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Indian Ocean heating affects micro plants and fish on the ocean surface – UCT researcher and international colleagues discover

The abundance of microscopic plants in the Indian Ocean has gone down by 20% in the last decade due to surface ocean warming having an impact on fishes, a study by the Indian Institute of Tropical Meteorology (IITM) has found. The study, published in the journal *Geophysical Research Letters*, has revealed that this decline in marine phytoplankton (microscopic plants in the ocean) might cascade through the food chain, turning the biologically productive region into an ecological desert.

Ocean primary production, the availability of organic compounds through photosynthesis by phytoplankton, is the basis of the marine food web. The Indian Ocean (especially the western region) hosts one of the largest phytoplankton blooms in summer due to the availability of nutrient-rich waters driven by the Monsoons. Large-scale distribution of tuna and other fishes are associated with the abundance of these microscopic plants.

It has been found that the decline can potentially impact the food security in the Indian Ocean rim countries and the global fisheries market in Japan, USA and several European Union (EU) countries. University of Cape Town (UCT) researcher, Marcello Vichi, together with other researchers across the globe, contributed in this study.

The ocean has absorbed the largest portion of the extra heat caused by increased atmospheric greenhouse gases. Among the tropical oceans, the warming is most prominent in the western Indian Ocean, possibly taking a huge toll on the marine ecosystem. The summer warming during the past century is up to 1.2 degrees Celsius, which is very large as compared to a global surface warming of up to 0.8 degrees Celsius during the same period.

Rising ocean surface temperature results in less dense water on the surface and dense water in the subsurface. Such a condition inhibits the vertical upwelling of nutrient-rich subsurface waters to the surface. This vertical exchange is a critical process for introducing nutrients into the upper zones, where sufficient light is available for photosynthesis. Future simulations project a further decline in marine primary productivity due to surface warming in the coming decades and the western Indian Ocean may act as an early indicator that needs to be constantly monitored.

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