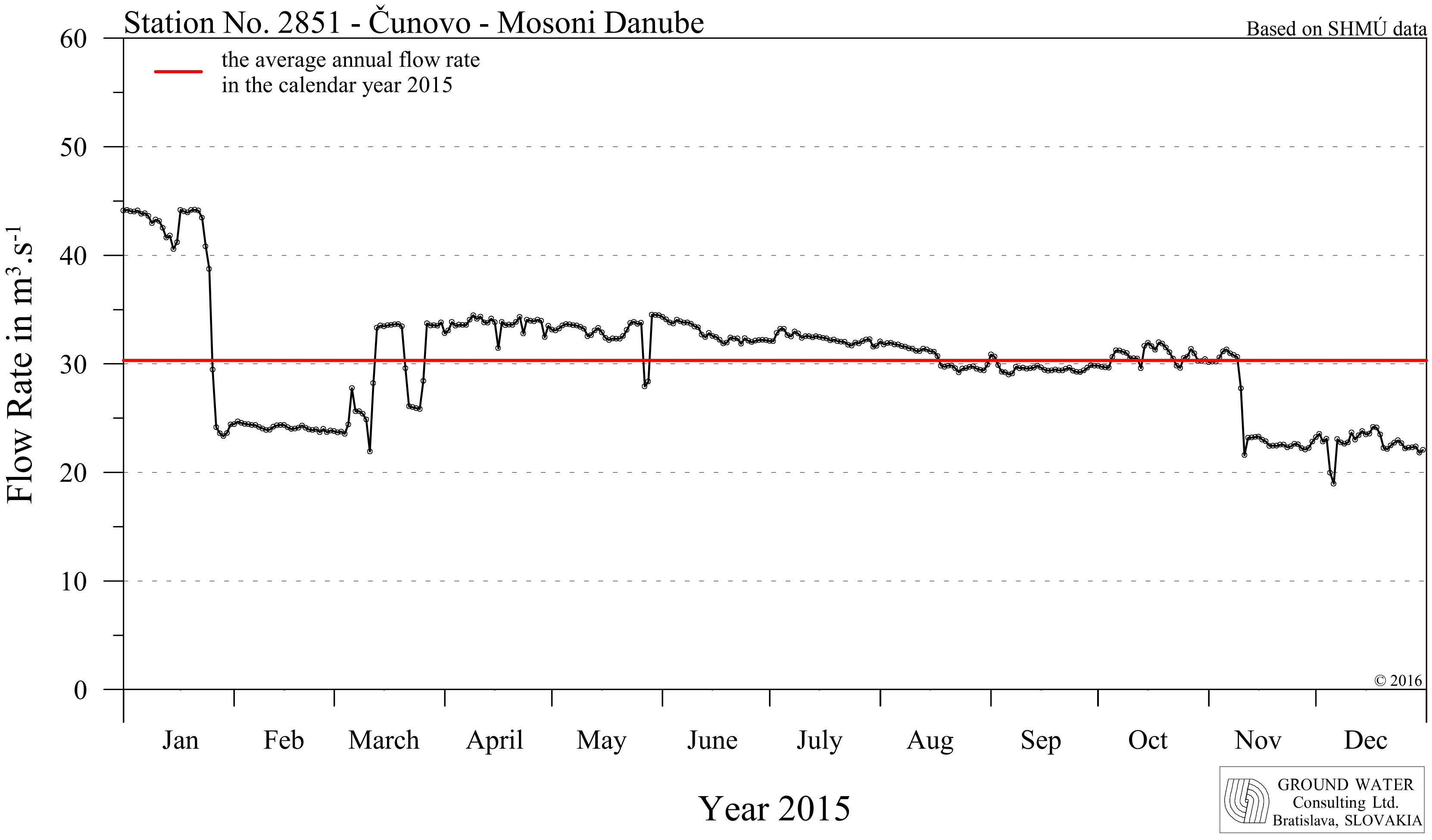


Fig. 1-5

Surface Water - Flow Rate

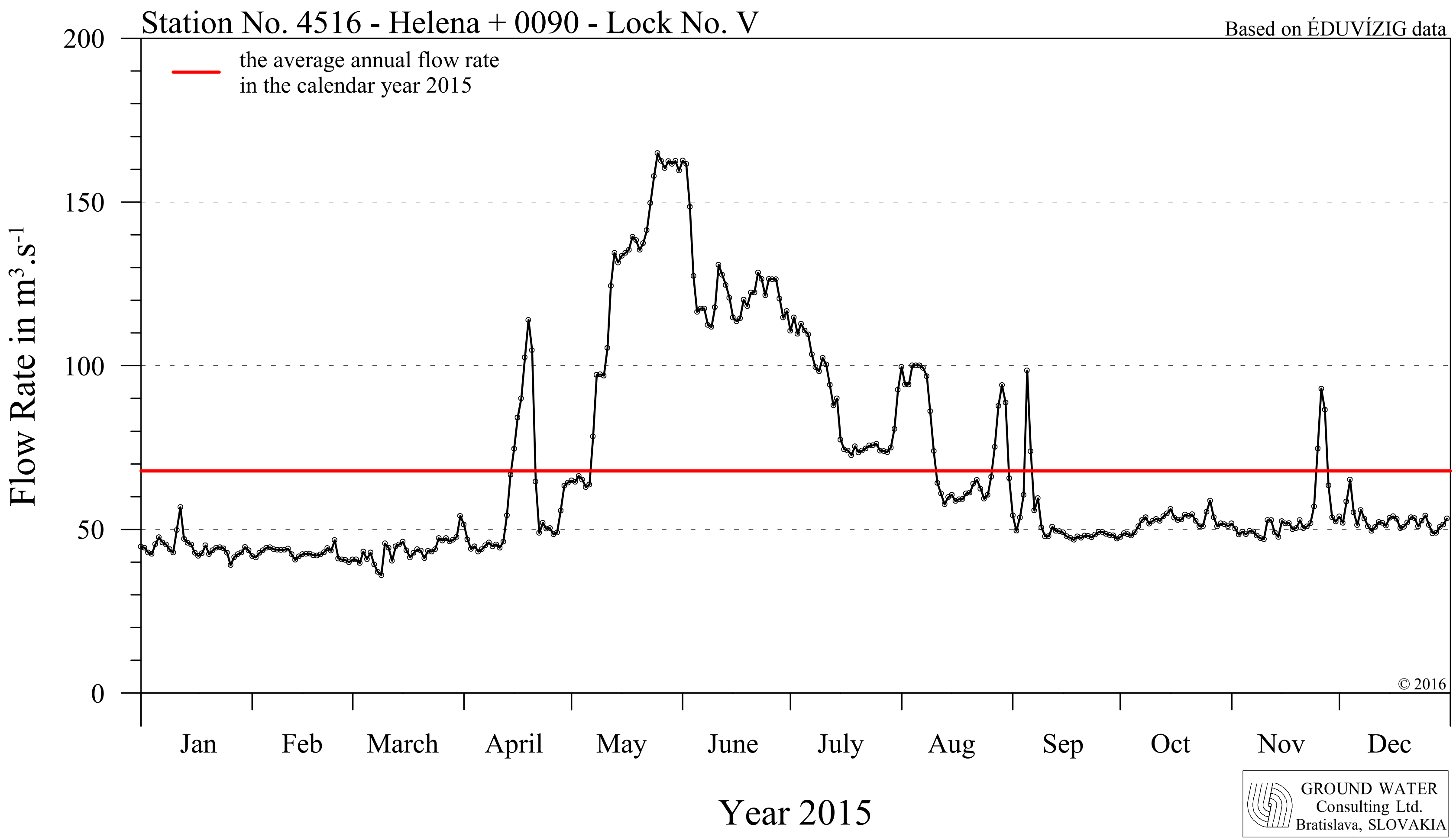


Fig. 1-6

Surface Water - Flow Rate

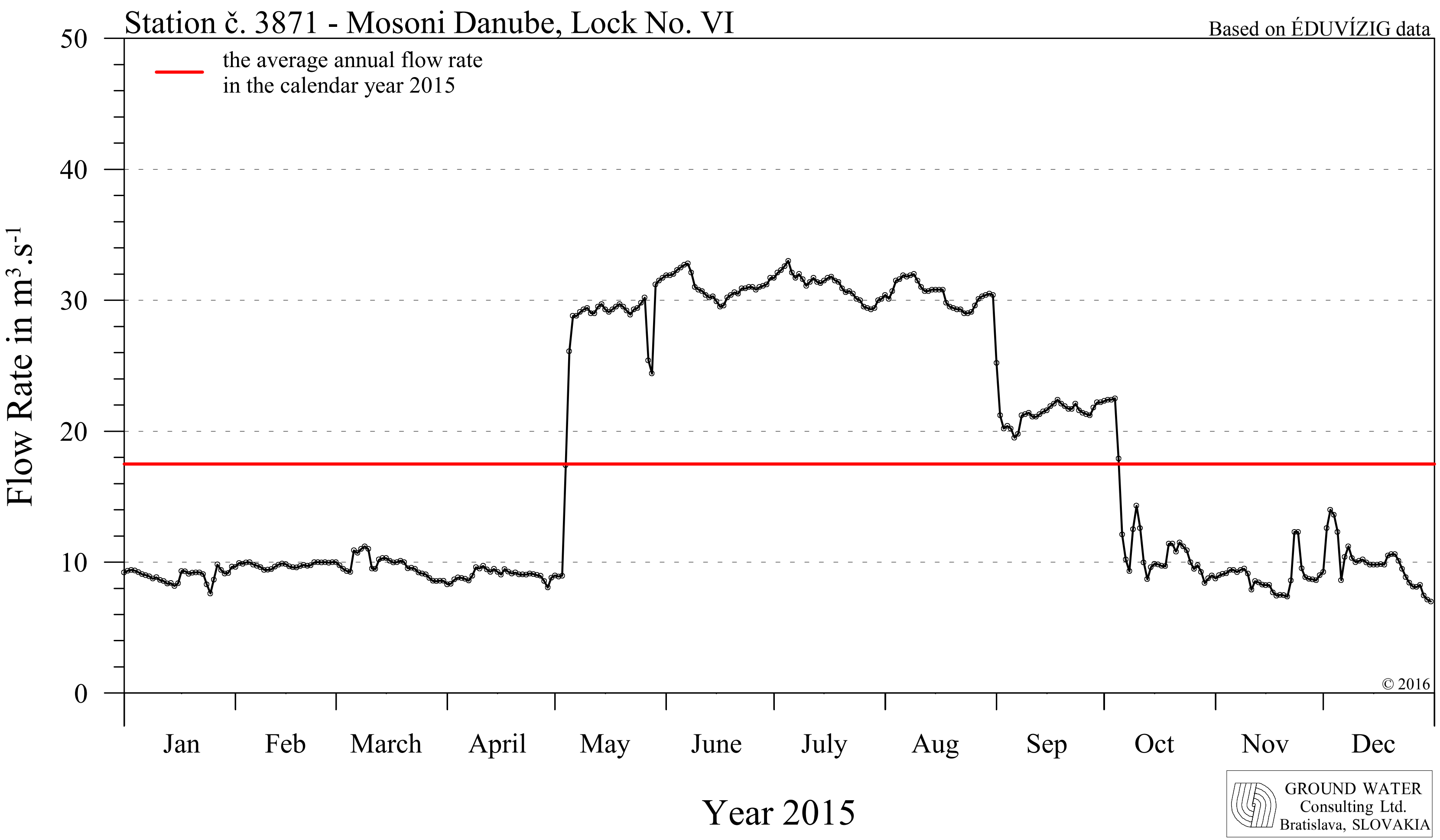


Fig. 1-7

Surface Water Level

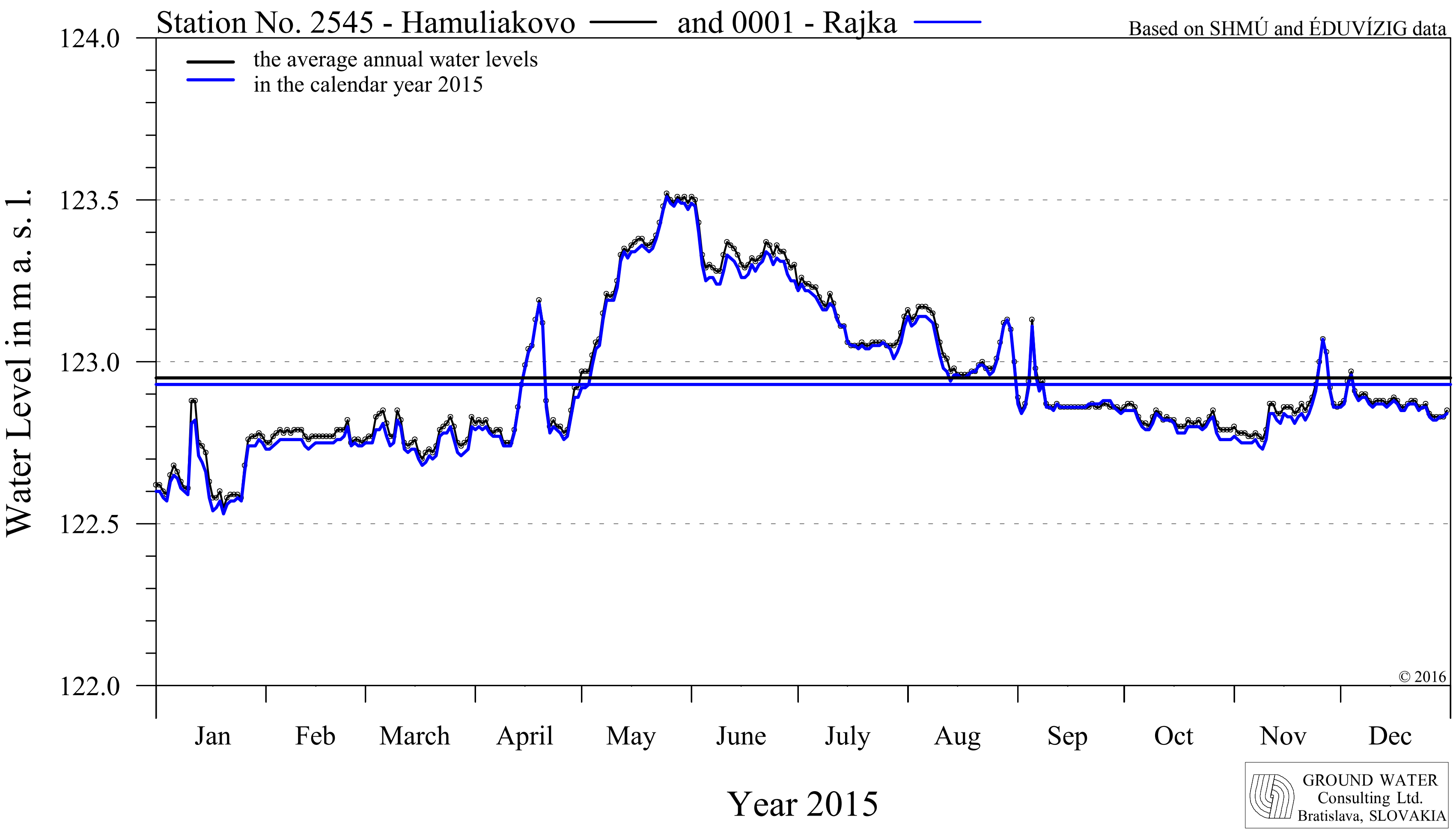


Fig. 1-8

Surface Water Level

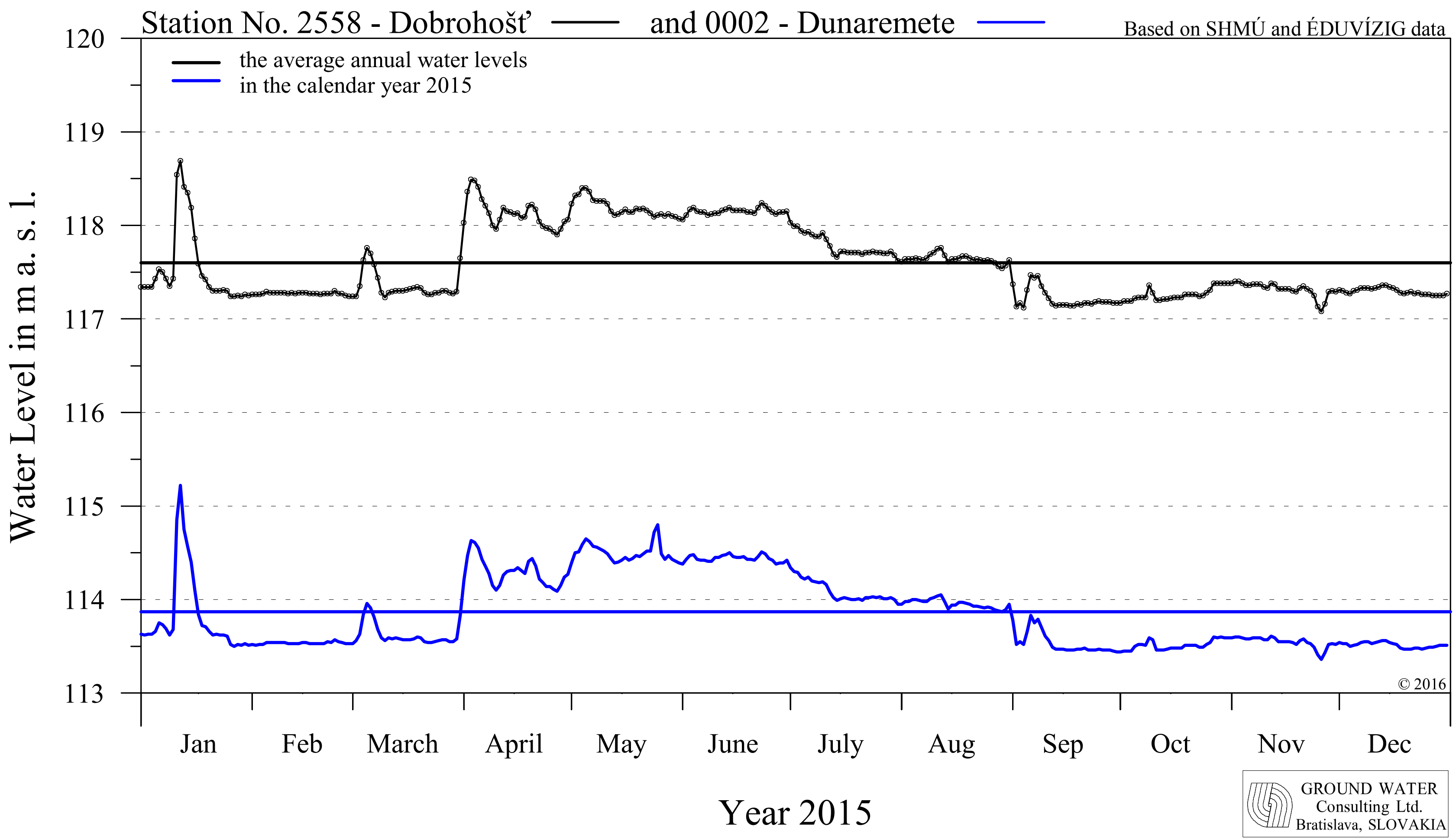


Fig. 1-9

Surface Water Level

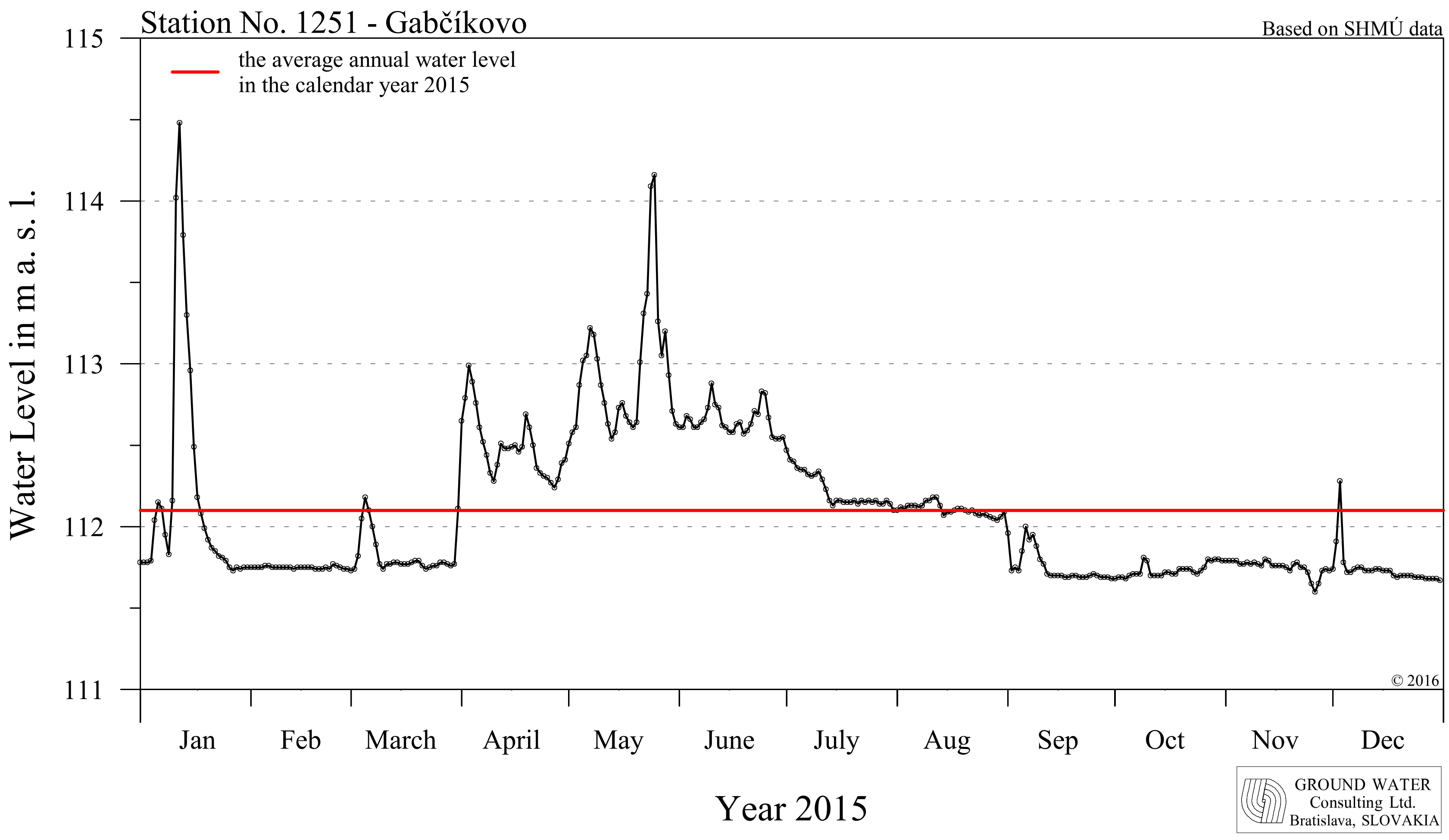
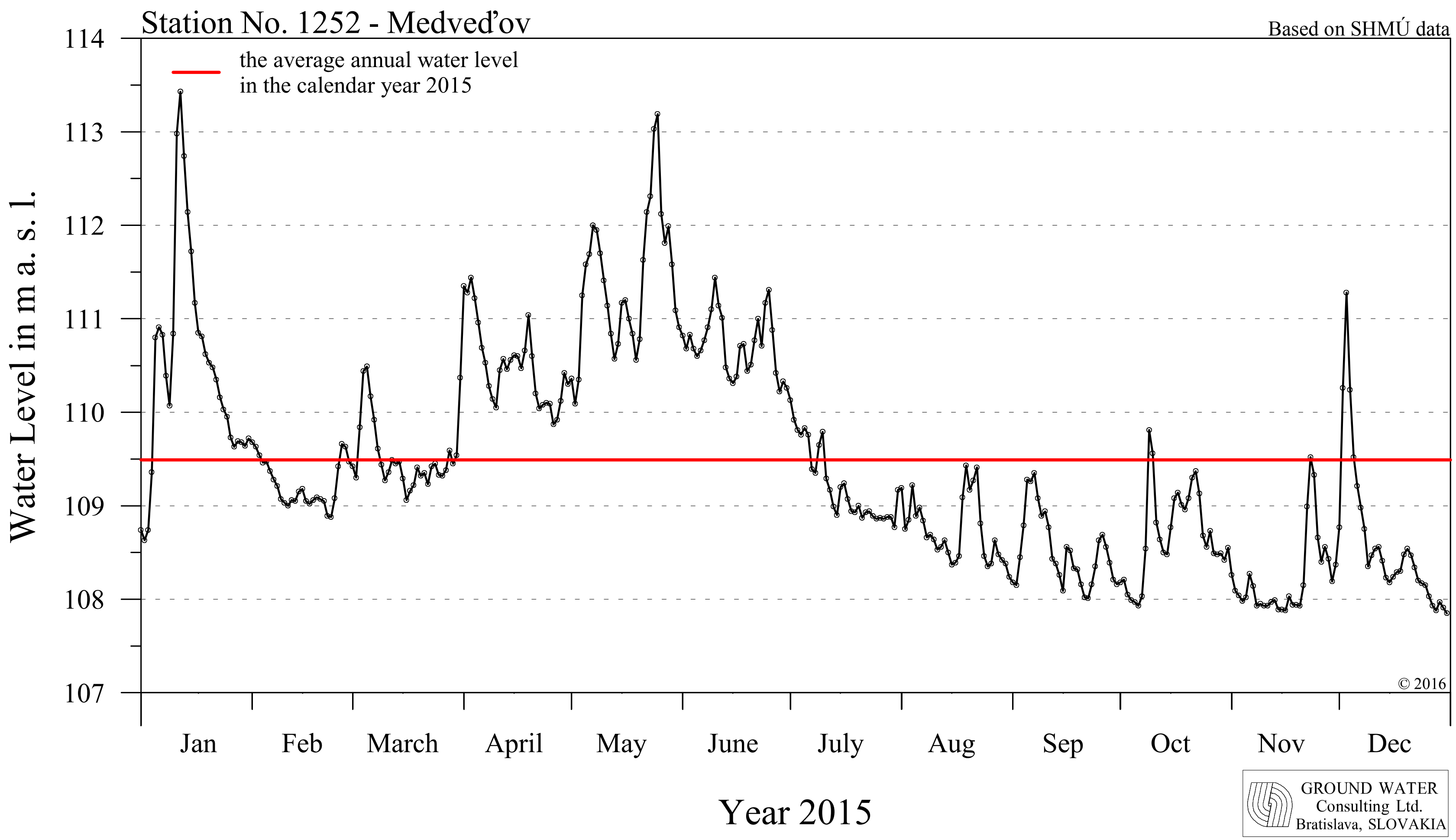


Fig. 1-10

Surface Water Level



PART 2

Surface Water Quality

The monitoring of surface water quality in 2015 have not changed. As in previous years the surface water quality on the Slovak territory was monitored at 15 sampling sites and on the Hungarian territory at 11 sampling sites. The list of sampling sites is presented in **Table 2-1**, and their location is shown in **Fig. 2-1**.

On all monitoring sites the influence of measures, described in the Agreement, on surface water quality was observed. The main factors that could affect the water quality, are: the backwater effect upstream of the submerged weir, increased discharges into the Danube downstream of the Čunovo dam and into the Mosoni branch of the Danube, the water supply into the right-side river branch system, and morphological changes in the riverbed.

Table 2-1: List of monitoring sites

	Country	Sampling site No.	Location and sampling site name
Slovak side			
1	**Slovakia**	**109**	Danube, Bratislava - middle
2	**Slovakia**	**4016**	Danube old riverbed, upstream of the submerged weir
3	**Slovakia**	**4025**	Danube old riverbed, Dobrohošť - left side
4	**Slovakia**	**3739**	Danube old riverbed, Sap – upstream of the confluence
5	**Slovakia**	**112***	Danube, Medveďov - middle
6	**Slovakia**	**1205**	Danube, Komárno - middle
7	**Slovakia**	**307**	reservoir, Kalinkovo - navigation line
8	**Slovakia**	**308**	reservoir, Kalinkovo - left side
9	**Slovakia**	**309**	reservoir, Šamorín - right side
10	**Slovakia**	**311**	reservoir, Šamorín - left side
11	**Slovakia**	**3530**	tail race canal, Sap - left side
12	**Slovakia**	**3529***	Mosoni Danube, Čunovo - middle
13	**Slovakia**	**3531***	right-side seepage canal, Čunovo - middle
14	**Slovakia**	**317**	left-side seepage canal, Hamuliakovo - middle
15	**Slovakia**	**3376**	left-side river arm system - Dobrohošť
Hungarian side			
1	**Hungary**	**0001***	Danube old riverbed, Rajka
2	**Hungary**	**0043**	Danube old riverbed, Dunakiliti, submerged weir, upstream
3	**Hungary**	**0042**	Danube old riverbed, Dunakiliti, submerged weir, downstream
4	**Hungary**	**0002**	Danube old riverbed, Dunaremete
5	**Hungary**	**2306***	Danube, Medve
6	**Hungary**	**1141**	Mosoni Danube, Vének
7	**Hungary**	**0082***	Mosoni Danube, Lock No. I
8	**Hungary**	**0084***	right-side seepage canal, Lock No. II
9	**Hungary**	**1112**	right-side river arm system, Helena
10	**Hungary**	**1114**	right-side river arm system, Szigeti arm, 42.2 km
11	**Hungary**	**1126**	right-side river arm system, Ásványráró, 23.9 km

* - jointly observed monitoring sites

Surface water quality and sediment quality data for agreed monitoring sites, and time series diagrams of individual surface water quality parameters, are presented in the Slovak and Hungarian National Annual Reports on the Environment Monitoring in 2015 or in their Annexes. Figures in the Joint Report represent the data of selected parameters at selected monitoring sites.

Table 2-2: Agreed limits for surface water quality classification

Parameter / Class	Unit	I.	II.	III.	IV.	V.
Temperature	°C	<20	25	27	30	>30
Electric conductivity	$mS.m^{-1}$	<40	70	110	130	>130
Suspended solids	$mg.l^{-1}$	<20	30	50	100	>100
pH	-	6.5-<8	8-<8.5	6-<6.5 8.5-<9.0	5.5-<6.0 9.0<9.5	<5.5 >=9.5
Fe	$mg.l^{-1}$	<0.5	1	2	5	>5
Mn	$mg.l^{-1}$	<0.05	0.1	0.3	0.8	>0.8
O_2	$mg.l^{-1}$	>7	6	5	4	<4
BOD_5	$mg.l^{-1}$	<3	5	10	25	>25
COD_{Mn}	$mg.l^{-1}$	<5	10	20	50	>50
TOC	$mg.l^{-1}$	<3	7	10	12	>12
NH_4^+	$mg.l^{-1}$	<0.26	0.39	0.77	1.93	>1.93
NO_3^-	$mg.l^{-1}$	<4.4	13.3	26.6	66.4	>66.4
NO_2^-	$mg.l^{-1}$	<0.03	0.20	0.39	0.99	>0.99
PO_4^{3-}	$mg.l^{-1}$	<0.15	0.31	0.61	1.53	>1.53
total N	$mg.l^{-1}$	<1.5	4	8	20	>20
total P	$mg.l^{-1}$	<0.1	0.2	0.4	1	>1
Cl^-	$mg.l^{-1}$	<100	150	200	300	>300
SO_4^{2-}	$mg.l^{-1}$	<150	250	350	450	>450
Dissolved solids	$mg.l^{-1}$	<300	500	800	1000	>1000
UV oil	$mg.l^{-1}$	<0.01	<0.05	0.1	0.3	>0.3
Zn	$\mu g.l^{-1}$	<2	5	10	50	>50
Cu	$\mu g.l^{-1}$	<1	2	4	10	>10
Cr	$\mu g.l^{-1}$	<1	2	4	10	>10
Cd	$\mu g.l^{-1}$	<0.05	0.1	0.2	0.5	>0.5
Hg	$\mu g.l^{-1}$	<0.05	0.1	0.2	0.5	>0.5
Ni	$\mu g.l^{-1}$	<0.5	1	2	5	>5
Pb	$\mu g.l^{-1}$	<0.5	1	2	5	>5
As	$\mu g.l^{-1}$	<0.5	1	2	5	>5
Saprobic index of biosestone	-	<1.8	2.3	2.7	3.2	>3.2
Saprobic index of macrozoobenthos	-	<1.8	2.3	2.7	3.2	>3.2
Saprobic index of phytobenthos	-	<1.5	2.0	2.5	3.0	>3.0
Chlorophyll-a	$mg.m^{-3}$	<10	35	75	180	>180

The results of monitoring of surface water quality at selected sampling sites, as assessed according to limits in **Table 2-2**, are shown at the end of this chapter**.**

2.1. General evaluation of the actual year

The year 2015 belonged to the dry years, it was less water bearing than the previous year. While in the year 2014 the average annual flow rate was 1788 $m^3.s^{-1}$, in the evaluated year it was only 1700 $m^3.s^{-1}$. This value represents the second lowest average annual flow rate since the year 1990, and it was the same as in 2011. Lower was only the average annual flow rate in 2003 (1646 $m^3.s^{-1}$). After a significant warming the highest discharge wave occurred in January, which peaked on January 11, 2015 at 5262 $m^3.s^{-1}$. Slightly lower discharge waves in late May (May 24, 2015) achieved 5240 $m^3.s^{-1}$ at culmination. Lower discharge waves were recorded also at the beginning of March (March 5, 2015), April (April 2, 2015) and May (May 7, 2015), with the highest flow rate of 3781 $m^3.s^{-1}$ in May. During June, there were two increases of flow rates, which only just exceeded 3000 $m^3.s^{-1}$. and then the flow rate in July and August gradually declined to values below 1500 $m^3.s^{-1}$ and at the end of August it even dropped below 1000 $m^3.s^{-1}$. Slight and short-term increases of flow rate were recorded in August, at the beginning of September and in early October. However, in neither case they exceeded 2000 $m^3.s^{-1}$. More significant discharge wave occurred in early December (December 2, 2015), when the flow rate peaked at 2987 $m^3.s^{-1}$. The lowest flow rate was recorded at the end of the year, when on December 31, 2015 dropped to 789 $m^3.s^{-1}$. The average daily flow rates in the evaluated year mostly fluctuated below the long-term average daily flow rates (averages for the period 1901-2014). Significantly above the long-term average the flow rates increased in January and in May and slight increases were recorded also at the beginning of March, April and early in December. Significantly below the long-term average, the average daily flow rates ranged from July to September and in the first two decades of November.

The average daily air temperatures were most of the year above the long-term daily averages (averages for the period 1961-2014 at station Bratislava-airport), similarly as in 2014. Values significantly above the long-term average occurred in January, from February to April, early June, in July and October. More significant cooling down, when the air temperature has dropped below the long-term normal, occurred in the first half of February, at the turn of March-April, in the second half of May and June. Moderate cooling down, when the average daily temperature fluctuated near to the long-term average daily temperatures, were recorded in late September and in October.

The year 2015 was below the average in terms of precipitation totals (at the station Bratislava-airport the third lowest precipitation amount was recorded since 1992). Higher monthly precipitations amounts have been recorded in January, May, August and October, with the maximum of 82.4 mm in October. In the other months the precipitation totals ranged around 30 mm or lower, and the lowest value of 15.2 mm was recorded in June.

2.2. Basic physical and chemical parameters

<u>Water temperature</u>

The development of water temperature during the year is closely related to climatic and hydrological conditions. The course of measured water temperature values shows a seasonal character and the fluctuation of its values is similar, except the sampling sites in the seepage canals. The water temperature in the winter period is low and maximal values occur in the summer period. In the year 2015, the lowest values occurred in late January or early February. The lowest water temperature of 1.7 ° C was recorded at the beginning of February on the common sampling site No. 3529/0082 in the Mosoni Danube at Čunovo/Rajka. Maximal water temperatures were recorded during the hottest period of the year - in July and August. The highest temperature of water in the evaluated year (25.6 °C) was recorded in July on the sampling site No. 308 in the upper part of the reservoir and in August on the sampling site No. 1141 in the Mosoni Danube at Vének (**Fig. 2-3**). In connection with the significant warming in April, May and especially in the first half of

June temporary increase of water temperature occurred at some sampling sites, the most considerable on the sampling site No. 308 in the upper part of the reservoir, where the water temperature in June achieved rather high value of 23.3 °C (**Fig. 2-3**). The water temperature in the main flow of the Danube ranged from 2.0 to 24.96 °C. In the Danube old riverbed, in the tail-race canal, in the river branch system and in the reservoir (except the sampling site No. 308) fluctuated in a narrower range from 2.7 to 23.0 °C. The water temperature in the Mosoni Danube at the sampling site No. 1141 at Vének reached higher values than at the common sampling site No. 3529/0082 at Čunovo/Rajka (2.2-25.6 °C versus 1.7-22.1 °C). The most balanced water temperature was characteristic for the water in the left-side seepage canal at Hamuliakovo (sampling site No. 317), where it fluctuated from 9,9 to 15.7 °C (**Fig. 2-3**). The water temperature in the right-side seepage canal in the evaluated year ranged in wider range, from 5,2 to 18.0 °C. Compared with the previous year, the water temperatures values at individual sampling points were higher or similar. An exception was the sampling points in the reservoir (No. 309), where the water temperature declined and slight decrease was recorded also in the left-side seepage canal at Hamuliakovo (No. 317.

pH

The water quality indicator pH is closely related to the development of phytoplankton. Higher values occur in seasons corresponding to periods with increased assimilation activity of phytoplankton. The pH values in 2015 in comparison to the previous year at individual sampling sites ranged in narrower ranges. The highest values occurred in the period from March to May, during the main development of phytoplankton. Besides the highest spring values, increase of pH at some sampling sites was recorded also in July and late September. Overall, the pH values in 2015 varied in the range from 7.69 to 8.77. The lowest value was measured in August on the sampling site No. 1141 in the Mosoni Danube at Vének, and the highest in March on the sampling site No. 1126 in the Ásványi river branch. On the common sampling site No. 3531/0084 in the right-side seepage canal at Čunovo/Rajka the Hungarian Party in November recorded lower value of pH than at Vének (7.15), but this value was not confirmed by the Slovak Party, which at that time measured value of 7.96. The pH value in the Danube old riverbed on the right side (Hungarian territory) varied in the range 7.77 - 8.70, and on the left side (Slovak territory) it fluctuated in a narrower range 7.96 - 8.39. The differences in pH values measured by the Hungarian and the Slovak Parties can be seen especially at jointly monitored sampling sites (**Fig. 2-4**). In the year 2015 these differences were similar as in the previous year. The pH values in the main flow of the Danube ranged from 7.83 to 8.32 and in the reservoir from 8.06 to 8.54. The narrowest range was characteristic for the seepage canals. In the left-side seepage canal the pH fluctuated from 7.83 to 8.15 (sampling site No. 317 at Hamuliakovo), in the right-side seepage canal from 7.73 to 8.09 (sampling site No. 3531/0084 at Čunovo/Rajka), except the above mentioned low value. The pH values compared to the year 2014 on most locations decreased. Exceptions were two sampling sites, No. 308 in the reservoir and No, 1126 in the Ásványi river arm, where the pH values in comparison with the previous year slightly increased. The development of pH values at selected sampling sites is shown in **Fig. 2-4**.

Specific electric conductivity

The specific electric conductivity of surface water refers to the content of dissolved salts of mineral origin. It has a seasonal character, which is in seepage canals less pronounced. Values are higher in winter months, lower values occurs during summer. The development of values at individual localities in the year 2015 was very similar, with a declining trend from March to May and at some sampling sites until August. Maximal values were recorded in February, minimums from May to August, depending on the sampling site. Since September the conductivity started to increase again. On the sampling site No. 1141 in the Mosoni Danube at Vének the conductivity varied from 39.7 to 87.0 $mS.m^{-1}$ and it was slightly higher than in 2014 (31.4 to 72.5 $mS.m^{-1}$). On the other observed sampling sites it varied in the range from 27.6 to 56.5 $mS.m^{-1}$. The dissolved salts content in seepage canals is rather stable over the year. The electric conductivity values fluctuates in narrow ranges and in the evaluated year the lowest spread of values (41.8-49.6 $mS.m^{-1}$) was typical for water in the left-side seepage canal (sampling site No. 317 at Hamuliakovo). The conductivity values in 2015 slightly increased or were similar as in the previous year. The Slovak Party again measured higher values of conductivity than the Hungarian Party. This fact is most visible at jointly monitored sampling sites (**Fig. 2-5**).

Suspended solids

The suspended solids content is closely related to the flow rate. It increases at flood/discharge waves and higher values are characteristic mainly for the summer period. The year 2015 was low water bearing, the discharge waves were lower than in 2014 and mostly of short duration. The highest discharge wave atypically occurred in January (culmination on January 11, 2015 at 5262 $m^3.s^{-1}$) and the second, slightly lower, in late May (culmination on May 24, 2015 at 5240 $m^3.s^{-1}$). Flow rates around 3000 $m^3.s^{-1}$ occurred in early April, during June and at the beginning of December. In summer and autumn flow rates were low and occasional increases have not exceeded 2000 $m^3.s^{-1}$. Accordingly to the above, the highest contents of suspended solids at individual sampling sites were recorded in January, May or in June, slight increase of suspended solids content in the reservoir was documented also at the beginning of December. The annual maximum of 146 $mg.l^{-1}$ was recorded in January on the sampling site No. 109 in the Danube at Bratislava, and slightly lower content (108 $mg.l^{-1}$) in June. was . The other contents at this sampling site ranged maximally up to 32 $mg.l^{-1}$. The contents on the other locations in the main riverbed and in the Danube old riverbed varied in the range from <2 to 60.6 $mg.l^{-1}$. Similar range was characteristic also for the Helena river arm (2 - 54 $mg.l^{-1}$), while the contents in the Szigeti and Ásványi river arms were lower, maximally up to 34 $mg.l^{-1}$. In the Mosoni Danube at Čunovo/Rajka (sampling site No. 3529/0082) in January was measured higher content of suspended solids (75 $mg.l^{-1}$ by the Slovak party or 63 $mg.l^{-1}$ by the Hungarian Party). The other contents fluctuated maximally up to 34 $mg.l^{-1}$, similarly as at Vének (sampling site No. 1141). Contents in the upper part of the reservoir (<2 - 97.0 $mg.l^{-1}$) were higher than in the lower part (<2 - 38.6 $mg.l^{-1}$). The lowest contents of suspended solids are typical for the water-in seepage canals, where in the evaluated year varied from <2 to 13 $mg.l^{-1}$. Compared with the previous year, the content of suspended solids in 2015 was lower, and in the lower part of the reservoir and in the seepage canals similar. Exceptions were the sampling sites in the upper part of the reservoir (No. 307 and 308) and in the tail-race canal (No. 3530), where higher contents than in 2014 were recorded. The content of suspended solids measured downstream of reservoir (sampling site No. 112/2306 at Medveďov) during discharge waves was lower than in the Danube at Bratislava, what reflects the settling effect of the reservoir. The suspended solids content at selected sampling sites is shown in **Fig. 2-6**.

Iron

The amount of suspended solids influences the iron content in the surface water, therefore higher iron content occurs in samples taken during higher flow rates. The iron content on the sampling site No. 109 at Bratislava, where it is usually the highest, was not determined in 2015. The iron content in the evaluated year the Slovak Party did not observed even on the common sampling sites at Medveďov, in the Mosoni Danube and in the seepage canal at Čunovo/Rajka. The highest iron concentrations 0.96 $mg.l^{-1}$ was recorded on the sampling site No. 1141 in the Mosoni Danube at Vének in early November. Maxima on the other sampling sites occurred in may, June or in December, on the sampling site No. 308 in the reservoir it was in April. Besides the highest concentration (0.96 $mg.l^{-1}$) the iron content varied in the range <0.01 to 0.88 $mg.l^{-1}$. Lower contents (up to 0.38 $mg.l^{-1}$) were recorded on sampling sites in the Danube at Medveďov (No. 2306), in the Mosoni Danube at Rajka (No. 0082), in the left-side river branch system at Dobrohošť (No. 3376) and in the lower part of the reservoir (No. 309, 311). Similarly as in the case of suspended solids, the iron contents in the upper part of the reservoir were higher than in the lower part and varied from 0.04 to 0.65 $mg.l^{-1}$. The lowest iron concentrations are characteristic for the seepage water. In the evaluated year the iron content in the left-side seepage canal at Hamuliakovo (sampling site No. 317) varied in the range from <0.01 to 0.18 $mg.l^{-1}$, in the right-side seepage canal at Rajka (No. 0084) two higher value occurred: 0.36 $mg.l^{-1}$ in August and 0.58 $mg.l^{-1}$ in December. Overall, the iron contents on monitored sampling sites, compared with the previous year, were similar or higher, only in the Mosoni Danube lower highs were recorded.

Manganese

The manganese content in the evaluated year was low. Like the iron, manganese was not monitored by the Slovak party on sampling sites in the Danube at Bratislava and Medveďov, and in the Mosoni Danube and in the right-side seepage canal at Čunovo. Maximum (0.15 $mg.l^{-1}$) was recorded in August in the left-side seepage canal at Hamuliakovo (sampling site No. 317). The other concentrations at this location varied in the range from 0.03 to 0.09 $mg.l^{-1}$. Sporadic higher concentrations occurred also in the Danube old riverbed at Rajka (0.10 $mg.l^{-1}$) and in the Danube at Komárno (0.08 $mg.l^{-1}$). The other concentrations in the main riverbed and in the river branch system were low, varied from 0.01 to 0.03 $mg.l^{-1}$, in the Danube old riverbed, in the reservoir and in the tail-race canal they fluctuated up to 0.06 $mg.l^{-1}$. On the sampling site in the Mosoni Danube at Rajka (No. 0082) the manganese concentrations were lower (only one measured value at the level of determination limit 0.02 $mg.l^{-1}$) than on the sampling site at Vének (No. 1141), where they varied from <0.02 to 0.08 $mg.l^{-1}$. The manganese contents were mostly lower in comparison with the previous year, only at sampling site in the reservoir they were slightly higher, and more significant increase was documented in the left-side seepage canal at Hamuliakovo.

2.3. Cations and Anions

The quantitative ratio of ionic composition of the surface water in the year 2015 showed high stability, just as in previous years. The seasonal fluctuation of individual ion contents followed the changes of conductivity. Changes of dissolved solids content are related to the flow rate fluctuation in the Danube. Compared to the long-term measurements the values of basic cations and anions have not changed. The development of cations and anions concentrations at particular sampling sites was similar. Higher content of salts is characteristic for the sampling site in the Mosoni Danube at Vének, because of its tributaries and cleaned wastewater from Győr. The average values of sodium, potassium, chlorides and sulphates at Vének exceeded the average values registered at the other sampling sites. The most stable ionic composition is characteristic for seepage water. In comparison to the year 2014 increase of sodium and calcium concentrations was recorded in the evaluated year, while the content of magnesium have not changed. From among anions only the chloride content has increased. Sulphates and bicarbonates in the evaluated year fluctuated in similar ranges as in 2014, slight increase of sulphates have been recorded only in the right-side river branch system. Special development of cations and anions was observed at the sampling site in the Mosoni Danube at Vének. Contents were higher than in the previous year, only the content of sulphates was similar. The highest concentrations were registered in February, what correlates with the highest conductivity value recorded at this sampling site..

2.4. Nutrients

<u>Ammonium ion</u>

At sampling sites on the right bank of the Danube old riverbed and in the right-side river branch system (sampling sites observed by the Hungarian Party) the ammonium ion contents decreased in the evaluated year. On the other sampling sites increase of ammonium concentrations was documented. In the Mosoni Danube at Vének (sampling site No. 1141) the development of ammonium ion content was specific, values have not achieved such high maxima as in the year 2014 (0.31 and 0.21 $mg.l^{-1}$), but over the year several higher values were recorded, but which did not exceeded 0.16 $mg.l^{-1}$. The highest concentration of 0.18 $mg.l^{-1}$ in the evaluated year was recorded at the common sampling site No. 1203/0001 in the Danube old riverbed at Rajka, the other concentrations at this sampling site varied in the range from 0,03 $mg.l^{-1}$ to 0,10 $mg.l^{-1}$. The lowest values were recorded at sampling sites on the right bank of the Danube old riverbed and in the right-side river branch system, they varied from 0.02 to 0.07 $mg.l^{-1}$. n the other sampling sites concentrations ranged up to 0.14 $mg.l^{-1}$. Low values occurred mainly in the spring months (March-May). The maximal values at individual sampling sites occurred at the beginning of the year, in summer months (July-August) or at the end of the year, depending on the sampling site. The values over the year were mostly volatile (higher values were alternated with low values).

<u>Nitrates</u>

In the case of nitrates seasonal fluctuation of measured values is characteristic, which is less remarkable in seepage canals. Seasonal fluctuation is related to the growing season and the consumption of nutrients in the water. In the growing period the nutrient content usually falls to a half of the winter amount. The highest concentrations of nitrates in the evaluated year were recorded in January or in February. Subsequently the concentrations until May gradually declined. At the end of May it cooled down and due to precipitations in the German and Austrian catchment area significant discharge wave occurred, what caused an increase of nitrates content in samples taken at the beginning of June. Another increase of nitrate content was repeated during cooling down at the end of June (**Fig. 2-7**). The lowest concentrations were recorded in July and August, from September they started to rise again and in December ranged between 8-10 $mg.l^{-1}$. Except the seepage canals the course of nitrates at individual sampling sites was similar and their concentrations varied from <4.0 to 14.3 mg.l^{-1}. The lowest nitrates content was characteristic for the seepage water, where the seasonality is not as pronounced. The content of nitrates in seepage canals varied from 2.9 to 9.0 mg.l^{-1}. Compared to the previous year, it can be concluded that nitrates concentrations in the evaluated year slightly increased and only at the sampling site in the Mosoni Danube at Vének achieved lower values than in the previous year.

Nitrites

In general, higher contents of nitrites occurred in colder months (January, February and December) and during discharge waves or after cooling down (in May, June and August). In the Danube old riverbed at Dunakiliti upstream of the submerged weir (sampling site No. 0043 on the right bank and No. 4016 on the left bank) also in July. Overall the content of nitrites varied from 0.100 to 0.105 mg.l^{-1}. The highest value was recorded on the sampling site No. 4016 upstream of the submerged weir in February and on the sampling site No. 1141 in the Mosoni Danube at Vének in May. In the Danube main riverbed and in the Mosoni Danube at Čunovo/Rajka the content of nitrites fluctuated maximally up to 0.084 mg.l^{-1} and in the right-side river branch system up to 0.078 mg.l^{-1}. The highest nitrites contents over the year were documented on the sampling site in the Mosoni Danube at Vének (0.043 to 0.105 mg.l^{-1}) and the lowest on the common sampling site in the right-side seepage canal at Čunovo/Rajka (0.016 to 0.062 mg.l^{-1}). The content of nitrites in the evaluated year was higher or similar as in the year 2014, depending on the sampling site.

Total nitrogen

The total nitrogen belongs to water quality parameters with significant seasonal fluctuation. Changes of total nitrogen in the water follow the seasonal changes of nitrates. The highest contents in the evaluated year were achieved in colder periods (early in February, or in seepage canals in March), the lowest concentrations occurred during summer months (in July and August). Since August the contents of total nitrogen gradually increased and in December they varied between 2-3 mg.l^{-1}, in the seepage canals between 1-2 mg.l^{-1}. The highest concentrations in the year 2015 were recorded in February in the river branch system, when total nitrogen content of 5.67 mg.l^{-1} was measured in the Helena river arm and slightly lower value of 4.47 mg.l^{-1} in the Szigeti river arm (**Fig. 2-8**). The other concentrations in the river branch system varied in the range 1.18 to 3.60 mg.l^{-1}. The concentrations in the Danube old riverbed on the left bank varied in a narrower range (1.15 to 3.09 mg.l^{-1}) than on the right bank (1.29 to 4.30 mg.l^{-1}). Higher concentrations in the Danube old riverbed on the right bank and in the Helena river arm occurred also at the end of May and late August with a maximum of 2.90 mg.l^{-1} (**Fig. 2-8**). The total nitrogen content in the main riverbed and in the reservoir varied from <1 to 3.48 mg.l^{-1}, in the Mosoni Danube up to 3.95 mg.l^{-1}. The seasonal fluctuation in the seepage canals is less remarkable and regarding the origin of water the total nitrogen content is lower. In the left-side seepage canal (sampling site No. 317 at Hamuliakovo) the total nitrogen in the evaluated year fluctuated in a narrow range from <1.0 to 1.98 mg.l^{-1}. In the right-side seepage canal at Čunovo/Rajka (common sampling site No. 3531/0084) the differences in values determined by the Slovak and Hungarian Parties were lower than in 2014. The total nitrogen content fluctuated here from 0.83 to 2.27 mg.l^{-1}, with one higher concentration of 3.70 mg.l^{-1} measured by the Slovak Party in March, the Hungarian Party in that time measured only 2.27 mg.l^{-1}. Similarly as in the case of nitrates the total nitrogen contents have increased, except the sampling site in the Mosoni Danube at Vének, where in comparison with the previous year they have decreased and were similar as on the other sampling sites (**Fig. 2-8**).

Phosphates

Higher concentrations of phosphates are characteristic for colder months and during high flow rates. Low values are typical for the vegetation period, when intensive growth of algae going on. The main wave of phytoplankton development in the evaluated year was documented in the spring months and low contents of phosphates were recorded from late February to May. In connection with the milder summer wave of phytoplankton development the content of phosphates on some sampling sites in the Danube old riverbed, in the tail-race canal and in the lower part of the reservoir decreased also in July (**Fig. 2-9**). The highest contents of phosphates at particular sampling sites occurred mostly in January or December samples. Exceptions were the sampling sites in the Danube old riverbed at Rajka (No. 1203/0001) and in the Danube at Medveďov (112/2306), where the maxima were achieved in May, in the Mosoni Danube at Vének (No. 1141) early in June, and in the Danube at Bratislava (No. 109) the highest concentration (0.552 $mg.l^{-1}$) was recorded in August, what represents the maximum for the year 2015. The Slovak Party on common sampling sites measured also rather high concentrations, which however were not confirmed by the Hungarian measurements (in the Danube 0.368 $mg.l^{-1}$, in the Danube old riverbed at Rajka 0.368 and 0.399 $mg.l^{-1}$, in the Mosoni Danube at Čunovo/Rajka 0.430 $mg.l^{-1}$, and in the right-side seepage canal at Čunovo/Rajka 0.307 $mg.l^{-1}$,) The Hungarian Party in the same timing measured much lower values, maximally 0.230 $mg.l^{-1}$ in the Danube at Medveďov. After excluding these concentrations, the phosphates content in the evaluated year ranged from <0.030 to 0.270 $mg.l^{-1}$. In the river branch system, in the tail-race canal and in the reservoir they fluctuated maximally up to 0.170 $mg.l^{-1}$ and in the seepage canals up to 0.153 $mg.l^{-1}$. Compared with the previous year the contents of phosphates were lower or similar, with higher maxima recorded by the Slovak Party in the Danube at Bratislava and on the common sampling sites. However, these values were not confirmed by the measurements of the Hungarian Party.

Total phosphorus

Changes of the total phosphorus content in time only partially follow the quantitative changes of phosphates. The increase of its concentration in surface water is often caused by phosphorus bound to suspended solids. Therefore higher concentrations can occur in connection with discharge waves. Such concentrations in the evaluated year occurred at some sampling sites in January, at the end of May or June, and early in December. Overall the total phosphorus content varied in the range from 0.02 to 0.19 $mg.l^{-1}$. On sampling sites in the Danube at Bratislava (No. 109) and at Medveďov (No.112), where the total phosphorus content is usually the highest, the Slovak Party observed this parameter only at the beginning of the year (in January 0.17 $mg.l^{-1}$ was measured on both locations). The Hungarian Party at Medveďov in January measured 0.15 $mg.l^{-1}$, the other concentrations were lower, maximally up to 0.08 $mg.l^{-1}$. The highest concentration in 2015 (0.19 $mg.l^{-1}$) was recorded on three sampling sites: in the Mosoni Danube at Rajka (No. 0082), in the river branch system (No. 1112) and in the upper part of the reservoir (No. 308). On sampling site No. 1141 in the Mosoni Danube at Vének, specific development of this parameter is characteristic, and usually achieves the highest values. In 2015 the values over the year were slightly higher than on the other locations, but they have not exceeded 0.17 $mg.l^{-1}$. Different course of concentrations was recorded on the sampling site No: 308 in the upper part of the reservoir, where three higher concentrations were registered in

April and May, with the maximum of 0.19 mg.l^{-1} (**Fig. 2-10**). The lowest contents in the evaluated year were recorded in the right-side seepage canal at Rajka (sampling site No. 0084), where the total phosphorus fluctuated in the range from 0.02 to 0.06 mg.l^{-1}. Compared with the year 2014 the total phosphorus contents were lower or similar. The time course of total phosphorus concentrations in the year 2015 at selected sampling sites is shown in **Fig. 2-10**.

2.5. Oxygen regime parameters

Dissolved oxygen

The dissolved oxygen content in the surface water is, besides the decay processes of organic pollution, affected by hydro-meteorological conditions and by assimilation activity of phytoplankton. The dissolved oxygen content proportionally decreases with increasing water temperature. Lower values in the year 2015 were recorded from June to September, depending on the sampling site location and the lowest oxygen concentrations occurred mainly in July and August. The highest concentrations were recorded mostly in March. Time series data of dissolved oxygen on sampling sites in the Danube main riverbed and in the Mosoni Danube were, unlike the other locations, relatively balanced. Except the right-side seepage canal the dissolved oxygen concentrations have not decreased below 7 mg.l^{-1}, which is the limit for the I. quality class according to the **Table 2-2**, and the oxygen content fluctuated in the range from 7.2 to 14.5 mg.l^{-1}. In connection with the decrease of water temperature during the discharge waves in May and June, increased values were recorded at some sampling sites in the Danube old riverbed and in the reservoir. On the sampling site No. 308 in the upper part of the reservoir such values also occurred in the hottest period of the year, in July and August, and were probably related to overgrowth of macrophytes in this shallowest part of the reservoir (**Fig. 2-11**). Also the highest dissolved oxygen concentration in the evaluated year, 14.5 mg.l^{-1}, was recorded at this sampling site. The same value was measured by the Hungarian Party in January at common sampling site in the Mosoni Danube at Čunovo/Rajka (No. 3529/0082), but the Slovak Party at the same time recorded lower value of 13.7 mg.l^{-1}. In the left-side seepage canal at Hamuliakovo (sampling site No. 317) the dissolved oxygen concentrations in the evaluated year fluctuated in a fairly wide range, from 7.9 to 13.6 mg.l^{-1}. In the narrowest range the oxygen content varied at the sampling site No. 0042 on the right side of the Danube old riverbed downstream of the submerged weir at Dunakiliti (10.3 to 13.4 mg.l^{-1}). In the right-side seepage canal on the common sampling site No. 3531/0084 at Čunovo/Rajka the oxygen conditions compared to 2014 slightly deteriorated, but the oxygen concentrations did not reach such low values as in the year 2013. The Slovak Party has recorded values lower than 7 mg.l^{-1} in four occasions (from July to October), with the minimum of 5.6 mg.l^{-1}. The Hungarian Party in the same dates has measured slightly higher values, with a minimum of 6.3 mg.l^{-1}.

Generally it can be stated, that the oxygen conditions in the year 2015 were mostly good, only in the right-side seepage canal they slightly deteriorated in comparison with the previous year. The dissolved oxygen content on observed sampling sites varied mostly in wider ranges and achieved higher values. Exceptions were the sampling sites on the right bank of the Danube old riverbed and in the right-side river branch system, where contents compared to the year 2014 slightly decreased.

COD_{Mn} and BOD_5

COD_{Mn} and BOD_5 parameters are used for expression of organic contamination of water, they indicate the chemically and biologically degradable organic matter content. Higher values of COD_{Mn} and BOD_5 usually occur in periods with higher flow rates in the Danube, when the water contains higher amount of natural organic matter. In the Mosoni Danube and in the right-side seepage canal the Slovak Party in 2015 did not observed the COD_{Mn} parameter.

In the evaluated year 2015 have not occurred such a high values as in the previous year. The COD_{Mn} values varied in the range from <0.8 to 6.3 $mg.l^{-1}$. The highest value was recorded in January on the sampling site No. 0084 in the Mosoni Danube at Rajka, and it was probably related to the discharge wave. Except this value the COD_{Mn} at this sampling site varied up to 3.8 $mg.l^{-1}$. In the Danube main riverbed and in the Danube old riverbed it was maximally up to 4.4 $mg.l^{-1}$. One higher value (5.8 $mg.l^{-1}$) occurred also in the reservoir in April at sampling site No. 308, the others fluctuated in the range from <0.8 to 4.2 $mg.l^{-1}$. The highest values over the year were characteristic for the location in the Mosoni Danube at Vének, where the COD_{Mn} ranged from 2.8 to 5.9 $mg.l^{-1}$. The poorest water in terms of organic contamination was the water in seepage canals, where the COD_{Mn} values fluctuated in a narrow range, from 0.9 to 2.2 $mg.l^{-1}$ (sampling sites No. 317 and 0084). In general it can be concluded that the contamination by organic matter expressed by COD_{Mn}, compared to the previous year, has decreased.

In the case of BOD_5 water quality parameter, the biggest differences in values measured by the Hungarian and the Slovak Parties are characteristic in long-term, what is most visible at common sampling sites (**Fig. 2-12**). Higher values are determined by the Hungarian Party. In 2015 the BOD_5 values determined by the Hungarian Party fluctuated from <0.82 to 8.0 $mg.l^{-1}$ (maximum on the sampling site No. 0084 in the Mosoni Danube at Rajka), while Slovak values ranged from 0.4 to 3.1 $mg.l^{-1}$ (maximum on the sampling site No. 109 in the Danube at Bratislava). High values of BOD_5 were registered mainly in January, February, March and November at sampling site on the right side of the Danube old riverbed with a maximum of 6.8 $mg.l^{-1}$, in the right-side river branch system with a maximum of 7.8 $mg.l^{-1}$, and in the Mosoni Danube at Čunovo/Rajka with a maximum of 8.0 $mg.l^{-1}$. In the Mosoni Danube at Vének the BOD_5 fluctuated in a narrower range (from 1.3 to 5.3 $mg.l^{-1}$) than in the year 2014 (from 1.3 to 6.7 $mg.l^{-1}$). High values occurred also in the right-side seepage canal at the common sampling site No. 3531/0084 at Čunovo/Rajka (up to 7.5 $mg.l^{-1}$), but the maximum recorded by the Slovak Party was only 1.8 $mg.l^{-1}$ (**Fig. 2-12**). The lowest values, similarly as in the case of COD_{Mn}, were characteristic for the left-side seepage canal at Hamuliakovo (sampling site No. 317), where they fluctuated in the range from 0.8 to 1.2 $mg.l^{-1}$. In comparison with the year 2014 the contamination by organic substances expressed by BOD_5 indicator slightly decreased, with the exception of values measured by the Hungarian Party at the common sampling site in the Mosoni Danube at Čunovo/Rajka, which were higher than in 2014. The Slovak Party however, recorded similar values as in the previous year.

2.6. Heavy metals

From among heavy metals the joint monitoring includes observation of zinc, mercury, arsenic, copper, chromium, cadmium, nickel and lead contents. In 2015 the Slovak Party did not observed heavy metals at sampling site: No. 3376 in the left-side river branch system at Dobrohošť, on sampling site No. 3529 in the Mosoni Danube at Čunovo and on sampling site No. 3531 in the right-side seepage canal at Čunovo. Generally, the contents of heavy metals in the evaluated year were low. In the case of cadmium and chromium all concentrations in the evaluated year were below the detection limits, in the case of mercury, lead, arsenic and zinc most of values were below the detection limits.

The highest zinc content of 20 $\mu g.l^{-1}$ was recorded on the sampling site No. 109 in the Danube at Bratislava. Except this one value all other were lower than 20 $\mu g.l^{-1}$, what is the detection limit in case of analyses carried out by VÚVH. In the case of Hungarian data all values were lower than 10 $\mu g.l^{-1}$. At sampling sites monitored by the organization SVP-BA were lot of values lower than the detection value, thus lower than 1 $\mu g.l^{-1}$. Measured concentrations ranged from 1.9 to 15.8 $\mu g.l^{-1}$, similarly as in the year 2014 (1.1-14.2 $\mu g.l^{-1}$).

In the case of mercury only at two sampling sites in the Danube three values higher than the detection limit were determined by the Slovak Party (at Bratislava 0.031 $\mu g.l^{-1}$ and 0.045 $\mu g.l^{-1}$, and at Medveďov 0.025 $\mu g.l^{-1}$). At the common sampling site No. 112/2306 at Medveďov, the Hungarian Party, however, at the same time has determined a concentration lower than the detection limit, <0.02 $\mu g.l^{-1}$. The other values of mercury were lower than <0.02 $\mu g.l^{-1}$ or lower than 0.05 $\mu g.l^{-1}$, what are the limits of determination for the Hungarian and Slovak data.

