AN ASSESSMENT OF ECOLOGICAL POTENTIAL OF THE RADOINJA RESERVOIR (SERBIA)

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Introduction

The Serbian Environmental Protection Agency (SEPA) was carried out an investigation of the Radoinja Reservoir during 2014. Based on following biological quality elements (BQE): phytoplankton, phyto- and macroinvertebrates, supporting physico-chemical quality elements and specific non-polluting substances, the assessment of ecological potential of the Radoinja Reservoir is given according to national legislation. This assessment is different from previous reservoir water quality assessments. Implementation of the Water Framework Directive (WFD/2000/60/EC) had changed the criteria of water body ecological status/potential assessment.

Materials and Methods

Sampling of phytoplanktons and macroinvertebrates was conducted in August and October 2014. The sampling of phytoplanktons (benthic diatoms) was done according to the SRPS EN 13946: 2008. The material was preserved using 4% formaldehyde. Removing of cell content and diatom slide preparation was done according to the SRPS EN 13946: 2008. The analysis of diatoms was carried out on inverted microscopes Nikon TE-2000U with the DS-SM camera and NIS-Elements D software and Zeiss Axiovert AxioVision HRc camera and AxioVision 4.8 software. Identification and enumeration of the diatoms, as well as interpretation of the obtained results were performed according to the SRPS EN 14407: 2008. For calculation of diatom indices the Omnisdi software was used. The assessment of ecological potential was based on the 3P diatom index (Costa and Cemagref, 1982).

Aquatic macroinvertebrate samples were collected using hand nets (25x25 cm; 500 µm mesh size) according to the AqSEM protocol. The multi-habitat sampling procedure was applied. The samples were preserved using 70% ethanol solution. Identification of organisms was done using the Leica MS 5 stereo microscope. For the assessment of ecological potential, the following parameters of the ASTERICS software were used: Zelinka & Marvan Saprobic Index, BMWP Score, Shannon-Wiener Diversity Index, total number of taxa, percentage participation of Oligochaeta/Tubificidae in the total macroinvertebrate community and EPT taxa.

Results and Discussion

Investigation of diatom community revealed poor diversity (22 taxa in August and 16 in October 2014 respectively). The dominant species was Achnanthidium vitreum (Ehrenberg), Cleve & J.D. Möller, (even 54% in Aug and 45% in Oct). Subdominant species were Achnanthidium minutissimum (Kützing), Czamczki, Achnanthidium minutissimum (Kützing), Czamczki, and Cocconeis placenta Ehrenberg.

Considering aquatic macroinvertebrate community composition and structure, the total number of taxa was 13 in August and 12 in October 2014 respectively. In Aug 2014 Chironomidade and Tubificidae taxa were found to be principal components of the macroinvertebrate community, whilst in Oct 2014 the species Dina lineata (C. J. Müller, 1774) and the Chironomidae taxa. It is worth mentioning the finding of baetis litter/Müller-Liebenau, 1967 in Aug 2014.

The content of Dissolved Oxygen in water is the most important indicator of the ecological potential of the reservoir. In the Radoinja Reservoir there was not oxygen deficit in the hypolimnic.

Physico-chemical quality elements that support BQE, as well as specific non-polluting substances indicate good ecological potential of the Radoinja Reservoir.

Conclusion

According to the WFD 2000/60/EC ecological potential is determined by the worst-assersted BQE. The Radoinja Reservoir had a moderate ecological potential in 2014. Determined by the macroinvertebrates. According to national legislation, the reliability level of assessment is medium because not all BQE have been used and the frequency of biological monitoring and the monitoring of indicative physico-chemical parameters was lower than the minimal proposed for ecological status/potential assessment. However, due to the ecological potential assessment the monitoring frequency of indicator physico-chemical parameters that are most sensitive to the pressures that the Radoinja Reservoir was actually exposed (nutrient and organic pollution) were used, characteristic for the operational monitoring programme by the WFD, we considered that the level of reliability of the ecological potential assessment of the Radoinja Reservoir was high.