COMPLEXUL MUZEAL DE ŞTIINŢELE NATURII „ION BORCEA” BACĂU

STUDII ŞI COMUNICĂRI 2010	Vol. 23: 116 – 124

DATA CONCERNING SOME FISH COMMUNITIES FROM THE SOUTH PART OF ROMANIA

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ABSTRACT

The paper presents the results of an ecological study on the: Călmăţui, Ialomiţa and Mostiştea rivers, fish community.

Using an electrofisher FEG 500 they were captured, in 39 sample sites, a number of 1929 fish specimens belonging to 32 species. They were calculated a series of ecological metrics and indexes in order to assess the fish community structure. Based on this data we were able to conclude that fish community is still in good state, having a balanced ecological structure, even they are some negative human impacts on the aquatic habitats. In the area they are present a some fish species that are protected at European or national level.

Keywords: ichthyofauna, fish communities, Ialomiţa River

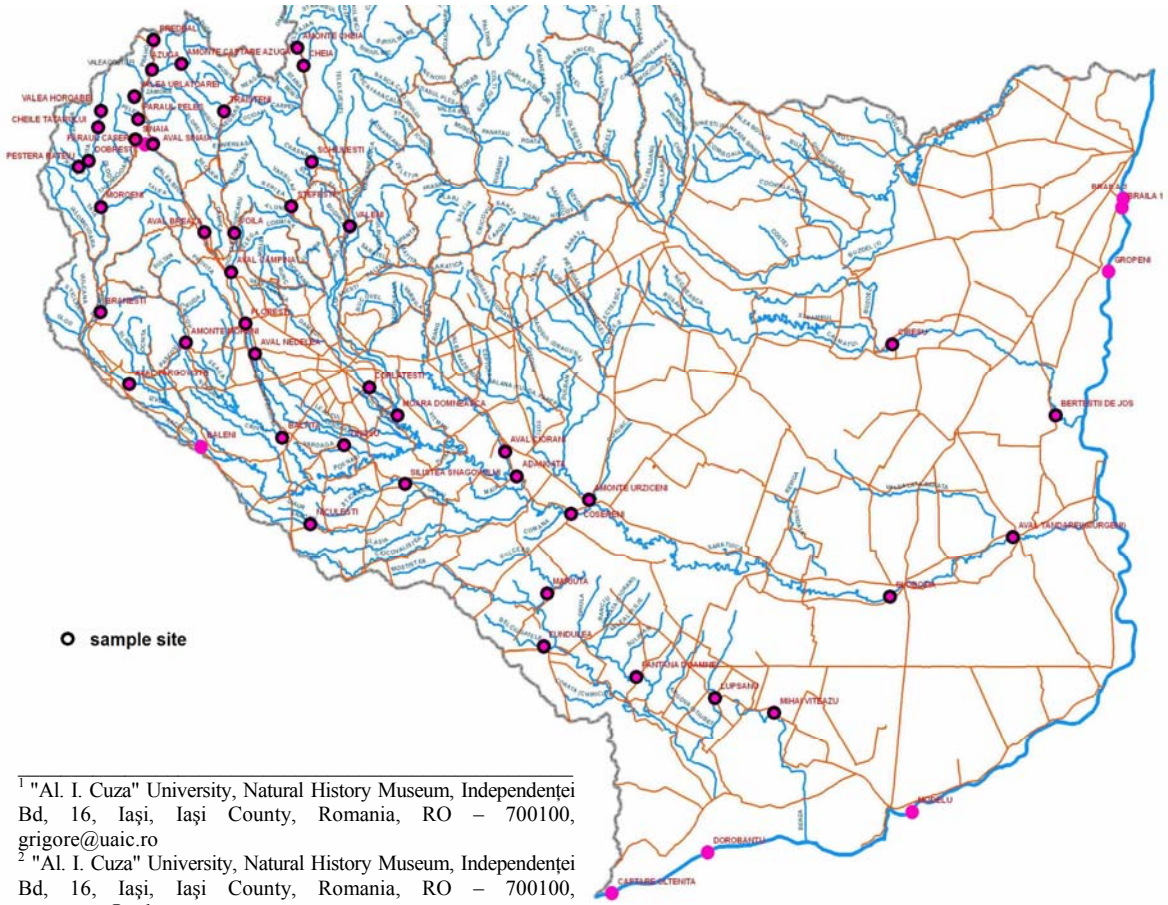

Figure 1- The map of Ialomiţa river basin , with sample sites

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Introduction

The fish fauna survey on the Ialomița river basin is part of the national wide program of the Romanian Water Authority for monitoring of the water quality using biological indicators. Ialomița river has a basin of 8 863 km^2 with sources located in the Leaota and Bucegi mountains at 2 395 m altitude. Its length is of 414 km and it's confluence with Danube is at 8 m altitude close to Țăndărei city. Mostiștea river basin has 520 km^2, with ists sources at 112 m and a total length of 92 km. Călmațui river basin has km^2, starts at 87 m altitude and the total length is of 144km.

Table 1 - The list of fish species with number of sites where was sampled and number of individuals captured for each species

	Sistematic position and species name	**Sites number**	**Abundance**	**Origin**	**Conservation status**
	Ord. Salmoniformes				
	Fam. Salmonidae				
1	*Rhabdofario mykiss Walbaum 1792*	1	1	introduced	
2	*Salmo fario Linnaeus 1758*	9	53	native	
	Ord. Cypriniformes				
	Fam. Cyprinidae				
