MONITORING IN THE GEMENC PROTECTED LANDSCAPE AREA: Hydrological, morphological water quality and ecological data of the Vén-Duna and River Danube in 2000, two years after reopening the dam

Contractor:

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1. Introduction

According to the contract between the RIZA (Institute for Inland Water Management and Waste Water Treatment of the Netherlands) and VITUKI Rt. (Water Resources Research Centre, Budapest), scientific co-operation and monitoring program was continued in the Vén-Duna side arm (u/s Baja) and River Danube similarly to the previous years. The Vén-Duna side arm is one of the connecting water bodies on the flood plain to the main Danube arm situated in the Gemenc Protected Landscape Area.

During the last decades the upper section of the side arm was isolated from the other lower stretch by an artificially built rock dam in order to exclude the side arm from the water transport. Stopping the water flow through the Vén-Duna during low and average flow condition resulted in better navigation conditions in the main river arm. This partly closed hydrological situation was characterised by extreme water quality in several times of the year. Individualisation of the different locations in terms of several quality variables (i.e. dissolved oxygen, Chlorophyll-a, abundance of phyto- and zooplankton) was frequently experienced.

The aim of the scientific and technological co-operation in the Gemenc area was to study the possibilities of ecological rehabilitation of the adjacent side arm using appropriate water training works. The detailed investigation of this pilot site was expected to provide data and methodology for similar side arm rehabilitation practice in the flood plain of the River Rhine in The Netherlands.

Therefore hydrological, morphological, water quality and ecological monitoring was carried out in order to describe the most important abiotic and biotic processes in the side arm. This report contains the results of the water quality and ecological monitoring research carried out by the VITUKI Plc. during the year 2000, three years after the reopening only. The Report consists of two distinct parts. The first part contains the evaluation of the monitoring data on water quality and ecological research in the area, including the necessary description of the applied methodology. Concerning material and methods in certain cases only references are given for the previous reports, where it is acceptable.

Similarly to the practice of the previous reports the presentation of the results of Discharge measurements and River Bed sampling are presented in separate volumes (carried out by the Technical Faculty of the Eötvös József College).

Based on the consultation among the Dutch and Hungarian contributors a synthesis of the research and monitoring of Vén-Duna will be presented in a summarising Final Report. This Final Report has to be submitted by the end of April 2001. The Final Report will contain all of the important conclusions of different topics together in one volume such as Hydrological, Morphological, Water Quality and Ecological Monitoring carried out during the four years monitoring program in the Gemenc Protected Landscape Area.

2. Water quality

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2.1 Introduction

Chemical and physical variables of macro-components and nutrients were investigated four times in the Vén-Duna and Danube (main channel) in 2000.

The aim of the investigations was to evaluate the quality of water in the sampling sites that are studied in the framework of the project. As a conclusion of the Preliminary Report, sediment was not investigated during this period of time. A detailed analysis of macro- and micro-components occurring in the sediment will be taken only during the last year of the monitoring program (in 2000). The sampling sites are indicated in Figure 1. Monthly average, minimum and maximum values of the water level measured in the Baja water gauge station in 2000 is illustrated in Figure 2.

2.2 Material and methods

Water samples for the **chemical analyses** were taken simultaneously with the hydrobiological studies along the long axis of the Vén-Duna (VD1 - 4) as well as the Danube at Baja (D6) on 18 May, 18 June, 29 July and 09 November.

Approximately 2 l of water samples were taken at each sampling sites from the surface of the water body. Analysis was done on the next day after storing samples in refrigerator. The following standards were used during the analysis: the standard series of MSZ 448, MSZ 12750, standards of **MSZ ISO 7150-1**, **MSZ ISO 5813** and the accredited individual methods of ÁVL-2 and ÁVL-4.

2.3 Results

The results of analyses are summarised in **Table 2.3.1-4** (see in the Appendix).

In **May** the physical and chemical characteristics of the water as well as the chlorophyll-a concentration were higly similar between the main and the side arm. The *total-N* concentration varied between 1.54 [VD3] and 1.80 [D6] mg/l. The *nitrate-N* (72.2 [D6] -84.4 [VD3] %) was the dominant component in the *N-spectrum* as a characteristic feature of large rivers (FELFÖLDY 1987). The proportion of *organic-N* varied from 13.6 [VD3] to 26.1 [D6] %.

In **June** the concentration of the **total-N** varied between 1.04 [VD4] and 1.75 [D6] mg/l. The *nitrate-N* (71.4 [D6] - 97.8 [VD1] %) was the dominant component in the *N-spectrum* usually with subdominance of *organic-N* (max. 27.1 [D6] %).

In **July** the concentration of the *total-N* varied between 1.23 [VD4] and 1.53 [VD1] mg/l. The main components of the *N-spectrum* were the *nitrate-N* (65.6 [VD1] - 73.2 [VD4] %) and the *organic-N* (22.8 [VD4] - 30.8 [VD1] %).

In **November** the physical and chemical characteritics of the water were nearly identical both the Vén-Duna and Danube with the exception of the total suspended solids. The values of this component varied between 1 and 2 mg/l in Vén-Duna and was 4 mg/l in the Danube. The concentration of the *total-N* varied between 2.42 [VD4] and 2.84 [VD2] mg/l. The main components of the *N-spectrum* were the *nitrate-N* (78.5 [VD1] - 83.0 [VD3] %) and the *organic-N* (12.3 [VD3] - 16.1 [VD4] %).

The concentrations of the *total-N* were higher in the River Danube than their average values in the Vén-Duna all the point of time investigated.

No significant differences were detectable between the Vén-Duna and the main arm concerning several physical and chemical characteristics (e. g. *pH*, *conductivity*, *total dissolved material*, *soluble reactive-P*, *biochemical-* and *chemical oxygen demand*, *total organic carbon*) as a result the reopening of the side arm.

The concentration of *dissolved oxygen* as well as the *chlorophyll-a* were slightly higher in the Vén-Duna (spatial average values) than in the Danube probably due to the lesser flow velocity in the side arm.

3. Hydrobiology

Authors: Németh J. (phytoplankton), Dr. Gulyás P. (zooplankton), Dr. Csányi B., Juhász P. (macrozoobenthon, fish)

3.1 Introduction

Phytoplankton, zooplankton and macrozoobenthon samples were collected in the Vén-Duna and the River Danube using the same methods as earlier. The tables containing the data are presented in the APPENDIX.

3.2 Material and methods

Altogether four series of samples were taken in the year of 2000 as follows: 18. May, 18 June, 29 July, and 09 November. Four sites on the Vén-Duna (1, 2, 3, and 4) and one Danubian site (6) were investigated during the study of 2000, respectively (Table 3.2.1). Detailed description of the sampling sites is given in the Base-line Report, too.

Table 3.2.1 List of the sampling sites and sample types (C, P, Z, M and F) (C=chemistry; P=phytoplankton; Z=zooplankton; M=macrozoobenthon; F=fish)

No.	Localities	18 May	18 June	29 July	24 Aug	12 Sept	09 Nov
1	Vén-Duna: u/s section (u/s rock dam)	CPZM	CPZM	CPZM	F	F	CPZM
2	Vén-Duna: u/s section (600 m below rock dam)	CPZM	CPZM	CPZM	F	F	CPZM
3	Vén-Duna: middle section (400 m d/s Cserta-Duna)	CPZM	CPZM	CPZM			CPZM
4	Vén-Duna: d/s section (200 m u/s the lower end)	CPZM	CPZM	CPZM			CPZM
5A	Rock dam		M		F	F	M
6	Danube, 1482 river km	CPZM	CPZM	CPZM	F	F	CPZM

Altogether four sites on the 4.1-km long Vén-Duna (1, 2, 3, and 4), one site on the Danube (6) was investigated during 2000. The location of the sampling sites is indicated on the map of the Vén-Duna side arm, as well (Figure 1).

The sampling methods used during the further monitoring program were the same as during the former (one base line and two follow up) studies. Detailed description of the methodology is published in the Base-line Report in details. Therefore only a short summary of the applied methods is given in this Report.

Phyto- and **zooplankton** samples were taken from the surface of the open water bodies of the investigated river sections. **Phytoplankton** samples were fixed and preserved with Lugol`s - iodine and formaldehyde respectively. Population density of taxa was determined by counting with an Opton-type Utermöhl invertoscope using sedimentation chambers of 2 cm^3 in volume. For the biomass estimation specific volume of all taxa were determined by measuring their linear dimensions and by approximation with simple geometric forms. The size of the individual populations are expressed in terms of their biomass (µg/l). Zooplankton samples were taken by filtering 50 l volume of surface water through a zooplankton net with 70 µm mesh size.

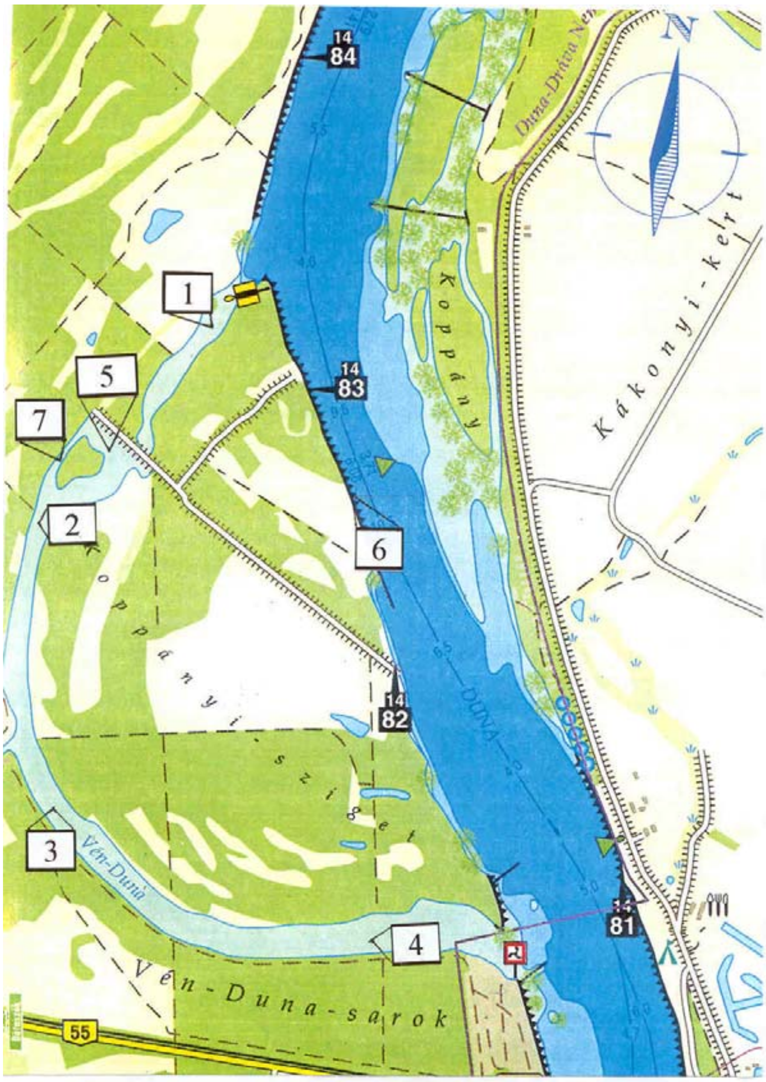


Figure 1. Map of the Vén-Duna indicating the sampling sites

The dominance conditions of phytoplankton was expressed by logarithmic interval scale, population density values of zooplankton are expressed as ind/100 l, and biomass according to BOTTRELL et al. (1976) in wet weight as mg/m^3 (see: Base-line Report).

