GOVERNMENT OF INDIA
EARTH SCIENCES
LOK SABHA

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FORECASTING OF NATURAL CALAMITIES
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Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Indian sub-continent is among the most disaster prone areas in the world and if so, the details thereof and the reasons therefor;

(b) whether the Department of Meteorology has been able to forecast natural calamities accurately and if so, the details thereof;

(c) whether adequate technology is available in the country to forecast natural calamities such as earthquake, cyclone, drought and floods etc. and if so, the details thereof and if not, the reasons therefor along with the action taken/proposed to be taken by the Government in this regard;

(d) whether the Government has drawn any action plan to ensure safety of life and property in the event of natural calamities and also to install early warning systems in all the States; and

(e) if so, the details thereof and the time by which such mechanism is likely to be put in place?

Answer

MINISTER FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES (DR. HARSH VARDHAN)

(a-b) Yes, Madam. India is vulnerable, in varying degrees, to a large number of hazards. More than 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares

(12%) of its land is prone to floods and river erosion; close to 5,700 km, India's 7,516 km, long coastline is prone to cyclones and tsunamis; 68% of its cultivable area is vulnerable to droughts; and, its hilly areas are at risk from landslides and avalanches. Moreover, India is also vulnerable to chemical, biological, radiological and nuclear (CBRN) emergencies and other man-made hazards. Disaster risks in India are further compounded by increasing vulnerabilities associated with changing demographics and socio-economic conditions, unregulated urbanization, development within high-risk zones, environmental degradation, climate change, other developmental constrains, epidemics and pandemics.

Earth System Science Organization-India Meteorological Department (ESSO-IMD) is responsible for monitoring, detection and forecasting of Cyclones. ESSO- Indian National Centre for Ocean Information Services (ESSO-INCOIS),Hyderabad is responsible for monitoring, detection and forecasting of Tsunami due to sea-bed earthquakes and storm surges associated with cyclone landfall. ESSO- National centre of Seismology (ESSO-NCS) is responsible for monitoring, detection of Earthquakes along with operational research in pure and applied seismology and earthquake precursory phenomena, earthquake processes and modelling.

ESSO-IMD is also responsible for monitoring, detection and forecasting of other severe weather phenomena like norwesters (severe thunder storms), dust storms, heavy rains and snow, cold and heat waves, etc., which cause destruction of life and property. ESSO-IMD also operates Flood Meteorological Offices (FMOs) at ten locations, viz. Agra, Ahmedabad, Asansol, Bhubaneshwar, Guwahati, Hyderabad, Jalpaiguri, Lucknow, New Delhi and Patna. FMOs provide valuable meteorological support to the Central Water Commission (CWC) for issuing flood warnings in respect of the 43 rivers of India: i)Agra - Lower Yamuna and Betwa ; ii)Ahmedabad - Narmada, Tapi, Mahi, Sabarmati, Banas and Deman Ganga; iii)Asansol - Ajay, Mayurakshi and Kangsabati; iv)Bhubaneshwar- Mahanadi, Brahmani, Baiterini, Bruhaba-lang, Subernarekha, Rushkulya and Vansdhara; v)Guwahati - Brahmaputra and Barak; vi)Hyderabad - Godawari and Krishna; vii)Jalpaiguri − Teesta; viii)Lucknow - Ganga, Ramganga, Gomti, Sai, Rapti Ghagra and Samda; ix)New Delhi - Upper Yamuna, Lower Yamuna, Sahibi; x)Patna - Kosi, Mahananda, Baghmati, Kamla, Gandak, Buri Gandak, North Koel, Kanhar, PunPun and Upper Sone. The floods in plains are forecasted about 6 hours to 30 hours in advance by CWC.

(c) Yes, Madam, except for earthquake for which no warning system exists. ESSO-IMD operates 24X7 monitoring of satellite based weather monitoring over the potential cyclogenic zones of the Bay of Bengal and the Arabian Sea for detecting the cyclogenesis. Commissioning of the high performance computing (HPC) system has provided opportunity to assimilate satellite radiance, Doppler Weather Radar (DWR), OCEANSAT (scatterometer, total precipitable water content) data, etc. of global oceans in to the global (22km grid scale)/meso-scale(9Km grid scale) forecast systems.

Data generated from all observing systems viz. surface and upper air observations, satellite observations, aircraft observations,

DWRs etc. are fully used by various forecast models to generate most representative initial state 3-D structure of the atmosphere and high resolution (9km grid scale) forecasts over India to predict heavy rainfall occurrences. Further, DWR network is primarily employed to improve the severe weather surveillance capability and for operating now-casting (very short range up to 6h in advance) service (operated for about 147 locations across India).

As and when the cyclone systems move in to the 500 km surveillance range of DWRs, identification of strong wind zones and pockets of heavy rainfall within the core cyclone area is carried out and their rapid changes are monitored on continuous basis. ESSO-IMD currently operates 5- Doppler Weather Radars (DWR) at Chennai, Machilipatnam, Visakhapatnam, Kolkata, Sriharikota on the east coast, 675 Automatic Weather Stations (AWS) and 1210 Automatic Rain Gauges (ARG) have been commissioned covering all districts of India. With the commissioning of the state-of-the-art observing, monitoring/ early warning and data visualization/information processing and communication technologies, several manual operations have been fully automated.

(d-e) National Disaster Management Authority (NDMA) has formulated various hazard specific guidelines for protection of life and property during natural as well as manmade disasters. Loss of life and damage to property due to various hazards could be considerably reduced through proper planning and implementation of pre and post-disaster preparedness and management strategies by respective State and Central Government agencies in a coordinated manner. NDMA regularly conducts Mock Drills on various disasters taking all stakeholders on board for capacity building and preparedness. Annual Mock Exercise Plan is drawn in advance and Mock Exercises are conducted in State/ UTs in coordination with concerned State Disaster Management Authorities.

Further, as part of pre-disaster preparedness measure, Government of India has also completed seismic microzonation studies of some of the major cities in the country such as, Jabalpur, Guwahati, Bangalore, greater Bharuch in Gujarat, Jammu in J & K, Shillong in Meghalaya, Chennai in Tamilnadu and Sikkim state. These studies demarcate the zones of least to most damage prone areas within the urban clusters so as to help the respective town and country planning agencies to formulate perspective planning within the overall earthquake impact minimization efforts. The Government has implemented various programmes to educate and raise awareness amongst school children and general public on various aspects of hazards, their impacts and measures to mitigate losses.