2	*Abramis brama Linnaeus 1758*	1	1	native	
3	*Alburnoides bipunctatus Bloch 1782*	2	7	native	
4	*Alburnus alburnus Linnaeus 1758*	9	83	native	
5	*Aspius aspius Linnaeus 1758*	3	4	native	protected
6	*Barbus petenyi Heckel 1852*	13	208	native	
7	*Carassius gibelio Bloch 1783*	15	798	native	
8	*Chondrostoma nasus Linnaeus 1758*	2	6	native	
9	*Ctenopharyngodon idella Valenciennes 1844*	1	3	introduced	
10	*Cyprinus carpio Linnaeus 1758*	3	4	native	
11	*Gobio obtusirostris Valenciennes 1844*	13	73	native	
12	*Romanogobio uranoscopus Agassiz 1828*	1	1	native	
13	*Hypophthalmichthys molitrix Valenciennes 1844*	1	1	introduced	
14	*Idus idus Linnaeus 1758*	2	13	native	
15	*Phoxinus phoxinus Linnaeus 1758*	4	19	native	
16	*Pseudorasbora parva Schlegel 1842*	7	104	introduced	
17	*Rhodeus amarus Bloch 1782*	5	59	native	protected
18	*Rutilus rutilus Linnaeus 1758*	5	115	native	
19	*Squalius cephalus Linnaeus 1758*	14	94	native	
	Fam. Nemacheilidae				
20	*Orthrias barbatulus Linnaeus 1758*	13	50	native	
	Fam. Cobitidae				
21	*Cobitis elongatoides Băcescu&Mayer 1969*	6	31	native	
22	*Misgurnus fossilis Linnaeus 1758*	1	2	native	
23	*Sabanejewia vallachica, Nalbant 1957*	11	66	native	
	Ord. Siluriformes				
	Fam. Siluridae				
24	*Silurus glanis Linnaeus 1758*	1	2	native	
	Ord. Perciformes				
	Fam. Percidae				
25	*Gymnocephalus cernuus Linnaeus 1758*	1	3	native	
26	*Perca fluviatilis Linnaeus 1758*	4	72	native	
27	*Stizostedion lucioperca Linnaeus 1758*	2	6	native	
	Fam. Centrarchidae				
28	*Lepomis gibbosus Linnaeus 1758*	2	14	introduced	
	Fam. Gobiidae				
29	*Neogobius gymnotrachelus Kessler 1857*	3	20	native	
30	*Proterorhinus marmoratus Pallas 1814*	1	4	native	protected
	Ord. Scorpaeniformes				
	Fam. Cottidae				
31	*Cottus gobio Linnaeus 1758*	4	12	native	

Material and method

The samples were collected by electro fishing during 2006 year summer, using a FEG 5000 electro fisher (5). The sample area varied in between 250 and 500 m^2 depending of the river width (Figure 1, Figure 5). Most of the samples, 35, were collected on Ialomița river, four samples were collected on Mostiştea and two others on Călmățui rivers.

