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RESEARCH REGARDING THE FISH COMMUNITIES IN BAHNA, TOPOLNITA, AND BLAHNITA (DANUBE TRIBUTARIES, ROMANIA)

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Key words: *fish communities, biological integrity, Danube River*

INTRODUCTION

The present study was carried out over the year 2007 in three of the Danube tributaries, i.e. Bahna, Topolnita, and Blahnita.

Bahna, Topolnita, and Blahnita are three of the left tributaries of the River Danube. The length of Bahna River is 29 km and its surface is 153 km^2. Topolnita River is 44 km long and its surface is 360 km^2 while Blahnita is 56 km long and its surface is 555 km^2.

The aim of this study was to assess the statement of the fish communities in this study area, based on biodiversity indices, species frequency, numerical and weight stocks in sampling sites.

MATERIALS AND METHODS

The biological material was sampled by electrofishing, from 10 sampling sites (1-2 on Bahna, 3-5 on Toplolnita, and 6-10 on Blahnita) (Map 1).

The fish individuals were determined and than biometricaly processed. Some of the ecological indices were calculated, as well as biodiversity indices, evenness (equitability), numerical and weight stocks and similarity indices. The ecological analysis, based on the obtained data, revealed some interesting aspects of fish communities structure and also of biodiversity.

RESULTS AND DISCUSSIONS

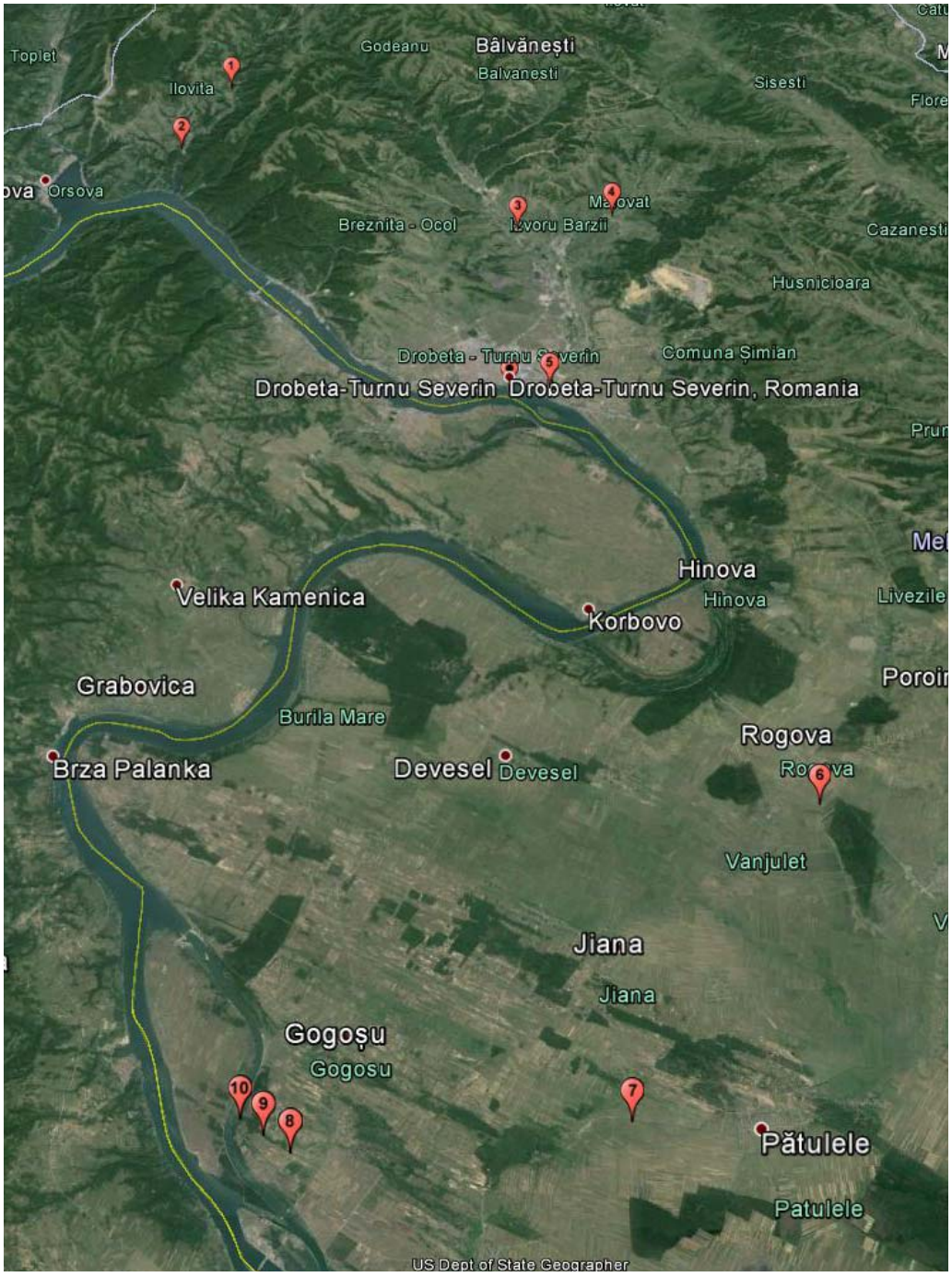
Table 1 presents some geographical and hydrochemical parameters on the three Danube tributaries in the sampling sites. As we can see, the water temperature has recorded different values, between 14.1 and 25.8^0 C. The water conductivity value ranged between 264 and 746 µs/cm.

