A STEADY STATE WATER QUALITY MODEL FOR RIVER SYSTEMS

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PREFACE

This work was carried out by me as the final project for the Master's Degree in Environmental Engineering at the Department of Civil Engineering of the University of Moratuwa.

The project concerns mainly in the building up of a Predictive Water Quality Model for a river system for forecasting how a river system would react to a set of given waste effluent discharges along the stretch of the river under consideration.

Throughout my work I was aware of the limitations in the actual application of this model to the local river systems mostly due to the inadequacy in the present sampling programmes in respect of the local rivers for obtaining data. However, by carrying out this exercise, I felt that an awareness of this problem would be created which would be of some help in improving the situation at least to a certain extent. The work concerns more with the development of the model rather than the application of it to any given river system. I shall gladly welcome any comments on shortcomings of this work so that the model could be improved further.

Before concluding I wish to express my sincere thanks to my Project Supervisor, Dr. D C H Senarath, Co-supervisor Mr. S Pathinather, the Course Co-ordinator Mrs. N Ratnayake, the panel of lecturers and other staff of the University of Moratuwa as well as other Guest Lecturers.

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C O N T E N T S

LIST OF SYMBOLS (GENERAL)

L_o -   Ultimate BOD remaining to be exerted at time 0

L_t -   Ultimate BOD remaining to be exerted at time t

C -   Dissolved Oxygen concentration, mg/l

C_s -   Saturation DO concentration, mg/l

D -   DO deficit, mg/l

t -   Time taken to travel along the reach, days

T -   Water temperature in river, ^oC

T_e -   Equilibrium air temperature of the basin, ^oC

T_w -   Temperature of waste effluent inflows, ^oC

T_t -   Temperature of tributory inflows, ^oC

K_{o1} -   Deoxygeneration (or BOD) rate constant (base e) at 20^oC, $days^{-1}$

K_{o2} -   Reaeration rate constant (base e) at 20^oC, $days^{-1}$

K_1 -   Deoxygeneration (or BOD) rate constant (base e) at equilibrium air temperature T_e, $days^{-1}$

K_2 -   Reaeration rate constant (base e) at equilibrium at Temperature T_e, $days^{-1}$

K_3 -   Thermal decay rate constant, $days^{-1}$

θ_1 -   Temperaure activity constant for K_1

θ_2 -   Temperature activity constant for K_2

        The symbols pertaining to the reach i
are given in tables 3:2 and 3:3.

L I S T   O F   F I G U R E S

Figure

L I S T   O F   T A B L E S

Table