GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOKSABHA
UNSTARRED QUESTION NO. 1752
TO BE ANSWERED ON WEDNESDAY, 27TH JULY, 2022

NATIONAL CENTRE FOR MEDIUM RANGE WEATHER FORECAST

1752. DR. PRITAM GOPINATHRAO MUNDE:
SHRI CHANDRA SEKHAR SAHU:
SHRI GIRISH BHALCHANDRA BAPAT:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether an Institute of National Centre for Medium Range Weather Forecast (NCMRWF) has been functioning from Noida;
(b) if so, the details and salient features of the institution;
(c) whether the Government has modernised and upgraded the NCMRWF, Noida in the recent past;
(d) if so, the details of the modernisation work undertaken along with the details of funds allocated, released and incurred on the modernisation and upgradation activities;
(e) whether the forecasting institutions of the country have been providing their services to other countries; and
(f) if so, the details in this regard and rate of their efficiency?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

(a)-(b) The National Centre for Medium Range Weather forecasting (NCMRWF) a sub-ordinate office of MoES is functioning from Noida, Delhi-NCR.

Through Modelling and Data assimilation, NCMRWF supports country's national weather services organisation India Meteorological Department (IMD). The salient features of R&D initiatives are summarized below:

(1) Country's weather forecast is based on 'Advanced Dynamical Modelling System', being run on super computers at NCMRWF. These weather models have the capability to provide forecast guidance for the whole globe. NCMRWF has developed global and regional models, and they are being run in real-time to provide weather forecast guidance at different time scales like: (i) Short range up to 72 hours with high resolution regional model having 4 km grid, updated daily (ii) Medium Range up to 10 days with Global Model having 12 km grid, updated daily (iii) Extended Range up to four weeks with global Atmosphere-Ocean coupled model, Issued every Thursday up to next four weeks (iv) Long Range Seasonal Forecasts with global atmosphere-ocean coupled model, issuing forecast once a month up to next three months (seasonal mean) (v) A special model with 330 mts grid has been developed for Delhi winter Fog prediction. All these models are implemented under the 'Seamless Modelling Framework', a new

concept for the first time in the country. India is second country in world (after UK) to implement this Seamless Modelling Framework in the world.

(2) Due to chaotic nature of the climate system of earth, there exists uncertainty in describing the weather/climate systems. Due to lack of enough observations, additional uncertainty remains to define the current weather. To handle this uncertainty, 'Probabilistic Weather/Climate Forecasts' are issued with 'Ensemble Modelling Technique'. This forecast guidance provides the uncertainty in the forecast to the end users. NCMRWF has implemented this Ensemble modelling system with 22 members in global model and 11 members in regional model. The global ensemble model has a very high resolution of 12 km, which is the highest resolution in the world. This probabilistic forecast helps the disaster managers and decision makers to take appropriate decision based on these forecasts for a particular application.

(3) 'Data Assimilation' is an advanced mathematical technique which uses all the possible atmosphere/land/ocean based weather observations, satellite, radar observations to initialise the forecasts models. NCMRWF has implemented global/regional data assimilation systems for atmosphere, ocean, and land models. Currently NCMRWF has tested an UM (unified model) based Coupled atmosphere-ocean-land Data assimilation system (most advanced).

(c)-(d) Yes Sir. High Performance Computer (HPC) is the backbone of the modern modelling based weather/climate forecasting. The HPC capability was enhanced by 15 times to 350 TF in 2015. Again in 2018, the HPC capacity was enhanced to 2.8 PF (8 times). These HPC enhancement with corresponding enhancement in storage, high-end servers, networking system and use of National Knowledge Network (NKN) helped achieve to implement the world's highest resolution global ensemble prediction system in 2018. With this enhanced HPC, NCMRWF could implement the global coupled model to complete the 'Seamless Modelling Framework.'

HPC system at NCMRWF has been upgraded in 2015, a 350 TF HPC was provided to NCMRWF with approximate expenditure of Rs 70 crores. Again in 2018, another HPC of 2.8 PF capacity was provided to NCMRWF with approximate cost of Rs 175 crores including the peripherals. These HPCs was useful for modernisation of NCMRWF modelling system.

NCMRWF implements two sub-schemes namely, Atmosphere & Climate Research-Modelling Observing Systems & Services(ACROSS) and BIMSTEC Centre for Weather & Climate (BCWC). ACROSS deals with weather/climate modelling and data assimilation at NCMRWF. BCWC conducts the activities of BIMSTEC centre for Weather and Climate (BCWC).

Financial Year	Schemes	Budget Allocated	Expenditure incurred
2021-22	ACROSS	22 Cr	20 Cr
	BIMSTEC	1.7 Cr	0.5 Cr[*]
2022-23	ACROSS	29 Cr	7 Cr (till date)
	BIMSTEC	4.3 Cr	Nil

* Many planned activities could not be conducted due to Covid induced restrictions

For the period 2021-26 a total amount of Rs 160 crores is allocated under ACROSS for NCMRWF. For the period 2021-26 a total amount of Rs 26 crores is allocated for BCWC/REACHOUT at NCMRWF, which was announced by our honourable PM in the PM summit of BIMSTEC countries held recently in March 2022.

(e)-(f) NCMRWF also hosts the 'BIMSTEC Centre for Weather & Climate' (BCWC). Under the BIMSTEC regional cooperation of Government of India, BCWC works closely with National Hydro-Met departments of BIMSTEC member countries – Bangladesh, Bhutan, Myanmar, Nepal, Sri Lanka and Thailand. Weather/climate forecasts are shared with these member countries in real-time. Special products are also provided from time to time as per requests. Regular training, science workshop and visitor exchanges are taken up.

NCMRWF's work on Data Processing, Data Assimilation and Numerical Modelling helps UN's World Meteorological Organisation (WMO) Global Data-processing and Forecasting System (GDPFS), where India is a contributor. Accurate Numerical Weather Prediction (NWP) products and services in all time-scales for applications related to weather, short-term climate (extended/seasonal scale) are provided by designated GDPFS Centres (India is one). NCMRWF produces higher quality and accurate analysis and prediction products, which are then made available to all members via IMD. This has become possible due to enhanced HPC at MoES.

****