WEATHER DATA COLLECTION AND SHARING FRAMEWORK FOR AGRICULTURE

Gaps and possibilities pertaining to IMD and WINDS scheme

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CONTENTS

IN BRIEF

Weather data serves as a critical socioeconomic driver in India, bridging the gap between scientific observation and ground-level decision-making for different stakeholders. Given India's immense micro-climatic variations, the volume of data generated is enormous. This report assesses the ecosystem of weather data collection and dissemination, focusing on the frameworks of the Ministry of Earth Sciences (MoES) and the Weather Information and Network Data System (WINDS) scheme.

Current frameworks

- **Ministry of Earth Sciences (IMD):** The India Meteorological Department (IMD) is the primary agency for weather forecasting, supported by the Indian Institute of Tropical Meteorology (IITM) and National Centre for Medium-Range Weather Forecasting (NCMRWF) for data modelling. Data is collected via land-based instruments, oceans, and satellites. Sharing is guided by the National Data Sharing and Accessibility Policy (NDSAP) 2012, which promotes access to non-sensitive, government-owned data.
- **WINDS scheme:** Launched in July 2023 by the Ministry of Agriculture & Farmers Welfare, WINDS aims to strengthen infrastructure via a public-private partnership (PPP) model. Its primary objective is to support yield estimation and claim settlements for the Pradhan Mantri Fasal Bima Yojana (PMFBY).

Critical gaps and challenges

The report identifies several systemic barriers that impacts collection and sharing of weather data:

- **Policy delays and ambiguity:** A central gap is that the 'data and information sharing policy' for WINDS, intended to

clarify access and ownership, remains "under formulation" as of February 2026. This delay can lead to the misinterpretation of clauses mentioned in the WINDS manual, 2023 regarding data monetisation and commercial potential.

- **Cost prohibitive historical data:** While alerts are free, IMD's historical datasets are expensive. For instance, daily data for a specific parameter for around 25 years can cost in lakhs and add up if data on multiple parameters is required.
- **Restricted real-time access:** Real-time surface observation data (AWS/ARG) on IMD portals is access-controlled, preventing intermediaries from developing more accurate hyperlocal forecasts.
- **Accuracy and reach issues:** Despite multiple dissemination channels (SMS, mobile applications like Mausam), farmers in some regions report not receiving alerts. Furthermore, IMD's hyperlocal accuracy is limited by station density beyond the district level.
- **Implementation hurdles in WINDS:** The rollout has been uneven. Often, large players are able to clear the eligibility criteria. Many sites allocated for weather stations have been rejected by private partners for failing to meet technical criteria. At times, no Quality Assurance Partners (QAPs) are onboarded to verify data integrity.
- **Dependence on open-source data:** Due to the high cost of local IMD data, private players often use global datasets like the Global Forecast System, which may lack the local granularity needed for robust Indian forecasts.

Conclusion and the way forward

To build a robust weather data collection and sharing ecosystem, the report outlines the following strategic directions:

- **IMD as the quality custodian:** The IMD under the Ministry of Earth Sciences should be closely involved in the WINDS scheme to ensure the quality and integration of all weather data generated in the country, regardless of which ministry/department leads the collection.

- **Access to data for public good:** Data collected under the WINDS scheme using public funds, as well as data generated by the IMD or any other government agency at the national or state level, should reach end-users, like citizens and farmers, in a timely manner. There should be no "data divide" or "information asymmetry" due to pricing of products like forecasts and advisories generated from this weather data.
- **Removing cost barriers:** The IMD should re-evaluate its pricing model for historical datasets to ensure that high cost is not a barrier for data that benefits the end-user like a farmer.
- **Expediting the WINDS policy:** The Ministry of Agriculture and Farmers Welfare should fast-track the notification of the 'data and information sharing policy' to secure farmer interests and prevent the misuse or over-monetisation of public-funded data by private entities.
- **Enhancing dissemination:** Infrastructure needs to be improved to ensure that weather alerts reach all farmers, utilising improved smartphone penetration and indigenous data sources for more hyperlocal data instead of open-source global models which could be less accurate.