For each sample we covered at least 100 m length (one or both banks, depending of the local conditions) covering all the habitat types in the area. In 39 sample sites (Figure 1) we collected a total number of 1929 specimens, belonging to 5 orders, 6 families and 32 species.

The identification was done using, identification guidebooks (3, 4, 6, 7). Less than 5% of fish were retained as specimens for the Natural History Museum collections, the rest were set free.

We obtained a series of qualitative and quantitative data concerning the fish populations in the sample sites: the fish species list, the absolute numeric abundance for each species in each of the sites. These data were computed using statistical methods (1, 2) in order to calculate a series of ecological metrics and indexes for characterize the fish communities in the studied area.

Table 2 -The list of sample sites with number of species and individuals captured at each site

	River name / closest city, village	Species number	Individuals number
1.	Argova / Lupşani	4	186
2.	Azuga / Azuga upstream	3	11
3.	Azuga / downstream	2	2
4.	Belciugatele / Fundulea	5	638
5.	Berza / Mihai Viteazul	3	34
6.	Călmățui / Berteşti	2	6
7.	Călmățui / Cireşu	9	70
8.	Colceag/Mariuța	9	105
9.	Cricovul Dulce / Băltița	8	57
10.	Cricovul Dulce / Moreni	3	64
11.	Cricovul Sărat / Ciorani	4	12
12.	Doftana / Câmpina	5	58
13.	Doftana / Trăisteni	1	2
14.	Doftana /Voila	1	3
15.	Ialomicioara / Padina	1	12
16.	Ialomița / Băleni	5	11
17.	Ialomița / Brăneşti	6	41
18.	Ialomița / Coşereni	10	43
19.	Ialomița / Dobreşti	1	2
20.	Ialomița / Cheile Tătarului	1	2
21.	Ialomița / upstream Cheia	1	16
22.	Ialomița / Moroeni	2	2
23.	Ialomița Târgovişte upstream	5	36
24.	Ialomița / Siliştea Snagovului	6	94
25.	Ialomița / Slobozia	5	27
26.	Ialomița / Țăndărei	5	16
27.	Prahova / Adâncata	4	8
28.	Prahova / Breaza	4	46
29.	Prahova / Floreşti	3	25
30.	Prahova / Nedelea	4	8
31.	Prahova / Predeal	2	5
32.	Prahova / Tinosu	4	17
33.	Rătei / Peştera	1	2
34.	Sărata / Urziceni	10	135
35.	Teleajen / Cheia	2	15
36.	Teleajen / Moara Domnească	4	14
37.	Teleajen / Văleni	4	50
38.	Vânăta / Fântâna Doamnei	7	40
39.	Vârbilău / Ştefeşti	2	14

