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DIATOM SPECIES COMPOSITION OF THE NIŠAVA RIVER AND ITS TRIBUTARIES JERMA AND TEMSKA RIVERS (SOUTHERN SERBIA)

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Abstract – The main objective of this paper is to report the diatom taxa identified from the Nišava River and its tributaries, the Jerma and Temska rivers. The study area included 11 sampling sites along the Nišava River, with one site on the Jerma River and one on the Temska River. Monthly samples (from stones, sediments and macrophytes) were collected from May 2008 to May 2009. Diatom frustules were cleaned with chemical agents, and mounted on permanent slides. In total, 194 diatom taxa were identified. The most species rich genera are *Navicula* (25), *Nitzschia* (17) and *Gomphonema* (13), while other genera are presented with one or more species. Detailed floristic analysis of the benthic diatom flora has not been conducted before on these rivers. Therefore, this paper provides a baseline for future research.

Key words: Diatoms, Nišava River, Jerma, Temska River, species composition, Serbia

INTRODUCTION

Benthic algae are primary producers in streams and are the main source of energy in a food chain for aquatic organisms (Biggs, 1996). Diatoms are often the dominant group of algae in streams (Dodds, 2002). In this regard, their taxonomic diversity is an important aspect of an aquatic community because it reflects the biodiversity and stability of a river ecosystem.

The Nišava River is the biggest tributary of the South Morava River. It belongs to the Black Sea drainage basin, originates in the Stara Planina Mountains, arising from the Ginska and Vrbnica rivers at an elevation of 640 m, near the village Toden in Bulgaria. It enters Serbia 6 km from the city of Dimitrovgrad, flows generally westward, until it empties into the South Morava River, about 10 km from the city of Niš. Along with Ginska River, it is 202 km long, with a catchment area of 4068 km^2 (the Serbian part is 151 km long, the catchment area is 2971.5 km^2). Major tributaries of the Nišava River are the Temska, Visočica and Jerma rivers (Gavrilović and Dukić, 2002). The Nišava River is an important water resource for Niš (Branković et al., 2007), though the negative impact of Niš's wastewater has been reported by Branković et al. (2009). Pirot's communal waste is also a major pollution point (Miljojković et al., 2010).

Martinović-Vitanović (1985) has reported a few plankton diatom species from the Nišava River, as part of the South Morava drainage basin, while Branković et al. (2007) and Trajković el at. (2008) have reported 17 benthic diatom species from Sićevo and Prosek localities.

The main objective of the manuscript is to present 194 diatom taxa identified from 13 sampling sites in order to create baseline date for future research. The diatom flora is described and the

physico-chemical properties of the water are presented.

MATERIALS AND METHODS

The study area included 11 sampling sites along the Nišava River, with one site on the Jerma River and one on the Temska River (see Fig. 1). The sampling sites were located before and after the cities of Dimitrovgrad, Pirot, Bela Palanka and Niš, and before and after the Jerma River estuary.

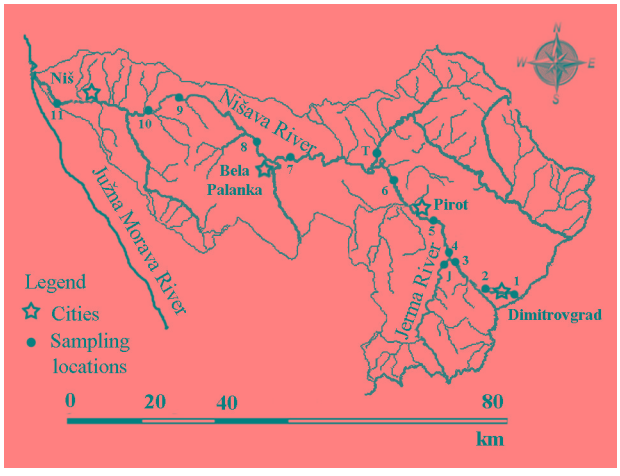

Fig.1. Distribution of sampling sites along the Nišava River (1-11). J-sampling site at the Jerma River, T-sampling site at the Temska River.

