

ABSTRACT

Water Pollution Model For Point Lisas

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The effective protection and management of the environment is absolutely important to the welfare of any nation and its inherent sustainability; all available mechanisms to achieve this goal must be constantly reviewed and optimized.

This thesis addresses water quality, which is one of the critical, pivotal and fundamental facets of environmental protection and management. A suite of predictive, mathematical, estimation and geographical models were designed and developed to model the water quality in small river systems as the receiving body of effluents from a large petrochemical based industrial estate. The research utilized the Point Lisas Industrial Estate and the Couva River as a case study for the small river model development.

The research utilized a wide array of research technique, such as, analytical, case study, comparative, correlational-predictive, design, developmental, evaluation, experimental, historical, quasi-experimental, status, theoretical, and trend analysis.

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This thesis will utilize the fundamentals of chemical engineering to formulate a predictive water quality management tool for the environmental protection and management aspects of an industrial estate. These fundamentals include conservation of mass and elements, conservation of momentum, conservation of energy, boundary conditions and initial conditions, laws governing chemical, biochemical and biological processes, and second law of thermodynamics. These fundamentals were used in conjunction with advanced simulation modeling techniques and Geographical Information Systems (GIS) technology to analyse and simulate the elements and characteristics of the Couva River network.

A methodology for small river water quality modeling was developed and subsequently simulated using the Couva River as a case study. The method can be applied to small river systems in the Caribbean. Water quality constants for small river systems, such as decay and re-aeration coefficients, were obtained. The methodology can also be applied for the formulation of standards for an industrial estate

Keywords : Water Pollution Model; Small River Water Quality Modeling; Point Lisas; Couva River