

INTRODUCTION

The study provides a survey of benthic invertebrate community composition and structure of the Mlava River (Eastern Serbia). The Mlava River is one of the larger tributaries (122 km long) of the Danube River in Serbia.

Drainage area of the Mlava covers 1,830 km³ and belongs to the Black Sea drainage area. Average annual discharge at the mouth is 14 m³/s.

The Shannon-Wiener Diversity Index (Shannon, 1948) was used as a metric for valorization of the Mlava River benthic invertebrate fauna.



Mlava River - The Bratinac sampling site

MATERIAL AND METHODOLOGY

Sampling of aquatic macroinvertebrates was carried out in the 2009-2014 period at 8 sampling sites (data on sampling sites are provided in the table below).

Sampling site	Latitude, N	Longitude, E	Altitude (m a.s.l.)	River substrate
Vrelo Mlave	44°11'29.58"	21°47'0.72"	314	pebble 40%, sand 30%, cobble 20%, clay 10%
Zagubica 1	44°11'50.52"	21°46'30.96"	311	pebble 75%, sand 15%, boulder 10%
Zagubica 2	44°11'46.86"	21°46'9.48"	310	cobble 75%, sand 10%, pebble 5%, clay 5%, boulder 5%
Belosavac	44°12'7.98"	21°45'7.98"	297	cobble 70%, pebble 10%, boulder 10%, sand 5%, clay 5%
Vukovac	44°13'29.28"	21°44'38.10"	296	cobble 75%, pebble 10%, clay 10%, boulder 5%
Gornjak	44°16'55.80"	21°30'36.00"	156	boulder 40%, cobble 40%, sand 10%, clay 10%
Veliko Selo	44°29'41.70"	21°17'58.60"	101	50% silt and clay, 20% sand, 10% pebble, 10% boulder
Bratinac	44°38'46.14"	21°13'12.35"	76	boulder 70%, cobble 20%, pebble 10%

Sampling was performed using Surber net (300 cm², 250 µm mesh size) and hand net (25x25 cm, 500 µm mesh size).

The multi-habitat sampling procedure (Hering, 2004) was used. Samples were preserved using 70% ethanol solution and further analysed in the laboratory using appropriate taxonomic keys.

A total of 44 invertebrate samples were processed.

According to the national surface water typology (Official Gazette of the Republic of Serbia 74/2011), the lower stretch of the Mlava River belongs to Type 2 (large rivers with medium grain-size mineral substrates, except for the Pannonian Plain rivers), while the middle as well as upper stretch of the river belongs to Type 3 of rivers (small and medium-sized streams, altitude up to 500 m with domination of large substrates).

RESULTS AND DISCUSSION

- ✓ During the extensive field research of the Mlava River in the 2009-2014 period a total of 197 benthic invertebrate taxa were recorded.
- ✓ Insecta were represented as principal component of the benthic invertebrate communities with 151 taxa, followed by Oligochaeta (18 taxa) and Mollusca (14 taxa).
- ✓ Among Mollusca, Gastropoda were represented with 13 taxa and only one bivalvian taxon (*Pisidium* sp.) was recorded.
- ✓ The most diverse insect orders were Diptera (56 taxa), Trichoptera (36 taxa) and Ephemeroptera (24), followed by Coleoptera (13 taxa), Plecoptera (10 taxa), Odonata (7 taxa) and Hemiptera (5 taxa). Diversity of other groups was significantly lower.



- ✓ With regard to abundance/percentage participation Gammaridae, Chironomidae and Oligochaeta were recorded as principal components of the invertebrate community.
- ✓ The Shannon-Wiener Diversity values ranged from 0.01 (the Mlava Well; April 2011) to 3.28 (the Gornjak Gorge; July 2011).
- ✓ The Mlava Well is a typical limnocrone spring in submountain karst landscape. It is a pool-forming spring with slow water flow and relatively uniform water conditions as well. Thus the diversity is expected to be low.

CONCLUSION

Among recorded taxa, it is worth mentioning the first recent record of endemic amphipod *Gammarus dulensis* S. Karaman, 1929 in Serbia, especially abundant in upper course of the Mlava River, sometimes co-occured together with *Gammarus balcanicus* Schaferna, 1922.

The new data for 22 rare benthic invertebrate species in Serbia are provided: *Spirosperma ferox* Eisen, 1879, *Spirosperma velutinus* Grube, 1879, *Isoperla* cf. *buressi* Rauser, 1962, *Leuctra braueri* Kempny, 1898, *Ithytrichia lamellaris*, Eaton, 1873, *Micrasema longulum* McLachlan, 1876, *Stenelmis canaliculata* (Gyllenhal, 1808) etc.

The major influence on benthic invertebrate community structure in the middle and lower river catchment has discharge of wastewaters, industrial and sewage waters from settlements into the river as well as different types of anthropogenic pressures (activities related to agriculture, river engineering, hydromorphological alterations, gravel and sand exploitation, habitat deterioration, emission of polluting substances originated from thermal power plants and quarries as well as other types of environmental stress).

Based on our investigation it could be concluded that the Mlava River represents a refugium for rare benthic invertebrates.

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