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AMBIENT WATER QAULITY MONITORING ON THE MURCHISION BAY – LAKE VICTORIA

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Presentation Outline

- Introduction – Ministry of Water and Environment
- Introduction – Ambient Water Quality Monitoring on the Murchison Bay
- Methodology – Sampling points, water quality analysis and statistical analysis
- Findings
- Conclusions & Recommendations

Introduction

Ministry of Water and Environment

Ensures the provision of quality water and environmental services in Uganda. It has the mandate of;

- Managing and sustainably utilizing the water and environmental resources of the country.
- Improving the quality of water resources for the population.
- Ensuring better access to water and environmental resources in all parts of the country.

Water Quality Monitoring Network

It's issue-based for integrated water quality monitoring across the country.

Comprises of 147 stations (*currently under review*).

Objectives of the Water Quality Monitoring Network

- To determine the impact of human activities on water resources quality (**SDG 6.3.2**).
- Compliance of industrial and municipal effluent discharges to national wastewater standards. (**S.D.G 6.3.1**).
- Compliance of quality of domestic water supplies to national standards. (**S.D.G 6.1.1**).

Introduction – Ambient Water Quality Monitoring in the Murchison Bay

- Lake Victoria is the source of the Nile
- The Murchison bay lies on the northern part of the L. Victoria at latitude 0^0 7' 0" N and longitude 32^0 37' 0"E
- The catchment of the Murchison bay includes Kampala city which is highly industrialized.

Methodology – Sampling, Water Quality Analysis & Data Interpretation

Sampling Points

- 23 Sampling points adopted from LVEMP (25 Km^2)
- Sampling sites form a transect from the bay to the open water.

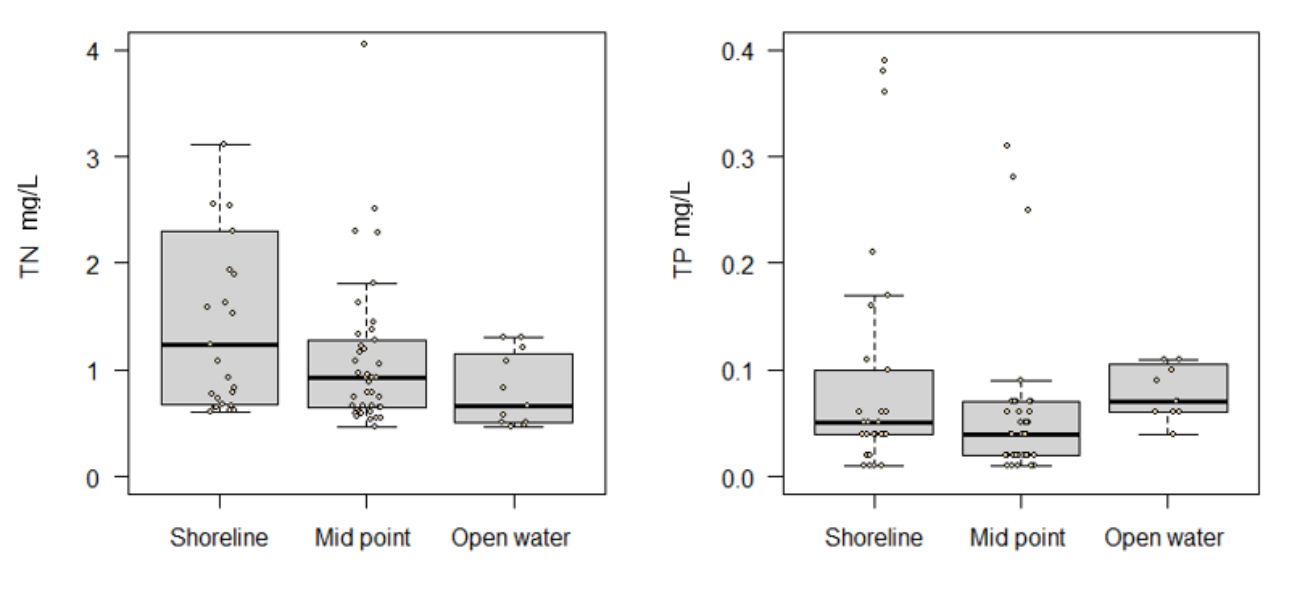
Sampling

- 2 Sampling campaigns in FY 2022/2023
- Water column profiling using van-dorn sampler, surficial sediment sampling.

