

RELATIONSHIP BETWEEN VARIATIONS OF WATER QUALITY AND ABUNDANCE OF BENTHIC INVERTEBRATES IN THE SAN DIEGO COASTAL AREA

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The quality of water has a significant impact on the distribution and growth of some species in an aquatic system. As the abundance of benthic invertebrates is sensitive to pollution and contaminants in their environment, they are commonly used as indicators of the quality of water bodies. In this study, we developed methods to quantify the relationships between the abundance of different benthic invertebrates and the physical and chemical properties of water bodies where they live. This was assessed by considering the water quality and abundance data collected from the San Diego coastal area in the United States of America. The study analyzed secondary data collected from 27 sampling stations during the winter (January and March) and summer (July) seasons from 1999 to 2014. Given the complexity of the data in the dataset, cluster analysis is used to obtain two-cluster solutions and then convert the water quality data from continuous to binary to facilitate data manipulation. The sampling stations were divided into two groups using the two-cluster solution of each water quality parameter. Alternatively, the sampling stations were divided into two groups using the abundance data of each benthic invertebrate, with one group having stations with above-average abundance values. The significance of the relationship between each water quality parameter and each benthic invertebrate was tested using Fisher's exact test. Furthermore, logistic regression models were fitted to predict selected water quality parameters based on abundance data. The prediction accuracy of the fitted models revealed that the water quality parameters, including density, dissolved oxygen concentration, and pH value, have a significant relationship with the abundance of selected benthic invertebrates. These findings enable future research to explore more accurate models to predict water quality based on abundance data of benthic invertebrates and provide insight into how such hidden relationships can be identified using statistical techniques.

Keywords: Cluster Analysis, Fisher's Exact Test, Logistics Regression, Species Abundance