

GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 187**  
TO BE ANSWERED ON 08.12.2022

**Increase in marine heatwaves**

187. DR. C.M. RAMESH:

Will the Minister of ENVIRONMENT, FOREST AND CLIMATE CHANGE be pleased to state:

- (a) whether marine heatwaves are increasing and thereby impacting Indian monsoon rainfall, the details thereof;
- (b) whether Government proposes to enhance the ocean observational arrays and update weather models, the details thereof; and
- (c) whether these heatwaves cause habitat destruction due to coral bleaching, sea grass destruction thus affecting fisheries sector adversely, the details thereof?

**ANSWER**

MINISTER OF STATE IN THE MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE  
(SHRI ASHWINI KUMAR CHOUBEY)

(a): The warmer-than-normal extreme ocean conditions are referred to as Marine Heatwaves (MHWs). Marine heatwave events have been increasing globally, including in the Indian Ocean over the last few decades. In recent decades, tropical Indian Ocean has experienced a rapid increase in ocean warming with an average rise in sea surface temperature (SST) of about 1°C over the period of 1951-2015 at a rate of 0.15°C/decade. It is also found that the warming is spatially non-uniform with the strongest warming observed in the Arabian Sea. (Climate Change Assessment Report- 2020 by the Ministry of Earth Sciences). There are times when SST warms rapidly to cross a predefined threshold and cause severe stress in local weather, ecosystem and marine-driven economy.

MHW events in the north Indian Ocean have become more frequent and longer in duration. The western Arabian Sea, coastal oceans along the west coast of India and the northern Bay of Bengal show the strongest increase in MHW events at a rate ~1.5 events/decade.

Research showed that the MHWs in the western Indian Ocean and the north Bay of Bengal led to a reduction in monsoon rainfall over the central Indian subcontinent. On the other hand, there is an enhancement in monsoon rainfall over southwest India due to the MHWs in the Bay of Bengal.

(b): As a part of Ocean Observation network (OON) component of O-SMART scheme of Ministry of Earth Sciences(MoES), the Indian Ocean observing network is optimized to acquire data for operational and research applications.

(c): Coral reefs in India are mainly confined to the Andaman and Nicobar Islands, Gulf of Mannar, Gulf of Kutchh, Palk Strait, and the Lakshadweep islands. Coral reefs are fragile and endangered ecosystems in the tropical marine and coastal environment. Thermal stress due to MHWs could cause significant negative impacts on the health conditions, i.e., bleaching of the coral ecosystem. Indian National Centre for Ocean Information Services (INCOIS) has been providing the coral bleaching Alert System (CBAS) since February 2021. This model uses the satellite-derived SST to assess the thermal stress accumulated in the coral environs of the Gulf of Kutch, the Gulf of Mannar, Andaman & Nicobar and Lakshadweep Islands.

The impact of Marine Heat Waves on the Chlorophyll-a (Chl-a) concentration in the northern Indian Ocean (NIO) during 2003-2020 was studied by Central Marine Fisheries Research Institute (CMFRI) and has shown that the temperature, duration, and intensities of the event have effects on the occurrence of Chl-a bloom, which affects the fisheries ecosystem.

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