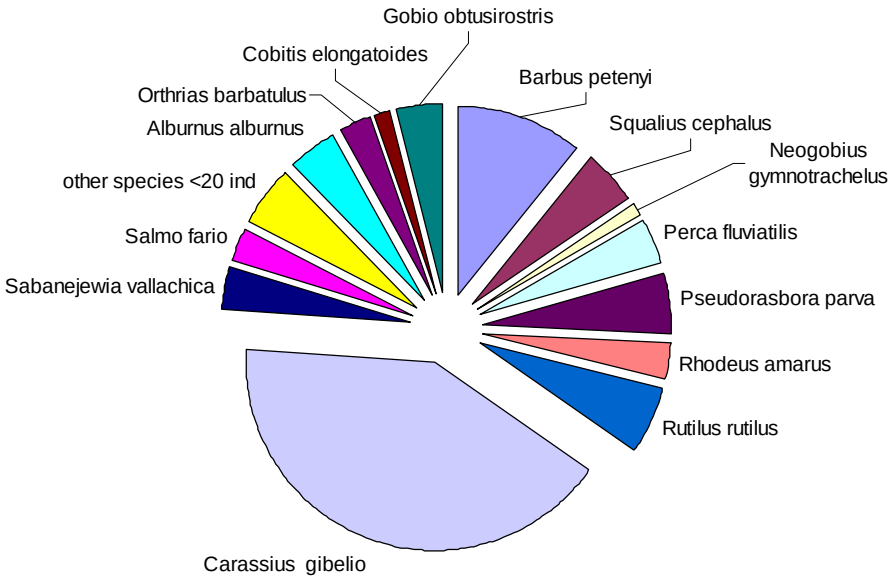

Figure 2 - Pie chart showing species distribution in total capture

Results and discussions

From the total number of 32 species, 26 species are native and 6 species are introduced. We found both *Ctenopharingodon idella*, *Hipophthalmiychthis mollitrix* and *Rhabdofario mykiss* that were introduced for economic purposes, as well as small, non valuable species, as *Lepomis gibossus* and *Pseudorasbora parva,* that were introduced by accident. The number of species varies in between 10 in Ialomița and Sărata and 1 for some basin head, high altitude sites (Table 2). The relatively high number of species in Ialomița river sites is due to the increasing diversity of habitats and the natural increase of species number downstream of the big rivers. For Sărata river is a peculiar situation due to the local high level of organic matter that offer food supply for fish. The quantitative differences in between sites are important. They are caused by the differences of habitat typology of each site and the human impact pressures on ecological systems.

From the Table 1 and 2 one can find that in terms of total abundance the most important species is *Carassius gibelio* with a total number of 798 individuals and then came *Barbus petenyi*-208, *Rutilus rutilus* with 115 fallowed by *Pseudorasbora parva*-105 and *Alburnus alburnus*-83. The first three species comprises more than 50% of total capture.

The most common species is *Carassius gibelio* found in 15 sites and then *Gobio obtusirostris* and *Squalius cephalus*, found in 14 sites; *Barbus petenyi* and *Orthrias barbatula* were found in 13 sites each.

For the 39 sites sampled there is a mean of 50 individuals captured at each site, with a maximal 638 at Belciugatele, were we sampled a small pond with a huge number of small *Carassius gibelio* specimens. The lowest number was 2 specimens for some of the small rivulets at head of basins (Figure 2).

