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Pursuing Excellence

FACULTY OF NATURAL RESOURCE AND ENVIRONMENTAL SCIENCES
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DEPARTMENT OF GEO-INFORMATION, EARTH OBSERVATIONS AND PHYSICAL LANDS RESOURCES

RESEARCH THESIS

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REGISTRATION NUMBER: BU/UP/2018/3883

TOPIC: ASSESSEMENT OF THE IMPACTS OF SUGARCANE FARMING IN WETLANDS ON WATER QUALITY OF RIVER CHICO: IMPLICATIONS ON AQUACULTURE PRODUCTION.

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A Thesis submitted in fulfillment of the requirements for the award of degree of Bachelors of Science in Fisheries and Water Resources Management in the Faculty of Natural Resources and Environmental Sciences at Busitema University

DECLARATION

I, **KYOGA FRANCIS**, declare that this dissertation is my original work and has not been submitted for a degree in any other university.

Signature…………………………………. Date………………………………………

APPROVAL

This is to certify that the work titled Assessment of the Impacts of Sugarcane Farming in Wetlands on Water Quality of River Chico; Implications on Aquaculture Production

Signature……………………………………...   Date………………………………….

Name: **Dr. Tebitendwa Sylvie Muwanga**

Supervisor.

DEDICATION

I dedicate this work to my wife who allowed me to go back to university for further studies.

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God bless you all.

ACRONYMS

mg/L…………………………………………….. Milligram per liter

NaFIRRI………………………………………….National Fisheries Resources Research Institute

NH_4 ………………………………… ……….. Ammonia

NO_3 ……………………………………………..Nitrate

PO4 ……………………………………………… Phosphate

TDS ………………………………………………Total dissolved solids

TSS ……………………………………………… Total suspended solids

µg/L………………………………………………..Micro liters

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ABSTRACT

A Study was undertaken on river Chico, in Buyengo town council in Jinja District in the areas habited by Sugar cane plantation and was aimed at assessing the impact of sugar cane farming in wetlands on water quality of river Chico, whose specific objectives were ;-(i) Determine the physico chemical composition (i.e. temperature, dissolved oxygen, pH and electrical conductivity) of the sugarcane plantation inflow and outflow. (ii)Determine the chemical composition (i.e. Nitrates, Nitrites, soluble reactive phosphorus, total phosphorus and total suspended solids) of the sugar cane farm in outflow and inflow. (iii) Evaluate the suitability of sugarcane, outflow water quality for pond siting/ aquaculture production. Water samples were collected from the R.Chico in three sampled sites for two months of December 2021 and January 2022. The Sites were upstream, middle and downstream of the river and they were georeferenced. The physico were collected by multi-probe meanwhile the nutrients were analyzed in the laboratory using a spectrophotometer. The outputs showed, dissolved oxygen from Chico River was less, upstream and was increasing as you could go down stream. This could have been, attributed by the person who are, found brewing alcohol in some of the upstream sites of this river. Thus hindering the oxygen levels in the water more especially when they were using this water placing hot gadgets that could heat the water thus leading to low oxygen levels. Environment still green, water smelling due to molasses discharge by Kakira Sugar Factory hence water was turbid. These effects cause a change in PH, conductivity and total dissolved solids in the water both by site and by timeframe. All the parameters were statistically significant with P-value of $P<0.05$ by site meanwhile by timeframe only DO, PH, Temperature and not for Conductivity and Total dissolved solids. The same applied to the nutrients. These effects could also affect the fisheries in this river. According to the study undertaken on River Chico, I recommend that the wastes from Kakira, factory should, be prohibited into this river to ensure that the aquatic biodiversity is conserved. Physico and nutrient parameters play a big role in the aquatic biodiversity, therefore there is need to protect River Chico to ensure biodiversity conservation and restorations including the fisheries, and fertilizers used by Kakira factory in the sugar plantations could also be another causative in the increased nutrient levels in these areas that need to observed and advise management.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Globally, wetlands are important to providing ecosystem goods and services including flood control, groundwater replenishment, wetland products e.g., wood for fuel, construction and craft materials, food in form of vegetables and fruits etc., reservoir for biodiversity including fish and wildlife and water purification among others (Mitsch and Gosselink, 2015; Mitsch *et al*., 2015). Nevertheless, natural wetlands are presently under threat from a number of anthropogenic activities. For instance, conversion of wetlands into arable land particularly for sugarcane farming presents a major threat to these vital ecosystems (Mitsch *et al*., 2015).

The impacts of sugarcane farming arises from the fact that sugarcane is a monoculture crop that requires wetland resources such as vast land use and requirement for large amounts of water for growth. According to Sharma (2015), the crop requires 1,500-2,500 mm of rainfall/water to complete the growth cycle, which results in 1500-3000 liters of water to produce a kilo of sugarcane. This may have consequences on availability of water not only for supporting wetland biota but also for domestic water use. Furthermore, sugarcane draws heavily from soil and thus, necessitates corresponding replacement of nutrients. Consequently, in recent times, the use of inorganic fertilizers and pesticides to improve sugar cane productivity has become more severe (Kumari *et al*., 2020; Mitsch *et al*., *2015;* Matavire, 2015). Sadly, long-term application of inorganic fertilizers and pesticides on sugarcane farms results in deterioration of soil quality and hence a decline in the overall productivity. Additionally, it contributes to the build-up of heavy metals in soil and raising concern about crop production and possible impact on human health (Kumari *et al*., 2014; Omwoma *et al*., 2014; Matavire, 2015). Most importantly, agricultural runoff emanating from farms that heavily employ fertilizers and pesticides are potential non-point source of pollutants especially nutrients (nitrogen and phosphorus), suspended solids, organic matter (BOD and COD) (Xia *et al*., 2020).

Nonetheless, among the pollutants contained in agricultural runoff, nutrients particularly nitrogen is of great concern due to its adverse impacts on both the environment and public health (Akpor and Muchie, 2011). The use of nitrate-contaminated drinking water to prepare infants' food is for instance a known cause for infant methemoglobinemia (blue baby syndrome) (Knobeloch *et al.*,

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