The Influence of anthropogenic activities HABs Development along Kenyan Coast

PhD Thesis proposal by;

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Abstract

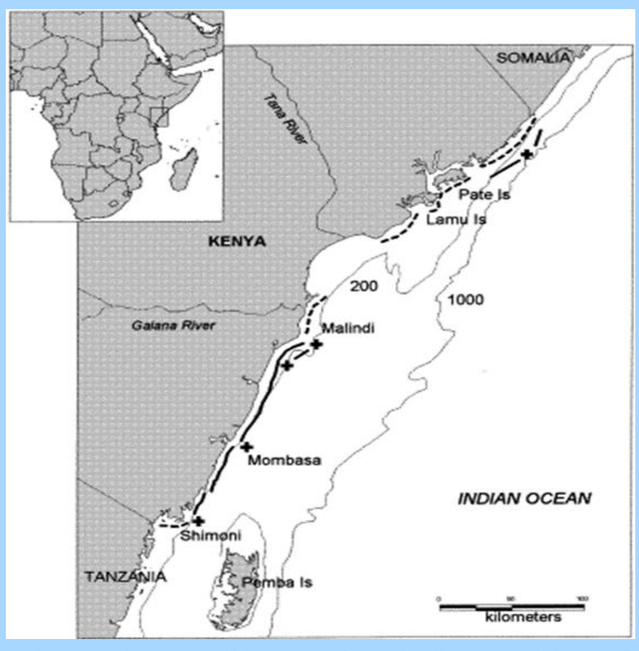
Phytoplankton produce oxygen that sustain life and provide benefits to humans and are the building blocks of food chains forming vital natural parts of aquatic ecosystems. However, excessive production of algae causes harmful algal blooms, or HABs, which can be harmful to human health, impact valuable fisheries, and degrade other marine and coastal ecosystems. Nutrients, temperature and carbon dioxide are essential conditions controlling growth and development of phytoplankton. Anthropogenic pressures from expanding human populations, particularly in coastal and developing countries, coupled with climate change have been hypothesized to affect HAB occurrences and their toxicity in the oceans. This study will be conducted to determine the influence of different human activities on the development of HABs along Kenyan Coast. Five sites (one control and four sites exposed to different anthropogenic activities namely agriculture, sewage, mari-culture and ballast water) will be monitored for their physicochemical parameters and phytoplankton species composition and concentration for a period of eighteen (18) months. Laboratory control experiments and analysis will be conducted at Kenya Marine and Fisheries Research Institute to determine how changes in nutrients quality and quantity, pH and temperature influences the tropical phytoplankton development. The main goal of this research is to promote healthier fisheries and ecosystems by minimizing the impacts of HABs on people and marine resources through provision of information required by policymakers to develop effective strategies for HABs mitigation.

Study Objectives/Hypothesis

Main aim is to test the hypothesis that environmental changes (nutrients, temperatures and pH) due to human pressures (coastal urban development, increase in agriculture, and mariculture) will enhance the development and impacts of HABs in marine environment.

Other objectives are to:

- Asses how nutrients from agriculture, sewage, mariculture and ballast water influence HABs development;
- Identify the phytoplankton toxin producing species in the Kenya's marine waters;
- Identify and quantify the level of biotoxins (Saxitoxins, Ciguatoxins and domoic acid) in seafood; and
- Investigate how the tropical phytoplankton community will respond to the interactive effects of changing nutrient conditions, CO2 concentrations and temperatures.



A map showing the study area (Kenyan Coast). Source: Obura D. O., (2001)

Expected Outcomes/Results

- Definition of nutrient conditions associated with different socio-economic activities.
- Identification and quantification of HABs species existing in the Kenya's marine waters.
- Establishment of levels of biotoxins (saxitoxins, brevetoxins and domoic acid) in Kenya's marine waters/sea food.
- Establishment of response of tropical phytoplankton to existing environmental changes (nutrients, pH and temperature).
- Recommendations to policy makers and public for HABs management and human safety.

Expected Outputs

- Information on water quality of the studied sites
- Status of HABs reports
- Recommendations for management.
- Vital scientific evidence about priority management practices to help coastal communities and the government to make effective decisions for management of HABs and related human pressures.

Methodology

- Study site – Kenyan Coast; Period -18 months- .
- In situ measurements - pH, temperature, salinity, D.O;
- Water and fish samples will be collected and analyzed for productivity (Chl a), nutrients, phytoplankton and biotoxins using spectrophotometric and ELISA analysis methods respectively.
- Laboratory microcosm experiments will be conducted to determine the effects of changing temperature, CO_2 concentrations and nutrient ratios on phytoplankton structure.

References

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