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ENVIRONMENTAL ENGINEERING AND ECOLOGY

STATISTICAL ANALYSIS OF POLLUTION INDICES IN THE LAST TWO DECADES FOR THE BOKA KOTORSKA BAY, ADRIATIC SEA

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Abstract

The surface sediments sampled from forty sampling sites in the Boka Kotorska Bay, starting from October 2005 to December 2019, were analysed for the content of ten heavy metals (As, Cd, Cr, Cu, Hg, Mn, Ni, Pb, Zn, Fe). Five complex indices (pollution load index (PLI), potential ecological risk index (RI), mean ERM quotient (MERMQ), toxic risk index (TRI), contamination severity index (CSI)) were determined for each site in the study period (2005, 2007, 2013, 2019), and statistically examined by principal component analysis (PCA) and cluster analysis (CA). In the semi-enclosed Bay, which consists of four smaller bays (Kotor, Risan, Tivat, Herceg Novi bays), a spatio-temporal comparison of sediment quality was carried out using PCA and CA analysis of the considered pollution indices. Statistical results revealed that the increased environmental risk in 2005 was observed in the bay of Kotor; in 2007 was in the bay of Tivat and Risan; in 2013 in the bay of Kotor and Tivat; and in 2019 was in the bay of Tivat, particularly at the shipyard site Bijela. The PCA and CA analysis highlighted that the sediment contamination in Kotor bay decreased from 2005 to 2019, while at the same time increased in Tivat bay, which is an indication of pollution due to urbanization and population growth in this part of the Bay. The results gave a statistical overview of the similarities between the pollution indices and the differences in the degree of sediment pollution in the Bay during the last two decades.

Keywords: Surface sediments, pollution indices, statistical analysis, environmental risk, Adriatic Sea.



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