Five series of quantitative **macroinvertebrate** samples were collected in 2000. An Ekman-Birge grab sampler was used for the estimation of abundance of dominant benthic organisms: individual numbers of the most dominant *Oligochaeta* and *Chironomidae* group of the **macroscopic invertebrate community** were calculated in each cross section based on 3 Ekman garb samples.

The water flow made the grabbing difficult due to the current. Several trials were unsuccessful because the water movement. Sand as a common substrate along the side arm inhibited the proper functioning of the grab sampler, as well.

Four cross sections of the Vén-Duna and one site of the Danube (right bank at 1482 river km) were sampled as earlier. Semiquantitative kick samples were also taken by kicking method using an FBA pond net. In June and November the macroinvertebrates of the reopened rock dam were investigated also.

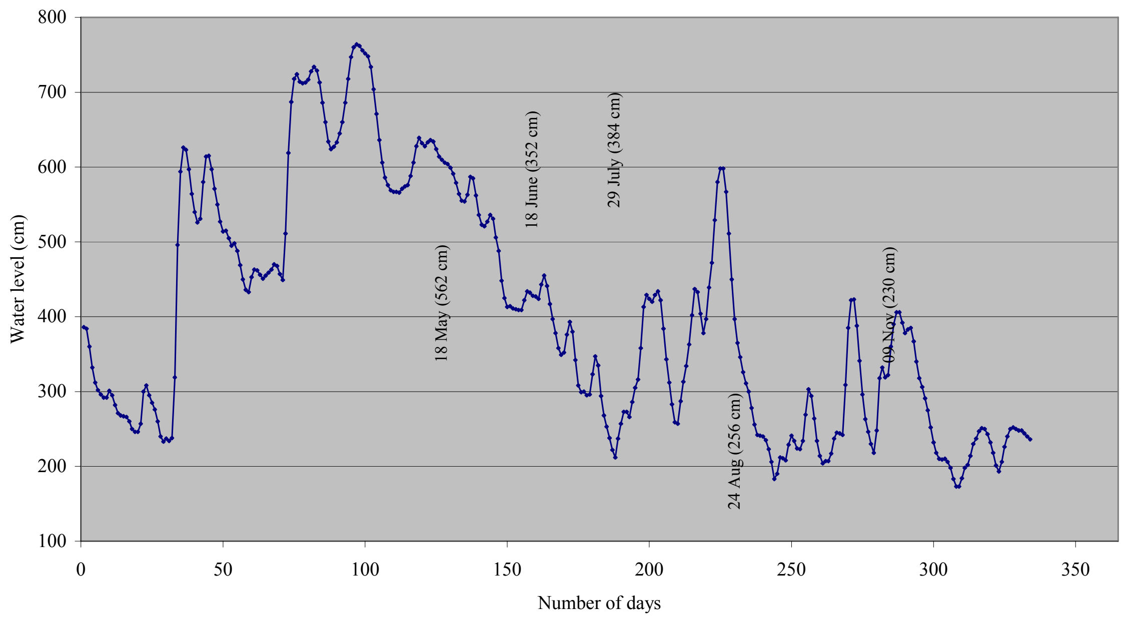
Fish sampling at sites VD5A and D was performed from boat by using different methods: electrofishing equipment having 500 W electric capacity. Trawling and dredging nets were applied in sites VD1 and VD2, respectively. The fish caught during sampling were measured; standard body length was determined at field conditions. All specimens were released after species determination and measurement.

Sampling sites of fishing were as follows. VD 1 is situated at the upper stretch of the side arm (upstream the reopened rock dam). The right bank of the Vén-Duna around sampling site 2 (VD2) was investigated also. The surrounding rocky shore at the reopened former dam (VD5A) and the Danube situated at the 1483 river km section (D) where rocky shore is available were fished, too. Fishing was carried out by electrofishing apparatus around the reopened rock dam and the Danube from boat in the marginal side waters along the bank.

3.3 Results

In order to analyse the hydrobiological results, daily water level data (in cm) are illustrated in Figure 2. The water level is measured on the Baja gauge, the day of sampling is illustrated on this Figure, as well.

Figure 2. Daily water level data measure at Baja water gauge in 2000



The maximum water level of 2000 was 764 cm at Baja in the beginning of April. The flood plain forest is standing in the water during these conditions and the bed is completely filled up by the river. Relatively strong current can be detected, too.

The medium flow periods were occurred at the end of May again. In the middle of August there was a short flooding peak but after that a continuous low water period was observed.

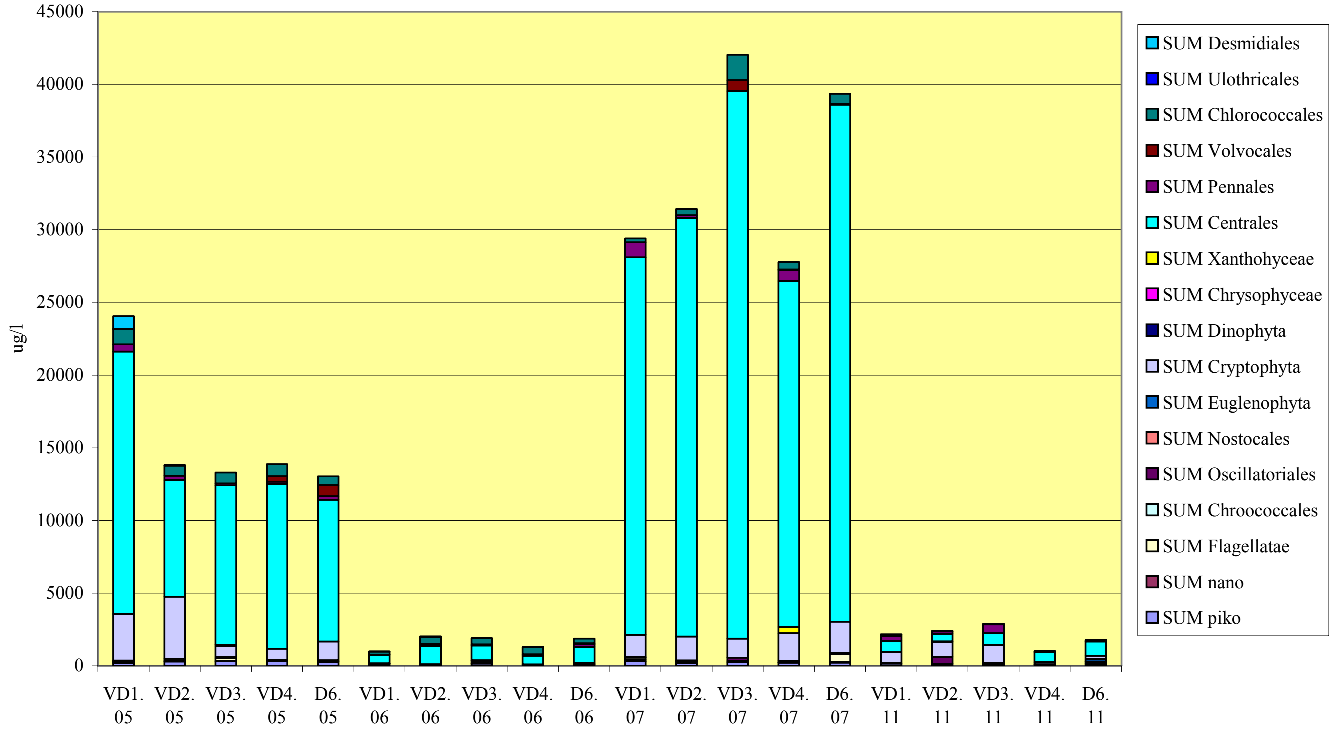
There were flooding, medium and low water periods during the sampling of the area in 2000.

The first sampling was coincidentally taken at high water level. Sampling in June and July was taken at middle flow conditions. This means that the water level drops at least 2 m comparing the high flood. The end of August, middle of September and the beginning of November represented low water situation, when it is difficult to pass the downstream section of the opened rock dam due to a shallow, deposited sandy stretch that is near to the island.

3.3.1 Phytoplankton

The community size of the phytoplankton and the abundance of the different taxa were characterized by the biomass (μg/l). The biomass data are summarized in **Table 3.3.1.1-4** (APPENDIX) and shown in **Figure 3.1** according to the main taxonomic groups.

Figure 3.1 Spatial and temporal changes of phytoplankton biomass (ug/l). Vén-Danube and River Danube (Baja), 2000.



The biomass of the phytoplankton varied between 13.0 (Danube) and 24.0 mg/l (Vén-Duna: VD 1) in **May**. The phytoplankton was dominated by centric-diatoms (*Thalassiosiraceae* spp.: 58.2-82.5 %).

In **June** the biomass of the phytoplankton varied between 1.0 and 2.0 mg/l. The minimal and maximal values were observed in the Vén-Duna (VD 1 and VD 2 sampling points respectively). The phytoplankton was dominanted by centric-diatoms (*Thalassiosiraceae* spp.: 46.6 [VD 4] - 61.6 % [VD 2]) with subdominance of chlorococcal green algae (17.2 [VD 6]-38.7 % [VD 4]), pennate diatoms (max.: 10.3 % [D 6]), or piko-algae (max.: 12.9 % [VD 1]).

In **July** the biomass of the phytoplankton varied between 27.8 (VD 4) and 42.0 mg/l (VD 3). The phytoplankton was dominanted by the centric-diatoms (85.7 [VD 4] - 91.6 % [VD 2]).

In **November** both extreme values of biomass were observed in Vén-Duna (VD 4: 1.0 mg/l; VD 3: 2.9 mg/l). The *Cryptophyta*-flagellates were dominant in the upper section of the Vén-Duna (VD 1-3), its relative abundances varied between 35.4 [VD 1] - 42,4 % [VD 2, VD 3]. The centric diatoms were dominant in phytoplankton, its proportion relative to the total biomass varied between 54.1 % (Danube) to 65.2 % (Vén-Duna: VD 4).

The temporal variation of the spatial means of the phytoplankton biomass in the Vén-Duna:

May: 16.3 mg/l → June: 1.6 mg/l → July: 32.7 mg/l → November: 2.1 mg/l

The temporal changes of biomass in the Danube:

May: 13.0 mg/l → June: 1.9 mg/l → July: 39.4 mg/l → November: 1.7 mg/l

The spatio-temporal average value of the phytoplankton biomass in the side arm and the temporal means of the main arm were 13.1 and 14.0 mg/l respectively. On the basis of the results of the phytoplankton biomass estimation no significant difference was detectable between the trophic status of the Vén-Duna and Danube.

Multivariate analyses have been used in the study of the spatio-temporal differences on the basis of the results of phytoplankton biomass investigations (see: **Table 3.3.1.1-4,** APPENDIX).

Hierarchical agglomerative clustering was performed by the NCLAS-program (PODANI 1993), using the Ruzicka's dissimilarity coefficient for the pairwise comparison of individual samples.

The results of the numerical classification are shown in the dendrogram of samples (**Figure 3.2**). The analysis yielded two main clearly distinguishable clusters according to the periods characterised by the high (May, July) and low biomass values (June, November).

The results of the multivariate analysis were confirmed the statement that no significant differences are detectable in the spatio-temporal pattern of phytoplankton because the main- and side arm of the Danube became more or less a uniform water body after the reopening of the Vén-Duna in 1998.

