

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
STARRED QUESTION NO. *242
TO BE ANSWERED ON WEDNESDAY, 05TH AUGUST, 2026**

ASSESSMENT FOR IMPACT OF EI NINO

***242. DR T SUMATHY ALIAS THAMIZHACHI THANGAPANDIAN:**

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the current projections and assessments made by the Indian National Centre for Ocean Information Services (INCOIS) regarding the impact of El Niño and cyclical climate phenomena on Indian monsoon patterns and marine ecosystems;
- (b) the steps taken/being taken by the Government to upgrade Ocean State Forecasting, early warning systems for storm surges and high-wave alerts for coastal communities;
- (c) the specific budgetary allocation and technological deployment under the Deep Ocean Mission for mapping marine resources during the current financial year; and
- (d) the details of specific advisories, Ocean State Forecasting models and collaborative coastal resilience projects implemented by INCOIS specifically tailored for the coastal districts and fishing communities of Tamil Nadu?

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

(a) to (d): A Statement is laid on the Table of the House.

**STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY (a) to (d) TO
STARRED QUESTION NO. *242 REGARDING “ASSESSMENT FOR IMPACT OF EI
NINO” TO BE ANSWERED ON WEDNESDAY, 05TH AUGUST 2026**

- (a) The Indian National Centre for Ocean Information Services (INCOIS), under the Ministry of Earth Sciences (MoES), has developed an indigenous Artificial Intelligence/ Machine Learning (AI/ML) based El Niño Southern Oscillation (ENSO) prediction system that provides probabilistic forecasts along with uncertainty estimates. Based on the latest ocean observations, the INCOIS Global Ocean Data Assimilation System (INCOIS-GODAS), and the indigenous AI/ML-based prediction system, El Niño conditions developed during May 2026. The latest ENSO Outlook indicates that El Niño is likely to persist from June 2026 to February 2027, with forecast probabilities ranging from 70–90%.

Current assessments indicate that the evolving El Niño may influence atmospheric circulation and ocean conditions over the Arabian Sea and Bay of Bengal. Historically, El Niño has been associated with weaker Indian Summer Monsoon rainfall over parts of the country, although the monsoon is also influenced by other climate drivers such as the Indian Ocean Dipole (IOD), Madden–Julian Oscillation (MJO), and regional ocean-atmosphere interactions. In the marine environment, the developing El Niño may increase the likelihood of marine heatwaves, driven by persistent warming in the Arabian Sea and the Bay of Bengal, potentially causing thermal stress on coral reef ecosystems. It may also alter ocean mixing, nutrient availability, and biological productivity, affecting fish distribution and its availability. In addition, changes in wave and swell conditions may influence navigation, offshore operations, and coastal activities.

- (b) To strengthen Ocean State Forecasting and marine multi-hazard early warning services, INCOIS has continually upgraded its high-resolution forecasting models for storm surge, high waves, swell surge, and high currents. INCOIS has expanded and modernized ocean observation networks, including ocean gliders, moored buoys, tide gauges, Argo floats, and satellite observations, while integrating data assimilation, and advanced decision-support tools to improve forecast accuracy and enable impact-based forecasting. It has also strengthened its 24×7 operational monitoring, enhanced multi-platform dissemination of advisories, and undertaken capacity-building initiatives through stakeholder training, mock exercises, and awareness programs to improve coastal preparedness and resilience.
- (c) The specific budgetary allocation under the Deep Ocean Mission (DOM) for mapping marine resources during the current financial year is Rs 145.06 Cr. The technological deployment for marine living resources includes completing biodiversity surveys of 32 seamounts in the Indian Exclusive Economic Zone (EEZ), along with inventory and archival of specimens, with planned surveys of 10 additional seamounts in the current financial year. For marine non-living resources mapping, high-resolution geophysical surveys using Autonomous Underwater Vehicles (AUV) have led to the identification of four active hydrothermal vents and two sulphide mineral sites in the Central Indian Ocean region, and during the current financial year, Remotely Operated Vehicle (ROV) surveys are planned for collecting mineral/ rock, sediment, and biological samples from hydrothermal vents and mineral-rich zones.

- (d) The Indian National Centre for Ocean Information Services (INCOIS) provides Ocean State Forecast (OSF) services for the Tamil Nadu coast, including forecasts of waves, winds, swells, currents, sea surface temperature and other ocean parameters at 3-hour intervals for up to 10 days using advanced numerical ocean models supported by real-time ocean observations. Based on these forecasts, INCOIS issues high-wave, swell, surge, and high-current advisories to the Government of Tamil Nadu, including the Tamil Nadu State Disaster Management Authority (TNSDMA), for disaster preparedness and marine safety. INCOIS has established six tide gauge stations at Ennore, Chennai, Nagapattinam, Thoothukudi, Rameswaram & Kanyakumari, and Coastal Wave Rider Buoys off Thoothukudi and Kanyakumari to support ocean observations, tsunami early warning and Ocean State Forecast services. INCOIS also collaborates with the Government of Tamil Nadu through awareness programmes, technical training, tsunami mock exercises, coordination meetings and implementation of the United Nations Educational, Scientific and Cultural Organization – Intergovernmental Oceanographic Commission (UNESCO-IOC) Tsunami Ready Recognition Programme to support coastal resilience and community preparedness, particularly for coastal districts and fishing communities.