Arsenic concentrations ranged below 5.0 $\mu g.l^{-1}$, what is the detection limit value in the case of analyses carried out by SVP-BA. At sampling sites observed by VÚVH or Hungarian Party the arsenic concentrations fluctuated in the range from <0.9 to 1.9 $\mu g.l^{-1}$. Measured values occurred only at six of sampling sites, with a frequency 1-2 times.

All concentrations of chromium fluctuated below 2 $\mu g.l^{-1}$ or 0.5 $\mu g.l^{-1}$, for analysis carried out by the Slovak Party (in the case of VÚVH, the determination limit has been reduced to the level of determination limit of SVP-BA, what is 0.5 $\mu g.l^{-1}$, in September) or below 1.7 $\mu g.l^{-1}$ in case of Hungarian data.

Similarly as in the case of chromium, all cadmium concentrations were lower than 0.10 $\mu g.l^{-1}$ or 0.08 $\mu g.l^{-1}$ at sampling sites observed by the Slovak Party (in the case of VÚVH, the determination limit has been reduced to the level of determination limit of SVP-BA, what is 0.5 $\mu g.l^{-1}$, in October), and lower than 0.1 $\mu g.l^{-1}$ in the case of Hungarian sampling sites.

The lead contents in the evaluated year has varied in the range from <0.7 to 1.9 $\mu g.l^{-1}$. At eight sampling sites the concentration above the detection limit was recorded once, and on the sampling site in the Danube at Bratislava it was twice. The other contents were below the determination limit, thus lower than 1 $\mu g.l^{-1}$, in the case of Slovak data and below 0.7 $\mu g.l^{-1}$ in the case of Hungarian data.

The highest frequency of concentrations above the detection limit is characteristic for copper. Except two higher values, the copper concentrations in the evaluated year has ranged from <0.5 to 4.7 $\mu g.l^{-1}$. Higher copper content of 8.5 $\mu g.l^{-1}$ was recorded in August in the Szigeti river arm (sampling site No. 1114) and the highest content of 12.2 $\mu g.l^{-1}$ in 2015 was measured in February on the sampling site in the Mosoni Danube at Rajka (No. 0082).

The content of nickel in the surface water in the year 2015 was slightly lower than in the previous year. It varied in the range from <0.7 to 4.5 $\mu g.l^{-1}$ (in 2014 up to 8.1 $\mu g.l^{-1}$). Most of the values were below the detection limit. Maximum was measured in December on the sampling site No. 109 in the Danube at Rajka.

In summary it can be concluded that heavy metal concentrations, which were determined from filtered samples, were low during the evaluated year. Two higher concentrations occurred in the case of copper. A large part of the measured values was below the detection limits of applied analytical methods. Low concentrations were characteristic mainly for chromium and cadmium. The highest frequency of concentrations above the detection limit was characteristic for copper. Compared to the previous year, the concentrations of observed heavy metals were similar or lower, and no significantly higher concentrations occurred, as it was in 2014 in the case of zinc, lead and especially copper.

The detection limits of particular heavy metals often correspond to the II., III. or IV. class of surface water quality according to the **Table 2-2**. The detection limits differ depending on the laboratory. The evaluation of heavy metals according to the agreed limits (**Table 2-2**) at selected sampling sites is given in **Table 2-8**.

Based on the comparison of heavy metal concentrations with the limits pursuant to the Directive of the European Parliament and of the Council No. 2008/105/EC on environmental quality standards, and limits according to the national standards (Hungarian standard MSZ No. 12749 „The quality of surface water, quality characteristics and evaluation" and „Regulation of the Government of the Slovak Republic No. 269/2010 Z.z., laying down the requirements for achieving good water status") it can be stated, that in the year 2015 concentrations of heavy metals were in compliance with environmental quality standards.

2.7. Chlorophyll-a

Chlorophyll-a content refers to the amount of phytoplankton and provides information about the eutrophic status of water. The amount of chlorophyll-a is affected by the flow rate and temperature conditions of the evaluated year and by the fluctuation of nutrients content in the surface water. Its development in the evaluated year was similar as in the year 2014, but the values were significantly lower. While in 2014 the chlorophyll-a content fluctuated from 0.5 to 63.4 $mg.m^{-3}$, in the year 2015 it was mostly from 0.8 to 25.7 $mg.m^{-3}$. The exception was the sampling site No. 308 in the upper part of the reservoir, where two high values were recorded: 81.2 $mg.m^{-3}$ in April, and 58.3 $mg.m^{-3}$ in May. These relatively high values seem to be related to the presence of cyanobacteria *Oscillatoria limosa*, which had dominant position in the spring phytoplankton at this sampling site. Higher contents of chlorophyll-a on the monitoring sites occurred in the spring months, when the main development of phytoplankton was documented. The highest values were recorded in April. The abundance of phytoplankton in late May, or early June declined on all locations and subsequently declined the contents of chlorophyll-a to low values. Since June the contents of chlorophyll-a at most of sampling sites were low until the end of the year. The exceptions were the sampling sites on the right-side of the Danube old riverbed, in the Helena river arm and in the lower part of the reservoir (No. 309), where the chlorophyll-a values have increased due to a moderate summer wave of phytoplankton development, with a maximum of 17.8 $mg.m^{-3}$ on the sampling site No. 0002 in the Danube old riverbed at Dunaremete. The lowest values in the year 2015 occurred in late June and at the end of the vegetation period in October. The content of chlorophyll-a in the seepage canals was low over the year, without major fluctuations and has varied in the range from 0.8 to 5.6 $mg.m^{-3}$. In general it can be stated, that the content of chlorophyll-a in the evaluated year was significantly lower than in the year 2014. The development of chlorophyll-a at selected sampling sites is shown in **Fig. 2-13**.

2.8. Other biological indicators

Evaluation of biological quality indicators in 2015 at jointly monitored sampling sites and on sampling sites monitored only by the Hungarian Party was carried out in accordance with the methodology agreed in the frame of the Transboundary Water Commission. On sampling sites monitored only by the Slovak Party evaluation used in the previous period was applied.

2.8.1. Biological indicators and evaluation of ecological status of surface water at jointly monitored sampling sites

Biological indicators in the year 2015 at jointly monitored sampling sites were evaluated within the ecological status of surface water and in accordance with the methodology agreed in the frame of the Transboundary Water Commission (in ”Assessment of water quality status of Slovak-Hungarian boundary flows in the year 2015”, May 2016 and the Hungarian National Annual Report in 2015). The overall ecological status of surface water is determined by biological quality elements, together with supporting hydromorphological, physico-chemical and chemical elements. The evaluation of ecological status in the year 2015 was focused on sampling sites, not water bodies. Hydromorphology was not a part of the joint monitoring, therefore it was not included in the evaluation. The ecological status was assessed at all sampling sites on the Slovak territory, despite the fact that some sampling sites are situated in water bodies designated as heavily modified. The basic principle of evaluation is the type specificity and the comparison of changes in environment quality with reference values, which reflect the environment status without or with minimal anthropogenic influence. From among the biological quality elements the benthic invertebrates (macrozoobenthos), phytobenthos, phytoplankton and macrophytes were evaluated.

The evaluation of monitoring results for particular biological elements was carried out according to the classification schemes, which include limit values for classification into the respective quality classes in the range I.-V. quality class, together with corresponding ecological status: I. class - high, II. - good, III. - moderate, IV. - poor, V. - bad. Limit values are determined by metrics (indexes), which reflect the response of aquatic organisms to disturbances (stressors) and also express the species diversity, abundance or the biomass and sensitive species. Metrics (indexes) were developed by the Slovak and Hungarian Party separately at national level. The Slovak Party assesses the macrozoobenthos according to the multimetric index that adequately responds to the degree of degradation of the environment and is type specific. The phytoplankton is evaluated according to the proportional representation of the four groups (*Cyanophyta*, *Chromophyta*, *Chlorophyta*, *Euglenophyta*) and according to the abundance and biomass. The assessment of phytobenthos is based on three indexes (CEE - the response of diatoms to overall pollution, EPI-D - detects the eutrophication processes in streams, IBD - biological diatoms index) and macrophytes on IBMR index - biological index (more details in Government Regulation No. 269/2010 Z.z. as amended by later regulations). The basis of the Hungarian evaluation of phytoplankton is the multimetric index HRPI (Hungarian River Phytoplankton Index) that characterizes the quantitative and qualitative conditions of phytoplankton. Macrozoobenthos is assessed on the basis of the national evaluation system HMMI (Hungarian Multimetric Macroinvertebrate Index) developed over the years 2010-2012. Evaluation of phytobenthos in the case of the Danube is carried out under the IPS index, or in the case of other flows under the IPSITI index (combination of three diatomaceous indexes: IPS - Integrated Pollution Index, SID - Saprobic Index, TID -

Trophic Index). Macrophytes are evaluated on the basis of reference index (RI), which except the relative estimation of biomass of species takes into account the characteristics of the indicator (more details in the Hungarian National Annual Report in 2015).

Table 2-3: Evaluation of ecological status for biological quality elements at jointly monitored sampling sites

No.	Sampling site	macro-zoobenthos		phyto-benthos		macro-phytes		phyto-plankton	
		SK	HU	SK	HU	SK	HU	SK	HU
109	Danube, Bratislava	III		III		x		I	I
0001	Danube old riverbed, Rajka	x	I	x	II	x	x	I	I
112/2306	Danube, Medveďov	x	II	III	III	x	x	I	I
3531/0084	seepage canal, Čunovo/Rajka	x	II	x	II	I	II	I	I
3529/0082	Mosoni Danube, Čunovo/Rajka	x	II	x	II	II	II	I	II

SK - Slovak results, HU - Hungarian results, x - not evaluated

In the **Table 2-3** the evaluation of ecological status according to particular biological quality elements is given separately for each country. The final quality class of the water body is determined by the worst value of biological element (the rule of "worst case approach").

Surface water quality

- according to macrozoobenthos is classified into I. or II. quality class, what corresponds to high or good ecological status;
- according to phytobenthos it was set into the range from II. to III. quality class, what corresponds to good and moderate ecological status;
- according to macrophytes and phytoplankton it belongs to the I. quality class (high ecological status) or II. quality class (good ecological status).

Ecological status of individual sampling sites was determined as follows:

Danube at Bratislava - this sampling site according to the Slovak results was classified into the moderate status (III. class).

Danube at Medveďov - according to the Slovak and Hungarian results it was classified into the moderate status (III. class).

Danube old riverbed at Rajka - according to the Slovak results this sampling site was classified into the high status (I. class), but only on the basis of phytoplankton, the Hungarian results corresponded to good ecological status (II. class).

Right-side seepage canal at Čunovo/Rajka - according to the results of the Slovak results was classified into the high status (I. class) and according to the Hungarian Party it was classified into the good status (II. class).

Mosoni Danube at Čunovo/Rajka - according to the Slovak and Hungarian results it was classified into the good status (II. class).

To determine the overall ecological status also the supporting elements were included in the evaluation. The Slovak Party, except the biological quality elements, considered the physico-chemical quality elements and synthetic and non-synthetic substances relevant for

Slovakia. The overall ecological status according to the obtained results corresponds to ecological status referred above. The high overall ecological status was achieved on the sampling site in the Danube old riverbed at Rajka, the good ecological status was achieved in the right-side seepage canal at Čunovo/Rajka and in the Mosoni Danube at Rajka, and the moderate in the Danube at Bratislava and Medveďov. The level of reliability of the ecological status assessment was high or medium.

The Hungarian Party, taking into account the physico-chemical quality elements and other specific substances (heavy metals) determined on the sampling site in the Danube at Medveďov and in the Mosoni Danube at Rajka moderate overall ecological status, and at sampling sites in the Danube old riverbed and in the right-side seepage canal at Rajka good overall ecological status.

2.8.2. Biological indicators and evaluation of ecological status of surface water at sampling sites monitored only by the Hungarian Party

From among the biological quality elements the Hungarian Party in 2015, except the jointly monitored sampling sites, observed the macroinvertebrates, phytobenthos and phytoplankton on another seven sampling sites in the Danube old riverbed, in the right-side river branch system and in the Mosoni Danube. An overview of evaluation results of biological quality elements is presented in **Table 2-4**. For the classification of biological quality elements, limit values corresponding to the typological classification No. 23 (Danube, upper Hungarian section) have been used for the Danube and the river branch system. In the case of the Mosoni Danube, limit values corresponding to the typological classification No. 14 (SV-Me-D-nn) should be used. However, the evaluation of samples taken in the Mosoni Danube at Vének was carried out according to the type No. 23, which better reflects the actual state.

Table 2-4: Evaluation of ecological status for biological quality elements at sampling sites on the Hungarian territory

No.	Sampling site	macro-zoobenthos	phyto-benthos	phyto-plankton
0043	Danube old riverbed, Dunakiliti, upstream of the submerged weir	II	II	I
0042	Danube old riverbed, Dunakiliti, downstream of the submerged weir	II	II	I
0002	Danube old riverbed, Dunaremete	III	III	I
1112	river branch system, Helena	II	II	I
1114	river branch system, Szigeti river arm	II	II	I
1126	river branch system, Ásványi river arm	II	II	I
1141	Mosoni Danube, Vének	III	II	II

Based on the results obtained from the monitoring of biological quality elements it can be stated that according to the phytoplankton high ecological status (I. quality class) was achieved on six sampling sites, and on the sampling site No. 1141 in the Mosoni Danube at Vének good ecological status (II. quality class). On the dates of sampling, when the amount of chlorophyll-a was lower than the limit value for the I. quality class (<15 $\mu g.l^{-1}$), a detailed analysis of phytoplankton was not carried out, therefore chlorophyll-a EQR values were took into account at the phytoplankton assessment (more details in the Hungarian National Annual Report in 2015).

According to phytobenthos, good ecological status (II. quality class) was achieved on observed sampling sites. Only on the sampling site in the Danube old riverbed at Dunaremete moderate ecological status was determined (III. quality class).

Based on macrozoobenthos moderate ecological status (III. quality class) was achieved on two sampling sites, in the Danube old riverbed at Dunaremete and in the Mosoni Danube at Vének. In the right-side river branch system and in the Danube old riverbed upstream and downstream of the submerged weir good ecological status (II. quality class) was determined.

Concerning the overall ecological status, when except the biological quality elements also the supporting elements (physico-chemical quality elements and other specific substances) are included in the evaluation, following results were achieved (Hungarian National Annual Report in 2015). On five sampling sites (in the Danube old riverbed upstream and downstream of the weir at Dunakiliti and at three sampling sites in the right-side river branch system) good overall ecological status was determined. On two sampling sites (in the Danube old riverbed at Dunaremete and in the Mosoni Danube at Vének) moderate overall ecological status was achieved.

2.8.3. Biological indicators at sampling sites monitored only by the Slovak Party

The monitoring and evaluation of biological quality elements was carried out according to the methodology applied in previous years.

Phytoplankton

In the period between March and October 2015 six phytoplankton samples were taken in seepage canals and twelve samples on other sampling sites (**Table 2-5**). Suitable conditions for phytoplankton development occurred already in March and the main wave of development in the evaluated year was registered in the spring months. The highest values of phytoplankton abundance were achieved in March (on one sampling site), in April (on seven sampling sites) and in May (on two sampling sites). Values above 10000 individuals.ml^{-1}, what represents the mass development of phytoplankton, were recorded on two sampling sites in April. On the sampling site No. 308, on the left side of the upper part of the reservoir at Kalinkovo, value of 14894 individuals.ml^{-1} was achieved, and on the sampling site No. 3529 in the Mosoni Danube at Čunovo value of 11176 individuals.ml^{-1} was recorded. The third case, when mass development of phytoplankton was documented, was the value of 12848 individuals.ml^{-1} recorded in May again on the sampling site No. 308. After cooling down at the end of May the abundance values in June significantly declined, at four locations to the annual minimum. The summer, less significant wave of phytoplankton development was recorded in the warmest time of the year - in the second half of July. The abundance values were low, and only at five locations they exceeded 1000 individuals.ml^{-1}. An exception was the sampling site No. 309 in the lower part of the reservoir, where the abundance in July achieved the value of 6208 individuals.ml^{-1}, and it represented the annual maximum for this sampling site. Annual minima on most sampling sites were recorded in October.

The phytoplankton abundance in the evaluated year ranged from 10 to 14894 individuals.ml^{-1}, while the lowest value was determined on the sampling site No. 112 in the Danube at Medveďov in October and the highest occurred in the upper part of the reservoir on the sampling site No. 308 at Kalinkovo in April. The limit for mass development of phytoplankton was exceeded three times (on the sampling site No. 3529 in the Mosoni

Danube at Čunovo in April and in the upper part of the reservoir on the sampling site No. 308 in April and May). In the year 2014 the mass development of phytoplankton was documented on six locations (up to 18900 individuals.ml^{-1}).

The annual average of phytoplankton abundance at various sampling sites ranged from 77 to 2973 individuals.ml^{-1}, which are substantially lower values than in the year 2014 (626 to 4596 individuals.ml^{-1}). At most monitoring sites significant decrease of average annual abundance occurred. The most significant decrease was documented on the sampling site No. 309 in the lower part of the reservoir, where the annual maximum was recorded in 2014. The only exception was the sampling site No. 308 in the upper part of the reservoir (annual maximum 2973 individuals.ml^{-1}), where slight increase of average abundance was registered in comparison with the year 2014. Values of annual average of phytoplankton abundance in 2015 were far below the limit for mass development.

The largest portion in the phytoplankton composition in the evaluated year, except the seepage canals, had the centric diatoms (*Bacillariophyceae - Centrales*), the pennate diatoms were on the second place. In the left-side seepage canal at Hamuliakovo (sampling site No. 317) the portion of centric diatoms is low in long-term and in the evaluated year they were not even recorded. The dominant presence, similarly as in the previous period of monitoring, had the pennate diatoms (*Bacillariophyceae - Pennales*). However, the portion of cyanobacteria (*Cyanophyceae*), and the third largest group were the green algae (*Chlorococcales*). In the right side seepage canal at Čunovo (sampling site No.3531) unusually the largest portion in the phytoplankton abundance in the evaluated year had the pennate diatoms, then the flagellated green algae (*Volvocales*), yellow-green algae (*Chrysophyceae*) and only the fourth were the centric diatoms. Their share in the composition of phytoplankton at this sampling site significantly declined.

Table 2-5: Values of saprobic index of biosestone in 2015

No.	Sampling site	Min	Max	Yearly average		Saprobity level
				2015	2014	
109	Danube, Bratislava	2.04	2.37	**2.17**	*2.16*	β -mesosaprobity
112	Danube, Medveďov	2.01	2.45	**2.20**	*2.15*	β -mesosaprobity
1205	Danube, Komárno	1.82	2.40	**2.16**	*2.21*	β -mesosaprobity
4016	Danube, submerged weir	1.87	2.37	**2.18**	*2.20*	β -mesosaprobity
4025	Danube, Dobrohošť	1.82	2.45	**2.16**	*2.15*	β -mesosaprobity
3739	Danube, Sap	1.73	2.39	**2.17**	*2.15*	β -mesosaprobity
3529	Mosoni Danube, Čunovo	1.90	2.43	**2.21**	*2.15*	β -mesosaprobity
307	reservoir - Kalinkovo	2.02	2.38	**2.23**	*2.13*	β -mesosaprobity
308	reservoir - Kalinkovo	2.00	2.36	**2.17**	*2.17*	β -mesosaprobity
309	reservoir - Šamorín	1.89	2.38	**2.21**	*2.17*	β -mesosaprobity
311	reservoir - Šamorín	1.92	2.43	**2.21**	*2.20*	β -mesosaprobity
3530	tailrace canal, Sap	2.07	2.27	**2.16**	*2.17*	β -mesosaprobity
3376	river branch system	1.71	2.34	**2.14**	*2.18*	β -mesosaprobity
3531	right-side seepage canal	1.75	2.23	**1.98**	*2.17*	β -mesosaprobity
317	left-side seepage canal	1.49	2.13	**1.70**	*1.86*	β -mesosaprobity

The phytoplankton composition significantly determines the saprobic index of biosestone. The saprobic index in 2015 varied from 1.49 to 2.45 (**Table 2-5**). It fluctuated in the range, which corresponds to β-mesosaprobity. Such an environment provides suitable living conditions for a wide scale of organisms with high species diversity. At the sampling site No. 317 in the left side seepage canal value of 1.49 was even recorded in august, which already represents oligo-saprobity. The average values of saprobic indexes on most of observed locations were similar as in the year 2014. Slight deterioration occurred on the sampling site No. 307 in the upper pert of the reservoir, while more significant improvement was registered at sampling site in seepage canals (No. 3531 and 317). The level of saprobity has not changed.

Concerning the abundance of phytoplankton, as a key determinant of saprobic index, it can be stated that the hydropower system even in 2015 have not had negative impact on saprobity level.

Macrozoobenthos

From an ecological point of view, the monitoring of macroinvertebrates in flowing water bodies appears to be the most appropriate method for bioindication. Samples are relatively easy to access and quickly processable. In 2015 the macroinvertebrate samples were collected in April, August and in October on monitoring sites listed in **Table 2-6**. In sections with fast flowing water with gravely or rocky bottom (sampling sites No. 109 at Bratislava, No. 112 at Medveďov in the Danube and No. 4025 in the Danube old riverbed at Dobrohošť) rheophillic and oxybiontic macroinvertebrate species prevail, indicating β-mesosaprobity. At these sampling sites the following species dominated in 2015: *Dikerogammarus villosus*, *Corophium curvispinum*, *Chironomidae g. sp. div.*, *Lumbriculidae g. sp. div.*, *Echinogammarus trichiatus*, *Echinogammarus ischnus*, *Cricotopus sp.*, *Corophium robustum*, *Limnomysis benedeni*, at Bratislava also *Dikerogammarus bispinosus* and in the Danube old riverbed at Dobrohošť *Lithoglyphus naticoides*. In sections with slow flowing water stagnophillic and oligooxybiontic species appear, which withstand slight pollution. On these sections sandy or muddy bottom occurs – sampling sites in the Danube old riverbed No. 4016 upstream of the submerged weir and No. 3739 at Sap, where representatives of the families *Lumbriculidae g. sp. div.*, *Lumbricidae g. sp. div.* and *Chironomidae g. sp. div.* dominated in the evaluated year, furthermore species such as *Lithoglyphus naticoides*, *Potamopyrgus antipodarum*, *Valvata piscinalis* and *Dikerogammarus villosus* occurred. In the Mosoni Danube greater diversity of dominant species has been recorded, in addition to the above mentioned also species *Radix peregra*, *Physella acuta*, *Gyraulus albus* and *Theodoxus fluviatilis* were dominant at this location.

In the reservoir there are places with different flow velocities. Depending on the flow velocity there are different types of bottom substrates. Sandy and gravely substrate (sampling sites No. 307 and 308) at places with slow flow velocity gradually changes into muddy substrate (sampling sites No. 309 and 311). Dominant macrozoobenthos species in 2015 on muddy substrate were *Lumbriculidae g. sp. div.*, *Lithoglyphus naticoides*, *Chironomidus plumosus*, *Corbicula fluminea* and at the sampling site No. 309 in the summer also *Fredericella sultana* dominated. On mostly gravely and sandy substrate (sampling sites No. 307 and 308) *Hypania invalida*, *Corophium curvispinum*, *Lumbriculidae g. sp. div.*, *Lithoglyphus naticoides*, *Lumbricidae g. sp. div.* and representatives of *Chironomidae g. sp. div.* dominated. On the sampling site No. 308 the greatest diversity of dominant species was observed. In addition to the above, dominant presence had here also *Limnomysis benedeni*, *Dikerogammarus villosus*, *Corbicula fluminea*, *Obesogammarus obesus* and *Valvata piscinalis*. In the river branch system representatives of *Lumbriculidae g. sp. div.*, *Lumbricidae g. sp. div.*, *Chironomidae* *g. sp. div.* dominated in the evaluated year, together with species *Valvata piscinalis, Dikerogammarus villosus*, *Physella acuta* and *Radix peregra*.

Based on the determined species the saprobic indexes of macrozoobenthos were calculated, which varied in the range from 1.83 to 2.59. The average values of saprobic index ranged from 2.00 to 2.38, thus in the range with a degree of saprobity at the level of β-mesosaprobity (**Table 2-6**). On most of sampling sites improvement of the average value of saprobic index occurred in 2015 in comparison with the previous year. Significant improvement has been recorded on the sampling site in the Danube old riverbed at Sap (No. 3739) and in the lower part of the reservoir at Šamorín (No. 309). Deterioration of the average value of saprobic index of macrozoobenthos has been documented only on three locations: slight deterioration on the sampling site in the Danube at Bratislava (No. 109) and at Medveďov (No. 112) and the most significant deterioration occurred on the sampling site in the upper part of the reservoir at Kalinkovo (No. 308) - **Table 2-6**. The highest average value of saprobic index of 2.38 was recorded on the sampling site No. 311 in the lower part of the reservoir. At this sampling site a saprobic index value corresponding already to α-mesosaprobity (2.59) was recorded in spring. It was the only case, all other values fluctuated below the value of 2.50. In 2014 values above 2.50 occurred on the sampling sites (No. 309 - once and No.311 - two times), and on the sampling site No. 311 even the average value of saprobic index of macrozoobenthos corresponded to α-mesosaprobity (2.55).

Table 2-6: Values of saprobic index of macrozoobenthos in 2015

No.	Sampling site	IV.	VIII.	X.	Yearly average		Saprobity
					2015	2014	
109	Danube, Bratislava, left	2.46	2.03	2.08	**2.19**	*2.15*	β -mesosaprobity
109	Danube, Bratislava, right	2.30	2.04	2.15	**2.16**	*2.17*	β -mesosaprobity
112	Danube, Medveďov, left	2.47	2.25	2.16	**2.29**	*2.21*	β -mesosaprobity
4016	Danube, bottom weir	2.21	2.09	1.96	**2.09**	*2.11*	β -mesosaprobity
4025	Danube, Dobrohošť	2.24	2.17	1.99	**2.13**	*2.23*	β -mesosaprobity
3739	Danube, Sap, left	2.11	1.96	2.15	**2.07**	*2.37*	β -mesosaprobity
3528	Mosoni Danube, Čunovo	2.13	1.94	1.94	**2.00**	*2.05*	β -mesosaprobity
3376	river branch system	2.14	1.83	2.02	**2.00**	*2.04*	β -mesosaprobity
307	reservoir, Kalinkovo	2.19	2.14	2.35	**2.23**	*2.41*	β -mesosaprobity
308	reservoir, Kalinkovo, left	2.30	2.11	2.19	**2.20**	*2.09*	β -mesosaprobity
309	reservoir, Šamorín, right	2.08	2.12	2.13	**2.11**	*2.41*	β -mesosaprobity
311	reservoir, Šamorín, left	2.59	2.28	2.27	**2.38**	*2.55*	β -mesosaprobity

Note: left - left bank; right - right bank

Other aspects of the development of macrozoobenthos communities are evaluated in Part 7 – Biological monitoring, where more detailed evaluation for cladocerans (*Cladocera*), copepods (*Copepoda*), molluscs (*Mollusca*), dragonflies (*Odonata*), mayflies (*Ephemeroptera*) and caddisflies (*Trichoptera*) can be found.

Phytobenthos

Phytobenthos represents communities of algae and heterotrophic microorganisms attached on submerged substrates in all aquatic ecosystems. Indicates short-term changes in the water quality. The saprobic index of phytobenthos correlates with the through-flowing water quality, especially with organic pollution. The saprobic index of phytobenthos in the evaluated year was monitored in the Danube (sampling sites No. 109 at Bratislava, left and right bank, No. 112 at Medveďov), in the Mosoni Danube at Čunovo (No. 3529) and in the river branch system at Dobrohošť (No. 3376). At monitoring sites mainly algal phytobenthos component, especially benthic diatoms have been studied.

The value of saprobic index of phytobenthos at monitored sampling sites ranged from 1.69 to 2.18. The average values varied from 1.81 to 2.04. Compared to 2014 slight deterioration of the annual average occurred at all sampling sites. The most significant deterioration was documented at Medveďov, where the annual average increased from 1.74 to 1.88 (**Table 2-7**). The average values of saprobic indexes varied within the β-mesosaprobity on all monitored sampling sites.

In terms of species diversity, the dominant part of phytobenthos in the evaluated year was formed by pennate and centric diatoms (*Bacillariophyceae - Pennales, Centrales*) - 39 taxa. Other groups were represented by fewer number of taxa. The dominant species at monitored sites were *Melosira varians*, *Diatoma vulgaris*, *Navicula avenacea*, *Navicula tripunctata.* from the group of diatoms (*Bacillariophyceae*), *Phormidium autumnale* from blue-green algae (*Cyanophyceae*), *Cladophora glomerata* from siphonous green algae (*Chlorophyceae - Siphonocladales*), *Bangia atropurpurea* from red algae (*Rhodophyceae*) and *Oedogonium sp.* from filamentous green algae group (*Chlorophyta - Ulotrichales*).

Table 2-7: Values of saprobic index of phytobenthos in 2015

No.	Sampling site	May	July	September	Yearly average	
					2015	*2014*
109	Danube, Bratislava, left	2,00	2,03	2,09	**2,04**	*1,97*
109	Danube, Bratislava, right	1,89	2,12	2,05	**2,02**	*1,99*
112	Danube, Medveďov, left	1,90	1,80	1,95	**1,88**	*1,74*
3528	Mosoni Danube, Čunovo	1,69	1,92	1,81	**1,81**	*1,79*
3376	river branch system	1,72	2,18	1,86	**1,92**	*1,83*

Note: left - left bank; right - right bank

2.9. Quality of sediments

Also in the year 2015, similarly to previous years, the Slovak and Hungarian Parties have realized unified evaluation of sediment quality according to the „Canadian Sediment Quality Guideline for Protection of Aquatic Life" (CSQG) published in 1999, revised in 2002.

The sediment sampling in the frame of Joint Monitoring by the Slovak Party was performed in September 2015 at six sampling sites. The Hungarian Party sampled the sediments in May or June and the autumn sampling has been performed in September at seven sampling sites. The situation of sampling sites is shown in **Fig. 2-2**. The list of analysed parameters had not changed. In addition to inorganic and organic microelements the Hungarian Party has analysed also the contents total phosphorus and total nitrogen.

Overall, the inorganic pollution of sediments on the Slovak territory declined slightly in comparison with the previous year. Concentrations lower than the threshold effect level (TEL, or ISQG) on all six monitored sampling sites occurred only in the case of lead. At such concentrations the adverse effect on biological life occurs rarely, and they correspond to uncontaminated natural environment. The threshold effect level was slightly exceeded in the case of mercury and chromium on two sampling sites in the reservoir and in the case of copper and zinc on four sampling sites. Contents of arsenic and cadmium were higher than the TEL limit values on all six monitored sampling sites. Concentrations of heavy metals in the range >TEL and <PEL (Probable Effect Level) were closer to the lower TEL limit, thus exceeding of the threshold effect level was only slight. The only one higher concentration of arsenic, exceeding the middle of the given range (TEL = 5.9 $mg.kg^{-1}$, PEL = 17.0 $mg.kg^{-1}$), was recorded on the sampling site No. 4016 in the Danube old riverbed and reached 11.8 $mg.kg^{-1}$. Concentrations from the range >TEL and <PEL represent the level, when the adverse effects on biological life can be observed occasionally (in more than 25 % of cases) and represent a potential eco-toxicological effect.

In sediment samples collected on the Hungarian territory smaller number of heavy metal concentrations above the threshold values. The lowest contents (lower than TEL) in the spring were documented in the case of lead, in the autumn sampling in the case of lead and copper. The copper in the spring only at Vének (sampling site No. 1141), with the value of 39,4 $mg.kg^{-1}$, slightly exceeded the threshold limit of 35.7 $mg.kg^{-1}$. On this sampling site also higher concentrations of arsenic occurred: in the spring 12.2 $mg.kg^{-1}$ and in the autumn sample 9.6 $mg.kg^{-1}$, while at other sites the contents of arsenic were lower than the TEL limit (5.9 $mg.kg^{-1}$). In the case of cadmium, mercury and zinc exceedances of threshold limit were recorded on more sampling sites, when the most occurred in the case of zinc (4-times in spring and 4-times in autumn). The highest concentrations of zinc were again recorded on the sampling site at Vének, in spring 388 $mg.kg^{-1}$ and in autumn 252 $mg.kg^{-1}$. The spring concentration even exceeded the PEL limit (315 $mg.kg^{-1}$). The autumn concentration was lower, but still it was closer to the PEL limit than to the threshold limit (123 $mg.kg^{-1}$). Concentrations exceeding the probable effect level (PEL), represent the level, when the adverse effect on biological life can occur frequently (in more than 50 % of cases).

<u>Organic pollution</u> of sediments on the Hungarian territory was low in 2015. In the spring there occurred slight exceedances of threshold limit in the case of three organic substances, in one case in acenaphthylene, in two cases in benzo(a)anthracene and in four cases in benzo(a)pyrene. The content of organic pollution in the autumn sediment samples was at the level of uncontaminated environment at all observed sampling sites. The sediment contamination by organic matter on the Slovak territory was slightly higher in comparison with the previous year, especially with regard to the content of substances from the group of PAHs. Their contents has increased mainly on sampling sites in the reservoir and there occurred more concentrations corresponding to a slightly contaminated environment. In the case of phenanthrene and fluoranthene such concentrations occurred at three locations, in the case of chrysene at five, and, similarly to the previous year, the concentrations of benzo(a)pyrene exceeded the threshold value for this parameter (31.9 $mg.kg^{-1}$) on all six sampling sites, with the highest concentration of 144 $mg.kg^{-1}$ on sampling site No. 307. From among the evaluated pesticides only on two sampling sites the endrine content belonged to the range >TEL and <PEL. All measured concentrations of organic pollution in this range, that corresponds to a slight pollution, were closer to the lower limit value of this range and thus closer to an uncontaminated environment. All other concentrations of organic contamination of sediments according to the Canadian standard correspond to the natural environment without anthropogenic influence.

The highest concentrations of organic micro-pollution were registered by the Slovak Party on the sampling site No. 307 in the upper part of the reservoir, and the highest concentrations of heavy metals on the sampling site No. 309 in the lower part of the reservoir at Šamorín. On the Hungarian territory the highest inorganic pollution of sediments was on the sampling site No. 1141 in the Mosoni Danube at Vének, and the highest concentrations of organic substances were detected in the river branch system on the sampling site No. 1126 in the Ásványi river arm in the spring.

The lowest sediment contamination in 2015 was documented on sampling site No. 3739 in the Danube old riverbed at Sap on the Slovak territory and on the Hungarian territory at sampling site No. 0084 in the right-side seepage canal at Rajka in spring and in autumn at sampling site No. 1112 in the river branch system (Helena river arm).

The Hungarian Party also analysed the total phosphorus and total nitrogen content in sediments. Total phosphorus content in 2015 varied in the range from 202 to 1602 $mg.kg^{-1}$ and the concentrations of total nitrogen varied in the range from 139 to 2110 $mg.kg^{-1}$. The lowest content of total phosphorus was recorded in the right side seepage canal in autumn (sampling site No. 0084) and of total nitrogen in the river branch system in spring on sampling site No. 1114 (Szigeti river arm). Maxima were detected on the sampling site No. 1141 in the Mosoni Danube at Vének, the total phosphorus in spring and the highest content of total nitrogen in autumn. Compared to the year 2014, the contents of total phosphorus and total nitrogen varied in wider ranges. The total nitrogen content in the spring was higher and in the autumn lower than in 2014, and the total nitrogen content was higher on most of sampling sites. Exception was the sampling site in the right side seepage canal, where the total nitrogen content in the spring and also in the autumn declined.

Overall, the sediment pollution in the evaluated year on the Slovak territory was slightly higher than in 2014, mainly the content of organic substances from the group of PAHs has raised. Significant decline has been recorded only in the case of copper content, which in the previous year achieved at several sampling sites the highest content since the start of sediment monitoring. The sediment contamination on the Hungarian territory in the spring was similar as in the year 2014, and in the case of autumn sampling the heavy metal concentrations were lower than in the fall 2014. Similarly to the previous year the PEL level has been exceeded once, in 2014 it was in the case of mercury, in 2015 in the case of zinc (in both cases on the sampling site No. 1141 in the Mosoni Danube at Vének).

2.10. Indicative assessment of surface water quality parameters according to agreed surface water quality classification limit values

In **Table 2-8** an indicative classification of selected sampling sites and selected surface water quality parameters was done.

The indicative classification was performed using the limit values for five-classes system, according to the trans-boundary water quality classification adopted by the Slovak-Hungarian Trans-boundary Water Commission at its LXV. session, and mentioned in the „Directive for surface water quality monitoring of the Slovak-Hungarian boundary waters and for extended water quality monitoring on the Danube".

Certain part of the observed parameters shows seasonal fluctuation, which subsequently affects the classification into the quality classes. In the case that a range is given (e.g. I-II), this means natural seasonal fluctuation of particular parameters or their dependence on climatic conditions. If in the evaluated period one or two values of different quality class occurred (mostly during higher discharges or flood waves), it is expressed by a cross mark in the colour of the respective class. In the case of two values, which fall into various classes, the colour of the cross corresponds to the worst class. The range with asterisks (e.g. I*-II*) represents a situation, when every recorded value was below the detection limit of applied analytical method, but the two Parties have different detection limits.

Table 2-8: Indicative assessment of surface water quality parameters according to agreed surface water quality classification limit values

Parameter	Sites situated on the Danube			Mosoni Danube		Seepage canal	Right-side river branch system
	Bratislava	Rajka	Medveďov	Čunovo/ Rajka	Vének	Čunovo/ Rajka	Helena, Szigeti, and Ásványi river arm
temperature	I +	I +	I +	I +	I +	I	I +
pH	I-II	II	II	I-II	I-II	I-II	II-III
conductivity	I-II	I-II	I-II	I-II	I-III	I-II	I-II
suspended solids	I-II +	I-II +	I +	I-II +	I +	I	I +
Cl^-	I	I	I	I	I	I	I
SO_4^{2-}	I	I	I	I	I	I	I
NO_3^-	II	II +	II +	II	II +	I-II	II
NH_4^+	I	I	I	I	I	I	I
NO_2^-	I-II	I-II	I-II	I-II	II	I-II	II
total nitrogen	II	II	II	II	II	I-II	II +
PO_4^{3-}	I-II +	I-II	I-II	I-II +	II	I +	I +
total phosphorus	-	I +	I +	I +	I-II	I	I-II
O_2	I	I	I	I	I	I-II	I
COD_{Mn}	-	I	I	I +	I-II	I	I
BOD_5	I +	I-III	II-I +	I-III	I-II +	I +	I-II +
chlorophyll-a	I +	I +	I +	I +	I +	I	I +
Fe	-	I	I	I	I +	I +	I +
Mn	-	I +	I	I	I-II	I +	I
Zn	IV**	III*-IV*	III*-IV*	III*	III*	III*	III*
Hg	I**	I*	I**	I*	I*	I*	I*
As	II* +	II* +	II* +	II*	II*	II* +	II* +
Cu	I-III	I-III	I-III	I-III +	I-III	I-II	I-III +
Cr	I*- II*	I*- II*	I*- II*	II*	II*	II*	II*
Cd	II*	II*	II*	II*	II**	II**	II*
Ni	II*-III +	II* +	II*-III	II* +	II** +	II**	II* +
Pb	II* +	II*	II* +	II**	II**	II*	II** +

Quality classes: **I. class** **II. class** **III. class** **IV. class** **V. class**

* all the data below the detection limit

** most of the data below the detection limit

\+ one or two values of different quality class occurred and the colour represents the worst quality class/highest value

Based on a comparison of water quality entering the influenced area (sampling site at Bratislava) and water quality, which leaves the influenced area (sampling site at Medveďov) it is evident, that the water quality that leaves the system is very similar.

2.11. Conclusions

Compared to the previous years the surface water quality at sampling sites monitored in the frame of Joint monitoring has not changed significantly in 2015 and in long-term is balanced. Increase or decrease of concentrations of individual parameters during the observed period appears already in Bratislava on the sampling site No. 109, which is located upstream of the Gabčíkovo Waterworks, and monitors the surface water quality entering the Slovak territory. Certain observed parameters of surface water quality in the Danube and in the river branch system show seasonal variations, some parameters predominantly depend on the flow rate, others are affected by biochemical processes in the surface water. The fluctuation of quality parameters in the Mosoni Danube and in the seepage canals reflects the different characteristics of these water bodies. The water quality in the Mosoni Danube is influenced by the Danube water and on sampling site at Vének by its tributaries and wastewater from Győr. The water in the seepage canals is influenced mainly by the leaking groundwater. Typical for this water are fairly balanced time series data of quality indicators, which fluctuate only in narrow ranges.

From among the basic physical and chemical surface water quality parameters, the water temperature on monitored sampling sites in the evaluated year was higher or similar as in 2014. The exemption was the sampling site on the right side of the lower part of reservoir (No. 309) where the water temperature dropped and slight decrease was recorded also in the left-side seepage canal at Hamuliakovo (No. 317). Also the values of specific electric conductivity slightly increased or were similar as the values in the previous year. The pH values fluctuated in narrower ranges and on most of sampling sites declined. Only on two sampling sites (No. 308 in the upper part of the reservoir and No. 1126 in the Ásványi river arm) the pH has slightly increased. The contents of suspended solids, iron and manganese were affected by the actual hydrological regime. The year 2015 was low water bearing, the discharge waves were lower and had short duration. In comparison to the previous year the achieved maxima were significantly lower. Also overall, the suspended solids content was lower, or in the lower part of the reservoir and in the river branch system has been similar. Iron concentrations were similar or higher, only in the Mosoni Danube lower maximal values were recorded. Manganese concentrations in the reservoir and in the left-side seepage canal have increased slightly, on other sampling sites have declined.

The development of cations and anions concentrations at particular sampling sites was similar. Higher content of salts is characteristic for the sampling site in the Mosoni Danube at Vének, because of its tributaries and cleaned wastewater from Győr. The average values of sodium, potassium, chlorides and sulphates at Vének exceeded the average values registered at the other sampling sites. The most stable ionic composition is characteristic for seepage water. Compared to 2014 increase of sodium and calcium concentrations has been recorded in the evaluated year, the magnesium content has not changed. From among anions only the chloride content increased. Sulphates and bicarbonates in the evaluated year fluctuated in similar ranges as in the year 2014, slight increase has been recorded only in the right-side river branch system.

Some nutrients show seasonal fluctuation. Higher concentrations are characteristic for colder months; decrease of values is recorded in the spring after warming. Seasonal fluctuation is related to the biochemical processes in the water, which are temperature dependent. Contents of phosphates and total phosphorus can increase at higher flow rates. Low values of phosphates are typical for the growing period, when intensive growth of algae going on and their contents frequently decrease below the detection limit. In the evaluated year the ammonium ion content has decreased on the right bank of the Danube old riverbed, in the right-side river branch system and in the Mosoni Danube at Vének. On other observed sampling sites increase of their concentrations was documented. Concentrations of phosphates and total phosphorus has been lower or similar as in the previous year. In the case of phosphates at the common sampling sites, higher maxima were measured by the Slovak party than in 2014. These values however, were not confirmed by the Hungarian Party, which at the same time measured significantly lower concentrations. The contents of nitrates, nitrites and total nitrogen has increased or were similar, except the sampling site in the Mosoni Danube at Vének. The most polluted water in terms of concentration of nutrients appears to be the surface water in the Mosoni Danube at Vének, where higher concentrations of nutrients occur more frequently during the year and disrupt the seasonal fluctuation. Compared to the year 2014, concentrations of nutrients at this sampling site has decreased or lower maxima has been achieved. In the case of nitrates and especially total nitrogen, the concentrations here were similar as on other locations. The lowest and the most balanced nutrient values can be found in the seepage water, what results from its groundwater origin. The seasonality here is not as strong as elsewhere. Along with other suitable conditions, the nutrient content in the Danube water is potentially sufficient for development of eutrophic processes.

Oxygen regime in the year 2015 can be classified as very good, except the right-side seepage canal. Compared with the previous year the dissolved oxygen content fluctuated in wider ranges and achieved mostly higher concentrations. Exceptions were the locations on the right bank of the Danube old riverbed and in the right-side river branch system, where the content slightly decreased in comparison with the previous year. Contamination by organic substances expressed by COD_{Mn} and BOD_5 compared with the year 2014 has decreased slightly. Only at the common sampling site in the Mosoni Danube at Čunovo/Rajka higher values of BOD_5 were recorded by the Hungarian Party, while values measured by the Slovak Party were similar as in the year 2014. In the case of BOD_5 at common sampling sites, significant differences in measured values were registered again between the Slovak and the Hungarian Party. Values obtained by the Hungarian side were higher. The water in the left-side seepage canal remained the cleanest. The organic pollution in the right-side seepage canal expressed by COD_{Mn} was low, however in the case of BOD_5 several high values occurred, recorded by the Hungarian Party, and in the period from July to October slight deterioration of oxygen conditions was registered. The oxygen conditions on sampling site in the Mosoni Danube at Vének were good in the evaluated year, although the COD_{Mn} values were among the highest, but the organic pollution expressed BOD_{Mn} was lower than in the right-side river branch system. In general it can be still stated that the organic pollution in long-term (1992-2015) indicates a slight downward tendency in the organic load expressed by the COD_{Mn} in the Bratislava section of the Danube. The long-term tendency in decrease of BOD_5 values has been disrupted in the period 2010-2013 by increase of BOD_5 values, what might be related to measures in the riverbed taken on the Austrian stretch of the Danube. In the second half of the year 2014 values have slightly decreased, and in the evaluated year they have been similar.

In summary, it can be concluded that concentrations of heavy metals, which were determined from the filtered samples, were low during the evaluated year. Only in the case of copper there were two higher concentrations. A large part of the measured values were below the detection limit of the analytical methods. Low concentrations were characteristic mainly for chromium and cadmium. The highest frequency of concentrations above the detection limit was typical for copper. Compared with the previous year the concentrations of monitored heavy metals were similar or lower, and there have not occurred significantly higher concentrations as it was in 2014 in the case of zinc, lead and particularly copper. Based on the comparison of heavy metals concentrations with the limits of the Directive of European Parliament and Council. No. 2008/105/EC on environmental quality standards and the limits according to national standards (Hungarian Standard MSZ No. 12749, Regulation of the Government of the Slovak Republic No. 269/2010 Z.z.) it can be stated that in 2015 concentrations of heavy metals were in accordance with the environmental quality standards.

Based on long-term observations of water quality entering the influenced area and water quality, which leaves the influenced area, it can be stated that the physico-chemical composition of Danube water passing through the Gabčíkovo Waterworks basically does not change. The situation in the quality of individual parameters is similar.

In the frame of monitoring in accordance with the Agreement the macrozoobenthos, phytoplankton and phytobenthos are observed in long-term from among the biological quality elements. Since 2007 the Commission of boundary waters at common sampling sites assesses the biological quality elements within the ecological status of surface water bodies.

From among the biological quality elements the chlorophyll-a was chosen for the joint assessment, which refers to the amount of phytoplankton and provides information about the eutrophic status of water. The chlorophyll-a content in 2015 was significantly lower than in 2014. An exception was the only sampling site in the upper part of the reservoir at Kalinkovo, where two high values they were recorded in April and May (81.2 and 58.3 $mg.m^{-3}$).

Based on the results obtained from the monitoring of the biological quality elements (macrozoobenthos, phytobenthos, phytoplankton and macrophytes) on common and Hungarian sampling sites it can be stated that good ecological status (II. quality class) has been achieved at sampling sites in the Danube old riverbed (except Dunaremete), in the Mosoni Danube at Čunovo/Rajka, in the right side seepage canal at Čunovo/Rajka and in the river branch system. The average ecological status (III. quality class) was achieved on the sampling sites in the Danube at Bratislava and Medveďov, in the Danube old riverbed at Dunaremete and in the Mosoni Danube at Vének.

Regarding the overall ecological status (which takes into account the results of the chemical status and the evaluation results of other elements entering into the assessment of ecological status), the results are identical to the results of overall biological status.

Based on results obtained from the monitoring of particular biological quality elements it can be stated that according to the phytoplankton high ecological status (I. class) was achieved at ten sampling sites and good ecological status (II. class) at two. According to the phytobenthos good ecological status (II. class) was achieved at nine locations and average status (III. class) at three. According to the macrozoobenthos average ecological status (III. class) was achieved also at three sampling sites, good ecological status (II. class) at eight and in the Danube old riverbed at Rajka high ecological status (I. class).

In the frame of monitoring of the biological quality elements on the Slovak side the macrozoobenthos, phytoplankton and phytobenthos are monitored in long-term and in the evaluation of the biological status of water quality saprobic indexes of biosestone, macrozoobenthos and phytobenthos are determined.

In macrozoobenthos in sections with fast flowing water with gravely or rocky bottom rheophillic and oxybiontic macroinvertebrate species prevail, indicating β-mesosaprobity. In sections with slow flowing water stagnophillic and oligooxybiontic species appear, which withstand slight pollution. On these sections sandy or muddy bottom occurs. In 2015, the average value of saprobic index of macrozoobenthos in all locations was at the level of β-mesosaprobity. On most of sampling sites improvement of the average value of saprobic index occurred in comparison with the previous year. Deterioration was documented only at three sampling sites. The highest average value of saprobic index of 2.38 was recorded on the sampling site No. 311 in the lower part of the reservoir. At this sampling site a saprobic index value corresponding already to α-mesosaprobity (2.59) was recorded in spring, what represents a water with higher pollution. However, it was the only case.

The development of phytoplankton was weaker in comparison with the year 2014. Limit for the mass development was exceeded three times, in 2014 it was six times. Phytoplankton consisted mainly of small centric diatoms, in the seepage canals of pennate diatoms. The highest abundance at 14894 individuals.ml^{-1} was recorded at the sampling site No. 308 in the upper part of the reservoir at Kalinkovo. At this sampling site also the highest value of the annual average phytoplankton abundance (2973 individuals.ml^{-1}) was documented and at the same time also a slight increase of its value was registered in comparison with the year 2014. On the other sampling sites the average values declined sharply, and all ranged well below the limit for mass development of phytoplankton. The saprobic index of biosestone on observed monitoring sites in the long-term fluctuates in the range corresponding to the β-mesosaprobity. Such an environment provides suitable living conditions for a wide range of organisms with high species diversity and represents a natural load of organic matter in the river. The average values of saprobic index at most observed sampling sites were similar as in the year 2014. Slight deterioration occurred at the sampling site No. 307 in the upper part of the reservoir and significant improvement at sampling sites in the seepage canals (No. 3531 and 317). The level of saprobity has not changed. Concerning the abundance of phytoplankton, as a key determinant of saprobic index, it can be stated that the hydropower system even in 2015 have not had negative impact on saprobity level.

In terms of species diversity, the dominant part of phytobenthos in the evaluated year was formed by pennate and centric diatoms. The average values of saprobic indexes of phytobenthos on all sampling sites monitored ranged within β-mesosaprobity. Compared to 2014 on all sampling sites slight deterioration of the annual average of saprobic index occurred, the most significant deterioration was documented at Medveďov.

The sediment quality in 2015 for the purposes of the Agreement was assessed according to the Canadian standard „Canadian Sediment Quality Guidelines for the Protection of Aquatic Life". Overall, the sediment pollution in the evaluated year on the Slovak territory was slightly higher than in 2014, mainly the content of organic substances from the group of PAHs has raised. The sediment contamination on the Hungarian territory in the spring was similar as in the year 2014, and in the case of the autumn sampling the heavy metal concentrations were lower than in the fall 2014. Similarly to the previous year the PEL level has been exceeded once, in 2014 it was in the case of mercury, in 2015 in the case of zinc (in both cases on the sampling site No. 1141 in the Mosoni Danube at Vének).

The highest concentrations of organic micro-pollution were registered by the Slovak Party on the sampling site No. 307 in the upper part of the reservoir, and the highest concentrations of heavy metals on the sampling site No. 309 in the lower part of the reservoir at Šamorín. On the Hungarian territory the highest inorganic pollution of sediments was on the sampling site No. 1141 in the Mosoni Danube at Vének, and the highest concentrations of organic substances were detected in the river branch system on the sampling site No. 1126 in the Ásványi river arm in the spring.

The lowest sediment contamination in 2015 was documented on sampling site No. 3739 in the Danube old riverbed at Sap on the Slovak territory and on the Hungarian territory at sampling site No. 0084 in the right-side seepage canal at Rajka in spring and in autumn at sampling site No. 1112 in the river branch system (Helena river arm).

Fig. 2-1

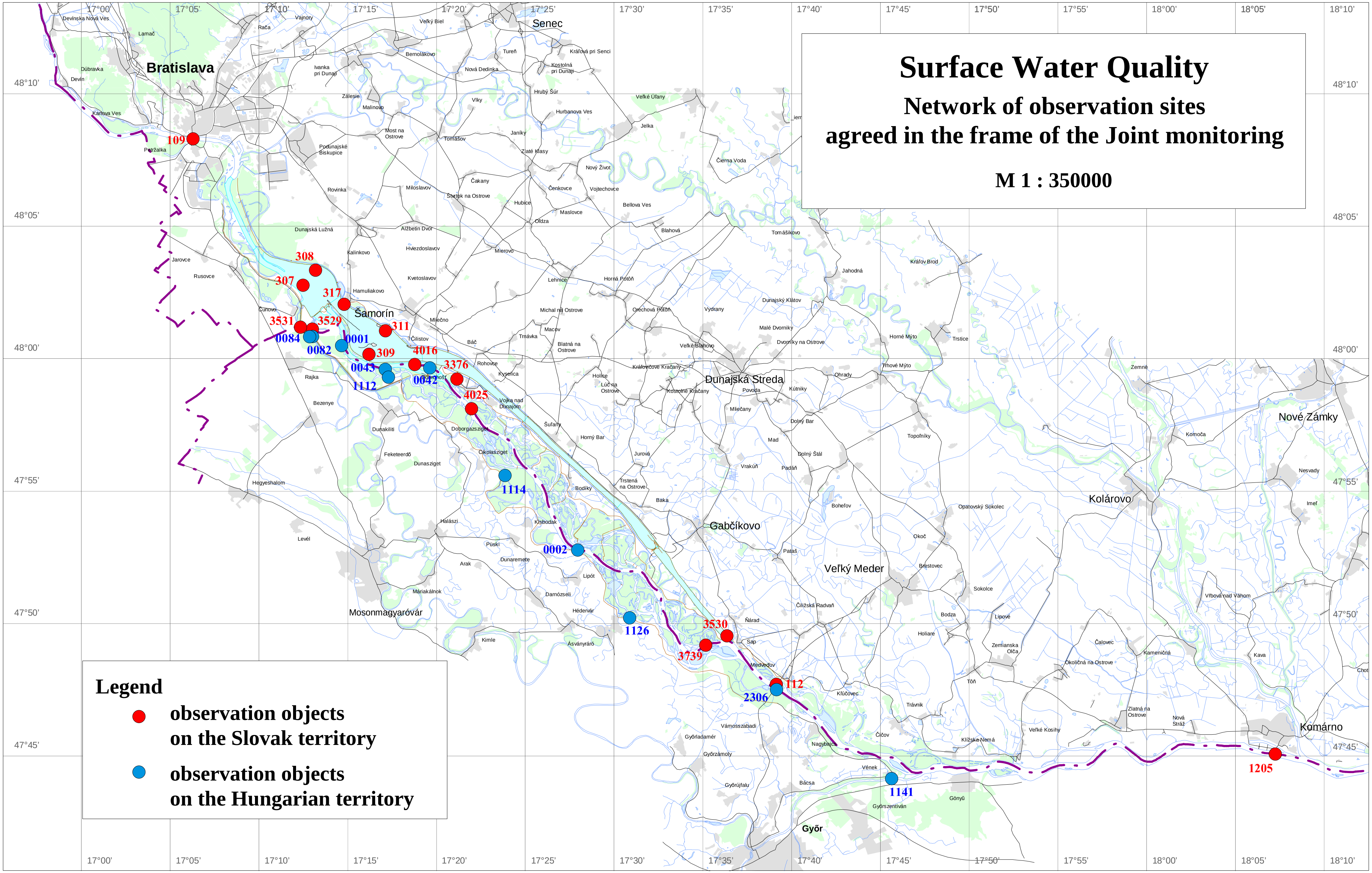
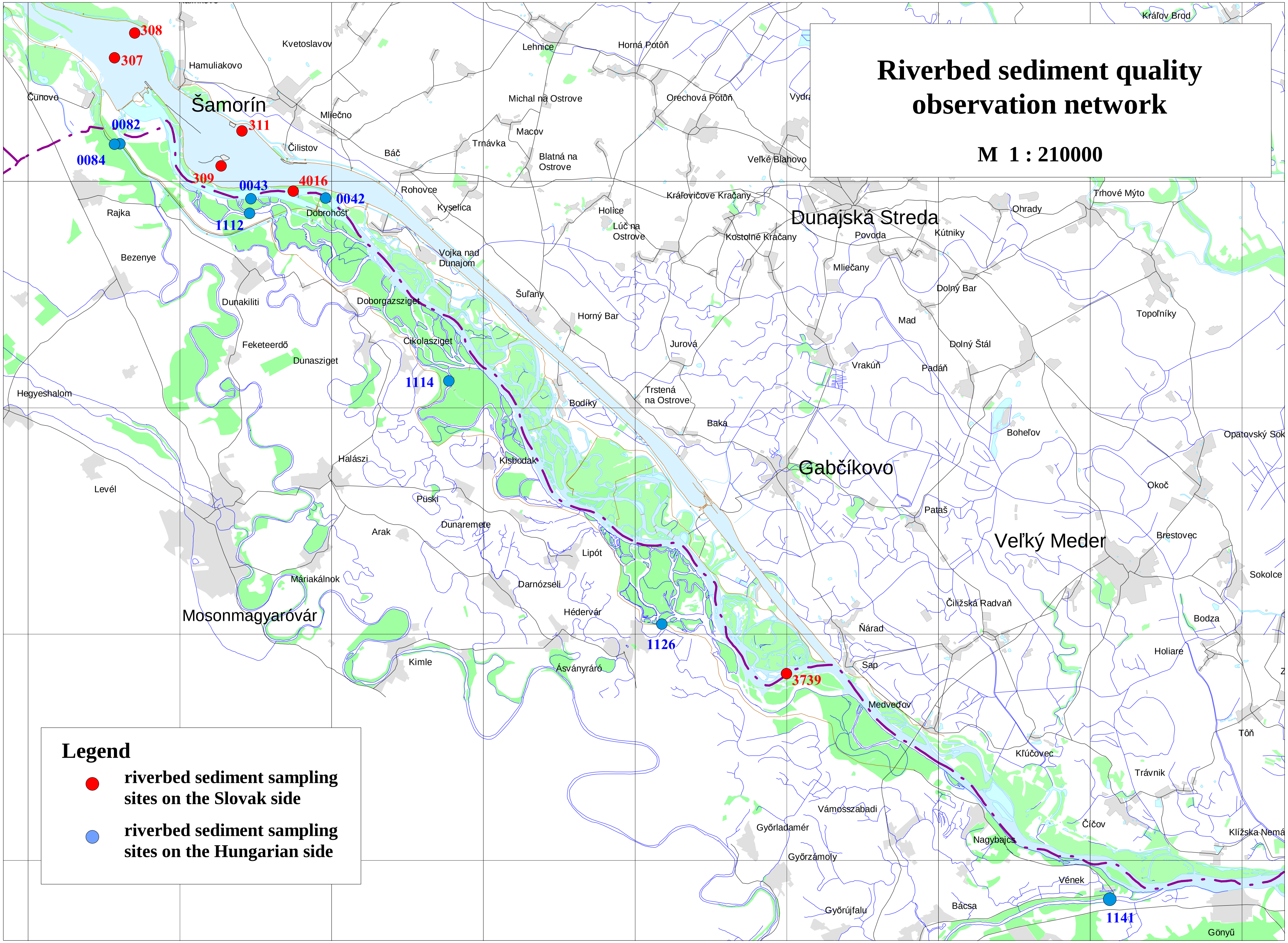

Surface Water Quality
Network of observation sites
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation objects on the Slovak territory
observation objects on the Hungarian territory
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
109
308
307
317
3531
3529
311
309
4016
3376
4025
3530
3739
112
1205
0084
0082
0001
0043
1112
0042
1114
0002
1126
2306
1141
17°00'
17°05'
17°10'
17°15'
17°20'
17°25'
17°30'
17°35'
17°40'
17°45'
17°50'
17°55'
18°00'
18°05'
18°10'
48°10'
48°05'
48°00'
47°55'
47°50'
47°45'

Fig. 2-2



Riverbed sediment quality observation network
M 1 : 210000
Legend
riverbed sediment sampling sites on the Slovak side
riverbed sediment sampling sites on the Hungarian side
308
307
311
309
4016
3739
0082
0084
0043
0042
1112
1114
1126
1141
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Mosonmagyaróvár
Čunovo
Hamuliakovo
Kvetoslavov
Mliečno
Čilistov
Báč
Rohovce
Kyselica
Dobrohošť
Vojka nad Dunajom
Rajka
Bezenye
Dunakiliti
Feketeerdő
Dunasziget
Doborgazsziget
Cikolasziget
Hegyeshalom
Levél
Halászi
Püski
Arak
Dunaremete
Kisbodak
Lipót
Darnózseli
Hédervár
Máriakálnok
Kimle
Ásványráró
Lehnice
Horná Potôň
Michal na Ostrove
Orechová Potôň
Macov
Trnávka
Blatná na Ostrove
Veľké Blahovo
Kráľovičove Kračany
Holice
Lúč na Ostrove
Kostolné Kračany
Šuľany
Horný Bar
Jurová
Trstená na Ostrove
Bodíky
Baka
Povoda
Mliečany
Kútniky
Ohrady
Dolný Bar
Mad
Dolný Štál
Vrakúň
Padáň
Trhové Mýto
Topoľníky
Kráľov Brod
Boheľov
Opatovský Sok
Okoč
Pataš
Brestovec
Sokolce
Čiližská Radvaň
Bodza
Ňárad
Holiare
Sap
Medveďov
Tôň
Kľúčovec
Trávnik
Vámosszabadi
Győrladamér
Čičov
Klížska Nemá
Nagybajcs
Győrzámoly
Vének
Győrújfalu
Bácsa
Gönyű

