The Zoobenthic Structure from Vâlsan River, the Tributary of Argeş, in the Sector Alunu-Muşeteşti, in the Conditions of Year 2003

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Introduction

The Vâlsan river (surface - 358 km^2, length - 84.6 km) springs from the bottom of Făgăraş mountains from the glacial hollow, U-shaped, situated between the mountains Picuiata and Scărişoara Mare from an altitude of 2310 m, flows parallel with Argeş river, wonder through the same relief group up to the river mouth, in Merişani, situated approximately half the distance between Curtea de Argeş and Piteşti (UJVÁRI, 1972).

In the year 1967, the Vâlsan river had suffered important modifications by constructing upstream of Vâlsan Keys a storage lake and also a hydroelectric–plant. This accumulation lake has a basinal surface of 83.3 km^3 here been also led the waters of the tributary Dobroneagu, which has been led to a drastically dropping of the downstream flow rate from the values beyond 2 m^3/s until 1967 to values smaller than 0.6 m^3/s presently.

The special interest of Vâlsan River is the presence of the fish species *Romanichthys valsanicola* (sculpinperch or Romanian darter), an endemic species to Romania and the Danube basin. It is considered the most endangered species of European ichthyofauna because of its narrow range (only a sector of Vâlsan) and small number of individuals.

Romanichthys valsanicola feeds only on larvae of rheophilous insects. The investigation of stomach content of 34 individuals collected before 1961 showed that the food of the fish consisted of 54% of larvae of the mayfly *Rhithrogena semicolorata,* 13.2% of other mayfly larvae, 10.9% of stonefly larvae, 6.5% of caddisflies and 4.7% of chironomids - midge larvae (GALDEAN et al., 1997).

It was hypothesized that the modification of benthic fauna structure could be one of the causes of the numerical decline of *Romanichthys valsanicola* (TATOLE, 1993). Starting from here, the present researches are made for the determination of the benthic structure of the Vâlsan River especially at Alunu (upstream the dam) to Muşeteşti sector, which includes the range of the endangered species *Romanichthys valsanicola.*

Materials and Methods

In the year 2003, benthic samples were taken in April, July, August and September on eight sampling sites (Fig. 1). The first station, Cascada Alunu, located upstream the damlake, was established as a standard, being located in the undisturbed sector by the hydrotechnical construction.

On each sampling site, three benthos samples were taken using a Surber–sampler, which covered a surface of 0.16 m^2 (mesh-size: 200 μm). The stones were washed in the stream and brushed. The samples were preserved on the field in 8% formalin solution. The retained material was separated into groups by a Zeiss stereomicroscope in the laboratory and removed in ethanol 70%. Romanian and European identifications keys were used.

Results and Discussion

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Individuals from seven taxonomic groups were identified in the collected samples (Table 1).

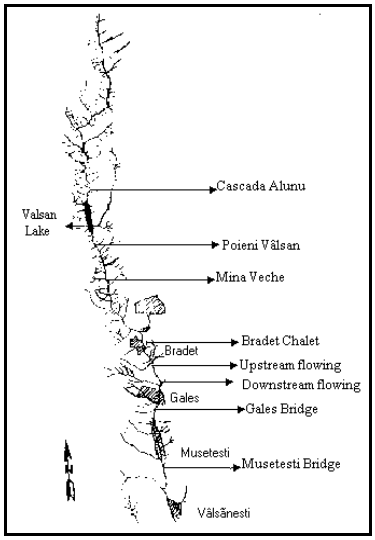

Figure 1. Sampling sites

The mayflies were found to be the most important among these, the majority of the species being either oxyphilous or rheophilous. A small number of species were found to be euribionte, these being able to tolerate a certain degree of pollution. Among the identified species, the most oxyphilous and rheophilous belong to the group of Plecoptera. Species from the group of caddisflies, most of them oxyphilous, and chironomids, including both rheophilous and mesosaprobic species, were highly represented in the investigated samples. Species of Gammaridae and Simuliidae were only sporadically present in the samples.

As shown in the Figure 2, the mayflies reached their maximum density during March, at Poieni Vâlsan (1184 individuals m^{-2}). The values calculated for the other stations from which the samples were collected, showed that the number of individuals per progressively decrease from the upstream to the downstream. Thus, from an average value of 756 individuals m^{-2} calculated for the sample collected at the station Alunu, the density drops up to 122 individuals m^{-2} at the station Muşeteşti Bridge. Similarly, in stoneflies, the maximum density was found in samples from the station Alunu (721 individuals m^{-2}), this decreasing progressively for the other stations, the minimum value (44 individuals m^{-2}) being determined in samples collected from the Muşeteşti Bridge Station. A slight increase was found in samples from the station Mina veche (656 individuals m^{-2}), which can be explained by the relatively similar conditions to that of the Alunu station, especially a high flowing speed, good oxygenation, and a very weak anthropogenic impact.