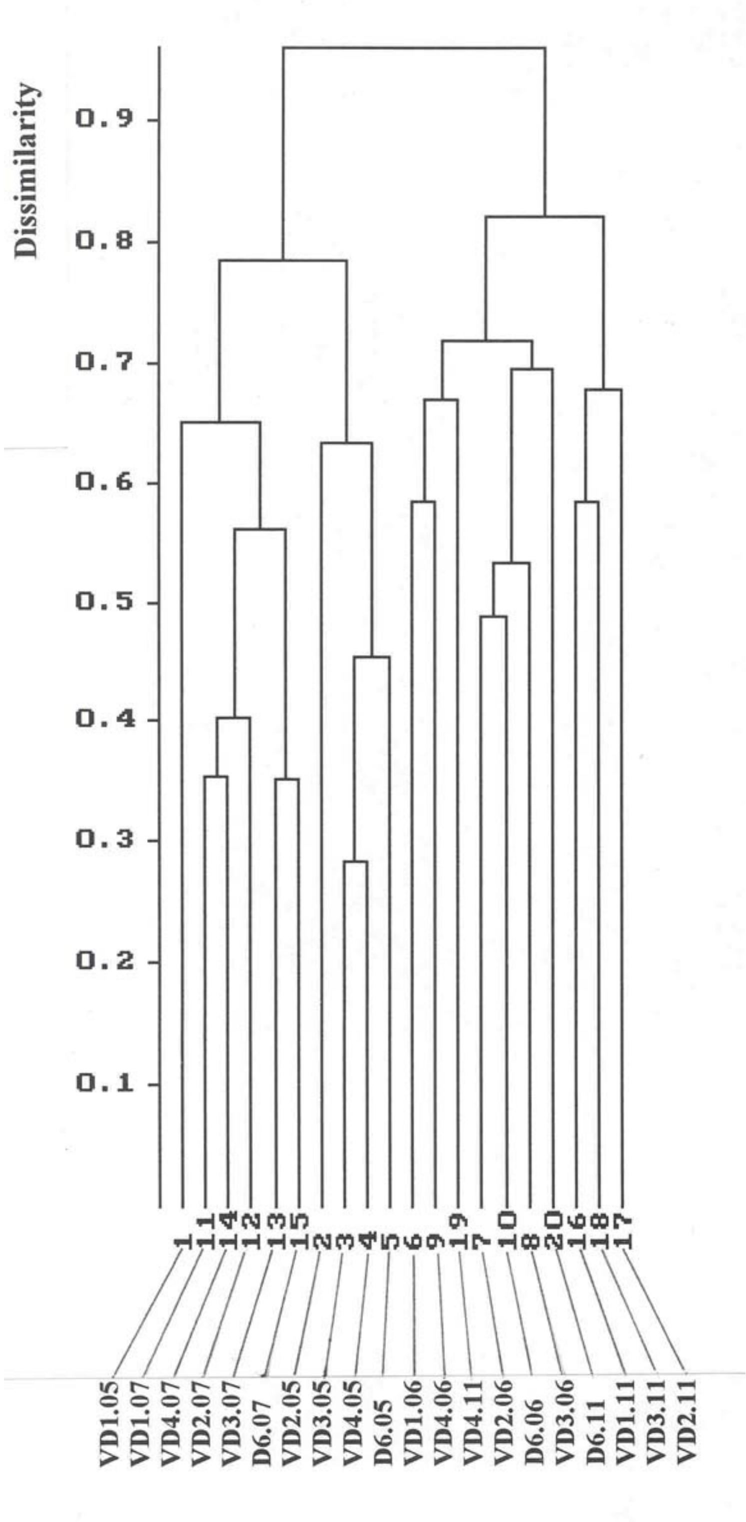


Figure 3.2 Results of numerical classification: Dendrogram of the samples. Vén-Duna and River-Danube (Baja), 2000.

3.3.2 Zooplankton

Presence of 30 *Rotatoria*, 10 *Cladocera* and 5 *Copepoda* species was revealed during the investigations. The results of the investigations indicate that both on the Danube and on the

Vén-Danube the plankton species characteristic to slow flowing eutrophic water were present, similarly to the results of the previous year (APPENDIX, Table 3.3.2.1). Biomass and individual numbers are illustrated in Table 3.3.2.2.

Detailed species list is presented in Tables 3.3.2.3-10. There are many species that contribute to large individual abundance stands in Hungarian stagnant water bodies: *Brachionus angularis, B. budapestinensis, B. calyciflorus, B. diversicornis, Euchlanis dilatata, Filinia longiseta, Keratella cochlearis, K. c. tecta, Polyarthra vulgaris, Bosmina longirostris, Daphnia longispina, Diaphanosoma brachyurum, Acanthocyclops robustus.*

The other group consists of those species that characterizes also stagnant water bodies, but their primary habitat is the biotecton, the surface of aquatic vegetatation and the sediment. These occur in lower abundances but frequently: *Brachionus urceolaris, Keratella quadrata, Lecane bulla, L. luna, L. lunaris, Pompholyx complanata, Synchaeta pectinata, Alona rectangula, A. quadrangularis, Chydorus sphaericus, Disparalona rostrata, Pleuroxus aduncus, Eucyclops serrulartus, Mesocyclopos leuckarti.*

The third group consists of those species that are accounted as rare ones in Hungarian water bodies. The primary habitat of these species is the macrovegetation and sediment surface: *Keratella tropica, Lecane closterocerca, L. quadridentata, Ptygura melicerta.* These taxa are usually found in low flow velocity waters.

Identified Rotatoria and Crustacea species in this section of the Danube and Vén-Danube are primarily the members of the plankton community of the slow flowing and stagnant waters, but there are some that tolerates the increase in flow velocity: *Brachionus angularis, Filinia longiseta, Keratella cochlearis cochlearis, K. c. tecta, K. quadrata, Polyarthra vulgaris, Bosmina longirostris, Chydorus sphaericus, Daphnia longispina, Disparalona rostrata, Acanthocyclops robustus, Mesocyclops leuckarti.*

Comparing the species list of the consecutive years it is concluded that both in the Danube and the Vén-Danube there are hardly any changes in the number of the identified taxa. Slow species composition change was however observed in the Vén-Danube. This process is characterized by the further decrease in species number of the rare species and more frequent (ubiquiter) species number is elevated. The underlying cause of this process is the effect of the intensive and continuous water exchange that resulted in disadvantage for those rare species that prefers lenitic waters.

Quantitative results show (Tables.3.3.2.7-10) that individual abundance values of the animals ranged between 128-1198 ind./100 liter, a value that is usual for the Hungarian section of the Danube.. Highest measured abundance values were observed in May and July corresponding to the seasonal dynamics of the Rotatoria and Crustacea species. Measured values were lower than the observed values in 1999.. It is rather interesting that in case of the Vén-Danube – apart from the results in June – there is an increase in individual abundance values along the longitudinal section of the river arm. Numbers measured at the upper part of the river arm are almost identical to the ones of the Danube. High individual abundance values measured during the previous year did not formed this year. Individual abundance values of the Rotatoria and Crustacea stands in the Danube were close to identical to the values of the seasons of the previous years.

Measured biomass values (Tables.3.3.2.3-6) were quite low in each of the measured four periods. Wet weight of the animals varied between 2.76-34.18 mg/100 liter. Similar to the individual abundance values the mass of the animals was highest in May and July while lowest in November. The cause of the decrease of the biomass value is that no large stands of Rotatoria were formed in the Vén-Danube and Danube as opposite to the pattern observed in May 1999. This is similar to the results of the 1999 investigations (except the results of the May investigations). The continuous water exchange in the river arm prevented the formation of large individual biomass values and higher animal weights.

In summary, on the basis of the results of the zooplankton investigations it is concluded that as the result of the dredging of the Vén-Danube arm and resulting continuous water exchange, the species composition and abundance values of the zooplankton (Rotatoria and Crustacea plankton) became similar to the one measured in the Danube. The occurrence of the rare species however significantly decreased as a result of the habitat changes. Contrary to the results of the previous years no high abundance and biomass values was observed. These aquatic organisms are good indicators under Hungarian hydrological and climatic conditions for the indication of eutrophycation processes for slow flowing and stagnant waters as it was discussed earlier.

3.3.3 Macrozoobenthon

Abundance data (ind. number of *Oligochaeta* and *Chironomidae*/m^2) are illustrated in Table 3.3.3.1 (APPENDIX). The maximum individual numbers of *Oligochaeta* were measured in the second half of the Vén-Duna stretch (at site 3 and 4) during middle and low water discharge periods (June-November). The abundance conditions were different comparing to the last year. Lower individual numbers were detected. The overall maximum of Oligochaets was estimated as around 6 thousands/m^2 at site 3 and 4, right side, in June and November.

The number of Chironomids varied between values less than 100 and few hundreds till almost 10 thousand per m^2. Much lower values were detected in May and June than in the later sampling period. The overall maximum value per m^2 of midge fly larvae was found in the middle-lower section of the side arm at left side (more than 8800) where thick layer of soft sediment is available.

Data indicate that huge differences were detected between sites. The most probable reason of that phenomenon is the variability of the sediment composition. The worms and the Chironomid larvae prefer the fine fraction of the sediment that is rich in organic material. Such kind of sediment depositions is available basically at several sections of the side arm due to the variable current conditions at the different cross sections. VD3 and VD4 (especially on the left side) seem to be rich in such habitats having usually higher individual number values. Similarly, the upper end of the Vén-Duna has an extended plate of fine sediment deposition connected immediately to the right bank.

Table 3.3.3.2 shows the cumulative list of macroscopic invertebrate taxa detected in the Vén-Duna and the River Danube during 2000 (see APPENDIX). Altogether 71 taxa (together with species of *Chironomidae*) are shown. The number of species occurring in both water bodies during 2000 has increased to 40 (without *Chironomidae*). The occurrence of leeches was detected in the Vén-Duna. Only one species was found strictly only in the Danube (*Jaera istri*), all of the others were described in the Vén-Duna, too. There were 27 Chironomidae taxa determined by Dr. Kálmán Bíró (Switzerland), 20 taxa were detected only in the Vén-Duna, and altogether 2 of them were found only in the River Danube (Chironomus aprilinus, Lipinella moderata). The number of overlapping taxa is 5.

Generally it can be stated that most of the benthic species detected in both the side arm and the River Danube belonged to the group of Mollusca and Chironomidae. The Mollusca group contains 24 species. The mussels represent 10 species, including the invading *Corbicula fluminea* and *C. fluminalis* originating from the River Rhine system. The large species number of mussels generally characterises both the main arm of the Lower Hungarian Danube section and the side arms. During the monitoring most of the mussel species were common in the River Danube also.

The data of the *Corbicula* species show that these animals are spreading now in Hungary, most probably only along the Danube (CSÁNYI 1999). *Corbicula fluminalis* was collected in 2000 on the Yugoslavian Danube stretch, too (VITUKI/ICPDR 2000). There are many juveniles and adult specimens of both taxa along the whole Vén-Duna section already.

Both the side arm and the Danube is rich in 4 Unionidae species (*Unio pictorum, U. tumidus, Anodonta anatina, Sinanodonta woodiana*). The most common snail species is *Viviparus acerosus*. It can be recognised that the Danubian snails distributed continuously the Vén-Duna during the last two years (*Valvata naticina, Valvata piscinalis, Lithoglypus naticoides*). Similar distribution can be observed in case of the Crustaceans. *Obesogammarus obesus* and *Dikerogammarus villosus* are more frequent in the side arm than earlier.