Fig. 2-3

Surface water quality

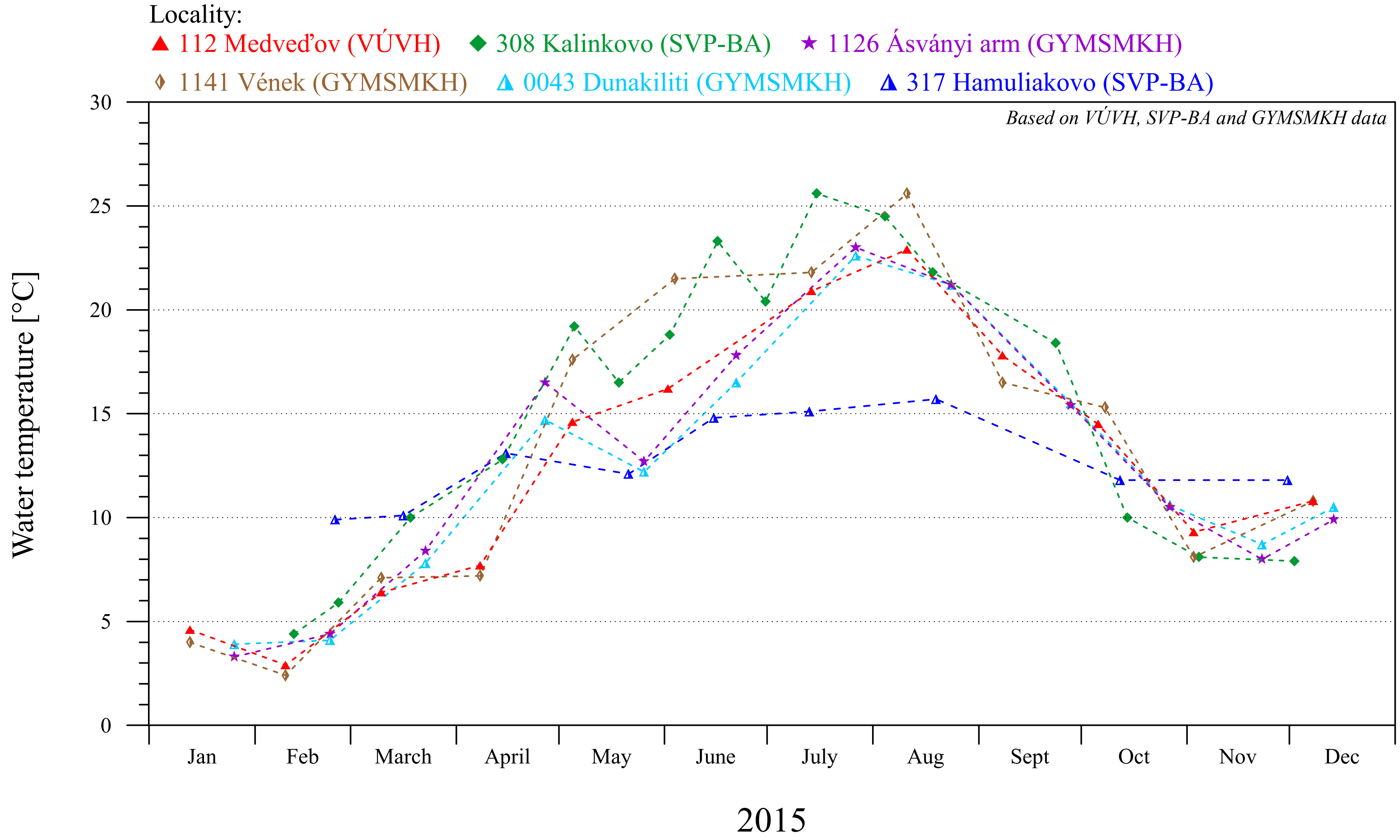


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Fig. 2-4

Surface water quality

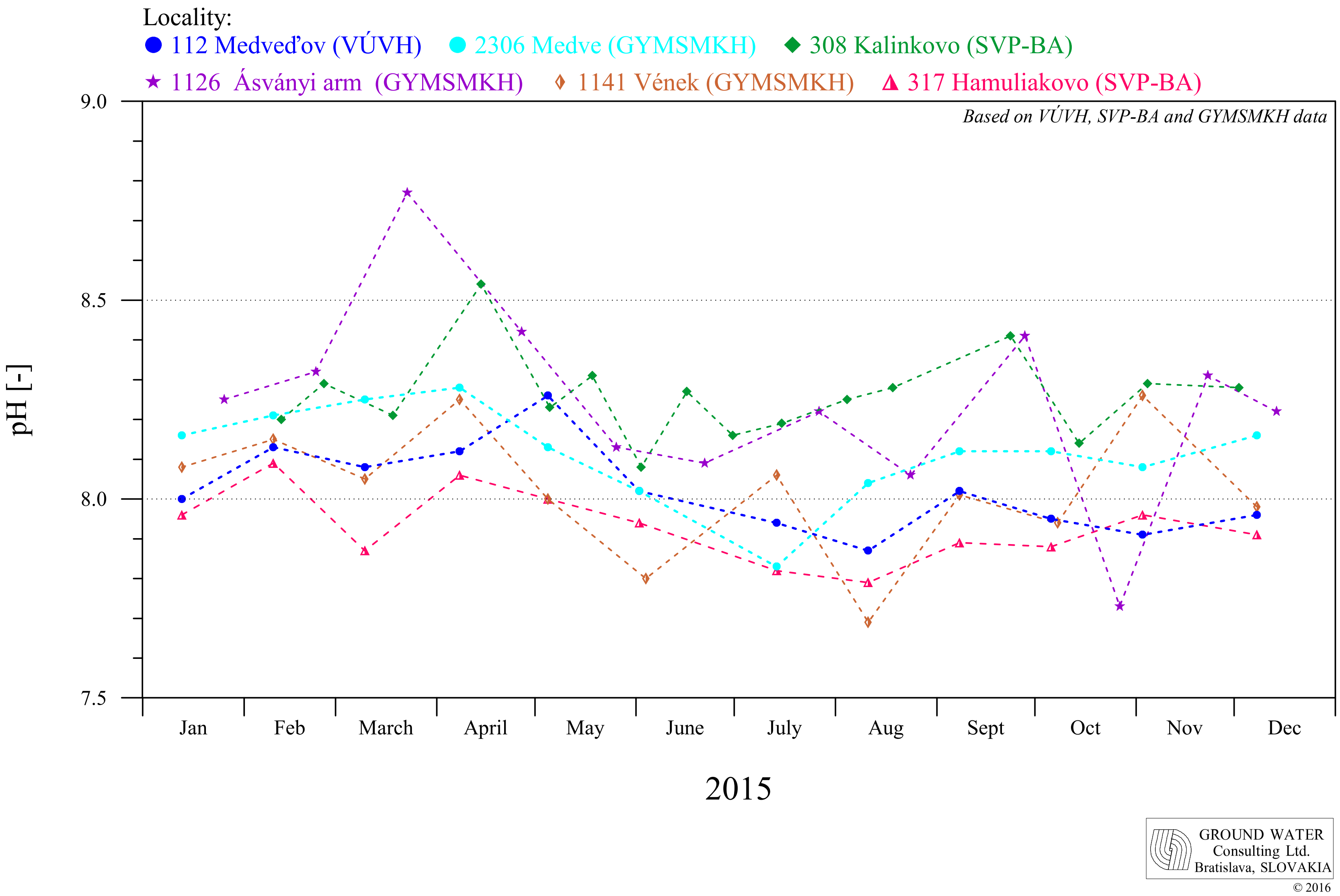

Fig. 2-5

Surface water quality

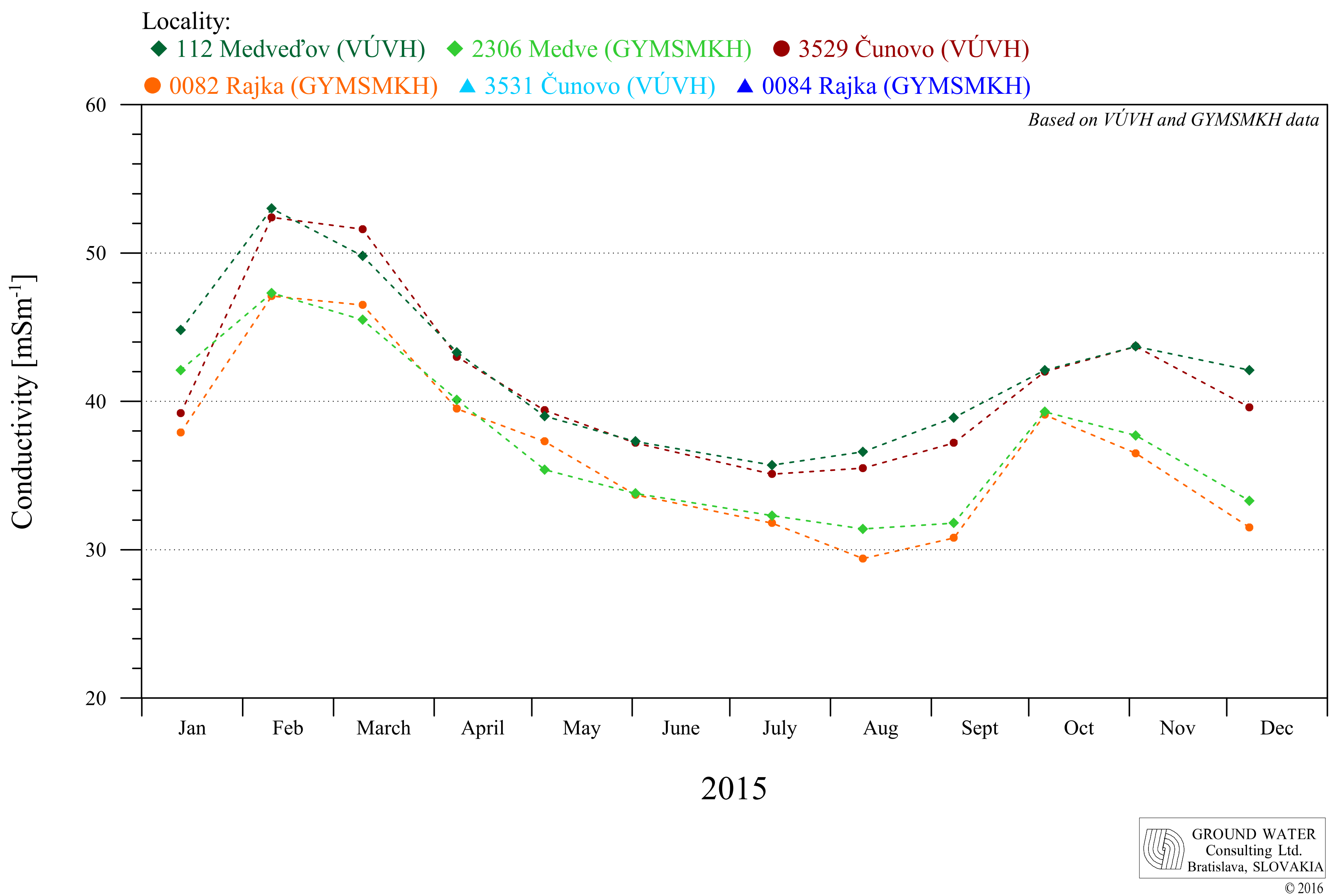

Fig. 2-6

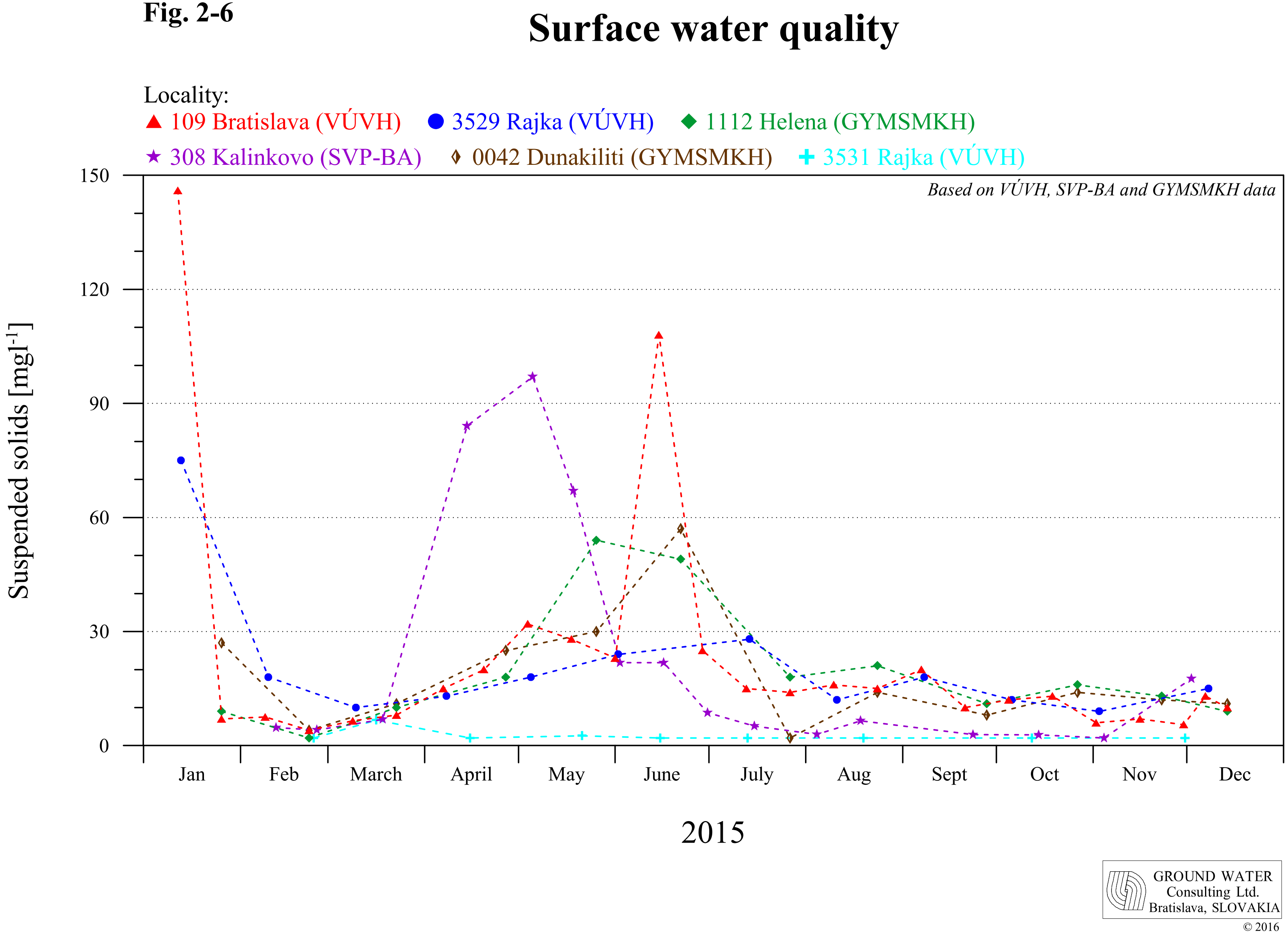
Surface water quality
Locality:
109 Bratislava (VÚVH)
3529 Rajka (VÚVH)
1112 Helena (GYMSMKH)
308 Kalinkovo (SVP-BA)
0042 Dunakiliti (GYMSMKH)
3531 Rajka (VÚVH)
Based on VÚVH, SVP-BA and GYMSMKH data
Suspended solids [mgl-1]
150
120
90
60
30
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
2015
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Fig. 2-7

Surface water quality

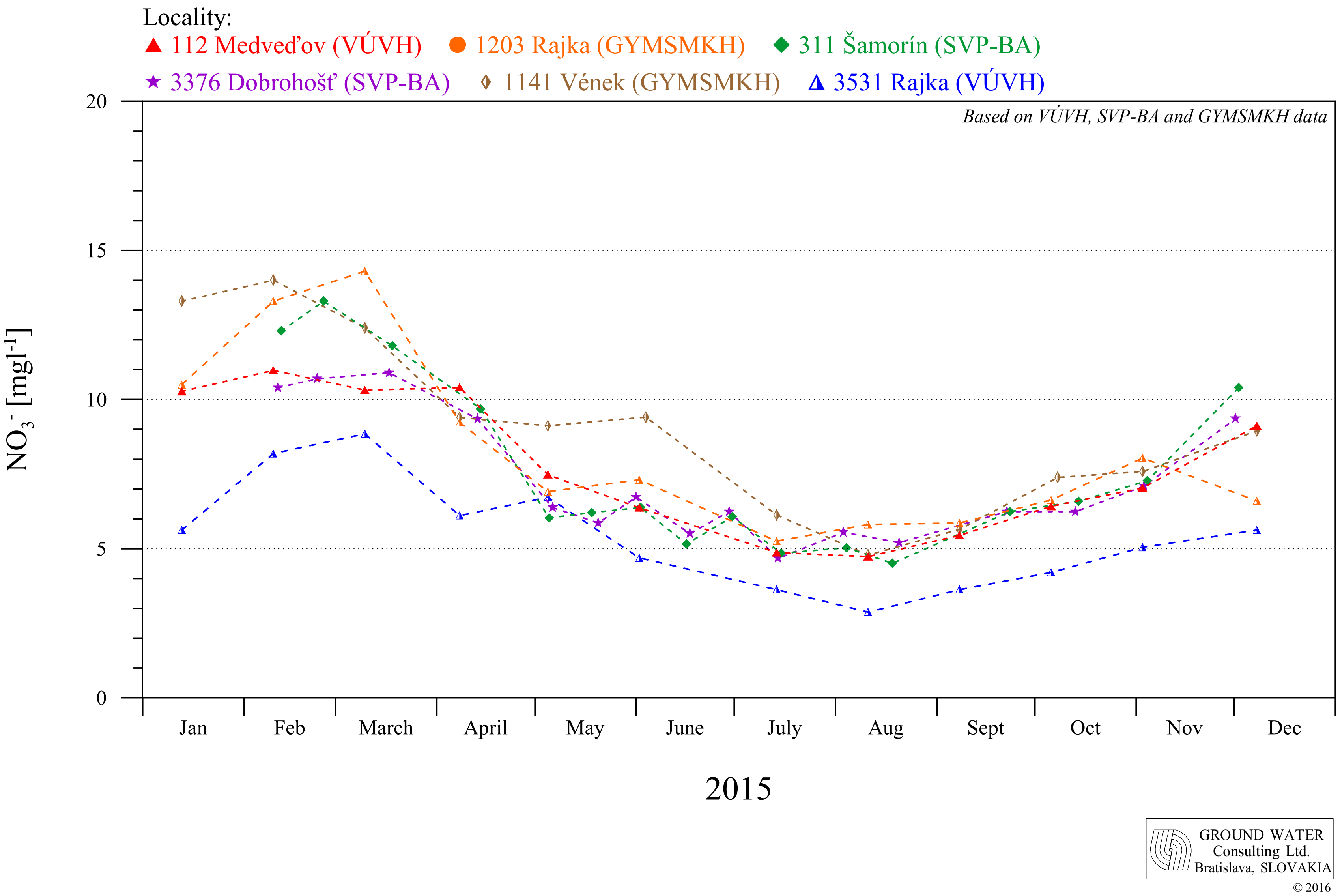

Fig. 2-8

Surface water quality

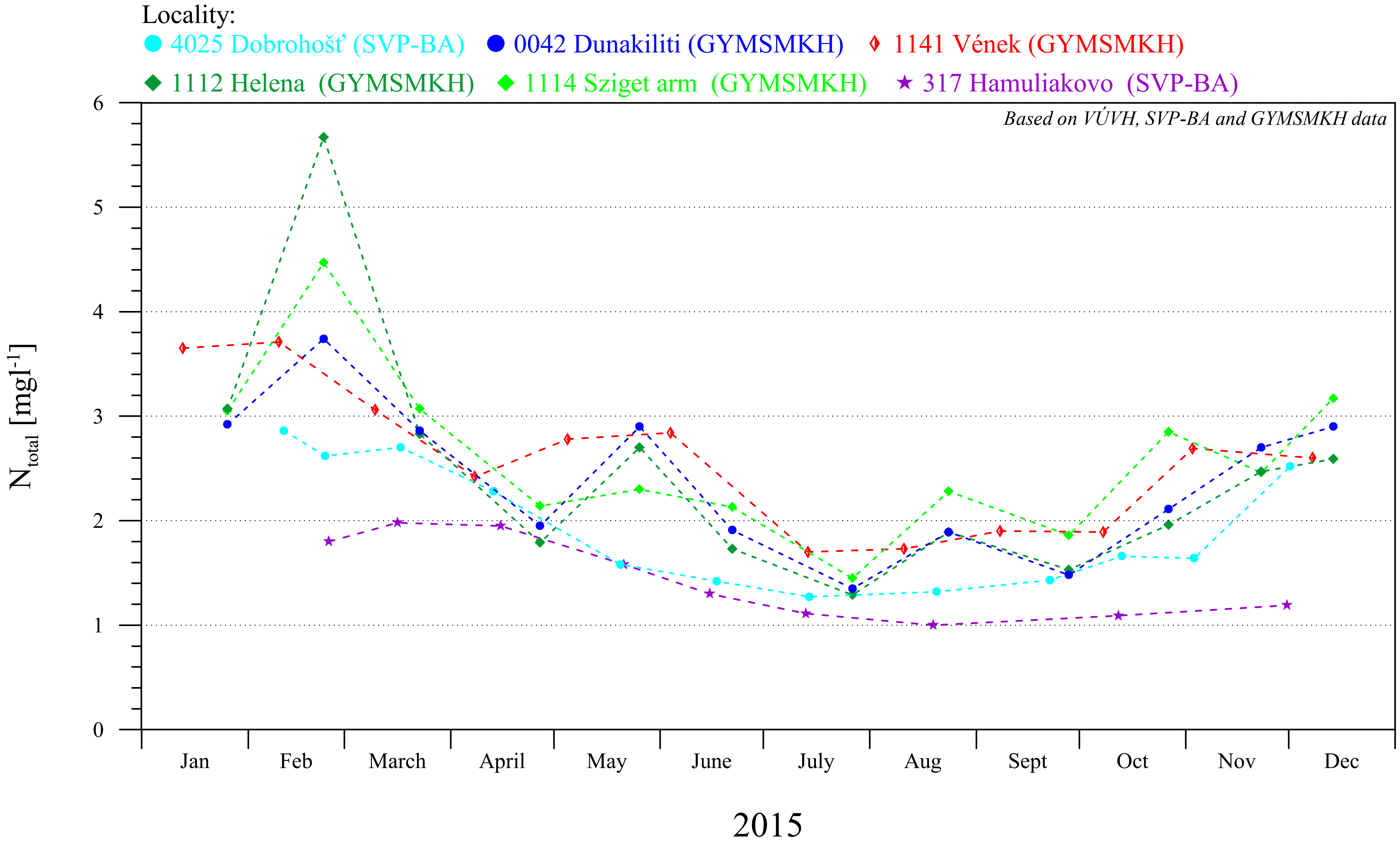

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Fig. 2-9

Kvalita povrchovej vody

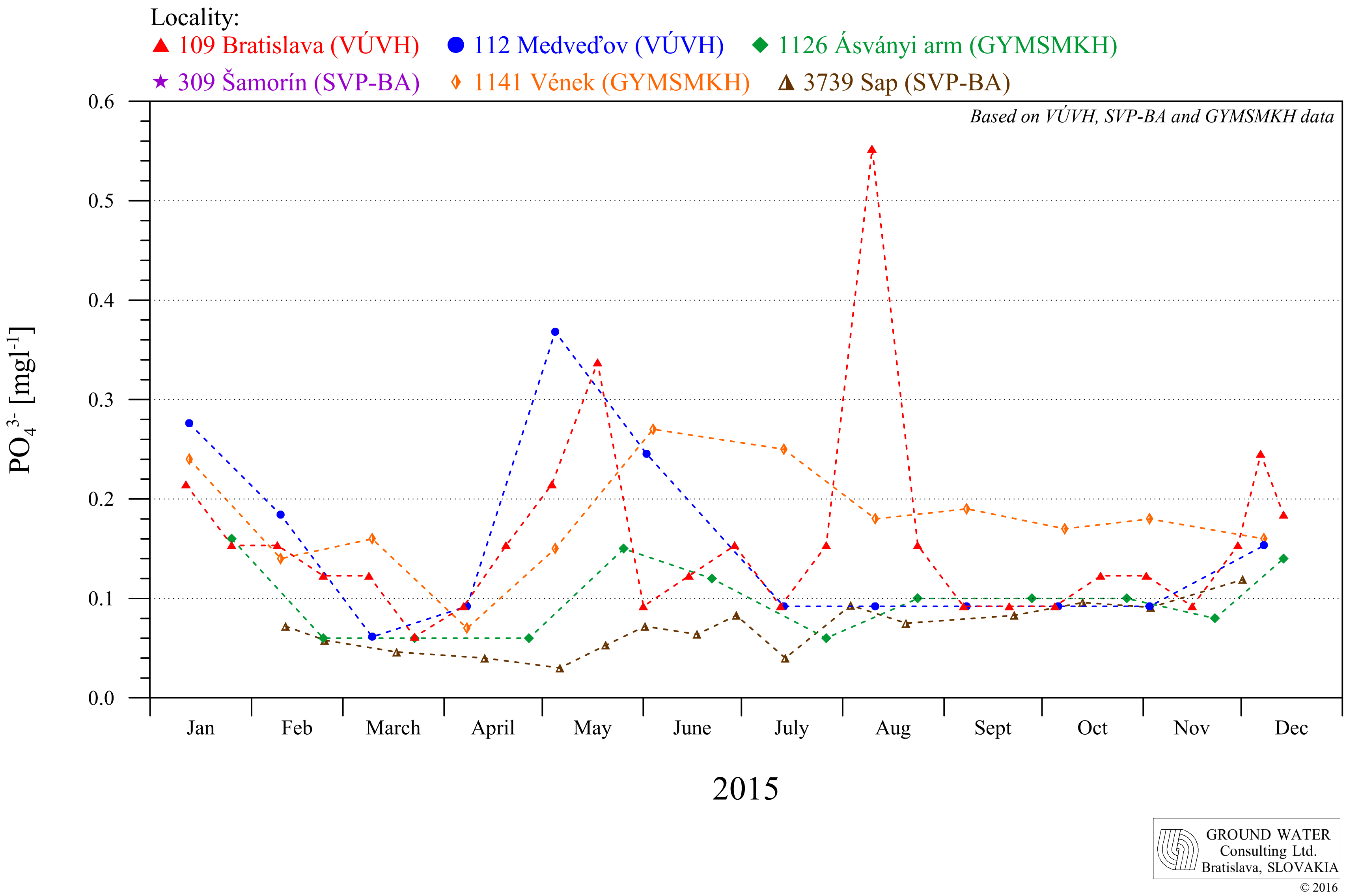

Fig. 2-10

Surface water quality

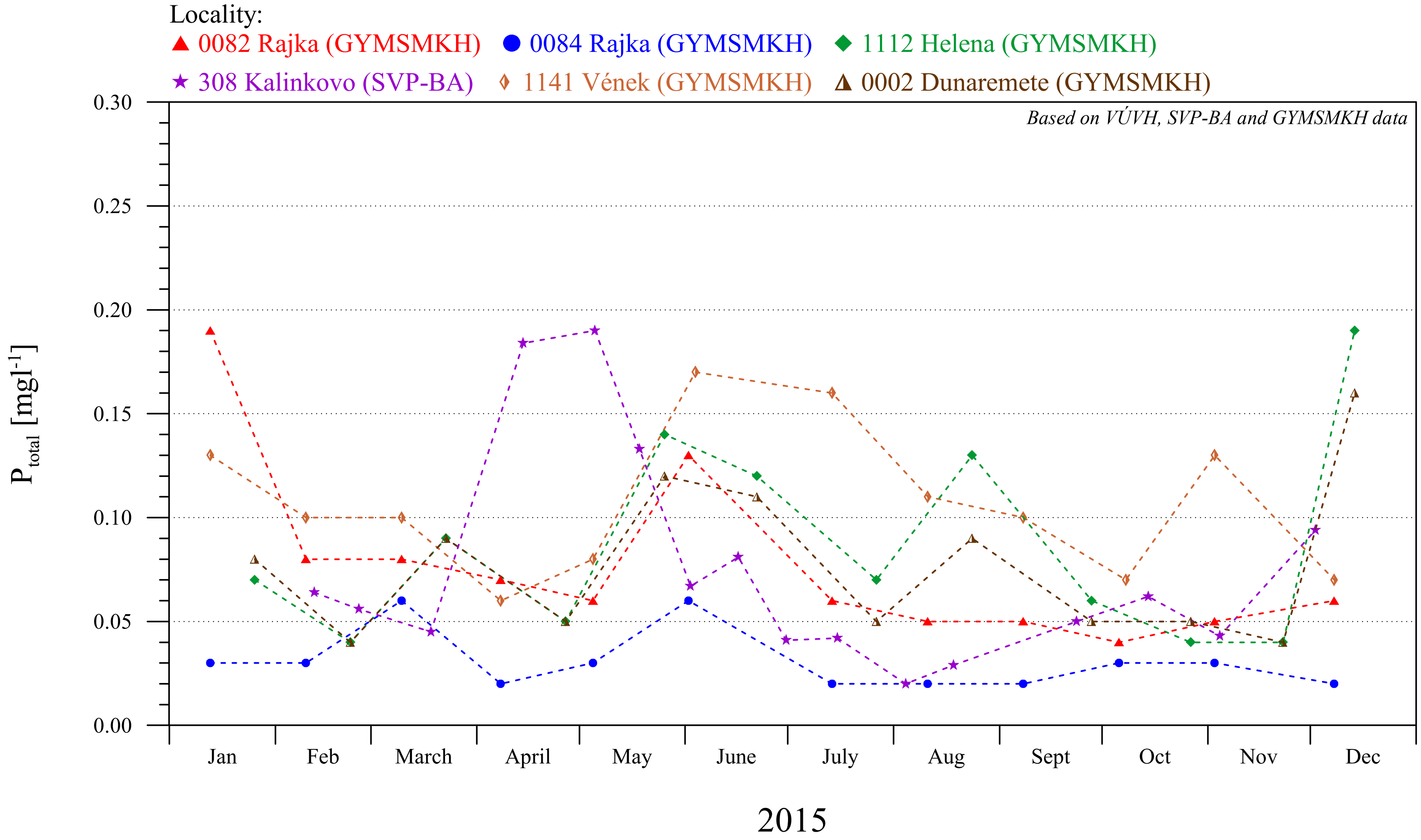

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Fig. 2-11

Surface water quality

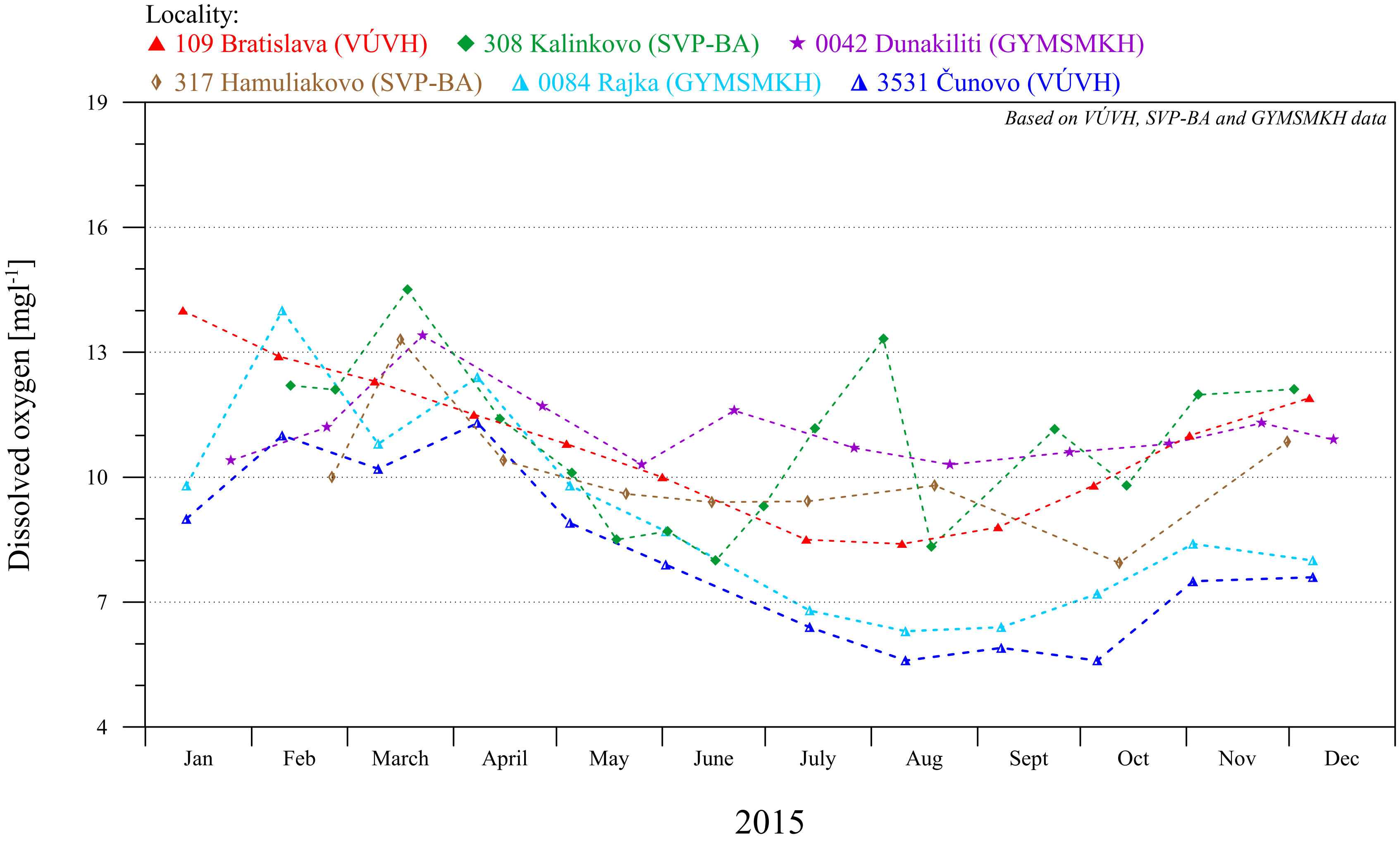

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Fig. 2-12

Surface water quality

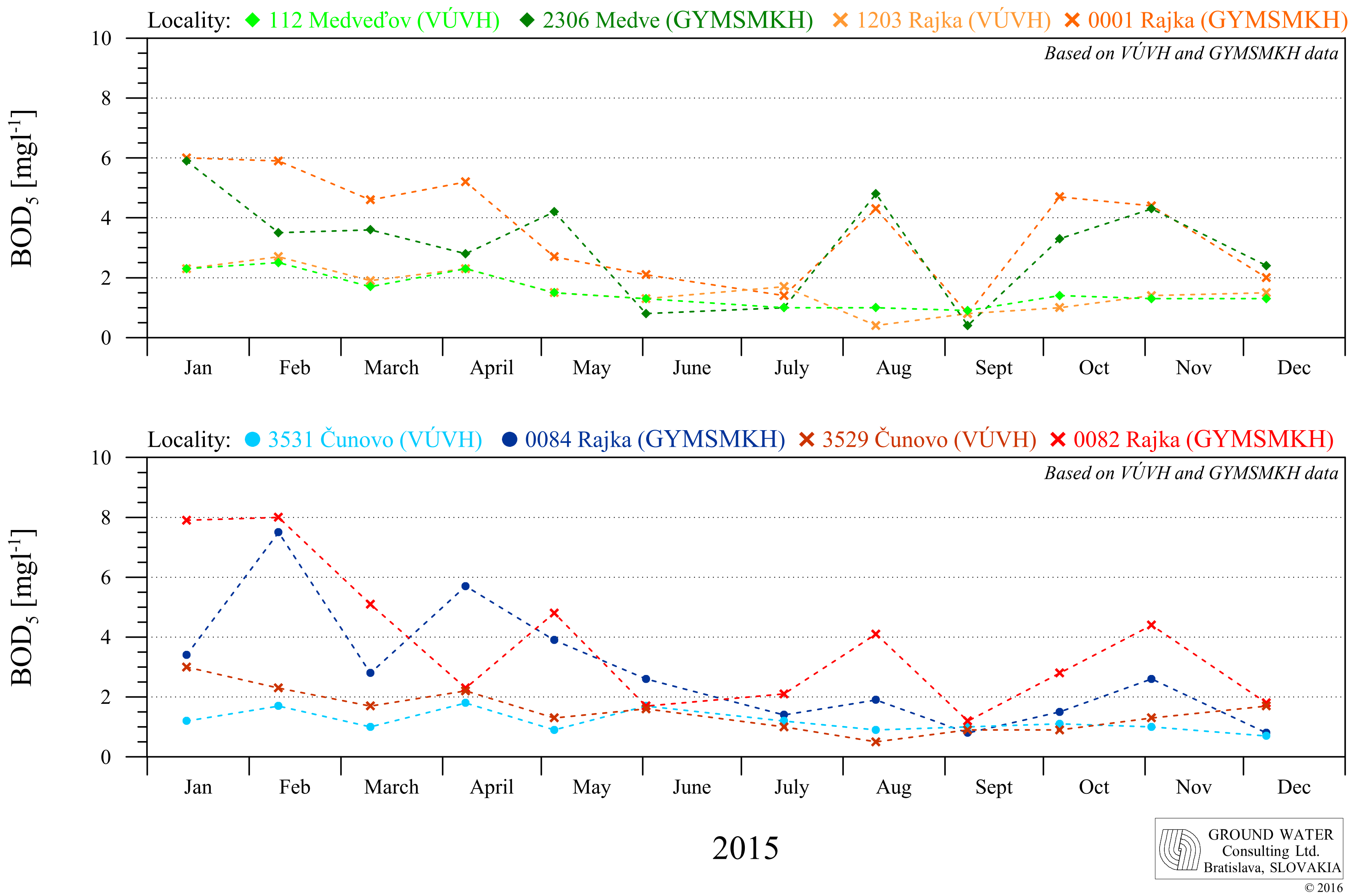
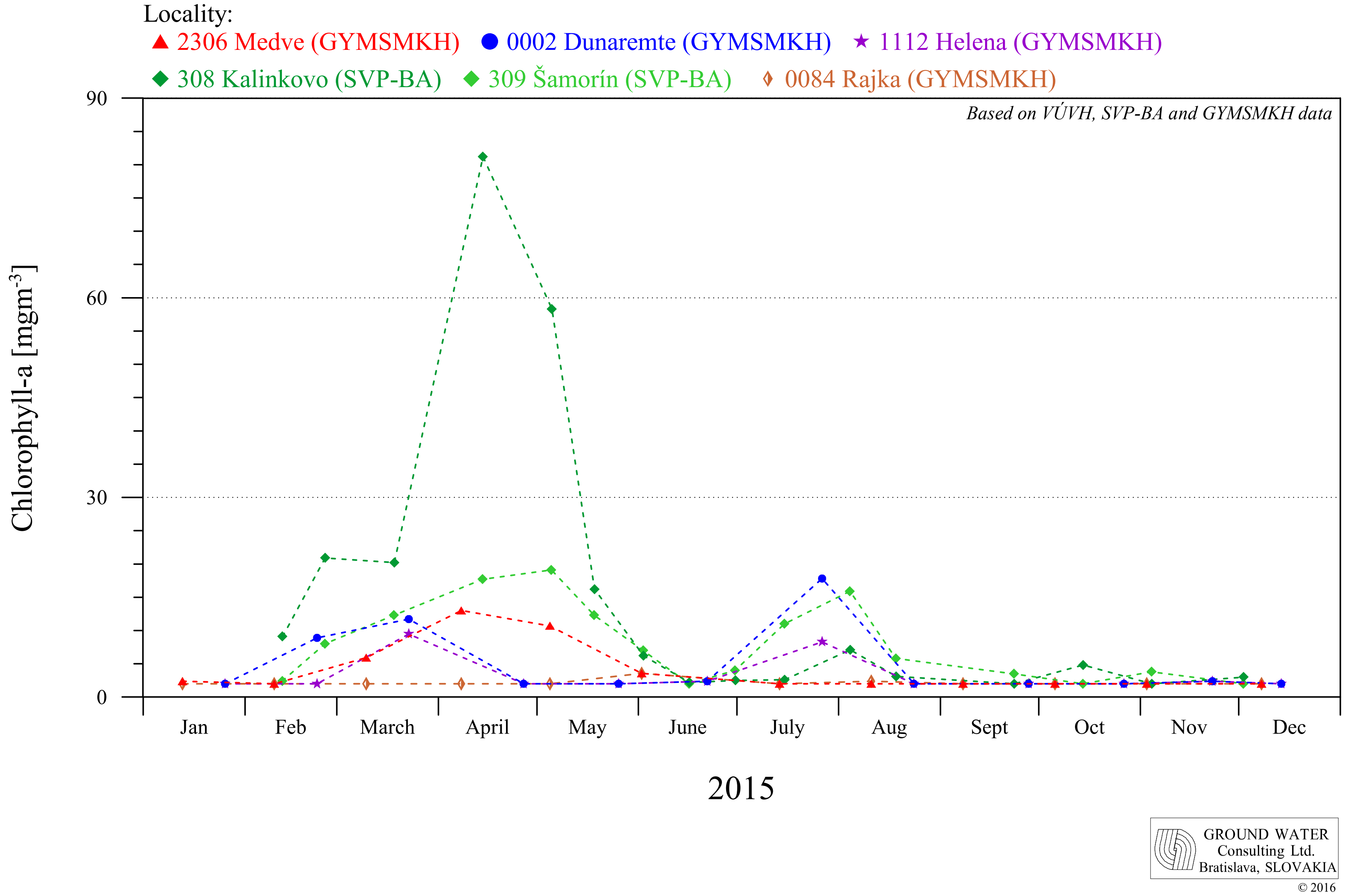


Fig. 2-13

Surface water quality



PART 3

Groundwater Regime

The monitoring of groundwater levels in 2015 continued in the prescribed extent. During the year rather extensive replacement of observation objects have been made on the Slovak side, where a number of new wells was constructed in the frame of reconstruction of the state observation network. The number of observation objects included in the data exchange have not changed, and new objects were mostly located close to the old wells. In the case, that the new object remained in the vicinity of the old one, the object number did not changed, otherwise a new number was introduced. The observation network on both sides in 2015 consisted of 264 observation wells (136 on the Slovak territory and 128 on the Hungarian territory). Monitoring objects are situated in the area of Žitný ostrov and in the Szigetköz region. The list of observation wells is given in the respective National Annual Reports on environmental monitoring. The situation of observation networks on both sides is shown in **Fig. 3-1**. Observation wells, that were concerned by the reconstruction, are presented by different colour. The observed groundwater levels data were used for evaluation of impacts of applied technical measures and discharges into the Danube and the Mosoni branch of the Danube and impact of water supply on the groundwater regime.

The evaluation of groundwater level data in 2015 in a local scale was done by the Parties themselves and is given in their National Annual Reports. In this Joint Report, the regional evaluation was jointly elaborated according to computed groundwater level equipotential lines. The equipotential lines were constructed in order to compare groundwater levels of the influenced area in the current year and in the period before construction of submerged weir and introducing the water supply into the river branches on Hungarian side.

3.1. Joint evaluation of groundwater regime

The groundwater levels in the whole observed area are primarily influenced by surface water levels in the Danube and in the reservoir. Besides this, the groundwater level in the inundation area is strongly influenced by drainage effect of the Danube old riverbed. This adverse effect is mitigated by the water supply into the river branch system on both sides of the Danube. The hydrological regime of the Danube in 2015 was not typical. The flow rate in January was rather high, significant discharge wave occurred at the end of the month. The flow rate in February and March was relatively stable, it mostly varied between 1200 and 1400 $m^3.s^{-1}$. In April, May and June several discharge waves occurred, however they were relatively low (lower than 5300 $m^3.s^{-1}$) and with short duration. Flow rates in the second half of the year were unusually low, except three low discharge waves, they fluctuated exclusively below the long-term average flow rate and in July, August, September and November they ranged mainly at the level of long-term minimum values occurring during these months. This hydrological regime was also reflected in the course of groundwater levels. As a result of substantially low flow rates in the second half of the year the groundwater levels decreased and the lowest levels occurred mainly in November and December 2015.

Groundwater levels started from an average position at the beginning of the year, and in comparison to the previous year they were higher. Although there occurred a relatively high discharge wave during January, significant increase of groundwater levels have been registered only on objects near the Danube. On most of observation objects decline of groundwater levels continued until end of February. A general increase of groundwater levels began during April, with increasing flow rates in the Danube. At the end of May the second highest discharge wave occurred on the Danube. Its influence on groundwater levels was more significant than it was in January, due to higher flow rates in April and May. On a great part of observation objects the highest groundwater levels were registered at the end of May and during June. In the region under the influence of the reservoir the maximum groundwater levels were recorded during July and August or in October, to which also contributed the high precipitation amounts. Due to the gradually decreasing and in general very low flow rates in the second half of the year, the groundwater level on observation objects under the influence of the Danube gradually declined. The lowest groundwater levels on these objects occurred in the winter period, either at the end of February, or more frequently at the end of the year. In general, the groundwater levels at the end of the year were lower than at its beginning.

As in the previous years, three hydrological situations were chosen in the period before introducing the water supply and in the year 2015 for computing the groundwater level differences. The selected hydrologic situations characterise the low, average and high flow rate conditions in the Danube, corresponding to flow rates approximately 1000, 2000 and 3000 m^3s^{-1}.

The selected dates and the corresponding flow rates in the Danube at Bratislava-Devín gauging station are the following (**Table 3-1, Fig. 3-2, Fig. 3-3a, b**):

Table 3-1: Selected dates and the corresponding flow rates in the Danube at Bratislava-Devín gauging station

hydrologic situation	before the water supply 1993		after the water supply 2014	
	date	Q ($m^3.s^{-1}$)	date	Q ($m^3.s^{-1}$)
low flow rate	09.03.1993	975.5	01.11.2015	968
average flow rate	09.05.1993	1937	24.04.2015	2017
high flow rate	25.07.1993	2993	29.05.2015	2933

Low flow rate period in 2015 (app. 1000 $m^3.s^{-1}$) was chosen at the beginning of November, because the flow rate in the first half of the year did not decreased to the corresponding value. When compared with the low flow period in 1993, it can be stated that the hydrological and climatic situations can be regarded as comparable. The period for average flow rate was chosen in the second half of April. Also in this case the hydrological and climatic situations can be regarded as comparable, since the compared dates in both cases were chosen after a small discharge wave and in the same season of the year. In the case of high flow rates similar hydrological situation as in 1993 was after the discharge wave at the end of May, when the decreasing flow rate achieved the desired value about 3000 $m^3.s^{-1}$. However, the climatic situation, especially the precipitation totals in the preceding two months, slightly differed (almost double amount of precipitation in 2015), what influenced the comparison result mainly in the lower part of the compared area.

The jointly constructed maps of equipotential lines for the selected dates, using the measured groundwater levels, are given on **Figs. 3-4 to 3-6**. In wells where the water level is measured once a week, the groundwater level for the selected dates was computed by linear interpolation. In all other wells the average daily values were used. Altitudes of groundwater levels are given on maps for each observation object that was used for calculating of equipotential lines. For calculation of equipotential lines the computed surface water level data in the Danube were used as well. These data were computed by calibrated model, using river morphology data and measured water levels data on the given stretch. The other surface water levels were not used for calculating the equipotential lines. The equipotential lines represent general groundwater levels and flow direction, and do not show the local influences of channels or river branch systems.

Differences between groundwater levels for selected hydrologic situations in years 1993 and 2015 are expressed in **Figs. 3-7 to 3-9**.

The evaluation is focused mainly on the area influenced by technical measures and discharges according to the intergovernmental Agreement and by the water supply realised on the Hungarian side. The influenced area in this sense is represented by the inundation and the flood-protected area on the Hungarian side, and partly by the inundation area on the Slovak side.

Low flow rate conditions (**Fig. 3-7**)

When comparing hydrological situations at low flow rate (approximately 1000 $m^3.s^{-1}$) in the period prior the implementation of technical measures and discharges according to the Agreement and in the year 2015 (2015 versus 1993), it can be stated that decrease can be seen in the vicinity of the lower part of the reservoir. Slight decrease from the reservoir can be seen also in the uppermost part of the inundation area. The decrease around the lower part of the reservoir is caused by the decrease of permeability of the reservoir bottom as compared with the situation immediately after its filling. In recent years, the decline of groundwater levels almost stopped and the area with decrease of groundwater level does not change significantly. Groundwater levels in a greater part of the Žitný ostrov area and in the upper and lower part of the Szigetköz region remained unchanged. Increase of groundwater levels, as the result of implemented water supply, occurs in the middle part of Szigetköz, approximately from Dunasziget to Ásványráró and Mecsér. Since completion the water supply system in the lower part of the Hungarian inundation area significant increase of ground water levels can be seen also in the river branch system at Ásványráró, which had previously been characterized by decrease. Around the Bagoméri river branch system, and in the vicinity of the tail-race canal on the Slovak territory the groundwater levels remain lower than in 1993. The groundwater level in this area is adversely influenced by the riverbed erosion in the tailrace canal and downstream the confluence of the tailrace canal and the Danube old riverbed. The decline in groundwater levels along the river Váh in the lower part of the Žitný ostrov area is related to lower water levels in the river Váh in the compared period.

In general the change of the groundwater levels in the area influenced by technical measures and discharges according to the Agreement mostly ranged between -0.7 and +1.2 m in comparison to groundwater levels in 1993. Since completion the water supply system in the lower part of the Hungarian river branch system slight decrease occurs only in the uppermost part of the inundation area along the lower part of the reservoir and in the part of the Bagoméri river branch system. Increase of groundwater levels, which has been evoked by the water supply, in the middle part of the Slovak and Hungarian inundation area reaches up to +0.7 m and in the lower part of the Hungarian inundation area up to +1.2 m. Groundwater levels in the large part of Žitný ostrov area and in the upper and lower part of Szigetköz area remained unchanged. The decrease of groundwater levels around the lower part of the reservoir, reflecting the decrease in permeability of the reservoir bottom, reached -1.2 m. Decline in groundwater level around the confluence of the Danube old riverbed and the tail-race canal ranged mostly from -0.25 to -1.2 m. The groundwater flow direction in the upper part of the river to Dunakiliti still shows infiltration from the river and the reservoir into the surrounding area. Along the Danube old riverbed from Dunakiliti to the confluence with the tailrace canal the groundwater is drained and the flow direction turns towards the Danube old riverbed. Groundwater at the Ásványi river branch system and in the inland area is flowing mostly paralelly with the Danube, while at the estuary of the Mosoni Danube it seems that the ground water flows back to the Danube (**Fig. 3-4**).

Average flow rate conditions (**Fig. 3-8**)

Comparing groundwater levels in the period prior to the implementation of technical measures and in the evaluated year at average flow rate conditions in the Danube (approximately 2000 $m^3.s^{-1}$), the actual results show an increase of groundwater levels in the middle part of the Slovak and Hungarian inundation area and in the lower part of the Hungarian inundation area. The groundwater level increase in the uppermost part of the Szigetköz and inundation area is reduced by the groundwater level decrease in the vicinity of the reservoir, due to decreased permeability of the reservoir bottom. Therefore the average groundwater levels show slight decrease or no change in this part of the Szigetköz. The groundwater level increase in the middle and lower part of the Hungarian inundation area reaches up to +0.7 m. The positive effect of completion the water supply system in the lower part of the Hungarian inundation area is apparent also in the case of average flow rate conditions. The decrease of ground water level in the Ásványi river branch system has been eliminated, on a large part of this area there is an increase of groundwater level higher than +0.2 m. Slight decrease remained along the Danube old riverbed in a part of the Bagoméri river branch system. This decrease in groundwater levels results from erosion of the Danube riverbed. The decrease in the vicinity of the tail-race canal on the Slovak territory is larger, because the applied measures do not yet have the desired effect. The impact of technical measures according to the Agreement appears in the vicinity of the lower part of reservoir, where increased water level partially eliminates the groundwater level decline, which results from the decrease of permeability of the reservoir bottom. Higher groundwater levels in the Slovak inundation area, besides the water supply, also reflect the different water supply regime in the river branch system in 1993 and 2015. Noticeable decline of groundwater levels, that appears particularly on the left side of the reservoir, results from the decrease of permeability of the reservoir bottom. In recent years, the decline of groundwater levels almost stopped in this area. Despite the fact that the decrease at some places exceeds -1.2 m, the groundwater level reaches higher or similar level as before damming the Danube. On a large part of the upper, middle and lower Žitný ostrov area and almost on the whole area of Szigetköz no change in groundwater levels were observed. Slight increase in the middle part of the Žitný ostrov area near the Little Danube and in the lower Žitný ostrov reflects local conditions in the channel system. The groundwater flow direction in the upper part of the river up to Dunakiliti shows infiltration from the river and the reservoir into the surrounding area. Along the Danube in the upper part of the inundation area the groundwater flows into the riverbed and the river is draining the adjacent area. In the middle and lower part of the inundation the groundwater flow is parallel with the Danube. The groundwater flow direction in the Szigetköz inland area remained unchanged (**Fig.3-5**).

High flow rate conditions (**Fig. 3-9**)

In the case of high flow rate conditions in the Danube (approximately 3000 $m^3.s^{-1}$) it is possible to see lower groundwater levels around the reservoir and along the Danube old riverbed, including the inundation area on both sides (**Fig. 3-9**). The decline around the reservoir, particularly on its left side and in the upper part of the Szigetköz, is caused by decreased permeability of the reservoir bottom. Besides this, the decrease in the vicinity of the lower part of the reservoir is enlarged by significantly lower water levels in the old riverbed, as well as its drainage effect. The decrease along the Danube old riverbed results from the difference in flow rates discharged into the Danube old riverbed in 1993 (approximately 760 $m^3.s^{-1}$, and more than 1100 $m^3.s^{-1}$ during several day just before the chosen date) and in 2015 (approximately 431 $m^3.s^{-1}$). This difference was reflected in significantly lower surface water level in 2015. The water level in the Danube old riverbed at Dunaremete gauging station reached 114.43 m.a.s.l., while in the year 1993 it was 115.41 m.a.s.l.. This is also the reason, why the groundwater level decline in 2015, against the year 1993, appears in the inland area behind the flood protective dikes. Groundwater levels in the outer part of upper and middle Szigetköz, in the lower Szigetköz and in the inland area of the middle Žitný ostrov, for the high flow rate conditions, have not changed. The groundwater level decrease along the Danube old riverbed reaches up to -0,7 m. In the upper part of inundation up to -1.25 m. Completion of the water supply system in the lower part of the Hungarian inundation area significantly influenced the groundwater levels also in the case of high flow rate conditions. Compared to the previous year, when the groundwater level decline exceeded -0.7 m over the whole area of Ásványi river branch system, in 2015 approximately half of this area show no change in comparison with 1993. The increase in the lower part of Žitný ostrov area, as well as in the middle part close to the Little Danube, is associated with above-average precipitation amount and reflects the local conditions influenced by manipulations in the channel system. The groundwater flow direction in the upper part of the river to the Dunakiliti shows water supply from the Danube into the adjacent area (**Fig. 3-6**). The groundwater flow direction in the inland area, on both sides of the Danube, also documents the water supply from the river. In the inundation area along the Danube section from Dunakiliti to Ásványráró, in the vicinity of the riverbed, the groundwater is drained by the Danube old riverbed.

3.2. Conclusions

Based on the evaluation of groundwater regime it can be stated that the water supply into the right-side river branch system and into the Mosoni Danube plays an important role in influencing groundwater levels over the Szigetköz region. As a result of measures taken according to the intergovernmental Agreement, the most significant increase in groundwater levels can be seen in the middle part of inundation area, for both, low and average flow rate conditions in the Danube. The increase in the upper part of the Szigetköz region and around the reservoir is reduced due to decrease of permeability of the reservoir bottom. Certain adverse effect also have the changes in sediment transport regime of the

Danube, which resulted from measures taken in the Austrian section of the Danube just upstream of Bratislava in recent years. Compared to the previous years, the most significant change in relation to the groundwater level was the completion of the water supply system in the lower part of the Hungarian inundation area. Since completion the water supply system, in the case of low and average flow rate conditions, significant increase of ground water levels can be seen in the river branch system at Ásványráró, which had previously been characterized by decrease. Decrease remained along the Danube old riverbed in a part of the Bagoméri river branch system and in the vicinity of the tail-race canal on the Slovak territory. The groundwater level in this area is adversely influenced by the riverbed erosion in the tailrace canal and downstream the confluence of the tailrace canal and the Danube old riverbed. In the case of high flow rates in the Danube the groundwater level decline exceeded -0.7 m over the whole area of Ásványi river branch system, in 2015 approximately half of this area show no change in comparison with 1993. The groundwater level decline around the reservoir and along the Danube old riverbed originates in the different flow rate discharged into the Danube in 1993 and 2015. This is also the reason, why the groundwater level decline in 2015, against the year 1993, appears in the inland area behind the flood protective dikes.

Monitoring results in 2015 show, that application of an effective water supply to the river branch system can significantly affect groundwater levels in the inundation area. The results on the other side confirm the need of solving the water supply in the lower part of the inundation area on the Slovak territory, particularly in the case of low and average flow rate conditions. The water supply system in the lower part of the Hungarian inundation area has proved the possibility to improve groundwater levels in this area. The positive influence of the water supply can be further effectively supported by measures applied in the Danube old riverbed upstream of the confluence with the tail race channel. Increase of groundwater levels in the strip along the Danube old riverbed on both sides can only be ensured by increasing the water level in the Danube by technical measures implemented in the riverbed. Such measures may improve the overall situation in the whole inundation area on the Hungarian and Slovak territory.

