GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **320**
TO BE ANSWERED ON 10th NOVEMBER, 2010

PREDICTION OF MONSOON

320. SHRI KALIKESH N. SINGH DEO:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the current technology in place for the prediction of monsoons;
(b) the relative success of this technology in accurately predicting rainfall patterns;
(c) whether the Government plans on introducing a dynamic model for the prediction of monsoon patterns through the Monsoon Mission; and
(d) if so, the success achieved so far by using this model?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES, MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

(a) The current seasonal monsoon rainfall forecasting system uses advanced statistical techniques for providing forecasts for monthly and seasonal rainfall over the country as a whole and over four geographical regions (Northwest India, Central India, Northeast India and South Peninsula) with respect to its long period average (LPA).

(b) The performance evaluation of these models suggests limitations in capturing the extreme variability (excess/deficit) of the seasonal quantum of rainfall.

(c) Yes, Madam.

(d) The performance of an adopted coupled ocean-atmospheric model of the National Oceanic and Atmospheric Administration (NOAA), USA is being critically examined for the monsoon-2010 in terms of reasonably capturing locations of excess and deficient rainfall on monthly and seasonal scales at Indian Institute of Tropical Meteorological (IITM), Pune. Based on the above, it is planned to develop a suitable dynamical model for improving the prediction of the monsoon.

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GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **350**
TO BE ANSWERED ON 10th NOVEMBER, 2010

EXCESS RAINFALL

350. SHRI HARSH VARDHAN:
SHRI M. K. RAGHAVAN:
SHRI RAJIV RANJAN SINGH *ALIAS* LALAN SINGH:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the actual rainfall recorded between June and September, 2010 in each State/UT;
(b) the details of intensity of rainfall recorded in different States, during the above period;
(c) whether the Government has identified the areas which had variance in rainfall;
(d) if so, the details thereof, State-wise and the reasons for such variation; and
(e) the steps taken/proposed to be taken for effective use of this rainfall for productive purposes?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES, MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

(a)-(d) Details of the rainfall recorded in each of the State/UT and its variance from normal along with the state-wise rainfall intensity are given in Annexure – I.

(e) Continuous efforts are made by the Government of India and States to utilize the rainfall received to create a large pool of live storage through construction of major/medium irrigation structures to enhance the irrigation potential. As a result of this, the total live storage capacity of the dams completed in the country has gone up to 225 Billion Cubic Meters (BCM). Besides, dams under construction will create an additional live storage capacity of 64 BCM. Dams for creating of around 108 BCM additional live storage capacity are under consideration/formulation. In addition, minor storage projects, flood flow diversion structures, minor irrigation schemes utilizing surface water and ground water also cater to meet water requirement of the country.

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Annexure – I

STATE-WISE RAINFALL DISTRIBUTION

S. No.	STATES	PERIOD: 01.06.2010 TO 30.09.2010				Average Intensity mm / Day
		ACTUAL	NORMAL	% DEP.	CAT.	
1	A & N ISLAND(UT)	1769.5	1693.1	5%	N	14.5
2.	ARUNACHAL PRADESH	1589.3	1709.5	-7%	N	13
3.	ASSAM	1378.1	1461.2	-6%	N	11.3
4.	MEGHALAYA	2293.0	3573.7	-36%	D	18.8
5.	NAGALAND	1347.2	1427.6	-6%	N	11
6.	MANIPUR	791.0	1707.3	-54%	D	6.5
7.	MIZORAM	1565.5	1580.4	-1%	N	12.8
8.	TRIPURA	1177.4	1449.3	-19%	N	9.7
9.	SIKKIM	1997.2	1901.4	5%	N	16.4
10.	WEST BENGAL	1147.4	1336.0	-14%	N	9.4
11.	ORISSA	992.7	1169.3	-15%	N	8.1
12.	JHARKHAND	644.0	1084.4	-41%	D	5.3
13.	BIHAR	794.0	1024.3	-22%	D	6.5
14.	UTTAR PRADESH	729.6	854.5	-15%	N	6
15.	UTTARAKHAND	1690.3	1208.1	40%	E	13.9
16.	HARYANA	557.4	460.2	21%	E	4.6
17.	CHANDIGARH(UT)	1121.8	846.6	33%	E	9.2
18.	DELHI	821.1	667.1	23%	E	6.7
19.	PUNJAB	459.0	495.7	-7%	N	3.8
20.	HIMACHAL PRADESH	882.6	773.9	14%	N	7.2
21.	JAMMU & KASHMIR	673.9	524.2	29%	E	5.5
22.	RAJASTHAN	539.5	421.2	28%	E	4.4
23.	MADHYA PRADESH	825.7	984.0	-16%	N	6.8
24.	GUJARAT	1003.9	677.7	48%	E	8.2
25.	DNH & DAMAN(UTs)	2496.0	2306.9	8%	N	20.5
26.	DIU(UT)	1183.1	574.2	106%	E	9.7
27.	GOA	3484.3	2742.9	27%	E	28.6
28.	MAHARASHTRA	1229.2	999.0	23%	E	10.1
29.	CHHATISGARH	1034.6	1203.2	-14%	N	8.5
30.	ANDHRA PRADESH	832.7	607.8	37%	E	6.8
31.	TAMILNADU	402.9	313.6	28%	E	3.3
32.	PONDICHERRY(UT)	651.4	337.3	93%	E	5.3
33.	KARNATAKA	934.4	840.9	11%	N	7.7
34.	KERALA	1933.3	2139.7	-10%	N	15.8
35.	LAKSHADWEEP(UT)	1152.6	985.2	17%	N	9.4
COUNTRY AS A WHOLE		912.8	893.2	2%		

GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **354**
TO BE ANSWERED ON 10th NOVEMBER, 2010

PREDICTION OF EARTHQUAKE

354. SHRI P. KUMAR:
SHRI JAYWANTRAO AWALE:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government proposes to set up a National Centre for Seismological Research for predicting earthquake in the country;
(b) if so, the details thereof and the location thereof;
(c) the salient features of this research centre alongwith funds earmarked for this purpose; and
(d) the benefits likely to accrue after setting up this research Centre?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES, MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

(a) Yes, Madam.

(b), (c) & (d) Proposal to set up National Centre for Seismology is under consideration of the Government.

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GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **380**
TO BE ANSWERED ON 10th NOVEMBER, 2010

SUBMERGENCE OF INDIRA POINT

380. SHRI ANTO ANTONY:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government has conducted a survey to actually establish the extent of submergence of Indira Point during the Tsunami-2004; and
(b) if so, the details thereof and the steps taken by the Government to reconstruct the Indira Point in Andaman and Nicobar Islands?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES, MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

(a) Yes, Madam.

(b) The Department of Space (DOS) has carried out studies using satellite remote sensing data of 26th Dec, 2004 as well as aerial photography of 6th Jan, 2005 after the Tsunami. The study indicates that Campbell Bay was affected and Indira Point was submerged under water. Beach erosion and vegetation damage was seen along the coast. An area of around 150ha was affected /submerged.

Multi-hazard approach accounting for holistic vulnerability due to Earth Quake, Cyclone, Flood, Storm surge and Tsunami etc. is considered by the Government in developing the design criteria for reconstruction of houses, buildings and infrastructures in the Tsunami affected areas of the Andaman & Nicobar Islands. Projects for the re-construction of about 10,000 houses, roads, infrastructure, ports & jetties, communication etc. have been successfully implemented.

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GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **387**
TO BE ANSWERED ON 10th NOVEMBER, 2010

DESALINATION OF SEAWATER

387. SHRI VARUN GANDHI:
SHRI G. M. SIDDESHWARA:

Will the Ministry of Earth Sciences to be pleased to state:

(a) whether the sea water can be converted into potable water through scientific process;
(b) if so, the cost of the process of one liter sea water;
(c) the location alongwith capacity of plants operating at present in the country;
(d) the funds allocated during the current Five Year Plan; and
(e) the steps taken by the Government to involve private sector to further boost the production of potable water from the sea water?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES,
MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND
MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

a) Yes Madam. The Ministry of Earth Sciences (MoES) has developed Low Temperature Thermal Desalination (LTTD) technology for conversion of seawater into potable water, which is more suitable for installation in the island territories and Thermal Power Plants, located near the coast.

b) The cost per liter of desalinated water would depend on the technology used and cost of electricity which varies from place to place. According to the cost estimates made recently by an independent agency for LTTD technology, the operational costs of desalinated water currently works to be 19 paise per litre.

c) At present, two plants are operational one each at Kavaratti, Lakshadweep and at Northern Chennai Thermal Power Station (NCTPS), Chennai, which have capacity of 1 and 1.5 lakh litre per day respectively.

d) Rs. 210 crores have been allocated in the current Five Year Plan to Ministry of Earth Sciences for conducting research, demonstration and installation of LTTD plants.

e) LTTD technology is at a development stage and is not yet commercially proven. However, National Institute of Ocean Technology has invited expression of interest to explore possibilities of public-private partnership.