The number of species in sampling sites ranged between 4 (Bahna, upstream Bahna village, Plesuva, Malovat village) and 19 (Blahnita, downstream Balta Verde village).

An ammount of 2722 fish individuals belonging to 37 species were determined and biometrically processed.

Table 1. The geographical and hydrochemical parameters on the three Danube tributaries in the sampling sites in 2007

No.	STREAM / SAMPLING SITE	No. sp.	Geographical parameters			Hydrochemical parameters		
			Lat (N)	Long (E)	Alt. (m)	Water Temp. (^{0}C)	pH	Conductiv. µs/cm
1	Bahna, upstream Bahna village	4	44.47171	22.29892	162	16.5	6.90	264
2	Bahna, downstream Ilovita village	6	44.44680	22.28511	56	20.4	6.20	306
3	Topolnita, downstream Izvoru Barzii village	7	44.42057	22.40364	91	24.4	7.30	528
4	Plesuva, Malovat village	4	44.42426	22.43912	114	25.8	6.80	603
5	Topolnita, upstream confl. of Danube	12	44.37247	22.41308	62	25.4	6.70	751
6	Blahnita, 1 km downstream Rogova village	5	44.27219	22.48797	104	19.9	7.10	640
7	Blahnita, 2 km downstream Patulele village	10	44.20718	22.44939	61	21.0	7.20	690
8	Blahnita, downstream Balta Verde village	19	44.20294	22.34533	35	14.1	9.40	469
9	Blahnita, 1.5 km upstream confl. of Danube	15	44.20478	22.34135	34	24,3	7.40	744
10	Blahnita, upstream confl. of Danube	15	44.20855	22.83214	33	21.7	7.60	746



Map 1. Sampling sites on the three Danube tributaries: Bahna, Topolnita, and Blahnita:
1 - Bahna, upstream Bahna village; 2 - Bahna, downstream Ilovita village; 3 - Topolnita, downstream Izvoru Barzii village; 4 - Plesuva, Malovat village; 5 - Topolnita, upstream confl. of Danube; 6 - Blahnita, 1 km downstream Rogova village; 7 - Blahnita, 2 km downstream Patulele village; 8 - Blahnita, downstream Balta Verde village; 9 - Blahnita, 1.5 km upstream confl. of Danube; 10 - Blahnita, upstream confl. of Danube

The species frequency in sampling sites is represented in figure 1. Analyzing the figure 1 it can be seen that the chub (*Squalius cephalus*) is the species with the highest frequency, i.e. it was present in 9 of the 10 sampling sites (90%) and it is followed by the Mediterranean barbel (*Barbus meridionalis*) (60%) and than by the bleak (*Alburnus alburnus*) and *Rhodeus amarus* (50%). Other 5 species have recorded a frequency of 40% (*Leuciscus idus, Chondrostoma nasus, Gobio obtusirostris, Carassius gibelio, Barbatula barbatula*) (Figure 1).