Sampling was done monthly from May 2008 to May 2009, except in November 2008 and February 2009 due to flooding. The material for studying the benthic diatom community was collected from three different microhabitats: cobbles or boulder (epilithon), macroalgae and vascular plants (epiphyton) and sediments (epipelon). A total amount of 326 samples from the epilithon (114), epiphyton (88) and epipelon (124) microhabitats were analyzed. Benthic diatoms were collected from stones and macrophytes by cleaning with a toothbrush, and sediments by means of a glass pipette. The algological material was preserved in 4% formalin. Conductivity, pH and water temperature were measured with a Lovibond Multimeter WTW 340i at each sampling site. Ammonium ions, nitrates, nitrites, phosphates, silicates and total hardness were measured using a Lovibond photometer PC Multidirect. Algological samples were transported and processed at the Institute for Botany and Botanical Garden, Belgrade. The material was digested using concentrated sulfuric acid (H_2SO_4), potassium permanganate ($KMnO_4$) and oxalic acid (Krammer and Lange-Bertalot 1986), then rinsed repeatedly with deionized water until the pH was approximately 7, and mounted on slides with Naphrax® mounting medium. Microscopic examination of the permanent slides was done using Zeiss Axio-Imager M1 microscope, and processed with AxioImager Vision v. 4.8 software. Identification of the valves was done according to Krammer and Lange-Bertalot (1986, 1988, 1991, 2004), Krammer (1997, 1997a, 2000, 2002, 2003), Lange-Bertalot (1993, 2001), Cantonati et al. 2010, Mann et al. (2004, 2008), Reichardt (1997, 1999, 2001), Reichardt and Lange-Bertalot 1991, Cox (2003) and Levkov and Luc (2010).

RESULTS AND DISCUSSION

Physico-chemical analysis of water

In the Nišava River the temperature gradient was the highest (0.1-27.1°C), while in the Jerma and Temska rivers it was lowest (1.3-16.7°C for Jerma, and 10-18.4°C for Temska). Mean water temperatures in the Nišava River increase from locality no.1 to locality no. 11, because the upper and middle course of the river is located in a mountain region, while the lower course is located in a valley. The pH varied within four units for the Nišava River, from moderately acidic to slightly alkaline (4.5-8.5), while in the Jerma and Temska rivers it varied within two units (5.54-7.5, 6.5-8.5). Conductivity level variations were greater in the Nišava River (289-986 µS/cm), compared to the Jerma and Temska rivers, where conductivity varied less (319-426 µS/cm, 175-254 µS/cm). In general, the amount of nutrients (nitrates, nitrites, silicates, ammonium ion and phosphates) tended to be higher downstream of wastewater discharges (Dimitrovgrad, Pirot and Niš cities), particularly at sites nos. 2, 6 and 11. Total hardness varied within 43 units for the Nišava River (4-47), in comparison to the Jerma and Tem-

