

**GOVERNMENT OF INDIA
EARTH SCIENCES
LOK SABHA**

UNSTARRED QUESTION NO:6621
ANSWERED ON:06.05.2015
CARBON CYCLE RESEARCH PROGRAMME
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Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Government has established adequate facilities for conducting carbon cycle research programme and if so, the details thereof;
- (b) the basic objectives of this programme;
- (c) the monitoring mechanism put in place by the government; and
- (d) the resources and funds drawn up for the implementation of the programme?

Answer

MINISTER OF STATE FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES (SHRI Y. S. CHOWDARY)

(a) Requisite facilities required for Carbon Cycle Research are built in stages by Earth System Science Organization – Indian Institute of Tropical Meteorology (ESSO-ITM) Pune under FLUXNET Program and the Department of Space - Indian Space Research Organization (DOS-ISRO) under National Carbon Project (NCP) in a complimentary manner.

Establishment of a network for typical sites for measuring net eco-system fluxes of CO₂, energy, water vapor so as to quantify the fluxes at different time scales and understanding the processes that control their variations.

(i) Erection of flux tower at Kaziranga National Park, Assam for measuring various meteorological parameters, such as, temperature, humidity, rainfall, wind vector, soil temperature, soil CO₂, photosynthetic active radiation, etc. is completed.

(ii) Erection of flux tower at Selebong forest, about 55km from Darjeeling, West Bengal is completed for measuring the net eco-system exchange (NEE) of CO₂, energy, water vapor between biosphere and atmosphere.

(iii) The biogeochemical studies are also organized at two island stations, viz. Port Blair in Andaman Islands and Agatti in Lakshwadeep Island for carrying out geochemical analysis of coastal sediment, as well as various atmospheric and oceanic parameters in the close proximity to the coral reef ecosystems.

(iv) NCP has been taken up to assess Carbon pools, Fluxes and Net Carbon balance for terrestrial biosphere in India using Satellite Remote Sensing and Ground based measurements. As part of this effort, for measurement and modelling of net carbon flux across some of the ecosystems over Indian region with a network of eddy flux towers have been established at

- # Meerut (for crop monitoring)
- # Haldwani (mixed plantation)
- # Barkot (Sal Forest)
- # Betul (Tak mixed forest) and
- # Sundarbans (Mangrove Forests).

The required computer facilities for the data assimilation and modelling have also been established. Other associated facilities for analyzing the random sampling of concentrations are also set up as per the following:

1. A Gas Chromatography Laboratory for measuring CO₂ and CH₄ mixing ratio. A laboratory consisting of a Laser Isotope Analyzer for measuring mixing ratio and isotopic ratio of atmospheric CO₂ is established. Laser analyzer facility has also been established at Sinhagad, near Pune for measuring CO₂, CH₄ and water vapor mixing ratio.

2. Horizontal and vertical profiling (up to 8.5 km) of black carbon was measured onboard sensors of an instrument aircraft as a part of Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX) field campaigns.

(b) Basic objectives of the associated research include:

- (i) Estimate the sources and sinks of CO₂ across the Indian eco-systems so as to capture typically the transient conditions under which ecosystems function as a source of CO₂.
 - (ii) Assessment of terrestrial vegetation biomass in the country using ground sampling and remote sensing data and generation of geospatial data of the terrestrial phyto-mass and terrestrial carbon of India.
 - (iii) Determine soil organic carbon in surface & sub-surface soils and inorganic carbon in arid region of the country including loss of soil carbon as a function of soil erosion.
 - (iv) Understanding spatial and temporal variations of mass and energy fluxes across the soil and vegetation-atmosphere interface.
 - (v) Understanding of carbon budget for Indian ocean and atmospheric CO₂ by using satellite/in-situ observations and multi-model simulations.
- (C) National steering and monitoring committees serve as an effective oversight mechanism with adequate guidance for the successful implementation of the associated programs both at MoES and DoS.
- (d) ESSO had allocated a grant of Rs. 16crore and ISRO had allocated Rs. 12.47crores.