Biota and Environment Interaction in the Lower Volta Estuary, Ghana

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Abstract

The changing physiographical conditions of the Volta estuary (a tropical river estuary) and the response of zooplanktonic and nektonic biota were examined for a total of 3 years spread over a 6-year period (1999–2005). The Bio-Env, a distribution-free analog of correlation analysis based on the Spearman’s rank correlation analysis was used to test the determinant variables responsible for ordering the biota, including all the developmental stages of the shrimps. The Simper analytical tool was used to compare the relative importance of species in two locations and used the discriminant as an index of characterization of the two habitats. The overall picture of species affinity to sampling stations as directed by prevailing physico-chemical variables was tested using the Canonical Correspondence Analysis (CCA). Within the study area of 84.37 km² evidence emerged of existence of two water masses; an oligohaline water mass surrounding a mesohaline water body where, on the average, 11 physico-chemical parameters, including hydrogen ion concentration and salinity determined the choice of habitats for the biota. The CCA results obtained from the pooled physico-chemical variables over the 3-year period for the zooplankton data and the six sampling stations showed that the four ordination axes accounted for 90.7% of the explained total variance of the sample species abundance by the pooled environmental variables data.