Table 3 presents the values of some ecological descriptors of the studied fish communities. We calculated the constancy, the dominance of different species in order to appreciate their ecological significance for the fish community. The most important species are *Carassius gibelio* W=15,91% followed by *Barbus petenyi* W=3,59%. Other important species for this basin are *Squalius cephalus, Gobio obtusirostris, Alburnus alburnus, Sabanejewia vallachica, Pseudorasbora parva*.

Table 3 -The values of the ecological indexes calculated and the ecological significance index calculated for the entire area

Species name	Abundance absolute #	Constancy	C class	Dominance	D class	Ecological significance	W class
Carassius gibelio	798	38,46	C2	41,36	D5	15,91	W5
Barbus petenyi	208	33,33	C2	10,7828	D5	3,5943	W3
Rutilus rutilus	115	12,82	C4	5,9616	D4	0,7643	W2
Pseudorasbora parva	104	17,9487	C4	5,3914	D4	0,9677	W2
Squalius cephalus	94	35,8974	C3	4,873	D3	1,7493	W3
Alburnus alburnus	83	23,0769	C4	4,3027	D3	0,9929	W2
Gobio obtusirostris	73	33,3333	C3	3,7843	D3	1,2614	W3
Perca fluviatilis	72	10,2564	C4	3,7325	D3	0,3828	W2
Sabanejewia vallachica	66	28,2051	C3	3,4215	D3	0,965	W2
Rhodeus sericeus	59	12,8205	C4	3,0586	D3	0,3921	W2
Salmo fario	53	23,0769	C4	2,7475	D3	0,634	W2
Orthrias barbatulus	50	30,7692	C3	2,592	D3	0,7975	W2
Cobitis elongatoides	31	15,3846	C4	1,6071	D2	0,2472	W2
Neogobius gymnotrachelus	20	7,6923	C4	1,0368	D2	0,0798	W1
Phoxinus phoxinus	19	10,2564	C4	0,985	D1	0,101	W2
Lepomis gibbosus	14	5,1282	C4	0,7258	D1	0,0372	W1
Leuciscus idus	13	5,1282	C4	0,6739	D1	0,0346	W1
Cottus gobio	12	10,2564	C4	0,6221	D1	0,0638	W1
Alburnoides bipunctatus	7	5,1282	C4	0,3629	D1	0,0186	W1
Chondrostoma nasus	6	5,1282	C4	0,311	D1	0,016	W1
Stizostedion lucioperca	6	5,1282	C4	0,311	D1	0,016	W1
Aspius aspius	4	7,6923	C4	0,2074	D1	0,016	W1
Cyprinus carpio	4	7,6923	C4	0,2074	D1	0,016	W1
Proterorhinus marmoratus	4	2,5641	C4	0,2074	D1	0,0053	W1
Ctenopharyngodon idella	3	2,5641	C4	0,1555	D1	0,004	W1
Gymnocephalus cernuus	3	2,5641	C4	0,1555	D1	0,004	W1
Misgurnus fossilis	2	2,5641	C4	0,1037	D1	0,0027	W1
Silurus glanis	2	2,5641	C4	0,1037	D1	0,0027	W1
Abramis brama	1	2,5641	C4	0,0518	D1	0,0013	W1
Gobio uranoscopus	1	2,5641	C4	0,0518	D1	0,0013	W1
Hypophthalmichthys molitrix	1	2,5641	C4	0,0518	D1	0,0013	W1
Rhabdofario mykiss	1	2,5641	C4	0,0518	D1	0,0013	W1
	1929						