Water Quality Analysis

- Heavy metals using ICP – OES
- Nutrients (N &P) using spectroscopy on discrete analyzer
- Algae identification at X400 magnification
- Statistical analysis using R Studio 4.3.1

Findings – Nutrients

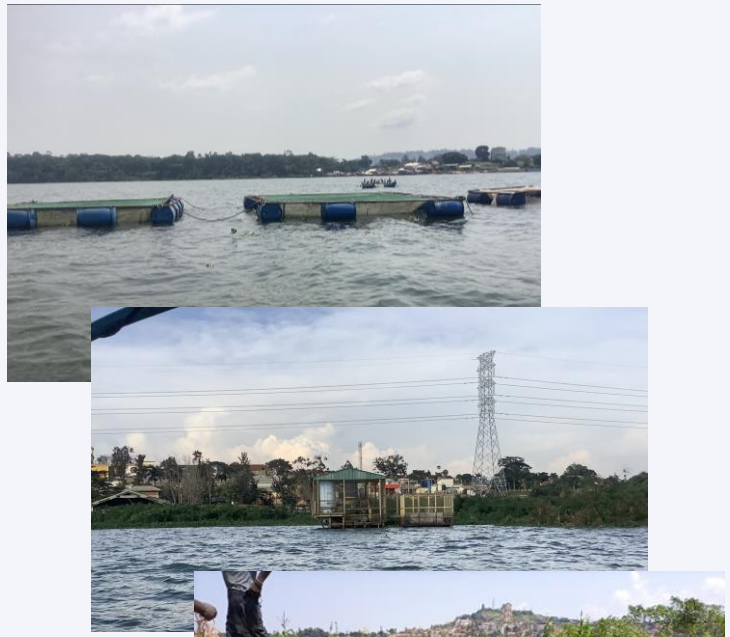


Mean concentrations	TN (mg/L)	TP (mg/L)
Shoreline	2.87 ± 3	0.09 ± 0.07
Mid point	1.59 ± 2.7	0.08 ± 0.12
Open waters	0.81± 34	0.08 ± 0.02

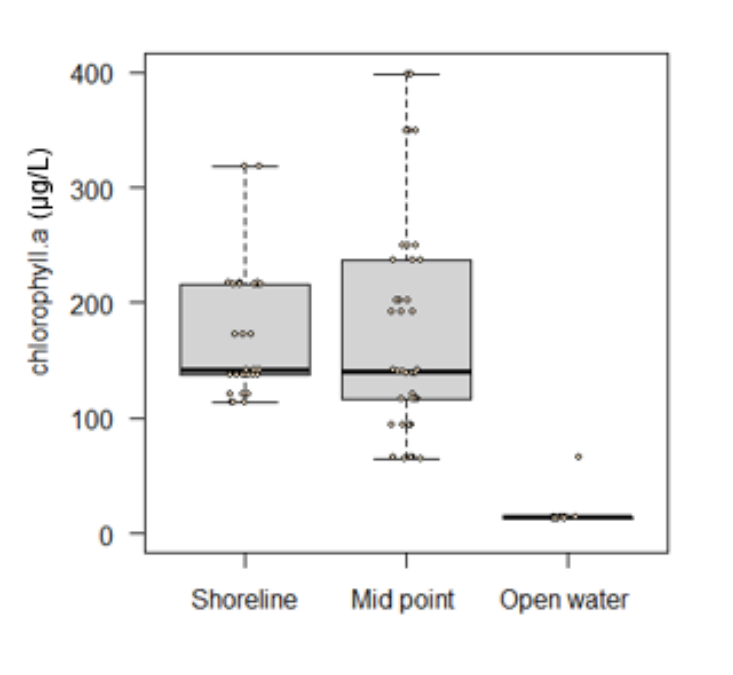
TN:TP Ratio

- Ratio of 11:1
- Phosphorus is limiting
- Deficiency of P is conducive for N – fixing bacteria

Sources of nutrients



Findings – Productivity



Mean concentrations	Chl –a (µg/L)	
Shoreline	174 ± 74	**Hyper trophic**
Mid point	173 ± 81	
Open water	13 ± 1.4	