During July, the mayflies reached the maximum density (950 individuals m^{-2}) at the Alunu station, the densities determined for the other stations (from which the samples were collected) being similar to those registered during March. However, a progressive decrease was found towards downstream, with a recovery to values close to the maximum determined for the species within the group (758 individuals m^{-2}) at the Mina veche station. For stoneflies, very low densities (e.g. 259 individuals m^{-2} at the Alunu station) were determined at each of the stations of sampling.

As in the previous months, during August, the maximum density of mayflies was found in samples collected from the Alunu station (831 individuals m^{-2}), this decreasing in those from Poieni Vâlsan station, and recovering in those from Mina veche. Surprisingly, the value determined for the species within this group is high al Cabana Bradet (603 individuals m^{-2}), where it was found also the maximum density for stoneflies. This is likely to be the

consequence of a significant decrease in quantities of domestic water discharged from the tourist centers in the area, following their endowment with draining collectors.

Table 1. Zoobenthonic coenosis structure - Vâlsan River – 2003 (No. = number of individuals m^{-2}, Ws. = wet substance in g m^{-2})

Month	Station / Organism groups	Alunu		Poieni Vâlsan		Mina veche		Bradet Chalet		Upstream flowing		Downstream flowing		Gales Bridge		Musetesti Bridge	
		No.	Ws.	No.	Ws.	No.	Ws.	No.	Ws.	No.	Ws.	No.	Ws.	No.	Ws.	No.	Ws.
MARCH	Gammaridae	6	0.003	3	0.001	6	0.003	-	-	129	0.009	-	-	-	-	-	-
	Ephemeroptera	756	0.900	1184	1.407	669	0.794	559	0.664	522	0.620	531	0.630	209	0.248	122	0.145
	Plecoptera	721	0.860	619	0.735	656	0.780	272	0.323	166	0.197	209	0.248	94	0.112	44	0.052
	Trichoptera	38	1.254	31	1.023	56	1.848	63	2.079	56	1.848	47	1.551	147	4.851	134	4.422
	Chironomidae	278	0.178	881	0.564	-	-	366	0.234	403	0.258	490	0.313	1475	0.944	1550	0.992
	Simuliidae	-	-	50	0.032	-	-	-	-	22	0.014	47	0.03	-	-	-	-
	Insecta varia	84	0.038	53	0.024	31	0.014	53	0.024	25	0.011	22	0.010	34	0.016	25	0.011
	TOTAL	**1883**	**3.233**	**2821**	**3.786**	**1418**	**3.439**	**1313**	**3.324**	**1213**	**2.957**	**1346**	**2.782**	**1959**	**6.171**	**1875**	**5.622**
JULY	Gammaridae	-	-	-	-	6	0.003	16	0.007	3	0.001	-	-	-	-	-	-
	Ephemeroptera	950	1.130	541	0.643	759	0.902	491	0.583	325	0.386	353	0.420	175	0.208	81	0.096
	Plecoptera	259	0.308	138	0.164	178	0.211	244	0.300	53	0.063	53	0.063	22	0.026	19	0.023
	Trichoptera	19	0.627	34	1.122	19	0.627	47	1.551	69	2.277	97	3.201	28	0.924	94	3.102
	Chironomidae	-	-	166	0.106	72	0.045	384	0.246	625	0.400	747	0.478	1328	0.850	1406	0.900
	Simuliidae	-	-	66	0.042	81	0.052	163	0.104	75	0.048	-	-	-	-	100	0.064
	Insecta varia	25	0.011	13	0.006	19	0.009	9	0.004	9	0.004	-	-	47	0.021	19	0.009
	TOTAL	**1253**	**2.076**	**958**	**2.083**	**1134**	**1.849**	**1354**	**2.795**	**1159**	**3.179**	**1250**	**4.162**	**1600**	**2.029**	**1719**	**4.194**
AUGUST	Gammaridae	6	0.003	-	-	-	-	22	0.010	-	-	3	0.001	-	-	-	-
	Ephemeroptera	831	0.987	519	0.617	697	0.828	603	0.716	378	0.450	447	0.531	138	0.164	113	0.134
	Plecoptera	238	0.283	128	0.152	200	0.238	334	0.397	209	0.248	69	0.082	38	0.045	-	-
	Trichoptera	6	0.198	-	-	22	0.726	100	0.033	16	0.528	41	1.353	53	1.750	59	1.947
	Chironomidae	41	0.026	225	0.144	-	-	453	0.290	981	0.628	866	0.554	1791	1.146	1116	0.714
	Simuliidae	-	-	53	0.034	-	-	22	0.014	-	-	-	-	378	0.242	-	-
	Insecta varia	9	0.004	56	0.026	-	-	31	0.014	22	0.010	25	0.011	50	0.023	50	0.023
	TOTAL	**1131**	**1.501**	**981**	**0.973**	**919**	**1.792**	**1565**	**1.474**	**1606**	**1.864**	**1451**	**2.532**	**2448**	**3.370**	**1338**	**2.818**
SEPTEMBER	Gammaridae	-	-	-	-	16	0.007	13	0.006	-	-	-	-	-	-	-	-
	Ephemeroptera	941	1.120	631	0.750	1069	1.270	1000	1.188	478	0.568	541	0.643	175	0.208	109	0.130
	Plecoptera	441	0.524	138	0.164	294	0.350	322	0.383	203	0.241	103	0.122	25	0.030	16	0.020
	Trichoptera	-	-	63	2.080	369	12.17	125	4.125	75	2.475	56	1.848	78	2.574	66	2.178
	Chironomidae	69	0.044	34	0.022	9	0.006	525	0.336	325	0.208	388	0.248	1425	0.912	719	0.460
	Simuliidae	-	-	22	0.014	-	-	113	0.072	-	-	-	-	334	0.214	-	-
	Insecta varia	16	0.007	22	0.010	44	0.020	38	0.017	22	0.010	25	0.011	41	0.019	47	0.021
	TOTAL	**1467**	**1.695**	**910**	**3.040**	**1801**	**13.83**	**2136**	**6.127**	**1103**	**3.502**	**1113**	**2.872**	**2078**	**3.957**	**957**	**2.809**

