IMPACTS OF SOURCE WATER QUALITY VARIATION ON OPERATIONAL PARAMETERS OF WATER TREATMENT PLANTS

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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Signature of the Supervisor: Date:

DEDICATION

I would like to dedicate my work to my family. They instilled in me a desire to learn and made sacrifices so I would have access to high quality education from an early age. Also, this is dedicated to my close friends who have always supported me throughout my years of studies.

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ABSTRACT

The quality of surface water is essential. The rapid growth of the human population and economic development have resulted in the current worldwide deterioration in water quality. Water quality refers to water's physical, chemical, and microbiological characteristics. Water treatment for drinking varies with the quality of raw water. The study aims to identify pollution sources, thereby analyzing hazards and hazardous events in the catchment of Kalu Ganga and assessment of risks in the catchment and assess spatial and seasonal variation of water quality of Kalu Ganga by analyzing suitable chemical, physical and bacteriological parameters and how it affects the water treatment plant operational parameters. This. Samples were collected from three intake locations in Kalu Ganga, and the test results were obtained from the laboratory, NWSDB, Ratnapura. There were several kinds of pollution sources along the river, and pollution levels rose with the distance 30 km of Kalu Ganga from Rathganga to Kanadola in the catchment of Kalu Ganga. All the parameters tested show spatial variation when the concentration of river pollution was increased. The rainfall pattern of the catchment strictly follows the physical parameters of colour and turbidity. All other chemical parameters, including pH, Electrical conductivity, chlorides, Alkalinity, and total hardness, did not match the rainfall. However, according to available test results, heavy metals present in water due to agrochemicals discharged from farmlands are below threshold limits as specified in SLS 722:1985 as per the test results shown in the Appendix A . Therefore, it is not a threat, at least for the moment, because of the high-water flow through the river. The risk rating can be reduced by implementing a catchment management plan, including preventive measures to protect the source water from possible polluting activities and enforcement of regulations and promoting awareness programs for the community to understand the influence of their actions on water quality. Although Kalu Ganga is polluted in many ways, water quality parameters are within the threshold limit to use as raw water for public water supply as specified in SLS 722:1985. A ready reckoner was developed to find the optimum alum dosage for water treatment for different turbidity and pH levels. Also, the graphs have been plotted for selected raw water quality parameters from available data and statistics for the future four years have been derived. Keywords: Water Quality, Water Treatment, Pollution, Risk Management

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LIST OF ABBREVIATIONS

Abbreviation	Description
Alum	Alluminium Sulphate
BOD	Biochemical Oxygen Demand
DO	Dissolved Oxygen
EC	Electrical Conductivity
NWSDB	National Water Supply & Drainage Board
SLS	Sri Lanka Standard
TDS	Total Dissolved Solid
TNC	Too Numerous to Count
TSS	Total Suspended Solid
WHO	World Health Organization
WSP	Water Safety Plan
WSS	Water Supply Scheme
WTP	Water Treatment Plant

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