

GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UN-STARRED QUESTION No. 498
ANSWERED ON 21/07/2022

COASTAL VULNERABILITY RESEARCH

498. Shri Ayodhya Rami Reddy Alla:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the details of the progress made in coastal research related to shoreline erosion and coastal vulnerability;
- (b) whether the country has acquired advanced technology for Ocean State Forecast and weather prediction, if so, the details thereof, and if not, the reasons therefor; and
- (c) the details of Ocean State Forecast and weather prediction tools in operation for coastal State of Andhra Pradesh and the accuracy of such tools?

ANSWER

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

- (a) The National Centre for Coastal Research (NCCR), an attached office of the Ministry of Earth Sciences (MoES) is monitoring shoreline erosion since 1990, using remote sensing data and GIS mapping techniques. Totally, 6907.18 km long coastline of the mainland has been analyzed for the period from 1990 to 2018. It is observed that (33.6%) of the coastline is under varying degrees of erosion for the past 28 years. The state-wise details of erosion (1990-2018) are given in the below table.

1990 – 2018					
Sl No	State		Coast Length (in km)	Coast length (in Km)	
				Erosion	
				Km	%
1	West Coast	Gujarat	1945.6	537.5	27.6
2		Daman & Diu	31.83	11.02	34.6
3		Maharashtra	739.57	188.26	25.5
4		Goa	139.64	26.82	19.2
5		Karnataka	313.02	74.34	23.7
6		Kerala	592.96	275.33	46.4
7	East Coast	Tamil Nadu	991.47	422.94	42.7
8		Puducherry	41.66	23.42	56.2
9		Andhra Pradesh	1027.58	294.89	28.7
10		Odisha	549.5	140.72	25.6
11		West Bengal	534.35	323.07	60.5
Total			6907.18	2318.31	
			%	33.6	

Under the shoreline mapping system, 526 maps were prepared for the entire Indian mainland coast for identifying vulnerable areas to coastal erosion in 1:25000 scale, along with 69 district maps, and 9 State and 2 UT maps. A report on "National Assessment of Shoreline Changes along Indian Coast" was released in July 2018 and the report was shared with various Central and State Government agencies and stakeholders for implementing shoreline protection measures. An updated version of Atlas, along with a digital version of the report, containing all the maps, was released on 25th March 2022. In addition, Indian National Centre for Ocean Information Services (INCOIS), MoES has prepared the Coastal Vulnerability Index (CVI) maps for the entire coastline of India at a 1:100000 scale by using 7 parameters. Further studies have been done on Multi-Hazard Vulnerability Mapping to identify potential areas of coastal inundation for the mainland of India at a 1:25000 scale using data on extreme water levels, coastal erosion, sea-level change and high-resolution topography.

- (b) Yes, Sir. INCOIS has established state-of-the-art technology to generate and disseminate the Ocean state forecast (OSF). The backbone of this system are robust in-situ and satellite observation systems, state of the art numerical models, modern computational facilities and importantly, the adoption of the latest Information and Communication Technology (ICT) tools to receive data from ocean observatories and effective dissemination of advisories to various stakeholders. The numerical models include atmospheric models, wave models, Ocean General Circulation Models (OGCM), and tidal models. The most recent data assimilation schemes are also incorporated into these operational models for providing accurate forecasts. The parameters routinely predicted are wave parameters, tides, surface and subsurface thermohaline features. All these parameters are being predicted 5-7 days in advance, and 3-6 hourly time intervals. The early warning services for the ocean parameters include high wave warnings, swell wave warnings, swell surge warnings, rough sea alerts and perigeon spring tide alerts. INCOIS issues Joint Bulletin with IMD during the depressions/cyclones.

User-customised, tailor-made products have been generated and supplied to the fishermen, defense authorities, maritime boards, port authorities, and offshore industries. The latest in these is a satellite-based dissemination service for fishing vessels through NAVIC (Navigation with Indian Constellation) and GEMINI (Gagan Enabled Mariner's Instrument for Navigation and Information) systems. India is also supporting six neighboring countries (Sri Lanka, Maldives, Seychelles, Mosambique, Medagaskar and Comoros) with daily Ocean State Forecast services.

- (c) INCOIS issues Joint Bulletin with IMD during the depressions/cyclones. All these ocean state forecast and warning advisories by using the modern scientific and ICT tools are disseminated to Andhra Pradesh coast routinely.

INCOIS has deployed two Wave Rider Buoys and four tide gages along the coast of Andrapradesh for routine monitoring and assimilating the data in ocean forecast models . The latest information and Communication Tools such as multi lingual website, SMS in local languages, FAX, Email, and social media are used to disseminate ocean forecasts to the user community for their operational use and safety.

The accuracy for five day forecast is 85-90% and the detailed results were published in peer-reviewed research papers.
