GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. 2863
TO BE ANSWERED ON WEDNESDAY, DECEMBER 10, 2014

RAIN DEFICIENCY

2863. SHRI ARJUN MEGHWAL:
SHRI BHAIRON PRASAD MISHRA:
SHRI NALIN KUMAR KATEEL:
SHRI RAJU SHETTI:
SHRI FEROZE VARUN GANDHI:
SHRIMATI POONAMBEN MAADAM:
SHRI RAHUL KASWAN:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the details of National and Statewise short falls in rain during the current year so far;
(b) the reasons therefor and the steps taken/being taken by the Government to tackle its adverse impacts;
(c) whether Indian Meteorological Department proposes to install more sophisticated equipments for the accurate prediction of weather;
(d) if so, the details thereof; and
(e) the details of the initiative taken under the National Monsoon Mission to improve monsoon and weather forecast?

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

(a) The details of National and State-wise shortfalls in rain for the current year so far are given in Annexure I-IV.

(b) The large rainfall deficiency occurred during the initial part of the Southwest Monsoon season, especially during the month of June and up to mid-July is due to late onset, and delay in the advance of monsoon over major part of the country.

Integrated Agro-meteorological Advisory Service (AAS) is rendered on twice-weekly basis in collaboration with State Agricultural Universities (SAUs), institutions of Indian Council of Agricultural Research (ICAR), etc. District level weather forecast for next 5-days in respect of:

- **Rainfall**
- **maximum temperature, minimum temperature,**
- **wind speed, wind direction,**
- **relative humidity and clouds**
- **weekly cumulative rainfall forecast are provided.**

Further, crop specific advisories to help the farmers are issued and widely disseminated. The AAS of ESSO-IMD has been successful in providing the crop specific advisories to the farmers through different print/visual/Radio/ IT based media including short message service (SMS) and Interactive Voice Response Service (IVRS) facilitating for appropriate field level actions.

Indian Council of Agriculture Research (ICAR) is advocating several technologies like use of short duration drought tolerant varieties, in-situ soil moisture conservation and water harvesting measures, mulching, micro irrigation, resource conservation technologies and use of poor quality water to tackle the situation of moisture deficit in agriculture across the country. The ICAR has also prepared district level contingent plans for over 500 districts to address seasonal rainfall variability (including drought) impact on agriculture.

(c-d) Based on scientific assessment of the needs for further augmentation of observing system network, comprising Doppler Weather Radars, rain radars, Automatic Weather Stations (AWSs), Automatic Rain Gauges (ARGs), Snow Gauges etc. expansion has been formulated. In addition, augmenting high performance computing facilities, communication, forecast/warning systems, product dissemination systems etc. are part of a continuous process by which state-of-the-art science and technology tools can be made accessible to the scientists engaged in weather research and forecasting for enhancing the service quality.

(e) Under the National Monsoon Mission initiative institutions of ESSO, the Indian Institute of Tropical Meteorology (ESSO-IITM), Pune, ESSO-IMD, Indian National Centre for Ocean Information Services (ESSO-INCOIS), Hyderabad and National Centre for Medium Range Weather Forecasting (ESSO-NCMRWF), NOIDA, have embarked upon to build a state- of-the-art coupled ocean-atmospheric climate model for a) improved prediction of monsoon rainfall on extended range to seasonal time scale (16 days to one season) and b) improved prediction of temperature, rainfall and extreme weather events on short to medium range time scale (up to 15 days) so that forecast skill gets quantitatively improved further for operational services of ESSO-IMD.

Using the Monsoon Mission model (CFS v2.0), ESSO-IITM has been preparing the seasonal forecasts for all India monsoon rainfall from 2012 onwards. Since 2013 onwards, experimental extended range (up to 20 days) forecasts of active-break events of the monsoon are also prepared. Both the seasonal forecasts and extended range forecasts are found to be generally accurate. These forecasts are shared with ESSO-IMD for their operational use.

