

India Meteorological Department (IMD)

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From a modest beginning in 1875, IMD has progressively expanded its infrastructure for meteorological observations, communications, forecasting and weather services and it has achieved a parallel scientific growth. IMD has continuously ventured into new areas of application and service, and steadily built upon its infra-structure in its history of 140 years. It has simultaneously nurtured the growth of meteorology and atmospheric science in India. Today, meteorology in India is poised at the threshold of an exciting future.

In news: India Meteorological Department (IMD) celebrates its 146th Foundation Day

Placing it in syllabus: Agriculture

Dimensions

- About IMD
- Recent initiatives
- Role in agriculture
- Radars and satellites used for weather forecast

Content:

About IMD:

- India Meteorological Department was established in 1875.
- It is the National Meteorological Service of the country and the principal government agency in all matters relating to meteorology and allied subjects.
- The administrative responsibilities of the Department are **under the supervision** of the **Ministry of Earth**

Sciences of the Indian Government.

- IMD is headquartered in Delhi and operates hundreds of observation stations across India and Antarctica.
- Regional offices are at Chennai, Mumbai, Kolkata, Nagpur, Guwahati and New Delhi.
- IMD is also **one of the six Regional Specialised Meteorological Centres of the World Meteorological Organisation**.
- It has the responsibility for **forecasting, naming and distribution of warnings for tropical cyclones** in the **Northern Indian Ocean region**, including the Malacca Straits, the Bay of Bengal, the Arabian Sea and the Persian Gulf.

It has the following mandate:

- To take meteorological observations and to provide current and forecast meteorological information for optimum operation of weather-sensitive activities like agriculture, irrigation, shipping, aviation, offshore oil explorations, etc.
- To warn against severe weather phenomena like tropical cyclones, norwesters, dust storms, heavy rains and snow, cold and heat waves, etc., which cause destruction of life and property.
- To provide meteorological statistics required for agriculture, water resource management, industries, oil exploration and other nation-building activities.
- To conduct and promote research in meteorology and allied disciplines.

IMD's Role in Agriculture

- Agriculture and farming are mainly dependent on seasons and weather. The temperature matters a lot in that case when it comes to the farming of different kinds of fruits, vegetables, and pulses.
- Occurrences of erratic weather are beyond human control.

It is possible, however, to adapt to or mitigate the effects of adverse weather if a forecast of the expected weather can be obtained in time.

- Crop weather factors require crops and cropping practices that vary across areas within the same season.
- The forecast of the weather event helps for suitable planning of farming operations.
- It helps to **decide whether to undertake or withhold the sowing operation.**
- To irrigate the crop or not, when to apply fertilizer and whether to start complete harvesting or to withhold it are the major components for which forecasting is a must.
- **Climate variability** is something that all farmers need to react upon. Extended periods of dry conditions, commonly known as drought is one of the major impacts in the irrigation system. So if their proper forecast is done chances of losses are way lower than expected.
- Drought can increase daily crop water use due to lower humidity and accompanied by higher temperatures. Managing under the extreme conditions, irrigators need to understand daily and seasonal crop water use patterns, as well as adopt practices and technology which result in good production of crops.

Monsoon Dependency of Indian Agriculture

- The Indian economy is heavily dependent on agriculture and the livelihood of the Indian farmer largely depends on the Monsoon rains.
- Water availability can make a pronounced difference to agricultural output and standard of living.
- The fate of the Kharif crops depend on the performance of the southwest Monsoon.
- Unfortunately, Areas fed by canals and other irrigation account for only 40% of India's net sown area.
- The remaining 60%, which accounts for a substantial part

of agricultural output, is rain-dependent.

- Simply speaking, the Indian economy gains due to good Monsoon rains in the country.
- On the other hand, weak Monsoon rains result in crop failure which affects the economy in a negative manner due to lower production.
- Thus, there is a need for accurately predicting and forecasting weather in India.

- In order to provide direct services to the farming community of the country an exclusive **Division of Agricultural Meteorology** was set up in **1932** under the umbrella of IMD at Pune.
- Its objective is to **minimize the impact of adverse weather on crops and to make use of favourable weather to boost agricultural production.**
- The Division supports and participates in multi-disciplinary activities in this field.
- It is also the centre for research programmes in agricultural meteorology and has field units in various parts of the country.
- Besides, forecasts and advisories for farmers are issued by IMD's Forecasting Offices located at different State capitals.

Services of the Division are :

- **Gramin Krishi Mausam Seva**
 - launched in 2015 by the Ministry **of Earth Science** to provide crop specific advisories to the farmers at the district level.
 - Advisory is **provided twice weekly** through different media like print/visual/Radio/ IT based including short message service (SMS) and Integrated Voice Response System (IVRS) for a wider dissemination.
 - The scheme is implemented by India Meteorological

Department in collaboration with State Agricultural Universities /Indian Council of Agricultural Research etc.