The *Theodoxus fluviatilis* became common in this lower Danube, too. The lowest point of the distribution of this species was described earlier in the section of Paks, at 1526 river km by CSÁNYI (1997). Now it is common at the section of Baja (1483 river km), as well.

Three of the river dragonfly species (*Calopteryx splendens, Platycnemis pennipes, Gomphus flavipes*) were detected in the Vén-Duna in May and July. Two of them were found in the River Danube in July, too. The colonisation of the Vén-Duna by caseless caddis larvae was experienced in 2000, similarly to the other rheophilic taxa (Table 3.3.3.3-6). The large overlap of the species distribution and the increasing occurrence of Danubian species in the Vén-Duna side arm are evidently the consequence of the reopened situation of the side channel.

Table 3.3.3.7 Number of species in different water bodies.

Date of sampling	***Water level at Baja (cm)***	**Number of species**		
		Total	**Vén-Duna**	**River Danube**
18 May	***541***	**28**	**24**	**14**
18 June	***483***	**35**	**32**	**26**
29 July	***411***	**32**	**27**	**25**
9 November	***158***	**26**	**18**	**22**

3.3.4 Fish

Altogether 29 fish species were detected in the Vén-Duna and the Danube during the two sampling campaigns (Table 3.3.4.1, APPENDIX). Both methods (trawling net and electrofishing apparatus) were very useful for fish collection. The trawling net was especially appropriate for the capture of juvenile population in the water bodies of VD1 and VD2. Electrofishing was the best method for fishing along the stony shoreline at the reopened dam (VD5A) and on the Danube (D), as well.

Quantitative evaluation of the data shows that species from the group of Cyprinidae are the most abundant. Similarly to the results of earlier years roach (*Rutilus rutilus*), bleak (*Alburnus alburnus*), white bream and bream (*Blicca bjoerkna, Abramis brama*) were caught in the largest number, even in the River Danube. It has to be mentioned that most of the specimens were belonging to the juvenile age group (with standard body length of few cm-s only).

Low species number and abundance represented the other fish families generally. River lamprey was detected in the upper part of the side arm in September by hand net. The same species occurred in the Danube also (caught by electrofishing). Sturgeon (*Acipenser ruthenus*) is strictly living in the main arm. A trawling net that could be used only in sections where no wood trunks exist on the bottom trapped the specimens. Eel was found only on rocky parts by electrofishing.

Only few carnivorous species were caught in the investigated section. The possible reason of that could be that they have hiding character during daytime. Asp (*Aspius aspius*) is especially sensitive to the disturbance. It was very difficult to approach these specimens because they immediately escaped.

Three species of Percidae were found only in stony habitats. Perch (*Perca fluviatilis*) was detected in both the sidearm and the main Danube. Gobiidae have similar distribution in the investigated stretch. The tubenose goby is the most frequent species of them.

There are 24 species detected in the sidearm during the two sampling. The Danube contained 25 of the 29 species at the same time. The surrounding area of the reopened rock dam (VD2 and VD5A) is relatively richer in species number than the upper section. The maximum species richness was detected in the Danube in September, when 25 species of the total number of 29 were caught.

There are some fish species that occurred only in the Danube. Typical rheophilous ones are *Acipenser ruthenus, Rutilus pigus virgo, Cottus gobio*. Almost all of the others were found al least in the Vén-Duna.

4. General discussion and conclusions

No significant differences were detectable between the Vén-Duna and the main arm concerning several physical and chemical characteristics (e. g. *pH*, *conductivity*, *total dissolved material*, *soluble reactive-P*, *biochemical-* and *chemical oxygen demand*, *total organic carbon*) as a result the reopening of the side arm.

Only *dissolved oxygen* as well as the *chlorophyll-a* concentrations were slightly higher in the Vén-Duna (spatial average values) than in the Danube probably due to the smaller flow velocity in the side arm.

On the basis of the results of the phytoplankton biomass estimation no significant difference was detectable between the trophic status of the Vén-Duna and Danube. As a result of continuous water exchange, the species composition and abundance values of the zooplankton (Rotatoria and Crustacea plankton) became similar to the one measured in the Danube.

The large overlap of the macrozoobenthic species distribution and the increasing occurrence of Danubian species in the Vén-Duna side arm are evidently the consequence of the reopened situation of the side channel.

Increase of the number of fish species was detected in the side arm of Vén-Duna in 2000. The distribution of several fish species indicate that the reopened situation is more favourable for them than that of the earlier closed up condition at low and medium flow periods.

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APPENDIX

Basic measured data during the monitoring of the Vén-Duna and River Danube in 2000

December 2000

Table 2.3.1 Physical and chemical characteristics of the water. Vén-Danube and Danube, Baja, 2000

Variables		18. May 2000					
		VD1	**VD2**	**VD3**	**VD4**	**AVG-VD**	**D6**
PH		-	7,7	7,9	7,9	7,8	7,9
Conductivity	uS/cm	-	317	315	314	315	316
suspended solids	mg/l	-	24	16	25	22	27
total dissolved material	mg/l	-	188	192	230	203	192
ammonia-N	mg/l	-	0,01	0,01	0,005	0,01	0,01
nitrite-N	mg/l	-	0,02	0,02	0,02	0,02	0,02
nitrate-N	mg/l	-	1,40	1,30	1,30	1,33	1,30
organic-N	mg/l		0,30	0,21	0,29	0,27	0,47
total-N	mg/l		1,73	1,54	1,61	1,63	1,80
soluble reactive-P	mg/l	-	0,04	0,08	0,06	0,06	0,05
total-P	mg/l	-	0,04	0,08	0,07	0,06	0,06
dissolved oxygen	mg/l	11,4	11,9	12,1	10,9	11,6	11,1
biochemical oxygen demand	mg/l	3,8	4,5	3,4	2,6	3,5	3,5
total organic carbon	mg/l	-	2,6	2,6	4,2	3,1	2,5
chlorophyll-a	ug/l	-	34	33	30	32	29
chemical oxygen demand	mg/l	-	27,0	15,2	23,0	21,7	23,0
N-spectrum							
ammonia-N	%	-	0,6	0,6	0,3	0,5	0,6
nitrite-N	%	-	1,2	1,3	1,2	1,2	1,1
nitrate-N	%	-	80,9	84,4	80,7	82,0	72,2
organic-N	%		17,3	13,6	17,7	16,2	26,1
SUM			100	100	100	100	100

Table 2.3.2 Physical and chemical characteristics of the water. Vén-Danube and Danube, Baja, 2000.

Variables		18. June 2000					
		VD1	**VD2**	**VD3**	**VD4**	**AVG-VD**	**D6**
PH		8,5	8,4	8,3	8,3	8,4	8,5
Conductivity	uS/cm	302	293	286	286	292	299
suspended solids	mg/l	41	42	31	34	37	38
total dissolved material	mg/l	238	208	210	202	215	206
ammonia-N	mg/l	0,005	0,005	0,005	0,005	0,01	0,005
nitrite-N	mg/l	0,02	0,02	0,02	0,02	0,02	0,02
nitrate-N	mg/l	1,12	1,07	1,05	1,01	1,06	1,25
organic-N	mg/l	0,00	0,30	0,28	0,00	0,14	0,48
total-N	mg/l	1,15	1,39	1,35	1,04	1,23	1,75
soluble reactive-P	mg/l	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02
total-P	mg/l	0,12	0,11	0,07	0,07	0,09	0,12
dissolved oxygen	mg/l	13,4	13,7	14,5	14,8	14,1	13,3
biochemical oxygen demand	mg/l	6,0	4,8	4,9	5,4	5,3	5,5
total organic carbon	mg/l	2,6	2,3	2,3	2,4	2,4	2,4
chlorophyll-a	ug/l	51	43	38	23	39	37
chemical oxygen demand	mg/l	21,0	17,0	15,0	16,0	17,3	19,0
N-spectrum							
ammonia-N	%	0,4	0,4	0,4	0,5	0,4	0,3
nitrite-N	%	1,7	1,4	1,5	1,9	1,6	1,1
nitrate-N	%	97,8	77,0	77,8	97,6	87,5	71,4
organic-N	%	0,0	21,2	20,4	0,0	10,4	27,1
SUM		100	100	100	100	100	100

Table 2.3.3 Physical and chemical characteristics of the water. Vén-Danube and Danube, Baja, 2000.

Variables		29. July 2000					
		VD1	**VD2**	**VD3**	**VD4**	**AVG-VD**	**D6**
pH		8,7	8,8	8,7	8,6	8,7	8,7
conductivity	uS/cm	326	324	314	312	319	322
suspended solids	mg/l	36	40	38	46	40	34
total dissolved material	mg/l	228	230	212	210	220	230
ammonia-N	mg/l	0,05	0,03	0,03	0,04	0,04	0,04
nitrite-N	mg/l	0,005	0,005	0,01	0,01	0,01	0,005
nitrate-N	mg/l	1,00	1,00	1,00	0,90	0,98	1,00
organic-N	mg/l	0,47	0,43	0,43	0,28	0,40	0,45
total-N	mg/l	1,53	1,47	1,47	1,23	1,42	1,50
soluble reactive-P	mg/l	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02
total-P	mg/l	0,11	0,12	0,08	0,12	0,11	0,12
dissolved oxygen	mg/l	14,0	14,2	15,8	15,6	14,9	13,9
biochemical oxygen demand	mg/l	5,1	5,2	4,6	4,6	4,9	4,9
total organic carbon	mg/l	2,5	2,0	3,5	3,9	3,0	3,2
chlorophyll-a	ug/l	67	59	64	55	61	41
chemical oxygen demand	mg/l	15,7	16,7	14,7	14,7	15,5	12,8
N-spectrum							
ammonia-N	%	3,3	2,0	2,0	3,3	2,7	2,7
nitrite-N	%	0,3	0,3	0,7	0,8	0,5	0,3
nitrate-N	%	65,6	68,3	68,0	73,2	68,8	66,9
organic-N	%	30,8	29,4	29,3	22,8	28,0	30,1
SUM		100	100	100	100	100	100

Table 2.3.4 Physical and chemical characteristics of the water. Vén-Danube and Danube, Baja, 2000.

Variables		9. November 2000					
		VD1	**VD2**	**VD3**	**VD4**	**AVG-VD**	**D6**
PH		7,9	8,0	8,0	8,0	8,0	8,0
Conductivity	uS/cm	426	428	423	427	426	423
suspended solids	mg/l	2	1	2	1	1,5	4
total dissolved material	mg/l	292	304	288	310	298,5	296
ammonia-N	mg/l	0,09	0,09	0,1	0,11	0,10	0,09
nitrite-N	mg/l	0,02	0,02	0,02	0,02	0,02	0,02
nitrate-N	mg/l	2,30	2,30	2,10	1,90	2,15	2,30
organic-N	mg/l	0,37	0,43	0,31	0,39	0,38	0,38
total-N	mg/l	2,78	2,84	2,53	2,42	2,64	2,79
soluble reactive-P	mg/l	0,06	0,06	0,06	0,06	0,06	0,07
total-P	mg/l	0,10	0,09	0,10	0,11	0,10	0,15
dissolved oxygen	mg/l	9,4	9,7	10,0	9,2	9,6	9,6
biochemical oxygen demand	mg/l	1,8	1,6	2,1	4,5	2,5	2,0
total organic carbon	mg/l	2,7	2,9	3,7	2,8	3,0	3,5
chlorophyll-a	ug/l	1,1	3,0	1,5	0,7	1,6	0,7
chemical oxygen demand	mg/l	16,8	13,8	16,8	10,9	14,6	15,8
N-spectrum							
ammonia-N	%	3,2	3,2	4,0	4,5	3,7	3,2
nitrite-N	%	0,7	0,7	0,8	0,8	0,8	0,7
nitrate-N	%	82,7	81,0	83,0	78,5	81,3	82,4
organic-N	%	13,3	15,1	12,3	16,1	14,2	13,6
SUM		100	100	100	100	100	100

Table 3.3.1.1 Spatial and temporal changes of the phytoplankton biomass (ug/l). Vén-Danube and the River Danube (Baja), 2000.

