

**GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
LOK SABHA  
UNSTARRED QUESTION NO. 3163  
TO BE ANSWERED ON WEDNESDAY, 19<sup>TH</sup> MARCH, 2025**

**Adverse Effects of Climate Change in Ocean Areas**

3163. SHRI PARSHOTTAMBHAI RUPALA:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the reason for Ocean Areas suffering the most due to intense adverse effects of climate events;
- (b) whether it is due to overground and underground salinity ingress apart from cyclones and if so, the details thereof; and;
- (c) the details of the Action plan and its actual progress thereof, State/UT-wise including the State of Gujarat?

**ANSWER**

THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR  
MINISTRY OF SCIENCE AND TECHNOLOGY  
AND EARTH SCIENCES  
(DR. JITENDRA SINGH)

- (a) The Indian Ocean has been warming rapidly over the last few decades. An estimate based on Enhanced Reconstructed Sea Surface Temperature (ERSSTv4) indicates that the tropical Indian Ocean is warming at a rate of 0.15 degC per decade during 1951–2015. The SST trend during 1982–2019 for the Arabian Sea indicates that annual anomalous warming of ~ 1.5 deg C in the recent decade is limited to the northern part of the Arabian Sea and ~ 0.75 deg C in some parts of the southern Arabian Sea. Owing to this rapid warming, the duration (frequency) of Marine Heat Waves (MHW) exhibits a rapidly increasing trend of ~ 20 days per decade in the northern Arabian Sea and the southeastern Arabian Sea close to the west coast of India, which is a multifold increase in MHW days (frequency) from the 1980s. Moreover, longer heatwave days are also associated with dominant climate modes. The decaying phase of El Niño is the most influential mode contributing to more than 70 %–80% of observed heatwave days in the Indian Ocean basin. Also, Ministry of Earth Sciences (MoES) in 2020 has published a report ‘Assessment of Climate Change over the Indian Region’, which contains a comprehensive assessment of the impact of climate change upon the Indian subcontinent.
- (b) Yes Sir. Apart from the effects of cyclones and other extreme weather events, overground and underground salinity ingress are significant contributors to the suffering of coastal regions and ocean areas.

In coastal areas where storm surges from frequent cyclones occur, salinity can increase rapidly, further affecting both human settlements and ecosystems. Overground salinity ingress leads to the degradation of freshwater habitats, reduced agricultural productivity and loss of critical ecosystems like wetlands and mangroves.

Also, underground salinity ingress (groundwater salinization) which has been increasing with rising sea levels, poses a significant challenge to communities relying on groundwater for drinking and irrigation. This also intensifies the long-term effects of climate change, particularly in low-lying coastal areas. Together with cyclones and other storm-related phenomena, salinity intrusion worsens the existing fragile conditions in many coastal regions.

Further, during high tides, tidal ingress occurs in upper aquifers and low-lying marshy lands inundated by sea water resulting into mixing of saline sea water with ground water in aquifers. The downward seepage in these areas increases ground water salinity.

(c) The Government of India has put in place various strategies and action plans aimed at mitigating the impacts of climate change on coastal areas focusing on adaptation, mitigation, and resilience-building. Some of the major strategies are:

- National Action Plan on Climate Change (NAPCC)
- State Action Plan on Climate Change.
- National Mission for Sustainable Habitat,
- National Mission on Sustainable Agriculture,
- National Mission for Green India.
- Renewable Energy development plans
- Water Conservation
- Integrated Coastal Zone Management (ICZM),
- Coastal Regulation Zone (CRZ) Notification
- Coastal Zone Management Plans (CZMP)

For realization of these proposed actions at the sub-national level, the state government has created its own state level action plan consistent with strategies in the National Plan. Thirty-four States /Union Territories (UTs) have already prepared and some have updated their State Action Plan on Climate Change (SAPCC) in line with NAPCC taking into account the State-specific issues relating to climate change.

The National Adaptation Fund for Climate Change (NAFCC) was established to support adaptation activities in the States and Union Territories (UTs) of India that are vulnerable to the adverse effects of climate change. Further, the National Disaster Management Authority (NDMA) has issued several disaster specific guidelines for managing extreme weather-related disasters such as cyclones, floods, landslides and heat waves.

National Disaster Management Plan (NDMP) has been formulated to assist all stakeholders including State Governments in disaster risk management of various hazards including hazards related to climate change.

Furthermore, advance and early warning systems are being implemented by Indian Meteorological Department to facilitate timely evacuation in the event of floods/cyclones and prevent the loss of lives.

Government of India has implemented Integrated Coastal Zone Management project (ICZMP) that has contributed, inter-alia, mapping of hazard line, Eco-sensitive Area, Sediment cell for the entire coastline of India.

As part of Gujarat, Gujarat Government's department of Climate Change was set up on September 2009 with a vision to act as a bridge within the Government, and between the Government and society to address Climate Change related aspects.

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