Analyzing the index of species similarity graph, (Figure 3), we may notice that they are a series of sites that are grouped at the top part of the graph (sites from the mountain area of the basin) with a very high similarity because they only have 2 species. At the middle part of the graph there are a number of sites with similarity higher tahn 50% and containing in between 4-6 species most of them being tolerant species. That are also some sites grouped at the lower part of the graph having a similarity higher than 40% with a high number of species also, they represents the downstream portion of the rivers that have a good quality and high species number.

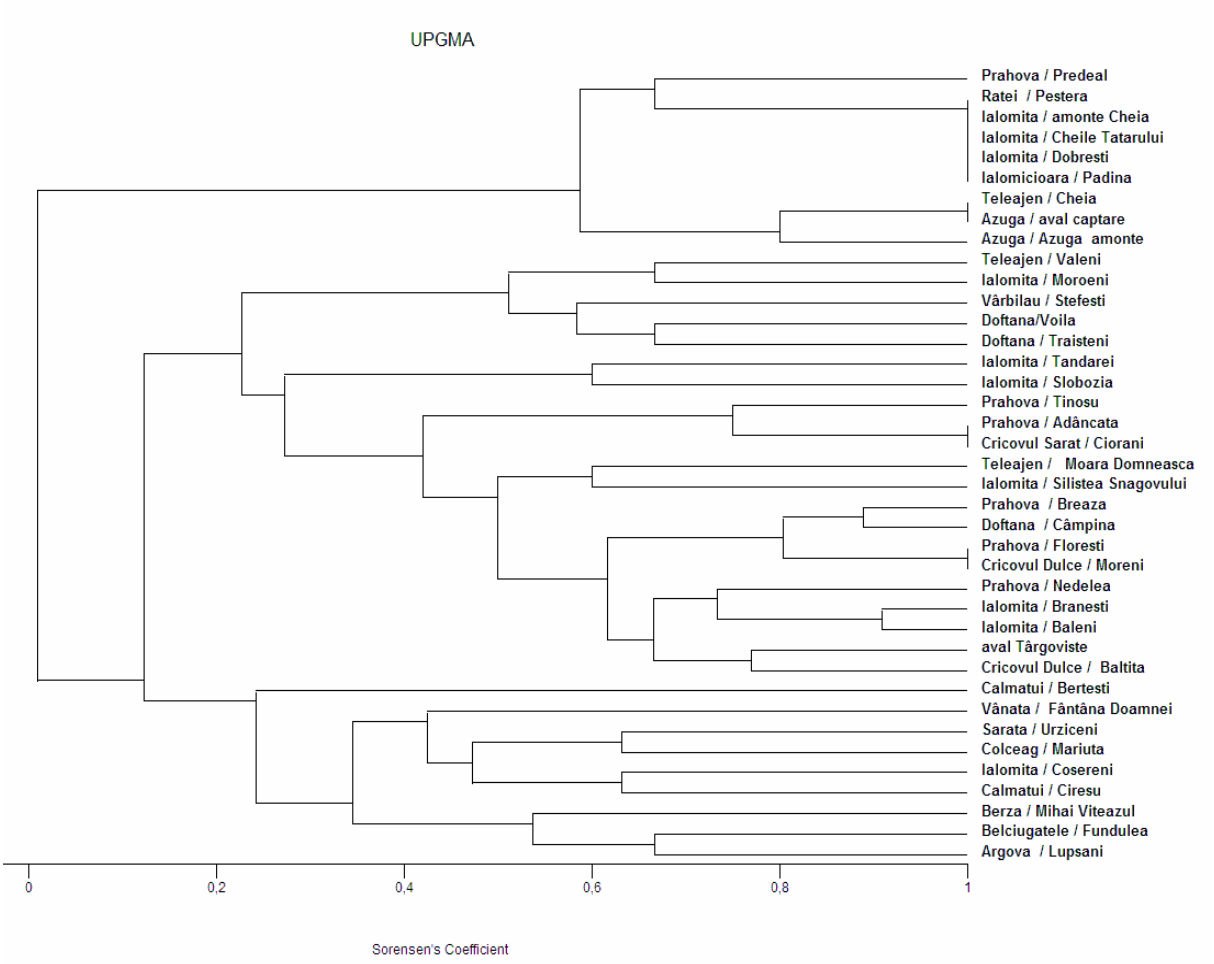

Figure 3 - The graph of the species similarity

The index of cenotic affinity (Figure 4) was calculated in order to appreciate the affinity in between species, which is due to the common preferences for certain habitat descriptors. On the graph, we find that *Proterorhinus marmorartus* and *Misgurnus fossilis* have highest cenotic affinity 100%, that is an artifact caused by the fact that these species are quite rare and they were found in only one sample The species with an affinity index in between 51-81% forms two groups that have preferences for similar habitats like: *Sabanejewia, Squalius, Barbus* species group well adapted to ecological conditions in the hilly region of medium size rivers. A second group is formed by: *Neogobius, Leuciscus, Aspius* that prefers large rivers in plains region.

