

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION

RAJYA SABHA
UNSTARRED QUESTION NO. 2249
TO BE ANSWERED ON 18/12/2015

ADVERSE EFFECTS OF CLIMATE CHANGE ON AGRICULTURE

2249. SHRI P. BHATTACHARYA:

Will the Minister of AGRICULTURE AND FARMERS WELFARE be pleased to state:

- (a) whether it is a fact that clear indications of change in climate are being noticed in the country and this has begun affecting the agriculture of the country adversely, if so, the reaction of Government thereto;
- (b) whether Government has undertaken any study about the adverse effects of climate changes on agriculture; and
- (c) if so, the details of the report in this regard?

ANSWER

MINISTER OF STATE IN THE MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DR. SANJEEV KUMAR BALYAN)

(a) Yes, Sir. The climate change studies pertaining to India show enough evidence of rising mean temperature during post-1970 period. Greater warming of 0.21°C per 10 years during post-1970 period as compared to 0.51°C per 100 years during past century has been reported. Besides, country experienced 15 deficit and 6 excess monsoon years in post-1960 period in comparison to only 27 deficit and 20 excess monsoon years during 1871-2014. These climate change pattern has already begun affecting Indian agriculture sector adversely by enhanced abiotic and biotic stresses to crops and livestock.

The Government is implementing National Mission for Sustainable Agriculture (NMSA) to address the issues associated with effect of climate change in Indian Agriculture through suitable adaptation and mitigation measures mainly in the domain of crops and animal husbandry. The adaptation and mitigation measures are devised to ensure food security, equitable access to food resources, enhance livelihood opportunities and economic stability of people through four major components of Rainfed Area Development (RAD), On-Farm Water Management (OFWM), Soil Health Management (SHM) and Climate Change & Sustainable Agriculture Modeling & Networking (CCSAMN).

(b) Indian Council of Agricultural Research (ICAR) started National Network Project on Climate Change (2004-13) to study the changing climate and its impact on Indian agriculture. Subsequently, ICAR has taken a major initiative by launching a network project, “National Innovation on Climate Resilient Agriculture (NICRA)” in 2011 to enhance resilience of Indian agriculture to climate change through strategic research and technology demonstration.

(c) Research studies indicate more erratic and intense monsoon rains/unseasonal rains and hailstorm, increasing risk of droughts and floods and rise in temperature including increased frequency of warm days. This leads to projected average reduction of yield by 6% in wheat, 4-6% in rice, 18% in maize, 2.5% in sorghum, 2% in mustard and 2.5% in potato. The crop yield were projected more vulnerable in Central and East India for wheat; Punjab, Haryana, and Rajasthan for irrigated rice, Maharashtra, Odisha, Chhattisgarh and Assam for rainfed rice; Central India for mustard and Punjab, Bihar, Jharkhand, Uttar Pradesh and West Bengal for potato.

The impact of climate change is also expected in economic viability and production of livestock systems through poor availability of quality feed and fodder, decreased reproductive performance and decline in milk production. Further, ICAR- CRIDA has also mapped 572 districts of the country for their vulnerability to extreme events due to climate change. The vulnerability was assessed high to very high in 230 districts, medium in 114 districts and low to very low in 228 districts. The details are placed in **Annexure-I**.

Table: District-wise Vulnerability Indices to Climate Change

State	Vulnerability Indices to Climate Change				
	Very High	High	Medium	Low	Very Low
A & N Islands					A & N Islands.
Andhra Pradesh	Chittoor, Anantapur.	Kurnool.	Cuddapah,	Prakasam.	Guntur, Srikakulam, Visakhapatnam, Nellore, East Godavari, Vizianagaram, West Godavari, Krishna.
Arunachal Pradesh				Tawang, East Kameng, Upper Subansiri, West Siang, Upper Siang.	West Kameng, Dibang valley, Tirap, Lower Subansiri, Lohit, Changlang, Kurung Kumey, Papum Pare, East Siang.
Assam	Karbi-Anglong.	Barpeta	N C Hills.	Hailakandi, Dhemaji, Nalbari, Kamrup, Dhubri, Morigaon , Golaghat.	Karimganj, Nagaon, Kokrajhar, Goalpara, Bongaigaon, Lakhimpur, Sonitpur, Dibrugarh, Tinsukia, Jorhat, Sibsagar, Cachar, Darrang.
Bihar	Kishanganj, Madhubani, Araria, Darbhanga, Supaul, Bhagalpur.	Gopalganj, Saran, Purnea, Saharsa, Siwan, Katihar, Patna, Buxar, Sitamarhi, Nalanda, Champaran(East), Champaran(West), Samastipur, Muzafarpur, Vaishali.	Begusarai, Lakhisarai, Jahanabad, Banka, Bhojpur, Jamui, Madhepura.	Sheikhpura, Aurangabad, Khagaria, Sivhar, Rohtas, Bhabhua (Kaimur).	Gaya, Nawadha, Monghyr.
Chhattisgarh		Kawardha, Sarguja, Rajnandgaon, Koriya, Dantewara, Jashpur, Durg.	Mahasamund, Bilaspur, Bastar, Kanker.	Korba, Raigadh, Janjgir, Raipur, Dhamtari.	
Dadra & Nagar Haveli					Dadra & Nagar Haveli.
Daman & Diu	Daman & Diu				

