

Assessment of Significant Water Quality Parameters and Distribution of Benthic Macroinvertebrates on Gediz Basin (Turkiye)

Gürçay Kıvanç AKYILDIZ^{1,2}, Mustafa DURAN², Serdar POLAT², Recep BAKIR²

¹Program of Biomedical Device Technology, Vocational High School of Tech. Sciences, Pamukkale Univ., Turkey

²Hydrobiology Lab., Dept. of Biology, Faculty of Arts and Sciences, Pamukkale Univ., Turkey
gkakyildiz@pau.edu.tr

Aim of the study: The study was aimed to assess the significant water quality parameters which have the major effects on distribution of benthos on Gediz Basin (Turkiye) by using multivariate analysis.

Material and Methods: The study was carried out between the years 2016 and 2017. In total, 24 sampling sites from 15 creeks and 6 dams were selected based on different water mass with a common formation of drainage, depth, width and altitude. The methods and equipments given by TS6469, EN27828, TS EN 28265, TS EN ISO 9391, TS EN 15196, TS EN 8689-1 and TS EN 8689-2 standards were applied for collecting benthic macroinvertebrates. Environmental parameters measured are: water temperature (WT), pH, Conductivity, dissolved Oxygen (dO₂), Ammonium-Nitrogen (NH₃-N), Nitrate-Nitrogen (NO₃-N), Total Phosphor (TP), Total Dissolved Solids (TDS), Total Organic Carbon (TOC), Total Nitrogen (TN) and Ortho-Phosphate (PO₄P). Benthos was identified at family-level. Observed dissimilarity and ordination distance was calculated using Non-Metric Multidimensional Scaling (NMDS). Significant environmental variables were selected by forward selection while p values based on 999 permutations. Inflated variation parameters (VIF) over 10 were excluded. Canonical Correspondence Analysis (CCA) was applied to figure out ordination between biological parameters, environmental variables and sampling sites. All statistical analysis were calculated and graphed by R.

Results: As the result of the current study, 59 families were identified from 19,755 benthos. The most dominant family groups are Chironomidae, Baetidae, Gammaridae, Oligochaeta, Caenidae, Lymnaeidae, Simuliidae, Corixidae, Asellidae, Physidae, Ephemerellidae and Psychodidae respectively. Expanded scores based on NMDS are non-metric R² = 0.952 and linear fit R² = 0.905. Environmental variables except WT, pH, NO₃-N and TDS were found significant (p<0.05). TP and TN were excluded from the ordination analysis because of VIF > 10. Permutation test for CCA under reduced model was Pr = 0.32 (p<0.05). Water temperature, pH and dO₂ were the most significant environmental variables that affected benthos and water quality.

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