INTRODUCTION

The current state of the atmosphere at a particular place is defined as weather.[1] Parameters like temperature, humidity, wind speed or direction, atmospheric pressure, and precipitation define the current state of atmosphere.[2] Such information for a geographically and climatically diverse country like India serves as a critical socio-economic driver, bridging the gap between scientific observation and ground-level decision-making.

This information in its raw form or from the product generated, i.e., weather forecast, serves a diverse set of stakeholders such as related to disaster management, logistics, renewable energy, aviation, and agriculture. For farmers in particular, the hyperlocal forecast on precipitation and temperature change is critical as it helps determine the precise timing for sowing, irrigation, and harvesting. In matters of crop insurance and yield assessment, past and present information on weather plays a crucial role.

With immense micro-climatic variations in a large country like India, the data generated on weather is enormous. It comprises of historical, real-time information and future prediction and caters to intermediaries like those involved in forecasting, crop insurance, agro-weather advisories, scientific community as well as end-users like farmers, disaster management agencies, and the general public.

It is therefore critical to understand how this data is collected and shared by different stakeholders.

This report intends to understand the ecosystem of data collection and dissemination of weather information relevant to the

agriculture sector stakeholders. It assesses the existing framework, government policies and programmes, role of private sector, civil society, and situation at the ground.

The specific aim was to understand the gaps, challenges, and possibilities with respect to a) the terms and conditions of data collection and sharing between stakeholders; b) optimal utilisation of data collected for the benefit of end-user; and c) effectiveness in coordination between stakeholders or departments.

The findings presented are based on secondary research and primary interactions with officials from the agriculture departments of the central and select state governments, the Indian Meteorological Department, the Mahalanobis National Crop Forecast Centre, the Department of Science and Technology, and the National Informatics Centre.

It also includes inputs based on engagements with weather forecasting companies such as Skymet Weather Services Pvt. Ltd, WeatherCast Solutions Pvt. Ltd, CropIn Technology Solutions, as well as institutions like Punjab Agricultural University and the Hume Centre for Ecology and Wildlife Biology, Kerala, in addition to responses received under the Right to Information Act.