TAXA	2000.05.18					
	1	2	3	4		5
	VD1. 05	VD2. 05	VD3. 05	VD4. 05	AVG-VD	D6. 05
SUM piko	174	301	317	317	277	270
SUM nano	43	34	17	17	28	17
SUM Flagellatae	48	143	190	48	107	0
SUM Chroococcales	0	0	0	0	0	0
SUM Oscillatoriales	36	0	72	24	33	98
SUM Nostocales	54	0	0	0	14	0
SUM Euglenophyta	0	0	0	0	0	0
SUM Cryptophyta	3210	4268	762	763	2251	1286
SUM Dinophyta	0	0	0	0	0	0
SUM Chrysophyceae	0	0	0	0	0	0
SUM Xanthohyceae	0	0	90	0	22	0
SUM Centrales	18060	8043	10966	11354	12106	9746
SUM Pennales	484	294	131	148	264	249
SUM Volvocales	6	1	0	379	96	758
SUM Chlorococcales	1030	693	747	814	821	607
SUM Ulothricales	48	48	0	0	24	0
SUM Desmidiales	853	0	0	0	213	0
SUM	**24045**	**13825**	**13291**	**13864**	**16256**	**13030**

Table 3.3.1.2 Spatial and temporal changes of the phytoplankton biomass (ug/l). Vén-Danube and the River Danube (Baja), 2000.

TAXA	2000.06.18					
	6	7	8	9		10
	VD1. 06	VD2. 06	VD3. 06	VD4. 06	AVG-VD	D6. 06
SUM piko	128	95	159	80	116	111
SUM nano	8	2	12	5	7	4
SUM Flagellatae	0	0	0	0	0	1
SUM Chroococcales	1	0	0	0	0	0
SUM Oscillatoriales	19	0	0	0	5	0
SUM Nostocales	0	0	93	0	23	0
SUM Euglenophyta	0	0	0	0	0	0
SUM Cryptophyta	0	0	99	0	25	74
SUM Dinophyta	0	4	0	0	1	0
SUM Chrysophyceae	15	7	25	14	15	0
SUM Xanthohyceae	0	0	0	0	0	0
SUM Centrales	576	1245	1003	604	857	1106
SUM Pennales	24	100	75	53	63	192
SUM Volvocales	0	67	0	38	26	57
SUM Chlorococcales	208	448	433	501	398	320
SUM Ulothricales	10	0	0	0	2	0
SUM Desmidiales	0	52	0	0	13	0
SUM	**989**	**2020**	**1898**	**1296**	**1551**	**1865**

Table 3.3.1.3 Spatial and temporal changes of the phytoplankton biomass (ug/l). Vén-Danube and the River Danube (Baja), 2000.

TAXA	2000.07.29					
	11	12	13	14		15
	VD1. 07	VD2. 07	VD3. 07	VD4. 07	AVG-VD	D6. 07
SUM piko	317	190	254	222	246	222
SUM nano	93	93	76	17	69	26
SUM Flagellatae	143	48	0	95	71	536
SUM Chroococcales	0	0	0	0	0	0
SUM Oscillatoriales	56	36	227	0	80	120
SUM Nostocales	0	0	0	0	0	0
SUM Euglenophyta	0	2	0	0	0	0
SUM Cryptophyta	1526	1641	1323	1905	1599	2133
SUM Dinophyta	0	0	0	0	0	0
SUM Chrysophyceae	0	0	0	0	0	0
SUM Xanthohyceae	0	0	0	432	108	0
SUM Centrales	25961	28799	37659	23806	29056	35578
SUM Pennales	1038	187	0	742	492	0
SUM Volvocales	0	1	758	48	202	48
SUM Chlorococcales	267	429	1751	509	739	688
SUM Ulothricales	0	0	0	0	0	0
SUM Desmidiales	0	0	0	0	0	0
SUM	**29400**	**31423**	**42045**	**27775**	**32661**	**39351**

Table 3.3.1.4 Spatial and temporal changes of the phytoplankton biomass (ug/l). Vén-Danube and the River Danube (Baja), 2000.

TAXA	2000.11.09					
	16	17	18	19		20
	VD1. 11	VD2. 11	VD3. 11	VD4. 11	AVG-VD	D6. 11
SUM piko	159	127	96	79	115	127
SUM nano	2	5	7	3	4	19
SUM Flagellatae	19	1	10	20	12	60
SUM Chroococcales	0	0	0	0	0	0
SUM Oscillatoriales	5	480	0	0	121	87
SUM Nostocales	0	0	0	0	0	0
SUM Euglenophyta	0	0	85	0	21	175
SUM Cryptophyta	766	1021	1224	152	791	229
SUM Dinophyta	0	53	0	0	13	0
SUM Chrysophyceae	0	0	28	11	10	6
SUM Xanthohyceae	0	0	0	0	0	0
SUM Centrales	765	503	791	661	680	965
SUM Pennales	321	183	601	41	286	6
SUM Volvocales	0	0	0	0	0	0
SUM Chlorococcales	98	35	47	46	56	110
SUM Ulothricales	0	0	0	0	0	0
SUM Desmidiales	32	0	0	0	8	0
SUM	**2166**	**2408**	**2887**	**1014**	**2118**	**1783**

Table 3.3.2.1 Zooplankton taxa found in River Danube and Vén-Duna in 2000

Taxon	Duna	Vén-Duna	lotic	lenitic
ROTATORIA				
Ascomorpha ecaudis	+	+		
Asplanchna brightwelli		+		
A. priodonta	+	+		oo
Brachionus angularis	+	+	*	oo
B. budapestinensis		+		oo
B. calyciflorus calyciflorus	+	+		oo
B. c. anuraeiformis	+	+		oo
B. diversicornis		+		oo
B. quadridentatus brevispinus	+	+		oo
B. urceolaris	+	+		o
Cephalodella gibba	+	+	*	
Euchlanis dilatata	+	+		oo
Filinia longiseta	+	+	*	oo
Keratella cochlearis cochlearis	+	+	*	oo
K. c. tecta	+	+	*	oo
K. quadrata	+	+	*	oo
K. tropica		+		
Lecane bulla		+		
L. closterocerca		+		
L. luna		+		o
L. lunaris		+		
L. quadridentata		+		
Notholca acuminata	+	+	*	o
N. squamula		+	*	
Polyarthra vulgaris	+	+	*	oo
Pompholyx complanata	+	+	*	oo
Ptygura melicerta		+		
Synchaeta pectinata	+	+		o
Testudinella patina		+		
Trichocerca pusilla	+	+	*	o
CLADOCERA				
Alona quadrangularis		+		o
A. rectangula	+	+		o
Bosmina longirostris	+	+	*	oo
Chydorus sphaericus	+	+	*	o
Daphnia longispina		+	*	oo
Diaphanosoma brachyurum		+		oo
Disparalona rostrata	+	+	*	o
Moina micrura	+	+		
Pleuroxus aduncus		+		o
Scapholeberis mucronata		+		o
COPEPODA				
Acanthocyclops robustus	+	+	*	oo
Cyclops vicinus		+		o
Eucyclops serrulatus	+	+		o
Mesocyclops leuckarti	+	+	*	o
Thermocyclops oithonoides	+	+	*	o
Total:	27	45		
Legend: **+** presence, ***** tolerates lotic, **o** small ind. number in stagnant, **oo** mass in stagnant				

Table 3.3.2.2 Individual number and biomass of zooplankton detected in 2000

Danube and Vén Duna (individual number/100 liter)					
	VD1	VD2	VD3	VD4	D
18. 05. 2000.	692	628	1304	684	946
18. 06. 2000.	328	360	248	280	308
29. 07. 2000.	1020	617	686	1198	722
09. 11. 2000.	162	200	252	260	128
Danube and Vén-Duna biomass (mg wet weight/100 liter)					
	VD1	VD2	VD3	VD4	D
18. 05. 2000.	27,90	24,29	35,37	30,17	34,18
18. 06. 2000.	10,41	10,49	9,60	17,83	13,17
29. 07. 2000.	28,63	19,38	18,77	32,98	24,86
09. 11. 2000.	4,63	6,74	6,82	8,99	2,76

Table 3.3.2.3 Zooplankton biomass in River Danube and Vén-Duna (18 May 2000)

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Ascomorpha ecaudis			0,05		
Asplanchna priodonta	2,10	1,20	1,60	1,20	1,20
Bdelloidea sp.		0,64			
Brachionus angularis	1,68	0,96	0,96	1,92	3,52
B. calyciflorus calyciflorus	13,12	11,52	17,92	13,12	17,36
B. diversicornis		0,72			
B. quadridentatus brevispinus	0,24	0,48		0,24	
B. urceolaris	0,96	0,96	0,96	0,96	0,96
Euchlanis dilatata	1,92	0,96	0,96	0,96	
Filinia longiseta		0,48			0,24
Keratella cochlearis cochlearis	0,25	0,25	1,48	0,14	0,52
K. c. tecta	0,14	0,14	0,77	0,14	0,14
K. quadrata			1,18	0,09	0,34
Lecane bulla	0,09				
Notholca acuminata			0,05	0,02	0,02
N. squamula					
Polyarthra vulgaris	0,38	0,19	0,79	0,38	0,38
Pompholyx complanata					
Synchaeta pectinata				0,08	
Testudinella patina	0,11				
Trichocerca pusilla	0,04				
CLADOCERA					
Alona quadrangularis				0,20	
A. rectangula	0,20		0,20		
Bosmina longirostris	0,32	0,32	0,48	0,64	1,60
Chydorus sphaericus		0,50	1,00	0,50	1,00
Disparalona rostrata	0,24	0,24	0,24	0,24	0,24
COPEPODA					
Acanthocyclops robustus	2,80	2,80	2,80	4,20	
Cyclops vicinus			1,40		
Eucyclops serrulatus	1,40				2,80
Mesocyclops leuckarti	1,20	1,20	1,20	3,60	2,40
nauplius larvae	0,11	0,13	0,13	0,14	0,26
kopepodit larvae	0,60	0,60	1,20	1,40	1,20
Total	27,90	24,29	35,37	30,17	34,18

Table 3.3.2.4 Zooplankton biomass in River Danube and Vén-Duna (18 June 2000)