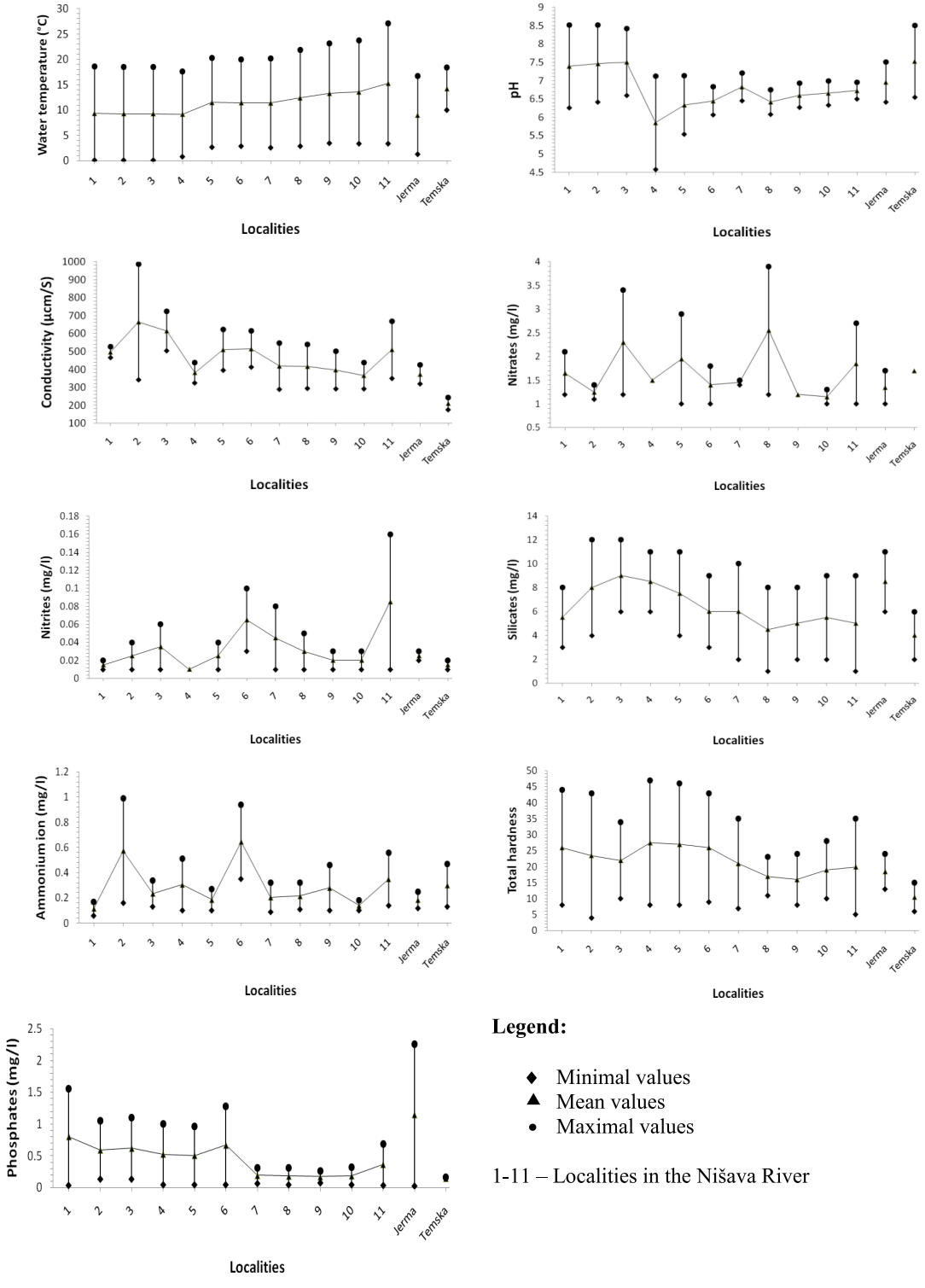

Fig. 2. Minimal, maximal and mean values of measured environmental variables in the Nišava, Jerma and Temska Rivers

Table 1. List of the benthic diatoms, found in the Nišava, Jerma and Temska Rivers. Species names are listed in alphabetical order. Abbreviations: N-Nišava River, J-Jerma River, T-Temska River. The symbol +, represents the presence of a species, and -, represents the absence of a species.

No.	TAXON	N	J	T
1	*Achnanthes coarctata* (Brébisson) Grunow	+	-	-
2	*Achnanthidium minutissimum* (Kützing) Czarnecki	+	+	+
3	*A. pyrenaicum* (Hustedt) Kobayasi	+	+	+
4	*Actinocyclus normanii* (Gregory) Hustedt	+	-	-
5	*Amphipleura pellucida* (Kützing) Kützing	+	+	-
6	*Amphora copulata* (Kützing) Schoeman & Archibald	+	+	+
7	*A. inariensis* Krammer	+	+	-
8	*A. montana* Krasske	+	+	-
9	*A. normani* Rabenhorst	-	+	-
10	*A. ovalis* (Kützing) Kützing	+	+	+
11	*A. pediculus* (Kützing) Grunow	+	+	+
12	*Anomoeoneis sphaerophora* (Ehrenberg) Pfitzer	+	-	-
13	*Asterionella formosa* Hassal 1850	+	-	-
14	*Aulacoseira* sp.A	+	-	-
15	*Caloneis amphisbaena* (Bory) Cleve	+	+	-
16	*C. bacillum* (Grunow) Cleve	+	+	-
17	*C. molaris* (Grunow) Krammer	+	-	+
18	*C. schumanniana* (Grunow) Cleve	+	-	-
19	*C. silicula* (Ehrenberg) Cleve	+	+	-
20	*Campylodiscus hibernicus* Ehrenberg	+	-	-
21	*Cocconeis disculus* (Schumann) Cleve	+	-	-
22	*C. pediculus* (Ehrenberg)	+	+	+
23	*C. placentula* (Ehrenberg)	+	+	+
24	*C. placentula* var. *pseudolineata* Geitler	-	-	+
25	*Craticula accomoda* (Hustedt) Mann	+	-	-
26	*C. ambigua* (Ehrenberg) Mann	+	+	+
27	*C.cuspidata* (Kützing) Mann	+	+	-
28	*Cyclotella distinguenda* Hustedt	+	-	-
29	*C. meneghiniana* Kützing	+	+	+
30	*C. ocellata* Pantocsek	+	-	+
31	*Cymatopleura elliptica* (Brébisson) Smith	+	+	+
32	*C. solea* (Brébisson) Smith	+	+	+

