

# **Shifts in ecosystem quality as a precursor to degenerative biotic health!**

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# Introduction

- Biotic community have a distinct set of environmental conditions under which they experience optimal growth and reproduction.
- Life exist on earth because it's the only planet that provides optimal environmental conditions to support life (e.g.  $N_2$ -78%;  $O_2$ -21%;  $CO_2$ -0.04%).
- Since Industrial revolution in 1750's, human induced impacts on biotic systems of the earth has been dramatic and is accelerating as a result of climatic and non-climatic stressors.
- Climatic factors, such as air and water temperatures, and precipitation and wind patterns, strongly influence biotic health.

- Non-climatic factors include Pollutions through Municipal and Industrial effluent discharges and unsustainable use of land and aquatic ecosystems.
- According to Intergovernmental Panel on Climate Change (IPCC) Report, globally averaged surface air temperatures are projected to increase by 1.4 – 5.8 °C by the year 2100 above the pre-industrial levels.
- These pressures have exerted stress on the available global natural resources with the tropical regions bearing the greatest brunt due to its enriched biodiversity.
- According to the IUCN Red List update of 2008, over 900 biotic species have gone extinct since 1500. Extinction rates of freshwater fauna are estimated to be at least five times higher than terrestrial or avian species.

# Tropical Ecological shifts

- The East African lakes—Victoria, Tanganyika, and Malawi—hold one quarter of the earth's total surface freshwater supply, and are home to a myriad of fish species.
- The lakes have been greatly impacted by shifts in cultural practices.
- Surface and deep waters of the East African lakes have responded to global warming air temperatures at varying depths from early 1900's to the year 2000.
- Along with warming surface waters, deep-water temperatures of (Edward, Albert, Kivu, Victoria, Tanganyika and Malawi) have warmed by between 0.2 – 0.7<sup>0</sup>C since the early 1900's.
- Carbon Isotope data, also shows aquatic life lose of 20%, with a 30% decrease in fish yield.

- The trophic status has changed from mesotrophic to eutrophic/hypertrophic.
- Dramatic algal species composition reorganization from abundantly diatoms to nitrogen fixing blue-green cyanobacteria
- The waters have become increasingly nitrogen limiting.
- Mineral turbidity and primary productivity have increased.
- Levels of microcystin toxins are beyond threshold levels of 1.5  $\mu\text{g/l}$  for LR. Concentration as high as 81  $\mu\text{g/l}$  was observed in Kisumu bay.
- The cumulative pressure on the lakes coupled with ballooning cage culture practices have exerted stress to the biotic resources especially on capture fisheries resulting into outbreak of fish diseases

# Lesion infested Tilapiines caught in Nyanza Gulf of Lake Victoria



- The emerging yet dreadful Tilapia Lake Virus (TiLV) has been reported from Lake Victoria (Mugimba et al. 2018).
- There is therefore great need to monitor ecosystem quality and developments over emerging diseases.

**THANK YOU**