

Government of India  
Ministry of Earth Sciences

Prithvi Bhawan, Lodhi Road  
New Delhi-110003

No. MoES/29/220/2015/RTI

To

Shri Udit Poddar  
Building No. 1, Lane No. 1  
Second Floor, Saidulajab  
Western Marg  
Saket, New Delhi-110030

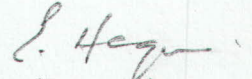
**Sub: Online RTI Application No Moecd/2015/60/160 dated 17/12/2015- reg.**

Sir,

Please refer to your online application referred above. The information provided by the concerned division pertaining to this Ministry is enclosed herewith. The information for serial no 1 to 3 is closely related to Ministry of Environment and Forest and Climate Change and hence transferred under relevant provision of RTI Act.

An appeal, if any, against this reply may be made on the following address.

Shri Vivek Misra, Director,/FAA.  
Ministry of Earth Sciences, Prithvi Bhawan,  
,Lodhi Road, New Delhi-110003.

  
(E. Haque)

Central Public Information Officer & Scientist-'C'

Copy for information to:-

1. Director/ (ICC) & FAA MoES, New Delhi
2. Dr. N.Khare, Scientist- F, & Transparency Officer, MoES, New Delhi
3. In Charge IT Section (Shri Krishnan is requested to upload this reply on website [www.moes.gov](http://www.moes.gov))
4. The CPIO, MoEF&CC, -Request for providing information with reference to this Ministry's application dated 22/12/2015 which has been transferred.



## Inputs to RTI queries

Question (a) What was the total expenditure on climate change research by Ministry of Earth Sciences in 2014-15?

The total expenditure during 2014-15 incurred by Centre for Climate Change Research (CCCR), IITM, under Global & Regional Climate Change Research (GRCC) was Rs. 3.54 Crores

Question (b) What priorities have been identified by the Ministry of Earth Sciences in an effort to combat climate change in India? Please provide details about the priorities roles and main programs for meeting these goals.

Ans: One of the top priorities of the Ministry of Earth Sciences (MoES) to combat climate change is to develop in-house capability in the country to understand and address all aspects concerning the Science of Climate Change. Keeping this priority, the MoES established the Centre for Climate Change Research (CCCR) at Indian Institute of Tropical Meteorology (IITM), which is mandated to carry out research on global and regional climate change with particular focus on the Indian climate and the monsoons.

The primary objectives of the CCCR include (a) Identification and exploration of new areas of research that will contribute to the fundamental understanding of the earth's climate system, (b) Enhancement of knowledge on regional climate change over the Indian subcontinent, (c) To understand the nature of biogeochemical interactions and their response to environmental change, (d) To understand impacts of global warming on planetary scale phenomena like monsoon and El Niño, (e) To understand the interactions of atmospheric chemistry with tropical and monsoon climate processes using chemistry-climate model simulations and observations, (f) To understand past climatic and monsoon rainfall variations by reconstructing responsive climate parameters, going back to a few thousand years, using a wide network of high resolution proxies such as tree-ring, historical records, speleothems, corals etc. over different parts of India and Asian Monsoon region, (g) To understand and quantify the processes that control net eco-system exchange of CO<sub>2</sub>, energy, water vapor and quantification of these fluxes at different time scales by establishing Eddy Covariance (EC) flux towers at a variety of ecosystems and making measurements of atmospheric CO<sub>2</sub> and other greenhouse gases, (h) To create and update information reservoirs for better assessment of changes and impacts, and (i) Building linkages with national and international research groups to optimally leverage scientific capabilities for climate change research. To meet the aforementioned objectives and goals, the CCCR has undertaken the following Research and Development programs:



**Development of IITM ESM:** A major achievement of the CCCR is the successful in-house development of the IITM Earth System Model (ESM) which is essential for addressing key scientific issues on climate variability and change specific to South Asia; and for gaining deeper insights about interactive feedbacks among the different components of the Earth System (*viz.*, atmosphere, ocean, land, biosphere, cryosphere, etc) and their response to natural and anthropogenic forcing. **The development of IITM-ESM at CCCR, which is the first of its kind developed in India, is a very important milestone towards timely participation in the 2020 Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR – 6).** During the last two years, various improvements and refinements have been incorporated in the IITM-ESM by the scientists at CCCR, IITM. Currently the IITM-ESM is making preparations to make long climate simulations for the Coupled Model Inter-comparison Project – Phase 6 (CMIP-6) as part of the IPCC assessment exercise (AR-6).

**CORDEX South Asia:** Additionally, the CCCR also coordinates and disseminates climate projections through the use of high-resolution regional climate simulations suitable for the South Asian region under the World Climate Research Program (WCRP) Coordinated Regional Downscaling Experiment (CORDEX) for South Asia. Societal needs are strongly driven by regional climate science information and regional capacity building. The CORDEX program for South Asia is coordinated by CCCR, IITM. Under this framework, CCCR and several partner institutions are contributing towards generation and evaluation of regional climate simulations over South Asia using multiple high-resolution models. CCCR-IITM has generated regional climate projections using the (a) LMDZ variable grid global model (grid size < 35 km over South Asia) (b) RegCM4 regional climate model (grid size ~ 50 km). Various partner institutions have also provided regional climate projections over South Asia (eg., RCA4 from SMHI, Sweden, CCLM from IAES, University of Frankfurt, Germany, REMO from Max Planck Institute, Germany, CCAM from CSIRO, Australia). These data are being archived and disseminated through the Earth System Grid Federation (ESGF). An ESGF data node has been setup at CCCR for dissemination and management of climate datasets in accordance with the international protocols for dissemination of large volumes of climate data.

**Paleoclimate:** The IITM Paleoclimate program focuses on the reconstruction of past climatic variability over the Indian subcontinent for the last few thousand years. Various natural archives, such as tree ring, speleothem, corals, sediments etc. are used and ring width index, density, isotopic ratios are determined in order to understand the science of the climate change. High resolution analysis of a few proxy records indicate that the current declining trend of monsoon rainfall is likely to be a part of the natural mode of climate variability albeit tampered by the anthropogenic activities.



**Fluxnet:** The primary goal of the Fluxnet project is to estimate the sources and sinks of the CO<sub>2</sub> across the Indian landmass. The global model simulation of CO<sub>2</sub> variability shows large uncertainties especially over the Indian region. This is mainly due to paucity of high resolution CO<sub>2</sub> flux data from the Indian region. The IITM observational program is aimed at generating high quality CO<sub>2</sub> and CO<sub>2</sub> fluxes required for reducing model uncertainties. Other objectives include establishment of a net work of Eddy Covariance flux towers across the ecosystems for measuring the net ecosystem exchange of CO<sub>2</sub>, energy, water vapor and quantification of these fluxes at different time scales and understanding the processes that control their variations.