Under the Monsoon Mission, research proposals were invited from scientists from India and abroad to do research on monsoon process studies and to improve the monsoon prediction models so that monsoon forecasts on different time scales are also improved. So far, 26 research proposals (16 from abroad and 10 from India) were approved for funding under the Monsoon Mission.

Observations of monsoon process studies are also important in order to improve the monsoon prediction models. Therefore, under the Monsoon Mission, a project has been undertaken with the help of academic institutions in India and abroad for a detailed observational programme over the Bay of Bengal.

The primary objective of the programme is to have high resolution ocean observations (like temperature, salinity, ocean current etc) using specialized instruments. This kind of observations is undertaken over the Bay of Bengal for the first time. These observations will be helpful to understand ocean processes over the Bay of Bengal and their representation in numerical models.

Annexure I

STATE-WISE RAINFALL DISTRIBUTION AND SHORT FALLS IN RAIN DURING WINTER 2014				
S. NO.	STATES	ACTUAL	NORMAL	% DEP.
1.	A & N ISLAND(UT)	50.5	82.9	-39%
2.	ARUNACHAL PRADESH	120.9	148.1	-18%
3.	ASSAM	31.2	48.4	-36%
4.	MEGHALAYA	26.3	40.2	-35%
5.	NAGALAND	31.3	47.5	-34%
6.	MANIPUR	14.2	46.0	-69%
7.	MIZORAM	30.6	39.4	-22%
8.	TRIPURA	9.3	44.7	-79%
9.	SIKKIM	19.3	143.6	-87%
10.	ORISSA	17.6	31.8	-45%
11.	HARYANA	29.6	32.4	-9%
12.	PUNJAB	41.9	49.5	-15%
13.	HIMACHAL PRADESH	184.9	195.5	-5%
14.	JAMMU & KASHMIR	195.0	212.9	-8%
15.	GOA	0.0	0.6	-100%
16.	ANDHRA PRADESH	1.6	13.2	-88%
17.	TAMILNADU	13.3	30.8	-57%
18.	PONDICHERRY(UT)	20.9	56.7	-63%
19.	KERALA	14.9	24.3	-39%

- **For remaining subdivision there is no shortfall of rainfall during the season.**
- **For country as a whole seasonal rainfall was 14% above of its long period average.**

Annexure II

STATE-WISE RAINFALL DISTRIBUTION SHORT FALLS IN RAIN DURING PRE MONSOON 2014				
S. NO.	**STATES**	**ACTUAL**	**NORMAL**	**% DEP.**
1.	**A & N ISLAND(UT)**	**249.1**	**465.0**	**-46%**
2.	**ARUNACHAL PRADESH**	**466.0**	**750.4**	**-38%**
3.	**ASSAM**	**403.0**	**556.1**	**-28%**
4.	**MEGHALAYA**	**513.9**	**717.9**	**-28%**
5.	**NAGALAND**	**200.5**	**413.7**	**-52%**
6.	**MANIPUR**	**212.1**	**358.1**	**-41%**
7.	**MIZORAM**	**207.9**	**563.7**	**-63%**
8.	**TRIPURA**	**492.1**	**710.3**	**-31%**
9.	**SIKKIM**	**617.0**	**729.5**	**-15%**
10.	**WEST BENGAL**	**185.4**	**214.8**	**-14%**
11.	**HIMACHAL PRADESH**	**238.9**	**244.9**	**-2%**
12.	**JAMMU & KASHMIR**	**395.0**	**326.0**	**21%**
13.	**RAJASTHAN**	**29.9**	**18.0**	**66%**
14.	**MADHYA PRADESH**	**15.3**	**18.0**	**-15%**
15.	**GUJARAT**	**2.8**	**4.8**	**-41%**
16.	**DIU(UT)**	**0.0**	**1.5**	**-100%**
17.	**KERALA**	**364.5**	**379.7**	**-4%**
18.	**LAKSHADWEEP(UT)**	**76.7**	**232.4**	**-67%**

- **For remaining subdivision there is no shortfall of rainfall during the season.**
- **For country as a whole seasonal rainfall was normal (0%) of its long period average.**