Table 1. *Continued*

No.	TAXON	N	J	T
33	*C.solea* var. *apiculata* (Smith) Ralfs	+	+	+
34	*Cymbella compacta* Østrup	+	+	+
35	*C. cymbiformis* Agardh	+	+	+
36	*C. excisa* Kützing	+	+	+
37	*C. lanceolata* (Ehrenberg) Kirchner	+	+	+
38	*C. preparva* Krammer	-	-	+
39	*C. subcistula* Krammer	+	-	-
40	*C. tumida* (Brébisson) van Heurck	+	+	+
41	*Cymbopleura amphicephala* (Nägeli) Krammer	+	+	+
42	*C. cuspidata* (Kützing) Krammer	+	-	-
43	*Denticula kuetzingii* Grunow	+	-	-
44	*D. tenuis* Kützing	+	-	-
45	*Diadesmis contenta* (Grunow) Mann	+	-	+
46	*Diatoma ehrenbergii* Kützing	+	+	+
47	*D. mesodon* (Ehrenberg) Kützing	+	-	+
48	*D. moniliformis* Kützing	+	+	+
49	*D. vulgaris* Bory	+	+	+
50	*Diploneis marginestriata* Hustedt	+	-	-
51	*D.s oblongella* (Nägeli) Cleve-Euler	+	-	-
52	*D. oculata* (Brébisson) Cleve	+	-	-
53	*D. ovalis* (Hilse) Cleve	+	-	-
54	*Ellerbeckia arenaria* (Moore) Crawford	-	+	-
55	*Encyonema caespitosum* Kützing	+	-	+
56	*E. minutiformae* Krammer	+	-	+
57	*E. prostratum* Kützing	+	+	+
58	*E. silesacum* (Bleisch) Mann	+	-	+
59	*E. ventricosum* (Agardh) Grunow	+	+	+
60	*Encyonopsis subminuta* Krammer & Reichardt	+	-	-
61	*Eolimna minima* (Grunow) Lange-Bertalot	+	+	+
62	*E. subminuscula* (Manguin) Moser,L.-Bert.&Metz.	+	+	+
63	*Epithemia sorex* Kützing	+	-	-
64	*Eunotia pectinalis* f. *undulata* (J.Ralfs) Berg	-	-	+
65	*Fallacia monoculata* (Hustedt) Mann	+	-	-

Table 1. *Continued*

No.	TAXON	N	J	T
66	*F. pygmaea* (Kützing) Stickle & Mann	+	+	-
67	*F. subhamulata* (Grunow) Mann	+	+	+
68	*Fragilaria biceps* (Kützing) Lange-Bertalot	+	+	-
69	*F.a capucina* Desmazières	+	-	-
70	*F.a capucina* var. *capitellata* (Grunow) Lange-Bertalot	+	+	+
71	*F.a vaucheriae* (Kützing) Petersen	+	-	+
72	*Frustulia vulgaris* (Thwaites) De Toni	+	+	-
73	*Geissleria decussis* (Østrup) Lange-Bertalot & Metzeltin	+	+	+
74	*Gomphonema acuminatum* Ehrenberg	+	-	-
75	*G. aff. affine* Kützing	+	+	-
76	*G. angustatum* (Kützing) Rabenhorst	+	-	-
77	*G. augur* Ehrenberg	+	-	-
78	*G. capitatum* Ehrenberg	+	+	+
79	*G. italicum* Kützing	+	-	-
80	*G. micropus* Kützing	+	+	-
81	*G. minutum* (Agardh) Agardh	+	+	+
82	*G. olivaceolacuum* (L.-B.&Reich.)L.-B.&Reich.	+	-	-
83	*G. olivaceum* (Hornemann) Kützing	+	+	+
84	*G. parvulum* (Kützing) Kützing	+	-	+
85	*G. pumilum* (Grunow) Reich. & L.-Bertalot	+	+	+
86	*G. tergestinum* (Grunow) Fricke	+	+	-
87	*Gyrosigma acuminatum* (Kützing) Rabenhorst	+	+	+
88	*G. attenuatum* (Kützing) Rabenhorst	+	+	+
89	*G. scalproides* (Rabenhorst) Cleve	+	+	-
90	*Hannaea arcus* (Ehrenberg) Patrick	+	+	+
91	*Hantzschia amphioxys* (Ehrenberg) Grunow	+	+	-
92	*Hippodonta capitata* (Ehrenberg) L.-Bert.,Metz.&Witko.	+	+	+
93	*Karayevia ploenensis* (Hustedt) Bukhtiyarova	-	+	-
94	*Luticola dismutica* (Hustedt) Mann	+	-	-
95	*L. goeppertiana* (Bleisch) Mann	+	-	-
96	*L. mutica* (Kützing) Mann	+	-	-
97	*L. muticopsis* (Van Heurck) Mann	+	-	-
98	*Mayamaea atomus* (Kützing) Lange-Bertalot	+	+	+

