FAUNISTIC ANALYSIS OF MACROINVERTEBRATE COMMUNITY AND ECOLOGICAL QUALITY ASSESSMENT OF THE PEK RIVER

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The upper part of the Pek River is under high anthropogenic pressure, as it is used as a recipient of wastewater from a copper mine and communal waters. The aim of this study was to analyse the macroinvertebrate community and to assess the ecological status of the Pek River.

Samples were gathered with benthological hand net, from all available habitats (eng. *multihabitat sampling procedure)*, from six localities along the river course, with a standard "*Kick & Sweep*" method. The Asterics software package (AQEM 2000) was used for the analysis of the community. The study shows quantitative and qualitative community structure, ecological attributes by habitat type, zonation, and feeding types. For the assessment of the ecological status, according to national legislative, following biological indices were used: number of taxa (N), Shannon-Wiener diversity index, Zelinka-Marvan saprobic index, BMWP, and ASPT.

In total, 76 macroinvertebrate taxa were recorded, the dominant component were insects (87.73%). The highest number of taxa (48) was found at the first locality. The highest pollution is present at the second locality that had the lowest number of taxa (eight). Orders Ephemeroptera, Plecoptera and Trichoptera were missing, while dominant groups were Diptera (70%) and Oligochaeta (20%). At the fifth locality the community showed a complete recovery, with far less Diptera participation. According to the biological indices, the second locality had the worst status (IV class of water quality).

The localities downstream showed a trend of improvement, with lower course reaching I class. The results confirmed a negative anthropogenic influence on the Pek River, but have showed signs of improvement downstream from the point of the pollution.

Key words: copper mine, ecological status, macroinvertebrates, Pek, pollution

PROCENA KVALITETA VODE SREDNJEG TOKA REKE RZAV NA OSNOVU SASTAVA ZAJEDNICE MAKROZOOBENTOSA

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Reka Rzav nastaje u podnožju planine Mučanj, kod sela Močioci, spajanjem dva potoka - Presečka reka i Jemčica, i dužine je 62 km. Predstavlja najveću pritoku Moravice u koju se uliva kod Arilja i zajedno sa njom čine pritoku Zapadne Morave. Kratkoročno istraživanje zajednice bentosnih makroinvertebrata srednjeg toka reke Rzav izvršeno je krajem jula 2017. godine, s ciljem da se na osnovu sastava zajednice makrozoobentosa proceni kvalitet vode ovog dela toka.

Istraživanje je rađeno u selu Roge, uzvodno od sela Svračkovo. Bentosne makroinverebrate su uzorkovane ručnom bentosnom mrežom, dimenzija rama 25 x 25 cm i promera mreže 250 μm, na tri lokaliteta. Metoda uzorkovanja je 'kick and swip', u trajanju od tri minuta po uzorku radi standardizacije. Uzorcima je obuhvaćeno dno reke, gde je svaki uzorak uziman sa različitog mikrostaništa dna u cilju dobijanja što reprezentativnijeg sumarizovanog uzorka za svaki lokalitet. Time se postiže uključivanje raznovrsnijih organizama i grupa organizama koje naseljavaju dno u analizi i proceni akvatičnog ekosistema.

Utvrđeno je prisustvo 28 famiilija, gde su neki od organizama identifikovani do roda a neki do vrste, dalje svrstani u sedam redova, pet klasa, dva podfiluma i tri filuma. Među njima dominiraju insekti iz redova Diptera i Trichoptera, koji su predstavljeni sa po šest familija i insekti iz reda Ephemeroptera, predstavljen sa pet familija. Rod *Leuctra* iz reda Plecoptera je zastupljen s najvećim brojem jedinki. Velika raznovrsnost i brojnost predstavnika redova Ephemeroptera, Plecoptera i Trichoptera ukazuje na dobar kvalitet vode, gde možemo izdvojiti rodove *Perla* sp., *Ephemera* sp. i *Ephemerella* sp. kao indikatore čiste vodene sredine. Od fizičko-hemijskih parametara, mereni su pH, sa opsegom vrednosti od 8.4 do 8.9, temperatura vazduha od 25.2 do 27.5 ^{0}C, temperatura vode od 17.4 do 19.3 ^{0}C i elektroprovodljivost od 333 do 352 μS/cm. Deo istraživanog toka, u dužini od 927 m, se nalazi na nadmorskoj visini od oko 450 m i pripada srednjem toku reke. Od indeksa za procenu kvaliteta vode izračunati su biotički indeks BMWP (engl. *Biological Monitoring Working Party)* i Familijarni biotički indeks (FBI). Dobijena vrednost BMWP indeksa je 139. BMWP indeks se koristi za procenu efekta organskog zagađenja, a njegova vrednost u ovom istraživanju ukazuje na krajnje čistu vodu, sa pripadnosti ksenosaprobnoj kategoriji. Ovakva procena ukazuje na referentne uslove akvatičnog ekosistema. Vrednost Famiijarnog biotičkog indeksa od 2.63 ukazuje na prirodno čiste vode, tj. I (prvu) klasu kvaliteta.