DATA COLLECTION AND SHARING BY THE MINISTRY OF EARTH SCIENCES, GOVERNMENT OF INDIA

2.1 DATA COLLECTION AND FORECAST GENERATION

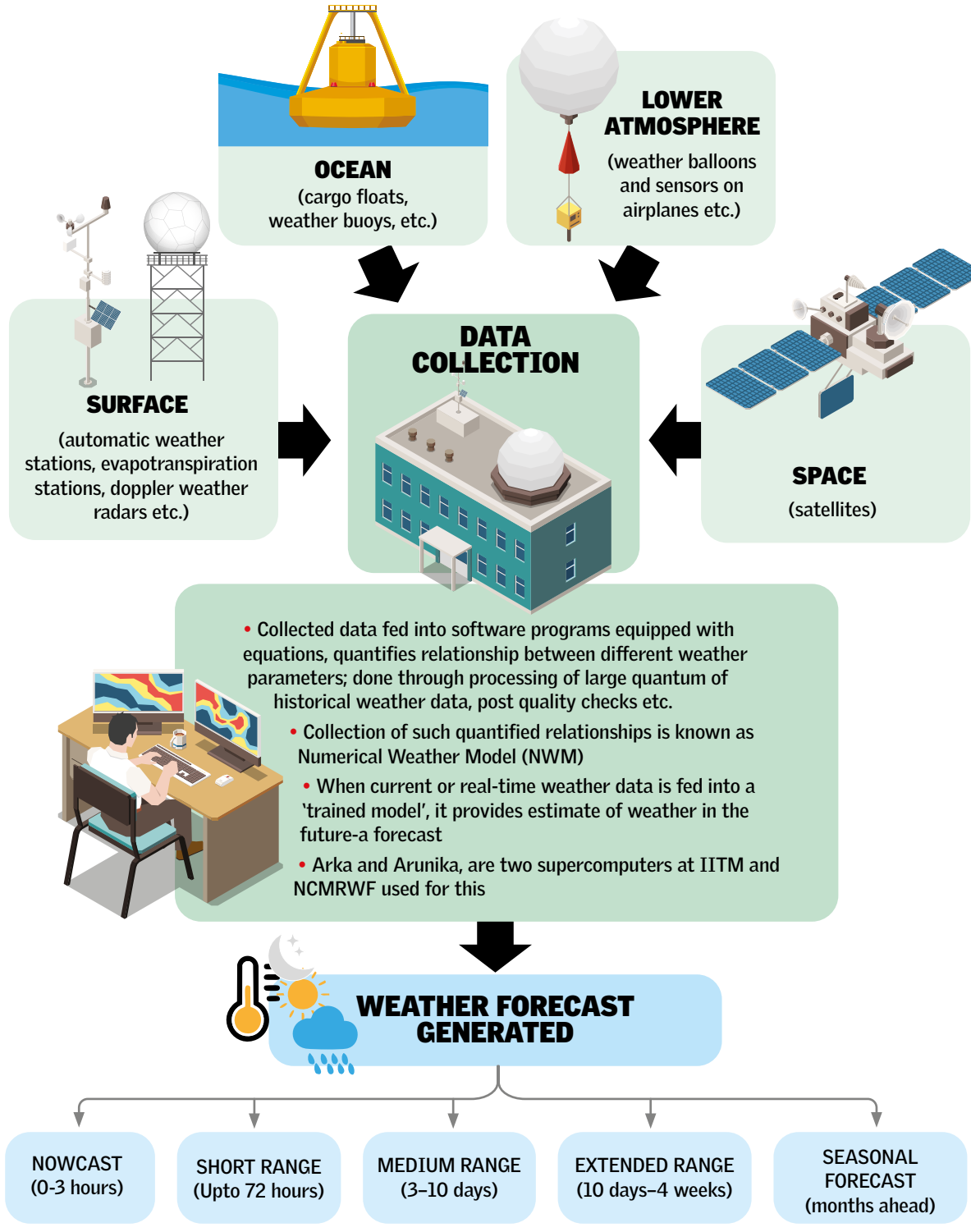
Recording weather parameters like precipitation, wind, and temperature serves as a precursor to an important commodity—'the forecast or the predicted weather'—generated for a specific time and location.

As part of the Ministry of Earth Sciences (MoES), Government of India, the India Meteorological Department (IMD) is the face of weather forecasting, while the Indian Institute of Tropical Meteorology (IITM) and the National Centre for Medium Range Weather Forecasting (NCMRWF) are involved in data collection and modelling, the two key components of 'weather forecasting'.

This data is collected over land surfaces, oceans, lower atmosphere, and from the space. For example, Automatic Weather Station (AWS) measures temperature, humidity, wind speed or direction, and barometric pressure, along with precipitation (rain or snow). Automatic Rain Gauge (ARG) measures the depth of precipitation (rain, snow, or hail) over time.[3, 4] This data is fed into software programs and through the use of Numerical Weather Models (NWM), different types of forecasts are generated *(see Figure 1: Data collection and modelling for weather forecasting under MoES).*

WEATHER DATA COLLECTION AND SHARING FRAMEWORK FOR AGRICULTURE

Figure 1: Data collection and modelling for weather forecasting under MoES



Source: Developed by the research team of this report based on research inputs

In addition, there are several private, academic, and non-government organisations involved in data collection and/or creating forecasts.

2.2 SHARING OF COLLECTED DATA AND GENERATED FORECAST

2.2.1 Policy framework

As per the mandate given to the IMD, they are expected to provide current and forecast meteorological information, warn against severe weather phenomena, and provide meteorological statistics for different purposes.[5]

In addition, the National Data Sharing and Accessibility Policy (NDSAP), 2012 is expected to have influenced data sharing by the IMD. Issued by the Department of Science and Technology, and approved by the Union Cabinet, this policy aimed to facilitate access to Government of India (GoI)-owned shareable data (data collected using public funds), which is non-personal and non-sensitive to promote national planning, research, and development. It required government ministries and departments to identify and publish such datasets on data.gov.in. Currently, the National Informatics Centre (NIC), under the Ministry of Electronics and Information and Technology (MeitY), has ownership of this.[6, 7]

IMD 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, duststorms, 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.

