**Monitoring of variability of weather phenomena**

476. DR. K.V.P. RAMACHANDRA RAO: Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether Government monitors the variability of the weather phenomena and development of abnormal weather pattern like drought, flood, cyclone, heat and cold waves, etc. on a continuous basis; and

(b) if so, the findings made in the monitoring, and to what extent the extreme conditions are on the rise?

THE MINISTER OF EARTH SCIENCES (DR. HARSH VARDHAN): (a) Yes Sir.

(b) The Government continuously monitors the variability of the weather phenomena, extremes and development of abnormal weather pattern potentially leading to drought, flood, flash flood, cyclone, rain induced landslides, heat cold wave, etc. on a continuous basis. Records of past weather events show that extreme values in respect of heavy rainfall, maximum and minimum temperatures, seasonal rainfall etc. remained unsurpassed in many cases.

Heavy rain events (>10 cm/day) over central India are found to have increased in the recent decades while weak and moderate events are decreasing. The extreme rain events which are becoming more intense in recent years are localized and could be part of the natural variability of the monsoon system.

The occurrence of heat wave conditions is found to be more frequent in May than in June, while very few heat waves occur in the months of March and April. The spatial changes in minimum temperature are found to be decreasing in most parts of Western Ghats and increasing in most parts of Himalayan region and certain parts of the north-eastern region and such warming is confined to winter and post-monsoon seasons. No such pattern is discerned in respect of other weather phenomena.

Spatial pattern of trend in mean annual temperature anomalies, for the period 1902-2012, suggests significant positive (increasing) trend (0.5 °C) in general with few pockets of 1.0° C) over most parts of the country except some parts of Rajasthan, Gujarat and Bihar, where significant negative (decreasing) trend was observed. No significant long-term trends are reported in the frequencies of large-scale droughts or floods in the summer monsoon season. The total frequency of cyclonic storms that form over the Bay of Bengal has remained almost constant. Although, the monsoon rainfall at all India level

does not show any trend but on regional scale, areas of increasing trend is discerned. It is not clear if this increasing trend in the heavy rainfall events is attributable to global warming.

**Proposal to conversion of sea water into potable water**

477. SHRI GARIKAPATI MOHAN RAO: Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether it is a fact that the Government proposes to convert the sea water into potable water by using technology and transport it through pipelines to the water deficit areas, if so, the details of the proposal; and

(b) the number of States that will be covered under the proposal?

THE MINISTER OF EARTH SCIENCES (DR. HARSH VARDHAN): (a) and (b) Ministry of Earth Sciences, through National Institute of Ocean Technology (NIOT), has been working on the Low Temperature Thermal Desalination (LTTD) Technology that utilizes the temperature difference available between surface water and deep sea water. In this methodology, the warmer surface sea water is evaporated at low pressures and the vapour obtained are condensed using the colder deep sea water. Three LTTD plants have been successfully commissioned in the country, one each at Kavaratti, Minicoy, and Agatti islands of the Union Territory of Lakshadweep. The capacity of each of these LTTD plants is 1 lakh liter of potable water per day. The fresh water produced is supplied through local pipe network within the same Island. The Lakshadweep Administration requested NIOT for setting up similar plants in remaining six islands. NIOT has sent a detailed project report to the Lakshadweep Administration in this regard. Work has been initiated to set up a prototype LTTD plant with a capacity of generating 2 million litres of potable water per day at the Tuticorin Thermal Power station, Tamil Nadu.

**Mapping of multi-hazard coastal vulnerability**

478. SHRI GARIKAPATI MOHAN RAO: Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether ESSO-INCOIS, Hyderabad and ESSO-ICMAM, Chennai have carried out mapping and demarcating of multi-hazard coastal vulnerability for the States, if so, the details thereof; and

(b) what is the vulnerability being found for Andhra Pradesh?

THE MINISTER OF EARTH SCIENCES (DR. HARSH VARDHAN): (a) Yes Sir. Earth System Science Organization (ESSO) - Indian National Centre for Ocean