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SPATIAL AND SEASONAL ECOLOGICAL STATUS OF FRESH WATER EVALUATED BY MULTIVARIATE ANALYSES

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Abstract

The changes in fresh water quality are reflected, over time, in the structure of the biocenosis by adjusting the composition, the abundance and the spatial distribution of species, in an attempt to maintain a constant equilibrium. It is difficult to identify this equilibrium just by analysing the physicochemical measurements because they represent water quality conditions of the moment, while the analysis based on biological indicators which are reflecting the composition of macrozoobenthos populations are showing the conditions from the sampling moment and, also, from the past. In our study, water and macroinvertebrates samples were taken from three sections of Uz River, Bacau County, Romania, respecting maximum development periods, between years 2007 and 2009. The locations chosen are covering all types of water courses and possible sources of pollution in the area and the period includes an important flood event that took place in the basin in March 2009. The measured physicochemical parameters and the determined biological indices were analysed using descriptive statistics, bivariate correlations and Partial Least Square Regression (PLRS) in order to highlight seasonal and location variations, to identify the correlations between them and to assess the PLRS algorithm as a method to generate a model for predicting ecological status of fresh water. By comparison with descriptive statistics, PLSR algorithm proved to be able to highlight fine variations in values, in fact, the accuracy of the model is improving in case of anthropogenic influences.

Key words: biological indices, bivariate correlation, fresh water, geostatistics, Partial Least Square Regression, physicochemical parameters

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