Source: IMD

NATIONAL DATA SHARING AND ACCESSIBILITY POLICY (NDSAP), 2012 (RELEVANT EXCERPTS)

The **principles** on which data sharing and accessibility need to be based include openness, flexibility, transparency, legal conformity, protection of intellectual property, formal responsibility, professionalism, standards, interoperability, quality, security, efficiency, accountability, sustainability, and privacy.

The **objective** of the policy is to facilitate the access to Government of India-owned shareable data and information in both human readable and machine-readable forms through a network of all over the country in a proactive and periodically updatable manner, within the framework of various related policies, Acts, and rules of Government of India, thereby permitting wider accessibility and use of public data and information.

The **scope** of the policy applies to all data and information created, generated, collected, and archived using public funds provided by the Government of India directly or through authorised agencies by various ministries/ departments/organisations/agencies and autonomous bodies.

The **benefits** of the policy include maximising use, avoiding duplication, maximised integration, ownership information, and better decision making.

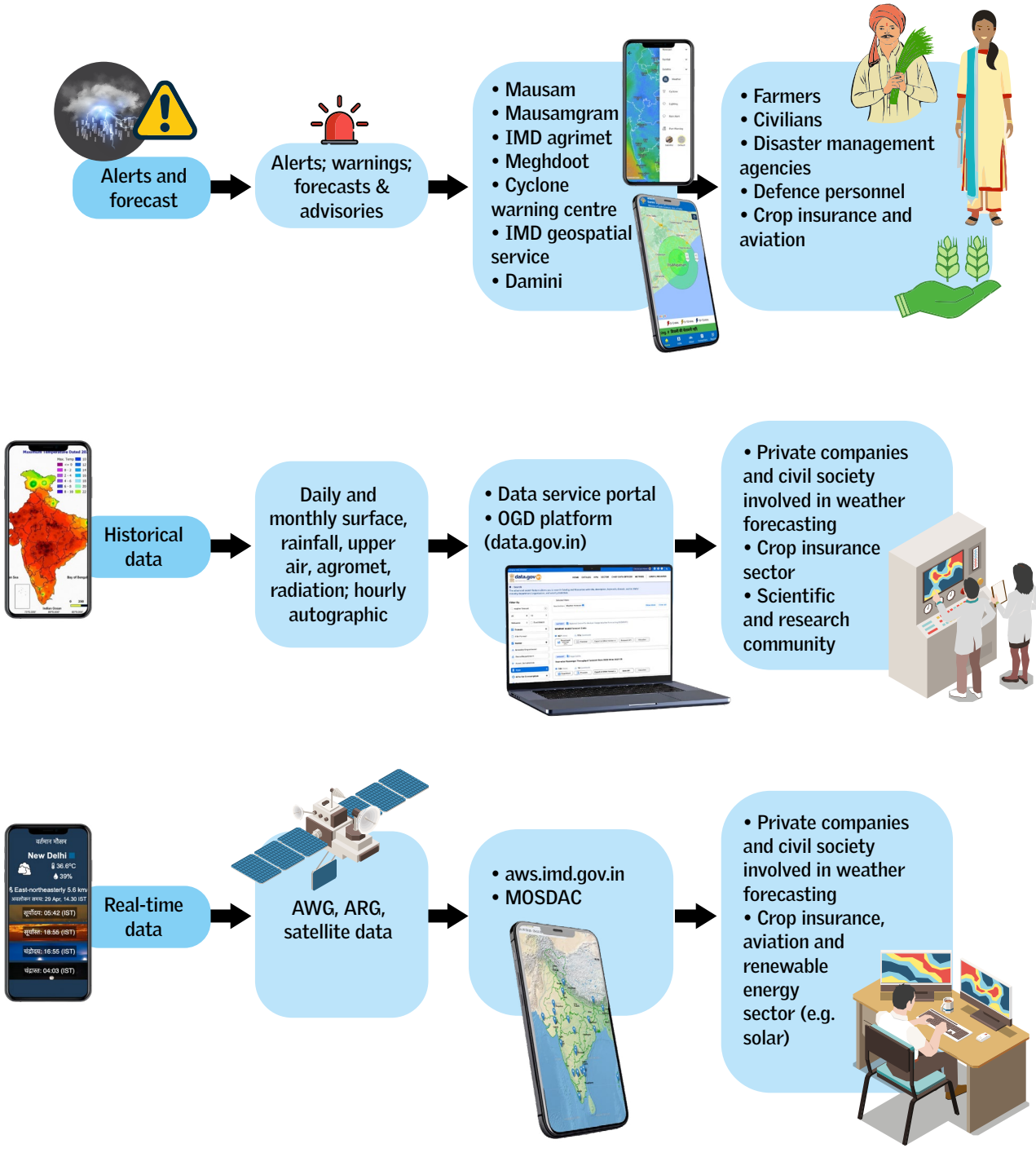
Source: Gazette notification – National Data Sharing and Accessibility Policy (NDSAP)-2012

