GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENCE AND TECHNOLOGY
LOK SABHA
UNSTARRED QUESTION NO. 2651
ANSWERED ON 11/12/2024

DEVELOPMENT AND DEPLOYMENT OF ADVANCED TECHNOLOGIES

2651. Smt. Sangeeta Kumari Singh Deo:

Will the Minister of SCIENCE AND TECHNOLOGY विज्ञान और प्रौद्योगिकी मंत्री be pleased to state:

(a)   the details of initiatives undertaken to develop and deploy advanced technologies for mitigating the impacts of climate change particularly in coastal regions like Odisha, which are vulnerable to cyclones and rising sea levels;

(b)   whether any research collaborations have been established with academic institutions in Odisha to advance innovations in mineral exploration and sustainable resource management, if so, the outcomes of such collaborations; and

(c)   the Government efforts to integrate Artificial Intelligence (AI) and Internet of Things (IoT) technologies for addressing environmental, industrial, and disaster management challenges in Odisha and other resource-rich States of India?

ANSWER
MINISTER OF STATE (INDEPENDENT CHARGE) OF THE
MINISTRY OF SCIENCE AND TECHNOLOGY AND EARTH SCIENCES
(DR. JITENDRA SINGH)
विज्ञान और प्रौद्योगिकी तथा पृथ्वी विज्ञान मंत्रालय के राज्य मंत्री (स्वतंत्र प्रभार)
(डॉ. जितेंद्र सिंह)

(a)   Yes Sir. Department of Science and Technology (DST) supports renewable energy interventions for development of bamboo-based floating solar structures and self-cleaning solar panels in the coastal regions of Odisha.

The Department of Biotechnology (DBT) funds mangrove conservation at RPRC Bhubaneswar and research on plant productivity in Bhitarkanika mangroves at NIT Rourkela. Geological Survey of India (GSI) studies coastal dynamics and shoreline changes along Odisha's coast.

The Ministry of Earth Sciences (MoES) enhances cyclone prediction and mitigation using advanced technologies like satellite-based warnings and

collaborates with Indian National Centre for Ocean Information Services (INCOIS) and Odisha State authorities for preparedness.

CSIR institutes contribute with CO2 sequestration research at CSIR-Institute of Minerals and Materials Technology (IMMT), Bhubaneswar, development of cyclone shelter designs during storms at CSIR-Structural Engineering Research Centre (CSIR-SERC), Chennai, and cyclone-resistant rural housing post-Fani cyclone at CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee.

(b) In 2024, GSI signed a Memorandum of Understanding with CSIR-IMMT Bhubaneswar for critical mineral beneficiation, including studies on lithium ores. CSIR-IMMT collaborates with institutions in Odisha on mineral processing and metallurgy, resulting in publications, patents, and skill programs for faculty and students. A process developed at CSIR-National Aluminium Company (NALCO) to recover metal from fly ash is being up-scaled with Kalinga Institute of Industrial Technology, Bhubaneswar.

The Ministry of Mines (MoM) funds academic institutions, R&D centres, start-ups, and Micro Small Medium Enterprises (MSMEs) for projects under its Science and Technology Programme to advance geosciences, mineral exploration, mining, and resource conservation. Odisha-based institutes like CSIR-IMMT, Indian Institute of Technology, Bhubaneswar, and National Institute of Technology, Rourkela has been funded by MoM for these projects.

(c) DST has established 25 Technology Innovation Hubs (TIHs) advancing AI, Internet of Things (IoT) and robotics. Under this initiative, IIT Ropar is working to improve Air quality forecasting & IIT-Banaras Hindu University (BHU) has developed IoT-ML rainfall prediction systems for farmers.

Artificial Intelligent/Machine Learning (AI/ML) technologies have been integrated into weather forecasting through a dedicated AI/ML center and Graphical Processing Unit-based systems at Indian Meteorological Department (IMD). Key initiatives include:

1. A Task Force for cyclone-resilient electricity infrastructure in coastal regions.
2. Bureau of Indian Standards (BIS) efforts on cyclone-resilient infrastructure and shelters.
3. The coalition for Disaster Resilient Infrastructure (CDRI) has been also launched in 2019 to strengthen early warning systems and infrastructure resilience globally.

CSIR-IMMT is developing AI-based image processing for iron ore palletization and wireless thermocouples for industrial furnaces.

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