Fig. 3-1

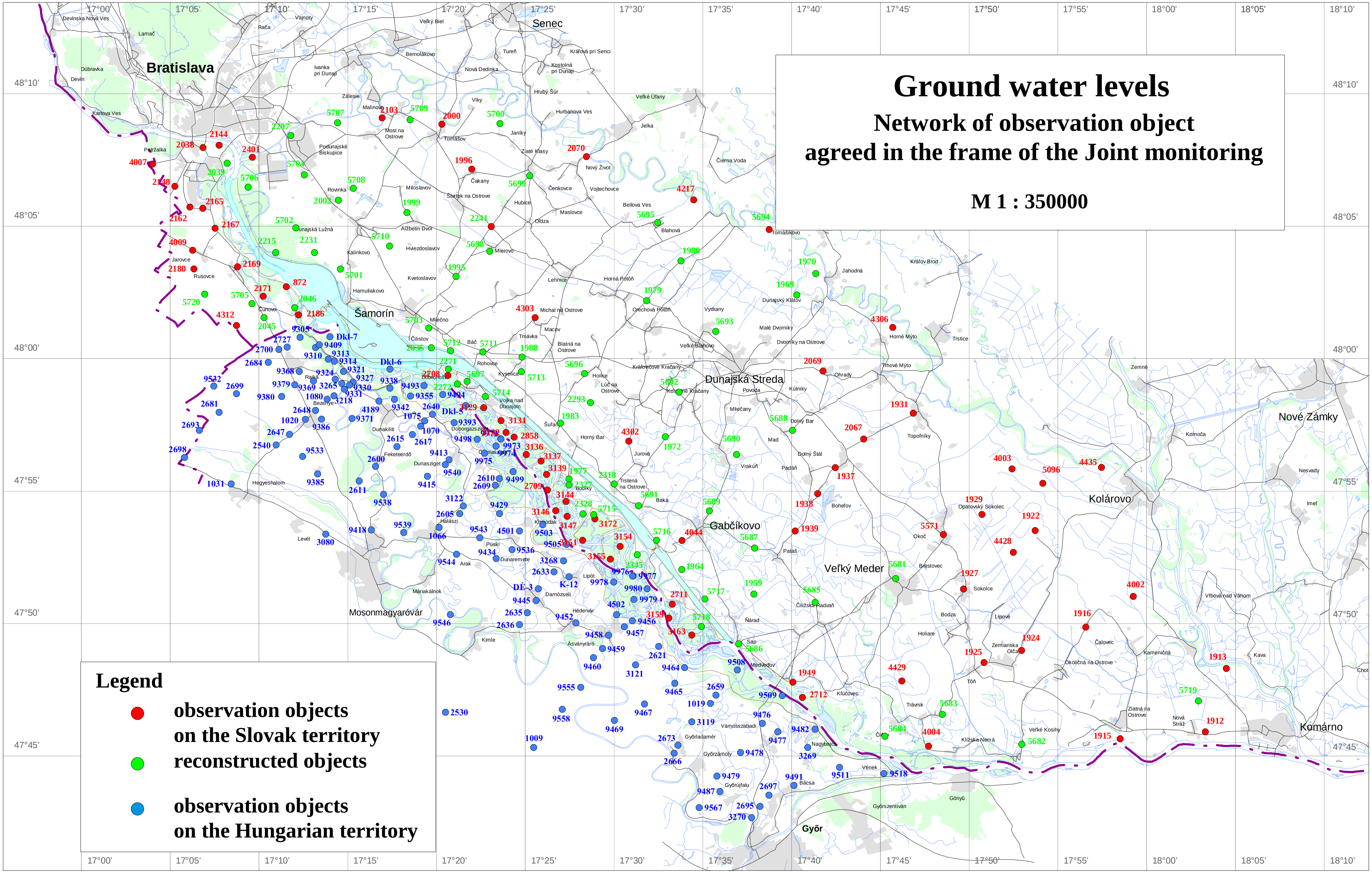

Ground water levels
Network of observation object
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation objects
on the Slovak territory
reconstructed objects
observation objects
on the Hungarian territory
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr

Fig. 3-2

Surface Water Flow Rate

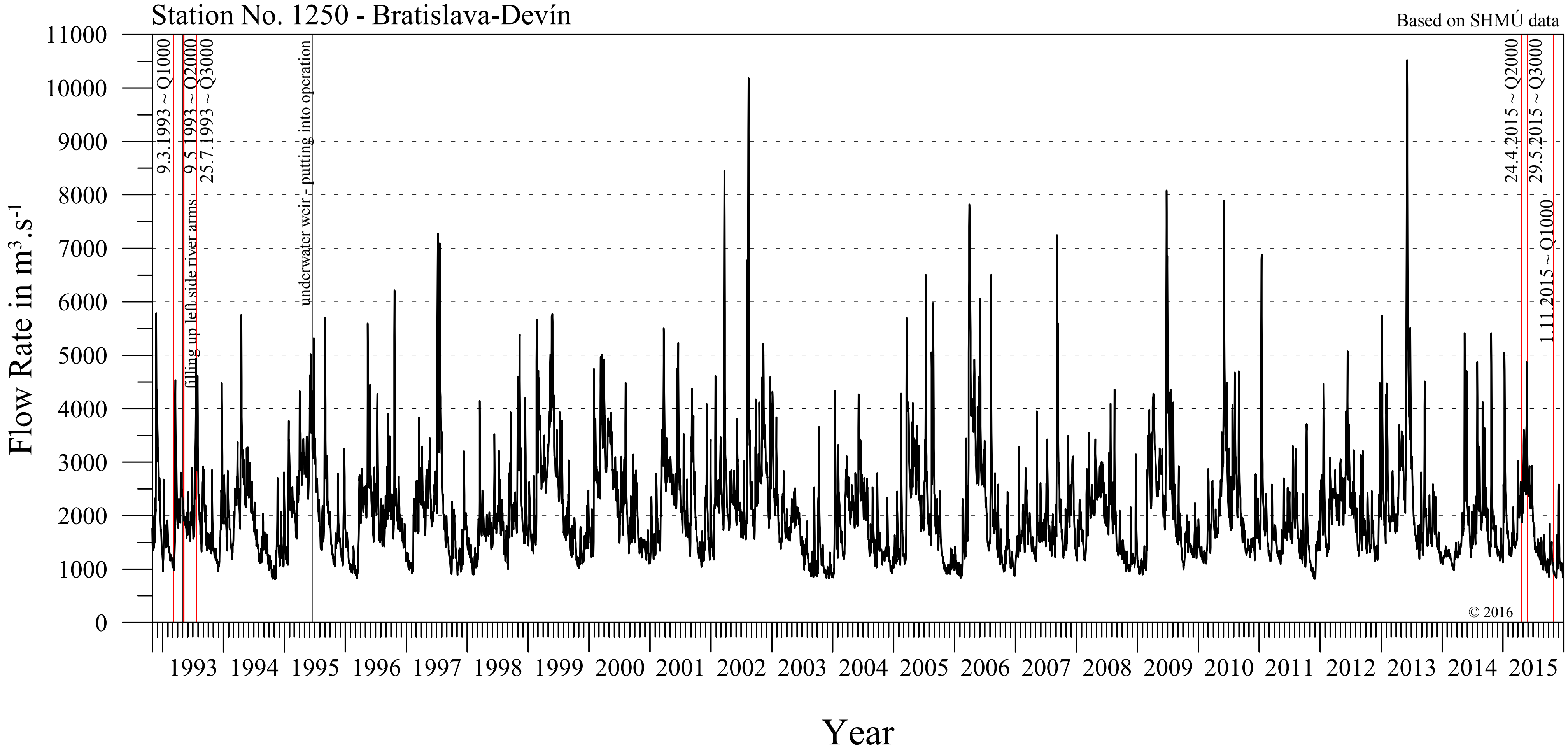


Fig. 3-3a

Surface water flow rate

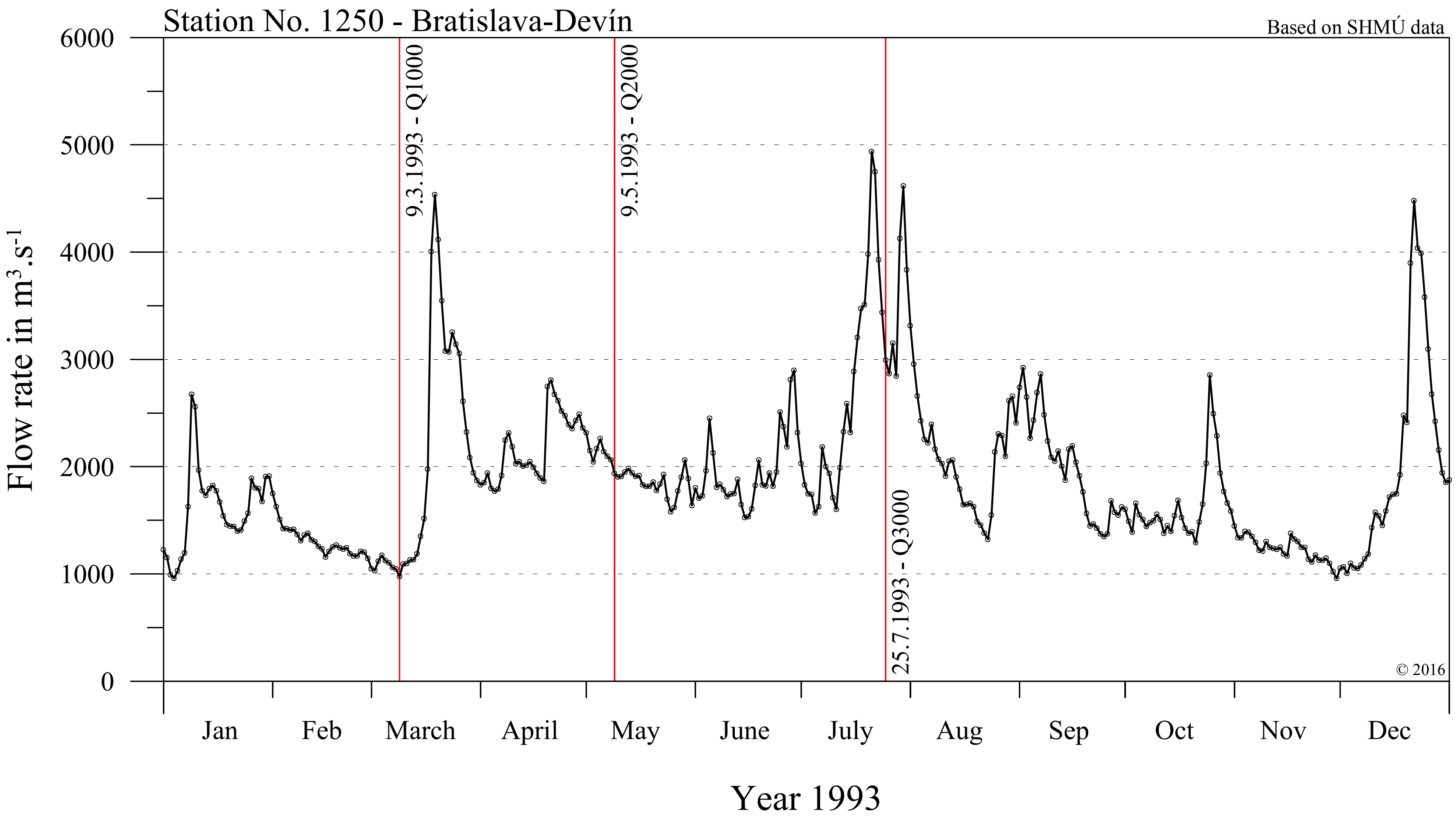


Fig. 3-3b

Surface water flow rate

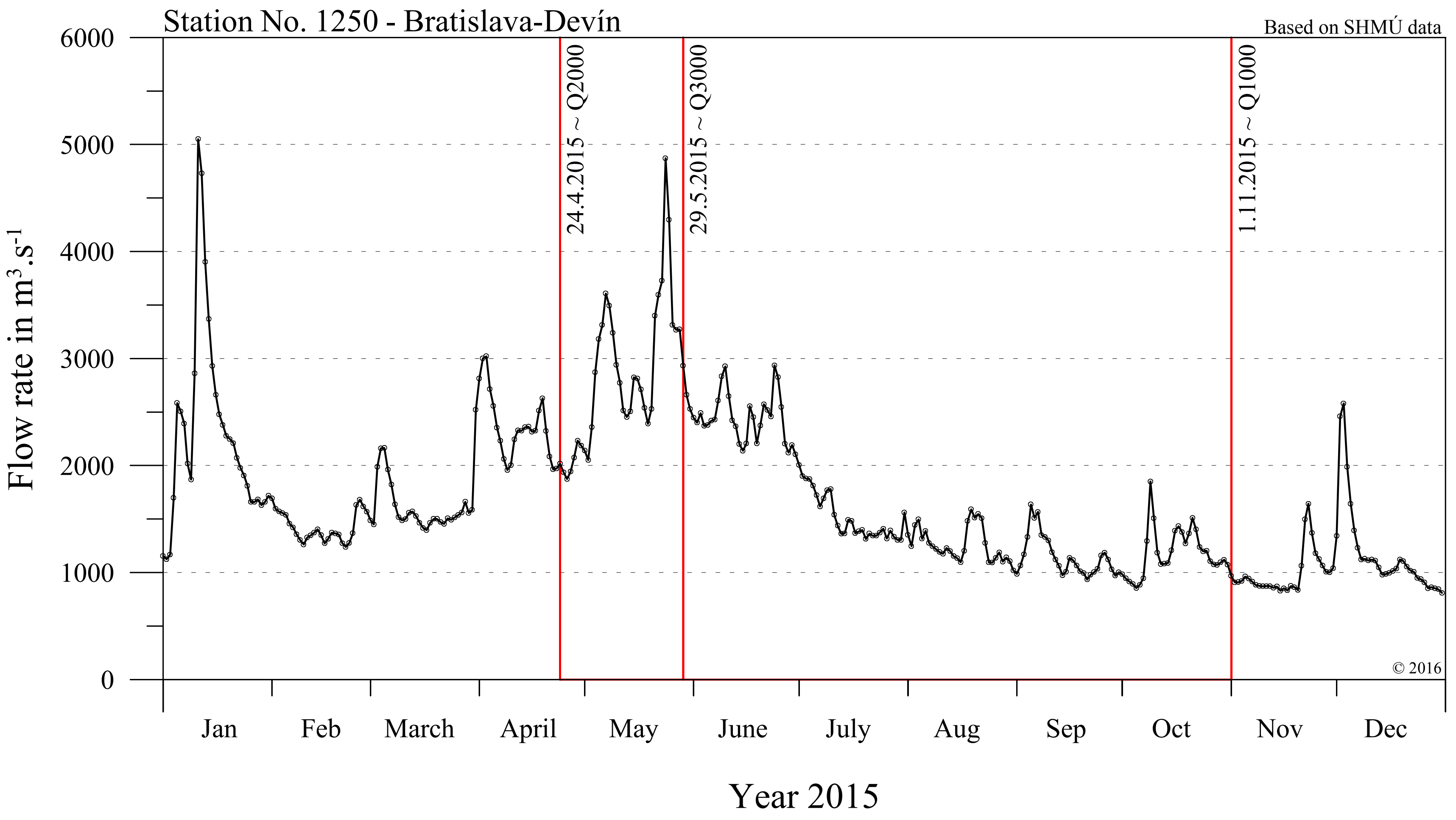
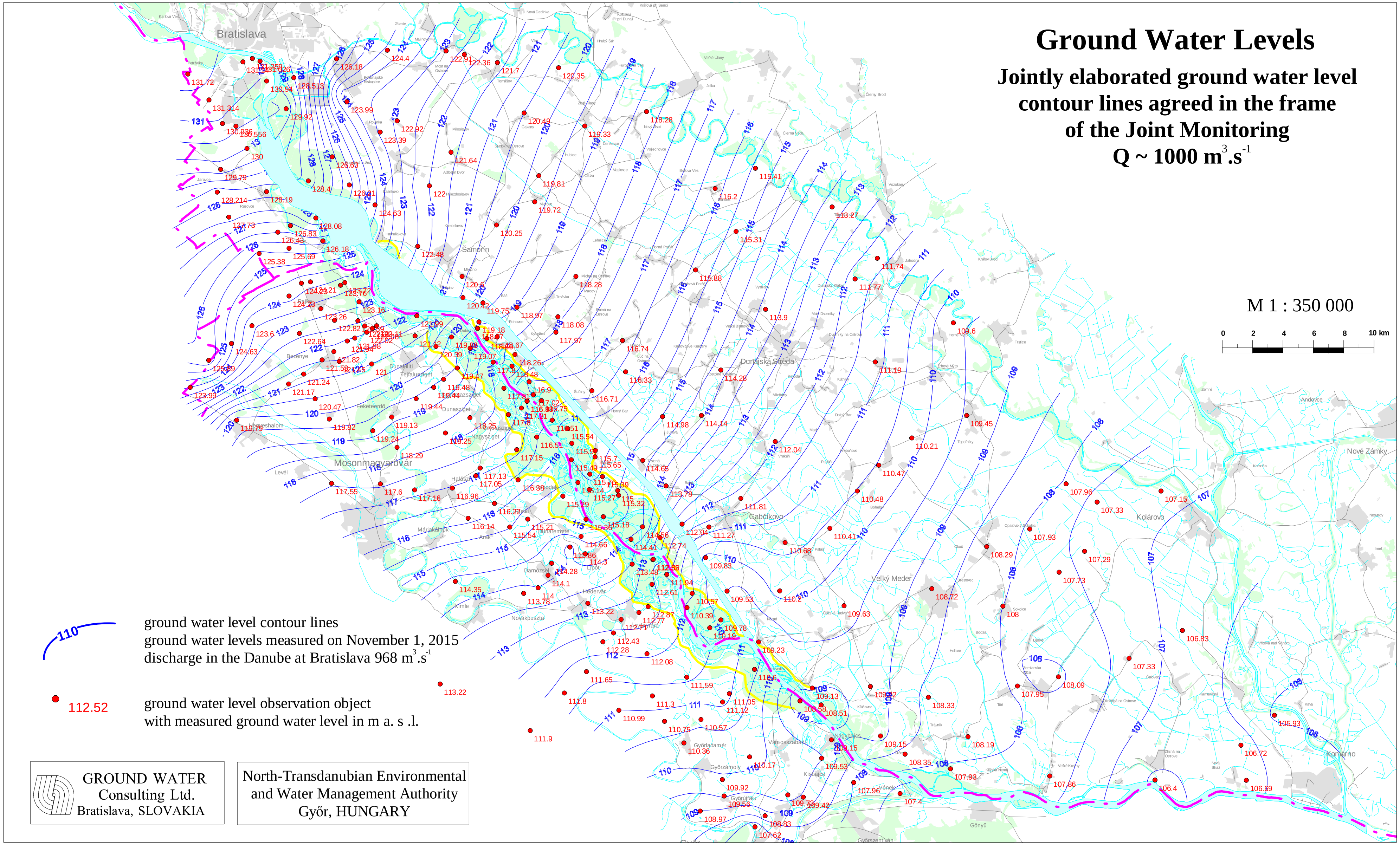


Fig. 3-4



Ground Water Levels
Jointly elaborated ground water level contour lines agreed in the frame of the Joint Monitoring
Q ~ 1000 m3.s-1
M 1 : 350 000
0 2 4 6 8 10 km
ground water level contour lines
ground water levels measured on November 1, 2015
discharge in the Danube at Bratislava 968 m3.s-1
112.52
ground water level observation object
with measured ground water level in m a. s .l.
GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA
North-Transdanubian Environmental and Water Management Authority Győr, HUNGARY
Bratislava
Samorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Komárno
Mosonmagyaróvár

Fig. 3-5

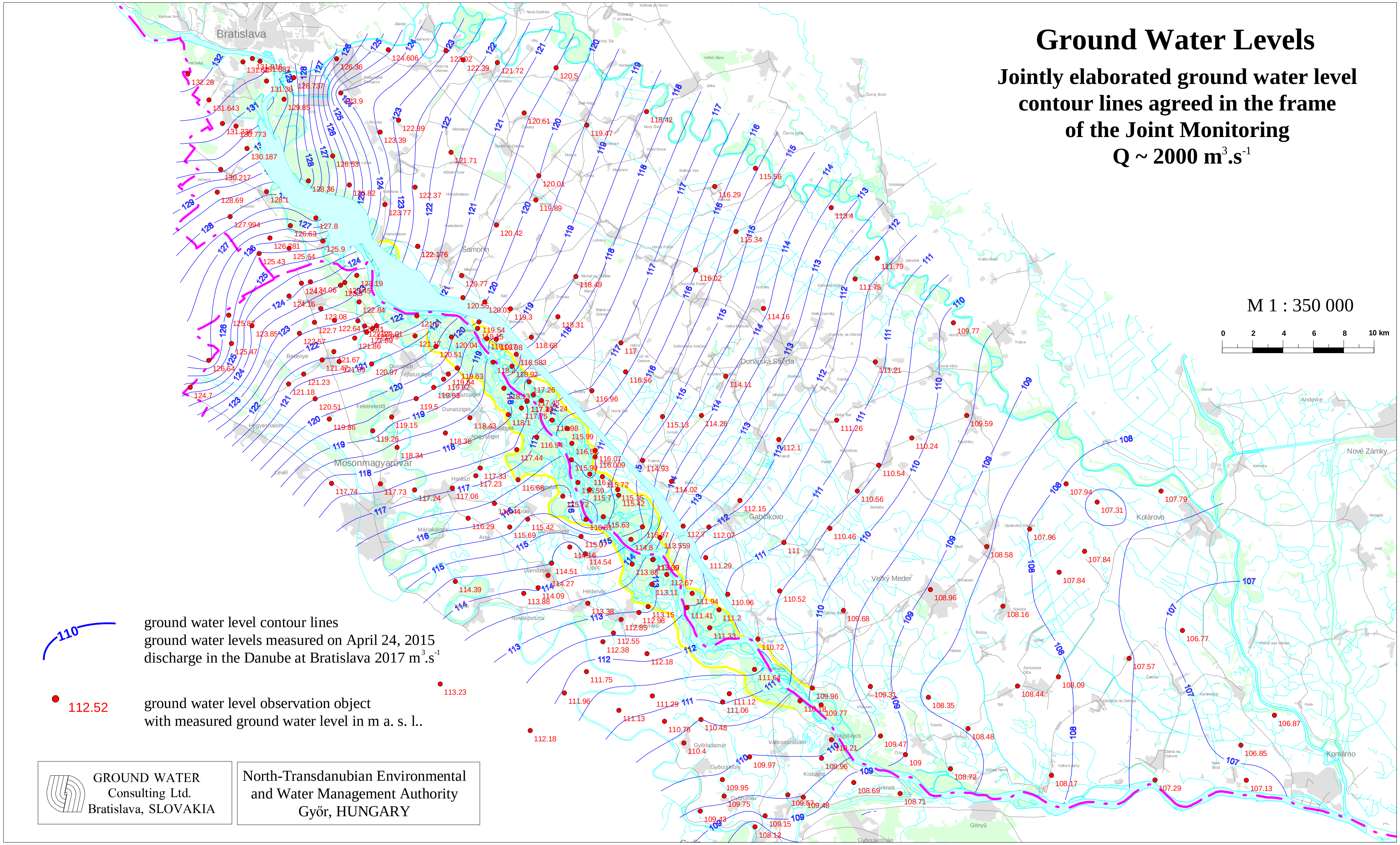

Ground Water Levels
Jointly elaborated ground water level contour lines agreed in the frame of the Joint Monitoring
Q ~ 2000 m³.s⁻¹
M 1 : 350 000
0 2 4 6 8 10 km
110
ground water level contour lines
ground water levels measured on April 24, 2015
discharge in the Danube at Bratislava 2017 m³.s⁻¹
112.52
ground water level observation object
with measured ground water level in m a. s. l..
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
North-Transdanubian Environmental and Water Management Authority
Győr, HUNGARY
Bratislava
Samorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Komárno
Nové Zámky
Mosonmagyaróvár
Gönyű

Fig. 3-6

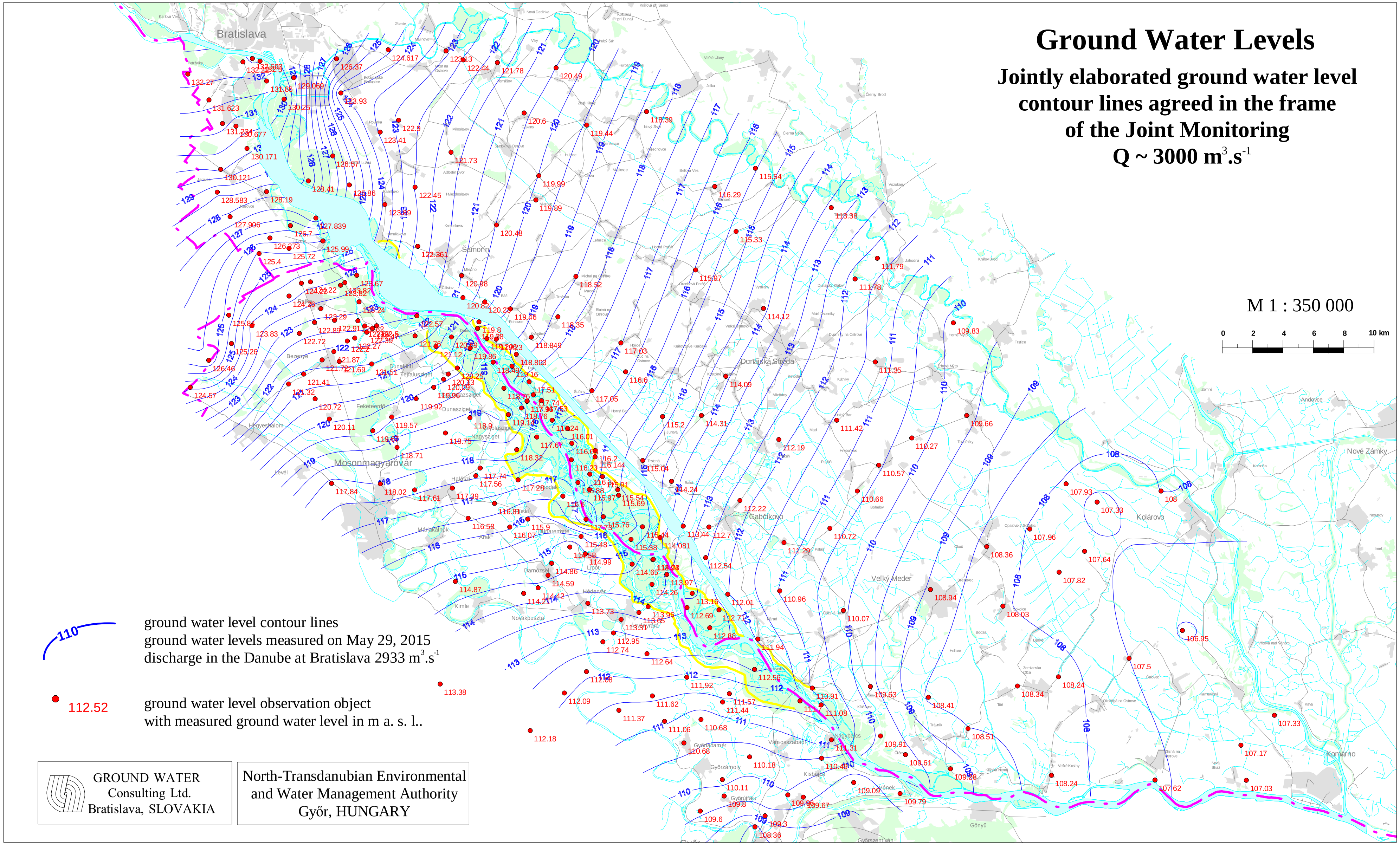

Ground Water Levels
Jointly elaborated ground water level
contour lines agreed in the frame
of the Joint Monitoring
Q ~ 3000 m³.s⁻¹
M 1 : 350 000
0 2 4 6 8 10 km
ground water level contour lines
ground water levels measured on May 29, 2015
discharge in the Danube at Bratislava 2933 m³.s⁻¹
112.52
ground water level observation object
with measured ground water level in m a. s. l..
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
North-Transdanubian Environmental
and Water Management Authority
Győr, HUNGARY
Bratislava
Samorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Komárno
Nové Zámky
Mosonmagyaróvár
Győr

Fig. 3-7

GROUND WATER LEVELS

Ground water level differences between 2015 and 1993 discharge at Bratislava ~ 1000 $m^3.s^{-1}$

(1.11.2015 vs. 9.3.1993)

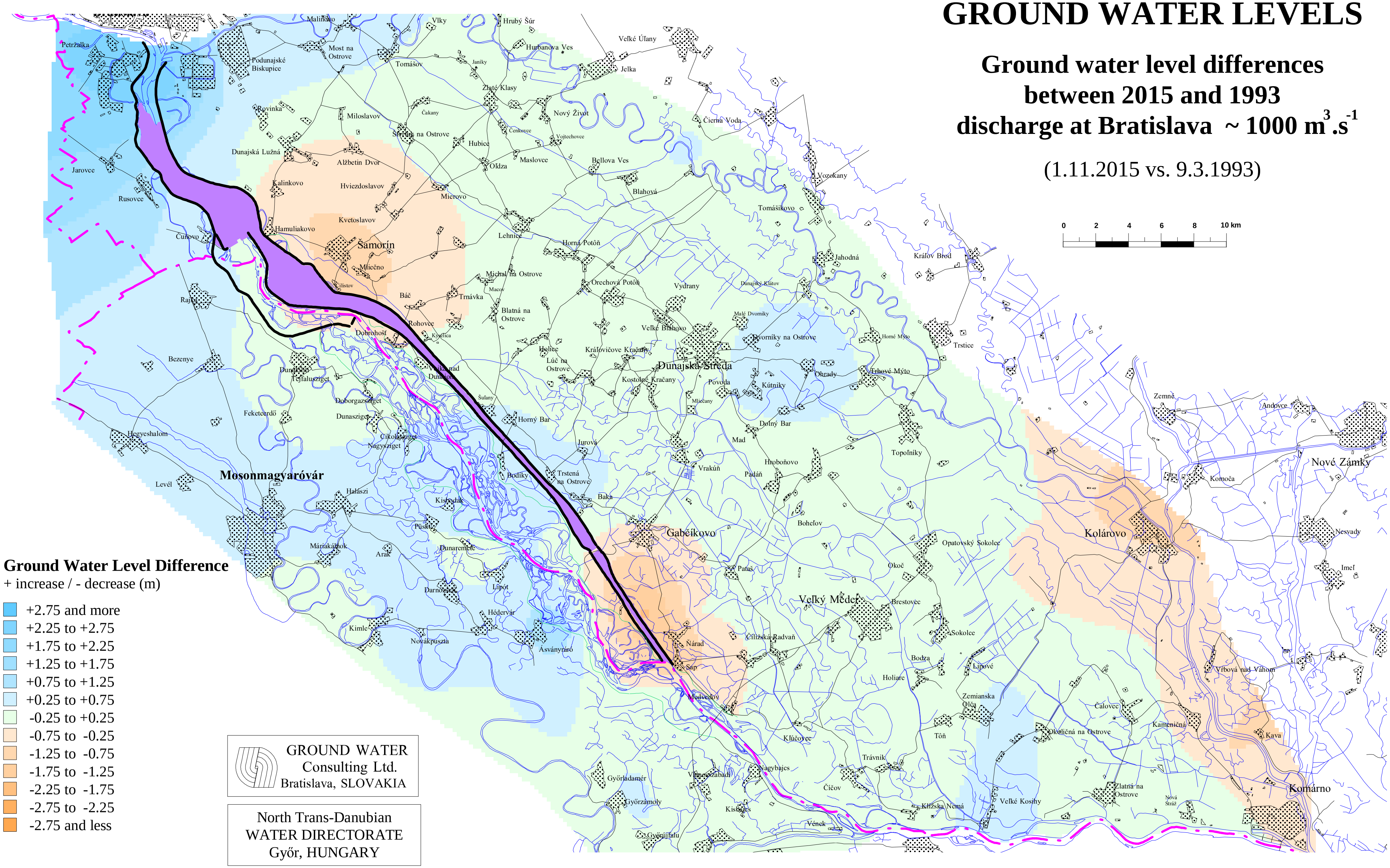


Fig. 3-8

GROUND WATER LEVELS

Ground water level differences between 2015 and 1993 discharge at Bratislava ~ 2000 $m^3.s^{-1}$

(24.4.2015 vs. 9.5.1993)

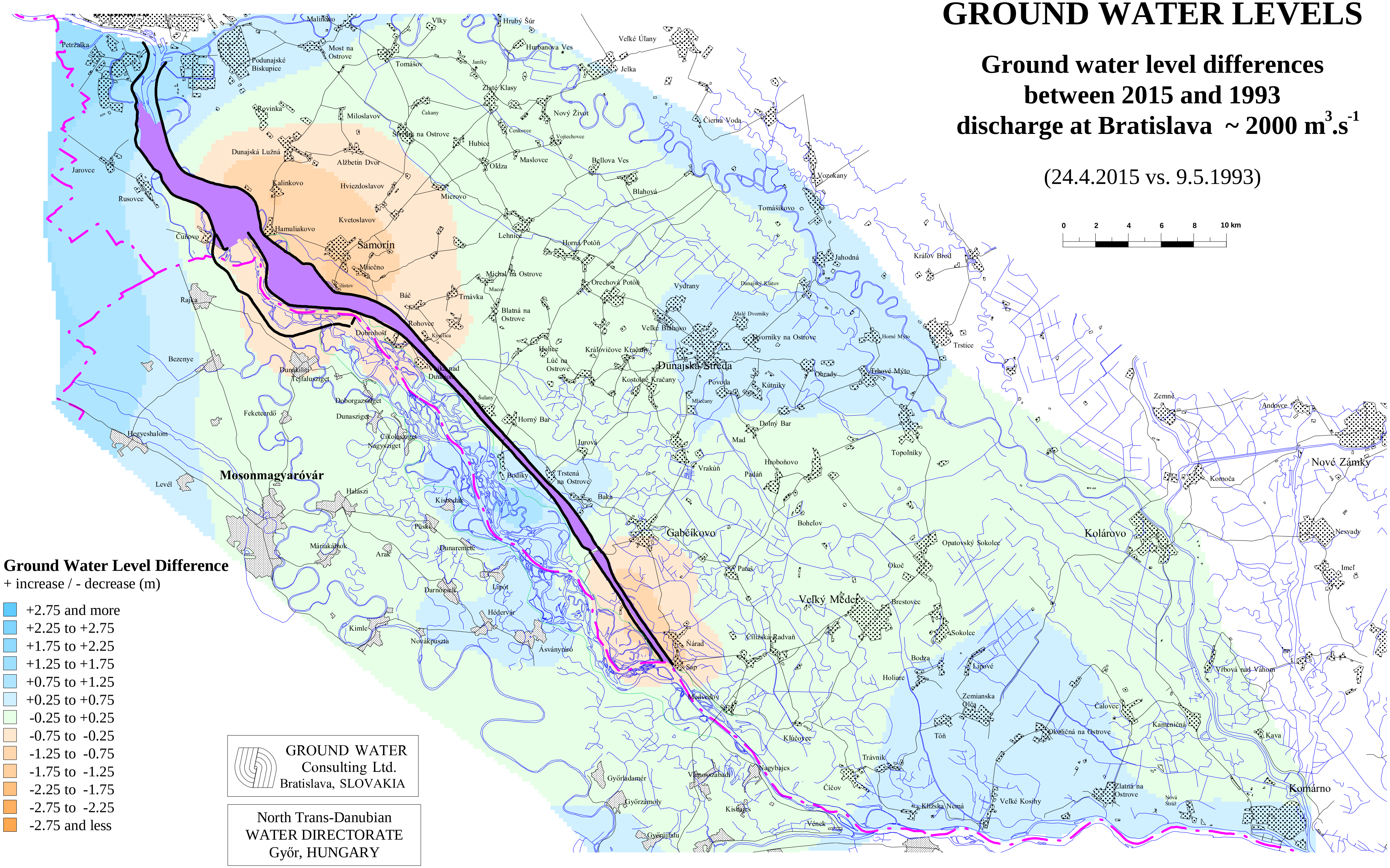
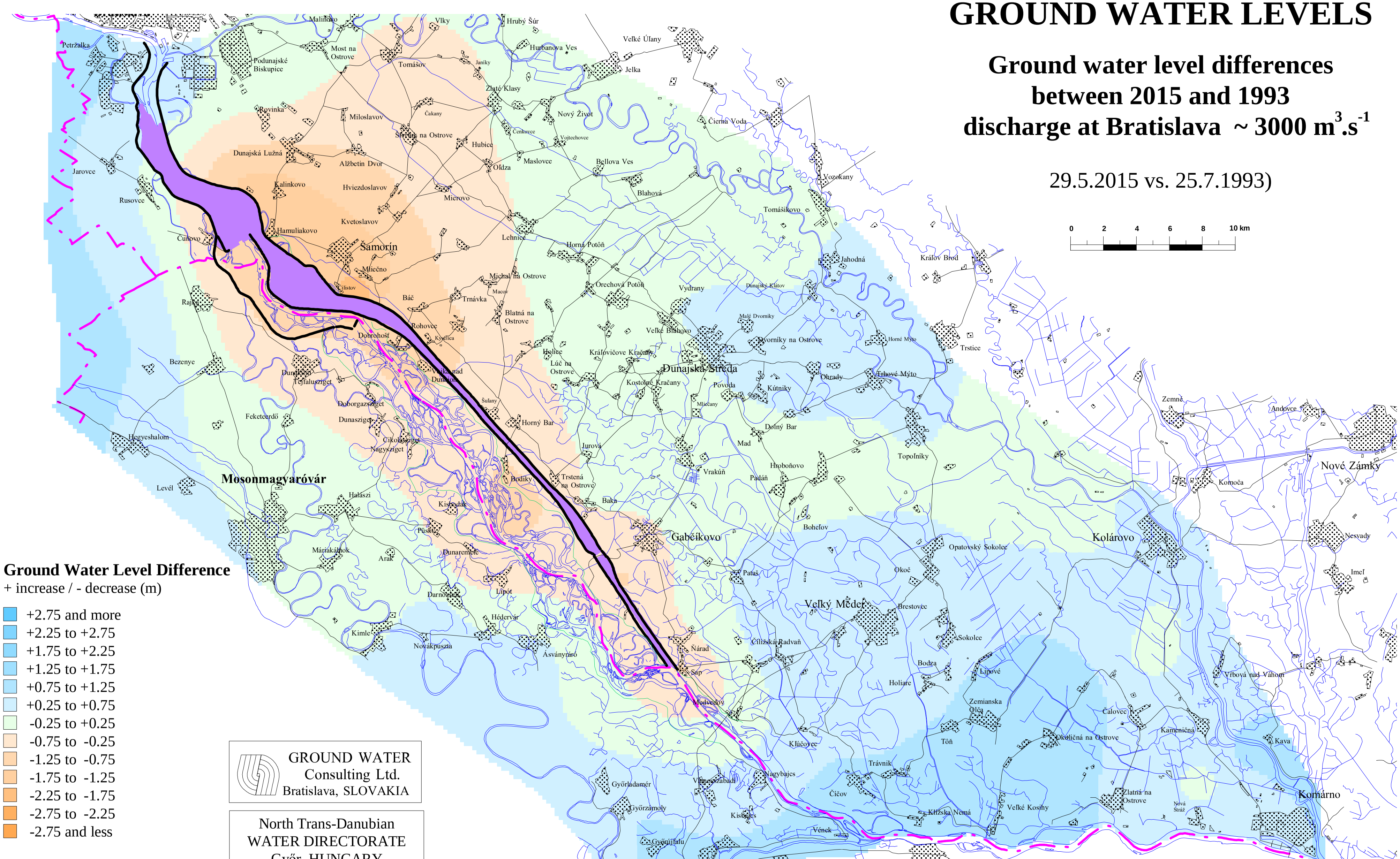


Fig. 3-9

GROUND WATER LEVELS

Ground water level differences between 2015 and 1993 discharge at Bratislava ~ 3000 $m^3.s^{-1}$

29.5.2015 vs. 25.7.1993)



Ground Water Level Difference
+ increase / - decrease (m)

- +2.75 and more
- +2.25 to +2.75
- +1.75 to +2.25
- +1.25 to +1.75
- +0.75 to +1.25
- +0.25 to +0.75
- -0.25 to +0.25
- -0.75 to -0.25
- -1.25 to -0.75
- -1.75 to -1.25
- -2.25 to -1.75
- -2.75 to -2.25
- -2.75 and less

GROUND WATER Consulting Ltd.
Bratislava, SLOVAKIA

North Trans-Danubian
WATER DIRECTORATE
Győr, HUNGARY

PART 4

Groundwater Quality

The groundwater quality on the Slovak and Hungarian territory is evaluated separately. The list of objects included in the joint monitoring is given in **Table 4-1** and **Table 4-2**, and their position is shown in **Fig. 4-1**. For the evaluation in the Joint Report representative objects for groundwater quality observation have been selected on both sides. Detailed evaluation of groundwater quality for each object included in the joint monitoring was done in the Slovak and Hungarian National Annual Reports on environmental monitoring in 2015. Monitoring data for the year 2015 in tabular form and the long-term graphical development of observed quality parameters for the period 1992-2015 form a part of the National Reports. The data from monitored objects are interpreted in relation to limits for groundwater quality evaluation agreed in the frame of intergovernmental Agreement from 1995. Due to changes in national legislations these limits have been modified in 2011. The limits are listed in **Table 4-3**.

4.1. Evaluation of groundwater quality on the Slovak territory

The groundwater quality monitoring on the Slovak territory is carried out at 18 objects (10 observation objects and 8 water sources). Their list is given in **Table 4-1**. For the purposes of the Slovak-Hungarian monitoring data of the Western Slovakia Water Company (ZsVS), the Bratislava Water Company (BVS), Slovak Hydrometeorological Institute (SHMÚ) and Ground Water Consulting Ltd. (GWC) were used. Evaluation in the Joint Report is focused mainly on groundwater quality in water sources that are more representative because of their continual pumping.

Table 4-1: List of monitoring objects on the Slovak territory

	Country	Object No.	Location
1	**Slovakia**	**899**	Rusovce, right side of the reservoir
2	**Slovakia**	**888**	Rusovce, right side of the reservoir
3	**Slovakia**	**872**	Čunovo, right side of the reservoir
4	**Slovakia**	**329**	Šamorín, left side of the reservoir
5	**Slovakia**	**87**	Kalinkovo, left side of the reservoir
6	**Slovakia**	**170**	Dobrohošť
7	**Slovakia**	**234**	Rohovce
8	**Slovakia**	**262**	Sap
9	**Slovakia**	**265**	Kľúčovec
10	**Slovakia**	**3**	Kalinkovo, left side of the reservoir
11	**Slovakia**	**102**	water source Rusovce
12	**Slovakia**	**2559**	water source Čunovo
13	**Slovakia**	**119**	water source Kalinkovo
14	**Slovakia**	**105**	water source Šamorín
15	**Slovakia**	**467**	water source Vojka
16	**Slovakia**	**485**	water source Bodíky
17	**Slovakia**	**353**	water source Gabčíkovo
18	**Slovakia**	**907**	water source Bratislava – Petržalka

From among the water sources, three are situated on right side of the Danube (No. 102, 2559 and 907) and five on the left side (No. 119, 105, 353, 485 and 467), while the latter two are located between the Danube old riverbed and the derivation canal. The groundwater quality in the water sources is stable in long-term. The water source Bratislava - Pečniansky les (No. 907) is influenced by the water quality in the Danube. Unlike the other water sources, most parameters here fluctuate and show seasonality. Groundwater quality on the water sources at Rusovce (No. 102) and Čunovo (No. 2559) has improved since damming the Danube. The quality on the water sources at Kalinkovo (No. 119) and Šamorín (No. 105) is influenced by the infiltration of surface water from the Danube and from the reservoir. The groundwater quality in the water source at Gabčíkovo (No. 353) differs due to prevailing direction of groundwater flow, coming from the inland area. In the water source at Vojka (No. 467) and Bodíky (No. 485) the groundwater quality is significantly influenced by local conditions.

Right side of the Danube

The water sources at Rusovce – No. 102 and at Čunovo – No. 2559

The groundwater quality in the water source at Rusovce is similar to the water quality in the water source at Čunovo, with certain differences in the values of some parameters. The concentrations of cations, anions and conductivity values on both water sources fluctuate in a narrow range. More significant differences in the measured values are recorded in the case of hydrogen carbonates, which are higher at Rusovce, and in the case of nitrates, which are higher at Čunovo. Small differences and slightly higher contents are registered in the case of calcium, magnesium and chlorides at Rusovce. The contents of these three parameters, together with hydrogen carbonates on the object No. 102 at Rusovce achieves the highest values within the monitored water sources. Hydrogen carbonates at this object range up to 300 $mg.l^{-1}$ since 1998. During the evaluated year, however, there occurred two higher concentrations (342.3 $mg.l^{-1}$ and 348.4 $mg.l^{-1}$), similarly as in the previous year in one case (338.6 $mg.l^{-1}$). In samples taken in May on both water sources increased contents of chlorides occurred. The increase at Čunovo was only slightly (23.7 $mg.l^{-1}$), but the concentration of 48.0 $mg.l^{-1}$ at Rusovce was the highest value measured since the start of monitoring. An increase was also recorded in the case of observed cations. At Čunovo in the sample from October higher content of potassium occurred (2.84 $mg.l^{-1}$), which represents the maximum since the start of monitoring. In the case of magnesium very variable values have been recorded: while the content in February was low (5.6 $mg.l^{-1}$), the concentration measured in the October sample of 30.4 $mg.l^{-1}$ slightly exceeded the agreed limit (30.0 $mg.l^{-1}$). The contents of ammonium ions and phosphates are low in long-term and mostly range below their detection limits. The manganese content is also low, its contents in long-run satisfy the agreed limit value. The organic pollution expressed by COD_{Mn} has decreased in comparison to the previous year. The dissolved oxygen content was similar as in 2014, it ranged from 2.34 to 3.86 $mg.l^{-1}$ at Rusovce and from 3.47 to 4.66 $mg.l^{-1}$ at Čunovo. Besides the manganese, one exceedance in the case of water temperature was recorded on both water sources (17.1 °C at Čunovo and 15.0 °C at Rusovce). The contents of other observed parameters in the evaluated year satisfied the agreed limits.

Waterworks at Bratislava No. – 907

With regard to the location of the water source Pečniansky les, near the Danube, the groundwater quality in the object No. 907 is significantly influenced by changes and fluctuation of chemical components in the Danube water. Values of individual parameters, particularly cations, anions, water temperature, dissolved oxygen content and nitrates concentrations considerably fluctuate during the year. The groundwater quality in this water source in the evaluated year has not changed and there were not recorded any high concentrations of observed parameters. In comparison with the other water sources, higher values of dissolved oxygen (up to 10.7 $mg.l^{-1}$, in 2015 it varied from 5.1 to 6.3 $mg.l^{-1}$), nitrates (up to 21.7 $mg.l^{-1}$, in 2015 they varied from <5.0 to 6.9 $mg.l^{-1}$) and COD_{Mn} (up to 2.0 $mg.l^{-1}$, in 2015 it varied from 0.5 to 1.2 $mg.l^{-1}$) continue to be characteristic for this water source. The concentration of iron in the evaluated year was similarly low as in the years 2012 and 2014, when it fluctuated up to 0.02 $mg.l^{-1}$. The ammonium ions and phosphates were below the detection limits (0.014 $mg.l^{-1}$ and 0.10 $mg.l^{-1}$). In the August sample the water temperature (16.8 °C) exceeded the limit value (12 °C) and slight exceedance was recorded also in the case of magnesium (38.4 $mg.l^{-1}$). Other exceedances of the observed parameters in the evaluated year did not occurred.

Left side of the Danube

Water sources at Kalinkovo No. – 116 and at Šamorín – No. 105

The groundwater quality in water sources situated on the left side of the Danube was not influenced by damming as much as the quality in the water sources on the right side. The groundwater chemistry in the water sources at Kalinkovo (No. 119) and at Šamorín (No. 105) is similar since the beginning of monitoring and the course and changes of majority of groundwater quality parameters are also similar.

Slightly higher values occur in the water source at Kalinkovo (No. 119) in the case of potassium, manganese and ammonium ions. The ammonium ions content is the second highest from among the monitored water sources (higher is only in the object No. 485 at Bodíky). In the evaluated year the concentrations of ammonium ions varied from <0.014 $mg.l^{-1}$ to 0.1 $mg.l^{-1}$, but they are low in comparison with the agreed limit value (0.5 $mg.l^{-1}$). The second highest are also the contents of manganese, which in the last two years exceed the limit value (0.05 $mg.l^{-1}$) at each determination. Previously, higher concentrations (above the limit value) occurred only occasionally. In the evaluated year the contents of manganese ranged from 0.063 to 0.075 $mg.l^{-1}$. In the May sample, the content of nitrates of 14.5 $mg.l^{-1}$ was found, which represents the highest value of nitrates in this object during the monitoring, and increased was also the content of sulphates and chlorides (42.1 $mg.l^{-1}$ and 22.2 $mg.l^{-1}$).

In contrast to the object No. 119 at Kalinkovo, the contents of ammonium ions and manganese in the water source at Šamorín (object No. 105) are low and mostly fluctuate below the detection limits. During the evaluated year one unusually high concentration of iron (0.40 $mg.l^{-1}$) occurred in this object, which exceeded the limit value for this parameter.

The water temperature on both water sources in May slightly exceeded the limit value according to the **Table 4-3**. Compared to 2014, the dissolved oxygen content slightly decreased, at Šamorín it fluctuated from 3.64 to 5,42 $mg.l^{-1}$ and at Kalinkovo from 2.49 to 5,76 $mg.l^{-1}$. In the last four years, the hydrogen carbonates and the magnesium contents are more volatile than in the previous period of monitoring, with slightly increasing tendency.

During the evaluated year also the contents of sodium and calcium have increased slightly. The agreed limit values for groundwater quality assessment in 2015 has been exceeded by the manganese contents in the water source at Kalinkovo, once by the water temperature in both water sources and once by the iron concentration at Šamorín.

Waterworks at Gabčíkovo – No. 103 and 353

The groundwater quality in the water source Gabčíkovo differs from the groundwater quality in water sources at Kalinkovo and Šamorín due to the different groundwater flow direction. The values of a number of quality indicators are relatively balanced in this object: the water temperature, the content of calcium, sodium, chlorides, sulphates and also the conductivity values fluctuates only in a narrow ranges. Relatively balanced are also the nitrates concentrations, which in long-term oscillate around 4 $mg.l^{-1}$ (in 2015 they fluctuated from 2.7 to 3.9 $mg.l^{-1}$, with one higher value of 5.9 $mg.l^{-1}$ found in the October sample). The dissolved oxygen contents are among the lowest ones, in the evaluated year they varied from 0.24 to 0.28 $mg.l^{-1}$. The concentrations of sodium (about 5 $mg.l^{-1}$), potassium (about 1 $mg.l^{-1}$) and chlorides (about 10 $mg.l^{-1}$) belong to the lowest from among all other monitored objects. The sodium and potassium concentrations reach only half of the values recorded in water sources at Šamorín or Kalinkovo. Contents of ammonium ions, phosphates, iron and manganese are low in long-term, and mostly oscillate at the level of detection limits of the analytical methods used. The organic pollution, expressed by COD_{Mn}, is below the detection limit (0.5 $mg.l^{-1}$) since 2002. By comparing the measured contents of observed parameters in the year 2015 with the agreed limit values for groundwater quality assessment (**Table 4-3**), it can be stated that on the object No. 353 at Gabčíkovo exceedances did not occurred.

Water sources at Vojka – No. 467 and Bodíky – No. 485

The water sources at Vojka and Bodíky are situated in the area between the Danube old riverbed and the derivation canal. The groundwater quality in these objects can be influenced by local conditions.

The groundwater in the water source at Vojka (No. 467) has a satisfactory quality for drinking purposes. The water temperature sometimes exceeds the limit value of 12 °C, in the evaluated year, however, such a temperature has not occurred. In the period of years 2007-2015 improvement of redox conditions occurred here, and in the last three years the dissolved oxygen contents fluctuate around 1.6 $mg.l^{-1}$ (in the year 2015 from 1.2 $mg.l^{-1}$ to 1.7 $mg.l^{-1}$). Concentrations of ammonium ions, phosphates, values of COD_{Mn}, and the contents of manganese and iron are low in long-term at Vojka and are often below the detection limits. In the evaluated year only one concentration in the case of manganese (0.017 $mg.l^{-1}$) was higher than the detection limit (0.003 $mg.l^{-1}$). The content of nitrates was similar to that in 2014, and ranged from 2.7 to 3.4 $mg.l^{-1}$. Unlike to other water source objects the time series of cations and chlorides are balanced. In the year 2015, on the water source at Vojka (No. 467) exceeding of agreed limits for groundwater quality assessment has not occurred.

The water quality in the water source at Bodíky (No. 485) differs in a number of parameters. From among the monitored water sources, for this object are characteristic the lowest contents of dissolved oxygen, nitrates and sulphates, and conversely the highest values for water temperature, ammonium ions and especially manganese. The manganese concentrations exceed the agreed limit value at each determination, in the evaluated year they fluctuated from 0.72 to 0.91 $mg.l^{-1}$. The water temperature in 2015 was also above the limit value, and ranged from 12.1 to 13.8 °C. Concentrations of ammonium ions varied in the range from 0.29 to 0.41 $mg.l^{-1}$, so they were lower than the limit value for this parameter (0.5 $mg.l^{-1}$). The dissolved oxygen content was very low (0.09 to 0.17 $mg.l^{-1}$) and the nitrates have not achieved the limit of determination (1 $mg.l^{-1}$). The organic pollution, expressed by COD_{Mn}, mostly does not achieve the detection limit (0.5 $mg.l^{-1}$). Only occasionally higher values occur (e.g. in 2014 - 0.97 $mg.l^{-1}$). From among the monitored groundwater quality parameters on the water source at Bodíky (No. 485) the agreed limits were not met in the case of manganese and water temperature at each determination. Other exceedances have not occurred in the evaluated year.

4.2. Conclusions regarding the Slovak territory

The chemical composition of groundwater in water sources indicates stable conditions for development of groundwater quality. The water source Pečniansky les is significantly affected by changes and fluctuations of the chemical composition of the surface water in the Danube due to the fact, that this object is situated in close proximity to the river. Most parameters are volatile and show seasonality. The water temperature, the contents of dissolved oxygen and nitrates on this object are the highest, but do not exceed the limit values. The concentrations of observed groundwater quality parameters on other water sources mostly fluctuate in narrow and similar to each other ranges. The exception is the Gabčíkovo water source, where the contents of sodium, potassium and chlorides achieve approximately half of the values than on other water sources. The difference in the groundwater chemistry on the water source at Gabčíkovo is related to the groundwater supply from the inland area of the Žitný ostrov region, in contrast to other water sources, which are supplied by infiltration of water from the Danube and from the reservoir.

The quality of groundwater in the monitored water sources mostly satisfies the agreed limits for drinking water (**Table 4-3**). Exceedances of limits occur only on several objects in the case of water temperature, manganese and in some years also in the case of iron. In the year 2015 the limit value for the water temperature was exceeded once at five monitored water sources and in the object at Bodíky it was at all four samplings. Only on the water sources at Gabčíkovo and Vojka the water temperature was lower than the limit value 12 °C. The manganese content exceeded the limit value on the water source at Bodíky in each determination, similarly as in the other years of monitoring. In last two years also on the water source at Kalinkovo all the manganese concentrations has been higher than the limit value. Besides the water temperature and manganese one exceedance of the limit value in 2015 has occurred in the case of iron in the water source at Šamorín and slight exceedance has also been recorded in the case of magnesium in the water sources at Čunovo and Bratislava.

Based on long-term measurements it can be stated that the organic pollution, expressed by COD_{Mn}, decreased during the observed period. From among nutrients the phosphates and ammonium ions occur in low concentrations at observed objects in long-term and currently they are mostly below the detection limits of applied analytical methods. Only at Bodíky and Kalinkovo the ammonium ions fluctuate above the detection limit, but do not exceed the limit value agreed for this groundwater quality parameter. The highest contents of nitrates (up to 21.7 $mg.l^{-1}$), with strong seasonal variation, are registered on the water source Pečniansky les, due to its location close to the Danube. On the other objects the nitrates content recently varies at low level, from 3 to 9 $mg.l^{-1}$ or less (at Rusovce and

Bodíky). During the evaluated year in the case of some groundwater quality parameters atypically high concentrations has occurred. Unusually high values were recorded in the case of chlorides and hydrogen carbonates on the water source at Rusovce, if the case of potassium on the water source at Čunovo, in the case of nitrates on the water source at Kalinkovo and in case of iron on the water source at Šamorín. The inorganic and organic micro-pollution observed in the evaluated year on water source at Gabčíkovo was low. Except the above mentioned parameters (manganese, iron, magnesium and the water temperature) another exceedances on monitored water sources in 2015 were not registered.

The groundwater quality in observation objects that are evaluated in the National Report is more influenced by local impacts. Monitoring results show that the agreed limits are exceeded more frequently in comparison with the water sources. Exceedances occur in the case of ammonium ions, manganese, iron and water temperature. Inorganic and organic micro-pollution is monitored at selected observation objects (No. 888, 872, 329, 170, 234, 262 and 265). In 2015, the highest limit value was exceeded in one pesticide. Similarly as in the year 2014 it was in the case of atrazine in the object No. 234 at Rohovce. The measured concentration, however, was lower than in the previous year. Other indicators of the organic and inorganic micro-pollution were found in concentrations below the limit values for groundwater quality evaluation (**Table 4-3**). From among the heavy metals the zinc, copper and mercury concentrations indicate slight pollution at some observation objects. The arsenic, cadmium, chromium, nickel and lead contents in the evaluated year did not reached the level of detection limit. Concentrations of all other analysed components of groundwater quality in observation objects in the year 2015 meet the agreed limits for drinking water quality.

4.3. Evaluation of the groundwater quality on the Hungarian territory

The subject of joint groundwater quality monitoring on the Hungarian side consists of 22 objects, composed of 16 observation objects and 6 wells that are used for drinking water supply (water sources). While the observation wells have the screens located in the upper part of the gravel sediments, the water supply wells draw water from deeper horizons. The list of monitored objects is given in **Table 4-2**.

Data from wells that are used for drinking water supply are provided by Regional Water Companies. The groundwater quality monitoring in observation wells is carried out by the Győr-Moson-Sopron County Government Office, Department of Environment Protection and Nature Conservation. The frequency of monitoring on water sources was four times a year, on the observation objects it was twice a year.

In the assessment of groundwater quality in the Joint Report four observation objects were selected on Hungarian territory (No. 9327, 9413, 9430 and 9456) that are mentioned below.

Table 4-2: List of monitoring objects on the Hungarian territory

	Country	Object No.	Locality
1	**Hungary**	**9310**	Rajka
2	**Hungary**	**9327**	Dunakiliti
3	**Hungary**	**9331**	Dunakiliti
4	**Hungary**	**9368**	Rajka
5	**Hungary**	**9379**	Rajka
6	**Hungary**	**9413**	Sérfenyősziget
7	**Hungary**	**9418**	Mosonmagyaróvár
8	**Hungary**	**9430**	Kisbodak
9	**Hungary**	**9544**	Halászi
10	**Hungary**	**9456**	Ásványráró
11	**Hungary**	**9457**	Ásványráró
12	**Hungary**	**9458**	Ásványráró
13	**Hungary**	**9475**	Győrzámoly
14	**Hungary**	**9480**	Győrzámoly
15	**Hungary**	**9484**	Vámosszabadi
16	**Hungary**	**9536**	Püski
17	**Hungary**	**Du-I**	water source Dunakiliti
18	**Hungary**	**T-II**	water source Feketeerdő
19	**Hungary**	**Da-I**	water source Darnózseli
20	**Hungary**	**K-5**	water source Győr - Révfalu
21	**Hungary**	**6-E**	water source Győr - Szőgye
22	**Hungary**	**25-E**	water source Győr - Szőgye

<u>Observation well No. 9327, site: Dunakiliti</u>

Based on long-term data, in the object No. 9327 a seasonal, periodical fluctuation of some water quality parameters is clearly observable. Periodicity primarily appears in the changes of water temperature, pH and concentrations of nitrates. The groundwater has low salt content, like the Danube water. The water temperature from time to time exceeds the limit value of 12 °C (in the evaluated year once), but it has never reached the highest limit value (25 °C). Pollution by organic matter, expressed by COD_{Mn}, is rather balanced in last six years and the measured values meet the agreed limits in long-term. The nitrates and the ammonium ions content is low, permanently below the limit value. Contrary to the previous year the content of phosphates in October slightly exceeded the limit value (0.5 $mg.l^{-1}$). Manganese concentrations decreased compared to the previous year and were just above the agreed limit (0.05 $mg.l^{-1}$). In addition to the water temperature, phosphates and manganese, also the iron content (1.69 $mg.l^{-1}$) in April exceeded the limit value of 0.20 $mg.l^{-1}$. Other observed parameters occurred in quantities below respective limit values for groundwater quality evaluation.

<u>Observation well No. 9413, site: Sérfenyősziget</u>

The water temperature in this object is relatively balanced, because it is only to a small extent affected by meteorological conditions. Conductivity values in 2015 were similar as in the previous year. Contrary to the previous year the nitrates content in the evaluated year has increased (78.6 $mg.l^{-1}$ and 76.6 $mg.l^{-1}$) and significantly exceeded the limit value (50 $mg.l^{-1}$), just like in 2012. In long-term the calcium content quite often varies above 100 $mg.l^{-1}$, what is the limit value for this parameter. In the evaluated year both concentrations (131 $mg.l^{-1}$ and 118 $mg.l^{-1}$) were higher than the given limit. Concentrations of ammonium and phosphate ions and the contamination by organic matter are low in long-term. This object is characteristic by high manganese concentrations, that consistently exceed the limit value of 0.05 mg.l^{-1}. In the case of iron occasionally occurs higher concentration, which exceeds the limit value. In the year 2015 such a concentration did not occurred. Based on the data from 2015 it can be stated that from among the observed groundwater quality parameters the nitrates and manganese more significantly exceeded the agreed limit values, moderate exceedances were documented in the case of water temperature, calcium and magnesium.

Observation well No. 9430, site: Kisbodak

The groundwater in this object has a moderate salt content. The water temperature and the pH values show a slight seasonal fluctuation. The water temperature since 2001 often exceeds the limit value (12 °C), in the evaluated year in both cases. The electric conductivity is relatively balanced. The organic matter content also shows seasonal fluctuation, and in long-term is below the limit value (3 mg.l^{-1}). However, in the evaluated year the first exception occurred, when in the September sampling a value of 3.3 mg.l^{-1} has been determined, what exceeded the limit value. Low concentrations are characteristic for phosphates and nitrates in long-term. Ammonium ions content show after a slight increase declined and in long-term is below the limit value (0.5 mg.l^{-1}). Iron and manganese concentrations high in this object are permanently and significantly exceed the limit values. In the case of iron occasionally a low concentration occurs, in the evaluated year once. In the last two years also in the case of manganese, low values were recorded during the sampling in the spring (below the limit value of 0.05 mg.l^{-1}), however the concentration in the autumn was again high (0.45 mg.l^{-1}). In the evaluated year exceedances of limit values were registered in the case of water temperature and once in the case of manganese and iron. For the first time since the beginning of monitoring the organic matter content was higher than the limit value, but it did not exceeded the highest limit value. Also in the case of calcium, there occurred in the September sample a concentration (115 mg.l^{-1}) above the limit value.

Observation well No. 9456, site: Ásványráró

The groundwater is of medium mineralization and has stable water temperature with a slight seasonal fluctuation. The conductivity values are relatively balanced. The upward trend in the concentrations of ammonium ions stopped in 2008 and after a slight decrease it has stabilized at concentration higher than the limit value for this parameter (it oscillates around 1.5 mg.l^{-1}). The high ammonium ion content in the water in this object is considered to be background pollution from agricultural activities. From among the other observed nutrients, the content of nitrates and phosphates is low in long-term. The organic matter content, expressed by COD_{Mn}, does not show significant changes and is below the limit value in long-term. The groundwater has a high iron and manganese content, with seasonal fluctuation. Concentrations of these parameters significantly exceed the drinking water limit values. In the evaluated year the manganese concentrations has decreased significantly and for the first time since the start of monitoring there occurred also a concentration below the detection limit. From the observed water quality data in 2015 results that ammonium ions, iron and manganese (once) concentrations significantly exceeded the agreed limit values. The water temperature slightly exceeded the limit value of 12 °C and in one case also the content of calcium (130 mg.l^{-1}) was higher than the limit value. Concentrations of other observed parameters varied below the respective limit values.

4.4. Conclusions regarding the Hungarian territory

The above results show that the groundwater in shallow horizons of gravel sediments is enriched with iron and manganese. This also applies to other observation wells that were evaluated in the National Report. Iron and manganese concentrations in most observation wells permanently exceed the limit values.

Increased contents of nutrients and organic pollution mostly relate to local contamination, which is of agricultural origin, or in some cases come from wastewater ponds. In general it can be stated that their content in observation objects has not changed significantly in comparison with the previous year. High contents exceeding the limit values are recorded only at certain objects. For example the water quality at object No. 9368 at Rajka is still affected by local pollution. High ammonium ion contents occur here in long-term, which exceed the limit value by tenfold (in some years up to hundredfold). Also phosphates fluctuate above the limit value and only the content of nitrates in the years 2007-2015 decreased below the limit value, with the exception of one concentration in 2013 and one concentration in 2014, which however, only slightly exceeded the limit value. Contents of ammonium ions occur above the limit value in long-term also on the object No. 9475 at Győrzámoly and also on the above evaluated object No. 9456 at Ásványráró, where the increasing concentrations has stabilized on the level of 1.5 $mg.l^{-1}$ in recent years. Obsolete animal breedings gradually being disposed of, what is reflected in the groundwater quality improvement, e.g. on the object No. 9458 at Ásványráró, where no signs of fresh pollution were found. The content of nitrates and ammonium ions decreased, but the content of phosphates continues to be six or seven times higher than the limit value. The change in the concentration of nitrates in the object No. 9418 at Mosonmagyaróvár points to the impact of background pollution. From the long-term point of view, after a decrease in nitrate concentrations, since 2005 it was possible to see again an increase of their concentrations and the measured values fluctuated around the limit value. Since 2012, however, they began to gradually decline.

The organic pollution, expressed by COD_{Mn}, mostly meets the limit value. During the monitoring in some objects time-to-time occurred values exceeding the limit value, but since 2008 it was only three times on the object No. 9457 at Ásványráró. In the evaluated year a slight increase of organic pollution has been recorded in the object No. 9430 at the village Kisbodak (3.3 mgl^{-1}) and a relatively high value (6.2 mgl^{-1}) was measured in the autumn in the object No. 9475 at the village Győrzámoly. This value exceeded also the highest limit value for this parameter (5.0 mgl^{-1} - **Table 4-3**). On objects close to pollution sources located in the direction of groundwater flow (objects at Rajka and Ásványráró) the changes in groundwater quality related to livestock farming can be well and sensitively observed.

Inorganic and organic micro-pollution is monitored at selected objects (No. 9379, 9413, 9536, 9456 and 9480). In the year 2015, organic micro-pollution was found in concentrations below the limit values for groundwater quality evaluation (**Table 4-3**). From among the inorganic micro-pollutants the concentrations of copper, nickel, chromium and cadmium in certain objects indicate slight pollution. In the case of arsenic exceeding of the highest limit value of 10 $\mu g.l^{-1}$ was found in the object No. 9536 at village Püski (12.2 $\mu g.l^{-1}$). Concentrations of zinc, lead and mercury in the evaluated year did not reached the limit of detection.

The groundwater quality in deeper horizons of gravel sediments in the Szigetköz is monitored by production wells in water sources. Wells in the region at Győr have higher content of ammonium ions, organic matter, manganese and iron in comparison with the other monitored wells. Manganese and iron concentrations exceed the limit values or approach them. The concentrations are lower in wells where the water is drawn from a greater depth. The water extracted in water sources Dunakiliti I, Feketeerdő T-II and Darnózseli I is of satisfactory quality and the groundwater quality is characteristic by high stability. In general, the groundwater quality in wells producing potable water (occasionally after pre-treatment) is suitable for drinking water supply.

Table 4-3: Groundwater quality limits for drinking purposes

Basic parameters - physical and chemical parameters

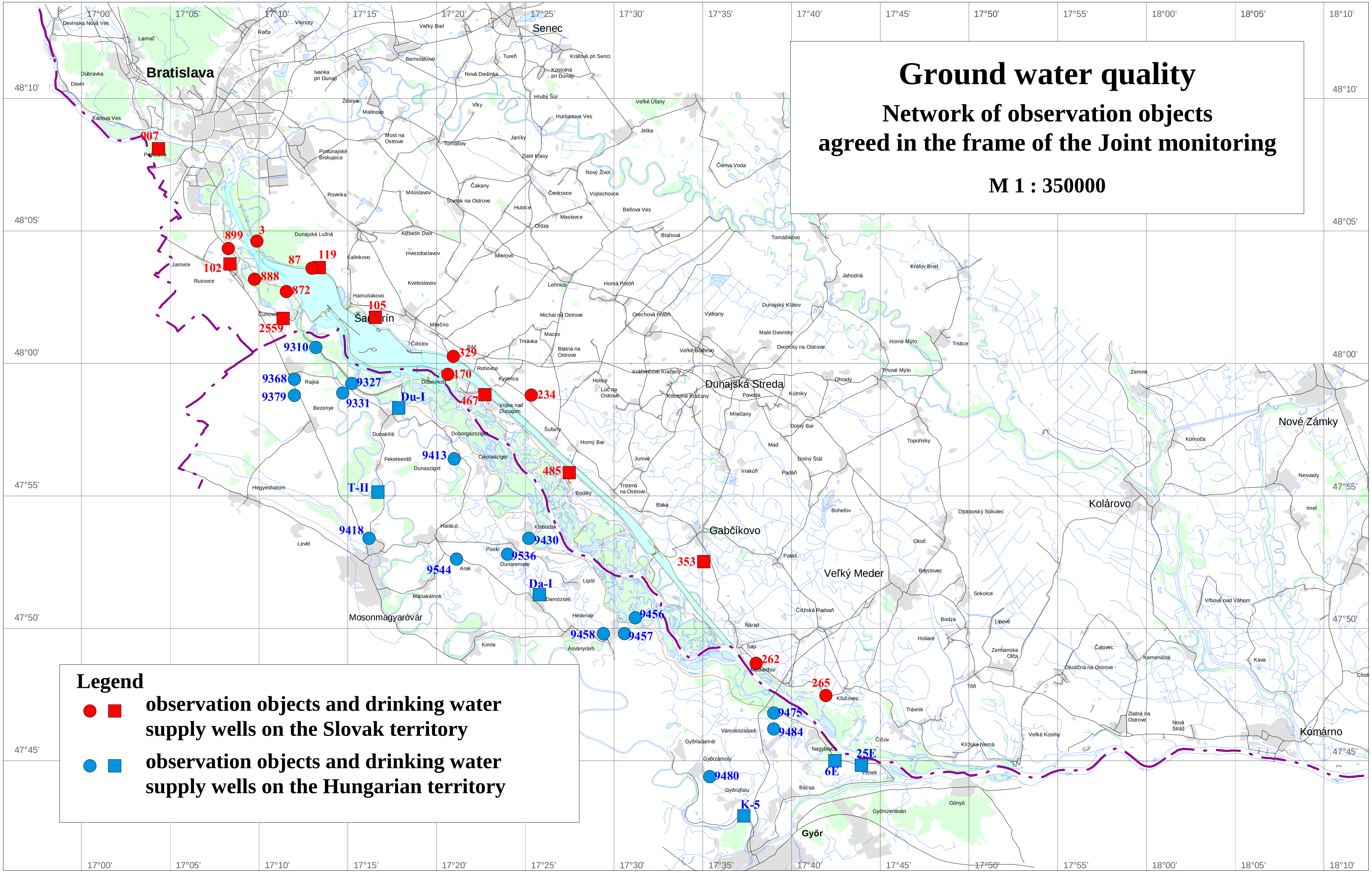
parameter	unit	limit value	highest limit value
temperature	°C	12	25
pH	-	6.5-9.5	
conductivity at 25 °C	$mS.m^{-1}$	250	
O_2	$mg.l^{-1}$	-	
COD_{Mn}	$mg.l^{-1}$	3	5
NH_4^+	$mg.l^{-1}$	0.5	
NO_3^-	$mg.l^{-1}$	50	
PO_4^{3-}	$mg.l^{-1}$	0.5	
Mn	$mg.l^{-1}$	0.05	
Fe	$mg.l^{-1}$	0.2	
Na^+	$mg.l^{-1}$	200	
K^+	$mg.l^{-1}$	10	12
Ca^{2+}	$mg.l^{-1}$	100	
Mg^{2+}	$mg.l^{-1}$	30	50
HCO_3^-	$mg.l^{-1}$	-	
Cl^-	$mg.l^{-1}$	250	
SO_4^{2-}	$mg.l^{-1}$	250	

Supplemental parameters – inorganic and organic micropollutants

parameter	unit	limit value	highest limit value
Inorganic micropollutants - heavy metals			
As	$\mu g.l^{-1}$		10
Cd	$\mu g.l^{-1}$		5
Cr	$\mu g.l^{-1}$		50
Cu	$\mu g.l^{-1}$	200	2000
Hg	$\mu g.l^{-1}$		1
Ni	$\mu g.l^{-1}$		20
Pb	$\mu g.l^{-1}$		10
Zn	$\mu g.l^{-1}$	200	3000
Organic micropollutants			
pesticides – sum	$\mu g.l^{-1}$		0.5
pesticides – individually	$\mu g.l^{-1}$		0.1
aldrin	$\mu g.l^{-1}$		$\Sigma \leq 0.03$
dieldrin	$\mu g.l^{-1}$		
heptachlor	$\mu g.l^{-1}$		0.03
heptachlor epoxide	$\mu g.l^{-1}$		0.03
trichloroethylene	$\mu g.l^{-1}$		$\Sigma \leq 10$
tetrachloroethylene	$\mu g.l^{-1}$		
DDT/DDD/DDE	$\mu g.l^{-1}$	1	5
HCH – sum	$\mu g.l^{-1}$		$\Sigma \leq 0.1$

HCH – hexachlorciclohexane

Fig. 4-1



Ground water quality
Network of observation objects
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation objects and drinking water supply wells on the Slovak territory
observation objects and drinking water supply wells on the Hungarian territory
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
907
899
3
102
888
87
119
872
2559
105
329
170
467
234
485
353
262
265
9310
9368
9379
9327
9331
Du-I
9413
T-II
9418
9430
9536
9544
Da-I
9456
9457
9458
9475
9484
6E
25E
9480
K-5
17°00'
17°05'
17°10'
17°15'
17°20'
17°25'
17°30'
17°35'
17°40'
17°45'
17°50'
17°55'
18°00'
18°05'
18°10'
48°10'
48°05'
48°00'
47°55'
47°50'
47°45'

PART 5

Soil Moisture Monitoring

5.1. Data collection methods

In the year 2015 the soil moisture monitoring on the Slovak side continued without changes. The soil moisture is measured on 20 monitoring areas (12 forest monitoring areas, 5 biological monitoring areas and 3 agricultural areas) with neutron probe to the prescribed depth or to the depth of the groundwater level. Measurements are performed at 10 cm depth intervals and the soil moisture is expressed by the total soil moisture content in volume percentage.