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Asplanchna priodonta	0,60	0,60	0,60		0,60
Brachionus angularis	0,96	0,48	0,48	0,24	0,96
B. budapestinensis			0,06		
B. calyciflorus calyciflorus	1,92	5,12	1,68	1,68	1,68
B. c. anuraeiformis			0,48	0,48	0,96
B. quadridentatus brevispinus		0,48	0,16		
B. urceolaris	0,48			0,48	0,48
Cephalodella gibba					0,32
Euchlanis dilatata	0,48	0,32	0,32	8,00	0,48
Filinia longiseta	0,18			0,18	
Keratella cochlearis cochlearis	0,14	0,14	0,14	0,14	0,28
K. c. tecta	0,14	0,14	0,07	0,28	0,14
K. quadrata			1,92	0,96	0,96
Lecane lunaris				0,09	
Polyarthra vulgaris	0,11	0,11	0,22	0,22	
Pompholyx complanata	0,03		0,03		
Synchaeta pectinata					0,12
Testudinella patina	0,07				
Trichocerca pusilla			0,02	0,04	0,02
CLADOCERA					
Alona rectangula	0,20	0,20			0,20
Bosmina longirostris	0,64	0,64	0,48	0,64	0,10
Chydorus sphaericus			0,50	0,50	1,00
Daphnia longispina	0,60		0,60	0,60	
Pleuroxus aduncus		0,20			
COPEPODA					
Acanthocyclops robustus	2,80	1,40	1,40	1,40	2,80
Cyclops vicinus				1,40	
Mesocyclops leuckarti					1,20
nauplius larvae	0,26	0,26	0,04	0,10	0,07
kopepodit larvae	0,80	0,40	0,40	0,40	0,80
Total	10,41	10,49	9,60	17,83	13,17

Table 3.3.2.5 Zooplankton biomass in River Danube and Vén-Duna (29 July 2000)

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Ascomorpha ecaudis	0,08	0,04	0,04	0,17	0,05
Asplanchna brightwelli			0,60		
A. priodonta	1,40	0,60	0,40	1,20	
Brachionus angularis	6,08	0,96	1,68	3,44	1,68
B. budapestinensis		0,12	0,21	0,21	
B. calyciflorus calyciflorus		5,04	3,36	8,56	6,72
B. c. anuraeiformis	11,76	5,04	5,04	9,44	8,56
B. diversicornis		0,96	1,68	1,68	
B. quadridentatus brevispinus		0,16		0,84	0,24
Euchlanis dilatata	0,96	0,48	0,48	0,48	0,48
Filinia longiseta				0,18	
Keratella cochlearis cochlearis	0,52	0,25		0,25	0,25
K. c. tecta	0,25	0,14	0,25	0,52	0,25
K. quadrata		0,19	0,34	0,19	
K. tropica		0,09			
Lecane bulla				0,19	
Polyarthra vulgaris	0,38	0,22	0,77	0,38	0,22
Pompholyx complanata	0,30			0,05	0,08
Ptygura melicerta				0,16	
Synchaeta pectinata		0,16	0,24	0,12	
Trichocerca pusilla			0,07		
CLADOCERA					
Alona rectangula		0,40		0,30	0,20
Bosmina longirostris	1,28	0,20	0,48		
Chydorus sphaericus	2,80				
Diaphanosoma brachyurum				0,30	
Disparalona rostrata		0,24			0,24
Moina micrura	0,96	0,36		0,36	0,36
Pleuroxus aduncus			0,20		
COPEPODA					
Eucyclops serrulatus		1,40			
Mesocyclops leuckarti				1,20	2,40
Thermocyclops oithonoides		1,00	2,00	1,50	1,50
nauplius larvae	0,26	0,13	0,13	0,26	0,13
kopepodit larvae	1,60	1,20	0,80	1,00	1,50
Total	28,63	19,38	18,77	32,98	24,86

Table 3.3.2.6 Zooplankton biomass in River Danube and Vén-Duna (9 November 2000)

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Ascomorpha ecaudis		0,48	0,24		
Asplanchna brightwelli			0,40		
A. priodonta	0,50			0,50	
Brachionus angularis	0,80	0,48	0,96	1,12	0,48
B. budapestinensis			0,08	0,06	
B. calyciflorus calyciflorus		0,48		0,64	0,48
B. c. anuraeiformis			0,64	0,32	
B. urceolaris		0,32			
Cephalodella gibba			0,32		
Filinia longiseta	0,18				
Keratella cochlearis cochlearis	0,12	0,14	0,25	0,14	0,14
K. c. tecta	0,05	0,07	0,14	0,07	0,07
K. quadrata	0,09	0,09	0,13	0,09	0,09
K. tropica	0,05				
Lecane bulla	0,06			0,06	
L. closterocerca				0,06	
L. luna			0,06		
L. quadridentata			0,06		
Notholca squamula	0,02				
Polyarthra vulgaris	0,18	0,22	0,22	0,38	0,14
Ptygura melicerta		0,24			
Synchaeta pectinata					0,08
CLADOCERA					
Alona quadrangularis		0,80			
A. rectangula		0,02			
Bosmina longirostris	0,32	0,80	0,96	2,88	0,64
Chydorus sphaericus	0,50	0,75	0,50		
Disparalona rostrata					0,20
Scapholeberis mucronata				0,60	
COPEPODA					
Acanthocyclops robustus	1,40	1,40	1,40	1,40	
nauplius larvae	0,06	0,05	0,06	0,07	0,04
kopepodit larvae	0,30	0,40	0,40	0,60	0,40
Total	4,63	6,74	6,82	8,99	2,76

Table 3.3.2.7 Individual number of zooplankton in 18 May 2000

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Ascomorpha ecaudis			24		
Asplanchna priodonta	42	24	32	24	24
Bdelloidea sp.		16			
Brachionus angularis	42	24	24	42	88
B. calyciflorus calyciflorus	328	288	448	328	434
B. diversicornis		24			
B. quadridentatus brevispinus	12	24		12	
B. urceolaris	24	24	24	24	24
Euchlanis dilatata	24	12	12	12	
Filinia longiseta		24			12
Keratella cochlearis cochlearis	42	42	248	24	86
K. c. tecta	24	24	128	24	24
K. quadrata			148	12	42
Lecane bulla	12				
Notholca acuminata			24	12	12
N. squamula					
Polyarthra vulgaris	42	24	88	42	42
Pompholyx complanata					
Synchaeta pectinata				8	
Testudinella patina	12				
Trichocerca pusilla	12				
CLADOCERA					
Alona quadrangularis				4	
A. rectangula	4		4		
Bosmina longirostris	4	4	6	8	20
Chydorus sphaericus		4	8	4	8
Disparalona rostrata	4	4	4	4	4
COPEPODA					
Acanthocyclops robustus	8	8	8	12	
Cyclops vicinus			4		
Eucyclops serrulatus	4				8
Mesocyclops leuckarti	4	4	4	12	8
nauplius larvae	36	42	42	48	86
kopepodit larvae	12	12	24	28	24
Total	692	628	1304	684	946

Table 3.3.2.8 Individual number of zooplankton in 18 June 2000

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Asplanchna priodonta	12	12	12		12
Brachionus angularis	24	12	12	6	24
B. budapestinensis			12		
B. calyciflorus calyciflorus	48	128	42	42	42
B. c. anuraeiformis			12	12	24
B. quadridentatus brevispinus		24	8		
B. urceolaris	12			12	12
Cephalodella gibba					8
Euchlanis dilatata	12	8	8	8	12
Filinia longiseta	12			12	
Keratella cochlearis cochlearis	24	24	24	24	42
K. c. tecta	24	24	12	42	24
K. quadrata			24	12	12
Lecane lunaris				12	
Polyarthra vulgaris	12	12	24	24	
Pompholyx complanata	12		12		
Synchaeta pectinata					12
Testudinella patina	8				
Trichocerca pusilla			8	12	8
CLADOCERA					
Alona rectangula	4	4			4
Bosmina longirostris	8	8	6	6	12
Chydorus sphaericus			4	4	8
Daphnia longispina	4		4	4	
Pleuroxus aduncus		4			
COPEPODA					
Acanthocyclops robustus	8	4	4	4	8
Cyclops vicinus				4	
Mesocyclops leuckarti					4
nauplius larvae	88	88	12	32	24
kopepodit larvae	16	8	8	8	16
Total	328	360	248	280	308

Table 3.3.2.9 Individual number of zooplankton in 29 July 2000

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Ascomorpha ecaudis	42	24	24	86	24
Asplanchna brightwelli			12		
A. priodonta	28	12	8	24	
Brachionus angularis	152	24	42	86	42
B. budapestinensis		24	42	42	
B. calyciflorus calyciflorus		126	84	214	168
B. c. anuraeiformis	294	126	126	236	214
B. diversicornis		24	42	42	
B. quadridentatus brevispinus		8		42	12
Euchlanis dilatata	24	12	12	24	12
Filinia longiseta				12	
Keratella cochlearis cochlearis	86	42		42	42
K. c. tecta	42	24	42	86	42
K. quadrata		24	42	24	
K. tropica		12			
Lecane bulla				24	
Polyarthra vulgaris	42	24	86	42	24
Pompholyx complanata	152			24	42
Ptygura melicerta				4	
Synchaeta pectinata		16	24	12	
Trichocerca pusilla			24		
CLADOCERA					
Alona rectangula		8		6	4
Bosmina longirostris	16	3	6		
Chydorus sphaericus	8				
Diaphanosoma brachyurum				4	
Disparalona rostrata		4			4
Moina micrura	16	6		6	6
Pleuroxus aduncus			4		
COPEPODA					
Eucyclops serrulatus		4			
Mesocyclops leuckarti				4	8
Thermocyclops oithonoides		4	8	6	6
nauplius larvae	86	42	42	86	42
kopepodit larvae	32	24	16	20	30
Total	1020	617	686	1198	722

Table 3.3.2.10 Individual number of zooplankton in 9 November 2000

Taxon	Sampling sites				
	VD1	VD2	VD3	VD4	D
ROTATORIA					
Ascomorpha ecaudis		24	12		
Asplanchna brightwelli			8		
A. priodonta	10			10	
Brachionus angularis	20	12	24	28	12
B. budapestinensis			16	12	
B. calyciflorus calyciflorus		12		16	12
B. c. anuraeiformis			16	8	
B. urceolaris		8			
Cephalodella gibba			8		
Filinia longiseta	12				
Keratella cochlearis cochlearis	20	24	42	24	24
K. c. tecta	8	12	24	12	12
K. quadrata	12	12	16	12	12
K. tropica	6				
Lecane bulla	8			8	
L. closterocerca				8	
L. luna			8		
L. quadridentata			6		
Notholca squamula	8				
Polyarthra vulgaris	20	24	24	42	16
Ptygura melicerta		8			
Synchaeta pectinata					8
CLADOCERA					
Alona quadrangularis		16			
A. rectangula		4			
Bosmina longirostris	4	10	12	36	8
Chydorus sphaericus	4	6	4		
Disparalona rostrata					4
Scapholeberis mucronata				4	
COPEPODA					
Acanthocyclops robustus	4	4	4	4	
nauplius larvae	20	16	20	24	12
kopepodit larvae	6	8	8	12	8
Total	162	200	252	260	128

Table 3.3.3.1 Abundance of the dominant benthic taxa as number of individuals/m^2 at various sampling periods and sites in 2000

