BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

ASSESSMENT OF THE STREAM'S ASSIMILATIVE CAPACITY USING THE STREETER PHELPS MODEL... (NAKAWA STREAM)

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BU/UG/2012/167

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A final year project report submitted to the Department of Water Resources and Mining Engineering as a partial fulfillment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering

2015/2016

ABSTRACT

Water is an essential resource on earth; without it no life is possible, it aids human civilization, ecological integrity, ecosystem functioning, bio-diversity of the lake resources and environment conservation. Uganda has undergone through economic reforms that have led to increased industrialization, urbanization and high rates of population growth, this has increased water use and escalated its degradation due to the prevalent effluent discharge in to the water resources. The water resources have the ability to purify them-selves naturally after pollution but in some case contamination is done quickly and to a much higher degree that it exceeds the self-purification capacity of a stream. This poses danger to the present and future generations unless proper management plans for judicious utilization of the resource for sustainable development is effectively implemented.

Effective water resource management involves conducting studies on the self-purification capacity of the stream/river. Self-purification is the process in which balance restoration of the aquatic environment takes place through simultaneous participation or in some sequence of the physical and chemical factors, biological and hydraulic characteristics of the river/stream. Analysis of these factors gives us complex information about water quality and an attempt is made through this project in assessing the assimilative capacity of a stream through DO/BOD modeling using streeter Phelps equations. Samples are going to be collected from the point source effluent discharger and from both the upstream and downstream areas of the stream; these samples are going to be tested for DO, BOD and Temperature before mixing and after mixing, the results are going to be fed in to the model to compute the various DO deficits downstream and also determine the minimum DO concentration which will determine the streams ability to purify its self after pollution.

DECLARATION

I, **Namwanje Roset**, declare that this is the original copy of my project report and no other duplicate of the same report is going to be found anywhere.

NAMWANJE ROSET

BU/UG/2012/167

B.Sc. WAR IV

Signature..... **Date**.....26th/08/2016.....

APPROVAL

This project report has been submitted to the faculty of engineering for evaluation with the approval of my supervisors below

Main supervisor

MR. MUGISHA MOSES

Signature

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Date

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Co supervisor

MR. BAAGALA BRIAN SEMPIJJA

Signature

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Date

.....

ACKNOWLEDGEMENTS

I would love to acknowledge a few people whose assistance has had a significant impact on the success of my project.

Firstly I thank the almighty lord for the life and strength he has bestowed upon me through the entire process of conducting this project.

With all due respect, I would like to extend my gratitude to the treatment facility at National Water, Bugolobi for giving me the opportunity to conduct my experiments from their labs.

Sincere thanks go out to Busitema University, MEB & WAR department and most importantly to my supervisors Mr. Mugisha Moses and Mr. Baagala Brian for the tremendous support and guidance.

I also acknowledge the love and care of my family and loved ones, for all the financial, moral, spiritual and physical support they gave to me, it kept me going.

Lastly, I recall with love my course mates Allen Nantambi, Enoch Kajubi and Omaido Ronnie Perez for the encouragement and inspiration they unselfishly passed on to me

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DO	Dissolved Oxygen
BOD	Biochemical Oxygen Demand
T	Temperature
Mg/l	milligrams per liter
K2	reaeration constants
K1	deoxgyenation constants
C	Actual dissolved oxygen concentration
D	Dissolved oxygen deficit
Q	Flow rate
U	Flow velocity
H	Flow depth
MWE	Ministry of Water and Environment

Chapter one

1.0 Background

Uganda has undergone policy reforms that have brought about increased investments and a faster economic growth at an average annual GDP growth rate of 6.9%.This has led to expansion of cities, industrial and economic development (WWAP, 2006). Due to this development, the water resources of the country are stressed due to the need to service the development. The industries are continually abstracting water for use and discharging their waste waters back to the receiving streams without prior treatment and also without determining the streams capacity to dissolve the pollutants. This influences water usability downstream, threatens human health and the functioning of aquatic ecosystems thereby reducing effective water availability and increasing competition for water of adequate quality (Heathcote, 1998).

Studies have been carried out to examine the impact of industrial effluents on stream water quality on the streams of Nakawa-Ntinda industrial area, (Walakira, 2011) and the quality of Nakivubo channel has been bio monitored and assessed by collecting a number of samples and tested for water quality parameters (Kwitonda, 2013) but this has not stopped pollution now the city is threatened with a water scarcity come 2035 (Kagenda, 2015) unless effective water resources planning and management is implemented by the MWE which includes water resources assessment on purification capacities of the flowing water bodies after pollution.

Self-purification is the ability of a stream/river to purify itself of sewage or other wastes naturally. It is the process in which balance restoration of the aquatic environment takes place through simultaneous participation or in some sequence of the physical and chemical factors, biological, hydraulic characteristics of the river/stream. Although streams have the ability to self-purification, in some cases contamination is done quickly and to a much higher degree that exceeds the capacity of a stream to recover leading to water quality impairment in water resources where that stream drains to

6.0 REFERENCES

Chandravathi, R. (2013). *Assimilative Capacity*. Advanced technology in Engineering and Science Volume 1, 13.

Changrekar, M. (Unknown). *Self purification capacity of Natural Streams*. In I. Kharagpur, Waste Water Management (pp. 12-20).

Grizzard, T. (2007). *Deoxygenation-reoxygenation and the streeter phelps equations*.

Heathcote, I. W. (1998). " *Intergrated WaterShed Management*; Principles and practices". Newyork: John Wiley & sons.

Kagenda, P. (2015). *Kampala Water Scarcity*.

Kwitonda, A. (2013). *Biomonitoring and assessment of urban streams*. Kampala.

Streeter, E. B. (1925). *A study of the pollution and natural purification of the Ohio river*.

unknown. (2010, sept 17). *Biochemical Oxygen Demand*. Retrieved oct 14, 2015

Walakira, P. (2011). *impact of industrial effluents on water quality of streams in Nakawa-Ntinda*. Kampala.

Woman, J. (2005). *Assimilative Capacity*.

WWAP. (2006). *National Water Development Report*; Uganda, Prepared for the 2nd UN World Water.