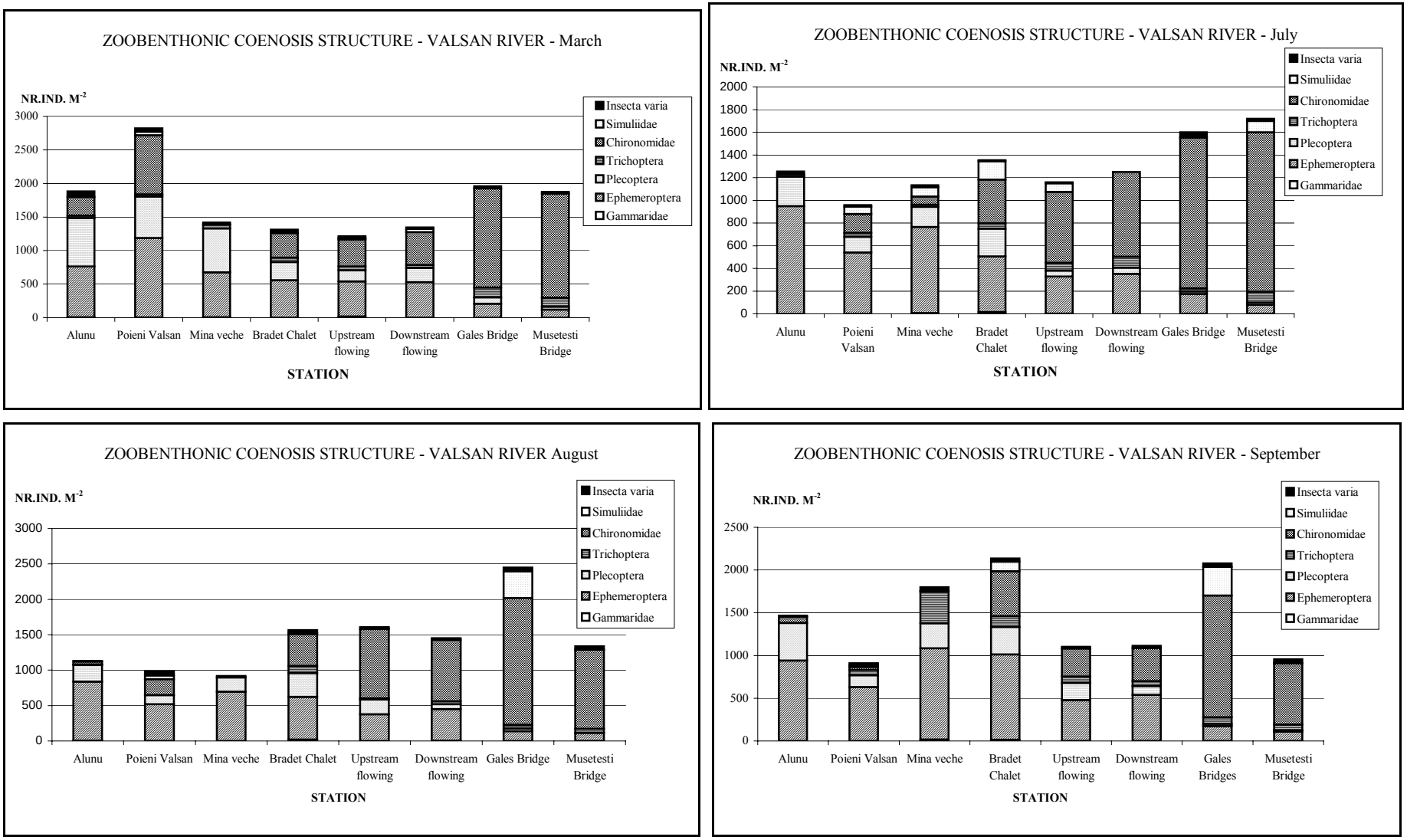

Figure 2. The zoobenthic structure (number of individuals m^{-2}) from Vâlsan River in the sector Alunu - Muşeteşti and spatial distribution - 2003

Similar to the stoneflies, the mayflies reached the maximum density during September at the Mina veche station (1069 individuals m^{-2}), this being very close to those determined for the Cabana Bradet station (1000 individuals m^{-2}) and Alunu station (941 individuals m^{-2}), respectively. The results of our observations revealed that the number of individuals was progressively decreasing in the other stations towards the downstream.

The invertebrate fauna is further richest than that reported for the year 1992 (TATOLE, 1993), thus invalidating the hypothesis of a relation between the diminishing of number of *Romanichthys valsanicola* individuals and poorness of the benthonic fauna. Moreover, it was found that *Rhithrogena semicolorata*, which accounts for over 50% from the feed of Romanian darter, is truly abundent in all the stations of sampling within the habitat area of this endemic species.

In the studied river, 17 species of Ephemeroptera were identified (Table 2). The level of the impact influenced conspicuously the richness of taxa, which decreased from upstream to downstream. Minimum species richness was found in the sampling sites Gales Bridge (3 species) and Musetesti Bridge (2).

Table 2. Checklist of the identified species of Ephemeroptera

Species \ Station	Alunu	Poieni Vâlsan	Mina veche	Brădet Chalet	Upstream flowing	Downstream flowing	Galeş Bridge	Muşeteşti Bridge
