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Article

Ecological status of Aquatic Ecosystems in the Gaziantep catchment (Turkey): application of diatom indices

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With 2 figures and 4 tables

Abstract: According to the European Union Water Framework Directive requirements, diatom metrics were used to assess the ecological status of surface waters in the Gaziantep central catchment (Turkey). A total of 42 diatom taxa were identified. A few environmental factors (especially lead, copper, orthophosphate, and chromium) played significant roles on the distribution of diatom assemblages among the sampling stations. The first two axes of the canonical correspondence analysis elucidated 91.6 % of the species–environment correlations with 13.9 % of the cumulative variance of species. The applied diatom indices (TIT – Trophic Index Turkey, TI – Trophic Index, and EPI-D – Eutrophication and/or Pollution Index-Diatom) showed different results in the evaluation of the ecological status of sampling stations. The results of TIT and TI indicate that Kıratlı creek has a poor ecological condition, while a good ecological condition was reported by the EPI-D index. This creek is associated with relatively high nutrient values (e.g., 91.1 µg L^{-1} P-PO_4, 8.6 mg L^{-1} N-NO_3, 0.59 mg L^{-1} N-NO_2, and 97.5 mg L^{-1} SO_4) and characterized by pollution-tolerant taxa (e.g., *Amphora ovalis*, *Cocconeis placentula*, *Cyclotella meneghiniana*, *Gomphonema parvulum*, *Fragilaria biceps*, and *Navicula trivialis*). The results of the Spearman correlation analysis reveal that TIT has a significant positive correlation with P-PO_4 ($p < 0.01$, $r = 0.780$), conductivity ($p < 0.01$, $r = 0.769$), N-NO_3 ($p < 0.01$, $r = 0.714$), and N-NO_2 ($p < 0.01$, $r = 0.778$). Our results show that TIT is a suitable diatom metric to assess the ecological status of surface waters in the Gaziantep central catchment and for the Mediterranean region in general.

Keywords: biological assessment; diatoms; ecological status; Trophic Index Turkey; Gaziantep

Introduction

Water quality has a great importance for life, and can be characterized using the biological composition, physicochemical variables, and hydromorphological characteristics of aquatic ecosystems. The importance of aquatic systems comes from the fact of maintaining the ecological balancing processes that support both aquatic and terrestrial biodiversity. However, deteriorating water quality hinders the ecosystem services and functions of aquatic ecosystems due to threats to the stability of the biotic integrity (Hering et al. 2010; Birk et al. 2012). The amount of clean freshwater has decreased with increasing loads of nutrients and undesired compounds, which result in the deterioration of their ecological status. The distribution of the more seriously polluted rivers throughout the world is a consequence of the worst situations commonly found in and around the larger conurbations, industrial areas, and agricultural land use.

The roles of researchers in the monitoring and control of water pollution are i) to detect and describe the alterations that occur in the water bodies, ii) to elucidate as precisely as possible the mechanisms by which they are brought about, and iii) to understand the qualitative and quantitative relationships between pollution and its biological consequences.

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