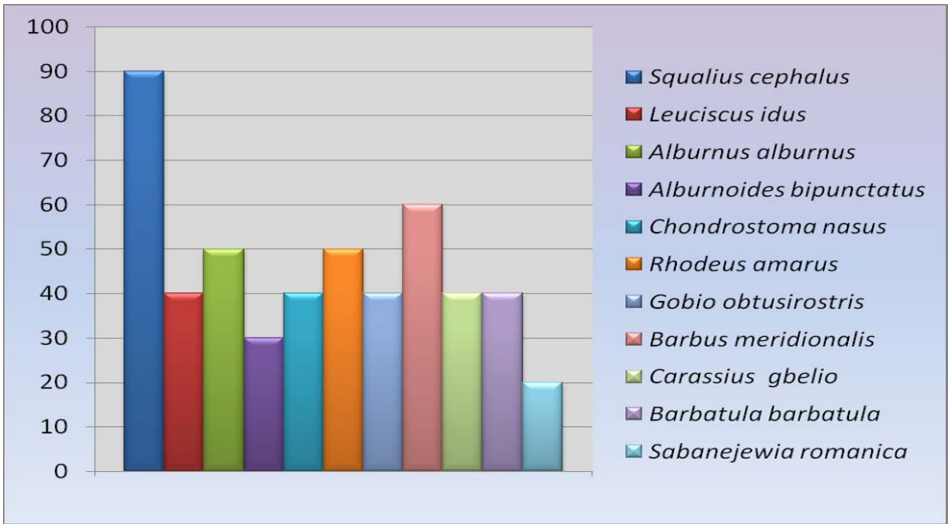


Figure 1. Species frequency in samplig sites

Figure 2, and figure 3 show the numerical stock average and the weight stock average in sampling sites respectively.

Analyzing the figure 2 it can be seen that by far, the Mediterranean barbel (*Barbus meridionalis*) has the highest value of the numerical stock average (94.86 ind./100 m^2), and it is followed by chub (*Squalius cephalus*) (42.40 ind./100 m^2), and then by *Rhodeus amarus* (33.92 ind./100 m^2). For other 8 fish species the numerical stock average has recorded values below 30 ind./100 m^2 (Figure 2).

Analyzing the figure 3 we can see that the highest value of the weight stock average was recorded by Prussian carp (*Carassius gibelio*) (948.55 g/100 m^2), followed by chub (*Squalius cephalus*) (653.14 g/100 m^2) Mediterranean barbel (*Barbus meridionalis*) (522.36 g/100 m^2), and then by common nase (*Chondrostoma nasus*) (332.83 g/100 m^2) (Figure 3). For the rest of the fish species the weight stock average has recorded values below 200 g/100 m^2 (Figure 3).

It is obvious that the situation is quite different regarding the weight stock average in sampling sites. The highest values of the weight stock average belong to the fish species of medium, and great size.

Analyzing the fish communities structure from the food regime point of view, we can see that the fish species with animal food regime are dominant (75.68%), and they are followed by the omnivorous species (13.51%), detritivorous species (8.11%), and finally by the phytophagous species with only 2.7% (Figure 4).