The National Geospatial Policy (2022) also influences geo-spatial information that IMD collects and shares.[8] The IMD also has to seek approval from the Ministry of Electronics and Information Technology (MeitY) for sharing certain data sets. Additionally, the World Meteorological Organisation guidelines are expected to be followed which then also helps data to be made public.

2.2.2 Operational framework

At the operational level, the collected data (surface, space-satellite, or upper air), alerts and warnings, historical data sets, and real-time data is shared across different websites and mobile applications. This data is available in different formats meant for a wide variety of intermediate users and end-users. Some of this is publicly available, while others are access controlled or priced (see *Figure 2: Few examples of weather data sharing framework of IMD).*

Figure 2: Few examples of weather data sharing framework of IMD



Source: Developed by the research team of this report based on research inputs

Alerts and forecasts

Forecasts, alerts, and warnings are shared based on the 'Standard Operation Procedure – Weather Forecasting and Warning Services' (latest version of 2021), which mentions use of emails, Short Message Service (SMS), social media, websites, All India radio bulletins, telefax, press briefing, and mobile applications as per the section on 'Public Weather Services'.[9] Other SOPs also exist for weather forecasting in specific sectors, such as aviation.

The 'Mausam' website is the IMD's primary public-facing portal. It is designed to provide a comprehensive, real-time snapshot of the country's weather.[10] Other digital websites and mobile applications include 'Mausamgram', 'IMD-Agrimet', 'Cyclone warning centre', 'IMD-geospatial', 'Meghdoot', and 'Damini'.[11, 12, 13, 14, 15, 16]

In addition, there are websites and mobile applications that are not dedicated to weather information but also provide such data. For example, UMANG (Unified Mobile Application for New-age Governance) of MietY and eGramSawaraj of Union Ministry of Panchayati Raj (MoPR) incorporate weather-related information alongside other services.[17, 18]

All these are open to public and free of cost, largely aimed at informing and alerting citizens, farmers, and other stakeholders about real-time and forecasted weather information. However, none of these directly share historical data sets or real-time surface observation data in formats that would enable an intermediary to develop their own forecast.

Historical data sets

The historical data set repositories are made available on the Data Service Portal. However, this data is not free of cost and each data point for a particular type or duration is separately costed. In line with the requirement, the total cost is added up. Depending upon the stakeholder type, there are some provisions for price waive offs.[19]

For example,

- 100 per cent data charge is applicable for commercial use including, private institutes, companies, Public Sector Undertaking (PSUs), banks, non-governmental organisations (NGOs), private research institutes, individuals, media, foreign organisations, and foreign educational institutes.
- 50 per cent concession is applicable for Indian universities, faculty, students, and researchers (above post-graduation).
- These charges are completely waived off only for serving government officials at the national and state level and students (up to post graduation).