Annexure III

STATE-WISE RAINFALL (MM) DISTRIBUTION SHORT FALLS FOR THE MONSOON SEASON 2014				
S. No.	**States**	**ACTUAL**	**NORMAL**	**% DEP.**
1.	A & N ISLAND(UT)	1618.6	1682.5	-4%
2.	ARUNACHAL PRADESH	1758.3	1768.0	-1%
3.	ASSAM	1403.8	1523.4	-8%
4.	MEGHALAYA	2707.9	2786.8	-3%
5.	NAGALAND	968.5	1329.9	-27%
6.	MANIPUR	640.1	1404.5	-54%
7.	MIZORAM	1464.3	1708.3	-14%
8.	TRIPURA	1451.2	1489.1	-3%
9.	WEST BENGAL	1209.4	1390.4	-13%
10.	JHARKHAND	928.3	1091.9	-15%
11.	BIHAR	848.3	1027.6	-17%
12.	UTTAR PRADESH	446.7	846.1	-47%
13.	UTTARAKHAND	897.7	1229.1	-27%
14.	HARYANA	198.3	459.8	-57%
15.	CHANDIGARH(UT)	354.5	844.2	-58%
16.	DELHI	289.3	636.2	-55%
17.	PUNJAB	244.1	491.9	-50%
18.	HIMACHAL PRADESH	522.4	825.3	-37%
19.	MADHYA PRADESH	761.5	952.3	-20%
20.	GUJARAT	591.5	657.6	-10%
21.	MAHARASHTRA	867.4	1007.3	-14%
22.	CHHATISGARH	1106.2	1147.3	-4%
23.	ANDHRA PRADESH	435.9	608.9	-28%
24.	TAMILNADU	314.9	317.0	-1%
25.	LAKSHADWEEP(UT)	964.1	998.5	-3%

- **For remaining subdivision there is no shortfall of rainfall during the season.**
- **For country as a whole seasonal rainfall was -12 % below of its long period average.**

Annexure IV

STATE-WISE RAINFALL (MM) DISTRIBUTION SHORTFALL FOR THE PERIOD 01.10.2014 TO 19.11.2014				
S. NO.	**STATES**	**ACTUAL**	**NORMAL**	**% DEP.**
1.	ARUNACHAL PRADESH	46.2	211.9	-78%
2.	ASSAM	29.1	149.2	-81%
3.	MEGHALAYA	49.6	265.8	-81%
4.	NAGALAND	64.5	148.5	-57%
5.	MANIPUR	43.7	209.5	-79%
6.	MIZORAM	73.6	289.4	-75%
7.	TRIPURA	60.6	209.3	-71%
8.	SIKKIM	39.9	266.1	-85%
9.	WEST BENGAL	49.6	145.2	-66%
10.	ODISHA	113.9	136.1	-16%
11.	JHARKHAND	44.9	82.5	-46%
12.	BIHAR	47.8	70.6	-32%
13.	UTTARAKHAND	40.8	64.5	-37%
14.	HARYANA	11.1	19.3	-43%
15.	CHANDIGARH(UT)	12.4	37.8	-67%
16.	DELHI	1.0	21.9	-95%
17.	PUNJAB	6.7	25.0	-73%
18.	HIMACHAL PRADESH	20.9	51.9	-60%
19.	JAMMU & KASHMIR	50.4	56.1	-10%
20.	RAJASTHAN	2.1	13.3	-84%
21.	MADHYA PRADESH	30.9	40.9	-24%
22.	GUJARAT	7.7	27.4	-72%
23.	DNH & DAMAN(UTs)	1.7	45.6	-96%
24.	DIU(UT)	9.2	42.4	-78%
25.	MAHARASHTRA	48.2	87.5	-45%
26.	ANDHRA PRADESH	176.1	232.3	-24%
27.	TELANGANA	54.9	109.0	-50%
28.	KARNATAKA	150.5	168.4	-11%
29.	LAKSHADWEEP(UT)	218.6	242.2	-10%

- **For remaining subdivision there is no shortfall of rainfall during the season.**
- **For country as a whole seasonal rainfall was 29 % below of its long period average.**