

Trichoptera larvae as bioindicators for Bistrița River quality assessment

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Abstract

This study aims to verify the known methods used in the biological assessment for Bistrița River by macroinvertebrates of 8 samples from different kinds of substrate or combinations deep-velocity of water taken in May, July and September 2005 using the Surber sampler (mesh 0,500 μ m, sample surface 1/20 m²). The most appropriate index to investigate the macroinvertebrates communities in small running waters assessment in superior catchment area of Bistrița River was IBGN (Indice Biologique Global Normalisee) – AFNOR NF T 90-350 utilized successfully in France, requiring the family level of identification. The macroinvertebrates composition showed the dominant presence of Trichoptera in oppositions to Plecoptera that missed in some collecting seasons. To verify our conclusions we will intend to define an ecological preferendum (including pollution tolerance) for Trichoptera larvae, at species level if possible, using similar experiments mentioned in literature concerning the ecotoxicity tests in macroinvertebrates.

Key words: macroinvertebrates communities, biological assessment, water quality

Introduction

The data about trichoptera presence in Bistrița River catchment area can be found in complex studies such those made by MOTAȘ and ANGHELESCU (1939, 1944) on the macroinvertebrates and fish also by L. BOTOȘĂNEANU (1957, 1961) or trichoptera studies concerning mainly its middle basin (Murgoci 1953; Ailenei 2005).

In the superior catchment area of Bistrița River it has been identified during our previous researches larvae from 34 species of 8 families: Rhyacophilidae, Glossosomatidae, Hydropsychidae, Polycntrópodidae, Brachycentridae, Limnephilidae, Bareidae and Sericostomatidae. The dominant number of individuals are from the family of Limnephilidae - over 50% (214 larve) followed by Sericostomatidae – 30%, Hydropsychidae – 20%, Brachycentridae 11 %, Rhyacophilidae – 8%; the families Bareidae and Glossosomatidae are represented each by 0.24 % (Ghețeu 2006).

This study aims to verify the known methods used in the biological assessment for Bistrița River. In Romania, the most recent normative offers five quality classes based on the Saprobe Index system, even if the European policy in this matter recommends the use of this index only in medium and inferior basin of rivers.

The river typology begun to be used also in Romania but its communities are not defined yet. In the river typology Bistrița River is included as Ro1a from its source to its confluence with Dorna and its

tributaries also; after this confluence its typology changes to Ro03a.

Material and methods

From each workstation we had 7 samples from different kinds of substrate or combinations deep-velocity of water by IBGN (Indice Biologique Global Normalisee) – AFNOR NF T 90-350. The samples have been taken in May, July and September 2005 using the Surber sampler (mesh 0,500 μ m, sample surface 1/5 m²) and preserved in phormaldehyde 5%. The trial and the identification of the benthic organisms were made with a binocular microscope. IBGN and EPT coefficient was calculated.

Results and discussions

The results showed quit good water quality on Bistrița River at 15 km from its source (Table 1) compared to the bad quality of Ortoaia station (Table 2), strongly influenced by the human impact. The antropic impact may explain the bad water quality in Dorna River (Table 4), tributary to Bistrița River. Negrisoara Stream, tributary to Dorna River, has a quit good water quality (Table 3).

Conclusions

The most appropriate index to investigate the macroinvertebrates communities in small running waters assessment in superior catchment area of Bistrița River was IBGN (Indice Biologique Global Normalisee) – AFNOR NF T 90-350 (3) utilized

successfully in France , requiring the family level of identification.

The macroinvertebrates composition of the samples taken in May, July and September 2005, showed the dominant presence of Trichoptera in op-

positions to Plecoptera that missed in some collecting seasons (Tables: 1-4).

Because the saprobe index can not be use in the study area in small waterbodies and EPT didn't gave relevant results, we intend in the nearby future

Table 1

IBGN and EPT scores for Bistrița River in Wood exploitation station

May		July		September	
Perlodidae	8	Perlodidae	3	Perlodidae	2
Rhyacophilidae	1	Nemouridae	2	Capniidae	2
Hydropsychidae	1	Betidae	19	Ephemerillidae	9
Limnephilidae	13	Heptageniidae	13	Betidae	19
Sericostomatidae	1	Sericostomatidae	2	Heptageniidae	3
Betidae	19	Rhyacophilidae	8	Rhyacophilidae	1
Heptageniidae	3	Limnephilidae	18	Limnephilidae	43
Athericidae	6	Athericidae	8	Brachycentridae	6
		Limoniidae	2	Sericostomatidae	31
		Simuliidae	2	Hydropsychidae	1
		Chironomidae	4	Athericidae	9
				Tipulidae	1
				Simuliidae	7
Total individuals	52		81		134
Total Trichoptera individuals	16		28		82
% Trichoptera individuals	30,76		34,56		61,19
IBGN Score	11		12		12

Table 2

IBGN and EPT scores for Bistrița River at Ortoaia Village

May		July		September	
Betidae	1	Betidae	1	Rhyacophilidae	2
Limnephilidae	10	Ephemerillidae	7	Hydropsychidae	37
Hydropsychidae	17	Rhyacophilidae	2	Betidae	14
Tipulidae	1	Limnephilidae	1	Heptageniidae	4
Acarina	1	Chironomidae	3	Ephemerillidae	8
Betidae	1	Tipulidae	2	Chironomidae	1
		Gammaridae	1	Oligoneurillidae	7
		Erpobdellidae	2	Megaloptera	1
Total individuals	31		19		74
Total Trichoptera individuals	27		3		39
% Trichoptera individuals	87,09		15,78		52,70
IBGN Score	4		5		7

Table 3

IBGN and EPT scores for Negrisoara Stream at Poiana Negri Village

May		July		September	
Taeniopterigidae	8	Perlidae	2	Perlidae	1
Heptageniidae	3	Ephemeridae	2	Betidae	1
Rhyacophilidae	11	Leptophlebiidae	1	Sericostomatidae	12
Limnephilidae	8	Betidae	4	Limnephilidae	20
Ephemerillidae	11	Heptageniidae	1	Hydropsychidae	6
Betidae	11	Sericostomatidae	5	Rhyacophilidae	2

May		July		September	
Simuliidae	3	Limnephilidae	20	Chironomidae	1
Chironomidae	9	Hydropsychidae	3	Gammaridae	2
Total individuals	64		38		45
Total Trichoptera individuals	19		28		40
% Trichoptera individuals	29,68		73,68		88,88
IBGN Score	11		10		10

Table 4

IBGN and EPT scores for Dorna River at Dorna Candreni Village

May		July		September	
Rhyacophilidae	3	Taeniopterigidae	2	Perlidae	1
Limnephilidae	14	Heptageniidae	1	Leptophlebiidae	2
Athericidae	1	Rhyacophilidae	4	Sericostomatidae	3
Chironomidae	1	Hydropsychidae	4	Rhyacophilidae	3
Empididae	1	Limnephilidae	4	Hydropsychidae	8
Halpididae	1	Ephemerillidae	7	Betidae	17
Arachnida	1	Oligoneuriidae	30	Heptageniidae	6
				Oligoneuriidae	1
Total Individuals	22		52		41
Total Trichoptera individuals	17		12		14
% Trichoptera individuals	77,27		23,07		34,14
IBGN Score	7		7		7

to define an ecological preferendum (including pollution tolerance) for Trichoptera larvae, at species level if possible, using similar experiments mentioned in literature concerning the ecotoxicity tests in macroinvertebrates.

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