**Satellite-based monitoring for climate change adaptation and sustainable fisheries management in the African Great Lakes**

Introduction

The African Great Lakes (AGL) with their vast freshwater resources and rich biodiversity are pertinent in achieving several of the Sustainable Development Goal (Cowx & Ogutu, 2019) including those related to Goal 6 (clean water and sanitation) and Goal 14 (life below water), as well as Goal 1 poverty reduction through supporting the livelihoods of millions of people in the region. The AGL basin spans 11 African countries (South Sudan, Ethiopia, Kenya, Uganda. Tanzania, Rwanda, Burundi, Malawi, Mozambique, Democratic Republic of Congo and Zambia) directly and indirectly supporting livelihoods and health of more than 90 million of the rapidly growing population in these developing countries (Plisnier et al., 2022) with a direct employment of over 35,000 fishers (Cowx & Ogutu, 2019). The AGL total catchment area of 850,000 km2 consists of the world’s second largest and second deepest lakes, Lake Victoria and Tanganyika respectively, Lake Turkana as well as other smaller lakes Malawi, Albert, Kivu, Edward and is known as a ‘biodiversity Hotspot’ with its rich endemic fisheries composition.

In recent years, monumental changes have taken place in Lake Victoria due to both anthropogenic, Anthropocene and changing climatic conditions. Changes leading to the disappearance of endemic fish species have been witnessed over the years with the diminishing of endemic traditionally important species of the lake. Such species include the haplochromines, the endemic tilapia which have been extirpated by the introduction of Nile perch and alien tilapia species. Increased turbidity, changes in the physical and chemical properties of the lake, changes in the cycles of nutrients and hydrology have all changed the Lake Victoria in monumental proportions. The management of Lake Victoria has had challenges due to the transboundary nature of its ecosystem. Therefore, monitoring, management and conservation has over the decades been patchy, uncoordinated without temporal and spatial gaps in the data collected. There needs to be a coordinated management of the lake among the sharing countries over time in order to avoid data gaps spatially and temporal.

The ultimate method for monitoring is satellite remote-based monitoring. Satellite-based monitoring ensures a continuous, complete and wholesome collection of data on a real-time basis. This kind monitoring ensures that changes are detected as they happen and the success or progress of monitoring strategies and programs can be assed in real-time as well. Understanding the changing condition of the lake through satellite-based monitoring would ultimately lead to adaptation and management of fisheries in a sustainable manner.

One of the longest-lasting and most blatant effects of the Anthropocene have been changes in land use, urbanization, agriculture, and deforestation. All have left their mark on our world. Monitoring this shift is essential for comprehending its effects as well as for potentially informing scientists and decision-makers about the areas where change is required to stop the deterioration of our natural environment.

Satellite monitoring has been made easier because of the thousands of satellites orbiting the earth taking land cover high resolution images of the earth periodically. There are numerous landcover formats that include sentinels and Landsat images crucial for monitoring changes over time.

Objectives

Main Objective

To develop a satellite-based monitoring system for climate change adaptation and sustainable fisheries management in Lake Victoria for upscale in the African Great Lakes.

Specific Objectives

1. To determine the influence of climate and land cover change on the lake’s ecosystem.
2. To develop a spatial pattern and temporal statistical model on water quality changes in Lake Victoria.
3. To identify and prioritize areas for improvement and further research in the implementation of the satellite-based monitoring system for upscale in other African Great Lakes.