Monitoring of soil moisture on the Hungarian side is currently suspended and has not been implemented for the third year. In the past it was carried out on 14 monitoring areas (6 forest monitoring areas and 8 agricultural areas). The soil moisture was measured with a capacity probe to a maximum depth of 3 m. Since no current data are available, evaluation have not been carried out.

The list of monitoring areas is given in **Table 5-1** and **5-2** and their situation is shown in **Fig. 5-1**.

Table 5-1: List of monitoring stations on the Slovak side

	Country	Station No.	Locality and position
1	**Slovakia**	**2703**	Dobrohošť, inundation area
2	**Slovakia**	**2704**	Bodíky, inundation area
3	**Slovakia**	**2705**	Bodíky, inundation area
4	**Slovakia**	**2706**	Gabčíkovo, inundation area
5	**Slovakia**	**2707**	Kľúčovec, inundation area
6	**Slovakia**	**2716**	Rohovce, agricultural area
7	**Slovakia**	**2717**	Horný Bar - Šuľany, agricultural area
8	**Slovakia**	**2718**	Horný Bar, agricultural area
9	**Slovakia**	**2755**	Sap, inundation area
10	**Slovakia**	**2756**	Gabčíkovo, inundation area
11	**Slovakia**	**2757**	Baka, inundation area
12	**Slovakia**	**2758**	Trstená na Ostrove, inundation area
13	**Slovakia**	**2759**	Horný Bar - Bodíky, inundation area
14	**Slovakia**	**2760**	Horný Bar - Šuľany, inundation area
15	**Slovakia**	**2761**	Horný Bar - Bodíky, inundation area
16	**Slovakia**	**2762**	Vojka nad Dunajom, inundation area
17	**Slovakia**	**2763**	Vojka nad Dunajom, inundation area
18	**Slovakia**	**2764**	Dobrohošť, inundation area
19	**Slovakia**	**3804**	Medveďov, inundation area
20	**Slovakia**	**3805**	Kľúčovec, inundation area

Table 5-2: List of monitoring stations on the Hungarian side
(since 2013 not observed)

	Country	Station No.	Location
1	Hungary	T02	Halászi H15 – agricultural area
2	Hungary	T03	Dunakiliti 16 – agricultural area
3	Hungary	T04	Dunaremete – agricultural area
4	Hungary	T06	Rajka 0 – agricultural area
5	Hungary	T09	Püski P14 – agricultural area
6	Hungary	T10	Ásványráró A19 – agricultural area
7	Hungary	T11	Püski P5 – agricultural area
8	Hungary	T12	Lipót L18 – agricultural area
9	Hungary	T15	Hédervár 11B – forest stand
10	Hungary	T16	Dunasziget 22B – forest stand, inundation area
11	Hungary	T17	Dunasziget 15D – forest stand, inundation area
12	Hungary	T18	Lipót 4A – forest stand, inundation area
13	Hungary	T19	Ásványráró 27C – forest stand, inundation area
14	Hungary	T20	Dunakiliti 15E – forest stand, inundation area

5.2. Data presentation methods

The mode of soil moisture data presentation have not changed. The soil moisture content is displayed in figures showing the average volume percentage of moisture for the depth interval from 0 to 100 cm and from 110 to 200 cm. The measured soil moisture content at selected sampling sites is presented in colour charts with soil moisture time distribution for the entire monitoring period and for the entire measured depth. Monitoring data are comprehensively processed in the National Annual Reports on environmental monitoring and the graphical presentation of each monitoring site is given in Annexes.

5.3. Evaluation of results on the Slovak side

Soil moisture on the Slovak side is observed on sites located in the inundation area and flood-protected agricultural area (**Fig. 5-1**).

Monitoring sites located in the agricultural area (No. 2716, 2717, 2718)

Monitoring sites that are located in the agricultural area are situated behind the derivation canal on regularly cultivated agricultural land. The soil moisture content on these sites during the entire observation period runs similarly. Since 2004, slight increase of the soil moisture content can be seen, while the groundwater level position and fluctuation remained mostly unchanged. Since 2011, however, slight decrease of groundwater level can be seen, what was reflected in a decline of soil moisture content in the depth interval 1-2 m below the surface. In last two years, the decline in soil moisture content more significantly appears also in the depth interval 0-1 m, what probably relates to the absence of larger and more longer-lasting flood or discharge waves (**Fig. 5-2, Fig. 5-3**).

The groundwater level at all three monitoring sites is relatively balanced. At the monitoring site No. 2716 the groundwater level usually fluctuates at a depth of 2.6 to 4.2 m, in the year 2015 it was from about 3.8 to 4.4 m. At the site No. 2717 the groundwater level fluctuates at a depth of 2.0 to 3.5 m, in 2015 it was only from 3 to 3,5 m

(**Fig. 5-3**). The groundwater level at the site No. 2718 varies in the depth of 1.5 to 3.0 m, however in early 2014 has decreased to 3.3 m, which was the lowest level since starting the observation, and in 2015 it fluctuated from 2,8 to 3,2 m. The reason for the significant drop in groundwater levels, as seen in 2014 or in the second half of the year 2015, were the long-term low flow rates on the Danube, that moved far below the long-term average values.

Similarly to the previous year the fluctuation of soil moisture content in 2015 in both depth intervals have been depended on climatic conditions. The groundwater level, even during discharges waves on the Danube, did not influenced the soil moisture in layers to the depth of 2 m (**Fig. 5-3**).

The soil moisture values in the depth interval 0-1 m at the site No. 2716 mostly vary in the range between 5 to 20 %, in 2015 it was from 5 to 21 %. Values at the site No. 2717 usually fluctuate between 20 and 30 %, in 2015 they varied between 16 and 32 %. The soil moisture content at the site No. 2718 mostly reaches values between 25-35 %, in the year 2015 it was from 21 to 35 % (**Tab. 5-5**). The soil moisture content in the winter period started at relatively high level and until the end of the winter period were more or less stagnant. Since the beginning of growing season it began to decline and declined until mid August, when slightly increased thanks to abundant precipitations. During September and first half of October the decline continued. Thanks to rich precipitations in the second half of October the soil moisture content has increased and remained increased until the end of the year. However, the soil moisture content at the end of the year have reached only approximately half of the content from the beginning of the year. The maximal values at all three sites occurred at the beginning of the year in January and February. The lowest values in the year 2015 occurred in August and September.

In the depth interval between 1 and 2 m the soil moisture values are more balanced. At the monitoring site No. 2716 they usually vary from 12 to 20 %, in 2015 were in the range from 12 to 19 %. At the monitoring site No. 2717 mostly reaches 28 to 37 %, in the year 2015 they fluctuated from 20 to 28 %. At the monitoring site No. 2718 they usually range from 16 to 30 %, in the year 2015 ranged from 8 to 23 % (**Tab. 5-5**). Comparing to the previous year the soil moisture content in 2015 in this depth interval slightly decreased again and at monitoring sites No. 2717 and 2718 reached the lowest values for the whole period of monitoring. The minimal average values of the soil moisture content were recorded in September and October. The maximal average values occurred in February or March.

Table 5-5: The minimal and maximal average soil moisture contents at agricultural monitoring sites

Monitoring site	Layers down to 1 m depth		Layers between 1-2 m depth	
	minimum [%]	maximum [%]	minimum [%]	maximum [%]
2716	5.72	20.57	12.28	18.73
2717	18.06	31.51	20.35	27.72
2718	21.48	34.90	8.53	22.63

Monitoring sites located in the inundation area (No. 2703-2707, 2755-2764, 3804, 3805)

The soil moisture in the inundation area, along with the groundwater level and precipitations, is highly dependent on natural or artificial floods. Since no flood or significant discharge waves occurred in the last two years, it has been reflected in a significant decline in moisture content in the soil, especially at sites that were previously influenced by the ground water level. Precipitations and the discharge wave in January 2015 created a relatively good conditions before the growing season, despite lower precipitations and low flow rates on the Danube in February and March. Since the beginning of the growing season the soil moisture content began to decline and on most of monitored sites it has been decreasing almost without interruption until mid-October. A short interruption of the soil moisture content decrease occurred in May during the discharge wave, when the increased ground water level moisturized the soil layers in the depth interval 0-1 m at monitoring sites No. 2706, 2707, 2755, 2756, 3804 and 3805 in the area of Istragov and below the confluence of the tail race canal and the Danube old riverbed. The soil moisture content has been influenced also at monitoring sites No. 2756, 2757 and 2758 in the depth interval 1-2 m. The soil moisture in the upper soil layers at these sites and in both depth intervals on the rest of the monitoring sites has been influenced only by climatic conditions. Development of soil moisture content at the end of the year was in both depth intervals different. While in the depth interval 0-1 m the soil moisture content has increased, due to the relatively abundant precipitations, particularly in the second half of October, the soil moisture content in the depth interval 1-2 m had not changed substantially or only slightly increased. The soil moisture content in layers to 1 m depth at the end of the year on most of observed monitoring sites hardly achieved half of the content from the beginning of the year. The situation in the depth interval from 1 to 2 m depth was even worse. On large number of monitoring sites the soil moisture content has remained very low and at several sites it has reached lowest or nearly lowest values during the period of observation. The occurrence of minimal and maximal values differed according to the prevailing influence (flow rates, precipitations, water supply), but in general it can be stated that the maximal values occurred at the beginning of the year in January and February or in May at places under the influence of the Danube flow rates. The minimal values were characteristic for the period from late august (layers to 1 m depth) till the end of the year (layers between 1 and 2 m depth). Concerning the minimal and the maximal average values it can be generally stated that compared to the previous year the minimal values in both depth intervals were lower on most of monitoring sites, on the rest they were very similar. The maximal values in both depth intervals were lower at half of the observed sites and slightly higher at the second half of the locations.

The thickness of soil profile in the upper part of the inundation area is low (monitoring sites No. 2703, 2764, 2763, 2762 and 2761), similarly as on the Hungarian side. The groundwater level at these places fluctuates only in the gravel layer. In 2015 the groundwater level on area No. 2703 fluctuated from 4.3 to 5.0 m. On areas No. 2764, 2763, 2762 and 2761 the groundwater level changed from 2.7 to 4.8 m. Layers to 1 m depth are almost exclusively dependent on climatic conditions. Only high flood waves can influence the soil moisture content by increasing the groundwater level. Layers below 1 m depth are also mostly dependent on climatic conditions, however the bottom part of this depth interval can be slightly influenced by discharge waves. In 2015 there did not occurred such a discharge wave. Maximal average soil moisture contents in both depth intervals occurred at the beginning of the year, in January and February. The minimal average soil moisture contents in the depth interval 0-1 m occurred in August and September, while in the depth interval 1-2 m they were recorded in the period from October to December.

The thickness of the soil profile in the middle part of the inundation area is higher. In general the groundwater regime in this region is influenced by the water supply of the river branch system, introduced in May 1993. Moreover, the natural floods or discharge waves have significant influence on the groundwater level. The groundwater level in 2015 fluctuated slightly above or around the boundary between the soil profile and gravel layers - monitoring sites No. 2704, 2705, 2757, 2758, 2759 (**Fig. 5-5**) and in the first half of the growing season partially supplied the soils with water. During the year the groundwater level on area No. 2704 fluctuated from 3 to 4 m. On areas No. 2757, 2758, 2759 and 2760 it mostly changed from 1.8-3.5 m (**Fig. 5-4a, Fig. 5-5**). The maximal values of average soil moisture content in both, in the layer down to 1 m depth and in the layer below 1 m depth occurred at the beginning of the year, from January to early March. Only on monitoring sites No. 2757 and 2758 the maximal average value of the soil moisture was recorded in May, after the discharge wave. Minimal values in the layer down to 1 m depth were reached from late August to October, in the layer below 1 m depth it was from October to the end of the year (**Fig. 5-4b**). Different situation is on the area No. 2705, where the groundwater level fluctuates close to the surface. The minimal soil moisture value in both depth intervals was recorded at the beginning of the year in January, and the maximal values occurred in the period from August to November.

In the lower part of inundation area, downstream of confluence of the river branch system and the Danube old riverbed (monitoring sites No. 2706, 2756, 2755), the groundwater level usually fluctuates around the boundary between the soil profile and gravel layer (**Fig. 5-6a**). The groundwater level in 2015 fluctuated in the depth between 1.4 and 4.6 m, monitoring areas were not flooded. Due to very low flow rates in the Danube during the second half of the year, the soil moisture in this period was dependent on precipitations only. Besides the discharge wave in January, which together with precipitations created favourable moisture conditions before the vegetation period, the soil profile had been moisturized also during the second discharge wave in May. The soil moisture content started to decline from the beginning of the vegetation period, but thanks to the discharge wave in May the decline has been shortly interrupted. However, with the decrease of flow rates the soil moisture continued to decline and the lowest values were recorded in late August and in September. Thanks to abundant precipitations in the second half of October the soil moisture content at the end of the year slightly increased. Maximal values in the layer down to 1 m depth occurred at the beginning of the year in January, in the depth below 1 m they occurred after the discharge wave in May (**Fig. 5-6a,b**).

The soil moisture contents at monitoring sites No. 2707, 3804, 3805, that are located in the inundation below the confluence of the tailrace canal and the Danube old riverbed, are highly influenced by the flow rate regime in the Danube. The maximum average values in 2015 in both depth intervals occurred after the discharge waves in January or in May. The lowest values were recorded in September and October. The groundwater level at monitoring sites No. 2707, 3804 and 3805 fluctuated in the depth 1.7-4.7 m, but during the discharge waves the groundwater level have raised to 0.3 m below the surface. The riverbed erosion negatively influences also these monitoring areas. During low flow rates in the Danube, as it was during the second half of the year, the groundwater level does not supply the soil profiles sufficiently.

Table 5-6: The minimal and maximal average soil moisture contents at monitoring sites in the inundation area

Monitoring site	Layers down to 1 m depth		Layers between 1-2 m depth	
	minimum [%]	maximum [%]	minimum [%]	maximum [%]
2703	9.14	27.78	12.53	25.81
2704	11.19	32.79	16.75	32.21
2705	44.43	49.07	42.92	44.46
2706	9.21	24.16	11.45	32.84
2707	6.81	21.29	9.61	27.64
2755	13.46	40.02	5.30	41.34
2756	13.71	31.71	21.88	37.50
2757	21.36	35.92	12.53	36.74
2758	29.56	42.58	16.44	38.41
2759	14.92	25.44	27.38	32.86
2760	13.99	37.86	10.23	22.56
2761	8.71	30.02	5.56	8.71
2762	15.08	35.12	13.33	39.03
2763	6.27	25.06	3.65	11.31
2764	13.78	32.60	6.08	9.64
3804	22.31	45.49	26.32	48.77
3805	23.30	38.07	11.70	40.56

Fig. 5-1

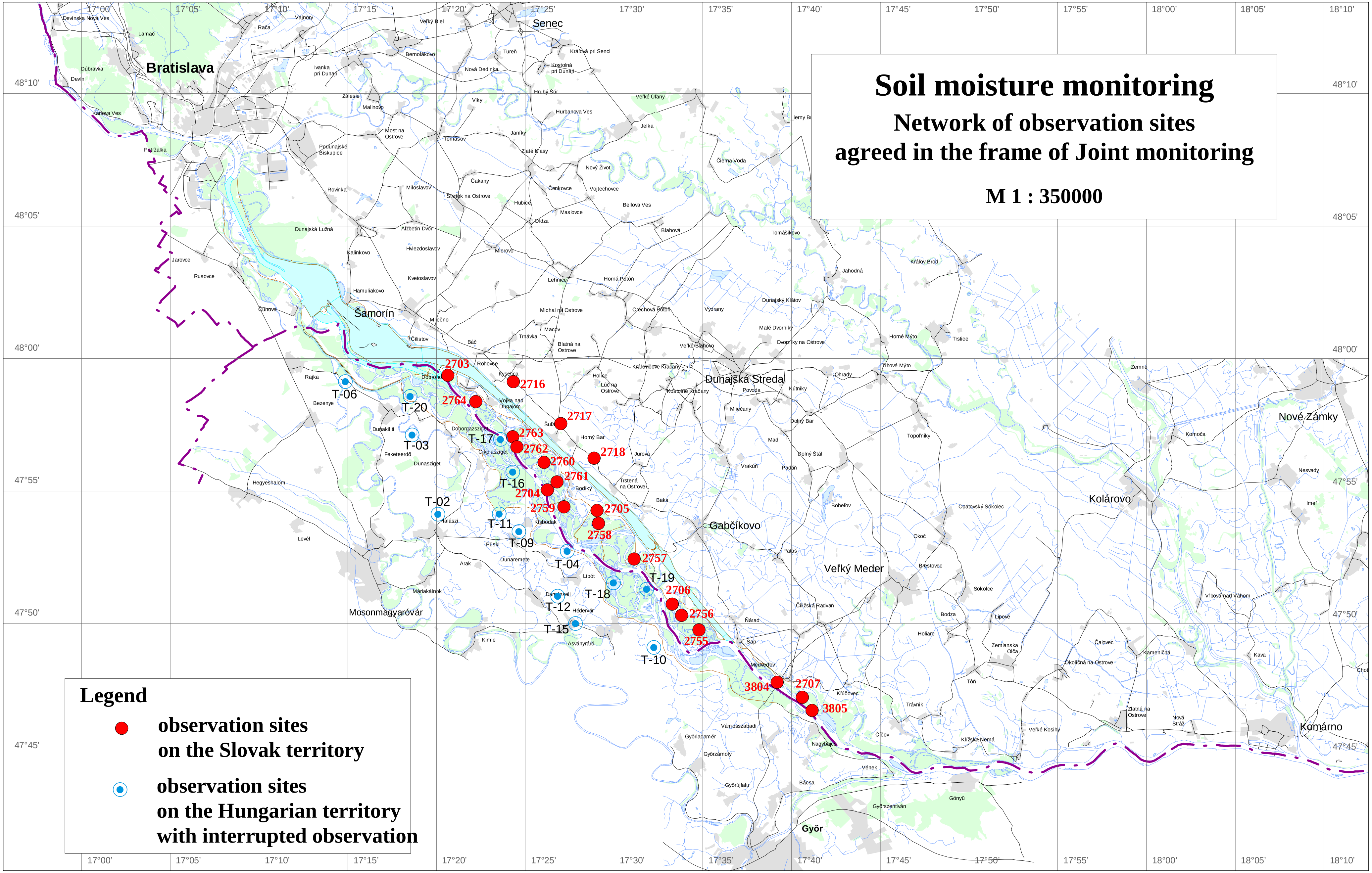
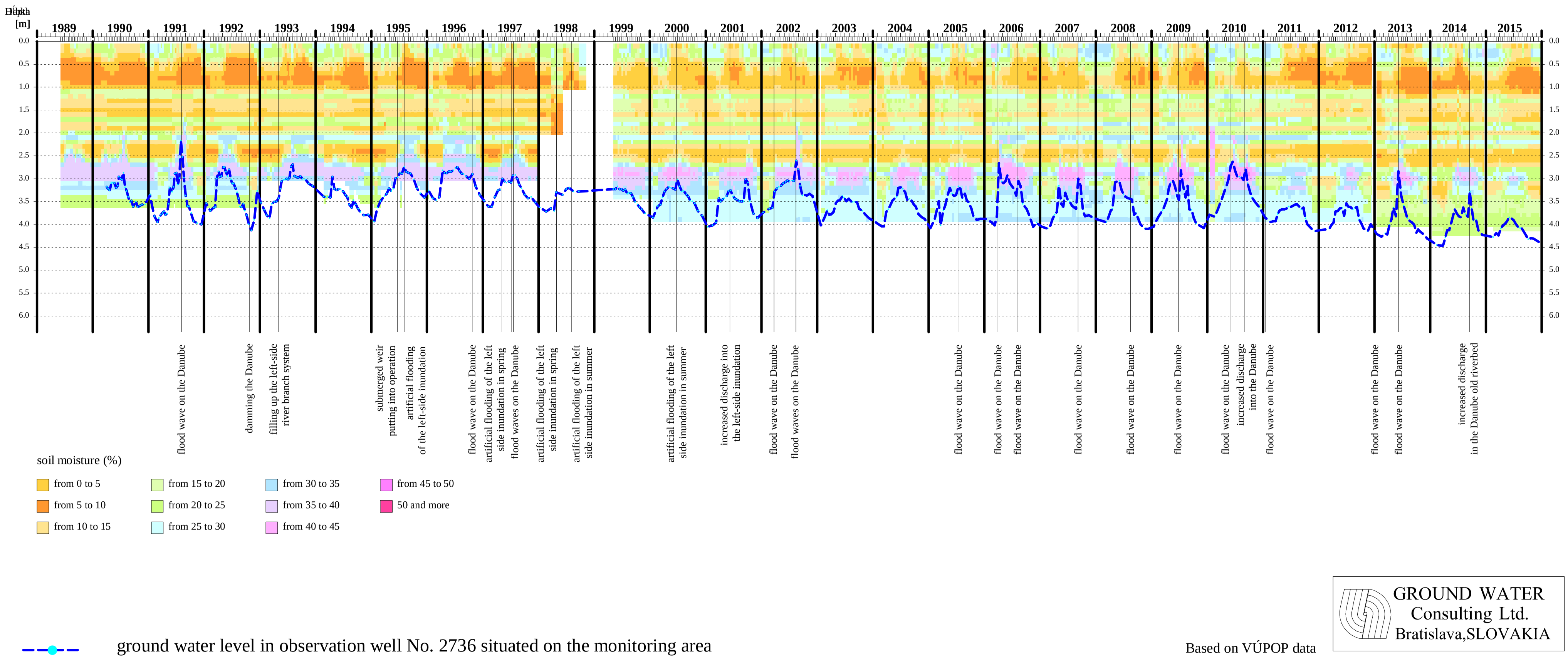

Soil moisture monitoring
Network of observation sites
agreed in the frame of Joint monitoring
M 1 : 350000
Legend
observation sites
on the Slovak territory
observation sites
on the Hungarian territory
with interrupted observation
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
2703
2716
2764
2717
2763
2762
2718
2760
2761
2704
2759
2705
2758
2757
2706
2756
2755
3804
2707
3805
T-06
T-20
T-03
T-17
T-16
T-02
T-11
T-09
T-04
T-19
T-18
T-12
T-15
T-10

Fig. 5-2

Soil moisture monitoring

Locality: **2716 - Rohovce, MP-4**



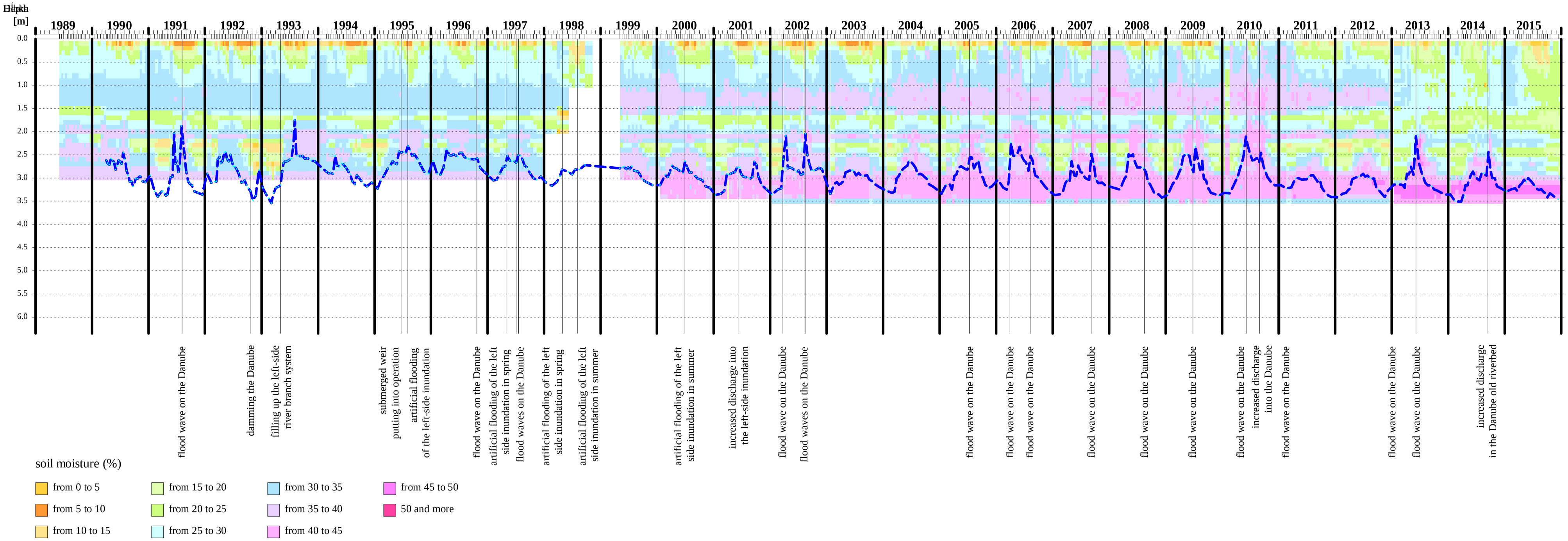
Based on VÚPOP data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-3

Soil moisture monitoring

Locality: **2717 - Horný Bar - Šuľany, MP-5**



ground water level in observation well No. 2737 situated on the monitoring area

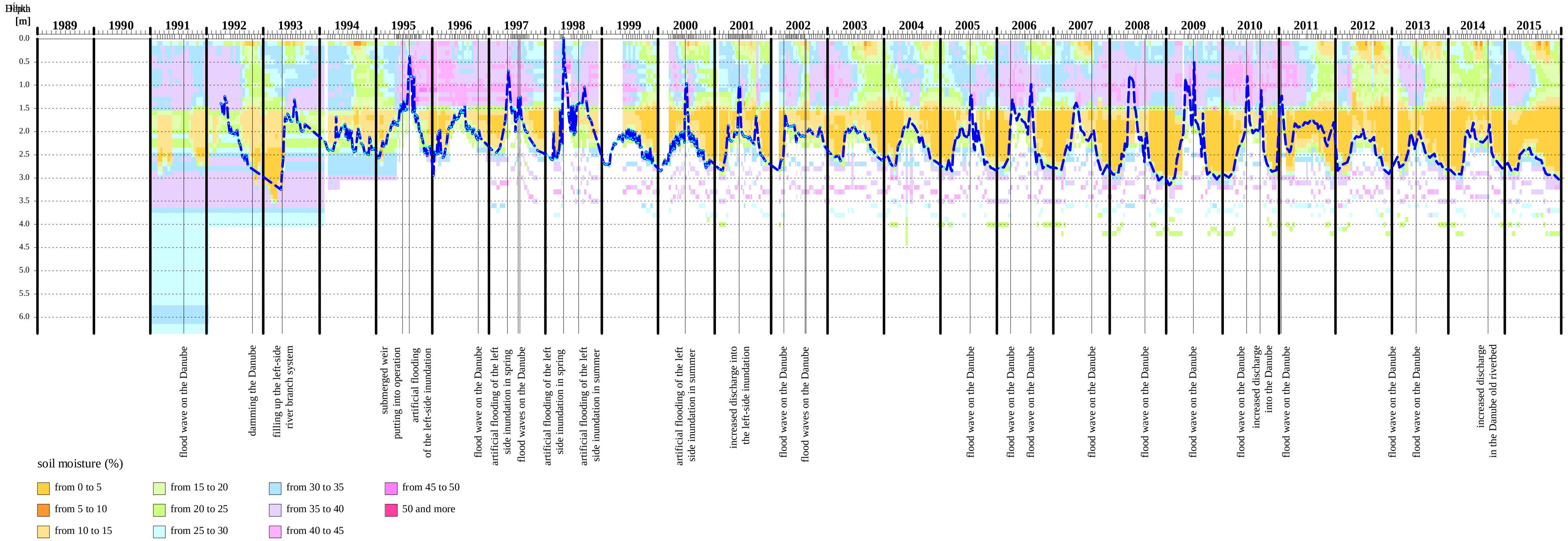
Based on VÚPOP data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-4a

Soil moisture monitoring

Locality: **2760 - Horný Bar - Šuľany, L-8**



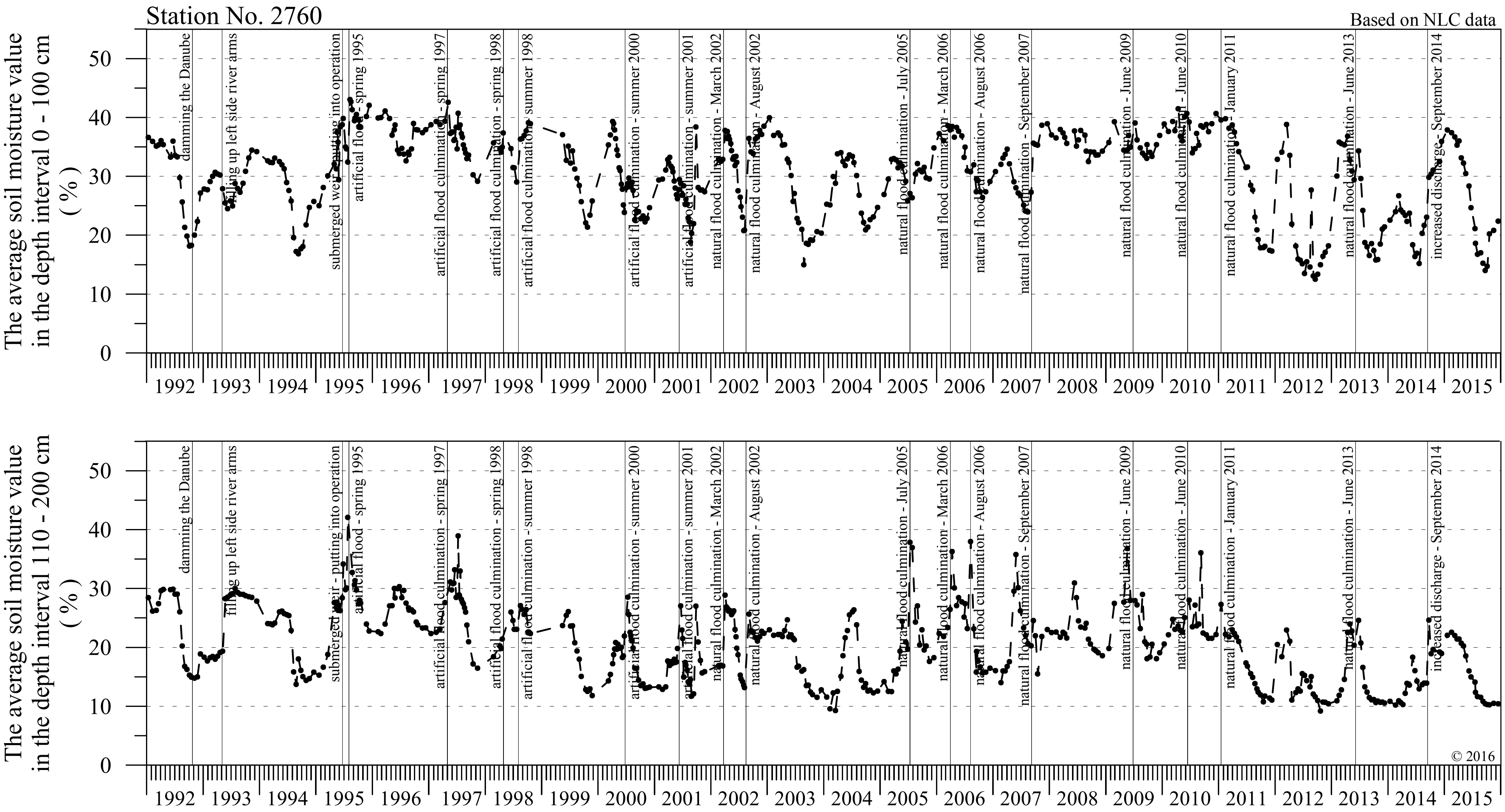
ground water level in observation well No. 2784 situated on the monitoring area

Based on NLC-LVÚ data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-4b

Soil moisture

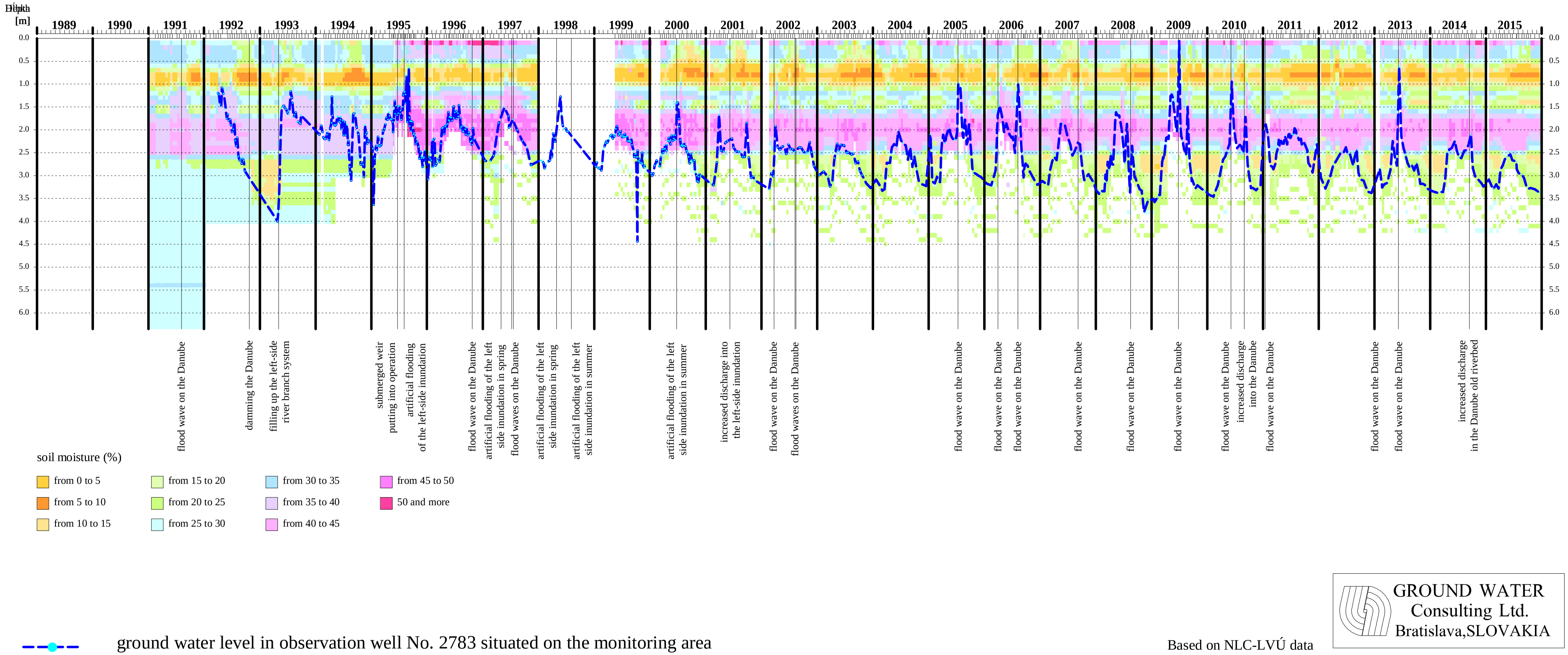


GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

Fig. 5-5

Soil moisture monitoring

Locality: **2759 - Horný Bar - Bodíky, L-7**



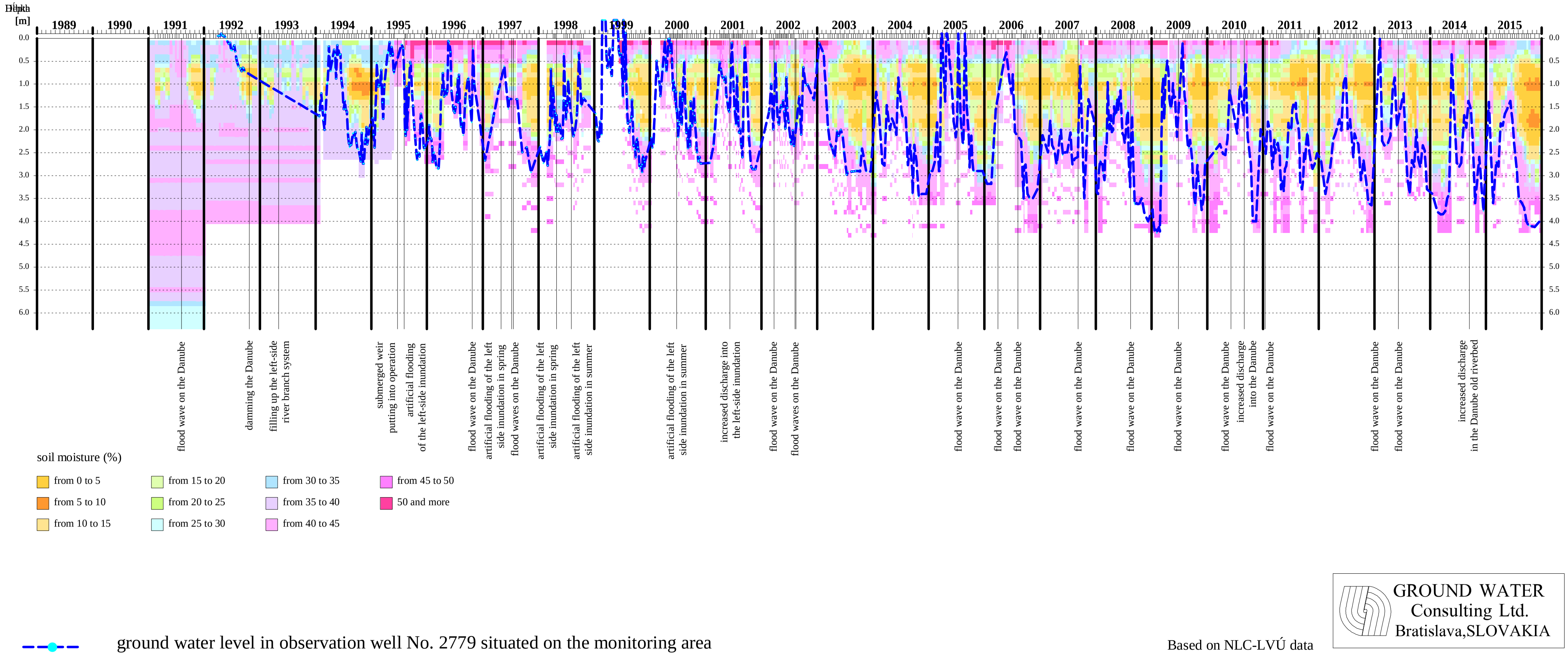
Based on NLC-LVÚ data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-6a

Soil moisture monitoring

Locality: **2755 - Sap, L-3**

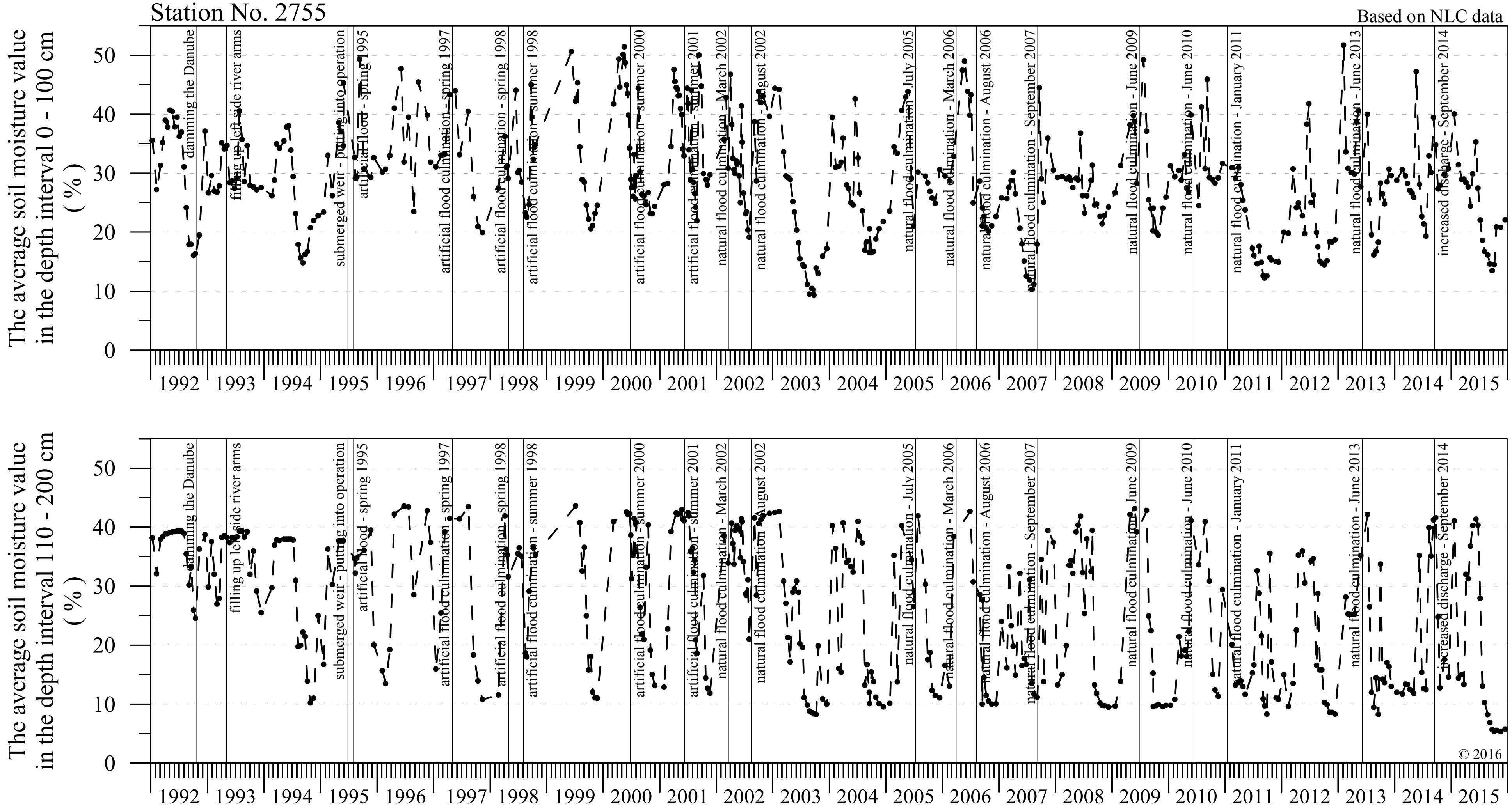


Based on NLC-LVÚ data

GROUND WATER Consulting Ltd.
Bratislava,SLOVAKIA

Fig. 5-6b

Soil moisture



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PART 6

Forest Monitoring

The development of forest stands, as well as plant and animal communities evaluated in Part 7 - Biological Monitoring, was influenced by below-mentioned hydrological and climatic conditions, that are considered to be relatively unfavourable:

- Considering the water content, the year 2015 was assessed as dry and the flow rate regime of the Danube as atypical. The average daily flow rates most of the year, except for a few discharge waves, ranged significantly below the long-term average daily flow rate values. No discharge wave was large enough to cause at least a partial flooding of the inundation area.
- In terms of rainfall totals the evaluated year was dry, moreover the precipitations were unevenly distributed in time and space. The rainfall totals in early spring were very low, subsequently the vegetation growth has been favourable influenced by intense precipitations in May. This was followed by very long dry season until mid August. Later periods with abundant rainfalls already had only little influence on vegetation development.
- The evaluated year can be characterized by frequent occurrence of periods with air temperatures above the average. Their negative effect on vegetation, reinforced by the severe lack of precipitations, was most noticeable in July and August.

6.1. Evaluation of the Slovak territory

Monitoring sites on the Slovak territory are situated in the inundation area. The list of monitored sites is given in **Table 6-1** and their situation is shown in **Fig. 6-1**. In accordance with the intergovernmental Agreement the Slovak Party also in the year 2015 observed the development of basic growth parameters, weekly girth growth and the health state of trees by terrestrial way. Aerial imagery of the health state of forest stands is carried out in three-year intervals, in the evaluated year was not carried out.

In the Slovak inundation area the most productive cultivated poplar stands are monitored. At present the Pannonia poplar clones had already replaced clones of I-214 and Robusta, as well as the white willow stand, on all originally observed areas. On two substitutive areas the weekly girth growth on the poplar clone I-214 are temporarily observed.

The development of most forest stands in the evaluated year did not show significant differences in comparison with the previous years, despite the absence of floods and les favourable hydrometeorological conditions.

The height increment quality classification in most of observed forest stands remains basically unchanged. Majority of stands is characterized by intense or moderate growth. On the area No. 2687 a gradual improvement of height increment can be seen during the last 6-7 years, and in the last two years also on the area No. 2682. Further decline of the increment on this area was not registered in the evaluated year, the tendency has turned.

Table 6-1: List of the forest monitoring areas on the Slovak side

Area No.	Area label	River km	Locality	Tree species	Age of trees
2681	L-3	1812	Sap	poplar - *Populus x euroamericana Pannonia*	13
2682	L-4	1816	Gabčíkovo	poplar - *Populus x euroamericana Pannonia*	8
2683	L-5	1821.5	Baka	poplar - *Populus x euroamericana Pannonia*	9
2684	L-6	1824.5	Trstená na Ostrove	poplar - *Populus x euroamericana Pannonia*	12-(14)
2685	L-7	1828.5	Horný Bar – Bodíky	poplar - *Populus x euroamericana Pannonia*	17
2686	L-8	1831.5	Horný Bar – Šuľany	poplar - *Populus x euroamericana Pannonia*	10
2687	L-9	1830	Horný Bar – Bodíky	poplar - *Populus x euroamericana Pannonia*	16
2688	L-10	1834	Vojka nad Dunajom	last unsuccessful reforestation in 2008	-
5573	L-10a*	1834	Vojka nad Dunajom	poplar - *Populus x euroamericana I-214*	cca 22
2689	L-11	1834.5	Vojka nad Dunajom	poplar - *Populus x euroamericana Pannonia*	(14)-16
2690	L-12	1838	Dobrohošť	last unsuccessful reforestation in 2006	-
4436	L-12b*	1838	Dobrohošť	poplar - *Populus x euroamericana I-214*	cca 43
3802	L-25	1806	Medveďov	poplar - *Populus x euroamericana Pannonia*	21
3803	L-26	1803	Kľúčovec	poplar - *Populus x euroamericana Giant*	19

* - on substitutive areas marked by letters “a” or “b” only temporary measurement of weekly girth growth is carried out

The weekly girth growth measurements in young Pannonia poplar stands (monitoring areas No. 2681, 2683, 2684, 2686) have been started in 2011. The cumulative girth growth values of young poplars are rather low during the whole observation period. Compared to the previous year at all areas lower increments have been registered in the evaluated year, except the area No. 2681. Similar tendency has been registered also on the substitutive areas No. 5573 and 4436, while their growth in the previous period significantly fluctuated.

Clear growth peak of poplars could not be identified on most of observed areas. In general it can be concluded that the growth of poplars was more stable and more intense in the first months of the growing period, especially in May and June.

Unlike the previous year multiple occurrence of zero weekly girth growth has been registered. Zero increments in a small number were registered basically on all areas. Their occurrence were the most frequent in the first half of August, probably due to the persistence of several unfavourable hydrometeorological conditions.

The length of the growing season in the evaluated year was relatively short. Initiation of growth at particular areas was recorded from mid-April until the beginning of May. During September, the majority of stands already had minimal increments, end of the growing season of all trees was dated to the end of September.

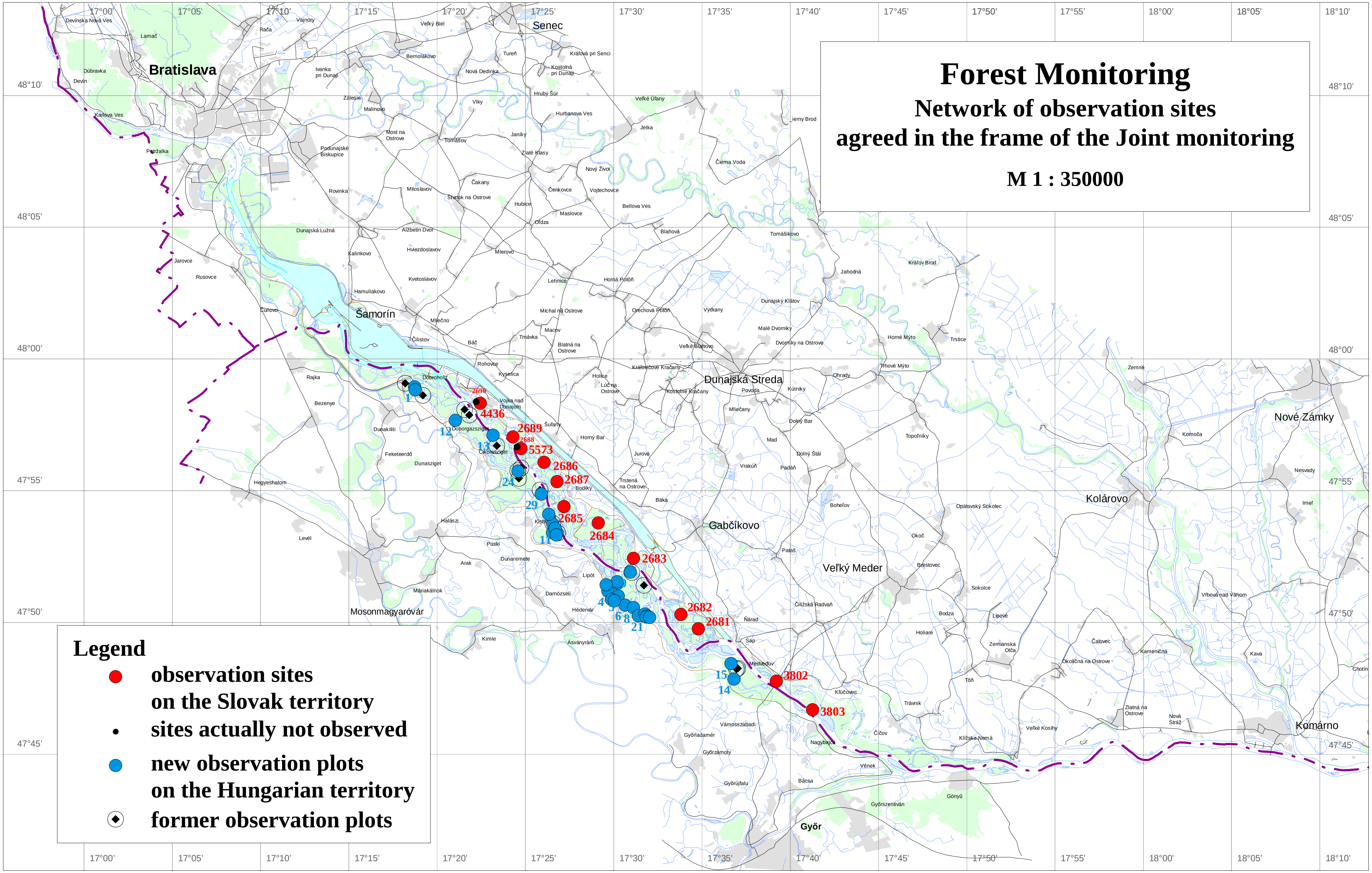
The observed cultivated poplar stands (Pannonia and Giant clones) were without changes healthy and vital. Still it is registered only isolated infestation of trees by diseases and pests. Due to the occurrence of certain weather conditions increase of foliar pests basically in the whole region has been registered in the evaluated year.

At the end it should be noted that the overall tendency in groundwater levels at most of observed sites is decreasing in long-term. For this reason it is necessary to emphasize the efficient use of existing weirs in the river branch system to mitigate the effects of groundwater level decline and to ensure annual artificial flooding of the area especially during periods of long-term drought. Permanent solution would be the increase of water level in the Danube old riverbed by submerged weirs It is also necessary to ensure an earlier increase of discharges to the river branch system, before the start of growing season.

6.2. Evaluation of the Hungarian territory

The forest monitoring in the Szigetköz area in the previous year has been carried out under the INMEIN project (Innovative methods for monitoring and inventory of Danube floodplain forests using modern 3D technologies of remote sensing), which introduced a new approach. Instead of obtaining dendrometric characteristics of forest stands at permanent monitoring areas, the areas for observation were randomly selected from layers into which the forest departments were classified according to type and age. In addition, weekly girth growth increments were observed during the vegetation period in three forest compartments. By the change of methodology the comparability with results achieved in previous years was interrupted. In the evaluated year however, the Hungarian Party provided no forest monitoring data.

Fig. 6-1


Forest Monitoring
Network of observation sites
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation sites
on the Slovak territory
sites actually not observed
new observation plots
on the Hungarian territory
former observation plots
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
2690
4436
2689
2688
5573
2686
2687
2685
2684
2683
2682
2681
3802
3803
1
12
13
24
29
11
4
5
6
8
21
15
14
17°00'
17°05'
17°10'
17°15'
17°20'
17°25'
17°30'
17°35'
17°40'
17°45'
17°50'
17°55'
18°00'
18°05'
18°10'
48°10'
48°05'
48°00'
47°55'
47°50'
47°45'

PART 7

Biological Monitoring

The biological monitoring consists of agreed groups of plants and animals. In the year 2015 it was performed only on the Slovak territory. The monitoring on the Hungarian side has been suspended in full extent, similarly as in 2012 and 2014. The monitoring on the Slovak side is performed on six complex monitoring areas, their position is displayed on **Fig. 7-1**. The list of observed groups of plants and animals is given in **Table 7-1**.

Table 7-1: The list of monitoring areas and monitoring sites

No.	Name	Id	Locality	Monitored groups									
								Macrozoobent.				Zoopl.	
				A	B	C	D	E	F	G	H	I	J
Slovak side – complex monitoring areas													
1	B-6	2600	Dobrohošť – Dunajské kriviny	●		●	●	●	●	●		●	●
2	B-9	2603	Bodíky – Bodícka brána	●	●	●	●	●	●	●		●	●
3	B-10	2604	Bodíky – Kráľovská lúka	●	●	●	●	●	●	●		●	●
4	B-14	2608	Gabčíkovo – Istragov	●	●	●	●	●	●	●		●	●
5	B-15	2609	Sap – Erčéd	●			●						
6	B-18	2612	Kľúčovec – Sporná sihoť	●	●	●	●	●	●	●		●	●
Hungarian side – monitoring sites (monitoring suspended in 2012, 2014 and 2015)													
1	*28a*	*B-01*	*Dunasziget – oak forest*	▪									
2	*28b*	*B-02*	*Dunasziget – meadow*	▪									
3	*31*	*B-03*	*Halászi – oak forest Derék*	▪									
4	*30*	*B-04*	*Lipót – poplar forest, Gombócos closure*	▪									
5	*4*	*H-04*	*Dunasziget – Schisler dead arm*		▪	▪						▪	▪
6	*5*	*H-05*	*Zátonyi Danube*									▪	▪
7	*5, 6*	*H-06*	*Lipót – Lipóti marsh*		▪	▪						▪	▪
8	*7*	*H-07*	*Danube, rkm 1828*		▪								
9	*8*	*H-08*	*Zátonyi Danube*		▪								
10	*9*	*H-09*	*Dunasziget – Csákányi Danube*		▪	▪						▪	▪
11	*10*	*H-10*	*Danube, rkm 1833*			▪							
12	*2, 11*	*H-11*	*Danube, rkm 1839*		▪	▪							
13	*12*	*H-12*	*Gázfűi Danube, rkm 28.5*			▪							
14		*F-26*	*Dunaremete-Pálfi island, forest, river arm*				▪	▪					
15		*F-27*	*Rajka – forest Felső*				▪						
16		*F-28*	*Novákpuszta –alder forest*				▪						
17	*22*	*F-31*	*Lipót – Zsejkei canal*						▪				
18	*20*	*F-35*	*Mosonmagyaróvár – Mosoni Danube*						▪				
19	*17*	*F-17*	*Arak – Nagy Kerek, alder forest*					▪					
20	*19*	*F-19*	*Danube, rkm 1824*				▪						
21		*F-N3*	*Arak, Nováki canal*						▪				
22		GAZ	Gázfűi Danube, Galambos					x	x	x	x		
23		MOS	Mosoni Danube, Szilos					x	x	x	x		

● – data provided according to the Agreement x – evaluation according to WFD methodology
▪ – observation not realized, monitoring suspended

Legend: A - Phytocoenology (Braun-Blanquet)
B - Macrophytes (according to Kohler and Braun-Blanquet as well)
C - Fish (Osteichthyes)
D - Terrestrial Molluscs (Gastropoda)

E - Aquatic Molluscs (Mollusca)
F - Dragonflies (Odonata – aquatic larvae on the Slovak side + flying imagines as supplement)
G - Mayflies and Caddisflies (Ephemeroptera and Trichoptera - aquatic larvae on the Slovak side + flying imagines as supplement)
H - other groups of macrozoobenthos according to the WFD requirements
I - Cladocerans (Cladocera)
J - Copepods (Copepoda)

Considering that for the year 2015 the Hungarian party do not provided any data from biological monitoring, evaluation of the Hungarian territory was not carried out in this Joint Report. A short description of climatic and hydrological conditions in the evaluated year, which influenced the development of observed groups of fauna and flora is given in Part 6 – Forest Monitoring.

7.1. Phytocoenology

The left-side river branch system

On the area No. 2600 community of the driest type of floodplain forest occur, in which positive changes can be observed in last three years, resulting from restoration interventions carried out (the peripheral arm and the central depression are permanently supplied with water from the Dobrohošť canal). In the evaluated year disintegration of the poorly developed tree layer had been registered again. The shrub layer continues to dominate. In line with the expectations, the synanthropic species in the dense herb layer have, that appeared after disruption with restoration works, receded. The significant summer drought however, has caused also a retreat of newly appeared wetland and hydrophilic species.

The influences of forest management interventions carried out on the monitoring area No. 2603 in previous years are just weakly visible. The coverage of the tree layer basically stagnates, the coverage of the shrub layer gradually increasing, only regarding the herb layer there were significant changes registered during the summer. Its coverage and species richness was significantly reduced due to the drought. From the community the hygrophilous species disappeared again, while the indigenous nitrophilous representatives have dominated. The significant presence of invasive woody plant mainly in the shrub layer is considered to be unfavourable.

The summer's drought slightly affected also the stabilized hygrophilous phytocoenoses on the monitoring area No. 2604. Willows in the tree layer have not suffered by water shortage and the shrub layer remained negligible. Changes have been registered in decline of species number of the herb layer, in the disappearance of hydrophytes vegetation and in increase of the presence of an invasive plant. The dominance of several nitrophilous species was preserved, as well as the occurrence of rare species.

The woody vegetation on monitoring area No. 2608 consists of young poplars, which so far have poor coverage. Slightly higher coverage is in the shrub layer, which consists of lower poplars and sprouting (mostly) native trees and shrubs. The coverage of herb layer is usually very high, its physiognomy remains determined by nitrophilous species that have been visibly weakened by a summer drought. Hydrophytes, which returned to the area after the flood in 2013, have absented due to drought, and the presence of an invasive plant has stabilised. The presence of precious snowflake (*Leucojum aestivum*) is assessed positively.

The tree layer on the monitoring area No. 2609 is created by young poplars, that had a relatively high coverage in the spring, but the long-lasting summer water shortage evoked the early shedding of their leaves. The shrub layer on this area is missing. In the stabilised plant undergrowth the neophytic aster (*Aster lanceolatus*), the indigenous marshy summer snowflake (*Leucojum aestivum*) and the nitrophilous dewberry (*Rubus caesius*) species have dominated again. However, the absence of floods allowed the return of two invasive plants, but their occurrence is still rare.

The species composition and the coverage values of the tree and shrub layers on the area No. 2612 in recent years are at similar level. However, the coverage value of the herb layer was greatly reduced due to the summer drought and the species number has decreased as well. In the undergrowth the original nitrophilous herbs continue to dominate. Invasive herbs in the evaluated year absented, but invasive woody plant appears in all three layers.

The right-side river branch system

Phytocoenological observations were not carried out.

7.2. Terrestrial molluscs

The left-side river branch system

Compared to the previous year the terrestrial mollusc's communities on areas No. 2600, 2603, 2604 and 2612 did not show significant changes. The malacocoenosis on the area No. 2600 still has a character of the driest type of soft (or transitional) lowland forest. Its structure is stable with slight inter-annual fluctuations; in recent years an euryoecious representative, along with high portion of forest mesohygrophilous and euryhygric species, dominates. Still holds, that in terrain depressions survive hygrophilous species with a stable low abundance. Due to the location of the observed site the changes evoked by the flow restoration in the adjacent river arm and subsequent water supply into the part of the monitoring area has not appeared neither in the third year after the completion of these measures.

The terrestrial malacocoenosis on the area No. 2603, which is observed in the gradually closing poplar stand, develops into a taxocoenosis of dryer type soft lowland forest. The dominant presence after the flood in 2013 reached hygrophilous species, but in the evaluated year, probably due to drought, they retreated again, and the presence of mesohygrophilous representatives have increased. The terrestrial malacocoenosis on the area No. 2604 still has a significant wetland character and represents the wettest variant of a floodplain forest, with high species richness and dominance of forest hygrophilous and polyhygrophilous species (along with the presence of rare and scarce wetland species). Signs of ruderalisation are not visible even after forest management interventions in the vicinity during previous years. The malacocoenosis on the area No. 2612 due to regular flooding consists of mixture of hygrophilous, mesohygrophilous and euryecious species in long-term. The polyhygrophilous species, which were brought by the flood in 2013, lost their dominant representation.

The malacocoenoses on areas No. 2608 and 2609 are significantly affected by the clear-cut of the forest stands in previous years. Their development at present reflects the impacts of forest management interventions and the subsequent regeneration of vegetation, not the changed moisture conditions in the area. Signs of the malacocoenosis degradation on the area No. 2608 are significant even after seven years after the reforestation of the area. In the malacocoenosis dominate the euryecious and mesohygrophilous species, while the reappearance of hygrophilous species is still not observed. Regeneration of the malacocoenosis was not registered neither after the flood in 2013, nor after the restoration measures in this region (the supplied amount of water is still not sufficient). Despite this, it is expected that the community can recover in 5-10 years. The situation in the malacocoenosis on the area No. 2609 since the strong flood in 2013 appears to significantly more favourable. At present it is possible to state that the hygrophilous and polyhygrophilous structure of the community gradually returns. Moisture demanding pioneer species, which have been brought here by the flood, have settled, their abundance is gradually increasing, and in the evaluated year started to have dominant representation. At the same time the abundance of the previously dominant forest steppe species decreased (also due to increasing shading of the stand).

The right-side river branch system

The monitoring of terrestrial molluscs was not carried out.

7.3. Aquatic macrophytes

The Danube and the right-side river branch system

Monitoring of macrophytes in the Danube old riverbed was carried out only on Hungarian monitoring sites No. 2 (at rkm 1839) and No. 7 (at rkm 1828), but the observation of these sites is suspended since 2011.