Kako bi se dobio detaljniji uvid u sastav zajednice makrozoobentosa reke Rzav i na osnovu njega procenio kvalitet vode potrebno je izvršiti sistematsko jednogodišnje istraživanje na mesečnom nivou i u istraživanje uključiti ceo tok reke.

Ključne reči: ekološka procena kvaliteta, makrobeskičmenjaci, Rzav

THE QUALITY ASSESSMENT OF THE WATER MID STREAM FLOW OF THE RZAV RIVER BASED ON THE COMMUNITY COMPOSITION OF MACROZOOBENTHOS

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Rzav River is formed at the foot of the mountain Mučanj, near the village Močioci, by joining of two streams: Presečka and Jemčica and it is 62 km long. It represents the major tributary of the Moravica River to which it is poured at Arilje. Together they form the tributary of the Zapadna Morava River. A short-term study of the benthic macroinvertebrate community of the Rzav River was conducted at the end of July 2017, in order to assess the water quality of this part of the stream based on the composition of the macrozoobenthos community.

The research has been done in the village of Roge, upstream from the village of Svračkovo. Benthic macroinverebrates were sampled with a manual benthic grid (net), a frame dimension of 25 x 25 cm and mesh size of 250 μm, at three sites. Methodology of sampling was 'kick and swip' with duration of 3 minutes per sample as a standard procedure. The samples represent the bottom of the river, where each of the samples has been taken from a different microhabitat for the purpose of getting a representative summarized sample from each

site. This is the way to include more diverse organisms or groups of organisms in our analysis and evaluation of aquatic ecosystem.

The presence of 28 families were determined, where organisms were identified to genus or species level. They were listed in seven orders, five classes, two subphyla and three phyla. The most dominant organisms are insects from orders Diptera and Trichoptera, which are represented by six families and insects from order Ephemeroptera with five families. Genus *Leuctra* is from order Plecoptera and it is the most abundnant. High diversity and abundance of orgranisms from orders Ephemeroptera, Plecoptera and Trichoptera indicate good water quality. Genus *Perla* sp., *Ephemera* sp. and *Ephemerella* sp. are indicators of extremly clean water. Physico-chemical parameters that were measured are: pH, with the value range of 8.4 to 8.9, air temperature of 25.2 to 27.5 °C, temperature of water from 17.4 to 19.3 °C and conductivity from 333 to 352 μS/cm. The part of researched flow of the river is 927 m long and its altitude is around 450 m. It represents the middle stream flow of the Rzav River. Indices which are used for estimation of water quality are biotic index BMWP (*Biological Monitoring Working Party)* and FBI (*Family Biotic Index*). The value of BMWP index is 139. The BMWP index is used for the estimation of effect of organic pollution. Its value in this research indicate very clean water, which can be listed as xenosaprobic valence. This assessment has shown the refferent factors of aquatic ecosystem. The value of Familiar Biotic Index is 2.63, which is the value of the naturally clean water, the first class of quality.

In order to get a more detailed insight into the composition of the macrozoobenthos community of the Rzav River, and on the basis of it, assess the quality of water, it is necessary to carry out a systematic one-year research at a monthly level and to include the entire flow of the river in the research.

Key words: ecological quality assessment, macroinvertebrates, Rzav River