Table 1. *Continued*

No.	TAXON	N	J	T
99	*Melosira varians* Agardh	+	+	+
100	*Meridion circulare* (Greville) Agardh	+	+	+
101	*M. constrictum* Ralfs	-	+	+
102	*Navicula amphiceropsis* Lange-Bertalot & Rumrich	+	+	+
103	*N. antonii* Lange-Bertalot & Rumrich	+	+	+
104	*N. capitoradiata* Germain	+	+	+
105	*N. cari* Ehrenberg	+	-	-
106	*N. cryptocephala* Kützing	+	-	+
107	*N. cryptotenella* Lange-Bertalot in Krammer	+	+	+
108	*N. erifuga* Lange-Bertalot in Krammer	+	-	-
109	*N. gregaria* Donkin	+	+	+
110	*N. kotschyi* Grunow	+	-	-
111	*N. lanceolata* (Agardh) Ehrenberg	+	+	-
112	*N. novaesiberica* Lange-Bertalot	+	-	-
113	*N. oblonga* (Kützing) Kützing	-	+	-
114	*N. pseudotenelloides* Krasske	+	-	-
115	*N. radiosa* Kützing	+	+	+
116	*N. reichardtiana* Lange-Bertalot	+	+	+
117	*N. reichardtii* (Grunow) Grunow	-	-	+
118	*N. rostellata* Kützing	+	-	-
119	*N. tenelloides* Hustedt	-	+	-
120	*N. tripunctata* (Müller) Bory de Saint-Vincent	+	+	+
121	*N. trivialis* Lange-Bertalot	+	-	-
122	*N. upsaliensis* (Grunow) Peragallo	+	+	-
123	*N. veneta* Kützing	+	+	+
124	*N. viridula* (Kützing) Ehrenberg	+	+	+
125	*N. viridulacalcis* Lange-Bertalot	+	+	+
126	*Neidiomorpha binodiformis* (Krammer) Lange-Bertalot & Cantonati	+	+	-
127	*Neidium ampliatum* (Ehrenberg) Krammer	+	-	-
128	*N. dubium* (Ehenberg) Cleve	+	+	+
129	*N.dubium* f. *constrictum* Hustedt	+	-	-
130	*Nitzschia acicularis* (Kützing) W.Smith	+	+	+
131	*N. capitellata* Hustedt in Schmidt et al.	+	+	-

Table 1. *Continued*

No.	TAXON	N	J	T
132	*N. clausii* Hantzsch	+	-	-
133	*N. dissipata* (Kützing) Grunow	+	+	+
134	*N. dubia* Smith	+	+	-
135	*N. fonticola* Grunow in Cleve & Möller	+	+	+
136	*N. heufleriana* Grunow	+	+	+
137	*N. inconspicua* Grunow	+	-	-
138	*N. linearis* (Agardh) Smith	+	+	+
139	*N. linearis* var. *tenuis* (Smith) Grunow in Cleve & Grunow	+	+	+
140	*N. palea* (Kützing) W.Smith	+	+	+
141	*N. pusilla* Grunow	+	-	-
142	*N. recta* Hantzsch ex Rabenhorst	+	+	+
143	*N. sigmoidea* (Nitzsch) W.Smith	+	+	+
144	*N. sinuata* var. *tabellaria* (Grunow) Grunow in van Heurck	+	-	-
145	*N. sociabilis* Hustedt	+	+	+
146	*N. vermicularis* (Kützing) Hantzsch in Rabenhorst	+	+	+
147	*Parlibellus protracta* (Grunow) Witkowski, Lange-Bertalot & Metzeltin	+	-	-
148	*Pinnularia borealis* var. *scalaris* (Ehrenberg) Rabenhorst	+	-	-
149	*P. borealis* var. *sublinearis* Krammer	-	-	+
150	*P. brebissonii* (Kützing) Rabenhorst	+	-	+
151	*P. obscuriformis* Krammer	+	-	-
152	*P. oriunda* Krammer	+	-	-
153	*P. subrupestris* Krammer	-	-	+
154	*P. undula* (Schumann) Krammer	-	+	-
155	*P. viridiformis* Krammer	+	-	-
156	*Placoneis clementis* (Grunow) E.J. Cox	+	-	-
157	*P.s paraelginensis* Lange-Bertalot	+	+	-
158	*P. placentula* (Ehrenberg) Mereschkowsky	+	-	-
159	*P. pseudanglica* Cox	+	-	-
160	*Planothidium dubium* (Grunow) Round & Bukhtiyarova	+	-	-
161	*P. frequentissimum* (Lange-Bertalot) Lange-Bertalot	+	+	+
162	*P. lanceolatum* (Brébisson ex Kützing) Round & L.Bukhtiyarova 1996	+	+	+
163	*Puncticulata radiosa* (Grunow) Hakansson	+	-	+