The data available for purchase includes 'daily' and 'monthly' surface, rainfall, upper air, agromet, and radiation. Autographic data is available 'hourly'. Data from sources like satellites and oceans is not available at this portal. The cost of each data record can add up to a very high amount, if adequate number of data records are to be purchased, such as for modelling *(*see *Table 1: Data format and model cost estimation).*

Table 1: Data format and model cost estimation

Data type	Cost per daily data record (Rs)	Total cost of daily data record for 25 years (Rs; 9,125 records)*
Surface	8	87,859
Rainfall	53	5,68,090
Autographic (hourly)	8	20,81,461 (2,19,000 records)
Upper air (Pilot balloon)	27	2,94,595
Upper air (Radiosonde)	52	5,59,476
Upper air (Radiowind)	52	5,59,476
Agromet	10	1,12,624
Radiation	14	1,49,233

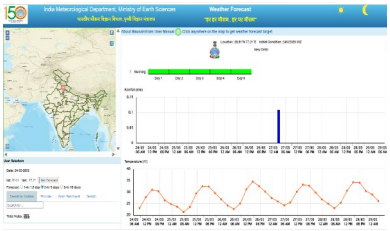
Source: Developed by the research team of this report based on information at the IMD data service portal (accessed on March 2026); *including processing charges and 18 per cent GST

WEATHER DATA COLLECTION AND SHARING FRAMEWORK FOR AGRICULTURE

IMD WEBSITES AND MOBILE APPLICATIONS (EXAMPLES)

Mausam (website and mobile application)

Mentions sub-district level alerts and warnings, realised weather and specialised forecasts (thunderstorm, flash flood, etc.) as well as high-resolution animations from Indian National Satellite System (INSAT) satellites and Doppler Weather Radars (DWR). It hosts links for services like agromet advisory, aviation, geospatial, and cyclone warnings.

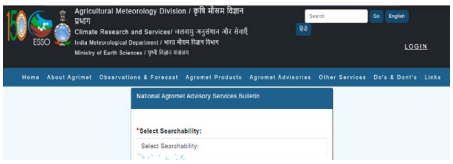


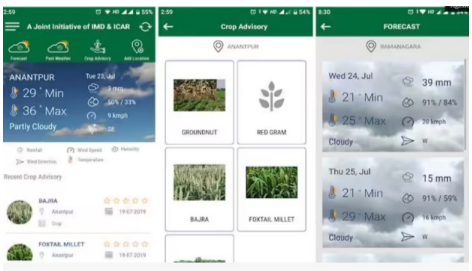
Mausamgram (website and mobile application)

Specialised platform for hyperlocal, village-level weather forecasting (available on an hourly, three-hourly, and six-hourly basis up to next ten days); has real-time localised alerts and warnings for severe weather events as well.

IMD Agrimet (website)

Provides agromet advisories (national, state, and district) which include weather forecast; also has specialised agromet products like NDVI (Normalised Difference Vegetation Index) and VCI (Vegetation Condition Index), etc.





Meghdoot (mobile application)

Provides crop advisories, current weather information, and past weather data for last seven to ten days and forecasted weather information of five days.

DAMINI (mobile application)

Specialised mobile tool to monitor lightning activity across India; provides GPS based, real-time alerts within a 20–40 km radius, offers three-hour advance warnings, displays live lightning maps, and includes safety instructions.

Source: Collated by the research team of this report

Some of this historical data (such as monthly data) is publicly available on the open government data platform of India, i.e., data.gov.in, as well as on the data service portal. Typically, intermediaries prefer granular daily data for forecasting and modelling.

Real-time data

Data recorded from the last minutes and up to a few hours can be understood as real-time data. It is operational and can be used for forecasting. The surface observation data, that of AWS and ARG is available on the IMD's website (aws.imd.gov.in). However, access to such data on this portal is controlled and needs login-id details.

While satellite-based images are available at IMD's Mausam, some API based satellite data—which could be used by intermediaries—is available at the Meteorological & Oceanographic Satellite Data Archival Centre (MOSDAC) website of the Indian Space Research Organisation (ISRO).[20]

For upper air, the real time information is accessible on the upper air instruments division website, i.e, ddgmui.imd.gov.in/ual/#, and its details are login ID password protected.[21]

2.3 GAPS AND POSSIBILITIES IN WEATHER DATA SHARING FRAMEWORK OF IMD

Clarity is needed on sharing data other than related to weather forecasting and warning services

While the IMD's mandate is to provide data related to forecasts and warnings, meteorological statistics and promote research, it has a clear standard operating procedure (SOP) laid out only for sharing weather forecasting and warning services. It does not have a similar guidance in public domain, which specifies what type of historical or real time data the IMD should share with different stakeholders. At present, such discussions are held internally and with other departments or ministries.