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GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **398**
TO BE ANSWERED ON 10th NOVEMBER, 2010

REAL TIME SEISMIC MONITORING NETWORK

398. SHRI HARISHCHANDRA CHAVAN:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether Indian Meteorological Department proposes to set up Real Time Seismic Monitoring Network in the country;
(b) if so, the details thereof, location-wise alongwith the salient features of the said system;
(c) the details of the estimated expenditure to be incurred in setting up of such network; and
(d) the time by which such stations will start functioning in the country?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES, MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

(a) Yes Madam, The Real Time Seismic Monitoring Network (RTSMN) has already been made fully functional.

(b) The RTSMN system consists of 17 broadband seismic field stations located at Dharmasala, Shimla, Dehradun, Bhuj, Bhopal, Bokaro, Shillong, Pune, Hyderabad, Vishakhapatnam, Goa, Chennai, Minicoy, Thiruvananthapuram, Diglipur, Port Blair and Campbell Bay. The data from the field stations is transmitted in real time through VSAT based communication systems to the two Central Receiving Stations (CRS) located at India Meteorological Department (IMD), New Delhi and Indian National Centre for Ocean Information Services (INCOIS), Hyderabad for rapid estimation of earthquake source parameters.

The RTSMN system is capable of providing information on earthquakes (Origin time, Latitude, Longitude, depth and magnitude of earthquake), in shortest possible time (less than 15 minutes), capable of generating tsunamis that are likely to affect the Indian coasts. The RTSMN system also receives data from global seismological stations in real time for providing better azimuthal coverage and better estimation of earthquake source parameters. The earthquake information is disseminated to various user agencies and decision making authorities through multiple modes of communication such as SMS, FAX, e-mail and is also uploaded on IMD's website.

(c) The Real Time Seismic Monitoring Network was established at a total cost of Rs.11.19 crores.

(d) Does not arise.

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GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. **433**
TO BE ANSWERED ON 10th NOVEMBER, 2010

INDIAN METEOROLOGICAL DEPARTMENT

433. SHRI PRADEEP MAJHI:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government has upgraded and strengthened the India Meteorological Department (IMD);
(b) if so, the details thereof;
(c) the salient features of the new forecast systems set up by the IMD; and
(d) the details of the funds allocated and incurred for strengthening of the IMD thereon?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE)
MINISTRY OF SCIENCE AND TECHNOLOGY, MINISTRY OF EARTH SCIENCES, MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE, MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS
(SHRI PRITHVIRAJ CHAVAN)

(a) Yes Madam, India Meteorology Department (IMD) is currently implementing the phase-I of the modernization programme.

(b) The basic objectives of the IMD's modernization programme are

- Induction of advanced technology for observational systems with installation of Automatic Weather Station (AWS), Automatic Rain Gauges (ARG) and Doppler Weather Radar (DWR) etc.
- Digital data communication and data base integration.
- Assimilation of non-conventional data into Numerical Weather Prediction (NWP) models.
- Procurement and Commissioning of High Performance Computing (HPC) systems for implementing operational suit of advanced forecast models.
- Improved data visualization, value-addition, dissemination for better public access/ utilization (SYNERGIE).
- Induction of more objective oriented forecasting system.
- Improvement in Public Weather Services (PWS) and Early Warning Services.
- Generation and dissemination of Agro-meteorological advisories for farmers spanning for 5-days.

Detailed Progress of commissioning advanced observing systems is presented below:

Observational Instrument	**Number planned for Phase I**	**Achievement till 31st October 2010**
ARG	1350	334
AWS	550	494
DWR	16	2
Wind Profiler	7	In progress
Pilot Balloon	70	65
Aeronautical Instrumentation	28	8
Upgraded RS/RW	25	11

Upgradation of observing system along with its connectivity with high performance computing system, installation of digitised forcasting platform and dissemination of observations, forecast and warning in real time to the end users are to be developed by March 2011 under phase-I of the modernization programme.

(c) The salient features of new forecasting system:

- Global Forecast System for forecast up to 7 days
- Regional Forecast System for forecast up to 3 days
- Meso-scale Forecasting System for forecast up to 48 hours
- Now-casting up to 3-6hrs
- Digitized weather analysis and forecasting platform:

SYNERGIE is a powerful tool with a user friendly interface for the operational meteorology forecaster. With Synergie, not only is it possible to display meteorological data, but also to extract information from this data, as well as enter expertised data or format documents produced by forecasters.

As a functional requirement, the SYNERGIE system has the following capabilities

- Ability of the system to ingest all available data,
- Display and prediction tools:
- Plotting of Observations on weather charts,
- Numerical Weather Prediction module,
- Satellite, Radar, Tropical Cyclone and warning module,

PWS system is a set of interfaces and automatic processes, that provide simple way to design, generate and disseminate products.

(d) Out of the allocated grant of Rs. 920crores for the Phase-I of the IMDs modernization programme, a sum of Rs 316crores has been spent till the end of October, 2010.

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