GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UN-STARRED QUESTION No. 500
ANSWERED ON 21/07/2022

STEPS TO MAKE AREAS ALONG COAST CYCLONE PROOF

500.   SHRI K.R.N. RAJESHKUMAR:

Will the Minister of EARTH SCIENCES be pleased to state:

(a)   the details of steps taken by Government to make areas along coast cyclone proof in light of the current increase in frequency of cyclones in the Arabian Sea;
(b)   the funds earmarked and utilized for the purpose along with the outcome thereof;
(c)   the steps being taken to improve the system of cyclone forecasting;
(d)   whether Government proposes to distribute emergency kits to people living in most vulnerable areas prone to cyclones; and
(e)   if so, the details thereof, and if not, the reasons therefor?

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

(a)   The Institutional Mechanism was established by Government of India through Disaster Management Act, 2005 to mitigate disasters including Cyclones in the country.

NDMA is implementing National Cyclone Risk Mitigation Project (NCRMP) across eight coastal States with four Main Components; i) Early Warning Dissemination System; ii) Cyclone Risk Mitigation Infrastructure; iii) Technical Assistance for Capacity and iv) Project Management and Monitoring, in two phases i.e. (Phase-I: Andhra Pradesh &Odisha); (Phase-II: Goa, Gujarat, Karnataka, Kerala, Maharashtra & West Bengal). Works on Phase-I has been completed in December 2018 & scheduled date of completion of Phase-II is September 2022.

Preparedness & Capacity Building Measures:-

1. NDMA conducts pre-Monsoon meetings, briefing/ debriefing sessions and issues instructions/advisories to all stakeholders regarding preparatory measures to be taken in the wake of Monsoon season, Tropical Cyclones, other impending disasters.

2. NDMA has been actively facilitating the conduct of State and Multi State Level Mock Exercises on various hazards like Cyclones, Floods, Landslides, Earthquakes and Chemical (Industrial) disasters etc. in consultation with States and UTs as per their vulnerability profile. These Mock Exercises consists of an Orientation & Coordination Conference, Table Top Exercise and Physical Mock Exercises during which first responders, various stakeholders and resources including Early Warning Agencies, CAPFs, NDRF and Armed Forces are mobilized across the State / UTs.

3. Integrated Mock Exercises provide an optimal, cost-effective means for generating awareness about the Incident Response System-Incident Response Team construct, and for building capacity of States / Union Territories (UTs) to respond effectively to any disaster situation.
4. Also, Post exercise feedback of these Mock Exercise / Online Table Top Exercises is shared with concerned State Govt / UT Administration highlighting the best practices and gaps identified.
5. NDMA runs campaigns on various disasters including on Cyclone for awareness generation, from time to time, through TV and Radio, including social media to inform, educate and making the public aware about disasters. These campaigns aim at saving lives and livelihood to the maximum extent.

(b) The Government of India has initiated the National Cyclone Risk Mitigation Project (NCRMP) with a view to address cyclone risks in the country. The overall objective of the Project is to undertake suitable structural and non-structural measures to mitigate the effects of cyclones in the coastal states and UTs of India. The National Disaster Management Authority (NDMA) under the aegis of Ministry of Home Affairs (MHA) is the implementation agency of the Project in coordination with participating State Governments and the National Institute for Disaster Management (NIDM). The Project has identified 13 cyclone prone States and Union Territories (UTs), with varying levels of vulnerability.

NCRMP Phase-I which started during 2011 and later expanded with more investment in 2015 with costing of Rs. 2541.60 crore [GoI share Rs. 1985.69 Cr and State share Rs. 555.91 Cr] and covering Andhra Pradesh and Odisha has been completed in December 2018.

Phase-I outcome:

1. Early Warning Dissemination System: All Coastal districts of AP &Odisha.
2. Multipurpose Cyclone Shelters: 535 Nos.
3. Connecting Roads: 1086.52 Km.
4. Connecting Bridges: 34 Nos.
5. Saline Embankment: 88.12 Km.

NCRMP-II is being implemented in 6 Coastal States (Goa, Gujarat, Karnataka, Kerala, Maharashtra and West Bengal) with an overall budget/outlay of Rs. 2059.83 Cr (GoIshare Rs.1629.07Cr, State Share Rs. 430.76 Cr), since July 2015. The scheduled completion date is September 2022.

Phase-II Status of Outcome:

1. Early Warning Dissemination System: All Coastal districts of Goa, Karnataka & Kerala (In Progress).
2. Multipurpose Cyclone Shelters: Planned 261/Completed 248 Nos.
3. Connecting Roads: Planned 205/ Completed 205 Km.
4. Connecting Bridges: 02Nos (In Progress).
5. Saline Embankment: Planned 30.06 / Completed 24.47 km.
6. Underground Cabling: Planned 1286/Completed 1156.05 Km.

The details of funds spent on awareness generation campaigns on Cyclone, during the last three years and the current year, so far, are as under :

Year	Amount Spent (in lakh)
2019-20	Rs.32.44
2020-21	Rs.41.23
2021-22	Rs.166.30
2022-23 (till June 2022)	Rs.8.65

(c)   India Meteorological Department (IMD) under this Ministry is responsible for providing early warnings for cyclonic disturbances developing over the north Indian Ocean and crossing Indian coasts. IMD has developed well defined mechanisms/technology for early warning on cyclones so as to enable disaster managers to minimise loss of life to double digit during last 10 years and minimize damage to property. During recent years, IMD has consistently and accurately predicted cyclones like Phailin (2013), HudHud (2014), Vardha (2016), Mekunu (2018), Sagar (2018), Titli (2018), Luban (2018), Fani (2019), Hikaa (2019), Bulbul (2019), Amphan, Nisarga&Nivaar (2020), Tauktae, YAAS, Gulab&Shaheen (2021) thereby helping disaster managers to minimise loss of lives to less than 100 due to tropical cyclones in recent years.