The left-side river branch system

Usually rich vegetation in the through-flowing river arm on the area No. 2603 have been decimated by the strong flood in the year 2013. The development of macrophytes was weak in the following years, in the evaluated year there were five species of different growth forms with low biomass values. The presence of a rare species has been re-confirmed. The development of aquatic vegetation in the dead arm on the area No. 2604 proceeded mostly in aquatic environment. Thanks to the favourable water stage hydrophytes have increasingly developed, but the population of wetland plants remained also preserved. This area is still rich in scarce species. The observed river branch sections No. 1 and 2 on the area No. 2608 were characterized by relatively favourable moisture conditions (resulting from restoration interventions), which enabled the development of rich vegetation consisting mainly of wetland species. The vegetation on the section No. 1 is in terms of the species number and their abundance considerably richer. Usually densely overgrown final section of the river arm (No. 3) was after two years of interruption again richly inhabited by species of the true aquatic vegetation (including rare and invasive species). In all three observed sections of the river arm on the area No. 2612 rich in species and abundant macrophyte vegetation was registered. In the deepest section No. 1 two species of the true aquatic vegetation dominated again, while the vegetation on the two other shallower sections still consisted of mostly wetland species. As a result of long-term uncovering of the bottom on the section No. 2 also annual terrestrial plants have been abundant. In the river arm also protected species survive.

The right-side river branch system

The monitoring of macrophyte vegetation in the Hungarian inundation (on locations No. 4 and 9) and in the flood-protected area (on locations No. 6 and 8) is interrupted since

2012. was not carried out in the evaluated year. The monitoring of macrophytes at present is carried out in the seepage canal at the Locks No. I and II. within hydrobiological assessment of the surface water quality according to the methodology of the Water Framework Directive. According to the actual results the water quality in the seepage canal achieves good ecological status.

7.4. Aquatic molluscs

The Danube

The evaluation of aquatic malacocoenoses in the Danube is based on data provided by the Slovak Party (Slovak observation areas No. 2600, 2608 and 2612). Based on these data the entire stretch of the Danube (derived section and the section downstream of the confluence of the tail-race canal and the Danube old riverbed) has been characterized by poor malacofauna in previous years, while the turning point of decline in species number and abundance was registered in 2005 after an extraordinary expansion of the non-native, invasive river nerite (*Theodoxus fluviatilis*). The gradual disappearance of most species in the following years was probably caused by interaction of several factors (hydrological, trophic, physical and chemical). The malacofauna of the Danube was further regularly composed only by the ubiquistic zebra mussel (*Dreissena polymorpha*). In the previous year enrichment of communities occurred, particularly on the area No. 2600 (the derived section) and on the area No. 2612 (downstream of the confluence), less significantly on the area No. 2608. It can be assumed, that appearing species (mainly species of stagnant or slowly flowing waters) are flushed out from the adjacent part of the inundation area. At the same time, increase in abundance of some appeared species can be observed, but dominant representation still have the above mentioned two non-native species.

The left-side river branch system

Aquatic mollusc communities in the river branch system on the Slovak side are monitored at areas No. 2603 and 2604. On both areas signs of destruction of the malacocoenosis had been registered in the previous period, but after the strong flood in 2013 positive changes have been observed in terms of the development of communities. More significantly it applies for the area No. 2603, which is characterized with suitable conditions for the development of a stabilized mollusc community. At present a gradual increase of species diversity is registered, rises the number of species with a year-round presence and also the abundance of their representatives, while the non-native and ubiquistic species dominates. The gradual destruction of the malacocoenosis on the area No. 2604 is probably caused by the frequent significant decrease of water level and the impact of invasive fish species. However, after the flood in 2013 enrichment of the malacocoenosis can be observed in terms of species richness and abundance of molluscs (in the evaluated year already less significantly). The dominant presence has been achieved by ubiquistic species, or the native eurytopic representative.

The right-side river branch system

The monitoring of aquatic molluscs was not carried out.

7.5. Dragonflies (Odonata)

The Danube

The macrophyte vegetation in the coves of the riparian zone of the Danube old riverbed on areas No. 2600 and 2608 provide suitable habitat for dragonfly communities. However, the odonatocoenoses are very poor in species and abundance in long-term, with frequent absence of representatives, or the whole community in the individual samples. Dragonflies on the location No. 2600 in the evaluated year were registered only in autumn, when two stagnicolous and one semirheophilous species were recorded. The odonatocoenosis on the area No. 2608 was formed by two semirheophilous species, which were collected only during summer.

The left-side river branch system

Diverse and very rich community was again registered in the river arm on the area No. 2603, proving the variety of the habitat. In odonatocoenosis in the evaluated year eurytopic and stagnicolous species dominated, but rheophilous representatives were also present. After the flushing of the dead arm on the area No. 2604 in 2013 the odonatocoenosis was enriched and the high number of species is retained. The river arm belongs to valuable habitats. The community is formed mainly of species typical for overwarmed waters and eurytopic representatives. The monitoring of dragonflies at Foki weir on the area No. 2608 was restored in the previous year after almost a ten-year break. In the species-rich and abundant odonatocoenosis mostly the semirheophilous, stagnicolous and eurytopic species dominate. Diverse habitats (periodic waters, smaller and larger river arms) on the area No. 2612 provide favourable conditions for dragonflies with different ecological demands, including several protected and endangered species. Mainly the imagines arriving from the surrounding area are captured, while the stagnicolous species dominate, but in the evaluated year also an eurytopic species.

The right-side river branch system

The monitoring of odonatocoenosis was not carried out.

7.6. Crustaceans (Cladocera, Copepoda)

The Danube

Evaluation of the development of cladocerans and copepods communities is based on results of the Slovak Party at monitoring areas No. 2600 and 2608, which are situated on the diverted stretch of the Danube. The cladocerans and copepods communities were unstable and poor in species and abundance in the recent period, but after the flood in 2013 they became temporarily richer. Increased species diversity and abundance in the evaluated year has been registered only in the case of cladocerans (at a lower rate also in the case of copepods in the littoral) on the area No. 2600. Both communities were characterized by the dominance of tychoplanktonic species, what is not typical for the Danube.

The left-side river branch system

In terms of the development of cladocerans and copepods communities in the river arm on the area No. 2603 the trend of previous years continues. The copepods community is poorer in species and has not changed significantly. The tychoplanktonic species, that are rinsed out of the richer inhabited overgrown littoral dominate in both communities. After discontinuing of isolation of the dead river arm on the area No. 2604, because of the flood in 2013, the cladocerans and copepods communities became richer and at similar level remained also in the evaluated year. Occurrence of cladocerans indicating higher degree of connectivity of the river arm with the inundation persists. The ratio of the euplanktonic and tychoplanktonic species is currently balanced in both communities. The monitoring area is considered as faunistic important habitat in terms of planktonic crustaceans. The cladocerans and copepods communities on the area No. 2608 were rich in species and abundant also in the evaluated year, conditions in the river arm are satisfactory for the planktonic crustaceans. In both communities the euplanktonic species prevail. Also the occurrence of species with affinity to flowing water persists, while the portion of species bound to macrophytes decreases. After the intensive flushing out of the river arm on the area No. 2612 in 2013 and the likely communication of the river arm with the inundation in the spring of the assessed year the planktonic crustaceans communities with abundance above the average have been registered. Appearance of some species resulted from the extremely hot and dry summer.

The right-side river branch system

The monitoring of planktonic crustaceans was suspended.

7.7. Mayflies and Caddisflies (Ephemeroptera, Trichoptera) and other groups of Macrozoobenthos

The Slovak Party performs the monitoring of mayflies and caddisflies in accordance with the methodology set out in the Agreement 1995. The monitoring methodology for macroinvertebrates (mayflies, caddisflies, dragonflies and aquatic molluscs) according to the Water Framework Directive has been implemented within the monitoring of the quality of surface waters (Part 2 - Surface water quality). The Hungarian Party has not carried out the observation of these groups of biota in the evaluated year, some results, however, are available within the monitoring of surface water quality.

The Danube

The Danube, according to the long-term results of the Slovak Party (monitoring areas No. 2600, 2603, 2608 and 2612), is inhabited by caddisflies and mayflies sporadically and irregularly, however particularly in the upper part of the river enrichment of the caddisfly community may be seen in past 4-5 years. On the area No. 2600 similar tendency in the evaluated year has been proved even in the case of mayflies. The presence of caddisflies in the samples in the evaluated year was basically all year round, the communities were formed mostly by 2-6 (mainly) rheophilous species, some of which achieved increased abundances in autumn. Mayflies on the monitoring area No. 2608 were missing, on the area No. 2612 the only species was captured. The situation on the upstream locations (No. 2600 and 2603) was more favourable, the presence of 4-6 (mostly rheophilous) species has been confirmed. In the frame of the monitoring of surface water quality (Part 2 of this Report) samples of macrozoobenthos in the Danube were taken in five profiles on the Hungarian side. In the evaluated year three profiles were characterized by good ecological status, at one high status was determined and also at one moderate status was recorded.

The left-side river branch system

In terms of mayfly and caddisfly communities, the observed river arms in the left-side inundation area (monitoring areas No. 2603, 2604 and 2612) are very poor in long-term, the presence of representatives in particular samples and years is irregular. Communities most often consist of 1-2 species and achieve (mostly) low abundance. In recent years, however, slight enrichment of the caddisfly community on the area No. 2603 and mayfly community on the area No. 2604 can be seen, particularly in terms of their abundance and stable presence of their representatives during the year:

The right-side river branch system

Communities of mayflies, caddisflies and the other groups of macrozoobenthos on the Hungarian side were not observed in the frame of the joint monitoring of biota. As a part of monitoring of surface water quality (Part 2 of this Report) the macrozoobenthos of the inundation area was sampled only in four water bodies in the evaluated year. The ecological status in three water bodies has been assessed as good, in one area as moderate.

7.8. Fish (Osteichthyes)

The Danube

The evaluation of ichthyofauna in the Danube use to be based on Slovak observation results at monitoring areas No. 2600 and 2608, and Hungarian observation results at monitoring sites No. 10 and 11, but the Hungarian Party have not carried out the monitoring in years 2012, 2014 and 2015. Based on results from Slovak monitoring areas (which already partially do not correspond to eupotamal) it can be stated that the ichthyocoenoses of the diverted stretch of the Danube is stable in recent years, with relatively low species diversity (6-7 species), and with comparable abundance between particular years. Dominant presence achieve eurytopic and non-native invasive species, however native rheophilous species regularly appear in samples.

The left-side river branch system

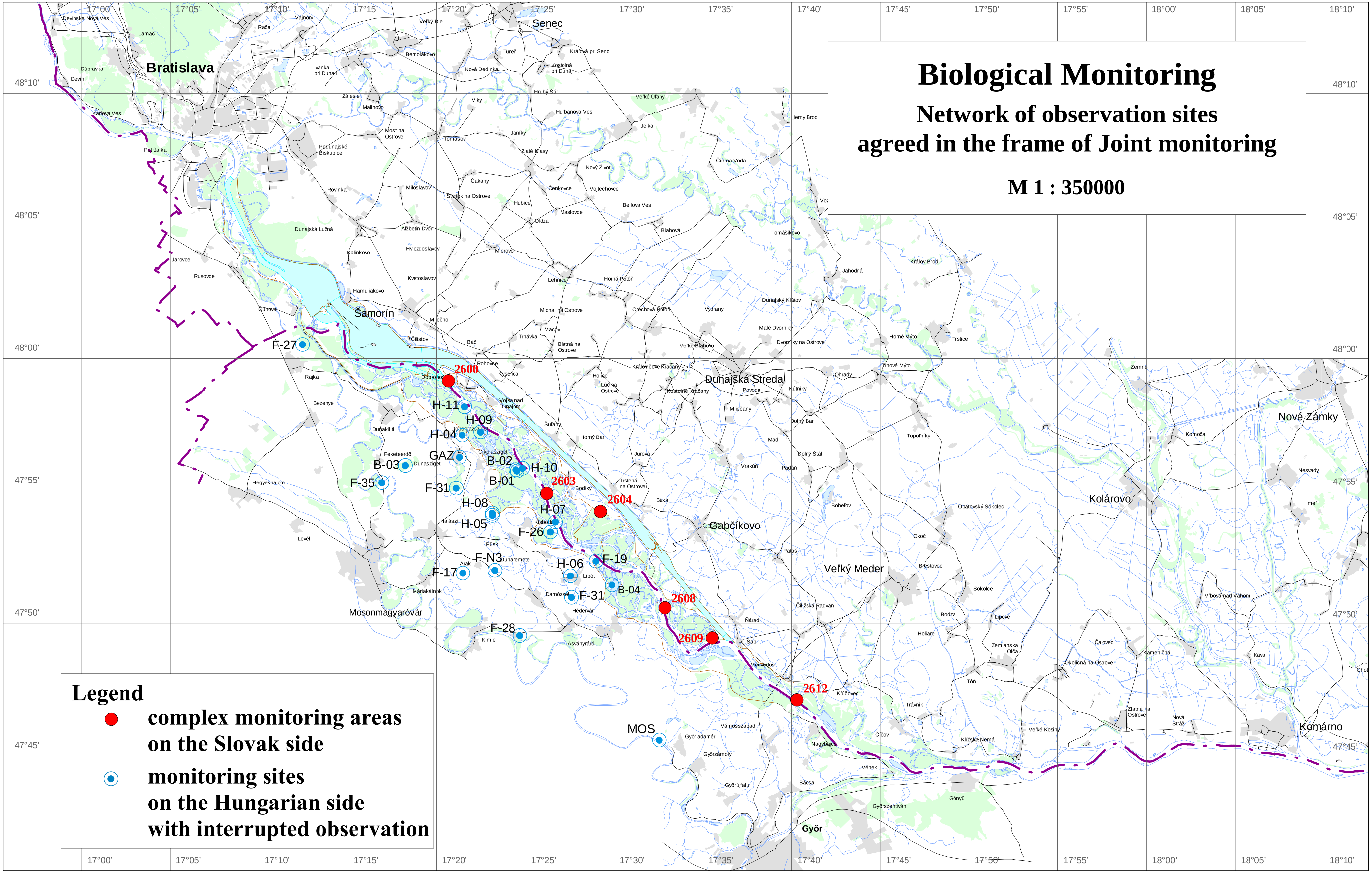
In the stable, rich in species and abundant ichthyocoenoses on the area No. 2603 (water supplying river arm) eurytopic and indifferent species dominate in long-term. Along with them the occurrence of several non-native invasive species have became regular in recent years, but in the evaluated year the dominance of one of them have been registered. The ichthyocoenosis of the dead arm on the area No. 2604, after a temporary status improvement after flushing out in 2012 and 2013, has became poorer in last two years in terms of species number and also abundance of the present species. The dominant position achieve invasive fish species. Majority of present species can survive even at higher water temperature and lack of oxygen.

The development of ichthyocoenosis in river arms on two sub-sites on the area No. 2608 (upstream and downstream of the Foki weir) is significantly affected by the actual water regime. If the observed parts of river arm communicate with the main riverbed the number of species and the abundance of fishes is stable and high. While the water level decreases fishes retreat and also the influence of fish-eating birds is stronger. In the evaluated year surprisingly high number of species, including rheophilous species, have been observed in both parts of the observed river arm. Compared to the previous years the abundance upstream of the Foki weir was slightly higher, while downstream of the Foki weir it was a record high, it exceeded even the value recorded upstream of the weir. Invasive species in both parts of the river arm occur with a stable low abundance, their expansive behaviour is still not observed. The ichthyocoenosis of the shallow muddy river arm on the monitoring area No. 2612 in the evaluated year have been poor in species and abundance, probably also due to fish-eating birds. Temporary enrichment usually occurs after flushing out the river arm.

The right-side river branch system

The observation of ichthyofauna on the Hungarian territory was suspended.

Fig. 7-1



Biological Monitoring
Network of observation sites
agreed in the frame of Joint monitoring
M 1 : 350000
Legend
complex monitoring areas
on the Slovak side
monitoring sites
on the Hungarian side
with interrupted observation
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
2600
2603
2604
2608
2609
2612
F-27
H-11
H-09
H-04
GAZ
B-02
H-10
B-01
B-03
F-35
F-31
H-08
H-05
H-07
F-26
F-N3
F-17
H-06
F-19
B-04
F-28
MOS

PART 8

8.1. Conclusion statements

Based on the results of environmental monitoring in 2015 the following conclusions can be stated.:

1. The gauging station Bratislava-Devín plays a key role in determining the current amount of water to be released into the Danube old riverbed downstream of Čunovo weir. The average annual flow rate at this station in the year 2015 reached 1700 $m^3.s^{-1}$, what represents the second lowest average annual flow rate since 1992. The flow regime of the Danube in the year 2015 did not have a typical course. At the beginning of the year rather significant discharge wave occurred. Increased flow rates, which were so far typical for summer months, occurred from April to June. Flow rates in the Danube from July to November ranged mainly at the level of long-term minimum values occurring during these months. Overall it can be stated, that the average daily flow rates in the Danube most of the year fluctuated significantly below the long-term average daily flow rates. The annual minimum was recorded on December 31, 2015 at 789 $m^3.s^{-1}$, the annual maximum occurred on January 11, 2015 culminating at 5262 $m^3.s^{-1}$.

   Taking into consideration obligations mentioned in the intergovernmental Agreement, the Slovak Party was obliged to release into the Danube riverbed downstream of Čunovo dam an average annual discharge of 336 $m^3.s^{-1}$. Based on measurements carried out at the Doborgaz and Helena gauging stations, the total average annual discharge released to the Danube downstream of Čunovo in the year 2015 was 354 $m^3.s^{-1}$. During the assessed year 2015 did not occurred such a situation, when it would be necessary to release increased discharges (over 600 $m^3.s^{-1}$) into the Danube old riverbed, due to higher flow rates in the Danube (over 5400 $m^3.s^{-1}$). But during the discharge wave in January 2015 flow rate over 600 $m^3.s^{-1}$ was released for two days. If we would apply the reduction in terms of methodology for calculating the average annual discharge, in connection with the higher amount of water released into the Danube old riverbed, we would get an average annual discharge of 353 $m^3.s^{-1}$, which means that the Slovak Party fulfilled the average annual discharge jointly agreed in the intergovernmental Agreement. Some deficiencies were encountered as regards compliance with the minimal discharges during the non-vegetation period, when the deficit of discharge exceeded the acceptable deviation for 89 days. The deficiencies in the winter period had not significant impact on the biota of the area affected.

   Concerning the water amount released into the Mosoni Danube the average annual discharge in 2015 was 33.1 $m^3.s^{-1}$. In the year 2015, technical maintenance of turbines was carried out from late January to early March (44 days) and due to the ongoing construction works on the small hydro-power plant enlargement almost all year round the idle outlets have been alternately closed. With respect to the above mentioned limitations, the total amount of water discharged into the Mosoni Danube was lower than the water amount set out in the intergovernmental Agreement. The Hungarian Party have been informed about the exceptional water discharge into the Mosoni Danube during the construction works by Slovak party at the negotiations of the Nominated Monitoring Agents on December 11, 2014 and in a letter dated April 15, 2015.

2. Compared to the previous years the surface water quality at sampling sites observed in the frame of Joint monitoring has not changed significantly in 2015 and in long-term is balanced. Increase or decrease of concentrations of individual parameters during the observed period appears already in Bratislava, where the quality of water entering the Slovak territory is monitored. Certain observed parameters of surface water quality in the Danube and in the river branch system show seasonal variations, some parameters predominantly depend on the flow rate, others are affected by biochemical processes in the surface water. The fluctuation of quality parameters in the Mosoni Danube and in the seepage canals reflects the different characteristics of these water bodies. The water quality in the Mosoni Danube is influenced by the Danube water and on sampling site at Vének by its tributaries and wastewater from Győr. The water in the seepage canals is influenced mainly by the leaking groundwater.

   The year 2015 was less water bearing, the discharge waves were mostly low and had short duration, what resulted in lower maxima of some parameters that are influenced by flow rate (suspended solids, iron, manganese, phosphates and total phosphorus). Other observed indicators were mostly higher or similar as in the year 2014 (water temperature, specific electric conductivity, other nutrients). The pH values fluctuated in narrower ranges and, apart from two sampling sites, decreased. From among basic cations and anions have slightly increased the contents of sodium, calcium and chlorides, content of other ions were similar as in the year 2014, only in the right side river branch system slight increase of sulphates was recorded. Oxygen conditions in the year 2015 can be classified as very good. The exception was the right side seepage canal, where compared to the previous year slight worsening has been registered in the summer period. The contamination by organic substances expressed by BOD_5 and COD_{Mn} has decreased. Only at the common sampling site in the Mosoni Danube at Čunovo/Rajka higher values of BOD_5 were recorded by the Hungarian Party, while values measured by the Slovak Party were similar as in the year 2014. When analysing the changes in suspended solids content at sampling sites in the Danube, generally it can be stated that the suspended solids content downstream of the reservoir (at Medveďov sampling site) during flood waves is lower than in the Danube at Bratislava, which demonstrates the settling effect of reservoir. Concentrations of heavy metals in 2015 were low, similar or lower than in 2014 and comply with environmental quality standards.

   The fluctuation of surface water quality parameters in the right-side river branch system since introducing the water supply in 1995 follows their fluctuation in the Danube. The water quality on the sampling site at Čunovo/Rajka follows the water quality in the Danube, while the water quality in the lower section of Mosoni Danube at Vének (upstream of the confluence with the Danube) is formed by its tributaries and local pollution from settlements. From the long-term point of view, the pollution on this sampling site decreased, but the content of nutrients and the COD_{Mn} values compared to other sampling sites still reaches the highest values. The cleanest water is characteristic for the seepage canals, what results from its groundwater origin.

   The content of chlorophyll-a was significantly lower than in 2014. An exception was the only sampling site in the upper part of the reservoir at Kalinkovo, where two high values they were recorded in April and May. The monitoring of biological quality elements of the surface water in 2015, at jointly observed sampling sites and on sampling sites monitored by the Hungarian Party, was carried out according to the national methodologies and quality schemes for particular biological quality elements, in accordance with the Water Framework Directive. Based on the assessment of phytoplankton, phytobenthos, macrozoobenthos and macrophytes the surface water quality at individual sampling sites was classified into the II. or III. quality class, what corresponds to good or moderate ecological status. Good status was determined on sampling sites in the Danube old riverbed (except Dunaremete), in the Mosoni Danube at Čunovo/Rajka, in the right-side seepage canal at Čunovo/Rajka and in the river branch system. Moderate ecological status was achieved on sampling sites in the Danube at Bratislava and Medveďov, in the Danube old riverbed at Dunaremete and in the Mosoni Danube at Vének.

The evaluation of sampling sites observed only by the Slovak Party was carried out according to the methodology used in previous years. Macrozoobenthos, phytoplankton and phytobenthos were evaluated. The average values of saprobic indexes varied in the range corresponding to β-mesosaprobity, thus to an environment which provides suitable living conditions for a wide scale of organisms. Like in the year 2014, in the case of saprobic index of macrozoobenthos α-mesosaprobity was documented in spring on the sampling site No. 311 in the lower part of the reservoir, but the average value also on this sampling site was at the level of β-mesosaprobity. The phytoplankton development in the evaluated year was weaker. Only on one sampling site (in the upper part of the reservoir at Kalinkovo) increase of the average value of phytoplankton abundance was documented. On other sites the average values have declined significantly compared to the previous year. Limit for the mass development was exceeded three times (in 2014 it was six times). Considering the abundance of phytoplankton, as the key determinant of saprobic index of biosestone, it can be stated that the hydropower plant neither in 2015 had any adverse impact on the level of saprobity.

The contamination of sediments in the influenced area, assessed according to Canadian standard CSQG, on the Slovak territory was slightly higher than in the year 2014, mainly the content of organic substances from the group of PAHs has raised. Significant decrease has been recorded only in the case of copper, which in the previous year on some sampling sites reached the highest values since the start of monitoring. The sediment contamination on the Hungarian territory in the spring was similar as in the year 2014, and in the case of the autumn sampling the heavy metal concentrations were lower than in the fall 2014. Similarly to the previous year the PEL level has been exceeded once, in 2014 it was in the case of mercury, in 2015 in the case of zinc (in both cases on the sampling site in the Mosoni Danube at Vének). Beyond this level, the adverse effects on biological life may occur frequently. Many measured values of organic micro-pollution (mainly on the Hungarian territory) corresponded to the level of uncontaminated natural environment (values <TEL). The concentrations of inorganic and organic micro-pollution, which varied in the range >TEL - <PEL, were closer to the lower limit and corresponded to a state where the adverse effects on biological life occurs rarely. The highest concentrations organic micro-pollution were documented in the upper part of the reservoir and in the right-side river branch system (Ásványi river arm). The highest concentrations of heavy metals were recorded in the lower part of the reservoir and in the Mosoni Danube at Vének. The lowest sediment pollution in 2015 has been documented in the Danube old riverbed at Sap on the Slovak territory and in the right-side seepage canal at Rajka and in autumn in the river branch system (Helena river arm).

Based on long-term observations of water quality entering the influenced area and water quality, which leaves the influenced area, it can be stated that the physico-chemical composition of the Danube water passing through the Gabčíkovo Waterworks basically does not change.

3. Monitoring of groundwater levels in 2015 continued without changes. The groundwater levels in the whole observed area are primarily influenced by surface water levels in the Danube and in the reservoir. Groundwater levels started from an average position at the beginning of the year, and in comparison to the previous year they were higher. Although there occurred a relatively high discharge wave during January, significant increase of groundwater levels have been registered only on objects near the Danube. On most of observation objects decline of groundwater levels continued until end of February. A general increase of groundwater levels began during April, with increasing flow rates in the Danube. At the end of May the second highest discharge wave occurred on the Danube. Its influence on groundwater levels was more significant than it was in January. On a great part of observation objects the highest groundwater levels were registered at the end of May and during June. Due to the gradually decreasing and in general very low flow rates in the second half of the year, the groundwater level on observation objects under the influence of the Danube gradually declined. The lowest groundwater levels on these objects occurred in the winter period In general, the groundwater levels at the end of the year were lower than at its beginning.

   Based on the evaluation of groundwater regime it can be stated that the water supply into the right-side river branch system and into the Mosoni Danube plays an important role in influencing groundwater levels over the Szigetköz region. As a result of measures taken according to the intergovernmental Agreement, the most significant increase in groundwater levels can be seen in the middle part of inundation area, for both, low and average flow rate conditions in the Danube. The increase in the upper part of the Szigetköz region and around the reservoir is reduced due to decrease of permeability of the reservoir bottom. Certain adverse effect also have the changes in sediment transport regime of the Danube, which resulted from measures taken in the Austrian section of the Danube just upstream of Bratislava in recent years. Compared to the previous years, the most significant change in relation to the groundwater level was the completion of the water supply system in the lower part of the Hungarian inundation area. Since completion the water supply system, in the case of low and average flow rate conditions, significant increase of ground water levels can be seen in the river branch system at Ásványráró, which had previously been characterized by decrease. Decrease remained along the Danube old riverbed in a part of the Bagoméri river branch system and in the vicinity of the tail-race canal on the Slovak territory. The groundwater level in this area is adversely influenced by the riverbed erosion in the tailrace canal and downstream the confluence of the tailrace canal and the Danube old riverbed. The groundwater level decline around the reservoir and along the Danube old riverbed originates in the different flow rate discharged into the Danube in 1993 and 2015. This is also the reason, why the groundwater level decline in 2015, against the year 1993, appears in the inland area behind the flood protective dikes.

   Monitoring results in 2015 show, that application of an effective water supply to the river branch system can significantly affect groundwater levels in the inundation area. The results on the other side confirm the need of solving the water supply in the lower part of the inundation area on the Slovak territory, particularly in the case of low and average flow rate conditions. The water supply system in the lower part of the Hungarian inundation area has proved the possibility to improve groundwater levels in this area. The positive influence of the water supply can be further effectively supported by measures applied in the Danube old riverbed upstream of the confluence with the tail race channel. Increase of groundwater levels in the strip along the Danube old riverbed on both sides can only be ensured by increasing the water level in the Danube old riverbed by technical measures implemented in the riverbed. Such measures may improve the overall situation in the whole inundation area on the Hungarian and Slovak territory.

4. The chemical composition of groundwater in water sources on the Slovak territory indicates stable conditions for development of groundwater quality. The quality of groundwater in the monitored water sources mostly satisfies the agreed limits for drinking water. Exceedances of limits occur only on several objects in the case of water temperature, manganese and in some years also in the case of iron. In the evaluated year 2015 the limit value for the water temperature was exceeded once at five monitored water sources. The manganese content exceeded the limit value on the water source at Bodíky in each determination, similarly as in the other years of monitoring. In last two years also on the water source at Kalinkovo all the manganese concentrations has been higher than the limit value. Besides the water temperature and manganese one exceedance of the limit value in 2015 has occurred in the case of iron in the water source at Šamorín and slight exceedance has also been recorded in the case of magnesium in the water sources at Čunovo and Bratislava. Exceedances of limit values in the case of observation objects are more frequent and occur on more objects. The groundwater quality in these objects mostly reflects local influences. Exceedances in 20154 has occurred in the case of ammonium ions, manganese, iron, and water temperature. Concentrations of all other analysed components of groundwater quality in observation objects in the year 2015 meet the agreed limits for drinking water quality.

   The groundwater quality monitoring on the Hungarian territory confirmed the long-term results. The groundwater in the upper part of gravel sediments in Szigetköz is characterised by higher iron and manganese content. Iron and manganese concentrations in most observation wells permanently exceed the limit values. On these objects also concentrations of indicators reflecting local pollution, which is of agricultural origin or it originates from sewage ponds, are higher. High contents in the case of ammonium ions, phosphates and occasionally nitrates, which exceed the limit value, are registered only at certain observation objects. The organic pollution mostly meets the limit value. During the monitoring in some objects time-to-time occurred values exceeding the limit value. In the evaluated year increase of organic pollution has been recorded in two objects Exceedances in some objects are recorded also in the case of water temperature, calcium and magnesium.

   The groundwater quality in deeper horizons in Szigetköz is monitored by wells used for drinking water supply. Iron and manganese concentrations are lower in wells, where water is drawn from a greater depth. In the region at Győr the iron and manganese contents exceed the drinking water quality limit values or oscillates around them. The water extracted in the northern part of the Szigetköz is of satisfactory quality and the groundwater quality is characteristic by high stability. In general, the groundwater quality in wells producing potable water (occasionally after pre-treatment) is suitable for drinking water supply.

Inorganic and organic micro-pollution of groundwater is monitored at selected observation objects on the Hungarian and Slovak territory. From among the organic micro-pollution on the Slovak territory in 2015, the highest limit value has been exceeded in the case of one pesticide. Other indicators of the organic and inorganic micro-pollution were found in concentrations below the limit values for groundwater quality evaluation. On the Hungarian territory the organic micro-pollution in 2015 was found in concentrations below the limit values for groundwater quality evaluation. From among the inorganic micro-pollutants the concentrations of copper, nickel, chromium and cadmium in certain objects indicate slight pollution. In the case of arsenic exceeding of the highest limit value was found.

5. In the year 2015 the soil moisture monitoring on the Slovak side continued without changes. Monitoring of soil moisture on the Hungarian side is currently suspended and has not been implemented for the third year. Measurements were carried out in the floodplain area and at agricultural sites in the flood-protected area. The soil moisture content in the winter period started at relatively high level and until the end of the winter period were more or less stagnant. Since the beginning of the growing season the soil moisture content began to decline and on most of monitored sites it has been decreasing almost without interruption until mid-October. A short interruption of the soil moisture content decrease occurred in May during the discharge wave, when the increased ground water level moisturized the deeper soil layers. The soil moisture content in the upper soil layers on most of observation sites has been influenced only by climatic conditions.

   Regarding the soil moisture development at monitoring sites located on agricultural area on the Slovak side, it can be stated that the soil moisture content during the entire observation period runs similarly. Since 2004, slight increase of the soil moisture content can be seen, while the groundwater level position and fluctuation remained mostly unchanged. Since 2011, however, slight decrease of groundwater level can be seen, what was reflected in a decline of soil moisture content in the depth interval 1-2 m below the surface. In last two years, the decline in soil moisture content more significantly appears also in the depth interval 0-1 m, what probably relates to the absence of larger and more longer-lasting flood or discharge waves. Similarly to the previous year the fluctuation of soil moisture content in 2015 in both depth intervals have been depended on climatic conditions. The groundwater level, even during discharges waves on the Danube, did not influenced the soil moisture in layers to the depth of 2 m. The minimal average values of the soil moisture content were recorded from end of August to October, the maximal values occurred from January to March.

   The soil moisture in the inundation area, along with the groundwater level and precipitations, is highly dependent on natural or artificial floods. Since no flood or significant discharge waves occurred in the last two years, it has been reflected in a significant decline in moisture content in the soil, especially at sites that were previously influenced by the ground water level. Precipitations and the discharge wave in January 2015 created a relatively good conditions before the growing season, despite lower precipitations and low flow rates on the Danube in February and March. Since the beginning of the growing season the soil moisture content began to decline and on most of monitored sites it has been decreasing almost without interruption until mid-October. A short interruption of the soil moisture content decrease occurred in May during the discharge wave, when the increased ground water level on most of locations moisturized the soil layers also in the depth interval 1-2 m. The soil moisture in the upper soil layers on most of monitoring sites has been influenced only by climatic conditions. The occurrence of minimal and maximal values differed according to the prevailing influence (flow rates, precipitations, water supply), but in general it can be stated that the maximal values occurred at the beginning of the year in January and February or in May and the minimal values were characteristic for the period from late august till the end of the year.

6. In accordance with the intergovernmental Agreement the Slovak Party also in the year 2015 observed the development of basic growth parameters, weekly girth growth and the health state of trees by terrestrial way. Aerial imagery of the health state of forest stands is carried out in three-year intervals, in the evaluated year was not carried out. The development of most forest stands in the evaluated year did not show significant differences in comparison with the previous years, despite the absence of floods and less favourable hydrometeorological conditions. The height increment quality classification in most of observed forest stands remains basically unchanged. Majority of stands is characterized by intense or moderate growth. Compared to the previous year at all areas lower increments have been registered in the evaluated year. Unlike the previous year multiple occurrence of zero weekly girth growth has been recorded. Zero increments in a small number were registered basically on all areas. The observed cultivated poplar stands were without changes healthy and vital. Still it is registered only isolated infestation of trees by diseases and pests. Due to the occurrence of certain weather conditions increase of foliar pests basically in the whole region has been observed in the evaluated year.

   The forest monitoring in the Szigetköz area in the previous year has been carried out under the INMEIN project, which introduced a new approach. Instead of obtaining dendrometric characteristics of forest stands at permanent monitoring areas, the areas for observation were randomly selected from layers into which the forest departments were classified according to type and age. In the evaluated year however, the Hungarian Party provided no forest monitoring data.

7. The biological monitoring consists of agreed groups of plants and animals. In the year 2015 it was performed only on the Slovak territory. The monitoring on the Hungarian side has been suspended in full extent, similarly as in 2012 and 2014.

   In the uppermost part of the Slovak inundation area positive changes in last three years can be observed, resulting from restoration interventions carried out. In the evaluated year disintegration of the poorly developed tree layer had been registered again. The shrub layer continues to dominate. In line with the expectations, the synanthropic species in the dense herb layer, that appeared after disruption with restoration works, have receded. The significant summer drought however, has caused also a retreat of newly appeared wetland and hydrophilic species. Phytocoenoses on other monitoring areas can be considered stable. On areas where forest management interventions has been applied, formation of the tree layer further continues, and gradual retreat of synanthropic and invasive species is registered. On other areas the persistence of current trends, dominance of native nitrophilous species and retreat of ruderal species, can be confirmed. On all observed sites the coverage value of the herb layer was greatly reduced due to the summer drought and the species number has decreased as well.

   Compared to the previous year the terrestrial mollusc's communities did not show significant changes. In the uppermost part of the inundation the malacocoenosis has a character of the driest type of soft lowland forest. On the areas in the middle of inundation area several hygrophilous species have significant share in the malacocoenosis, but in the evaluated year, probably due to drought, they retreated and the presence of mesohygrophilous representatives have increased. The malacocoenoses on areas in the lower part of the inundation, where clear-cut was done, are still significantly affected. On one of these sites regeneration of the malacocoenosis was not registered neither after the flood in 2013, nor after the restoration measures in this region.

Usually rich vegetation in the through-flowing river arm have been decimated by the strong flood in 2013. The development of macrophytes in the evaluated year was still relatively weak, several species of different growth forms with low biomass values has been recorded. The development of aquatic vegetation in the dead arm proceeded in aquatic environment. Thanks to the favourable water stages hydrophytes increasingly developed, but the population of wetland plants remained also preserved. This area is still rich in scarce species. In the downstream part of the inundation area rich in species and abundant macrophyte vegetation was registered.

According to the monitoring data the entire stretch of the Danube is characterized by poor aquatic malacofauna in recent years. The turning point of decline in species number and abundance was registered in 2005 after an extraordinary expansion of the non-native, invasive river nerite (*Theodoxus fluviatilis*). The gradual disappearance of most species was probably caused by interaction of several factors. In the evaluated year only the ubiquistic species *Dreissena polymorpha* has got regular and abundant occurrence in the Danube. Aquatic mollusc communities in the river branch system on the Slovak side are monitored on two areas. On both areas signs of destruction of the malacocoenosis had been registered in the previous period, but after the strong flood in 2013 positive changes have been observed in terms of the development of communities. At present a gradual increase of species diversity is registered, rises the number of species with a year-round presence and also the abundance of their representatives.

Dragonfly communities in the Danube old riverbed are very poor in species and abundance in long-term, with frequent absence of representatives in the individual samples. In the river branch system diverse and very rich dragonfly communities were registered again, proving the variety of habitats. The high number of species since 2013 has been retained also in the evaluated year. The community is formed mainly of eurytopic representatives and species typical for overwarmed waters. The lower part of the inundation area also provide favourable conditions for dragonfly species with different ecological demands, including several protected and endangered species. In the evaluated year stagnicolous representatives dominated.

The cladocerans and copepods communities in the observed stretch of the Danube, according to the Slovak results, were unstable and poor in species and abundance in the recent period, but after the flood in 2013 they became temporarily richer. Both communities were characterized by the dominance of tychoplanktonic species, what is not typical for the Danube. The development of cladocerans and copepods communities in the river branch system shows that the trend of previous years continues, the species compositions of communities has not changed significantly, the tychoplanktonic species dominate. Appearance of some species resulted from the extremely hot and dry summer.

The mayflies and caddisflies in the observed stretch of the Danube, according to the Slovak results, occur sporadically and irregularly, however particularly in the upper part of the river enrichment of the caddisfly community may be seen in past 4-5 years. The presence of caddisflies in the samples in the evaluated year was basically all year round, the communities were formed mostly by rheophilous species. The mayfly and caddisfly communities in the left-side river branch system are very poor in long-term. The presence of their representatives in particular samples and years is irregular. Communities most often consist of 1-2 species and achieve low abundance. However, after the flood in 2013 slight enrichment can be seen.

The evaluation of ichthyofauna in the Danube used to be based on two monitoring areas on the Slovak and Hungarian territory. The Hungarian Party, however, have not carried out the monitoring in years 2012, 2014 and 2015. Based on results from Slovak monitoring areas it can be stated that the ichthyocoenoses of the diverted stretch of the Danube is stable in recent years, with relatively low species diversity (6-7 species), and with comparable abundance between particular years. Dominant presence achieve eurytopic and non-native invasive species, however native rheophilous species regularly appear in samples. The development of the ichthyocoenoses in the left-side inundation area in the evaluated year was stable, with the dominance eurytopic and indifferent species in long-term. Occurrence of non-native invasive species have became regular in recent years. The ichthyocoenosis of the observed dead arm has became poorer in last two years in terms of species number and also abundance of the present species. The dominant position achieve invasive fish species. The development of ichthyocoenosis in the river arms at Foki weir is significantly affected by the actual water regime. If the observed parts of river arm communicate with the main riverbed the number of species and the abundance of fishes is stable and high. While during the water level decline, decrease of fish species number and their abundance is also registered.

8.2. Proposals

Proposals given in this chapter will be obligatory for both Parties and do not require further approval when the actual Joint Annual Report is approved and signed by Nominated Monitoring Agents.

1. Both Parties, on the basis of background documents, will elaborate a joint proposal on optimisation of the monitoring, carried out under the Intergovernmental Agreement of 1995, and shall submit it to the Nominated Monitoring Agents for approval.

APPENDIX A.1.

AGREEMENT
BETWEEN THE GOVERNMENT OF THE SLOVAK REPUBLIC AND GOVERNMENT OF THE REPUBLIC OF HUNGARY CONCERNING CERTAIN TEMPORARY TECHNICAL MEASURES AND DISCHARGES IN THE DANUBE AND MOSONI BRANCH OF THE DANUBE

The Government of the Slovak Republic

and

the Government of the Republic of Hungary

have agreed as follows:

Article 1

1. Immediately following the conclusion of this Agreement, the Slovak Party will increase the discharge of water through the intake structure at Čunovo into the Mosoni branch of the Danube to 43 m3/s subject to hydrological and technical conditions specified in Annex 1 to this Agreement. This value includes the flow of water through the seepage canal on the right side of the reservoir from Slovak territory into Hungarian territory.

2. The competent Slovak and Hungarian authorities shall take all necessary measures on their respective territories to enable the continuous flow of the increased discharge of water from Slovak territory into Hungarian territory.

3. The water will be distributed, on Hungarian territory, between the branch system on the right side of the Danube, the protected area and the Mosoni branch of the Danube.

Article 2

1. The day following the conclusion of this Agreement the discharge into the main riverbed of the Danube below the Čunovo weir will be increased to an annual average of 400 m3/s, in accordance with the rules of operation contained in Annex 2 to this Agreement. Discharges entering the main riverbed of the Danube through the inundation weir are excluded from the average calculation.

2. During the construction of the weir pursuant to Article 3 the discharge into the main riverbed of the Danube below the Čunovo weir will be regulated in accordance with Annex 3 to this Agreement.

Article 3

1. There will be a weir partly overflowed by water and constructed by the Hungarian Party in the main riverbed of the Danube, at rkm 1843. The main parameters of the weir are specified in Annex 4 to this Agreement.

2. The Parties undertake to ensure the issuance, without delay, of the administrative authorization required by their respective national legislation for the construction and maintenance of the weir in accordance with this Agreement.

3. The costs of the construction and maintenance of the weir will be borne by the Republic of Hungary.

4. The construction of the weir will begin not later that 10 days following the conclusion of this Agreement and is anticipated to be completed within a period of 50 days from the commencement of works.

Article 4

The Parties undertake to exchange those data of their environmental monitoring systems operating in the area that are necessary to assess the impacts of the measures envisaged in Articles 1-3. Collected data will be regularly exchanged and jointly and periodically evaluated with a view to making recommendations to the Parties. The observation sites, parameters observed, periodicity of data exchange, the methodology and periodicity of joint assessment are contained in Annex 5 to this Agreement.

Article 5

1. In the event that either Party believes the other Party is not complying with this Agreement, and f[illegible] to persuade the other Party that it is in breach, the Party may invoke the good offices of the Commission of the European Union and both Parties agree to give close cooperation to the Experts of the Commission and to take duly into consideration any opinion rendered by them.

2. If, for whatever reason, the good offices are not provided or are unsuccessful and the material breach continues to exist, the Party affected will be entitled to terminate this Agreement with a one month notice.

Article 6

This Agreement has a temporary character, pending the judgment of the International Court of Justice in the case concerning the Gabčíkovo-Nagymaros Project and is without prejudice to existing rights and obligations of the Parties as well as to their respective positions in the dispute before the Court and, in any event, unless otherwise agreed, it shall terminate 14 days after the judgment of the International Court of Justice in the case concerning the Gabčíkovo-Nagymaros Project.

Article 7

On the termination of this Agreement and unless otherwise agreed or decided, Hungary shall at its own expense remove the weir referred to in Article 3.

Article 8

This Agreement shall enter into force on the date of its signature.

Done at Budapest on the .19.. day of April, 1995, in duplicate, in the Slovak, Hungarian and English languages, the English text to prevail in the event of any discrepancy.

For the Government
of the Slovak Republic

For the Government
of the Republic of Hungary

Annex No. 1

Hydrological and technical conditions for the increase of the discharges into the Mosoni Danube

1/ The increase of the discharge into the Mosoni Danube and into the right side seepage canal of the Hrušov reservoir from 20m^3/sec up to 43 m^3/sec will be ensured subject to the following hydrological and technical conditions:

1.1 Provided that minimum difference between the water-level of the Mosoni Danube and the Hrušov reservoir is 5.10 m.

1.2 Provided that the minimum water level of the Hrušov reservoir is 130.40 m above sea level.

1.3 Provided that the water-level of the Mosoni Danube does not exceed 125.30 m above sea level.

1.4 Provided that the entrances to the intake structure are unobstructed. Whenever the discharges of the Danube exceed 4000 m^3/sec (involving the inundation of the flood-plain), the water-borne materials will move to a greater extent this may restrict the amount of water which can be provided.

1.5 Provided that there is no failure in the electricity network system. If the network system is damaged or in the event of any other failure of the generating capacity, the energy system will turn off automatically and the capacity of the intake structure will be reduced to half of the original.

2/ At the request of the Hungarian party the Slovak party will moderate the discharge for a period specified by the Hungarian party.

The selected site for the measuring of the discharge of the Mosoni Danube is a gauge at 0.160 km on the left bank of the canal on the territory of the Slovak Republic. The selected site for the measuring of the discharge of the right side canal of the Hrušov reservoir is on the regulating weir at 1.100 km on the territory of the Hungarian Republic.

Annex No.2

Rules of operation

The volume of water discharged through the Čunovo weir into the main river bed of the Danube to correspond to the annual average of 400 m^3/sec.

The annual average discharge in Bratislava corresponds to 2025 m^3/sec. The annual average discharge into the main Danube river bed in each specific year will correspond to the formula:

$$V_{Danube} = \frac{(V_{Devin} \times 400)}{2025}$$

where V_{Devin} is the average yearly discharge in the Devín profile in the specific year.

V_{Danube} is the average yearly discharge to the main Danube river bed in the specific year.

- During the growing season the discharge into the main river bed will be higher than during the dormant season.
- The discharge into the main river bed of the Danube will correspond to actual discharges in the Devin profile.
- The discharges released through the inundation weir during flood will not be included in the calculation.

The discharges in the Devin profile together with the corresponding discharges at the Čunovo weir.

January		February		March		April		May		June	
600	250	600	250	600	250	600	400	600	400	600	400
2200	250	2000	250	1500	250	1100	400	700	400	700	400
2300	251	2100	258	1600	250	1200	400	800	400	800	400
2400	273	2200	280	1700	271	1300	400	900	400	900	400
[illegible]00	295	2300	301	1800	392	1400	400	1000	400	1000	418
2600	317	2400	323	1900	314	1500	400	1100	400	1100	440
2700	339	2500	345	2000	336	1600	400	1200	400	1200	462
2800	360	2600	367	2100	358	1700	400	1300	400	1300	483
2900	382	2700	389	2200	380	1800	400	1400	405	1400	505
3000	404	2800	410	2300	401	1900	414	1500	427	1500	527
3100	426	2900	432	2400	423	2000	436	1600	449	1600	549
3200	448	3000	454	2500	445	2100	458	1700	471	1700	571
3300	469	3100	476	2600	467	2200	480	1800	592	1800	592
3400	591	3200	498	2700	489	2300	501	1900	514	1900	600
3500	513	3300	519	2800	510	2400	523	2000	536	4600	600
3600	535	3400	541	2900	532	2500	545	2100	558		
3700	557	3500	563	3000	554	2600	567	2200	580		
3800	578	3600	585	3100	576	2700	589	2300	600		
3900	600	3700	600	3200	600	2800	600	4600	600		
4600	600	4600	600	4600	600	4600	600				

July		August		September		October		November		December	
600	400	600	400	600	250	600	250	600	250	600	250
700	400	900	400	1100	250	1500	250	1800	250	2000	250
800	400	1000	400	1200	262	1600	250	1900	264	2100	258
900	400	1100	400	1300	283	1700	271	2000	286	2200	280
1000	400	1200	400	1400	305	1800	292	2100	308	2300	301
1100	400	1300	400	1500	327	1900	314	2200	330	2400	323
1200	400	1400	400	1600	349	2000	336	2300	351	2500	345
1300	400	1500	400	1700	371	2100	358	2400	373	2600	367
1400	405	1600	400	1800	392	2200	380	2500	395	2700	389
1500	427	1700	421	1900	414	2300	401	2600	417	2800	410
1600	449	1800	442	2000	436	2400	423	2700	439	2900	432
1700	471	1900	464	2100	458	2500	445	2800	460	3000	454
1800	492	2000	486	2200	480	2600	467	2900	482	3100	476
00	514	2100	508	2300	501	2700	489	3000	504	3200	498
2000	536	2200	530	2400	523	2800	510	3100	526	3300	519
2100	558	2300	551	2500	545	2900	532	3200	548	3400	541
2200	580	2400	573	2600	567	3000	554	3300	569	3500	563
2300	600	2500	595	2700	589	3100	576	3400	591	3600	585
4600	600	2600	600	2800	600	3200	600	3500	600	3700	600
		4600	600	4600	600	4600	600	4600	600	4600	600

The capacity of the by-pass weir when open under conditions of a minimum water level in the reservoir (which is 128.2 m above sea level), is 290 m^3/sec. The discharge of 400 m^3/s can be assured under the condition that the water level in the reservoir is 128.45 m above sea level, and 600 m^3/sec under conditions of a water level of 129.05 m above sea level.

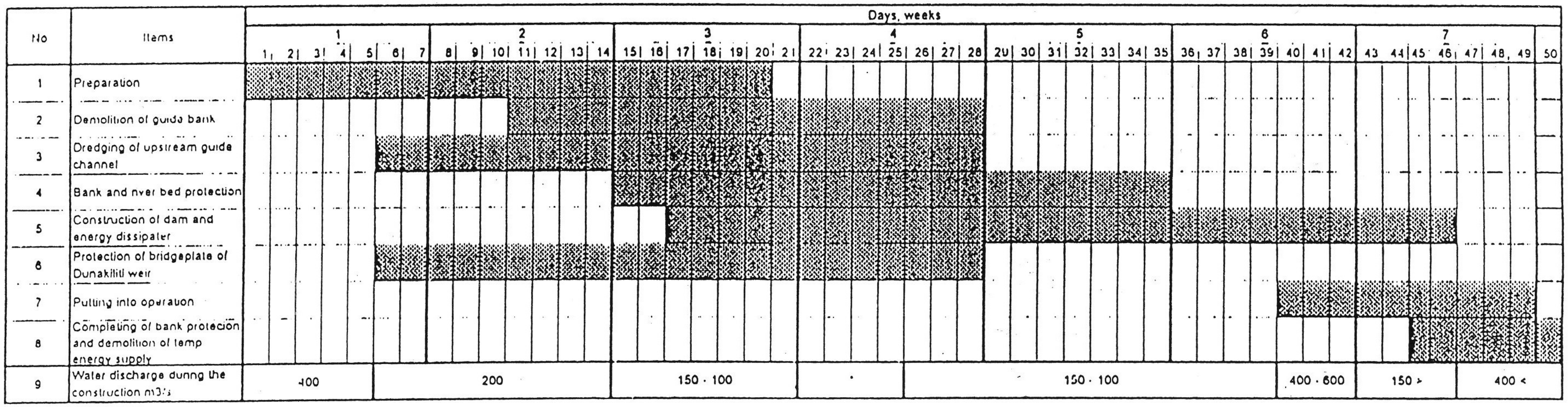
The water level in the reservoir is lowered only when required for construction or reparation works or when the discharge in Devín is below 925 m^3/s.

The possible differences in discharges which will be ascertained through monitoring by 31 Oct. will be adjusted within the shortest possible period by the end of the same year so that the average of 400 m^3/sec is attained.

The changes in the discharges through the Čunovo weir will occur at intervals of 200 m^3/sec. measured at the Devín site. Thus for instance at 800, 1000, 1200, 1400.... 2000, 2200 m^3/sec.

This distribution of the water resources shall be in force for 1995 and will be adjusted before the 1996 growing season on the basis of the results of a joint evaluation of the monitoring.

Time table of planned underwater weir's construction at rkm 1843



* ecological minimum 50 m3/s

Annex No III.

* Main parameters of the weir to be constructed at rkm 1843 of the Danube·

1. The weir which is partly overflowed by water will be constructed at rkm 1843 of the Danube.

2. Main parameters of the weir:

width between banks	300 m
width of the crest	5 m
width of the overflowed section	100 m
height of the center point of the overflowed section	121.80 B.s.l.
gradient of the downstream slope	1 : 10
gradient of the upstream slope	1 : 3

3. The elevation of the weir crest will be established in such a way that at the discharge of 600 m^3/s, the backwater at rkm 1851.7 of the Danube and elevation of 124.00 Bsl would not exceed.

4. The water level regulation at rkm 1843 take place when the discharge of the Danube is between 250-1300 m^3/s.

5. A maximum quantity of 150 m^3/s will be discharged into the right side branch system on the Hungarian side.

Based on the documentation approved under the number
No. VOD 161/A 28/1993-V
No. 21.663/17/1993

Annex No. 5

Matters relating to monitoring of environmental impacts .

Monitoring is divided into the following monitoring items:

Monitoring of surface water levels and discharges

the Danube:
profile at Devín
profile at Medveďov
profile at Komárno - Komárom
profile at Štúrovo - Esztergom
p file at Rajka
profile at Dobrohošť
profile at Dunaremete
profile downstream and upstream of overflowed weir at rkm 1843, (water level only)
Reservoir at Čunovo and the Danube downstream and upstream of the by-pass weir (water level only)
Reservoir at Gabčíkovo (water level only)
Tailrace canal downstream of Gabčíkovo (water level only)

Malý Danube:
at Bratislava
at Trstice

Mosoni Duna:
downstream of the intake structure at Čunovo
at Mecser
at Györ

Structures at Rajka
Seepage canal at Čunovo (on the Slovak territory)
No. 1. Lock of the outlet
No. 2. Lock of the water level control
No. 6. Lock of the water level control - Mosoni Duna
No. 1. Lock of the side branch Kility - Cikolai, Zátonyi Duna
No. 5. Lock at the seepage canal

Frequency of measurements: continuous on a daily basis

Monitoring of surface water quality

the Danube:
- upstream Bratislava *
- at Dobrohošt

at Gabčíkovo
at Medveďov *
at Gönyü
at Komárno - Komárom
at Štúrovo - Esztergom

Reservoir, bypass canal, seepage canals, river branches:

- upper part of the reservoir at Rusovce *
- the reservoir at Kalinkovo (left and right side)
- downstream of Mosoni Danube the intake structure
- the profile at Šamorín (left, middle and right side)
- the power canal at the ferry station
- the tailwater canal downstream of Gabčíkovo *
- the seepage canal at Čunovo *
- the seepage canal at Hamuliakovo
- the Mosoni Duna at Rajka
- the Mosoni Duna at Mecser
- the Mosoni Duna at Vének
- the Malý Dunaj at Kolárovo
- the river branches Helena and Doborgaz
- the Šulianske river branch

Frequency of measurement:
- stations marked by * - 12 times per year, between the 10th and 20th of each month,
- all other stations in: January, March, April, May, June, July, September, November, between the 10th and 20th of each month.

List of parameters:
- temperature, pH value, conductivity at 25°C, O_2
  cations: Li, Na, K, Ca, NH4, Mn, Mg, Fe
- anions: HCO3, Cl, SO4, NO3, NO2, PO4, P
- trace elements: Hg, Zn, As, Cu, Pb, Cr, Cd Ni, Vanadium
- COD, BOD, dissolved materials (mineralization)
- biological parameters: Saprobility index, bioseston, chlorophyll,
- number of algae, zooplancton, macrobenthos, according to the decision of the monitoring group,
- microbiological parameters, coliform bacteria, mezophilic bacteria, psychrophilic bacteria
- organic matters, TOC, Nonpolar extractable - UV, - IR, EOX, AOX, phenols, humic acids,
- organic micropollutants, polyaromatic hydrocarbons, - polychlorobiphenyls (and others, to be agreed)

Sediments:
- at jointly selected stations, e.g. at places of surface water quality sampling,
- three places in the Slovak and three in the Hungarian flood plain

Extent of parameters:

granulometric curves, organic matters and other selected parameters

Frequency of measurement: once per year in autumn

Monitoring of ground water levels

Monitoring of ground water levels will be carried out on wells between the Malý Danube and the Lajta - Mosoni Danube. Wells to be chosen in profiles based on maps containing all observation wells. [At least at 150 wells on the Slovak territory and at least at 100 wells on the Hungarian territory to be chosen.]

Frequency of measurement: once per week

Monitoring of ground water quality

Ground water quality will be monitored on the municipal water supply [and ground water] wells between the Malý Danube and the Laita - Mosoni Danube, [at least 10 localities on each territory. In addition to this other at least 10 selected ground water quality wells on each territory] should be monitored. These wells should be those which satisfy hygiene criteria for drinking water wells and sampling should be commonly agreed.

Frequency of measurement: once per month.

Quality should be evaluated according to the standards for drinking water in force in both countries.

Monitoring of soil moisture (aeration zone)

[At least 10] monitoring areas to be selected on each territory from among the localities already monitored.

Frequency of measurement: once every 10 days, but in winter (November, December, January and February) twice a month. Each locality should also include a ground water level monitoring well.

Monitoring of biota:

- microbenthos and macrobenthos in the Danube and river branches at places of water level measurements
- fish, in all surface waters
- [Forestry, on at least 8 selected places from among existing monitoring localities on each side]
- Special water related organisms as for example: Odonata, Ephemeroptera, Trichopetra, Braconidea and others, jointly selected.

Special monitoring

For the estimation of the impact of the overflowed weir special monitoring to be carried out. This will include measurements of flow velocities, water levels, water quality, micro and macro benthos, sediments, ground water quality in the impounded reach etc.

Submitting of data and reports:

Both sides will use data jointly agreed and will use jointly agreed methods of evaluation. All monitoring items and locations, and methods of measurements to be jointly agreed. Annual reports will include only measured data in tabulated, graphical and map forms with short explanations.

Joint and verification measurements will be carried out at any location where a discrepance occurs.

Data exchange will be carried out at three month intervals. Annual reports to be submitted as joint reports by the end of each calendar year and covering a period of a hydrological year.

Annual reports will be issued in English language with standardised graphical annexes in Hungarian or Slovak languages.

Statute

Monitoring will be carried out in accordance with the Statute of nominated Monitoring Agents.

Statute will be prepared by: Ing Arpád Kovács, Ministry of Environment (Hungary), Ing. Dominik Kocinger, Government plenipotentiary for the GNP (Slovakia)

Draft statute will be prepared jointly following the signing of this document and before 31.May 1995.

Text in square brackets [] contains Slovak proposals subject to agreement by the Monitoring Agents.

APPENDIX A.2.

STATUTE
on the activities of the Nominated Monitoring Agents
envisaged in the

"Agreement
between the Government of Republic of Hungary and
the Government of the Slovak Republic
concerning Certain Temporary Technical Measures and
Discharges in the Danube and the Mosoni Branch of the Danube",
signed on April 19, 1995

According to the Article 4 of the "Agreement between the Government of Republic of Hungary and the Government of the Slovak Republic concerning Certain Temporary Technical Measures and Discharges in the Danube and the Mosoni Branch of the Danube", signed on April 19, 1995 (in the following Agreement) the Parties undertake to exchange data of their environmental monitoring systems operating in the affected area which are necessary to assess the environmental impacts of the measures envisaged in Articles 1-3 of the Agreement.

According to the assignment contained in the Article 4 and Annex 5 of the Agreement, Nominated Monitoring Agents (Representatives of Parties):

Árpád Kovács, Deputy State Secretary of the Ministry for Environment and Regional Policy of Hungary

and

Dominik Kocinger, Plenipotentiary of Government of Slovak Republic for Construction and Operation of Gabčíkovo-Nagymaros Waterworks

agreed on the Statute concerning the exchange of data and joint periodical evaluation thereof (in the following Statute).

Article 1

1. Nominated Monitoring Agents are responsible for the exchange and evaluation of data from the environmental monitoring systems of the Parties which are necessary to assess the environmental impacts of the measures envisaged in Articles 1-3 of the Agreement.

2. The Nominated Monitoring Agents will submit the joint evaluations and proposals prepared periodically to their respective Governments.

Article 2
Data from the environmental monitoring system

1. The monitoring sites, objects and items based on Annex 5 of the Agreement are specified in the Annexes to this Statute. Annex 1 contains monitoring sites, objects and items for the Slovak Republic, and Annex 2 contains monitoring sites, objects and items for Hungary, both Annexes specifying the dates of data exchange.

2. The in situ survey of monitoring sites and objects or joint measurements will be carried out where a discrepancy occurs to measured data, or through agreement by the Nominated Monitoring Agents.

3. The Nominated Monitoring Agents are entitled to change or add a monitoring site, object or item by mutual consent.

4. Exchange of the data is made through the Nominated Monitoring Agents in writing and on magnetic media. The Nominated Monitoring Agents undertake to put at each other's disposal necessary topographical maps (M 1:10000) and any other maps in other scale under mutual agreement.

Article 3
Monitoring evaluation

1. The joint evaluation of exchanged data refers to one hydrological year. The Joint Annual Report will be carried out four months following the respective hydrological year. The Joint Annual Report will be prepared in Slovak, Hungarian and English languages, the English text shall prevail in the event of any discrepancy.

2. The National Annual Report will include the measured data in tabular, graphical and map forms with short explanations. The Parties will exchange National Annual Report three months following the respective hydrological year, and Nominated Monitoring Agents will call a meeting to carry out the joint evaluation of presented data.

Article 4
Activity of Nominated Monitoring Agents

1. Meetings will be held according to need, but at least two times in a calendar year. Meetings are called by both sides alternately. All necessary conditions for a meeting have to be secured by the receiving Party, and the meeting is chaired by the Nominated Monitoring Agent of the receiving Party. Minutes from the meeting will be prepared and will be signed by both Nominated Monitoring Agents.

2. Nominated Monitoring Agents have the right to invite experts to the meetings.

3. When a joint measurements or an in situ site survey will be carried out the receiving Party is obliged to secure all necessary conditions for measurement and access to the monitored site or object, subject to mutual agreement.

4. Meetings of the Nominated Monitoring Agents are to be held in the Slovak and Hungarian languages. Minutes from the meetings are prepared in the Hungarian, Slovak and English languages, the English text will prevail in the event of any discrepancy.

Article 5
Miscellaneous Provisions

1. All expenses connected to the activity of Nominated Monitoring Agents and meetings are covered by the Parties independently. Expenses connected to the preparation of the English version of the Joint Annual Report are covered by the Parties equally.

2. The Nominated Monitoring Agents begin their activities upon the approval of this Statute.

3. This Statute shall terminate with the termination of the Agreement.

4. This Statute is prepared in duplicate, in the Slovak, Hungarian and English languages, the English text will prevail in the event of any discrepancy.

Agreed at Gabčíkovo on 29th May, 1995.