Date	**18 May 2000**					
	Oligochaeta			***Chironomidae***		
Sampling site	***Location in cross section***					
	right	**middle**	**left**	**Right**	**middle**	**Left**
1	2267	267	222	2000	1244	1111
2	178	489	400	89	1422	533
3	2889	1822	1378	756	2578	
4	844	1200	3644	2489	2178	2444
River Danube	133					
	18 June					
1	222	1556	844	356	2089	2711
2	711	1956	2267	1244	89	2800
3	6533	5556	3067	0	1600	2267
4	4356	2089	5200	1067	7378	356
River Danube	356					
	29 July					
1	178	1022	400	400	89	1867
2	400	667	1956	133	4222	667
3	5022	2489	1200	267	933	622
4	1778	2978	1867	844	2267	2089
River Danube	533			178		
	9 November					
1	3600	622	222	356	3111	533
2	2489	4978	1422	1244	3600	2400
3	1556	5777	2889	1111	7555	8888
4	6311	2267	5378	2178	2267	2000
River Danube	800			89		

Table 3.3.3.2 Cumulative list of macrozoobenthic taxa (Vén-Duna and River Danube, 2000)

	TAXA	Sampling sites	
		Vén-Duna	River Danube
	Oligochaeta		
1	*Oligochaeta* sp.	1	1
	Polychaeta		
2	*Hypania invalida* (GRUBE, 1860)	1	1
	Hirudinea		
3	*Piscicola geometra* (LINNAEUS, 1761)	1	1
4	*Glossiphonia complanata* (LINNAEUS, 1758)	1	1
5	*Helobdella stagnalis* (LINNAEUS, 1761)	1	1
6	*Erpobdella octoculata* (LINNAEUS, 1758)	1	1
7	*Dina punctata* JOHANSSON, 1927	1	1
	Mollusca		
8	*Theodoxus danubialis* (C. PFEIFFER, 1828)	*	
9	*Theodoxus fluviatilis* (LINNAEUS, 1758)		1
10	*Viviparus acerosus* (BOURGUIGNAT, 1862)	1	1
11	*Valvata cristata* O.F. MÜLLER, 1774	1	
12	*Valvata naticina* (MENKE, 1845)	1	1
13	*Valvata piscinalis* (O. F. MÜLLER, 1774)	1	1
14	*Potamopyrgus jenkinsi* (SMITH, 1889)	*	1
15	*Lithoglyphus naticoides* (C. PFEIFFER, 1828)	1	1
16	*Bithynia tentaculata* (LINNAEUS, 1758)	1	1
17	*Lymnaea peregra var.ovata* (DRAPARNAUD)	1	1
18	*Lymnaea truncatula* (O.F. MÜLLER, 1774)	1	
19	*Physa acuta* DRAPARNAUD, 1805	1	1
20	*Unio pictorum* (LINNAEUS, 1758)	1	1
21	*Unio tumidus* RETZIUS 1788	1	1
22	*Anodonta anatina* (LINNAEUS, 1758)	1	1
23	*Sinanodonta woodiana* (LEA, 1834)	1	1
24	*Dreissena polymorpha* (PALLAS, 1771)	1	1
25	*Corbicula fuminea* (O. F. MÜLLER, 1774)	1	1
26	*Corbicula "fluminalis"* (O. F. MÜLLER, 1774)	1	1
27	*Sphaerium corneum* (LINNÉ, 1758)	1	1
28	*Sphaerium rivicola* (LAMARCK, 1799)	1	1
29	*Spaerium lacustre* (O.F. MÜLLER, 1774)	1	
30	*Pisidium amnicum* (O.F. MÜLLER, 1774)	1	1
31	*Pisidium henslowanum* (SHEPPARD, 1823)	1	1
	Crustacea		
32	*Obesogammarus obesus* (SARS, 1894)	1	1
33	*Limnomysis benedeni* CZERNIAVSKY, 1882	1	1
34	*Corophium curvispinum* SARS,1895	1	1
35	*Dikerogammarus villosus* (SOVINSKY, 1894)	1	1
36	*Jaera istri* VIEUILLE, 1979		1
	Ephemeroptera		
37	*Cloeon dipterum* (LINNAEUS, 1761)	1	
	Odonata		
38	*Calopteryx splendens* (HARRIS, 1782)	1	
39	*Platycnemis pennipes* (PALLAS, 1771)	1	1
40	*Gomphus flavipes* (CHARPENTIER, 1825)	1	1
	Heteroptera		
41	*Notonecta sp.*	1	
42	*Aquarius paludum* (FABRICIUS, 1794)	1	
	Trichoptera		

43	*Hydropsyche bulgaromanorum* MALICKY, 1977	1	1
	TAXA	**Sampling sites**	
		Vén-Duna	**River Danube**
44	*Hydropsyche contubernalis* MCLACHLAN, 1865	1	1
	Diptera - Chironomidae		
45	*Cardiocladius capucinus* (ZETTERSTEDT, 1850)	1	
46	*Chironomidae sp.*	1	1
47	*Chironomus acutiventris* WÜLKER, RYSER & SCHOLL, 1983	1	1
48	*Chironomus annularis* (nec DE GEER, 1776)	1	
49	*Chironomus anthracinus* ZETTERSTEDT, 1860	1	1
50	*Chironomus aprilinus* MEIGEN		1
51	*Chironomus balatonicus*	1	
52	*Chironomus dorsalis* (MEIGEN,1818)	1	
53	*Chironomus nudiventris*	1	1
54	*Chironomus obtusidens*	1	
55	*Chironomus plumosus* (LINNAEUS, 1758)	1	
56	*Chironomus riparius* (MEIGEN, 1804)	1	1
57	*Cladopelma lateralis*	1	
58	*Cryptochironomus defectus* (KIEFFER, 1913)	1	
59	*Cryptochironomus cf. pallidivittatus*	1	
60	*Dicrotendipes nervosus* (STAEGER, 1839)	1	
61	*Einfeldia pagana*	1	
62	*Harnischia sp.*	1	
63	*Lipinella moderata*		1
64	*Microchironomus tener* (KIEFFER, 1918)	1	
65	*Orthocladiinae sp.*	1	
66	*Polypedilum cultellatum* GOETGHEBUER, 1921	1	
67	*Polypedilum nubeculosum* (MEIGEN, 1804)	1	
68	*Procladius choreus* (MEIGEN, 1804)	1	
69	*Procladius ferrugineus* (KIEFFER, 1919)	1	
70	*Prodiamesa olivacea* (MEIGEN,1818)	1	
71	*Tanypus punctipennis* MEIGEN, 1818	1	

Table 3.3.3.3 Macrozoobenthic taxa of the Vén-Duna and River Danube (May 18 2000)

TAXA	Sampling sites												
	VD1			VD2			VD3			VD4			D
	l	m	r	l	m	r	l	m	r	l	m	r	
Oligochaeta													
Oligochaeta sp.	5	6	51	9	11	4	31	41	65	82	27	19	3
Polychaeta													
Hypania invalida (GRUBE, 1860)		3										2	7
Hirudinea													
Glossiphonia complanata (LINNAEUS, 1758)	1												
Helobdella stagnalis (LINNAEUS, 1761)	3									2			
Erpobdella octoculata (LINNAEUS, 1758)			1						1				3
Mollusca													
Viviparus acerosus (BOURGUIGNAT, 1862)								2			2	1	
Valvata naticina (MENKE, 1845)		3	5										
Valvata piscinalis (O. F. MÜLLER, 1774)		12	8										
Potamopyrgus jenkinsi (SMITH, 1889)													1
Lithoglyphus naticoides (C. PFEIFFER, 1828)	9	31	122		4			1		2			
Bithynia tentaculata (LINNAEUS, 1758)	3												
Lymnaea peregra var.ovata (DRAPARNAUD)													2
Anodonta anatina (LINNAEUS, 1758)					1			2		2		1	
Dreissena polymorpha (PALLAS, 1771)						6							2
Corbicula fuminea (O. F. MÜLLER, 1774)		24		4			3	7		1			1
Corbicula "fluminalis" (O. F. MÜLLER, 1774)		4		6		2		1			2		1
Pisidium henslowanum (SHEPPARD, 1823)	1												3
Crustacea													
Obesogammarus obesus (SARS, 1894)		1		2									3
Limnomysis benedeni CZERNIAVSKY, 1882													
Corophium curvispinum SARS,1895			3				2		1				4
Dikerogammarus villosus (SOVINSKY, 1894)	3	4	1		1	2			3		1	2	8
Odonata													
Calopteryx splendens (HARRIS, 1782)				2			1						
Platycnemis pennipes (PALLAS, 1771)					1	1				1			
Gomphus flavipes (CHARPENTIER, 1825)			2		1			1					
Heteroptera													
Notonecta sp.							2						
Trichoptera													
Hydropsyche bulgaromanorum MALICKY, 1977		2	1		1			1			2		5
Hydropsyche contubernalis MCLACHLAN, 1865		1			1	2							3
Diptera													
Chironomidae sp.	25	28	45	12	32	2	-	58	17	55	49	56	-

Table3.3.3.4 Macrozoobenthic taxa of the Vén-Duna and River Danube (18 June, 2000)

TAXA	Sampling sites													
	VD1			VD2			VD3			VD4			5A	D
	l	m	r	l	m	r	l	m	r	l	m	r		
Oligochaeta														
Oligochaeta sp.	19	35	5	51	44	20	69	125	147	117	47	98		8
Polychaeta														
Hypania invalida (GRUBE, 1860)									6					2
Hirudinea														
Piscicola geometra (LINNAEUS, 1761)								1						
Erpobdella octoculata (LINNAEUS, 1758)									2				2	1
Mollusca														
Viviparus acerosus (BOURGUIGNAT, 1862)				2			3	1			3			2
Valvata cristata O.F. MÜLLER, 1774					1									
Valvata naticina (MENKE, 1845)			2		5									1
Potamopyrgus jenkinsi (SMITH, 1889)	1													
Lithoglyphus naticoides (C. PFEIFFER, 1828)		21		7			4							5
Bithynia tentaculata (LINNAEUS, 1758)		4											2	2
Lymnaea truncatula (O.F. MÜLLER, 1774)	1										1		1	
Physa acuta DRAPARNAUD, 1805												2	1	1
Unio pictorum (LINNAEUS, 1758)						1			1	2				1
Unio tumidus RETZIUS 1788								1		1	1			1
Anodonta anatina (LINNAEUS, 1758)		1		1		5		2				4		1
Sinanodonta woodiana (LEA, 1834)			1		2	1	2				3			1
Dreissena polymorpha (PALLAS, 1771)		14	3			8	3	5		7	3	21	3	23
Corbicula fuminea (O. F. MÜLLER, 1774)		28	11		4		3			8				6
Corbicula "fluminalis" (O. F. MÜLLER, 1774)2		3	5		3		5			2		4		3
Sphaerium corneum (LINNÉ, 1758)					3								2	5
Sphaerium rivicola (LAMARCK, 1799)			1		2					1				3
Sphaerium lacustre (O.F. MÜLLER, 1774)								1		2				
Pisidium sp.														
*Pisidium amnicum (*O.F.MÜLLER, 1774*)*	1													2
Pisidium henslowanum (SHEPPARD, 1823)		2												1
Crustacea														
Obesogammarus obesus	2	1		3									2	4
Limnomysis benedeni CZERNIAVSKY, 1882														2
Corophium curvispinum SARS,1895			2	3				1	2				4	2
Dikerogammarus villosus (SOVINSKY, 1894)		6	1			2		1					3	5
Ephemeroptera														
Cloeon dipterum (LINNAEUS, 1761)				1		3	2		1		2			
Odonata														
Gomphus flavipes (CHARPENTIER, 1825)			3											1
Heteroptera														
Aquarius paludum FABRICIUS, 1794)							2			4				
Trichoptera														
Hydropsyche bulgaromanorum MALICKY, 1977		2	1	2		2							3	5
Hydropsyche contubernalis MCLACHLAN, 1865			2			3							4	2
Diptera														
Chironomidae sp.	61	47	8	63	2	28	51	36	-	8	166	24		-