Table 1. *Continued*

No.	TAXON	N	J	T
164	*Reimeria sinuata* (Gregory) Kociolek & Stoermer	+	+	+
165	*Rhoicosphenia abbreviata* (Agardh) Lange-Bertalot	+	+	+
166	*Rhopalodia gibba* (Ehrenberg) Otto Müller	-	+	-
167	*R. operculata* (C.Agardh) Håkanasson	+	-	-
168	*Sellaphora bacilloides* (Husted) Levkov, Krstic et. nakov	+	-	-
169	*S. bacillum* (Ehrenberg) Mann	+	+	+
170	*S. capitata* Mann & McDonald	+	+	-
171	*S. lanceolata* Mann & Droop	+	-	-
172	*S.pupula* (Kützing) Mereschkovsky	+	+	+
173	*Stauroneis gracilis* Ehrenberg	+	-	-
174	*S. phoenicenteron* (Nitzsch) Ehrenberg	+	+	-
175	*S. smithii* Grunow	+	+	-
176	*Staurosira pinnata* Ehrenberg	+	-	-
177	*Stephanodiscus parvus* Stoermer & Håkansson	+	-	-
178	*Surirella angusta* Kützing	+	+	+
179	*S. bifrons* Ehrenberg	-	+	-
180	*S. brebissonii* var. *kuetzingii* Krammer & Lange-Bertalot	+	+	+
181	*S. linearis* Smith	-	+	-
182	*S. minuta* Brébisson in Kützing	+	+	+
183	*S. ovalis* Brébisson	+	+	-
184	*S. tenera* Gregory	-	+	+
185	*Synedrella parasitica* (Smith) Round & Maidana	+	+	-
186	*S. subconstricta* (Grunow) Round & Maidana	+	+	-
187	*Tryblionella angustata* Smith	+	+	+
188	*T. apiculata* Gregory	+	+	-
189	*T. calida* (Grunow in Cleve & Grunow) Mann	+	-	-
190	*T. gracilis* Smith	+	-	-
191	*T. hungarica* (Grunow) Mann	+	+	-
192	*T. salinarum* (Grunow) Pantocsek	+	+	-
193	*Ulnaria acus* (Kützing) Aboal	+	+	-
194	*U. ulna* (Nitzsch) Compère	+	+	+
TOTAL		177	115	93
PERCENTAGE (%)		91.2	59.3	47.9

ska Rivers where hardness varied within around 10 units (13-23, 6-15). The minimal, maximal and mean values of measured environmental variables in the Nišava, Jerma and Temska Rivers are shown in Fig. 2.

Diatom species composition

A total of 194 diatom taxa were identified in this investigation (Table 1): 177 in the Nišava River, 116 in the Jerma River and 92 in the Temska River. Of the 194 taxa, 69 occurred in all three rivers. Several diatom taxa occurred in only one river: 57 in the Nišava River, 9 in Jerma River and 6 in the Temska River.

The most abundant genera were *Navicula* (25), *Nitzschia* (17) and *Gomphonema* (13); less abundant genera were *Pinnularia* (8), *Surirella* (7), *Cymbella* (7), *Amphora* (6), *Tryblionella* (6), *Encyonema* (5), *Sellaphora* (5), *Caloneis* (5), *Cocconeis* (4), *Diatoma* (4), *Diploneis* (4), *Fragilaria* (4), *Luticola* (4), *Placoneis* (4), *Stauroneis* (4), *Craticula* (3), *Cyclotella* (3), *Cymatopleura* (3), *Fallacia* (3), *Gyrosigma* (3), *Neidium* (3), and *Planothidium* (3). Two or a single species (Table 2) presented other genera.