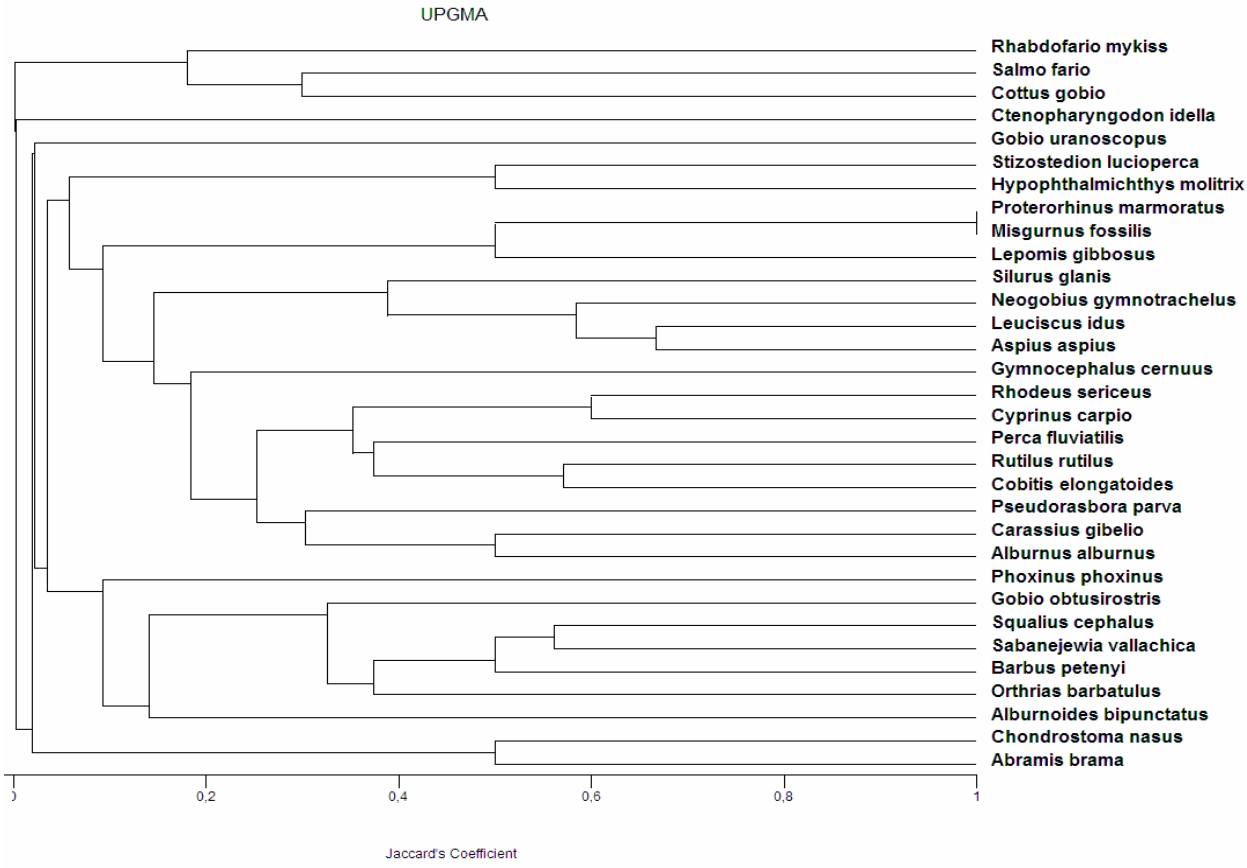

Figure 4 - The graph of the cenotic affinity index.

The Diversity Index Shannon and the Equitability Index, presented in the Table 4 and Figure 5, were calculated in order to find more about the stability and structure of the fish community. From these figures we may conclude that the fish community is relatively diverse and well balance for the entire studied area. A number of 8 samples have more than 5 fish species and the values of the evenness varies in between 962 and 167. For other 12 samples the species number varies in between 3 and 5, the others having a smaller species number. For 11 samples the species number is as low as 2 or 1, this is the case for some of the samples collected in the top head of basins in small mountain rivulets.

The high value for both diversity and eveness indexes indicates, especially when correlated with high species number, a well balanced community with a stabile structure: Cireşu, Baltiţa, Braneşti, Coşereni.

From these data (corelated with species similarity results) we may also appreciate that the conditions along the riverbed divided in at least 2 major habitat types, mountain rivulets and small plane rivers.

Table 4 - The values of the Shannon-Weaver diversity index and eveness, calculated for the samples sites.

Sample site	Diversity Index	Evenness	Num.Spec.
Argova / Lupşani	0,478	0,794	4
Azuga / Azuga upstream	0,398	0,834	3
Azuga / downstream	0,301	1	2
Belciugatele / Fundulea	0,117	0,167	5
Berza / Mihai Viteazul	0,324	0,679	3
Calmăţui / Berteşti	0,301	1	2
Calmăţui / Cireşu	0,816	0,855	9
Colceag / Măriuţa	0,658	0,689	9
Cricovul Dulce / Băltiţa	0,672	0,744	8
Cricovul Dulce / Moreni	0,389	0,815	3
Cricovul Sărat / Ciorani	0,486	0,807	4
Doftana / Câmpina	0,384	0,55	5
Doftana / Trăişteni	0,301	1	2
Doftana/Voila	0	0	1
Ialomicioara / Padina	0	0	1
Ialomiţa / Băleni	0,504	0,72	5
Ialomiţa / Brăneşti	0,714	0,918	6
Ialomiţa / Coşereni	0,757	0,757	10
Ialomiţa / Dobreşti	0	0	1
Ialomiţa / Cheile Tătarului	0	0	1
Ialomiţa / upstream Cheia	0	0	1
Ialomiţa / Moroeni	0,301	1	2
Ialomiţa downstream Târgoviste	0,529	0,757	5
Ialomiţa / Siliştea Snagovului	0,512	0,658	6
Ialomiţa / Slobozia	0,591	0,846	5
Ialomiţa / Ţăndărei	0,504	0,721	5
Prahova / Adâncata	0,466	0,774	4
Prahova / Breaza	0,363	0,603	4
Prahova / Floreşti	0,36	0,756	3
Prahova / Nedelea	0,574	0,953	4
Prahova / Predeal	0,292	0,971	2
Prahova / Tinosu	0,564	0,936	4
Ratei / Peştera	0	0	1
Sărata / Urziceni	0,521	0,521	10
Teleajen / Cheia	0,252	0,837	2
Teleajen / Moara Domnească	0,579	0,962	4
Teleajen / Văleni	0,545	0,905	4
Vânata / Fântâna Doamnei	0,703	0,832	7
Vârbilău / Ştefeşti	0,178	0,592	2