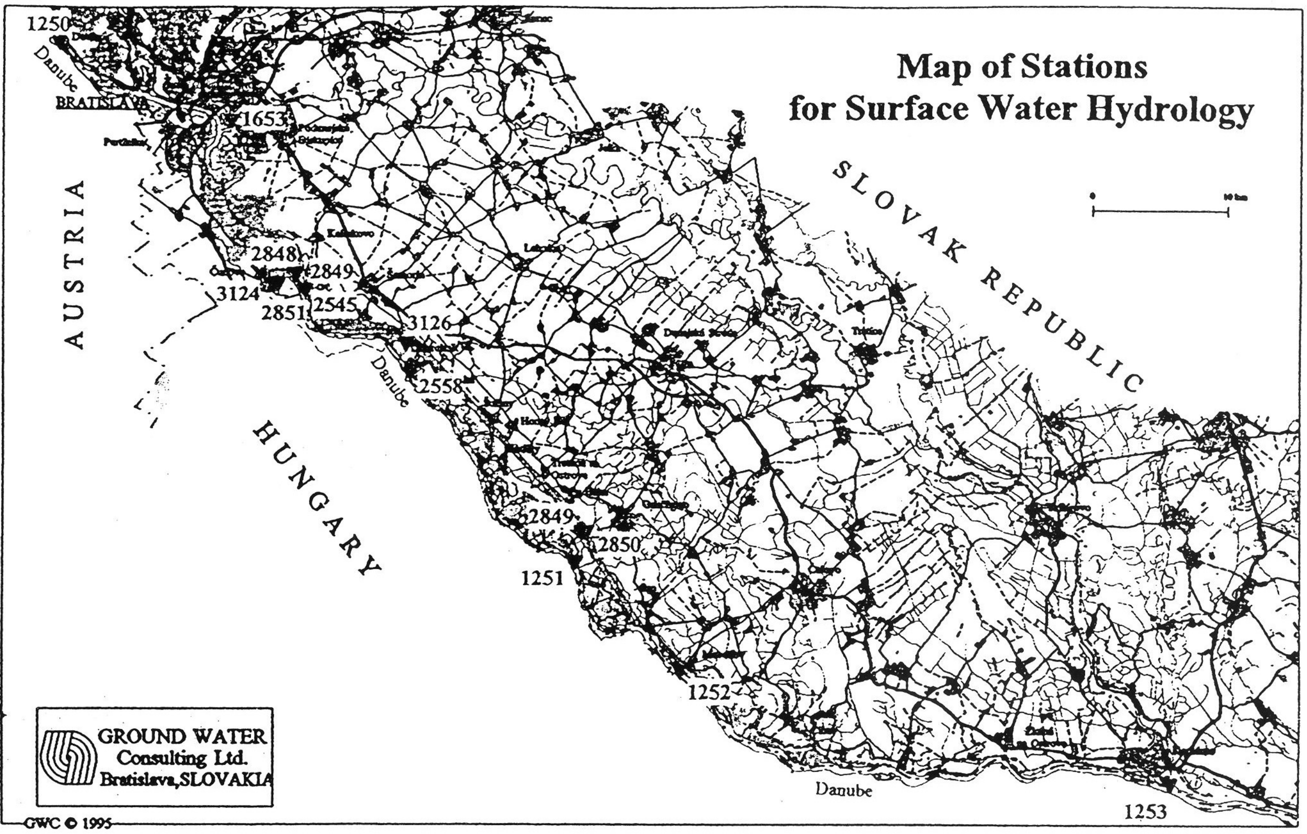
....	....
Kovács Árpád	**Dominik Kocinger**
Nominated Monitoring Agent	*Nominated Monitoring Agent*
of the Republic of Hungary	*of the Slovak Republic*

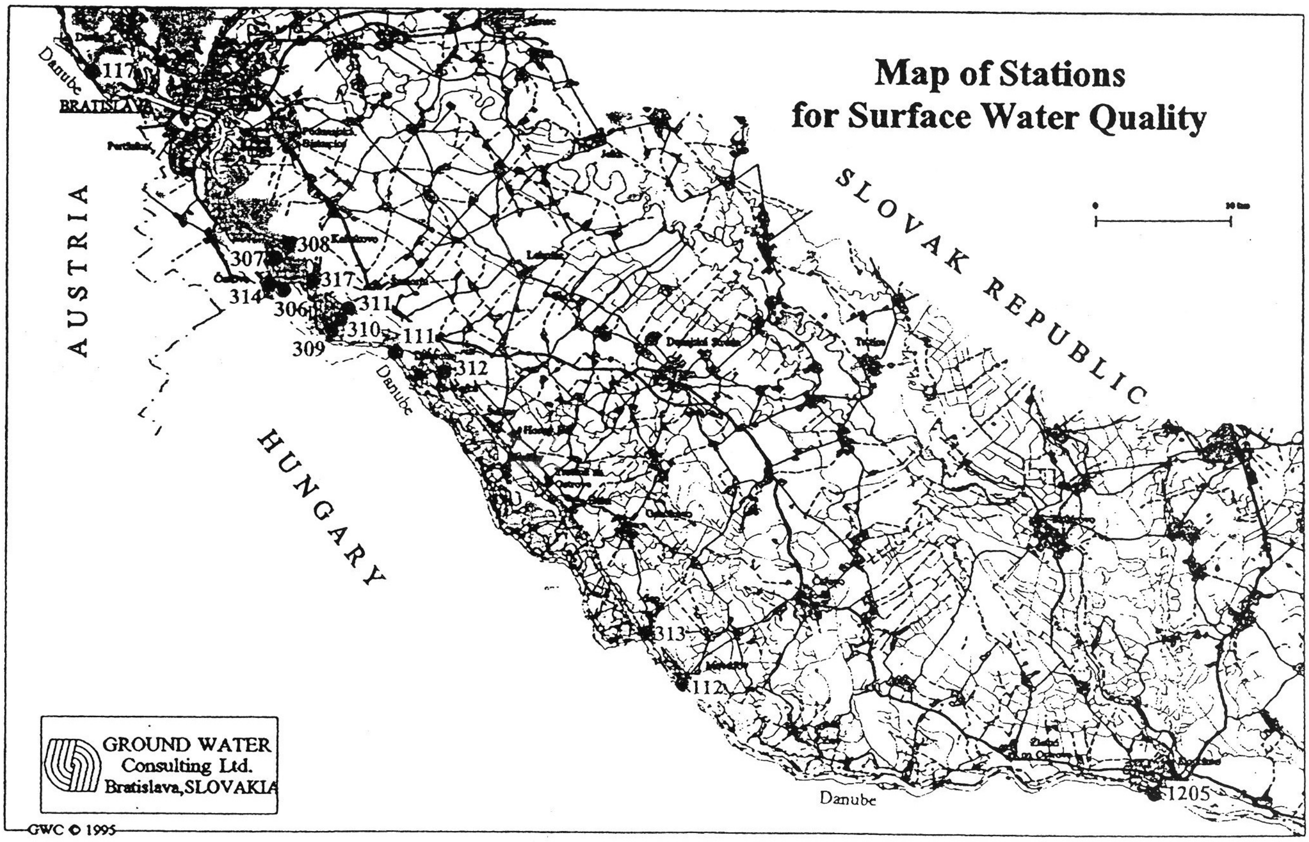
ANNEX 1

Monitoring areas, objects and items

of Slovak Republic

Contents


Map of Stations
for Surface Water Hydrology
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
BRATISLAVA
Danube
Danube
Danube
1250
1653
2848
2849
3124
2851
2545
3126
2558
2849
2850
1251
1252
1253
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995


Map of Stations
for Surface Water Quality
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
BRATISLAVA
Danube
Danube
Danube
117
308
307
317
314
306
311
310
111
309
312
313
112
1205
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995

List of Stations for Surface Water Hydrology

Station No.	Situated on	Location	H	Q	Q - daily average
1250	Danube	Bratislava-Devín	H	Q	Q - daily average
2545	Danube	Hamuliakovo	H	-	
2558	Danube	Dobrohošť	H	Q	Q - daily average
1251	Danube	Gabčíkovo	H	-	
1252	Danube	Medveďov	H	Q	Q - daily average
1253	Danube	Komárno	H	Q	Q - daily average
2848	Danube - Reservoir	By-pass Weir upstream	H	-	
2849	Danube - Old river bed	By-pass Weir downstream	H	Q	
2851	Mosoni Danube	Intake structure at Čunovo	H	Q	Q - daily average
3126	Danube - Power channel	Intake structure at Dobrohošť	H	Q	Q - daily average
2849	Danube - Power channel	Gabčíkovo upstream	H	-	
2850	Danube - Outlet channel	Gabčíkovo downstream	H	Q	
3124	Seepage canal	Čunovo	H	Q	
1653	Malý Danube	Malé Pálenisko	H	Q	Q - daily average

Frequency of measurements:
H - surface water level, measured daily at 7.00 a.m.
Q - surface water discharge, corresponding to measured surface water level at 7.00 a.m.
Q daily average - surface water discharge, evaluated from continuous surface water level measurements

Data exchange:
H,Q - daily
Q daily average - quarterly

Data sheet for Surface Water Hydrology

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Date: DD.MM.YYYY

Station No.	Situated on	Location	Surface Water level (m a.s.l.)	Discharge (m^3s^{-1})
1250	Danube	Bratislava-Devín	***.**	*****.**
2545	Danube	Hamuliakovo	***.**	-
2558	Danube	Dobrohošť	***.**	*****.**
1251	Danube	Gabčíkovo	***.**	-
1252	Danube	Medveďov	***.**	*****.**
1253	Danube	Komárno	***.**	*****.**
2848	Danube - Reservoir	By-pass Weir upstream	***.**	-
2849	Danube - Old river bed	By-pass Weir downstream	***.**	*****.**
2851	Mosoni Danube	Intake structure at Čunovo	***.**	*****.**
3126	Danube - Power channel	Intake structure at Dobrohošť	***.**	*****.**
2849	Danube - Power channel	Gabčíkovo upstream	***.**	-
2850	Danube - Outlet channel	Gabčíkovo downstream	***.**	*****.**
3124	Seepage canal	Čunovo	***.**	*****.**
1653	Malý Danube	Malé Pálenisko	***.**	*****.**

Data exchanged on a daily basis.
Daily average discharge exchanged quarterly.

List of Stations for Surface Water Quality

Station No.	Situated on	Location	Sample taken from
117	Danube	Bratislava - Karlova Ves	Left bank
111	Danube	Hrušov	Left bank
112	Danube	Medveďov	Middle
1205	Danube	Komárno	Middle
307	Danube - Reservoir	Kalinkovo	Navigation channel
308	Danube - Reservoir	Kalinkovo	Left side
309	Danube - Reservoir	Šamorín	Right side
310	Danube - Reservoir	Šamorín	Navigation channel
311	Danube - Reservoir	Šamorín	Left side
312	Danube - Power channel	Vojka	Left bank
313	Danube - Outlet channel	Sap	Left bank
306	Mosoni Danube	Čunovo	Middle
314	Seepage canal	Čunovo	Middle
317	Seepage canal	Hamuliakovo	Middle
	River arm	Dobrohošť	Left bank

Frequency of measurements, List of parameters:

12 times per year (monthly)
Temperature, pH, Conductivity, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{2-}
total P, total N
Hg, Zn, As, Cu, Cr, Cd, Ni
COD_{Mn}, BOD_5
Suspended silts (dried at 105°C)
Saprobity index, Clorophyll-a, Coliform Bacteria
Fecalcoli, Streptococcus, Number of Bacteria
TOC, UV oil, total dissolved solids (dried at 105°C)

4 times per year
Number of Algae, Zooplancton, Macrobenthos

Once per year
Sediments
total P, total N, organic and anorganic micropollutants

Data exchange: quarterly, yearly

Data sheet for Surface Water Quality

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

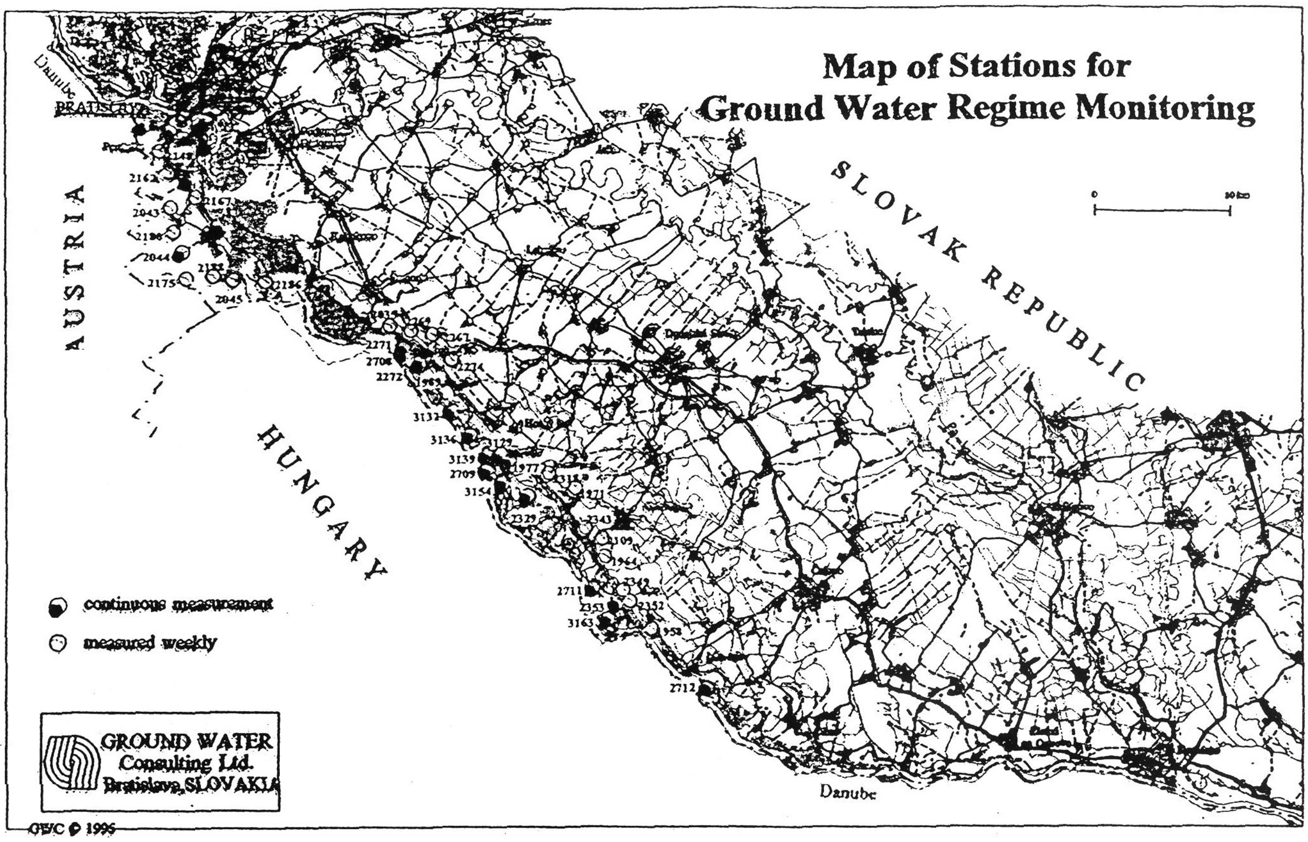
Joint Monitoring Data

Station No.: ****
Date: DD.MM.YYYY

Item	Value	Unit
Temperature	**.*	°C
pH	*.*	-
Conductivity	***.**	
O_2	***.**	
Na^+	***.**	
K^+	***.**	
Ca^{2+}	***.**	
Mg^{2+}	***.**	
Mn	***.**	
Fe	***.**	
NH_4^+	***.**	
HCO_3^-	***.**	
Cl^-	***.**	
SO_4^{2-}	***.**	
NO_3^-	***.**	
NO_2^-	***.**	
PO_4^{2-}	***.**	
total P	***.**	
total N	***.**	
Hg	***.**	
Zn	***.**	
As	***.**	
Cu	***.**	
Cr	***.**	
Cd	***.**	
Ni	***.**	

Item	Value	Unit
COD_{Mn}	***.**	
BOD_5	***.**	
suspended silts	***.**	
Saprobity index	***.**	-
Clorophyll-a	***.**	
Coliform Bacteria	***.**	
Fecalcoli	***.**	
Streptococcus	***.**	
Number of Bacteria	***.**	
TOC	***.**	
UV oil	***.**	
total dissolved solids	***.**	

Data exchanged quarterly.


Map of Stations for
Ground Water Regime Monitoring
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
Danube
BRATISLAVA
continuous measurement
measured weekly
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
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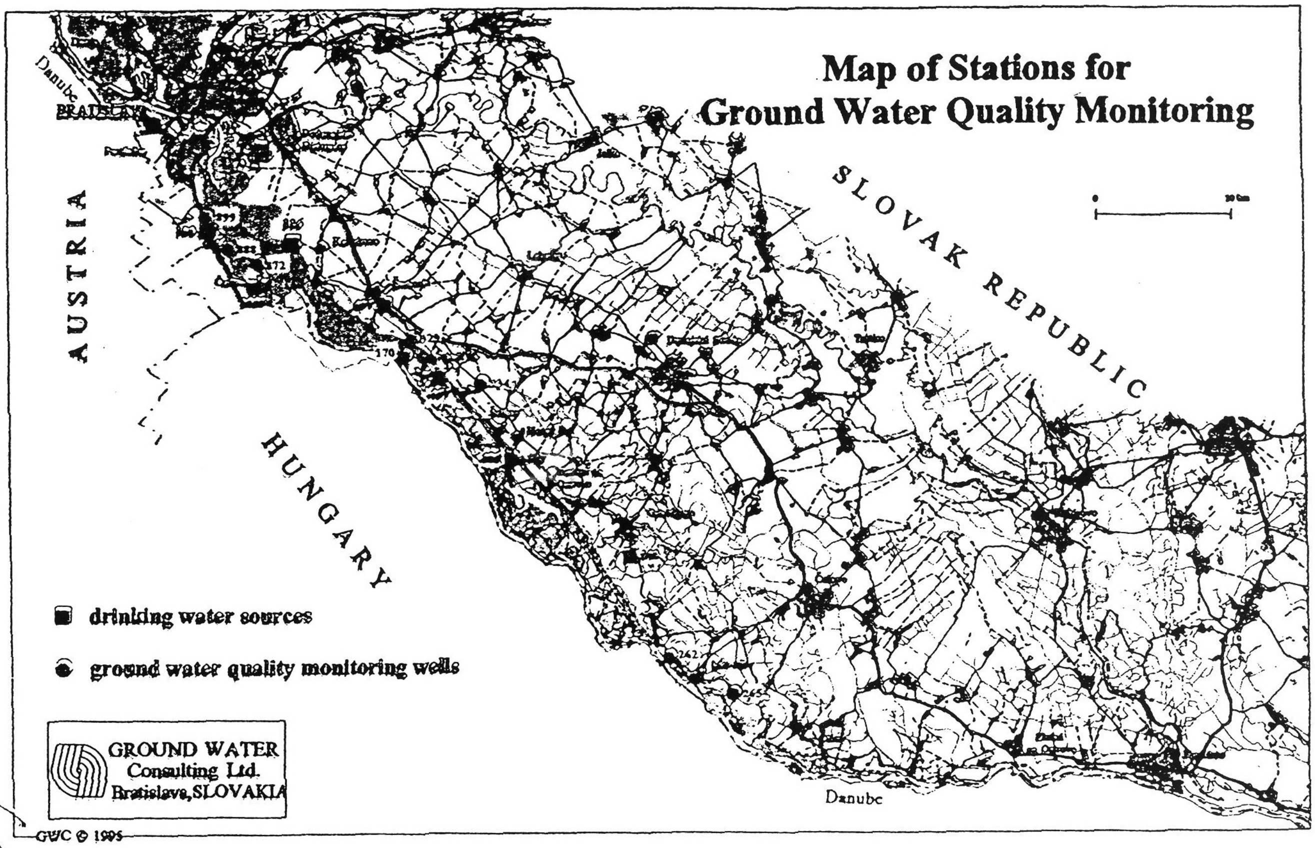

Map of Stations for
Ground Water Quality Monitoring
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
Danube
BRATISLAVA
drinking water sources
ground water quality monitoring wells
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995

List of Stations for Ground Water Regime Monitoring

Station No.	Measured
Right side of the Danube	
2148	weekly
2162	weekly
2167	weekly
2043	weekly
2180	weekly
2044	continuously
2175	weekly
2188	weekly
2045	weekly
2186	weekly
2169	weekly
2165	weekly
2041	weekly
2039	weekly
2144	weekly
Left side of the Power Channel	
2035	weekly
2269	weekly
2267	weekly
2274	weekly
2318	weekly
1971	weekly
2343	weekly
2109	weekly

Station No.	Measured
1964	weekly
2349	weekly
2352	weekly
1958	weekly
2712	weekly
Inundation area	
2271	continuously
2708	continuously
2272	weekly
1989	continuously
3132	continuously
3136	continuously
3139	continuously
3129	continuously
1977	continuously
2709	continuously
3154	continuously
2329	continuously
2711	continuously
2353	continuously
3163	continuously

Frequency of measurements:
measured continuously - measured every hour
measured weekly - measured once a week (on Wednesday)

Data exchange: monthly

Data sheet for Ground Water Regime Monitoring

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Station No.: ****
Date: DD.MM.YYYY

Date dd.mm.yy	Ground Water Level (m a.s.l.)
01.06.95	***.**
02.06.95	***.**
03.06.95	***.**
04.06.95	***.**
05.06.95	***.**
.	.
.	.
27.06.95	***.**
26.06.95	***.**
27.06.95	***.**
28.06.95	***.**
29.06.95	***.**
30.06.95	***.**

Data exchanged on a monthly basis.

List of Stations for Ground Water Quality

Station No.	Location	Situated	Sampled
Municipal Wells for Drinking Water Supply			
102	Rusovce	Right side of the Reservoir	monthly
2559	Čunovo	Right side of the Reservoir	monthly
116	Kalinkovo	Left side of the Reservoir	monthly
457	Šamorin	Left side of the Reservoir	monthly
467	Dobrohošť	Inundation area	monthly
485	Bodiky	Inundation area	monthly
103	Gabčikovo	Left side of the Outlet channel	monthly
	Bratislava-Petržalka	Right side of the Danube	monthly
Ground Water Quality Observation Wells			
899	Rusovce	Right side of the Reservoir	quarterly
888	Rusovce	Right side of the Reservoir	quarterly
872	Čunovo	Right side of the Reservoir	quarterly
329	Šamorin	Left side of the Reservoir	quarterly
170	Dobrohošť	Inundation area	quarterly
234	Rohovce	Left side of the Power channel	quarterly
262	Sap	Left side of the Danube	quarterly
265	Kľúčovec	Left side of the Danube	quarterly

Frequency of measurements, List of parameters:

4 times per year
Temperature, pH, Conductivity, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{2-}
COD_{Mn}, TOC
SiO_3^-

Data exchange: quarterly

Data sheet for Ground Water Quality

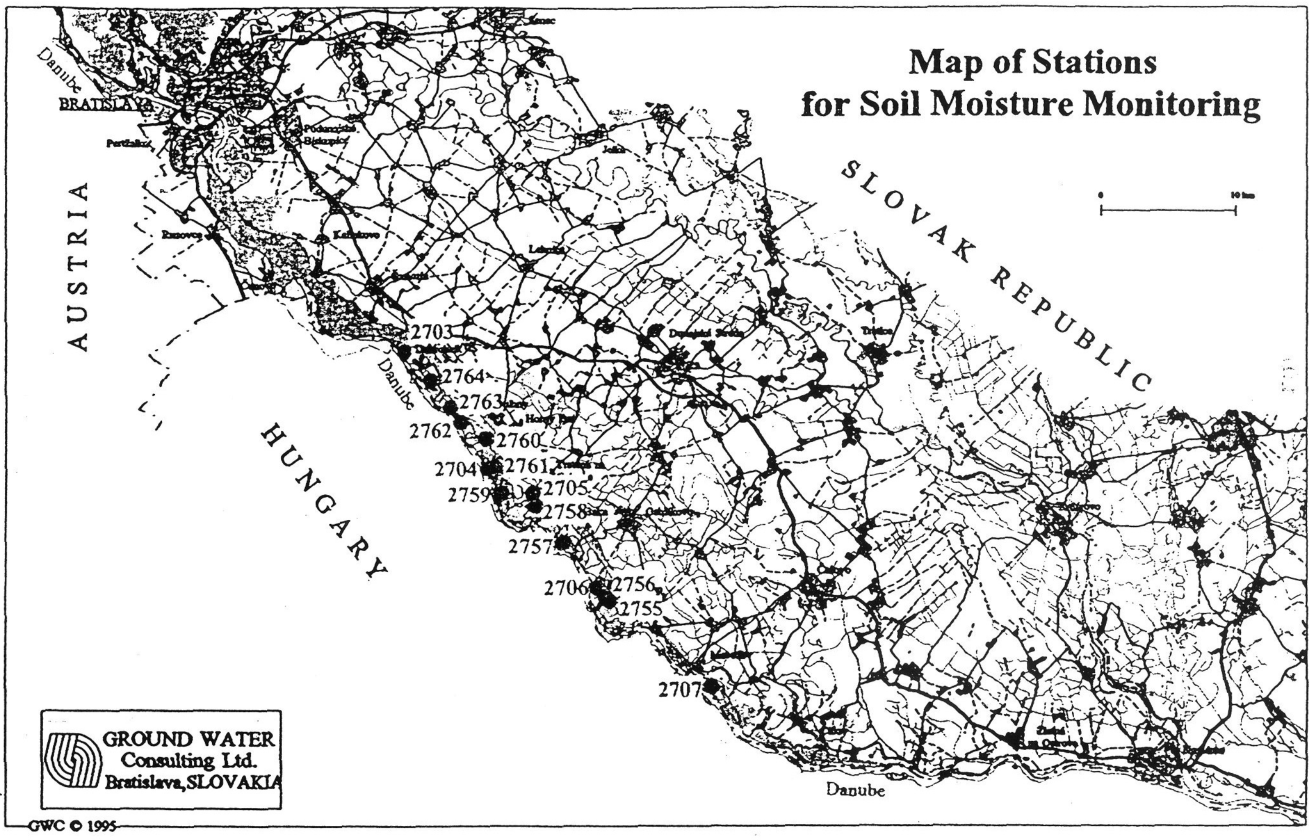
Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Station No.: ****
Date: DD.MM.YYYY

Item	Value	Unit
Temperature	**.*	°C
pH	*.*	-
Conductivity	***.**	
O_2	***.**	
Na^+	***.**	
K^+	***.**	
Ca^{2+}	***.**	
Mg^{2+}	***.**	
Mn	***.**	
Fe	***.**	
NH_4^+	***.**	
HCO_3^-	***.**	
Cl^-	***.**	
SO_4^{2-}	***.**	
NO_3^-	***.**	
NO_2^-	***.**	
PO_4^{2-}	***.**	
COD_{Mn}	***.**	
TOC	***.**	
SiO_3^-	***.**	

Data exchanged quarterly.


Map of Stations
for Soil Moisture Monitoring
AUSTRIA
HUNGARY
SLOVAK REPUBLIC
BRATISLAVA
Danube
Danube
Danube
2703
2764
2763
2762
2760
2704
2761
2759
2705
2758
2757
2706
2756
2755
2707
GROUND WATER
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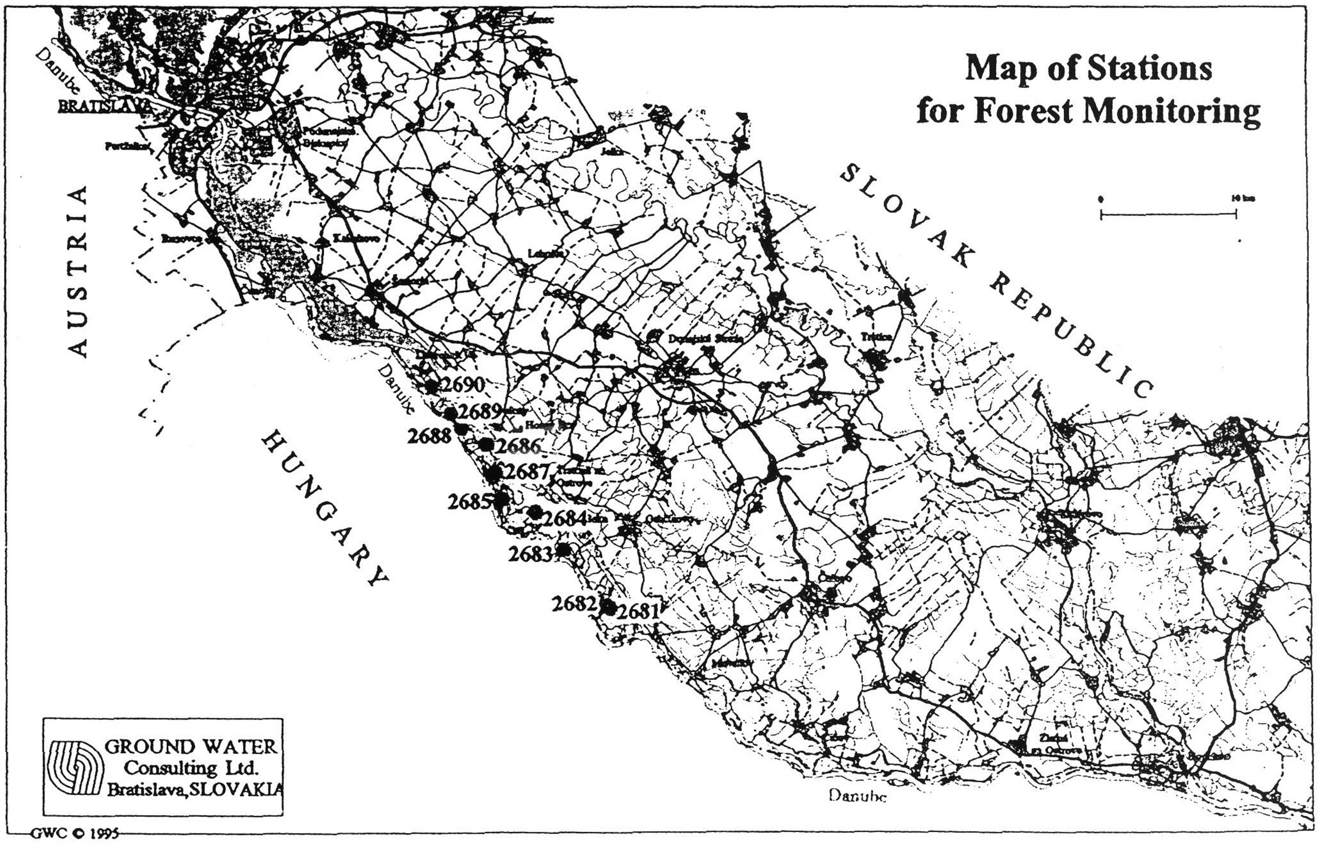
GWC © 1995


Map of Stations
for Forest Monitoring
AUSTRIA
HUNGARY
SLOVAK REPUBLIC
BRATISLAVA
Danube
Danube
Danube
2690
2689
2688
2686
2687
2685
2684
2683
2682
2681
GROUND WATER
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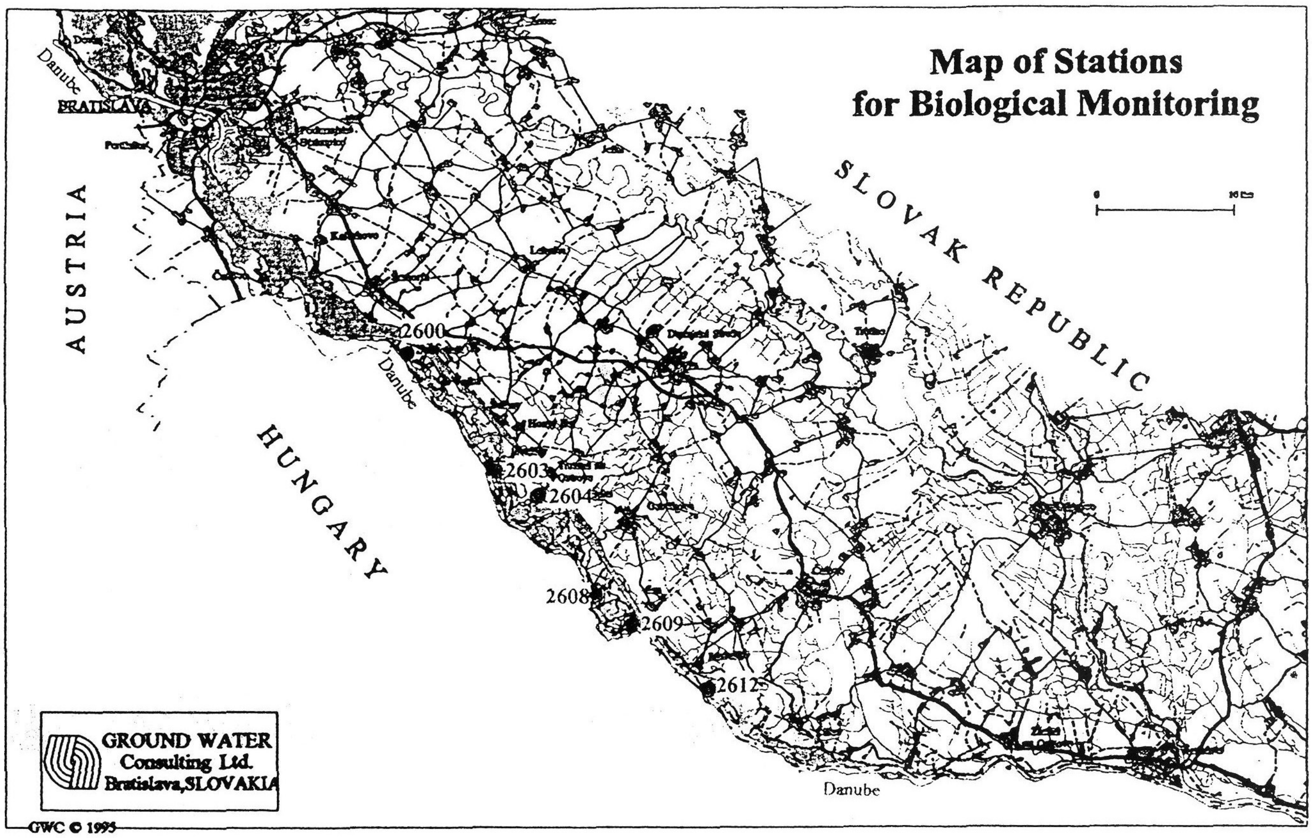
Map of Stations
for Biological Monitoring
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
BRATISLAVA
Danube
Danube
Danube
2600
2603
2604
2608
2609
2612
GROUND WATER
Consulting Ltd.
Bratislava,SLOVAKIA
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List of Stations for Soil Moisture Monitoring

Station No.	Name of Station	Location
2703	MP-6	Dobrohošť
2704	MP-9	Bodiky
2705	MP-10	Bodiky
2706	MP-14	Gabčíkovo
2707	MP-18	Kľúčovec
2764	L-12	Dobrohošť
2763	L-11	Vojka nad Dunajom
2762	L-10	Vojka nad Dunajom
2761	L-9	Horný Bar - Bodiky
2760	L-8	Horný Bar - Šuľany
2759	L-7	Horný Bar - Bodiky
2758	L-6	Trstená na Ostrove
2757	L-5	Baka
2755	L-4	Gabčíkovo
2755	L-3	Šap

Frequency of measurements, List of parameters:

Measured in vertical profile each 10 cm until ground water level is reached.
In the period March - Octobre measured with frequency 10 days.
In the period Novembre - February measured once per month.

Data exchange: quarterly

Data sheet for Soil Moisture Monitoring

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Station No.: ****
Date: DD.MM.YYYY

Depth (m b.s.)	Water content (%)
0.10	**.**
0.20	**.**
0.30	**.**
0.40	**.**
0.50	**.**
0.60	**.**
0.70	**.**
0.80	**.**
0.90	**.**
1.00	**.**
.	.
.	.
.	.

Data exchanged quarterly.

List of Stations for Forest Monitoring

Station No.	Name of Station	Location	Prevailing Type of Forest
2690	L-12	Dobrohošť	Poplar "I214"
2689	L-11	Vojka nad Dunajom	Poplar "Robusta, Alder
2688	L-10	Vojka nad Dunajom	Poplar "I214"
2687	L-9	Horný Bar - Bodiky	Poplar "I214"
2686	L-8	Horný Bar - Šuľany	Poplar "Robusta", "I214"
2685	L-7	Horný Bar - Bodiky	Poplar "Robusta"
2684	L-6	Trstená na Ostrove	Poplar "Robusta"
2683	L-5	Baka	Poplar "I214"
2682	L-4	Gabčíkovo	Poplar "Robusta"
2681	L-3	Sap	Willow

List of items: increase of diameter, (loss of leaves - proposed).

Frequency of measurements: Twice per year.

List of Stations for Biological Monitoring

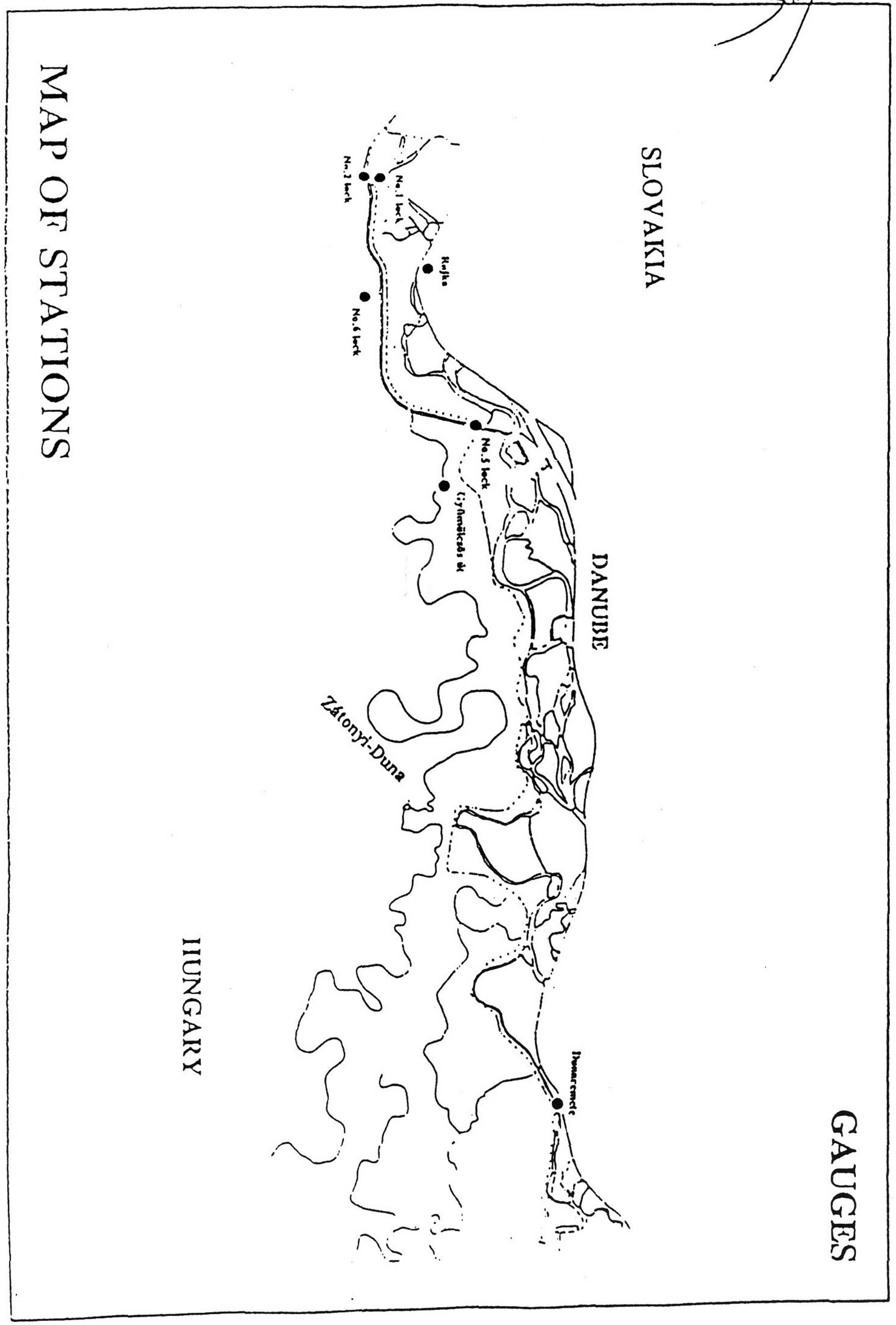
Station No.	Location	Situated
2600	Dobrohošť	Inundation area
2603	Bodiky	Inundation area
2604	Bodiky	Inundation area
2608	Gabčíkovo	Inundation area
2609	Sap	Inundation area
2612	Kľúčovec	Downstream confluence of Old Danube and Tail-race Canal

Frequency of measurements, List of parameters:

Twice or Three times per year
Planctonic crustacea (Cladocera, Copepoda)
Macrophyton
Mollusca
Pisces
Odonata
Ephemeroptera
Trichoptera
(Heteroptera, Coleoptera-Curculionidae - proposed)
(Phytocenoses - proposed)

Monitored data:
Species, dominance

Data exchange: yearly

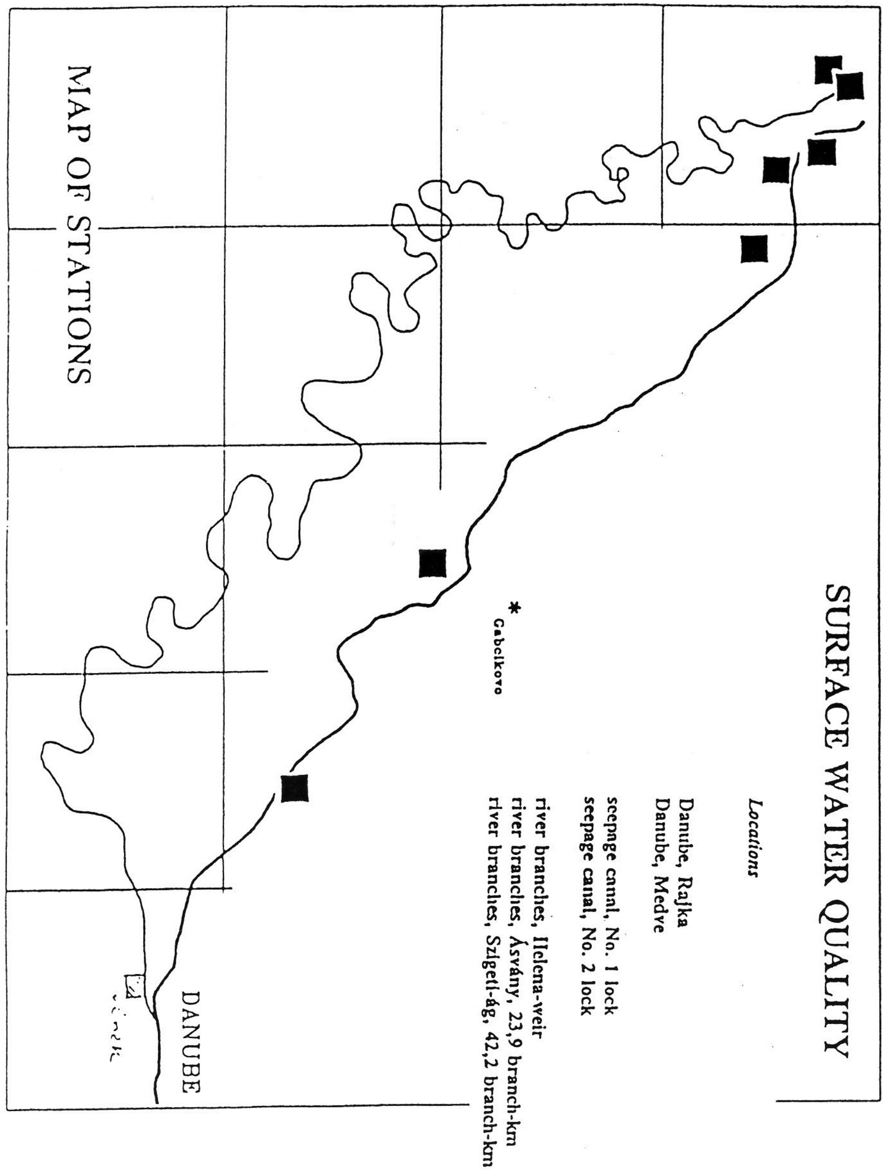


GAUGES (Daily Data)

List of Stations

Danube, Rajka (*water level only*)
Danube, Dunaremete (water level only)
Danube, Komárom
Mosoni-Duna, Mecsér*
Mosoni-Duna, Győr (Bácsa) (water level only)
Seepage canal, No.1 lock upstream
Seepage canal, No.1 lock downstream
Seepage canal, No.2 lock upstream
Seepage canal, No.2 lock downstream
Seepage canal, No.5 lock upstream
Seepage canal, No.5 lock downstream
Seepage canal, No.6 lock upstream
Seepage canal, No.6 lock downstream
Zátonyi-Duna, lock of the side branch upstream
Zátonyi-Duna, lock of the side branch downstream
upstream and downstream of weir at 1843 rkm (planned)
Helena-weir (planned)

Information: *Daily Report*
* *Monthly Report*



MONITORING OF SURFACE WATER QUALITY

List of parameter

Temperature, pH, conductivity, O_2

Na, K, Ca, Mg, Mn, Fe, NH_4

Hg, Zn, As, Cu, Cr, Cd, Ni, ~~X~~

HCO_3, Cl, SO_4, NO_3, NO_2, PO_4, total P, total N

COD, BOD, suspended silts

saprobity index, clorophyll-a, coliform bacteria, fecalcoli, streptococcus, number of bacteria, number of algae*, zooplancton*, macrobenthos*

TOC, UV oil, total dissolved-salt

Frequency of measurements: 12 times per year
** : 4 times per year*

Methodology: on basis of the Statutes of the Hungarian-Slovak Boundary Waters Commission, Statute of the Water Quality Subcommission, Annex 5

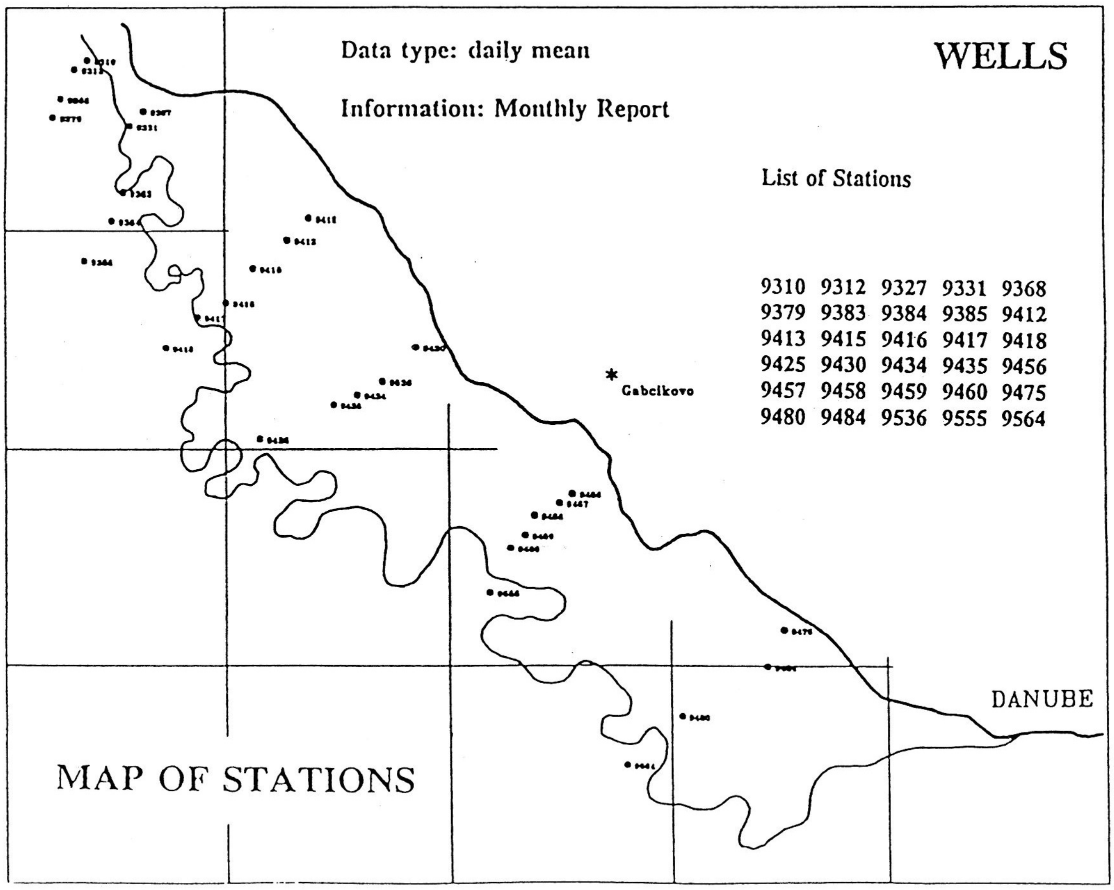
SEDIMENTS

list of parameters

total P, total N, organic and anorganic micropollutant

Frequency of measurements: once per year

Methodology: on basis of the Statutes of the Hungarian-Slovak Boundary Waters Commission, Statute of the Water Quality Subcommission, Annex 5


Data type: daily mean
Information: Monthly Report
WELLS
List of Stations
9310 9312 9327 9331 9368
9379 9383 9384 9385 9412
9413 9415 9416 9417 9418
9425 9430 9434 9435 9456
9457 9458 9459 9460 9475
9480 9484 9536 9555 9564
Gabcikovo
DANUBE
MAP OF STATIONS

Ministry of Environment
and Regional Policy
HUNGARY

Árpád Kovács
Deputy Secretary of State

Szigetköz Monitoring Data

DATE ****

Location	surface water level [m asl]	discharge [m³/s]
Danube, Rajka	****	
Danube, Dunaremete	****	
Danube, Komárom	****	****
Mosoni-Duna, Győr (Bácsa)	****	
Seepage canal, No.1 lock upstream	****	****
Seepage canal, No.1 lock downstream	****	
Seepage canal, No.2 lock upstream	****	****
Seepage canal, No.2 lock downstream	****	
Seepage canal, No.5 lock upstream	****	****
Seepage canal, No.5 lock downstream	****	
Seepage canal, No.6 lock upstream	****	****
Seepage canal, No.6 lock downstream	****	
Zátonyi-Duna, lock of the side branch upstream	****	****
Zátonyi-Duna, lock of the side branch downstream	****	

Ministry of Environment
and Regional Policy
HUNGARY

Árpád Kovács
Deputy Secretary of State

Szigetköz Monitoring Data

GROUND WATER LEVEL

Number of well : ****

Date	m a.s.l.
1995.06.01	***.**
1995.06.02	***.**
1995.06.03	***.**
1995.06.04	***.**
1995.06.05	***.**
1995.06.06	***.**
1995.06.07	***.**
1995.06.08	***.**
1995.06.09	***.**
1995.06.10	***.**
1995.06.11	***.**
1995.06.12	***.**
1995.06.13	***.**
1995.06.14	***.**
1995.06.15	***.**
1995.06.16	***.**
1995.06.17	***.**
1995.06.18	***.**
1995.06.19	***.**
1995.06.20	***.**
1995.06.21	***.**
1995.06.22	***.**
1995.06.23	***.**
1995.06.24	***.**
1995.06.25	***.**
1995.06.26	***.**
1995.06.27	***.**
1995.06.28	***.**
1995.06.29	***.**
1995.06.30	***.**

COMPONENTS OF GROUND WATER QUALITY' MONITORING

Temperature, pH, conductivity, DO_2,

Na, K, Ca, Mg, Mn, Fe, NH_4

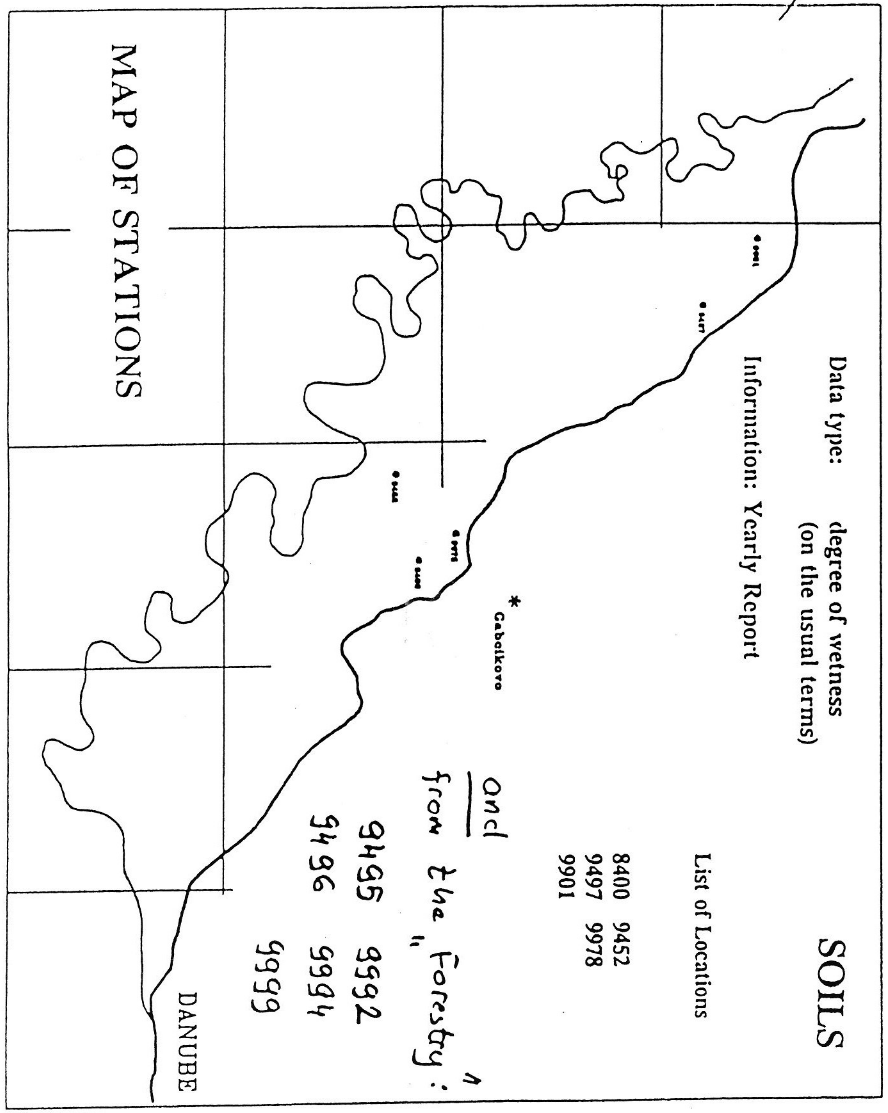
HCO_3, Cl, SO_4, NO_3, NO_2, PO_4

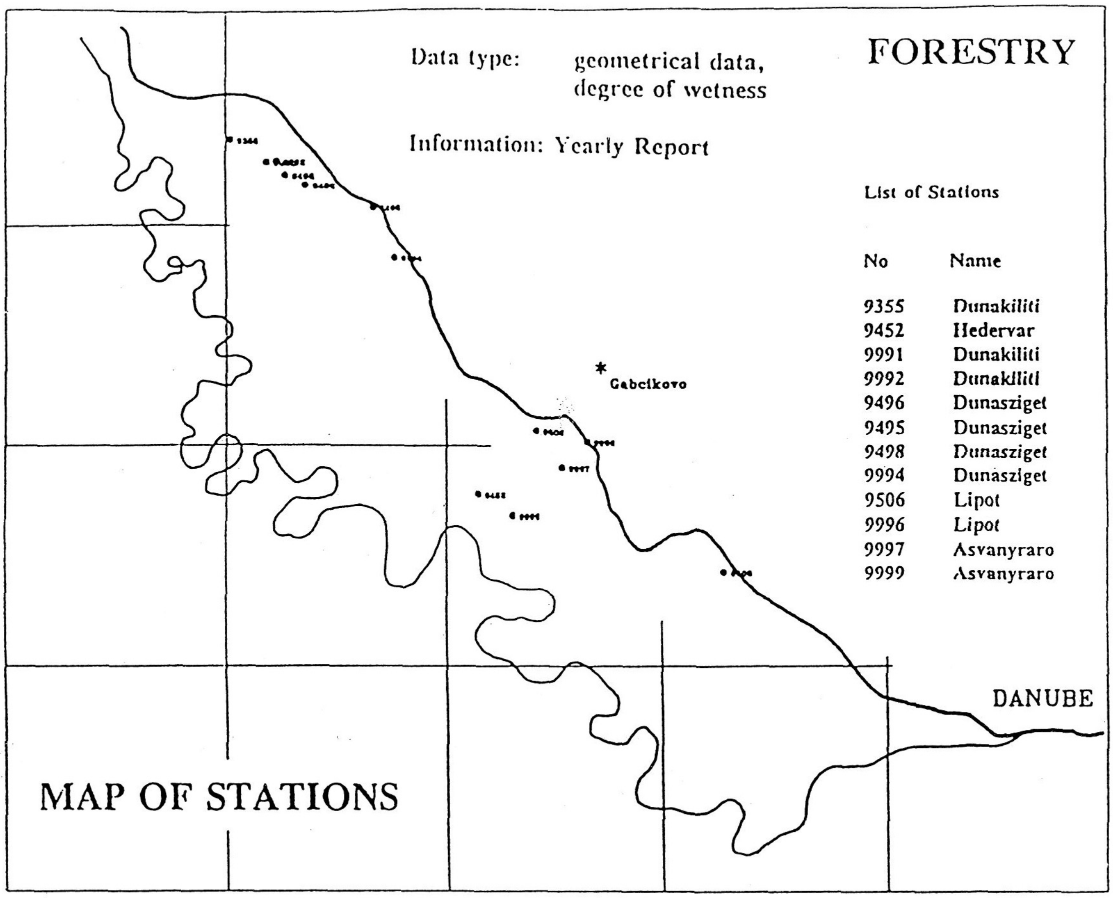
COD, TOC

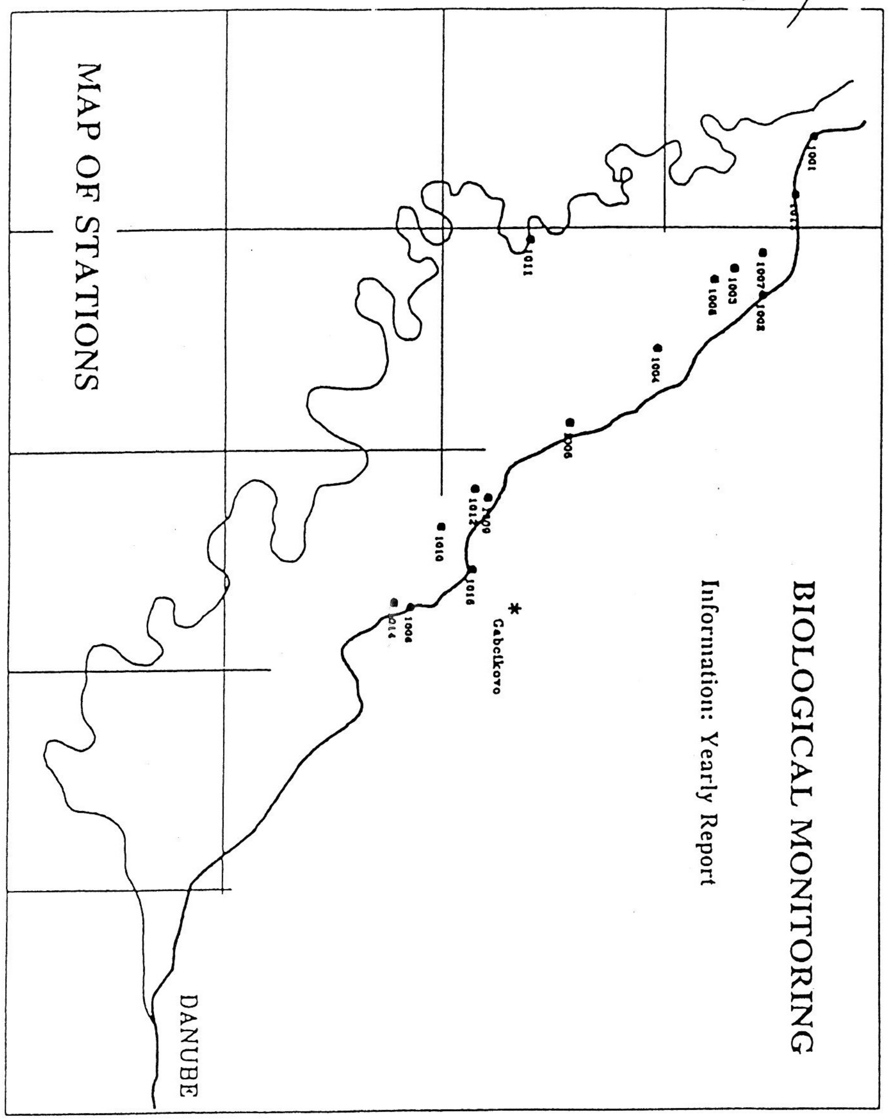
silicates

Frequency of measurements: 4 times per year

Methodology: on basis of the Statutes of the Hungarian-Slovak Boundary Waters Commission, Statute of the Water Quality Subcommission, Annex 5




FORESTRY
Data type: geometrical data, degree of wetness
Information: Yearly Report
List of Stations
No Name
9355 Dunakiliti
9452 Hedervar
9991 Dunakiliti
9992 Dunakiliti
9496 Dunasziget
9495 Dunasziget
9498 Dunasziget
9994 Dunasziget
9506 Lipot
9996 Lipot
9997 Asvanyraro
9999 Asvanyraro
Gabcikovo
DANUBE
MAP OF STATIONS



BIOLOGICAL MONITORING

AQUTIC ORGANISMS

Planctonic crustacea (Cladocera, Copepoda)

Location
- **Main channel : 1001, 1009**
- **Side arms: 1003, 1010,**
- **Mosoni-Duna: 1011**

Sampling: May, July, September
Biological data: species and specimen number / l (calculated from 100 l)

Macrophyton

Location
- **Main channel : 1001, 1009**
- **Side arms: 1002**
- **Protected area: 1012**

Sampling: May, July, September
Biological data: floristics, cenology (Braun-Blanqet method)

Mollusca

Location

Main channel : 1001, 1015
Side arms: 1003

Sampling: once/year
Biological data: species and specimen number / sample

Pisces

Location
- Main channel : 1013, 1006
- Side arms: 1014, 1007
- Mosoni-Duna: 1011

Sampling: bi-monthly
Biological data: species dominance (400 * 6 * 3 meter cubic water)

SEMIAQUTIC ORGANISMS

Odonata

Location
- **Main channel** : 1001
- **Side arms:** 1005, 1008
- **Mosoni-Duna:** 1011

Sampling: May, July, August
Biological data: species, dominance

Ephemeroptera

Location
- **Main channel** : 1001
- **Side arms:** 1004, 1010

Sampling: May, June, August, September

Biological data: species, dominance

Trichoptera

Location
- **Main channel** : 1001
- **Side arms:** 1004, 1010

Sampling: May, July, August
Biological data: species, dominance

+ Heteroptera, Coleoptera – Curculionidae

– after the agreement of the Experts

A P P E N D I X A.3.

Zápisnica
z rokovania zástupcov pre monitorovanie, konaného 25. apríla 2007 v Győri

Prítomní: podľa prezenčnej listiny
Miesto: úradná miestnosť Severozadunajského riaditeľstva pre ochranu životného prostredia a vodné hospodárstvo (ÉDUKÖVIZIG)
Dátum: 25. apríl 2007

Rokovanie za maďarskú stranu viedol zástupca pre monitorovanie Emil Janák, riaditeľ ÉDUKÖVIZIG; za slovenskú stranu zástupca pre monitorovanie Dominik Kocinger, splnomocnenec vlády Slovenskej republiky pre výstavbu a prevádzku Sústavy vodných diel Gabčíkovo - Nagymaros.

Body programu:

1. Prerokovanie návrhu maďarskej strany na zmeny Štatútu o činnosti zástupcov pre monitorovanie v zmysle medzivládnej Dohody z roku 1995
2. Detailné prerokovanie návrhu maďarskej strany na zmeny, týkajúce sa miest monitorovania, okruhu sledovaných ukazovateľov a frekvencie meraní, ktoré sú uvedené v prílohe Štatútu.
3. Rôzne.

K bodu 1

Zástupcovia pre monitorovanie sa na rokovaní dohodli na nasledovnom:

a) V preambule Štatútu sa doplní nasledovná veta:
Pri prevádzkovaní environmentálneho monitorovacieho systému budú uplatnené aj Smernice Európskej únie, vrátane Smernice 2000/60/ES Európskeho parlamentu a Rady určujúcej rámec opatrení Európskeho spoločenstva v oblasti vodnej politiky (Rámcová smernica o vode) prijatej 23. októbra 2000, a Aarhuskej dohody o prístupe k informáciám, o účasti verejnosti na rozhodovacom procese a o zabezpečení práva na spravodlivosť v záležitostiach životného prostredia.

b) V Článku 1 bod 1 sa doplní nasledovná veta:
Prevádzkovaný environmentálny monitoring je v súlade s operatívnym monitoringom podľa Rámcovej smernice o vode.

c) V Článku 2 bod 4 sa mení prvá veta nasledovne:
Výmena údajov sa uskutočňuje prostredníctvom poverených zástupcov pre monitorovanie v písomnej a digitálnej forme.

d) V Článku 3 sa bod 1 mení nasledovne:
Spoločné vyhodnotenie vymenených údajov sa vzťahuje na jeden kalendárny rok. V prípade prietokov a hladín povrchových vôd sa hodnotenie bude vzťahovať na hydrologický rok. Spoločná výročná správa bude vyhotovená šesť mesiacov po

ukončení kalendárneho roka.

e) V Článku 3 bod 2 sa druhá veta mení nasledovne:
Národné ročné správy si strany vymenia štyri mesiace po ukončení kalendárneho roka a poverení zástupcovia pre monitorovanie zvolajú poradu na spoločné vyhodnotenie predložených údajov.

f) Článok 3 sa doplní o nasledovný bod 3:
Po schválení a výmene Národných ročných správ budú tieto zverejnené na webových stránkach. Adresa slovenskej webovej stránky je www.gabcikovo.gov.sk, adresa maďarskej webovej stránky je www.kvvm.hu.

g) V Článku 4 bod 4 sa druhá veta mení nasledovne:
Zápisnice z rokovaní sa vyhotovujú v slovenskom a maďarskom jazyku.