The dominant species were: *Achnanthidium minutissimum*, *A. pyrenaicum*, *Amphora copulata*, *Cocconeis placentula, Gomphonema minutum*, *G. pumilum*, *Navicula cryptotenella*, *N. reichardtiana*, *N. tripunctata, Nitzschia dissipata* and *N. fonticola*. These species were abundantly-developing in mass and strongly predominating over the other diatom species in the community, and frequently-appearing in the majority of samples. Several diatom species were also abundant, but only at individual sites: *Diatoma moniliformis* and *D. vulgaris* at site no. 1, *Nitzschia palea* at site no. 2, *Navicula tripunctata* at site no. 7, *Cocconeis pediculus* at sites no. 6 and 8, *Eolimna subminuscula*, *Navicula capitoradiata* and *Ulnaria ulna* at site no. 11. The presence of plankton species such as *Asterionella formosa* and *Cyclotella meneghiniana* in the benthos was probably a result of drift from dams situated on the Nišava River. The highest species diversity was recorded at site no. 1, and lowest at site no. 5.

The recorded composition of the benthic diatom community is typical of running water and is similar to the diatom communities from other rivers in Serbia (Ržaničanin, 2004; Simić, 1996; Laušević, 1993; Nikitović, 1998; Tomašević, 2000; Jurišić, 2004). Similar to our study, *Navicula* was the most species rich genus in the West Morava River (Jurišić, 2004), Trgoviški Timok River (Simić, 1996) and in the Samokovska River (Laušević, 1993). Species belonging to the genera *Navicula* and *Nitzschia* are highly motile and capable of moving through sediments (Round, 1990). The high number of samples from epipelon might explain the high number of species of the *Navicula* and *Nitzchia* genera in our study. The availability of these microhabitats might play an important role in determining the spatial distribution of the species, though the distinct niche preferences of the diatoms in the samples collected from the rivers may not be so obvious (Round, 1991,1993). Ecological data about *Achnanthidium minutissimum* are controversial in the literature. The species is ubiquitous (van Dam, 1994), reported to be both tolerant to pollution (Stevenson and Bahl, 1999) and found in nutrient-poor waters (Kelly and Whitton, 1995; Potapova and Charles, 2007). In our study, the species was dominant at site no. 1, the Jerma and Temska rivers, where nutrient concentrations were lower in comparison to the other sites. *Navicula cryptotenella*, *N. reichardtiana*, *N. tripunctata, Nitzschia dissipata* and *N. fonticola* are tolerant to moderately tolerant to heavy organic pollution (Rott, 1999), and were dominant at sites nos. 2, 6 and 11. Physico-chemical analysis indicated elevated concentrations of nitrates and ammonium ions at these sites, which can be linked to the industrial and communal wastewaters from Dimitrovgrad, Pirot and Niš. An increase in nutrient concentration after Pirot and Niš has also been reported by Branković et al. (2009) and Miljojković et al. (2010). Species such as *Achnanthidium minutissimum*, *Amphora pediculus*, *Cocconeis placentula, Gomphonema parvulum* and *Ulnaria ulna* appear to be widely distributed inhabitants in three diatom communities on riverbeds and cosmopolitans (Ivanov et al., 2006; Voicino et al., 2004; Komulaynen, 2009; Potapova and Charles, 2003; Wunsam et al., 2002; Bere and Tundsi, 2011). The structure of

Table 2. List of diatom genera with the number of species from the Nišava, Jerma and Temska Rivers

