

Harmful algal bloom to make the ocean food chain less productive

Keywords: Harmful algal bloom, southeastern Arabian Sea, upwelling-relaxation Period, Marine ecosystem, NIOT

The earth is warming up rapidly due to climate change which is altering the ecosystems both on land and at sea for which we depend on our food source. In a study conducted by NIOT scientists, it was examined how climate warming could affect the marine ecosystem and fisheries due to harmful algal blooms. There are some species of algae that can have negative impacts on marine and freshwater environments.

Most of the heat that is added to the oceans due to climate warming results in warming of oceans mainly at the near surface zone. Such warmer water temperature in the summer and excessive nutrients from fertilizers or sewage waste brought by runoffs help triggering the development of certain types of harmful algae bloom (HABs) events making the ocean food chains less productive. NIOT scientists estimated that the global fish catch could be reduced by 20% by 2030 resulting in a major reduction of marine food sources for millions of people while this would also have far reaching impact in the coastal economy. They warned about a red tide of toxic algae (*Gonyaulax polygramma*) that have bloomed along the southeastern Arabian Sea resulting in large scale death of fish and invertebrate animals due to anoxia and high sulfide and ammonia levels resulting from cell decomposition. Such blooms can not only affect local and regional economies, as is happening in India but also can have far reaching impact in the global economy.

NIOT scientists tried to find out the influence of monsoonal upwelling on the phytoplankton community structure and environmental variables in the coastal waters of Kochi, southeastern Arabian Sea. As HABs have a significant impact on the socio-economic systems and human health, reducing the nutrient loads can help preventing the development of certain types of HABs. NIOT scientists emphasized the need for a continuous monitoring program for HABs which would be useful to develop strategies to control the ecosystem and economic losses caused by the undesirable blooms.

The NIOT study revealed an increased nutrient concentration of Phosphate and Nitrate during the year 2016, which most likely triggered the bloom of harmful Algae like *G. polygramma* threatening fish stocks such as sardines.



Sardine death due to harmful algal bloom

Coastal algal blooms are a natural phenomenon; but since the 1950s, their frequency, duration, and geographic scope have increased due to human-induced climate change. The HABs are often that result of land-based pollution commonly associated with excessive amounts of nitrates, phosphates and nutrients entering an aquatic ecosystem via discharges from sewage treatment plants and septic tanks and stormwater runoff from fertilized croplands or emissions from livestock or human wastewater. The runoff water during precipitation can pick up pollutants such as oils, fertilizers, pesticides, sediment, trash, bacteria, and animal waste among many others harmful substances. NIOT scientists said that *G. polygramma* has created an adverse impact on the economy of the southeastern Arabian Sea region. They suggest that long term nutrient management strategy needs to be developed, which would help to reduce harmful nutrients draining away into the natural environment to minimize economic losses caused by the HABs.

Led by P. Sathish Kumar, the research team comprised of M. Kumaraswami, P. Ezhilarasan, G. Durga Rao, R. Sivasankar, V. Ranga Rao, and K. Ramu of NIOT, Ministry of Earth Sciences, The research paper is published in the Journal of Marine Pollution Bulletin (available online from 29 January 2020). (India Science Wire)

VS/MoES/MFA/02.09.2020