Examples of algae identified in the bay

Blue green algae/ Cyanophyta	*Cylindrospermopsis Sp, Merismopedia Sp, Anabaena sp, Planktothrix Sp*
Green-algae/ Chlorophyta	*Microspora Sp, Desmidium, Spirogyra Sp, Pithophora Pandorina, Zygnema Coelastrum Scenedesmus sp, Cosmarium sp*
Chrysophytes Euglenopphytes	*Melosira Sp, Surirella Sp, Aulacoseira Sp, Rhopalodia*

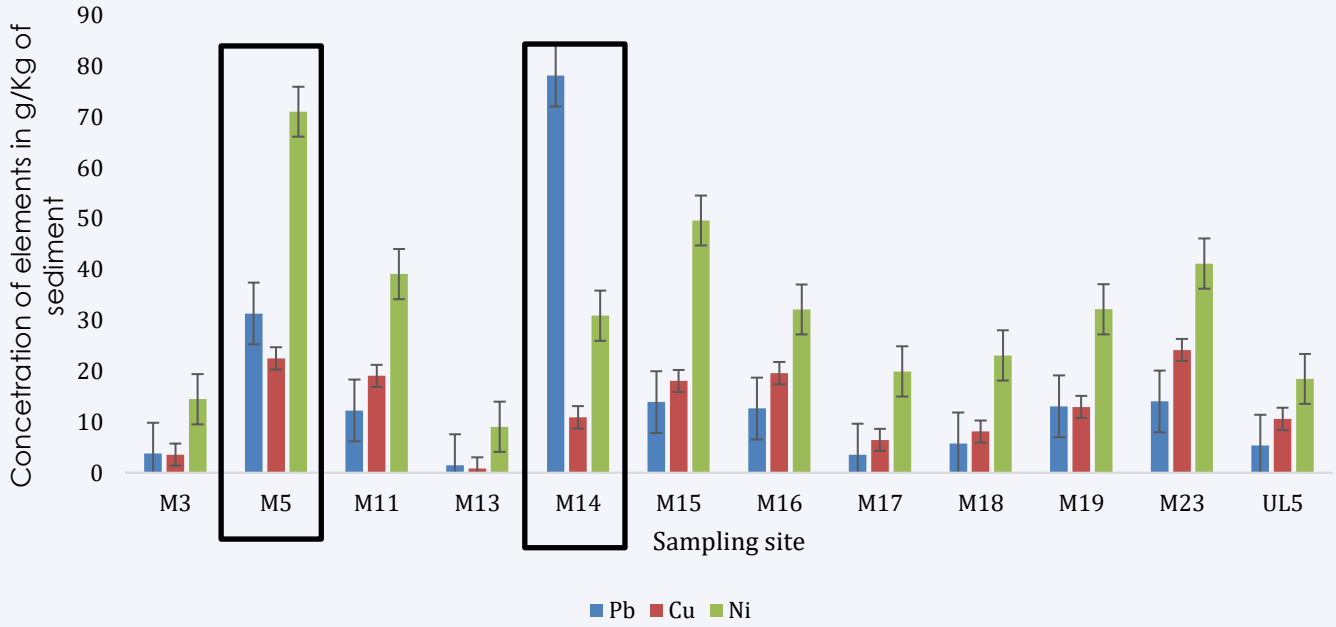
- Most dominant species are **blue-green algae**

Socio- economic Implications

- Poor esthetics (green water) which discourages tourism,
- High cost of water treatment due to clogging of filters
- Reduced fisheries since clogged fish gills can lead to fish kills
- Health impact of algal toxins in the water

Findings – Heavy metals' concentrations

- Analyzed Cd, Pb, Cu, & Ni
- In the water column elements were below detection limit of the method used.
- In sediments concentrations were variable.
- **Highest concentrations** observed at point discharge points of Nakivubo and Kinawataka areas – major effluent discharge channels
- **Heavy metals are being sunk in the sediments** of the bay & could act as a potential source upon mixing.



Implications of heavy metals in the lake include

- Bio accumulation in fish tissue and subsequently in humans
- Increased costs of water treatment for domestic use

Conclusions and Recommendations

Conclusions

1. The bay is becoming a source of pollution to the open lake.
2. Most dominant algae species are blue green algae with health implications on fish and humans
3. Heavy metals settle in the sediment but may be re-suspended during mixing

Recommendations

1. Industrial and municipal wastewater discharges in Kampala city must be regulated.
2. Degraded wetlands should be restored & the 200 meters' buffer zone stipulated in the Environment Management Act protected.
3. Advocate for pollution control at source through resource efficiency and clean production.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THANK YOU!