GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

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UNSTARRED QUESTION NO. 1793
TO BE ANSWERED ON 22.12.2022

Climate change and its effects on coastal regions

1793. SMT. SULATA DEO

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

(a) whether Government has taken any steps to evaluate the effects of climate change on habitats, particularly in the country's coastal regions;
(b) if so, in what manner the projected rise in sea level and temperature impact climate, environment, flora and fauna in coastal regions;
(c) the actions taken by Government to protect the coral reefs in the ocean; and
(d) the details thereof?

ANSWER

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

(a) and (b) As per the Special Report on 'The Ocean and Cryosphere in a Changing Climate' released in September 2019 by the Intergovernmental Panel on Climate Change (IPCC), since about 1950 many marine species across various groups have undergone shifts in geographical range and seasonal activities in response to ocean warming, sea ice change and biogeochemical changes, such as oxygen loss, to their habitats. This has resulted in shifts in species composition, abundance and biomass production of ecosystems, from the equator to the poles. However, in some marine ecosystems, species are impacted by both the effects of fishing and climate change. The report also states that the coastal ecosystem is affected by ocean warming, including intensified marine heat waves, acidification, loss of oxygen, salinity intrusions and sea level rise, in combination with adverse effects from human activities on ocean and land.

The National Centre for Coastal Research, Ministry of Earth Sciences has prepared shoreline change maps using remote sensing data and GIS mapping techniques. About 6,907.18 km long the Indian coastline of the mainland has been analyzed from 1990 to 2018. It is noted that about 34% of the coastline is under varying degrees of erosion, 26% is of accreting nature and the remaining 40% is in a stable state.

A 'Hazard line' has been demarcated by the Survey of India (SOI) taking into account the extent of the flooding on the land area due to water level fluctuations, sea level rise and shoreline

changes (erosion or accretion) occurring over a period of time. The hazard line mapped by SOI has been shared with the coastal States and Union territories to be used as a tool for a disaster management plan for the coastal environment, including the planning of adaptive and mitigation measures.

Time series data on sea surface temperature and the abundance of green microscopic plants in the Exclusive Economic Zone (EEZ) of the Arabian Sea and Bay of Bengal was obtained from satellite data for the period 2003-2019. The southern area of the Arabian Sea and Bay of Bengal showed sea surface temperature above the long-term mean. The years 2015 and 2016, had the warmest sea surface temperatures in the region. Correspondingly, the production of green microscopic plants (estimated as the concentration of chlorophyll - a pigment) as revealed from chlorophyll images decreased below the long term mean and was lowest during 2015-2016. These years also corresponded to the strongest El-Niño years of the decade.

Further, Central Marine Fisheries Research Institute (CMFRI) has also been entrusted to carry out the climate change impact studies on Indian marine fisheries sector through multiple projects viz 'National network project on climate change' (2004-2007), 'National Innovations in Climate Resilient Agriculture' (NICRA) (2010-2020) funded by Indian Council of Agricultural Research (ICAR), and the Ministry of Environment, Forest and Climate Change funded project entitled 'Impacts, Vulnerabilities and Adaptation Strategies for Marine Fisheries of India' (2017-2020). The preliminary investigations reveal strong correlations of sea surface temperature change with abundance of marine plankton species, fish eggs and larvae. The studies of marine fauna reveal that variations in oceanographic parameters such as sea surface temperature, current speed, wind, and rainfall, do have influence on the food and feeding, maturity and spawning, distribution range, abundance and catch of several marine fish species.

As per information provided by the Indian Space Research Organization, a study was carried out of the period, 1982-2018 on five major coral reef regions of India based on the modelled and satellite derived Sea Surface Temperatures (SST). The study found that Indian coral reef regions have different regional, thermal and bleaching thresholds corresponding to their individual warmest months and warmest quarters. A prototype coral bleaching alert system based on these regional thresholds has also been developed and hosted at VEDAS geoportal (vedas.sac.isro.gov.in).

(c) and (d) The Government has taken steps to protect and sustain coral reefs in the country through promotional as well as regulatory measures. The promotional measures have been implemented through a Central Sector Scheme under National Coastal Mission Programme of the Ministry at four sites namely Lakshadweep, Gulf of Kutch, Gulf of Mannar and Andaman & Nicobar Islands for restoration, monitoring, conservation and management of coral reefs. Regulatory measures are implemented through Coastal Regulation Zone Notification, 2019 under the Environment (Protection) Act, 1986; the Wild Life (Protection) Act, 1972; the Biological Diversity Act, 2002; and rules under these Acts as amended from time to time.

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