State	Vulnerability Indices to Climate Change				
	Very High	High	Medium	Low	Very Low
Goa					Goa
Gujarat	Patan, Amreli, Surendranagar, Kutch, Banaskantha, Mehsana, Ahmedabad, Bhavnagar, Rajkot, Jamnagar, Junagadh, Sabarkanta, Panchmahal, Porbandar.	Gandhinagar, Dahod, Dang, Bharuch, Vadodara, Narmada.	Kheda.	Anand.	Surat, Valasad, Navsari.
Haryana		Kaithal, Fatehabad, Jhajjar, Sirsa, Bhiwani, Panipet, Jind, Hissar, Mahendragarh.	Kurukshetra, Faridabad, Gurgaon, Rewari, Karnal, Sonipet.	Rohtak, Panchkula.	Ambala, Yamunanagar.
Himachal Pradesh		Kullu, Shimla, Chamba, Bilaspur.	Kinnaur, Hamirpur.	Mandi, Una, Kangra.	Sirmaur, Solan, Lahaul & Spiti.
Jammu & Kashmir		Rajouri.	Doda, Udhampur, Pulwama, Budgam, Poonch, Anantnag.	Srinagar, Kathua, Kupwara.	Kargil, Leh(Ladakh), Baramulla, Jammu.
Jharkhand	Godda, Pakur, Sahibganj.	Bokaro, Gumla, West Singhbhum, Lohardaga, East Singhbhum, Palamu.	Giridish, Dumka, Garhwa, Chtra, Ranchi, Dhanbad, Deoghar.	Hazaribag, Koderma.	
Karnataka	Bijapur, Gulbarga, Gadag, Bagalkot, Raichur, Chitradurga, Haveri, Bidar, Davanagere, Bangalore (Rural), Tumkur, Koppal, Dharwad, Chamarajanagar.	Kolar, Bellary, Belgaum, Mysore, Mandya.		Bangalore (Urban), Hassan.	Chikmagalur, Uttara Kannada, Kodagu / Coorgu, Udupi, Dakshina Kannada, Shimoga.
Kerala			Thiruvananthapuram, Malappuram, Kollam, Kozhikode.	Wayanad, Kasaragod, Kannur, Kottayam, Alappuzha, Idukki, Palakkad.	Thrissur, Pathanamthitta, Ernakulam.

State	Vulnerability Indices to Climate Change				
	Very High	High	Medium	Low	Very Low
Madhya Pradesh	Jhabua, Rajgarh, Mandsaur, Shajapur, Dindori, Ratlam, Dhar, Sidhi, Vidisha, Shivpuri, Ujjain, Bhind, Barwani, Shahdol,	Rewa, Mandla Dewas, Neemuch, Khargone(West Nimar), Betul, Guna, Sehore, Umaria, Damoh, Panna, Satna, Chhatarpur, Datia, Chhindwara, Katni.	Seoni, Morena, Sheopur Kalan, Raisen, Bhopal, Khandwa(East Nimar), Tikamgarh, Indore, Sagar.	Narsinghpur, Jabalpur, Gwalior, Harda.	Balaghat, Hoshangabad.
Maharashtra	Solapur, Beed, Ahmednagar, Osmanabad, Latur, Nandurbar, Sangli, Buldhana, Dhule, Nasik, Jalna, Amravati.	Akola, Aurangabad, Jalgaon, Parbhani, Washim.	Nanded, Pune, Hingoli.	Yavatmal, Wardha, Satara, Nagpur, Raigad, Thane.	Gondia, Ratnagiri, Gadchiroli, Bhandara, Sindhudurg, Kolhapur, Chandrapur.
Manipur			Churachandpur, Chandel, Ukhrul.	Senapati, Tamenglong, Imphal East.	Imphal West, Thoubal, Bishnupur.
Meghalaya			South Garo Hills.	West Garo Hills, East Garo Hills, West Khasi Hills.	Jaintia Hills, East Khasi Hills, Ri-Bhoi.
Mizoram			Champhai.	Saiha, Lawngtlai, Mamit, Serchhip, Lunglei, Kolasib, Aizawl.	
Nagaland				Mon, Tuensang, Wokha.	Phek, Zunheboto, Kohima, Mokokchung, Dimapur.
Odisha		Nuapada.	Kalahandi, Bolangir, Phulbani (Kandhamal), Keonjhar, Gajapati, Nabarangpur, Puri, Mayurbhanj, Kendrapara.	Sundargarh, Koraput, Malkangiri, Deogarh, Bhadrak, Sonapur, Jagatsingpur, Baragarh, Dhenkanal,	Boudh, Jajpur, Angul, Ganjam, Khurda, Cuttack.