- It **issues crop and location specific weather** based agro advisories for the benefit of the farming community.
- The **Agro-meteorological Advisory Services (AAS)** under the GKMS is operated to prepare bi weekly weather based bulletins.
- Agro-Meteorological Advisory Services (AAS) bulletins are disseminated under PPP mode and through Kisan Portal to about 40.2 million farmers.
- Dissemination of Agromet Advisories
- Feedback & Awareness of Agromet Service
- Training Programme to AMFUs

Recent Initiatives and Achievements:

System of Aerosol Monitoring and Research (SAMAR)

- The IMD launched the System of Aerosol Monitoring and Research (SAMAR) in January 2016 to study the concentration of Black carbon, radiative properties of aerosols, environmental visibility and their climatological impacts.
- It would contain a network of 16 aethalometers, 12 sky radiometers and 12 nephelometers

Digital Cyclone Warning Dissemination Systems (CWDS)

- The year 2020 witnessed five Cyclones, which included two Very Severe Cyclones and the Super Cyclone AMPHAN which affected West Bengal & Odisha.
- The efficient early warning services provided by the IMD and enhanced co-ordination among various Government Agencies helped in minimizing the human casualties and property damage associated with these cyclones.

Mobile App 'MEGHDOOT'

- Mobile App 'MEGHDOOT' provides Agromet Advisory Services to farmers

Air Quality Early Warning System for Delhi

- The Union Ministry of Earth Sciences (MoES) and IMD have launched an advanced Air Quality Early Warning System, which can predict places neighbouring Delhi that are likely to burn crop residue on a given day.
- The air pollution system has been developed jointly by the scientists at the Indian Institute of Tropical Meteorology (IITM), Pune, India Meteorological Department, National Centre for Medium-Range Weather Forecasting (NCMRWF) and National Center for Atmospheric Research (NCAR), Boulder, USA.
- The system uses data of stubble burning incidents from the past 15 years to predict the date and place of the next burning, and help authorities to act in advance.
- The warning system consists of:
 - Real-time observations of air quality over Delhi region and details about natural aerosols like dust (from dust storms) and particulate matter using different satellite data sets.
 - Predictions of air pollutants from two different air quality prediction systems based on state-of-the-art atmospheric chemistry transport models and
 - Warning Messages and Alerts and Bulletins.

Winter Fog Experiment (WiFEX)

- The presence of heavy and extended period fog in the northern regions of India is one of the major weather hazards, impacting aviation, road transportation, economy and public life
- The objectives of the **Winter Fog Experiment (WiFEX)** are to develop better now-casting (next 6 hours) and

forecasting of winter fog on various time and spatial scales and help reduce its adverse impact on aviation, transportation and economy, and loss of human life due to accidents.

- In addition to Indian Institute of Tropical Meteorology (IITM), Pune, India Meteorology Department (IMD), National Center for Medium-Range Weather Forecast (NCMRWF), Airport Authority of India, GMR, Indira Gandhi International Airport and Indian Institute of Science Education and Research (IISER) Mohali are also participating in this **observational campaign**.

Multi-Mission Meteorological Data Receiving and Processing System (MMDRPS)

- Union earth sciences minister launched the Multi-Mission Meteorological Data Receiving and Processing System (MMDRPS) in Jan 2021.
- IMD developed this system in collaboration with ISRO.
- This system is capable to process rapid scan data of INSAT-3DR Imager payload conducted during extreme weather events or cyclones.
- This will result in better monitoring of such extreme weather events in real time.

Radars and satellites used for weather forecast:

- IMD undertakes observations, communications, forecasting and weather services.
- In collaboration with the **Indian Space Research Organisation**, the IMD also uses the **IRS series** and the **Indian National Satellite System (INSAT)** for weather monitoring of the Indian subcontinent.
- IMD was the first weather bureau of a developing country to develop and maintain its own satellite system.
- IMD operates a network of hundreds of surface and glacial observatories, Upper Air (high altitude) stations, ozone and radiation observatories and

meteorological radar stations.

- Additional data is received from India's constellation of satellites, such as **Kalpana-1, Megha-Tropiques and instruments on board the IRS series and the INSAT series** of satellites.
- **KALPANA-1** is an exclusive meteorological satellite. The satellites are monitored and controlled by Master Control Facilities that exist in Hassan and Bhopal.
- **Megha-Tropiques** is a satellite mission to study the water cycle in the tropical atmosphere in the context of climate change

Mould your thought: Why is accurate weather prediction necessary for India? How does IMD help fulfil this need?

Approach to the answer:

- Introduction
- Mention the areas that need weather prediction and its advantages
- Write about the functions of IMD
- Discuss the recent IMD initiatives in weather prediction
- Conclusion