

Statistical Model of Water Quality in Estero El Macho, Machala-El Oro

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Abstract : Surface water quality is an important concern for the evaluation and prediction of water quality conditions. The objective of this study is to develop a statistical model that can accurately predict the water quality of the El Macho estuary in the city of Machala, El Oro province. The methodology employed in this study is of a basic type that involves a thorough search for theoretical foundations to improve the understanding of statistical modeling for water quality analysis. The research design is correlational, using a multivariate statistical model involving multiple linear regression and principal component analysis. The results indicate that water quality parameters such as fecal coliforms, biochemical oxygen demand, chemical oxygen demand, iron and dissolved oxygen exceed the allowable limits. The water of the El Macho estuary is determined to be below the required water quality criteria. The multiple linear regression model, based on chemical oxygen demand and total dissolved solids, explains 99.9% of the variance of the dependent variable. In addition, principal component analysis shows that the model has an explanatory power of 86.242%. The study successfully developed a statistical model to evaluate the water quality of the El Macho estuary. The estuary did not meet the water quality criteria, with several parameters exceeding the allowable limits. The multiple linear regression model and principal component analysis provide valuable information on the relationship between the various water quality parameters. The findings of the study emphasize the need for immediate action to improve the water quality of the El Macho estuary to ensure the preservation and protection of this valuable natural resource.

Keywords : statistical modeling, water quality, multiple linear regression, principal components, statistical models

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