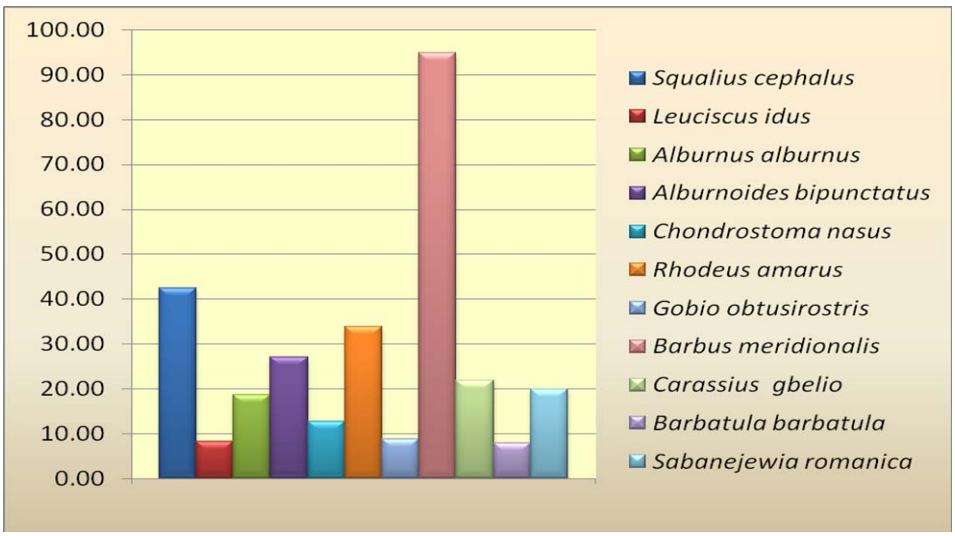


Figure 2. Numerical stock average in sampling sites (ind./100 m^2)

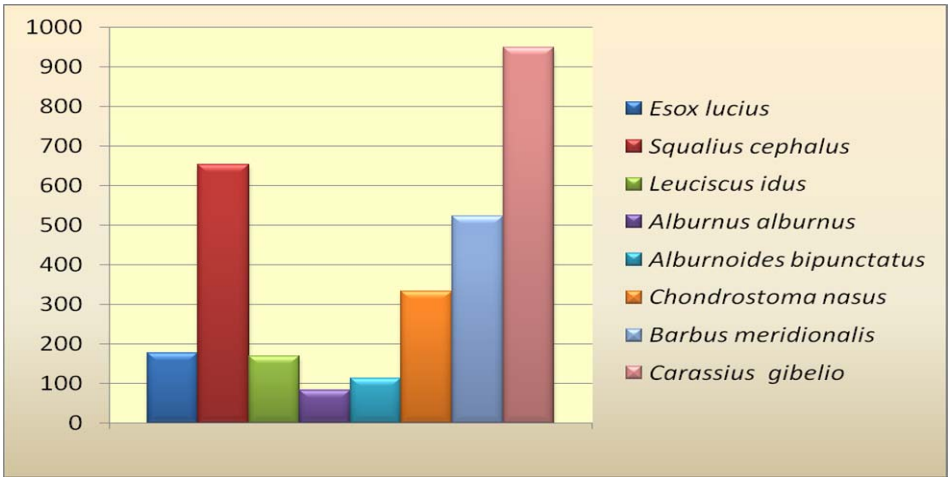


Figure 3. Weight stock average in sampling sites (g/100 m^2)