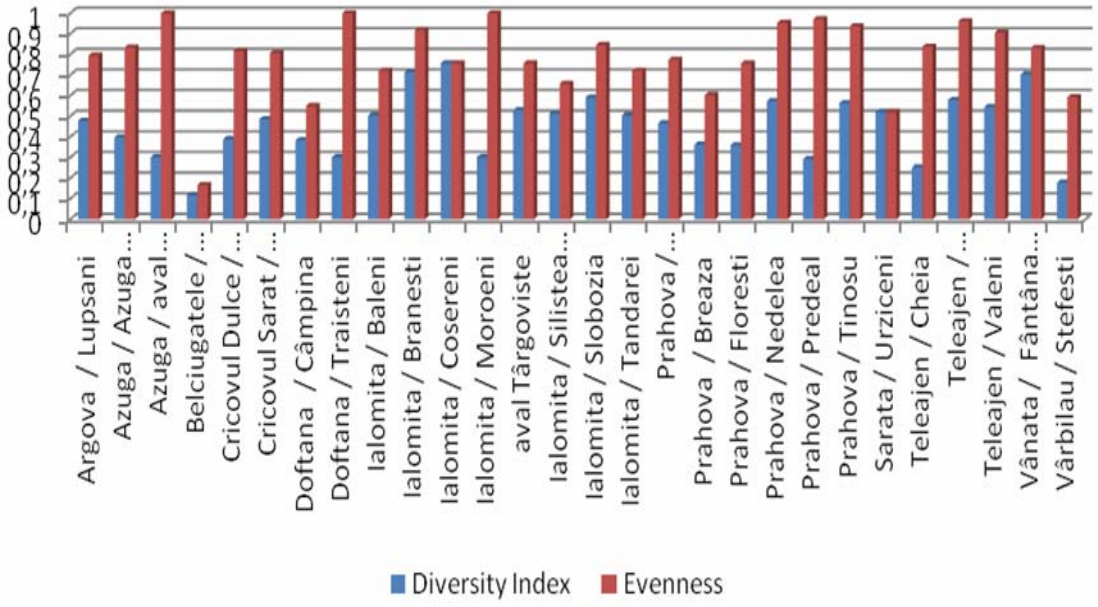

Figure 5 - The graph of the Shannon Diversity Index and Index of equitability.

Conclusions

The fish communities of the Ialomița river basin comprise 32 species: 26 native and 6 introduced species – *Carassius gibelio, Rhabdofario mykiss, Pseudorasbora parva, Ctenopharingodon idella, Hipophthalmichthys mollitrix* and *Lepomis gibossus*. The dominant species are: *Carassius gibelio, Barbus petenyi,* and *Pseudorasbora parva. Gobio uranoscopus, Misgurnus fossilis* are rare species. The fish communities composition is characteristic for the *Leuciscus* zone (European ecological delineation), small rivers in the hilly region. The river bed consists in sand, clay and moderate flow velocity. The human impact is caused by the hydro technical melioration works, drainage of the flood plains, dam construction and other.

These works reduce the natural diversity of habitat, destroying the shelter and feeding areas of many fish species. The abundance of fish for one sample are varying in between: 2 and 638. The data are important due to the scarce information on fish species that are available on these basins. It is important to mention the presence of species protected both at national and international level: *Aspius aspius*, *Cobitis taenia (elongatoides)*, *Rhodeus amarus*, that are protected by the Habitat Directive of the EEC, and *Proterorhinus marmoratus* that is protected by Bern Convention.

Aknowledgements

The financial support for the study was provided by the National Company Romanian Waters, the Buzau-Ialomița basin branch contributed for the logistical support.

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