K bodu 2

Zástupcovia pre monitorovanie sa na rokovaní dohodli na nasledovných zmenách miest monitorovania, okruhu sledovaných ukazovateľov a frekvencie meraní.

a) Hydrológia povrchových vôd
V miestach monitorovania prietokov a hladín povrchových vôd, v meraných ukazovateľoch ani vo frekvencii meraní neboli navrhnuté žiadne zmeny.

b) Morfológia povrchových vôd
Zástupcovia pre monitorovanie sa zhodli na tom, že posudzovanie zmien morfológie je dôležité a k novému systému hodnotenia je potrebné. Vypracovanie metodiky stanovili po roku 2007, frekvencia meraní bude raz za tri roky. Zástupcovia pre monitorovanie sa dohodli na tom, že prvé meranie sa uskutoční najneskôr v roku 2009. Sledovanie morfologických zmien je potrebné skoordinovať s aktivitami prebiehajúcimi v rámci slovensko-maďarskej Komisie hraničných vôd.

c) Fyzikálno-chemické prvky
V prípade kvality povrchových vôd sa zástupcovia pre monitorovanie dohodli, že sledovanie kvality povrchových vôd bude prebiehať na rovnakých miestach pozorovania (profiloch) ako doteraz s frekvenciou 12-krát ročne, t.j. raz za mesiac. Zo zoznamu stanovovaných ukazovateľov boli vynechané baktérie a zooplanktón. Riasy a makrozoobentos boli presunuté medzi hydrobiologické prvky. Zástupcovia pre monitorovanie sa dohodli, že v záujme zosúladenia monitorovania podľa Dohody z roku 1995 a programu monitorovania hraničných vôd na vybraných profiloch sa obrátia na slovensko-maďarskú Komisiu hraničných vôd.

d) Hydrobiologické prvky
Zástupcovia pre monitorovanie sa dohodli nasledovne:
- fytoplanktón: maďarská strana 4-krát za rok v období apríl-september
  slovenská strana 12-krát v období marec-október, so zahustením v letných mesiacoch
- fytobentos: 2-krát za rok
- bentické bezstavovce (makrozoobentos): 2-krát za rok
- makrofyty: 2-krát za rok
- ryby: raz za tri roky

Monitorovanie sa bude uskutočňovať v súlade s metodikou dohodnutou v rámci Komisie hraničných vôd.

e) Kvalita sedimentov
Analýza kvality sedimentov na maďarskej strane bude uskutočňovaná na 7 monitorovacích miestach (2x staré koryto Dunaja, 3x ramenná sústava, 1x pravostranný priesakový kanál, 1x Mošonský Dunaj). Na slovenskej strane sa kvalita sedimentov bude uskutočňovať na 6 monitorovacích miestach (2x staré koryto Dunaja, 4x zdrž). Analýzy budú zamerané na stanovenie obsahu anorganických mikropolutantov (Cu, Cr, Zn, Pb, Cd, Ni, Hg, As), obsahu živín (celkový fosfor, celkový dusík) a obsah organických mikropolutantov PAH (suma, resp. 10 vybraných zložiek). Frekvencia odberov bude raz ročne, pri nízkych vodných stavoch, spravidla na jeseň.

f) Kvantita podzemných vôd
Pri sledovaní hladín podzemných vôd vo frekvencii meraní neboli navrhnuté žiadne zmeny. Na maďarskej strane v rámci optimalizácie mierne klesol počet sledovaných studní na 126. Na slovenskej strane sa zmeny v počte studní nepredpokladajú. Presný zoznam objektov je v prílohe zápisnice.

g) Kvalita podzemných vôd
Sledovanie kvality podzemných vôd bude prebiehať na rovnakých objektoch ako doteraz. Zo sledovaných ukazovateľov boli vynechané dusitany, TOC a kremičitany. Na vybraných lokalitách na maďarskej strane (pozorovacie objekty č. 9379, 9413, 9536, 9456 a 9480) bolo navrhnuté sledovanie ťažkých kovov (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr) a organických mikropolutantov (pesticídy a tetrachlóretylén) s frekvenciou raz za rok. Na slovenskej strane sú ťažké kovy a vybrané organické mikropolutanty (okrem tetrachlóretylénu) merané takmer na všetkých studniach.

h) Pôdna vlhkosť
Meranie pôdnej vlhkosti sa bude uskutočňovať bez zmeny, podľa doterajšej metodiky. Frekvenciu meraní je potrebné prispôsobiť nasledovnej schéme: v zimných mesiacoch raz mesačne (január, február, november, december), vo vegetačnom období približne raz za dva týždne (marec-október), to jest cca 20-21 meraní.

i) Les
Zástupcovia pre monitoring sa zhodli, že dôležitou súčasťou hodnotenia zdravotného stavu lesov je plošné hodnotenie na základe leteckého snímkovania. Je potrebné dohodnúť spoločnú metodiku a spôsob hodnotenia na základe skúseností slovenskej strany. Spoločné letecké snímkovanie sa má uskutočniť v roku 2008.
Ohľadom ostatných monitorovaných ukazovateľov sa vzhľadom na budúci monitoring musia odborníci oboch strán dohodnúť do konca roka 2007. Slovenská strana informovala maďarskú stranu, že sledovanie základných dendrometrických charakteristík, spolu s podpornými údajmi (hladina podzemnej vody a pôdna vlhkosť) považuje naďalej za nevyhnutné.

j) Ostatné biologické skúmania
V rámci biologického monitoringu sa monitorovanie makrozoobentosu presunulo medzi hydrobiologické prvky. Hodnotenie bude prebiehať na základe metodiky RSV. Aj monitoring rýb bol presunutý medzi hydrobiologické prvky, s frekvenciou raz za tri roky. Hodnotenie bude prebiehať na základe metodiky RSV. Naďalej bude prebiehať monitoring doteraz sledovaných vybraných skupín zooplanktónu (Cladocera a Copepoda), bentických bezstavovcov - makrozoobentosu (Mollusca, Odonata, Ephemeroptera a Trichoptera) a suchozemských rastlín a suchozemských slimákov v doterajšom rozsahu. V tejto oblasti skúmania je potrebné ďalšie zosúlaďovanie miest, skupín a metodiky pozorovania.

Odborníci oboch strán zmeny uvedené v tabuľkách v prílohe tejto zápisnice do konca roka 2007 zapracujú do komplexnej prílohy štatútu.

K bodu 3

a) Slovenská strana informovala maďarskú stranu, že prevádzkové údaje poskytované v rámci dennej výmeny údajov budú k dispozícii na internetovej stránke. Navrhla maďarskej strane, aby sa po sprístupnení internetovej stránky denné zasielanie údajov zastavilo a údaje by sa mailom alebo faxom zaslali len v prípade poruchy pri prístupe na internet, alebo na základe telefonickej požiadavky. Slovenská strana navrhla archiváciu údajov na internete na dobu 40 dní. Maďarská strana poukázala na súvislosť problematiky poskytovania prevádzkových údajov s dohodami v rámci Komisie hraničných vôd. Prisľúbila, že sa k požiadavke slovenskej strany vyjadrí neskôr.

b) Slovenská strana zopakovala svoju skoršiu požiadavku na rozšírenie výmeny údajov o údaje spred roku 1992, tam kde sú takéto údaje k dispozícii. Maďarská strana v zásade s takýmto rozšírením súhlasí, avšak k obdobiu, na ktoré sa takáto výmena bude vzťahovať, sa vyjadrí neskôr.

V Győri, 25. apríla 2007.

Emil Janák zástupca pre monitoring za maďarskú stranu	Dominik Kocinger zástupca pre monitoring za slovenskú stranu

a) Hydrológia povrchových vôd

Slovenská strana

Číslo profilu	Tok	Lokalita
1250	Dunaj	Bratislava - Devín
2848	Dunaj	zdrž - Čunovo
2552	Dunaj	Čunovo - staré koryto
2545	Dunaj	Hamuliakovo
2558	Dunaj	Dobrohošť
1251	Dunaj	Gabčíkovo
1252	Dunaj	Medveďov
1600	Dunaj	Komárno
1653	Malý Dunaj	Bratislava - Malé Pálenisko
2851	Mošonské rameno Dunaja	Čunovo
3126	Dobrohošťský kanál	Dobrohošť - napustný objekt
2849	prívodný kanál	Gabčíkovo - horná hladina
2850	odpadový kanál	Gabčíkovo - dolná hladina
3124	pravostranný priesakový kanál	Čunovo - horná hladina
3125	pravostranný priesakový kanál	Čunovo - dolná hladina
4045	ramenná sústava	línia A
4046	ramenná sústava	línia B1
4047	ramenná sústava	línia B2
4048	ramenná sústava	línia C
4049	ramenná sústava	línia D
4050	ramenná sústava	línia E
4051	ramenná sústava	línia F1
4052	ramenná sústava	línia F3
4053	ramenná sústava	línia G
4054	ramenná sústava	línia H1
4055	ramenná sústava	línia H3
4056	ramenná sústava	línia J
4057	ramenná sústava	materiálová jama B

Maďarská strana

Číslo profilu	Tok	Lokalita
000001	Dunaj	Rajka
000002	Dunaj	Dunaremete
000005	Dunaj	Komárom
000017	Mošonský Dunaj	Mecsér
000018	Mošonský Dunaj	Bácsa
003871	Mošonský Dunaj	stavidlo VI - horná voda
003872	Mošonský Dunaj	stavidlo VI - dolná voda
003873	Mošonský Dunaj	stavidlo I - horná voda
003874	Mošonský Dunaj	stavidlo I - dolná voda

Číslo profilu	Tok	Lokalita
003875	priesakový kanál	stavidlo II - horná voda
003876	priesakový kanál	stavidlo II - dolná voda
003939	Dunaj	Hať Dunakiliti - horná voda
003940	priesakový kanál	stavidlo V - horná voda
003941	priesakový kanál	stavidlo V - dolná voda
004516	ramenná sústava	Helena
110092	chránená strana	stavidlo VII - horná voda
110106	Zátoňský Dunaj	Gyümölcsös út - horná voda
110144	Zátoňský Dunaj	Gyümölcsös út - dolná voda
110161	Dunaj	Hať Dunakiliti - dolná voda
110113	ramenná sústava	Z-1, horná voda
110127	ramenná sústava	Dobrorgaz 15
110115	ramenná sústava	B-2, horná voda
110114	ramenná sústava	B-2, dolná voda
110117	ramenná sústava	B-3, horná voda
110116	ramenná sústava	B-3, dolná voda
110170	ramenná sústava	Z-6, horná voda
110171	ramenná sústava	Z-6, dolná voda
110152	ramenná sústava	Z-8, horná voda
110153	ramenná sústava	Z-8, dolná voda
110119	ramenná sústava	B-4, horná voda
110118	ramenná sústava	B-4, dolná voda
110129	ramenná sústava	B-5, horná voda
110128	ramenná sústava	B-5, dolná voda
110162	ramenná sústava	B-6, horná voda
110138	ramenná sústava	B-7, horná voda
110198	ramenná sústava	B-8, horná voda
110131	ramenná sústava	B-9, horná voda
110133	ramenná sústava	B-11, horná voda
110132	ramenná sústava	B-11, dolná voda
110142	ramenná sústava	Z-12, horná voda
110141	ramenná sústava	Z-12, dolná voda
110155	ramenná sústava	Z-10, horná voda
110157	ramenná sústava	uzáver Gatya,horná voda

b) Morfológia povrchových vôd

Metodika meraní bude stanovená po roku 2007, frekvencia meraní bude raz za tri roky.

c) Fyzikálno-chemické prvky

Slovenská strana

Číslo profilu	Tok	Lokalita
109	Dunaj	Bratislava - Nový most, stred
4016	Dunaj	Dobrohošť, rkm 1843, nad prehrádzkou
4025	Dunaj	Dobrohošť, rkm 1839,6 - ľavá strana
3739	Dunaj	Sap, staré koryto, nad rkm 1812
112	Dunaj	Medveďov - most, stred
1205	Dunaj	Komárno - most, stred
307	Dunaj - zdrž	Kalinkovo - kyneta
308	Dunaj - zdrž	Kalinkovo - ľavá strana
309	Dunaj - zdrž	Šamorín - pravá strana
311	Dunaj - zdrž	Šamorín - ľavá strana
3530	Dunaj - odpadový kanál	Sap - ľavá strana
3529	Mošonské rameno Dunaja	Čunovo - stred
3531	pravostranný priesakový kanál	Čunovo
317	ľavostranný priesakový kanál	Hamuliakovo
3376	Dobrohošťský kanál	Dobrohošť - ľavá strana

Maďarská strana

Číslo profilu	Tok	Lokalita
0001	Dunaj	Rajka, rkm 1848
0043	Dunaj	nad prehrádzkou, rkm 1843
0043	Dunaj	pod prehrádzkou, rkm 1843
0002	Dunaj	Dunaremete
2306	Dunaj	Medve
1141	Mošonský Dunaj	Vének
0082	priesakový kanál	stavidlo I
0084	priesakový kanál	stavidlo II
1112	ramenná sústava	Helena
1114	ramenná sústava	Szigetské rameno, km 42,2
1126	ramenná sústava	Ásváňske rameno, km 23,9

Rozsah sledovaných ukazovateľov, frekvencia mesačne:
teplota, pH, merná vodivosť, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, NH_4^+, Mn, Fe (nefiltrované)
Hg, Zn, As, Cu, Cr, Cd, Ni, Pb (všetko filtrované)
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{3-}, celkový P, celkový N
$CHSK_{Mn}$, BSK_5, nerozpustené látky (sušené pri 105°C)
TOC, NEL-UV, rozpustené látky (sušené pri 105°C)
index saprobity biosestónu , chlorofyl-a

d) Hydrobiologické prvky

fytoplanktón: maďarská strana 4-krát za rok v období apríl-september
slovenská strana 12-krát v období marec-október,
so zahustením v letných mesiacoch

fytobentos: 2-krát za rok

bentické bezstavovce (makrozoobentos): 2-krát za rok

makrofyty: 2-krát za rok

ryby:
maďarská strana 5 monitorovacích miest (2x staré koryto Dunaja, 2x ramenná sústava, 1x Mošonský Dunaj))
slovenská strana 6 monitorovacích miest (2x staré koryto Dunaja, 4x ramenná sústava)
Frekvencia: raz za tri roky

e) Kvalita sedimentov

maďarská strana: 7 monitorovacích miest (2x staré koryto Dunaja, 3x ramenná
slovenská strana: 6 monitorovacích miest (2x staré koryto Dunaja, 4x zdrž)

anorganické mikropolutanty: Cu, Cr, Zn, Pb, Cd, Ni, Hg, As
obsah živín: celkový fosfor, celkový dusík
organické mikropolutanty: PAH (suma, resp. 10 vybraných zložiek)

Frekvencia: 1 krát ročne, spravidla na jeseň

f) Kvantita podzemných vôd

Slovenská strana

Studňa č.	Lokalita
1912	Nová Stráž
1913	Kameničná - Hadovce
1915	Zlatná na Ostrove
1916	Štúrová-Stará lúka
4002	Kameničná - Piesky
1922	Bodza - Lúky
1924	Zemianska Olča
1925	Tôň
1927	Sokolce
1928	Okoč
1929	Okoč - Goliáš
1931	Topoľníky
4435	Kolárovo
1937	Dolný Štál
1938	Boheľov
1939	Padáň - Majer
4428	Bodza - Maderét
1943	Kolárovo
4003	Okoč - Aszod
1948	Veľký Meder
1949	Medveďov
1950	Veľké Kosihy
4004	Kližská Nemá
1952	Trávnik
1954	Číčov
4429	Číčov - Kec
1957	Čiližská Radvaň
1958	Sap
1959	Ňárad
1960	Gabčíkovo - Čierny Les
1961	Mad
4306	Trhové Mýto
1964	Gabčíkovo
1965	Gabčíkovo
1966	Vrakúň
1969	Dvorníky
1970	Jahodná
1971	Baka
1972	Kračany - Dobor
1973	Kostolné Kračany
1974	Vydrany
1976	Veľké Blahovo - Lúky
1977	Bodíky

Studňa č.	Lokalita
4302	Lúč na Ostrove - Antónia Dvor
1979	Michal na Ostrove - Kolónia
1980	Michal na Ostrove - Lúky
4217	Blahová - Sever
1982	Blahová
1983	Horný Bar- Šuľany
1984	Holice
1988	Rohovce
1989	Dobrohošť
4303	Macov
1992	Mierovo
1993	Zlaté Klasy - Rastice
1995	Kvetoslavov
1996	Čakany
1997	Janíky - Búštelek
1998	Kalinkovo
1999	Miloslavov - Alžbetin Dvor
2000	Tomášov
2001	Podunajské Biskupice - Topoľové
2002	Rovinka
2003	Most na Ostrove
2033	Šamorín - Mliečno
2035	Šamorín - Čilistov
2038	Bratislava - Petržalka
2039	Petržalka - Ovsište
4007	Bratislava - Petržalka - Colnica Berg
4009	Bratislava - Jarovce
2044	Rusovce
2045	Čunovo - hranica
2046	Čunovo
2067	Hroboňovo
2069	Ohrady
2070	Nový Život - Eliášovce
2071	Podunajské Biskupice
4044	Gabčíkovo
872	Čunovo (len zmena čísla objektu z 2123)
2144	Bratislava - Petržalka
2148	Petržalka - Kopčianska ul.
2162	Petržalka
2165	Petržalka
2167	Petržalka
2169	Rusovce
2171	Čunovo
4312	Čunovo
2180	Jarovce
2186	Čunovo
2188	Rusovce - Dolné pole

Studňa č.	Lokalita
2205	Bratislava - Vlčie hrdlo (Slovnaft)
2207	Bratislava - Podunajské Biskupice
2208	Bratislava-Vrakuňa
2215	Bratislava - Podunajské Biskupice - Lieskovec
2217	Rovinka
2219	Malinovo
2231	Kalinkovo
2241	Mierovo
2247	Dunajská Lužná - Nová Lipnica
2267	Báč
329	Šamorín - Mliečno (len zmena čísla objektu z 2269)
2271	Dobrohošť - Dunajské kriviny
2272	Dobrohošť
2274	Kyselica
2279	Vojka
2293	Holice - Stará Gala
2318	Trstená na Ostrove
2327	Bodíky
2328	Bodíky
2329	Bodíky - Kráľovská lúka
2343	Gabčíkovo
2345	Malé Vranie - Dekanské
2349	Gabčíkovo
2353	Sap - Čiližská sihoť
2387	Nová Stráž
2401	Bratislava - Vlčie hrdlo (Slovnaft)
2708	Dobrohošť - Dunajské kriviny
2709	Bodíky - Malá sihoť, línia D
2711	Gabčíkovo - Dunajský ostrov
2712	Kľúčovec - Sporná sihoť
3129	Vojka nad Dunajom - Dolné mačacie
3132	Vojka nad Dunajom - Vrbiny
3136	Vojka nad Dunajom - Vrbiny
3139	Šuľany - Dunajské sihote
3147	Bodíky - Mlynské
3154	Baka - Obecný ostrov
3163	Sap - Riečina
2710	Bodíky - Kráľovská lúka
3172	Bodíky - Kráľovská lúka
2858	Vojka nad Dunajom - Dolné vrbiny
3131	Vojka nad Dunajom - pri Veľkej Žofín
3137	Šuľany - Dunajské sihote
3144	Bodíky - línia E
3146	Bodíky - Malá sihoť
3151	Bodíky - Malobodícke
3155	Baka - Nová trieda, Ostrov Orliaka morského
3159	Gabčíkovo - Dunajský ostrov, Istragov

Maďarská strana

Studňa č.	Ozn.	Lokalita
000062	1019	Győrladamér
000066	2659	Vámosszabadi
000072	2666	Győrladamér
000119	2681	Hegyeshalom
000134	2647	Bezenye
000135	2648	Bezenye
000140	2640	Dunakiliti
000143	2600	Feketeerdő
000144	2611	Feketeerdő
000147	2615	Feketeerdő
000148	2617	Feketeerdő
000151	2609	Cikolasziget
000152	2610	Cikolasziget
000159	2605	Halászi
000188	1009	Lébény
003470	1020	Bezenye
003473	1031	Hegyeshalom
003476	2698	Hegyeshalom
003509	2694	Győrladamér
003587	1066	Halászi
003592	1075	Tejfalusziget
003593	1080	Bezenye
003621	2695	Győr-Kisbácsa
003623	2697	Győr-Kisbácsa
003624	2693	Rajka
003625	2699	Rajka
003626	2700	Rajka
003627	2727	Rajka
003682	3080	Mosonmagyaróvár
003815	3119	Győrladamér
003817	3121	Ásványráró
003818	3122	Halászi
003878	4189	Dunakiliti
003882	4501	Kisbodak
003887	4502	Ásványráró
003936	2530	Lébény
003937	2540	Hegyeshalom
004121	3270	Győr
004122	3269	Kisbajcs
004123	3268	Dunaremete
004126	3265	Rajka
004129	3218	Bezenye
004322	2635	Magyarkimle
004323	2636	Magyarkimle
004327	2684	Rajka

Studňa č.	Ozn.	Lokalita
004328	2633	Dunaremete
110328	2621	Ásványráró
110502	8440	Lipót
110503	8444	Darnózseli
110504	8500	Rajka
110610	9310	Rajka
110619	9327	Dunakiliti
110621	9330	Dunakiliti
110628	9355	Dunakiliti
110634	9368	Rajka
110637	9379	Rajka
110638	9380	Rajka
110643	9385	Bezenye
110657	9409	Rajka-Dunakiliti
110660	9413	Sérfenyősziget
110661	9415	Halászi
110664	9418	Mosonmagyaróvár
110675	9434	Püski
110676	9435	Püski
110685	9456	Ásványráró
110686	9457	Ásványráró
110687	9458	Ásványráró
110688	9459	Ásványráró
110689	9460	Ásványráró
110700	9478	Győrzámoly
110702	9479	Győrzámoly
110714	9493	Dunakiliti
110715	9494	Dunakiliti
110716	9495	Dunakiliti
110719	9498	Dunasziget
110720	9499	Dunasziget
110723	9502	Kisbodak
110724	9503	Kisbodak
110729	9508	Győrzámoly
110749	9536	Püski
110758	9546	Kimle
110771	9555	Mecsér
110772	9558	Mecsér
110784	9567	Győrújfalu
110800	9972	Dunasziget
110802	9974	Dunasziget
110803	9975	Dunasziget
110806	9978	Ásványráró
110807	9979	Ásványráró
110808	9980	Ásványráró
110814	Dkl-5	Doborgaz
110815	Dkl-6	Dunakiliti

Studňa č.	Ozn.	Lokalita
110816	Dkl-7	Rajka
110622	9331	Dunakiliti
110609	93051	Rajka
110612	93131	Rajka
110616	93211	Rajka
110617	93241	Rajka
110623	93381	Dunakiliti
110624	93421	Dunakiliti
110636	93711	Dunakiliti
110644	93861	Bezenye
110649	93931	Dunasziget
110673	94291	Püski
110682	94451	Darnózseli
110684	94521	Hédervár
110690	94641	Ásványráró
110691	94651	Dunaszeg
110693	94671	Dunaszeg
110695	94691	Dunaszentpál
110699	94761	Vámosszabadi
110701	94771	Vámosszabadi
110705	94821	Nagybajcs
110709	94871	Győrújfalu
110712	94911	Bácsa
110730	95091/B	Győrzámoly
110732	95111	Kisbajcs
110737	95181	Vének
110748	95321	Rajka
110751	95381	Mosonmagyaróvár
110753	95402	Dunasziget
110755	95431	Halászi
110757	95451	Mosonmagyaróvár
110801	99731/B	Cikola
110804	99761/B	Ásványráró
110805	99771/B	Ásványráró

g) Kvalita podzemných vôd

Slovenská strana

Studňa č.	Lokalita
102	Rusovce - vodný zdroj
2559	Čunovo - vodný zdroj
119	Kalinkovo - veľkozdroj, S-10
105	Šamorín - veľkozdroj, S-2
467	Vojka - vodný zdroj, HV-1
485	Bodíky - vodný zdroj, HB-2
103	Gabčíkovo - veľkozdroj, HAŠ-5
907	Bratislava-Petržalka, veľkozdroj Pečenský les, PL-4
899/1	Rusovce - pozorovací vrt PZO-26/I
888/1	Rusovce - pozorovací vrt PZO-23/I
872/1	Čunovo - pozorovací vrt PZO-19/I
329/1	Šamorín - pozorovací vrt 7265/I
87/7	Kalinkovo - pozorovací vrt PZ-13/7
170/2	Dobrohošť - pozorovací vrt PV-3/2
234/1	Rohovce - pozorovací vrt HGP/A-18/1
262/1	Sap - pozorovací vrt HGZ-26/1
265/1	Kľúčovec - pozorovací vrt 7366/1
3/3	Kalinkovo - pozorovací vrt PZ-1/3

Maďarská strana

Studňa č.	Lokalita
110610	Rajka
110619	Dunakiliti
110622	Dunakiliti
110634	Rajka
110637	Rajka
110660	Dunasziget
110664	Mosonmagyaróvár
110674	Kisbodak
110676	Arak
110685	Ásványráró
110686	Ásványráró
110687	Ásványráró
110698	Győrzámoly
110703	Győrzámoly
110706	Vámosszabadi
110749	Püski

Rozsah sledovaných ukazovateľov, frekvencia 2 krát za rok:
teplota vody, pH, merná vodivosť, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+, HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, PO_4^{3-}, $CHSK_{Mn}$

raz ročne:
maďarská strana: vo vybraných studniach
ťažké kovy (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
organické mikropolutanty (pesticídy a tetrachlóretylén)

slovenská strana: vo vybraných studniach
ťažké kovy (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
organické mikropolutanty (pesticídy a iné)

h) Pôdna vlhkosť

Slovenská strana

Číslo objektu	Monitorovacia plocha	Lokalita
2703	MP-6	Dobrohošť
2704	MP-9	Bodíky
2705	MP-10	Bodíky
2706	MP-14	Gabčíkovo
2707	MP-18	Kľúčovec
2716	MP-4	Rohovce
2717	MP-5	Horný Bar - Šuľany
2718	MP-6	Horný Bar
2755	L-3	Sap
2756	L-4	Gabčíkovo
2757	L-5	Baka
2758	L-6	Trstená na Ostrove
2759	L-7	Horný Bar - Bodíky
2760	L-8	Horný Bar - Šuľany
2761	L-9	Horný Bar - Bodíky
2762	L-10	Vojka nad Dunajom
2763	L-11	Vojka nad Dunajom
2764	L-12	Dobrohošť
3804	L-25	Medveďov
3805	L-26	Kľúčovec

Maďarská strana

Číslo objektu	Lokalita
9355	Dunakiliti 15E
9452	Hédervár 11B

Číslo objektu	Lokalita
9498	Dunasziget 11D
9972	Dunasziget 15D
9994	Dunasziget 22B
9995	Lipót 4A
9996	Lipót 27C
9997	Ásványráró 6G
9998	Ásványráró 6D
2605	Halászi
2630	Püski
2653	Rajka
7920	Ásványráró
9443	Lipót

Frekvencia meraní:
zimné mesiace (január, február, november, december): raz mesačne
vegetačné obdobie (marec-október): raz za dva týždne

i) Les

Plošné hodnotenie zdravotného stavu lesov na základe leteckého snímkovania.
Frekvencia: raz za tri roky
Spoločné snímkovanie v roku 2008

Ostatné monitorované ukazovatele a monitorované plochy dohodnúť do konca roka 2007.

j) Ostatné biologické skúmania

Vybrané skupiny zooplanktónu (Cladocera a Copepoda), bentických bezstavovcov - makrozoobentosu (Mollusca, Odonata, Ephemeroptera a Trichoptera) a suchozemských rastlín a suchozemských slimákov budú uskutočňované v rozsahu doterajšieho monitoringu. Je potrebné ďalšie zosúlaďovanie miest, skupín a metodiky pozorovania.

Jegyzőkönyv
a monitoringgal megbízottak
2007. április 25.-én, Győrben megtartott tárgyalásáról

Jelenlevők: jelenléti ív szerint
Helyszín: ÉDUKÖVIZIG hivatalos helyisége
Dátum: 2007. április 25.

A tárgyalást a magyar fél részéről a monitoringgal megbízott képviselő, Janák Emil, az ÉDUKÖVIZIG igazgatója; szlovák oldalról monitoringgal megbízott képviselő, Dominik Kocinger, a Szlovák Köztársaság Bős-Nagymaros vízierőmű rendszer kiépítésének és üzemelésének kormánymeghatalmazottja vezette.

Programpontok:

1. A magyar fél javaslatának megtárgyalása a monitoringgal megbízott képviselők tevékenységéről szóló Alapszabály változtatására az 1995. évi kormányközi megállapodás értelmében.
2. A magyar fél változtatásokra vonatkozó javaslatának részletes megtárgyalása, a monitorozás helyeit illetően, a figyelt mutatók körére és a mérési gyakoriságra, amelyek az alapszabály mellékletében vannak feltüntetve.
3. Egyéb.

Az 1. ponthoz

A tárgyaláson a monitoringgal megbízottak a következőkben állapodtak meg:

a) Az alapszabály preambuluma a következő mondattal egészül ki:
A környezeti monitoring rendszer üzemeltetésében alkalmazva lesznek az EU irányelvei, beleértve a Európai Parlament és a Tanács, 2000. október 23.-án elfogadott 2000/60/EK irányelvét a vízvédelmi politika terén a közösségi fellépés kereteinek meghatározásáról (Vízkeretirányelv), és az Aarhusi egyezmény a környezeti ügyekben az információhoz való hozzáférésről, a nyilvánosságnak a döntéshozatalban történő részvételéről és az igazságszolgáltatáshoz való jog biztosításáról.
b) Az 1. cikk 1. pontja a következő mondattal egészül ki:
Az üzemeltetett környezeti monitoring összhangban van a Vízkeretirányelv szerinti operatív monitoringgal.
c) A 2. cikk 4. pontjának az első mondata a következőképpen változik:
Az adatok cseréjére monitoringgal megbízott képviselők útján valósul meg, írásos és digitális formában.
d) A 3. cikk 1. pontja a következőképpen változik:
A kicserélt adatok közös értékelése egy naptári évre vonatkozik. A felszíni vízhozam és vízszintek esetében az értékelés hidrológiai évre vonatkozik. A közös éves jelentés hat hónappal a naptári év vége után kerül elkészítésre.

e) A 3. cikk 2. pontjának második mondata a következőképpen változik:
A nemzeti éves jelentéseket a felek a naptári év vége után négy hónappal kicserélik és a monitoringgal megbízott képviselők tanácskozást hívnak össze az előterjesztett adatok közös kiértékelésére.

f) A 3. cikk kiegészül egy 3. ponttal:
A nemzeti éves jelentések jóváhagyása és cseréje után a weboldalakon ezeket nyilvánosságra hozzák. A szlovák weboldal címe www.gabcikovo.gov.sk, a magyar weboldal címe www.kvvm.hu.

g) A 4. cikk 4. pontjának második mondata a következőképpen változik:
A tárgyalások jegyzőkönyve szlovák és magyar nyelven kerül elkészítésre.

A 2. ponthoz

A monitoringgal megbízott képviselők a tárgyaláson a következő változtatásokban állapodtak meg a monitorozási helyek, a figyelt mutatók körét és a mérési frekvenciák vonatkozóan.

a) Felszíni víz hidrológia
A felszíni vizek vízhozamainak és vízszintjeinek monitorozási helyszínek, mért paraméterek, valamint a mérések gyakoriságára vonatkozó semmilyen változtatást nem javasolnak.

b) Felszíni víz morfológia
A monitoring képviselői megegyeztek abban, hogy a meder morfológiájának elbírálása fontos, és az új értékelési rendszerhez szükséges. A módszer kidolgozása 2007. év után kerül megállapításra, a mérési gyakorisága háromévente lesz. A monitoring képviselői megállapodtak abban, hogy az első mérést legkésőbb 2009-ben elvégzik. A morfológiai változások megfigyelését koordinálni kell a Szlovák-Magyar Határvízi Bizottság kereteiben történő tevékenységekkel.

c) Fiziko-kémiai elemek
A felszíni vizek minősége esetében a monitoring képviselői megállapodtak, hogy a felszíni vizek minőségének figyelése ugyanazokon a helyeken (szelvényekben) történik mint eddig, 12-szer évente, vagyis havonta egyszer. A vizsgált paraméterek listájából a baktériumok és a zooplankton lett kihagyva. Az algák, illetve a makrozoobenton átkerült a hidrobiológiai elemek közé. A monitoring képviselői megállapodtak abban, hogy az 1995 évi megállapodás szerinti monitoring és a határvízi monitoring program összehangolása érdekében a Szlovák-Magyar Határvízi Bizottsághoz fordulnak.

d) Hidrobiológiai elemek
A monitoring képviselői a következőkben állapodtak meg:
- fitoplankton: magyar fél 4-szer, az április-szeptember időszakban
szlovák fél 12-szer, március-október időszakban, a nyári hónapokban sűrűbben
- fitobenton: évente 2-szer
- bentikus gerinctelenek (makrozoobenton): évente 2-szer
- makrofiták: évente 2-szer
- halak: 3 évente egyszer
A monitorozás a Határvízi Bizottság keretében megállapodott módszertannal összhangban történik meg.

e) Üledék minősége

Az üledékek minőségének elemzését a magyar fél részéről 7 monitorozási helyen fogják megvalósítani (2-szer az Öreg-Duna meder, 3-szor ágrendszer, 1-szer jobboldali szivárgó csatorna, 1-szer Mosoni-Duna). Szlovák oldalon az üledékek minőségének elemzését 6 monitorozási helyen fogják megvalósítani (2-szer az Öreg-Duna meder, 4-szer tározó). Az elemzések során az szervetlen mikroszennyezők tartalom kerül bemérésre (Cu, Cr, Zn, Pb, Cd, Ni, Hg, As), tápanyag tartalom (összes foszfor, összes nitrogén) és a szerves mikroszennyezők PAH tartalmát (összege, ill. 10 kiemelt összetevő). A mintavétel gyakorisága évente egyszeri, alacsony vízállásoknál, rendszerint ősszel.

f) Felszín alatti víz mennyisége

A felszín alatti vizek vízszintjeinek megfigyelésében a mérések gyakoriságában semmilyen változtatást nem javasoltak. A magyar oldalon az optimalizálás keretében mérsékelten csökkent a megfigyelt kutak száma 126-ra. Szlovák fél részéről a kutak számában nem várható változás. A kutak pontos jegyzéke a jegyzőkönyv mellékletét képezi.

g) Felszín alatti víz minősége

A felszín alatti vizek minőségének megfigyelése ugyanazokon a kutakon történik, mint eddig. A megfigyelt mutatók közül a nitrit, a TOC és a szilikátok voltak kihagyva. A kiválasztott helyszíneken a magyaroldalon (a 9379, 9413, 9536, 9456 és 9480 számú megfigyelési kutakon) javasolták a nehézfémek (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr) és szerves mikroszennyezők (peszticidek és tetraklór-etilén) figyelését is évente egyszer. A szlovák oldalon a nehézfémek és kiemelt szerves mikroszennyezőket (tetraklór-etilén kivételével) majdnem az összes kúton mérik.

h) Talajnedvesség

A talajnedvesség mérése változások nélkül fog történni, az eddigi módszertan alapján. A mérés gyakoriságát a következő sémához szükséges igazítani: a téli hónapokban havonta egyszer (január, február, november, december) a vegetációs időszakban megközelítőleg két hetente egyszer (március-október), ez kb. 20-21 mérés.

i) Erdő

A monitoring képviselői megegyeztek abban, hogy az erdők egészségi állapot értékelésének fontos része a légi felvételek alapján készült területi értékelés. Szükség van közös módszertanban és értékelési módszerben való megállapodásra a szlovák fél tapasztalatai alapján. A közös légi felvételezésnek a 2008-as évben kell megvalósulnia.

Tekintettel az egyéb monitorozási mutatókra a következő monitoringgal kapcsolatban, a két fél szakértőinek 2007. év végéig kell megállapodniuk. A szlovák fél tájékoztatta a magyar felet, hogy az alap dendrometrikus jellemzők megfigyelését, az alátámasztó adatokkal (a felszín alatti vízszintek és a talajnedvesség) együtt, továbbra is nélkülözhetetlennek tartja.

j) Egyéb biológiai vizsgálatok

A biológiai monitoring keretében a makrozoobenton monitoringja átkerült a hidrobiológiai elemek közé. Az értékelés a Víz Keretirányelv módszertan alapján történik. A halak monitoringja is átkerült a hidrobiológiai elemek közé, háromévenként egyszeri gyakorisággal. Az értékelés a Víz Keretirányelv módszertan alapján történik. Az eddigi zooplankton (Cladocera, Copepoda), bentikus gerinctelenek – makrozoobenton (Mollusca, Odonata, Ephemeroptera és Trichoptera) kiemelt csoportjai, és a szárazföldi növények és szárazföldi csigák monitoringja továbbra is az eddigi mértékben történik. Ebben a vizsgálati területben további egyeztetés szükséges a helyek, csoportok és megfigyelési módszertanok vonatkozóan.

A jelen jegyzőkönyv mellékletében a táblázatokban feltüntetett változtatásokat a két fél szakértői a 2007 év végéig beillesztik a szabályzat összetett mellékletébe.

A 3. ponthoz:

a) A szlovák fél tájékoztatta a magyar felet, hogy a napi adatcsere keretében szolgáltatott üzemelési adatok az internetes oldalon lesznek elérhetőek. Javasolta a magyar félnek, hogy az internetes oldal megnyitása után a napi adatküldést állítsák le, és az adatokat csak internet kapcsolat meghibásodás, vagy telefonos igény esetén küldjék e-mailen vagy faxon. A szlovák fél az interneten levő adatok archiválását 40 napra javasolja. A magyar fél rámutatott az üzemelési adatok szolgáltatásának problémája és a HVB keretében levő megállapodások összefüggéseire. Megígérte, hogy a szlovák fél igényével kapcsolatosan később nyilatkozik.

b) A szlovák fél megismételte korábbi kérelmét az 1992. év előtti adatok cseréjének bővítésére, ott ahol az ilyen adatok elérhetők. A magyar fél az ilyen bővítéssel elvileg egyetért, azonban az időszakra, amelyre ez a csere vonatkozna, később nyilatkozik.

Győr, 2007.04.25.

Janák Emil monitoringgal megbízott képviselő a magyar fél részéről	Dominik Kocinger monitoringgal megbízott képviselő a szlovák fél részéről

a) Felszíni víz hidrológia

Szlovák oldal

Szelvény száma	Vízfolyás	Helyszín
1250	Duna	Bratislava - Devín
2848	Duna	tározó - Čunovo
2552	Duna	Čunovo – öreg meder
2545	Duna	Hamuliakovo
2558	Duna	Dobrohošť
1251	Duna	Gabčíkovo
1252	Duna	Medveďov
1600	Duna	Komárno
1653	Kis Duna	Bratislava - Malé Pálenisko
2851	Mosoni Duna	Čunovo
3126	Doborgazi csatorna	Dobrohošť - vízpótló műtárgy
2849	felvízi csatorna	Gabčíkovo - felvíz
2850	alvízi csatorna	Gabčíkovo - alvíz
3124	jobboldali szivárgó csatorna	Čunovo - felvíz
3125	jobboldali szivárgó csatorna	Čunovo - alvíz
4045	mellékágrendszer	A küszöbvonal
4046	mellékágrendszer	B1 küszöbvonal
4047	mellékágrendszer	B2 küszöbvonal
4048	mellékágrendszer	C küszöbvonal
4049	mellékágrendszer	D küszöbvonal
4050	mellékágrendszer	E küszöbvonal
4051	mellékágrendszer	F1 küszöbvonal
4052	mellékágrendszer	F3 küszöbvonal
4053	mellékágrendszer	G küszöbvonal
4054	mellékágrendszer	H1 küszöbvonal
4055	mellékágrendszer	H3 küszöbvonal
4056	mellékágrendszer	J küszöbvonal
4057	mellékágrendszer	B kavics gödör

Magyar oldal

Szelvény száma	Vízfolyás	Helyszín
000001	Duna	Rajka
000002	Duna	Dunaremete
000005	Duna	Komárom
000017	Mosoni Duna	Mecsér
000018	Mosoni Duna	Bácsa
003871	Mosoni Duna	VI. zsilip - felvíz
003872	Mosoni Duna	VI. zsilip - alvíz
003873	Mosoni Duna	I. zsilip - felvíz
003874	Mosoni Duna	I. zsilip - alvíz

Szelvény száma	Vízfolyás	Helyszín
003875	szivárgó csatona	II. zsilip - felvíz
003876	szivárgó csatorna	II. zsilip - alvíz
003939	Duna	Dunakiliti duzzasztó - felvíz
003940	szivárgó csatona	V. zsilip - felvíz
003941	szivárgó csatorna	V. zsilip - alvíz
004516	mellékágrendszer	Helena
110092	mentett oldal	VII. zsilip - felvíz
110106	Zátonyi Duna	Gyümölcsös út - felvíz
110144	Zátonyi Duna	Gyümölcsös út - alvíz
110161	Duna	Hať Dunakiliti - alvíz
110113	mellékágrendszer	Z-1, felvíz
110127	mellékágrendszer	Dobrorgaz 15
110115	mellékágrendszer	B-2, felvíz
110114	mellékágrendszer	B-2, alvíz
110117	mellékágrendszer	B-3, felvíz
110116	mellékágrendszer	B-3, alvíz
110170	mellékágrendszer	Z-6, felvíz
110171	mellékágrendszer	Z-6, alvíz
110152	mellékágrendszer	Z-8, felvíz
110153	mellékágrendszer	Z-8, alvíz
110119	mellékágrendszer	B-4, felvíz
110118	mellékágrendszer	B-4, alvíz
110129	mellékágrendszer	B-5, felvíz
110128	mellékágrendszer	B-5, alvíz
110162	mellékágrendszer	B-6, felvíz
110138	mellékágrendszer	B-7, alvíz
110198	mellékágrendszer	B-8, felvíz
110131	mellékágrendszer	B-9, felvíz
110133	mellékágrendszer	B-11, felvíz
110132	mellékágrendszer	B-11, alvíz
110142	mellékágrendszer	Z-12, felvíz
110141	mellékágrendszer	Z-12, alvíz
110155	mellékágrendszer	Z-10, felvíz
110157	mellékágrendszer	Gatyai zárás, felvíz

b) Felszíni víz morfológia

A módszer kidolgozása 2007. év után kerül megállapításra, a mérési gyakorisága három évente lesz.

c) Fiziko-kémiai elemek

Szlovák oldal

Szelvény száma	Vízfolyás	Helszín
109	Duna	Bratislava - Nový most, közepe
4016	Duna	Dobrohošť, rkm 1843, fenékküszöb felett
4025	Duna	Dobrohošť, rkm 1839,6 - bal oldal
3739	Duna	Sap, staré koryto, nad rkm 1812
112	Duna	Medveďov - híd, közepe
1205	Duna	Komárno - híd, közepe
307	Duna - tározó	Kalinkovo – hajózási vonal
308	Duna - tározó	Kalinkovo - bal oldal
309	Duna - tározó	Šamorín - jobb oldal
311	Duna - tározó	Šamorín - bal oldal
3530	Duna - alvíz csatorna	Sap - bal oldal
3529	Mosoni Duna	Čunovo - közepe
3531	jobboldali szivárgó csatona	Čunovo
317	baloldali szivárgó csatorna	Hamuliakovo
3376	Doborgazi csatorna	Dobrohošť - bal oldal

Magyar oldal

Szelvény száma	Vízfolyás	Helyszín
0001	Duna	Rajka, rkm 1848
0043	Duna	fenékküszöb felett, rkm 1843
0043	Duna	fenékküszöb alatt, rkm 1843
0002	Duna	Dunaremete
2306	Duna	Medve
1141	Mosoni Duna	Vének
0082	szivárgó csatona	I. zsilip
0084	szivárgó csatorna	II. zsilip
1112	mellékágrendszer	Helena
1114	mellékágrendszer	Szigeti ág, km 42,2
1126	mellékágrendszer	Ásványi ág, km 23,9

Figyelt paraméterek terjedelme, gyakoriság havonta:
vízhőmérséklet, pH, vezetöképesség, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, NH_4^+, Mn, Fe (filtráció nélkül)
Hg, Zn, As, Cu, Cr, Cd, Ni, Pb (minden filtráció után)
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{3-}, összes P, összes N
$KOI_{Mn,}$ BOI_5, lebegő anyag (105°C-nál szárított)
TOC, NEL-UV, összes oldott anyag (105°C-nál szárított)
bioszeszton szaprobitása , klorofil-a

d) Hidrobiológiai elemek

fitoplankton: magyar oldal évente 4-szer, április-szeptember idöszakba
szlovák oldal 12-szer, március-október idöszakba,
nyári hónapokban sűrűbben

fitobentosz: évente 2-szer

bentikusé gerinctelenek (makrozoobenton): évente 2-szer

makrofiták: évente 2-szer

halak:
magyar oldal 5 monitorozási helyszín (2x a Duna öreg medre, 2x mellékágrendszer, 1x Mosoni Duna))
szlovák oldal 6 monitorozási helyszín (2x Duna öreg medre, 4x mellékágrendszer)

Gyakoriság: három évente egyszer

e) Üledék minősége

magyar oldal: 7 monitorozási helyszín (2x Duna öreg medre, 3x mellékágrendszer , 1x szivárgó csatorna, 1x Mosoni Duna)
szlovák oldal: 6 monitorozási helyszín (2x Duna öreg medre, 4x tározó)

szervetlen mikroszennyező: Cu, Cr, Zn, Pb, Cd, Ni, Hg, As
tápanyag tartalom: összes foszfor, összes nitrogén
szerves mikroszennyező: PAH (összege, illetve. 10 kiemelt össztevő)

Gyakoriság: évente 1-szer, rendszerint ősszel

f) Felszín alatti víz mennyisége

Szlovák oldal

Kútszám	Helyszín
1912	Nová Stráž
1913	Kameničná - Hadovce
1915	Zlatná na Ostrove
1916	Štúrová-Stará lúka
4002	Kameničná - Piesky
1922	Bodza - Lúky
1924	Zemianska Olča
1925	Tôň
1927	Sokolce
1928	Okoč
1929	Okoč - Goliáš
1931	Topoľníky
4435	Kolárovo
1937	Dolný Štál
1938	Boheľov
1939	Padáň - Majer
4428	Bodza - Maderét
1943	Kolárovo
4003	Okoč - Aszod
1948	Veľký Meder
1949	Medveďov
1950	Veľké Kosihy
4004	Kližská Nemá
1952	Trávnik
1954	Číčov
4429	Číčov - Kec
1957	Čiližská Radvaň
1958	Sap
1959	Ňárad
1960	Gabčíkovo - Čierny Les
1961	Mad
4306	Trhové Mýto
1964	Gabčíkovo
1965	Gabčíkovo
1966	Vrakúň
1969	Dvorníky
1970	Jahodná
1971	Baka
1972	Kračany - Dobor
1973	Kostolné Kračany
1974	Vydrany
1976	Veľké Blahovo - Lúky
1977	Bodíky

Kútszám	Helyszín
4302	Lúč na Ostrove - Antónia Dvor
1979	Michal na Ostrove - Kolónia
1980	Michal na Ostrove - Lúky
4217	Blahová - Sever
1982	Blahová
1983	Horný Bar- Šuľany
1984	Holice
1988	Rohovce
1989	Dobrohošť
4303	Macov
1992	Mierovo
1993	Zlaté Klasy - Rastice
1995	Kvetoslavov
1996	Čakany
1997	Janíky - Búštelek
1998	Kalinkovo
1999	Miloslavov - Alžbetin Dvor
2000	Tomášov
2001	Podunajské Biskupice - Topoľové
2002	Rovinka
2003	Most na Ostrove
2033	Šamorín - Mliečno
2035	Šamorín - Čilistov
2038	Bratislava - Petržalka
2039	Petržalka - Ovsište
4007	Bratislava - Petržalka - Colnica Berg
4009	Bratislava - Jarovce
2044	Rusovce
2045	Čunovo - hranica
2046	Čunovo
2067	Hroboňovo
2069	Ohrady
2070	Nový Život - Eliášovce
2071	Podunajské Biskupice
4044	Gabčíkovo
872	Čunovo (csak kútszám változás, 2123 helyett)
2144	Bratislava - Petržalka
2148	Petržalka - Kopčianska ul.
2162	Petržalka
2165	Petržalka
2167	Petržalka
2169	Rusovce
2171	Čunovo
4312	Čunovo
2180	Jarovce
2186	Čunovo
2188	Rusovce - Dolné pole

Kútszám	Helyszín
2205	Bratislava - Vlčie hrdlo (Slovnaft)
2207	Bratislava - Podunajské Biskupice
2208	Bratislava-Vrakuňa
2215	Bratislava - Podunajské Biskupice - Lieskovec
2217	Rovinka
2219	Malinovo
2231	Kalinkovo
2241	Mierovo
2247	Dunajská Lužná - Nová Lipnica
2267	Báč
329	Šamorín - Mliečno (csak kútszám változás, 2269 helyett)
2271	Dobrohošť - Dunajské kriviny
2272	Dobrohošť
2274	Kyselica
2279	Vojka
2293	Holice - Stará Gala
2318	Trstená na Ostrove
2327	Bodíky
2328	Bodíky
2329	Bodíky - Kráľovská lúka
2343	Gabčíkovo
2345	Malé Vranie - Dekanské
2349	Gabčíkovo
2353	Sap - Čiližská sihoť
2387	Nová Stráž
2401	Bratislava - Vlčie hrdlo (Slovnaft)
2708	Dobrohošť - Dunajské kriviny
2709	Bodíky - Malá sihoť, línia D
2711	Gabčíkovo - Dunajský ostrov
2712	Kľúčovec - Sporná sihoť
3129	Vojka nad Dunajom - Dolné mačacie
3132	Vojka nad Dunajom - Vrbiny
3136	Vojka nad Dunajom - Vrbiny
3139	Šuľany - Dunajské sihote
3147	Bodíky - Mlynské
3154	Baka - Obecný ostrov
3163	Sap - Riečina
2710	Bodíky - Kráľovská lúka
3172	Bodíky - Kráľovská lúka
2858	Vojka nad Dunajom - Dolné vrbiny
3131	Vojka nad Dunajom - pri Veľkej Žofín
3137	Šuľany - Dunajské sihote
3144	Bodíky - línia E
3146	Bodíky - Malá sihoť
3151	Bodíky - Malobodícke
3155	Baka - Nová trieda, Ostrov Orliaka morského
3159	Gabčíkovo - Dunajský ostrov, Istragov

Magyar oldal

Törzsszám	Kútszám	Helyszín
000062	1019	Győrladamér
000066	2659	Vámosszabadi
000072	2666	Győrladamér
000119	2681	Hegyeshalom
000134	2647	Bezenye
000135	2648	Bezenye
000140	2640	Dunakiliti
000143	2600	Feketeerdő
000144	2611	Feketeerdő
000147	2615	Feketeerdő
000148	2617	Feketeerdő
000151	2609	Cikolasziget
000152	2610	Cikolasziget
000159	2605	Halászi
000188	1009	Lébény
003470	1020	Bezenye
003473	1031	Hegyeshalom
003476	2698	Hegyeshalom
003509	2694	Győrladamér
003587	1066	Halászi
003592	1075	Tejfalusziget
003593	1080	Bezenye
003621	2695	Győr-Kisbácsa
003623	2697	Győr-Kisbácsa
003624	2693	Rajka
003625	2699	Rajka
003626	2700	Rajka
003627	2727	Rajka
003682	3080	Mosonmagyaróvár
003815	3119	Győrladamér
003817	3121	Ásványráró
003818	3122	Halászi
003878	4189	Dunakiliti
003882	4501	Kisbodak
003887	4502	Ásványráró
003936	2530	Lébény
003937	2540	Hegyeshalom
004121	3270	Győr
004122	3269	Kisbajcs
004123	3268	Dunaremete
004126	3265	Rajka
004129	3218	Bezenye
004322	2635	Magyarkimle
004323	2636	Magyarkimle
004327	2684	Rajka

Törzsszám	Kútszám	Helyszín
004328	2633	Dunaremete
110328	2621	Ásványráró
110502	8440	Lipót
110503	8444	Darnózseli
110504	8500	Rajka
110610	9310	Rajka
110619	9327	Dunakiliti
110621	9330	Dunakiliti
110628	9355	Dunakiliti
110634	9368	Rajka
110637	9379	Rajka
110638	9380	Rajka
110643	9385	Bezenye
110657	9409	Rajka-Dunakiliti
110660	9413	Sérfenyősziget
110661	9415	Halászi
110664	9418	Mosonmagyaróvár
110675	9434	Püski
110676	9435	Püski
110685	9456	Ásványráró
110686	9457	Ásványráró
110687	9458	Ásványráró
110688	9459	Ásványráró
110689	9460	Ásványráró
110700	9478	Győrzámoly
110702	9479	Győrzámoly
110714	9493	Dunakiliti
110715	9494	Dunakiliti
110716	9495	Dunakiliti
110719	9498	Dunasziget
110720	9499	Dunasziget
110723	9502	Kisbodak
110724	9503	Kisbodak
110729	9508	Győrzámoly
110749	9536	Püski
110758	9546	Kimle
110771	9555	Mecsér
110772	9558	Mecsér
110784	9567	Győrújfalu
110800	9972	Dunasziget
110802	9974	Dunasziget
110803	9975	Dunasziget
110806	9978	Ásványráró
110807	9979	Ásványráró
110808	9980	Ásványráró
110814	Dkl-5	Doborgaz
110815	Dkl-6	Dunakiliti

Törzsszám	Kútszám	Helyszín
110816	Dkl-7	Rajka
110622	9331	Dunakiliti
110609	93051	Rajka
110612	93131	Rajka
110616	93211	Rajka
110617	93241	Rajka
110623	93381	Dunakiliti
110624	93421	Dunakiliti
110636	93711	Dunakiliti
110644	93861	Bezenye
110649	93931	Dunasziget
110673	94291	Püski
110682	94451	Darnózseli
110684	94521	Hédervár
110690	94641	Ásványráró
110691	94651	Dunaszeg
110693	94671	Dunaszeg
110695	94691	Dunaszentpál
110699	94761	Vámosszabadi
110701	94771	Vámosszabadi
110705	94821	Nagybajcs
110709	94871	Győrújfalu
110712	94911	Bácsa
110730	95091/B	Győrzámoly
110732	95111	Kisbajcs
110737	95181	Vének
110748	95321	Rajka
110751	95381	Mosonmagyaróvár
110753	95402	Dunasziget
110755	95431	Halászi
110757	95451	Mosonmagyaróvár
110801	99731/B	Cikola
110804	99761/B	Ásványráró
110805	99771/B	Ásványráró

g) Felszín alatti víz minősége

Szlovák oldal

Kútszám	Helyszín
102	Rusovce – ivóvíz bázis
2559	Čunovo - ivóvíz bázis
119	Kalinkovo - ivóvíz bázis, S-10
105	Šamorín - ivóvíz bázis, S-2
467	Vojka - ivóvíz bázis, HV-1
485	Bodíky - ivóvíz bázis, HB-2
103	Gabčíkovo - ivóvíz bázis, HAŠ-5
907	Bratislava-Petržalka, ivóvíz bázis Pečenský les, PL-4
899/1	Rusovce - figyelő kút PZO-26/I
888/1	Rusovce - figyelő kút PZO-23/I
872/1	Čunovo - figyelő kút PZO-19/I
329/1	Šamorín - figyelő kút 7265/I
87/7	Kalinkovo - figyelő kút PZ-13/7
170/2	Dobrohošť - figyelő kút PV-3/2
234/1	Rohovce - figyelő kút HGP/A-18/1
262/1	Sap - figyelő kút HGZ-26/1
265/1	Kľúčovec - figyelő kút 7366/1
3/3	Kalinkovo - figyelő kút PZ-1/3

Magyar oldal

Kútszám	Helyszín
110610	Rajka
110619	Dunakiliti
110622	Dunakiliti
110634	Rajka
110637	Rajka
110660	Dunasziget
110664	Mosonmagyaróvár
110674	Kisbodak
110676	Arak
110685	Ásványráró
110686	Ásványráró
110687	Ásványráró
110698	Győrzámoly
110703	Győrzámoly
110706	Vámosszabadi
110749	Püski

Figyelt paraméterek terjedelme, gyakoriság évente 2-szer:
vízhőmérséklet, pH, vezetőképesség, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+, HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, PO_4^{3-}, KOI_{Mn}

évente egyszer:
magyar oldla: kiválasztott kutakban
nehéz fémek (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
szerves mikroszennyezők (peszticidek a tetraklór-etilén)

szlovák oldal: kiválasztott kutakban
nehéz fémek (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
szerves mikroszennyezők (peszticidek, egyebek)

h) Talajnedvesség

Szlovák oldal

Azonosító	Monitoring terület	Helyszín
2703	MP-6	Dobrohošť
2704	MP-9	Bodíky
2705	MP-10	Bodíky
2706	MP-14	Gabčíkovo
2707	MP-18	Kľúčovec
2716	MP-4	Rohovce
2717	MP-5	Horný Bar - Šuľany
2718	MP-6	Horný Bar
2755	L-3	Sap
2756	L-4	Gabčíkovo
2757	L-5	Baka
2758	L-6	Trstená na Ostrove
2759	L-7	Horný Bar - Bodíky
2760	L-8	Horný Bar - Šuľany
2761	L-9	Horný Bar - Bodíky
2762	L-10	Vojka nad Dunajom
2763	L-11	Vojka nad Dunajom
2764	L-12	Dobrohošť
3804	L-25	Medveďov
3805	L-26	Kľúčovec

Magyar oldal

Azonosító	Helyszín
9355	Dunakiliti 15E
9452	Hédervár 11B
9498	Dunasziget 11D

Azonosító	Helyszín
9972	Dunasziget 15D
9994	Dunasziget 22B
9995	Lipót 4A
9996	Lipót 27C
9997	Ásványráró 6G
9998	Ásványráró 6D
2605	Halászi
2630	Püski
2653	Rajka
7920	Ásványráró
9443	Lipót

Mérési gyakoriság:
téli hónapok (január, február, november, december): havonta
tenyészeti időszak (március-október): kéthetente

i) Erdő

Erdők egészségi állapot területi értékelése a légi felvételek alapján.
Gyakoiság: három évente egyszer
Közös felvételezés 2008-ban.

Egyébb monitorozási mutatók és monitorozási területek 2007 év végéig megállapodásra jutnak.

j) Egyéb biológiai vizsgálatok

Zooplankton (Cladocera, Copepoda), bentikus gerinctelenek – makrozoobenton (Mollusca, Odonata, Ephemeroptera és Trichoptera) kiemelt csoportjai, és a szárazföldi növények és szárazföldi csigák monitoringja továbbra is az eddigi monitorozás mértékben történik. További egyeztetés szükséges a helyek, csoportok és megfigyelési módszertanok vonatkozóan.

APPENDIX A.4.

Zápisnica

z prerokovania a podpísania Spoločnej výročnej správy za rok 2014
zo spoločného slovensko-maďarského monitorovania,
stanoveného medzivládnou Dohodou z 19. apríla 1995

Prítomní:

za maďarskú stranu:

Dr. András Rácz,	zástupca štátneho tajomníka pre otázky životného prostredia, zástupca pre monitorovanie, Ministerstvo pôdohospodárstva
Dr. Bálint Dobi,	vedúci odboru, Odbor ochrany životného prostredia, Ministerstvo pôdohospodárstva
Mária Galambos,	hlavný radca, Odbor medzinárodných vzťahov a vzťahov v Karpatskej kotline, Ministerstvo pôdohospodárstva
Ildikó Kiss,	referent, Odbor ochrany životného prostredia, koordinátor, Ministerstvo pôdohospodárstva
Judit Pulai,	expert, Odbor ochrany životného prostredia a ochrany prírody, Úrad vlády Győr-Moson-Sopronskej župy
Orsolya Adamovics,	vedúca oddelenia, Odbor ochrany životného prostredia, Ministerstvo pôdohospodárstva
Pál Benyo,	tlmočník

za slovenskú stranu:

Ing. Ladislav Lazár,	splnomocnenec pre výstavbu a prevádzku SVD G-N, zástupca pre monitorovanie
Mgr. Maroš Nikolaj, PhD.,	riaditeľ TBD, Vodohospodárska výstavba, š.p.
RNDr. Zoltán Hlavatý, PhD.,	expert, Konzultačná skupina Podzemná voda, s.r.o.
Mgr. Renáta Vadkertiová,	odborný referent, Ministerstvo dopravy, výstavby a regionálneho rozvoja

1. Zástupcovia pre monitorovanie, Ing. Ladislav Lazár a Dr. András Rácz vyhodnotili plnenie odporúčaní uvedených v správe za rok 2013.
2. Zástupcovia oboch strán si vzájomne odovzdali tlačené verzie Národných ročných správ za rok 2014.
3. Zástupcovia oboch strán prerokovali a prijali Spoločnú výročnú správu za rok 2014.
4. Strany sa dohodli, že Národné ročné správy z monitorovania za rok 2015 vypracujú do 30. júna 2016.

5. Zástupca slovenskej strany pre monitorovanie informoval maďarskú stranu, že odborníci slovenskej strany vypracovali návrh na optimalizáciu monitorovania prírodného prostredia podľa Dohody 1995. Návrh, ako podklad pre rokovanie odborníkov, slovenská strana odovzdala maďarskej strane.
6. Maďarská strana predložený návrh preštuduje a vypracuje svoj návrh na optimalizáciu monitorovania prírodného prostredia podľa Dohody 1995.

Budapešť, 27. januára 2016.

....	....
Dr. András Rácz	**Ing. Ladislav Lazár**
za maďarskú stranu	za slovenskú stranu

Jegyzőkönyv
az 1995. április 19-i kormányközi megállapodásban
meghatározott közös magyar- szlovák monitoring
2014-évi Közös Éves Jelentésének megtárgyalásáról és aláírásáról

Résztvevők:

A magyar fél részéről:

Dr. Rácz András,	környezetügyért felelős helyettes államtitkár, monitorozással megbízott képviselő, Földművelésügyi Minisztérium
Dr. Dobi Bálint,	főosztályvezető, Környezetmegőrzési Főosztály, Földművelésügyi Minisztérium
Galambos Mária,	közigazgatási főtanácsadó, Nemzetközi és Kárpát medencei Kapcsolatok Főosztálya, Földművelésügyi Minisztérium
Kiss Ildikó,	referens, Környezetmegőrzési Főosztály, koordinátor, Földművelésügyi Minisztérium
Pulai Judit,	szakértő, Környezetvédelmi és Természetvédelmi Fősztály, Győr-Moson-Sopron Megyei Kormányhivatal
Adamovics Orsolya,	osztályvezető, Környezetmegőrzési Főosztály, Földművelésügyi Minisztérium
Benyó Pál,	tolmács

A szlovák fél részéről:

Ing. Lazár Ladislav	a Bős-Nagymarosi Vízlépcsőrendszer építésével és működtetésével megbízott kormánymeghatalmazott, monitorozással megbízott képviselő
Mgr. Nikolaj Maroš, PhD.,	igazgató, Műszaki és Biztonsági Felügyeleti Főosztály, Vodohospodárska výstavba, állami vállalat
Dr. Hlavatý Zoltán, PhD.,	szakértő, Ground Water Consulting Ltd.
Mgr. Vadkertiová Renáta,	szakmai referens, Közlekedési, Építésügyi és Regionális Fejlesztési Minisztérium

1. A két Fél monitoring felelőse, Ing. Lazár Ladislav és Dr. Rácz András kiértékelte a 2013-évi jelentésben szereplő javaslatok teljesítését.
2. A két Fél képviselői kölcsönösen átadták a 2014-évi Nemzeti jelentések nyomtatott változatait.
3. A két Fél képviselői megtárgyalták és elfogadták az 2014-évi Közös Éves Jelentést.
4. A Felek megegyeztek abban, hogy a 2015-évi megfigyelésekről szóló Éves Nemzeti Jelentéseket 2016. június 30-ig készítik el.

5. A Szlovák Fél képviselője tájékoztatta a Magyar Felet, hogy a szlovák szakértők elkészítették az 1995-évi Megállapodás szerint végzet környezeti monitorozás optimalizálásának javaslatát. A javaslatot, mint szakértői tárgyalási alapanyagot, a Szlovák Fél átadta a Magyar Félnek.
6. A Magyar Fél az átadott javaslatot áttanulmányozza és előkészít egy saját javaslatot az 1995-évi Megállapodás szerinti környezeti monitorozás optimalizálására.

Budapest, 2016. január 27.

....	....
Dr. Rácz András	**Ing. Lazár Ladislav**
a magyar fél részéről	a szlovák fél részéről