Table3.3.3.5 Macrozoobenthic taxa of the Vén-Duna and River Danube (29 July, 2000)

TAXA	Sampling sites												
	VD1			**VD2**			**VD3**			**VD4**			**D**
	l	**m**	**R**	**l**	**m**	**r**	**l**	**m**	**r**	**l**	**m**	**r**	
Oligochaeta													
Oligochaeta sp.	9	23	4	44	15	9	27	56	113	42	67	40	12
Polychaeta													
Hypania invalida (GRUBE, 1860)		1			2				7				5
Hirudinea													
Piscicola geometra (LINNAEUS, 1761)		1											1
Glossiphonia complanata (LINNAEUS, 1758)						3							
Helobdella stagnalis (LINNAEUS, 1761)			2				1						2
Erpobdella octoculata (LINNAEUS, 1758)		2					1						3
Dina punctata (JOHANSSON 1927)													2
Mollusca													
Theodoxus fluviatilis (LINNAEUS, 1758)													5
Viviparus acerosus (BOURGUIGNAT, 1862)				3							12		3
Valvata naticina (MENKE, 1845)			2	1									1
Lithoglyphus naticoides (C. PFEIFFER, 1828)		23	7	13		3			2				2
Bithynia tentaculata (LINNAEUS, 1758)		3											5
Lymnaea peregra var.ovata (DRAPARNAUD)													3
Unio tumidus RETZIUS 1788					2				1				
Anodonta anatina (LINNAEUS, 1758)						2	1		3		4		
Dreissena polymorpha (PALLAS, 1771)				12		2	4		5		23		21
Corbicula fuminea (O. F. MÜLLER, 1774)		4	5	4	2	3							3
Corbicula "fluminalis" (O. F. MÜLLER, 1774)	1	3	3		1	2		1					6
Sphaerium corneum (LINNÉ, 1758)		2			3							1	5
Spaerium lacustre (O.F. MÜLLER, 1774)										2		1	
Pisidium amnicum (O.F. MÜLLER, 1774)			1										1
Crustacea													
Obesogammarus obesus (SARS, 1894)			1		1								3
Corophium curvispinum SARS,1895		2											2
Dikerogammarus villosus (SOVINSKY, 1894)	1		3			2							5
Jaera istri VIEUILLE, 1979													2
Odonata													
Calopteryx splendens (HARRIS, 1782)									1				
Platycnemis pennipes (PALLAS, 1771)			1										1
Gomphus flavipes (CHARPENTIER, 1825)	1		3										1
Trichoptera													
Hydropsyche bulgaromanorum MALICKY, 1977		1	2										3
Hydropsyche contubernalis MCLACHLAN, 1865		4		2									5
Diptera													
Chironomidae sp.	42	2	9	15	95	3	14	21	6	47	51	19	4

Table3.3.3.6 Macrozoobenthic taxa of the Vén-Duna and River Danube (24 August, 2000)

TAXA	Sampling sites												
	VD1			VD2			VD3			VD4			D
	l	**m**	**R**	**l**	**m**	**r**	**l**	**m**	**r**	**l**	**m**	**r**	
Oligochaeta													
Oligochaeta sp.	6	21	32	13	7	35	19	25	8	45	14	9	25
Polychaeta													
Hypania invalida (GRUBE, 1860)				2					5	1			3
Hirudinea													
Piscicola geometra (LINNAEUS, 1761)				1									
Glossiphonia complanata (LINNAEUS, 1758)		1											1
Helobdella stagnalis (LINNAEUS, 1761)			2										4
Erpobdella octoculata (LINNAEUS, 1758)		1				2							2
Dina punctata (JOHANSSON 1927)													3
Mollusca													
Theodoxus fluviatilis (LINNAEUS, 1758)													2
Viviparus acerosus (BOURGUIGNAT, 1862)				1				2			4		2
Valvata naticina (MENKE, 1845)		5			2				2		1		5
Lithoglyphus naticoides (C. PFEIFFER, 1828)		12		3		3	4						4
Bithynia tentaculata (LINNAEUS, 1758)			1		4								1
Lymnaea peregra var.ovata (DRAPARNAUD)					1								2
Physa acuta DRAPARNAUD, 1805				1									
Unio pictorum (LINNAEUS, 1758)			2			1			1				1
Unio tumidus RETZIUS 1788		1			1						2		
Anodonta anatina (LINNAEUS, 1758)		2				1		1		2		3	1
Dreissena polymorpha (PALLAS, 1771)		23			3	14		7	5	11	8	17	18
Corbicula fuminea (O. F. MÜLLER, 1774)		28	5		14			4		6		2	24
Corbicula "fluminalis" (O. F. MÜLLER, 1774)		12	2		4			3		2		3	11
Sphaerium corneum (LINNÉ, 1758)		3					1						7
Spaerium lacustre (O.F. MÜLLER, 1774)				1			2						
Pisidium amnicum (O.F. MÜLLER, 1774)	1												
Crustacea													
Obesogammarus obesus (SARS, 1894)		1			2								4
Corophium curvispinum SARS,1895	3		1			1				2			5
Dikerogammarus villosus (SOVINSKY, 1894)	3				2		4			3			15
Jaera istri VIEUILLE, 1979													24
Odonata													
Calopteryx splendens (HARRIS, 1782)				1									
Platycnemis pennipes (PALLAS, 1771)			1					1					2
Gomphus flavipes (CHARPENTIER, 1825)	8		2		1				1				3
Trichoptera													
Hydropsyche bulgaromanorum MALICKY, 1977		3			1			2					7
Hydropsyche contubernalis MCLACHLAN, 1865		2		1			1						3
Diptera													
Chironomidae sp.	12	31	51	3	52	8	29	11	4	25	12	6	1

Table3.3.3.7 Macrozoobenthic taxa of the Vén-Duna and River Danube (9 November, 2000)

TAXONOK	Sampling sites													
	VD1			**VD2**			**VD3**			**VD4**			**5A**	**D**
	l	**m**	**r**	**L**	**m**	**r**	**l**	**m**	**r**	**l**	**m**	**r**		**R**
Oligochaeta														
Oligochaeta sp.	5	14	81	32	112	56	65	130	35	121	51	142		18
Hirudinea														
Glossiphonia complanata (LINNAEUS, 1758)			2										2	1
Helobdella stagnalis (LINNAEUS, 1761)													1	3
Erpobdella octoculata (LINNAEUS, 1758)		1	1										1	2
Dina punctata (JOHANSSON 1927)													1	5
Mollusca														
Theodoxus fluviatilis (LINNAEUS, 1758)														5
Viviparus acerosus (BOURGUIGNAT, 1862)			1				2						5	2
Lithoglyphus naticoides (C. PFEIFFER, 1828)		4	11	23			3						8	3
Bithynia tentaculata (LINNAEUS, 1758)		1											2	
Unio pictorum (LINNAEUS, 1758)													1	
Unio tumidus RETZIUS 1788									1				1	1
Anodonta anatina (LINNAEUS, 1758)				2		4			5		2	1	3	2
Sinanodonta woodiana (LEA, 1834)													2	
Dreissena polymorpha (PALLAS, 1771)		3											3	5
Corbicula fuminea (O. F. MÜLLER, 1774)		8	3		5								2	2
Corbicula "fluminalis" (O. F. MÜLLER, 1774)			2			2							3	1
Sphaerium rivicola (LAMARCK, 1799)														1
Spaerium lacustre (O.F. MÜLLER, 1774)							1							
Pisidium henslowanum (SHEPPARD, 1823)								1						2
Crustacea														
Obesogammarus obesus (SARS, 1894)														3
Corophium curvispinum SARS,1895		4			2									2
Dikerogammarus villosus (SOVINSKY, 1894)		1	2			1		1						3
Jaera istri VIEUILLE, 1979														1
Odonata														
Gomphus flavipes (CHARPENTIER, 1825)			4											1
Trichoptera														
Hydropsyche bulgaromanorum MALICKY, 1977		3		1										2
Diptera														
Chironomidae sp.	12	70	8	54	135	28	200	170	25	45	51	49		2

Table 3.3.4.1 Taxon list of fish species detected in the Vén-Duna and River Danube in 2000.

	TAXA	Sampling sites							
		VD1		**VD2**		**VD5A**		**D**	
		24 Aug	12 Sept	24 Aug	12 Sept	24 Aug	12 Sept	24 Aug	12 Sept
	PTEROMYZONTIDAE								
1	*Eudontomyzon mariae* (BERG, 1931)		1						2
	ACIPENSERIDAE								
2	*Acipenser ruthenus* LINNAEUS, 1758							2	1
	ANGUILLIDAE								
3	*Anguilla anguilla* (LINNAEUS, 1758)					1			1
	CYPRINIDAE								
4	*Rutilus rutilus* (LINNAEUS, 1758)	39	19	124	53	18		19	23
5	*Rutilus pigus virgo* (HECKEL, 1852)								2
6	*Scardinius erythrophthalmus* (LINNAEUS, 1758)				3				
7	*Leuciscus leuciscus* (LINNAEUS, 1758)			1			1		2
8	*Leuciscus cephalus* (LINNAEUS, 1758)								1
9	*Leuciscus idus* (LINNAEUS, 1758)						1	2	
10	*Aspius aspius* (LINNAEUS, 1758)				1				2
11	*Alburnus alburnus* (LINNAEUS, 1758)	121	79	15	36	12	5	14	26
12	*Blicca bjoerkna* (LINNAEUS, 1758)	33		89	67			8	18
13	*Abramis brama* (LINNAEUS, 1758)	48	24		23	13	9		6
14	*Barbus barbus* (LINNAEUS, 1758)			1			4	1	2
15	*Gobio gobio* (LINNAEUS, 1758)		1		3				1
16	*Rhodeus sericeus amarus* (PALLAS, 1776)			5		16			
17	*Carassius auratus* (LINNAEUS, 1758)	8		2			6		3
18	*Cyprinus carpio* LINNAEUS, 1758			5					
	SILURIDAE								
19	*Silurus glanis* LINNAEUS, 1758			1			1		
	ESOXIDAE								
20	*Esox lucius* LINNAEUS, 1758		2					3	1
	COTTIDAE								
21	*Cottus gobio* LINNAEUS, 1758							2	4
	GADIDAE								
22	*Lota lota* (LINNAEUS, 1758)					4	2	4	5
	PERCIDAE								
23	*Perca fluviatilis* LINNAEUS, 1758			8					2
24	*Gymnocephalus cernuus* (LINNAEUS, 1758)							2	6
25	*Gymnocephalus baloni* HOLCIK& HESSEL, 1974						1	5	3
26	*Stizostedion lucioperca* (LINNAEUS, 1758)					1		3	2
	GOBIIDAE								
27	*Proterorhinus marmoratus* (PALLAS, 1811)	4	3	8	7		12		3
28	*Neogobius fluviatilis* (PALLAS, 1811)			2	1				1
29	*Neogobius kessleri* BERG, 1949		2			4		11	5
	Sum of individuals	**253**	**131**	**261**	**194**	**69**	**42**	**76**	**122**
	Number of species	**6**	**8**	**12**	**9**	**8**	**10**	**13**	**24**
	Total number of species	**10**		**16**		**15**		**25**	
		24							