State	Vulnerability Indices to Climate Change				
	Very High	High	Medium	Low	Very Low
				Nayagarh, Rayagada, Jharsuguda, Balasore (Baleshwar), Sambalpur	
Pondicherry					Pondicherry
Punjab	Faridkot,	Moga, Kapurthala, Mansa, Ferozpur.	Sangrur, Muktsar, Bathinda, Jalandhar.	Fathegarh Sahib, Shahid Bhagat Singh Nagar, Patiala, Hoshiarpur, Amritsar, Ludhiana.	Rupnagar, Gurdaspur.
Rajasthan	Barmer, Jaisalmer, Jodhpur, Bikaner, Nagaur, Jalore, Churu, Pali, Tonk, Ajmer, Sirohi, Dungarpur, Sikar, Rajsamand, Banswara, Hanumangarh, Bhilwara, Jhunjhunu, Jaipur, Sawai Madhopur, Udaipur, Jhalawar, Chittorgarh, Dausa, Bharatpur.	Sri Ganganagar, Bundi, Dholpur, Alwar, Karauli, Baran.	Kota.		
Sikkim				Sikkim-South, Sikkim-North.	West-Sikkim, East-Sikkim.
Tamil Nadu	Perambalur, Ariyalur, Salem, Namakkal, Dharmapuri, Ramanathapuram,	Villupuram, Thiruvannamalai, Karur, Thiruvarur, Dindigul.	Thanjavur, Coimbatore, Vellore, Cuddalore, Erode, Thoothukudi, Madurai, Nagapattinam, Thiruchirappalli.	Kanyakumari, Pudukkottai, Theni, Sivagangai.	The Nilgiris, Virudhunagar, Thirunelveli, Thiruvallur, Kancheepuram.

State	Vulnerability Indices to Climate Change				
	Very High	High	Medium	Low	Very Low
Telangana		Mahabubnagar,	Medak, Adilabad.		Rangareddy, Karimnagar, Warangal, Nizamabad, Khammam, Nalgonda,
Tripura					Dhalai, South Tripura, North Tripura, West Tripura.
Uttar Pradesh	Mahoba, Chitrakut, Banda, Hamirpur, Ballia, Bahraich, Kaushambi, Mathura, Deoria, Shravasti, Jhansi, Siddharth Nagar,	Bagpat, Lalitpur, Budaun, Gonda, Balrampur, Mau, Ghazipur, Sonbhadra, Fatehpur, Raebareilly, Basti, Kushinagar, Shahjahanpur, Jalaun, Agra, Jaunpur, Faizabad, Maharajganj.	Mirzapur, Hardoi, Kanpur (Dehat), Aligarh, Sant Ravidas Nagar, Pratapgarh, Sant Kabir Nagar, Hathras, Farrukhabad, Azamgarh, Allahabad, Muzaffarnagar, Unnao, Jyotiba Phulenagar, Gorakhpur, Varanasi, Etah, Saharanpur, Auraiya, Kannauj, Bareilly, Sitapur, Ambedkar Nagar, Sultanpur	Etawah, Kheri, Firozabad, Bijnor, Pilibhit, Barabanki, Mainpuri, Gautam Buddh Nagar, Kanpur City, Bulandshahar, Chandauli, Lucknow, Moradabad, Rampur.	Ghaziabad, Meerut.
Uttarakhand	Bageshwar, Tehri Garwal, Chamoli,	Almora, Pithoragarh, Champawat, Rudraprayag.	Uttarkashi	Pauri Garhwal.	Haridwar, Dehardun, Nainital, Udham Singh Nagar.
West Bengal	Malda		Purulia, Dinajpur (Uttar), Murshidabad, Nadia, Dinajpur (Dakshin), 24-Paraganas (South), Howrah, Cooch Behar.	24-Paraganas (North), Midnapore, Birbhum.	Jalpaiguri, Darjeeling, Hooghly, Bankura, Burdwan.