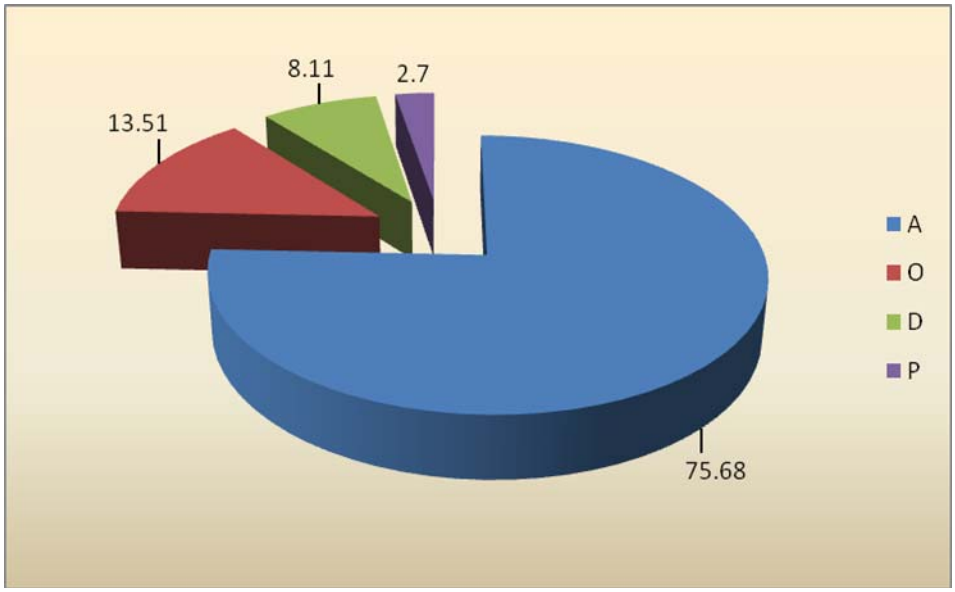


Figure 4. The trophic structure of the fish communities in the study area

The values of different biodiversity indices and the values of equitability for the fish communities in the study area are presented in table 2.

Margalef index, and Menhinick index indicate species richness.

Simpson's diversity index is also a measure of diversity, and it is often used to quantify the biodiversity of a habitat.

Shannon-Wiener index is one of the most used indicators, which measures the degree of organization or disorganization of a system. Evenness (equitability) is a measure of the relative abundance of the different species making up the richness of an area.

According to the values of Margalef index and Menhinick index, the sampling sites 8, 9, and 10 have a high species richness, but the highest value was recorded in the sampling site placed on Blahnita, 1.5 km upstream the confluence with Danube River (3.349, and 1.846 respectively).

The values of evenness (equitability) indicate the best relative abundance of the different species in sampling site 8 (Blahnita, downstream Balta Verde village), where we found the highest number of fish species, and also the highest number of individuals (Table 2).

According to the values of similarity indices, the fish communities' resemblance is highest between the sampling sites 5 and 10 and also between 8 and 9.

Table 2. Biodiversity indices in the study area

Sampling sites	1	2	3	4	5	6	7	8	9	10
No. of species	4	6	6	4	12	5	10	19	15	15
Margalef	0.542	0.929	0.781	0.665	1.992	0.824	1.444	2.995	3.349	2.811
Menhinick	0.251	0.406	0.244	0.419	0.757	0.440	0.442	0.940	1.846	1.241
Simpson	0.438	0.278	0.406	0.569	0.355	0.374	0.352	0.143	0.193	0.396
Shannon-Wiener	1.380	1.995	1.503	1.160	2.029	1.618	1.829	3.238	2.871	2.720
Evenness (equitability) (□)	0.690	0.772	0.581	0.580	0.566	0.698	0.550	0.762	0.735	0.696

CONCLUSIONS

The taxonomic analyzis of the biological material highlights the presence of 37 fish species belonging to 8 families of which the best represented are the folowing: Cyprinidae, Cobitidae, Percidae, and Gobiidae. *Squalius cephalus* has recorded the highest frequency in sampling sites. The value of numerical stock in sampling sites range between 0,19 (*Aspius aspius, Misgurnus fosilis*), and 94,86 ind./100 m^2 (*Barbus meridionalis*), while that of the weight stock range between 0,19 (*Rhodeus amarus*), and 2012,89 g/100 m^2 (*Squalius cephalus*).

The biodiversity indices indicate a great species richness in the sampling sites 5, 8, 9, 10 (close to the confluence with Danube River).

ABSTRACT

The study was carried out in three of the Danube tributaries in 2007. The aim of the study was to assess the state of fish communities in this area, and also to highlight significant aspects regarding the fish communities, such as biodiversity, stocks, and biological integrity. The biological material was sampled by electrofishing from 10 sampling sites.

The biodiversity is quite high, during the study period, 37 fish species being identified, with an amount of 2722 individuals and 35716.6 g. Only one of the 37 fish species is non-native (*Pseudorasbora parva*) while the rest of 36 fish species are native.

The species frequency ranges between 90% and 10%. The chub has recorded the highest value of the frequency (90%) and it is followed by the Mediterranean barbell (60%) and then by bleak and *Rhodeus amarus* (50%).

We found that the numerical stock in sampling sites ranged between 0.19 and 178.67 ind./100 m^2, the highest value being recorded by the Mediterranean barbell, while the weight stock ranged between 0.46 and 2012.89 g/100 m^2, the highest value being recorded by the chub.

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