GENUS	No. OF TAXA	GENUS	No. OF TAXA
Achnanthes	1	*Gyrosigma*	3
Achnanthidium	2	*Hannaea*	1
Actinocyclus	1	*Hantzschia amphioxys* (Ehrenberg) Grunow 1880	1
Amphipleura	1	*Hippodonta capitata* (Ehrenberg) L.-Bert., Metz.&Witko.1996	1
Amphora	6	*Karayevia ploenensis*(Hustedt) Bukhtiyarova 1999	1
Anomoeoneis	1	*Luticola dismutica* (Hustedt) Mann 1990	4
Asterionella	1	*Mayamaea atomus* (Kützing) Lange-Bertalot 1997	1
Aulacoseira	1	*Melosira varian* Agardh1827	1
Caloneis	5	*Meridion circulare* (Greville) Agardh 1831	2
Campylodicus	1	*Navicula*	24
Cocconeis	4	*Neidiomorpha*	1
Craticula	3	*Neidium*	3
Cyclotella	3	*Nitzschia*	17
Cymatopleura	3	*Parlibellus protracta* (Grunow) Witkowski, Lange-Bertalot & Metzeltin 2000	1
Cymbella	7	*Pinnularia bscala* (Ehrenberg) Rabenhorst 1864	8
Cymbopleura	2	*Placoneis pseudanglica*Cox 1987	4
Denticula	2	*Planothidium dubium* (Grunow) Round & Bukhtiyarova 1996	3
Diadesmis conten (Grunow) Mann 1990	1	*Puncticulata radiosa* (Grunow) Hakansson 2002	1
Diatoma ehrenbergi Kützing 1844	4	*Reimeria sinuata* (Gregory) Kociolek & Stoermer 1987	1
Diploneis	4	*Rhoicosphenia abbreviata* (Agardh) Lange-Bertalot 1980	1
Ellerbeckia	1	*Rhopalodia gibba* (Ehrenberg) Otto Müller 1895	2
Encyonema	5	*Sellaphora*	5
Encyonopsis	1	*Stauroneis*	4
Eolimna	2	*Stephanodiscus*	1
Epithemia sorex Kützing 1844	1	*Surirella*	7
Eunotia pectinalisundulata (J. Ralfs) Berg 1939	1	*Synedrella*	2
Fallacia monoculata (Hustedt) Mann 1990	3	*Tryblionella*	6
Fragilaria	4	*Ulnaria*	2
Frustulia vulgaris (Thwaites) De Toni 1891	1	**Total**	**194**
Geissleria decussis (Østrup) Lange-Bertalot & Metzeltin 1996	1		
Gomphonema acuminatum Ehrenberg 1832	13		

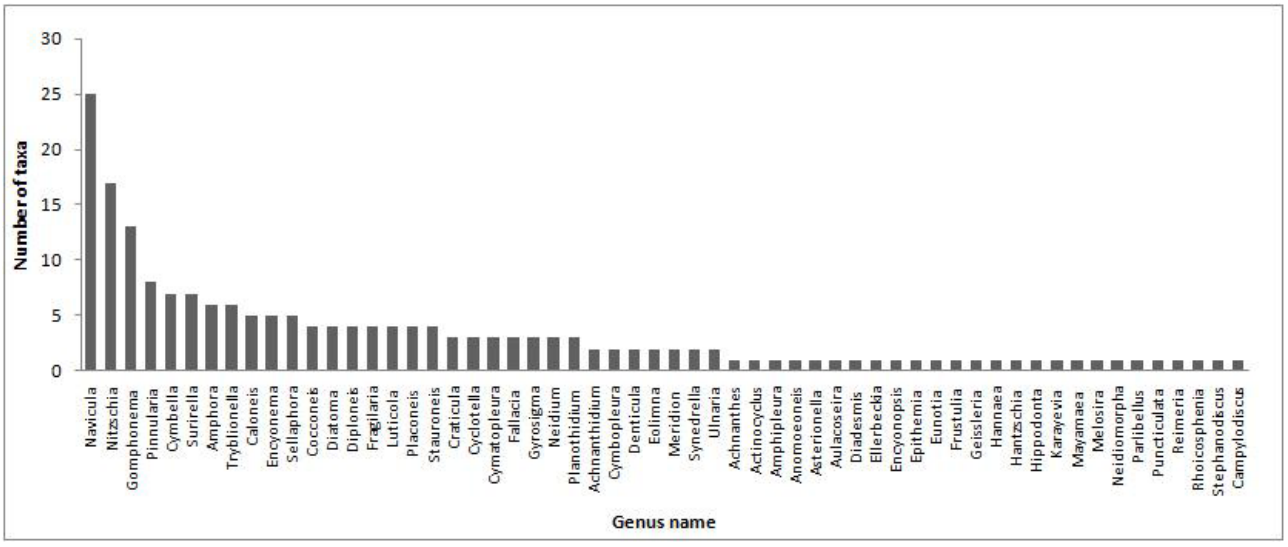

Fig. 3. Number of identified taxa in genera from Nišava, Jerma and Temska Rivers.

the diatom assemblages from the Nišava, Jerma and Temska rivers agrees with findings in the literature, which indicate that diatom communities are dominated by a few species that occur frequently and a large number of rare species that occur occasionally, or sometimes only once (Round, 1993; Kelly and Whitton, 1995) (Fig. 3).

A previous study of the biota from the Nišava River (Branković et al., 2007; Trajković et al., 2008) reported 17 diatom species. The number of samples studied (326 samples in total), collected monthly from diverse microhabitats, was probably the factor contributing to the much greater number of taxa identified (194 taxa).

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