Spatiotemporal modelling & automated *in-situ* sensors to monitor Harmful Algal Blooms (HABs)

***Case Study Lake Victoria***

**by**

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*Project report submitted to the department of Geomatic Engineering and Geospatial Information Systems degree of Bachelor of Science in Geospatial Information Sciences (GIS).*



**Department of Geomatic Engineering and Geospatial Information Systems (GEGIS)**

DECLARATION

*I declare that this project is my own work and has not been submitted by anybody else in any other university for the award of any degree to the best of my knowledge.*

Sign………………………………… Date………………………………………...

Student name

Registration number

Department of Geomatic Engineering and Geospatial Information Systems (GEGIS)

Jomo Kenyatta University of Agriculture and Technology

CERTIFICATION

This project has been submitted for examination with my approval as the candidate’s supervisor.

Sign……………………………. Date ………………………………………………

[Supervisor’s name]

[Designation]

[Department]

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# Acknowledgements

Thank the data providers, support from NASA XXXXXX

# Abstract

Urban population growth in Kenya XXXXX

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# Acronyms and abbreviations

1. HAB - Harmful Algal Bloom
2. IoT - Internet of Things

# Introduction

## Background

Algae, in limited concentration, are ecologically friendly however when an unanticipated bloom comes to pass, can have severe negative detrimental impacts on human health, aquatic ecosystems e.g., massive fish kills (see fig 5), great economic loses.

This is the fact that the said form unsightly views and nuisance in points of impact and with cyanotoxins, initiated by the cyanobacteria being particularly problematic. Moreover, they can be toxic and scum-forming, posing a risk to the ecosystem and to public health.

The economic sphere is in turn as well impacted negatively, making the overall Gross Domestic Product, GDP.

The geoscientific preparedness to monitor and predict algal and cyanobacteria blooms is of great material value to provide a pre-warning to society and enable management processes to be activated in advance to limit the disastrous and catastrophic impact.

Currently, there is ongoing collaborative efforts between SERVIR Africa and the Regional Centre for Mapping of Resources for Development (RCMRD). The research is currently mainly geared for estimating algal concentrations in Lake Victoria by assessing and monitoring the Lake Victoria water quality parameters such as chlorophyll-a concentration, Lake Surface Temperature, and turbidity for the lake using satellite data from the Moderate Resolution Imaging Spectrometer (MODIS) sensor on the Aqua satellite.

The advent and uptake of high resolution in-lake automated water quality sensing technology together with new satellite platforms now enables a step-change in data availability that could be used for monitoring and forecasting of cyanobacteria (and algal) blooms in Lake Victoria.

## Motivation and problem statement

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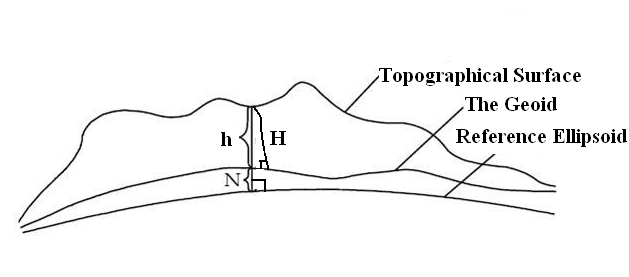


Figure 1: Example of a figure. It uses Tables & Figures Caption style in quick styles gallery.

Table 1: Sample of a table. It uses Tables & Figures Caption style in quick styles gallery.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| City or Town | Point A | Point B | Point C | Point D | Point E |
| Point A | — |  |  |  |  |
| Point B | 87 | — |  |  |  |
| Point C | 64 | 56 | — |  |  |
| Point D | 37 | 32 | 91 | — |  |
| Point E | 93 | 35 | 54 | 43 | — |

## Research identification

The main aim of this research is to develop …. This is achievable through the following specific objectives:

### Research objectives

1. XXXXX
2. XXXXX

### Research questions

The following questions are formulated with respect to aforementioned objectives:

1. XXXX
2. XXXX

## Study outline

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# Literature review

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# Materials and methods

## Study area

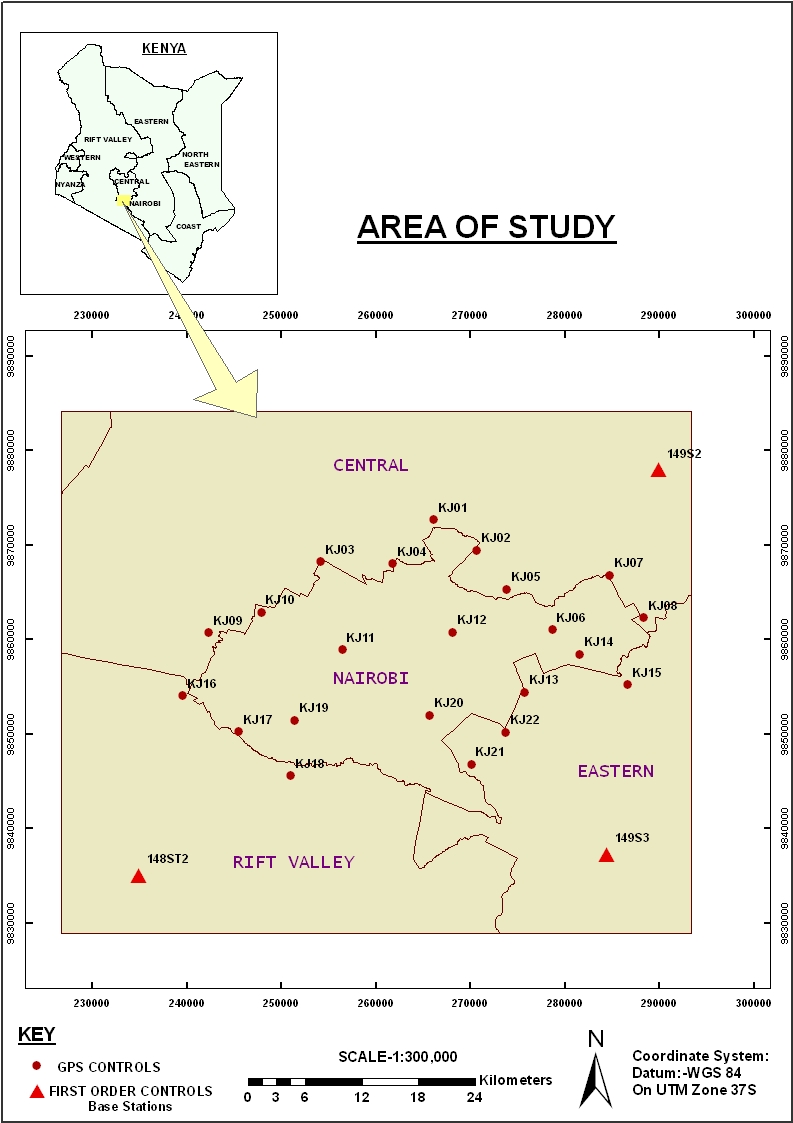


Figure 2: Example of a study area map

## Data

Describe the data used in the study.

## Methodology

Concisely describe the methodology used in your study.

# References

Provide an exhaustive list of references preferably using APA citation style. Be advised to use [Mendeley Desktop](https://www.mendeley.com/download-mendeley-desktop/) an open source reference manager software with MS Word plugin.

# Appendix

Add any extra materials that could not fit in the main text of your write up and is relevant to your study.

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