Baëtis alpinus (PICTET, 1843 - 1845)	X	X	X	X	-	X	-	-
Baëtis lutheri MÜLLER – LIEBENAU, 1967	-	X	-	X	-	-	-	-
Baëtis muticus (LINNAEUS, 1758)	-	-	X	-	-	-	-	-
Baëtis rhodani (PICTET, 1843 - 1845)	-	X	X	X	X	X	X	X
Baëtis scambus EATON, 1870	-	-	-	-	X	X	-	-
Baëtis vernus CURTIS, 1834	-	X	X	-	X	X	-	-
Rhithrogena semicolorata (CURTIS, 1834)	X	X	X	X	X	X	-	-
Ecdyonurus dispar (CURTIS, 1834)				X	X	X	-	-
Ecdyonurus torrentis KIMMINS, 1942	X	-	X	-	-	-	-	-
Ecdyonurus venosus (FABRICIUS, 1775)	-	X	X	-	-	-	-	-
Epeorus sp.	X	X	X	X	-	-	-	-
Paraleptophlebia submarginata (STEPH., 1835)	X	X	X	-	-	-	-	-
Paraleptophlebia werneri ULMER, 1919	-	-	X	-	-	-	-	-
Ephemera danica MÜLLER, 1764	-	-	-	X	X	X	-	-
Ephemerella ignita (PODA, 1761)	-	-	X	X	X	X	X	X
Ephemerella major (KLAPÁLEK, 1905)	-	-	-	-	X	X	-	-
Caenis macrura STEPHENS, 1835				X	X	X	X	-

Summary

Vâlsan River, an Argeş tributary, has a sector that represents a unique range of the endemic species *Romanichthys valsanicola* Dumitrescu, Bănărescu and Stoica, 1957 (sculpinperch or Romanian darter), which is included in the "RED LIST**"** of I.U.C.N. The basic food resource of this fish is represented of the benthic larvae of rheophilous insects, especially mayflies (*Rhithrogena semicolorata*) and stoneflies. The paper presents data referring to the structure of benthonic zoocenosis, during the year 2003, in the sector Alunu – Muşeteşti, the identified taxons as well as the number of individuals m^{-2} and wet weight m^{-2} and the list of the genera and species of mayflies identified inside the sampling.

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