IMD has undertaken holistic development of various components of early warning services including observations, numerical modeling, decision support system, effective warning products generation and presentation, effective warning dissemination tools & techniques, research & development, effective co-ordination mechanism between IMD and disaster management agencies, media & general public.

IMD regularly expands its infrastructure for meteorological observations, data exchange, monitoring & analysis, forecasting and warning services using latest technology. IMD uses a suite of quality observations from satellites, RADARs and conventional & automatic weather stations for monitoring of cyclones developing over North Indian Ocean. It includes INSAT 3D, 3DR and SCATSAT satellites, Doppler Weather Radars (DWRs) and High Wind Speed Recorders along the coast and coastal automated weather stations (AWS), automatic rain gauges (ARGs), meteorological buoys and ships.

IMD has one of the best forecasting systems for predicting tropical cyclones using high resolution advanced mathematical models including global, regional and cyclone specific models and a suite of quality observations from Satellites and Radars. Ministry of Earth Sciences (MoES) has also introduced global ensemble forecasting system (GEFS) and NCMRWF ensemble prediction system (NEPS) for forecasting of cyclones. IMD utilizes an array of various models including global, regional and cyclone specific models for forecasting genesis, track, intensity, landfall and associated adverse weather like heavy rainfall, gale wind, storm surge and coastal inundation.

IMD also has a very effective Decision Support System for analysing various observations at a single platform and predicting track and intensity of cyclones as well as the adverse weather like heavy rain and wind.

IMD utilizes all means of transmission (conventional and modern) to disseminate warnings and advisories. IMD has dedicated website for tropical cyclones. IMD has also developed API's (Application Programming Interface) that allows seamless flow of data between two agencies), crowd sourcing interface to get realtime observations from general public for validation of forecast, transmission of advisories through SMS, whatsapp, facebook, tweeter, common alerting protocol etc.

In terms of services, IMD is the national level agency to provide cyclone warning services to disaster managers, media and general public. The Cyclone Warning Division (CWD) at IMD, New Delhi also acts as a Regional Specialised Meteorological Centre for monitoring, predicting and issuing warning services on tropical cyclones developing over north Indian Ocean and provides forecast & advisories to 13 countries surrounding Bay of Bengal & Arabian Sea. It also carries out research on track, intensity, landfall and adverse weather associated with cyclones like heavy rainfall, gale wind and storm surge monitoring and prediction. IMD has three Area Cyclone Warning Centres at Chennai, Kolkata & Mumbai and four Cyclone Warning Centres at Ahmedabad, Bhubaneswar, Thiruvananthapuram and Visakhapatnam for carrying out operational warning activities at state level and to carry out related research & development activities. There is a Cyclone Warning Research Centre at IMD Chennai to carry out the research on tropical cyclones.

IMD is providing cyclone forecasting products in Web-GIS platform. Dynamic impact based forecast of cyclone will be provided with the commissioning of Web-DCRA being developed by NDMA in collaboration of State Governments, IMD & Indian National Centre for Ocean Information Services (INCOIS).

Cyclone forecasting skill of IMD is at par or better than other leading centres of the world for the cyclones forming over the north Indian Ocean.

There has been an improvement of 25% to 30% in track forecast errors for 24 to 72 hours lead period during 2017-21 with respect to that of 2012-2016. The lead period of cyclone warnings has been increased upto 5 days. As a result, the vulnerable population gets evacuated from the damage prone areas in a timely manner to safe shelters thereby reducing the human death toll to a bare minimum, in the recent years. It is noteworthy that death due to any cyclone crossing Indian coast has been reduced to less than 100 in recent 10 years.

IMD maintains round the clock watch over the north Indian Ocean and provides information about the convective activity over the region and probability of cyclogenesis (formation of depression with wind speed of 17-27 Knots (31.5-50.0 kmph) for next 120 hours with probability as NIL (0%), LOW (1-33%), MODERATE (34-67%) and HIGH (68-100%). On formation of cyclonic disturbance (wind speed 31.5 kmph and above), structured bulletins are issued as per Standard Operating Procedure containing information about the current status of system (including location, movement, intensity) and forecast track, intensity, landfall point, associated adverse weather (heavy rainfall, gale wind, storm surge), state of Sea, fishermen warning, damage expected and action suggested. In addition IMD also provides advisories for sea area, coastal area, port warnings, fishermen warnings through its regional offices. IMD also provide sector specific services for marine community including fishermen, power sector, offshore operations etc.

(d) - (e) NDMA is implementing *Up-scaling of AapdaMitra Scheme* to order to train 1,00,000 community volunteers in 350 districts of India highly prone to floods, earthquakes, landslides, & cyclones. The volunteers will be provided with the basic skills so that they can respond to their community's immediate needs in the aftermath of a disaster and to undertake basic relief and rescue tasks. Each volunteer will be provided an Emergency Responder Kit for use during response to such disasters. Each district will also be provided an Emergency Essential Resource Reserve. The Scheme covers all States/UTs including coastal States/UTs prone to cyclones. List of districts covered in the Scheme is attached.

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