The reach and accuracy of alerts and weather forecasts (such as those for farmers) needs to be improved

While the SOP for weather forecasting outlines several means of dissemination, the ground reality differs. For instance, in a study conducted by the Centre for Science and Environment (CSE) in 2025 across select north-Indian states, certain farmers and KVK scientists highlighted that they have not been getting SMS alerts from mKisan—a portal that enables government agricultural organisations to send SMS alerts to farmers. While platforms such as WhatsApp and social media are considered effective, their full potential remains to be underutilised and can be adequately leveraged, for example, by improving connectivity. Moreover, the warm-blooded dissemination tools should also be enhanced.

Additionally, the forecasts currently being shared (such as through Mausamgram) have limited accuracy when it comes to hyper-local forecasting, which could be linked to the IMD's limited weather station infrastructure beyond the district level.

Real-time observation data should be available in the interest of end-user

Real-time data from AWS and ARGs, available on aws.imd.in, is access controlled. It is not sold and is largely accessible to senior government officials. Till few years back, it was publicly available (updated every 15 minutes) but the practice has since been discontinued, citing security reasons.[22] This data along with other real-time observations (such as satellite-based, doppler weather radars), if available in the required format (not maps and animations), could be useful for intermediaries.

For example, a small–medium scale weather forecasting company with limited in-house weather stations but with a technology to generate effective hyper-local forecast would benefit from such data. Such organisations have highlighted that if real-time raw data is not possible due to security concerns, an intermediate form with basic analysis would still hold immense value. Similarly, civil society organisations with extensive reach at the local level and a capability to generate hyper-local forecast and advisories will also

be able to help end-users, such as farmers, if they get access to such real-time data. On the other hand, big companies, having their own web of weather stations, might not solely rely on this data.

Historical data sets need not be cost-prohibitive

As illustrated above and highlighted by multiple stakeholders across the private sector, government, and research institutions, sourcing historical data from the IMD's data service portal is expensive, particularly if data for adequate years is required. A robust model or extensive research requires a comprehensive set of data for several years, and with the current costing, access to this data can be cost-prohibitive. There were instances highlighted by small organisations wherein the cost of their contract was lower than cost of data from the IMD. This means that only big companies can afford this expensive data to develop and sell products on their own terms.

Open-source data, commonly used as a substitute, can compromise forecast accuracy

With limited access to IMD data—due to restrictions, high cost or inappropriate format—private sector companies, like those involved in developing forecasts, tend to use the open-source data, such as from the Global Forecast System and WorldClim.[23,24] This data, which is easily and freely available may not capture local observations comprehensively, thereby compromising on the robustness of the hyperlocal forecast reaching the end-user. On the other hand, years of data captured in the IMD repository comprising local weather observations can potentially provide a comprehensive base for an accurate forecast.

OPEN-SOURCE DATA USED BY PRIVATE SECTOR

Global Forecast System is one of the most commonly used data sets by private players. It is a weather forecast model of the National Centers for Environmental Prediction (NCEP), which generates data for dozens of atmospheric and land-soil variables, including temperatures, winds, precipitation, soil moisture, and atmospheric ozone concentration.

It is used to get the 'initial state of atmosphere', which is the precise, real-time snapshot of atmospheric conditions (temperature, pressure, humidity, and wind) across the globe, captured by sensors on ground stations, satellites, balloons, and aircraft.

WorldClim is another example used for historical global climate that is gridded data, such as on temperature, precipitation, and solar radiation. This is often combined with sources like European Centre for Medium-Range Weather Forecasts (ECMWF) for reanalysis with datasets like ERA5. Other examples include Kaggle datasets, National Centres for Environmental Information (NCEI) of the National Oceanic and Atmospheric Administration (NOAA), and Weather Underground.

Source: Collated by the research team of this report

WEATHER INFORMATION NETWORK AND DATA SYSTEM (WINDS)

The existing weather infrastructure in India is not uniform among the states with respect to granularity, number of parameters measured, and timeliness of the available data. As a result, weather data utilisation in the agriculture sector is skewed and the existing datasets are not effectively utilised due to limitations of quality and access.[25]

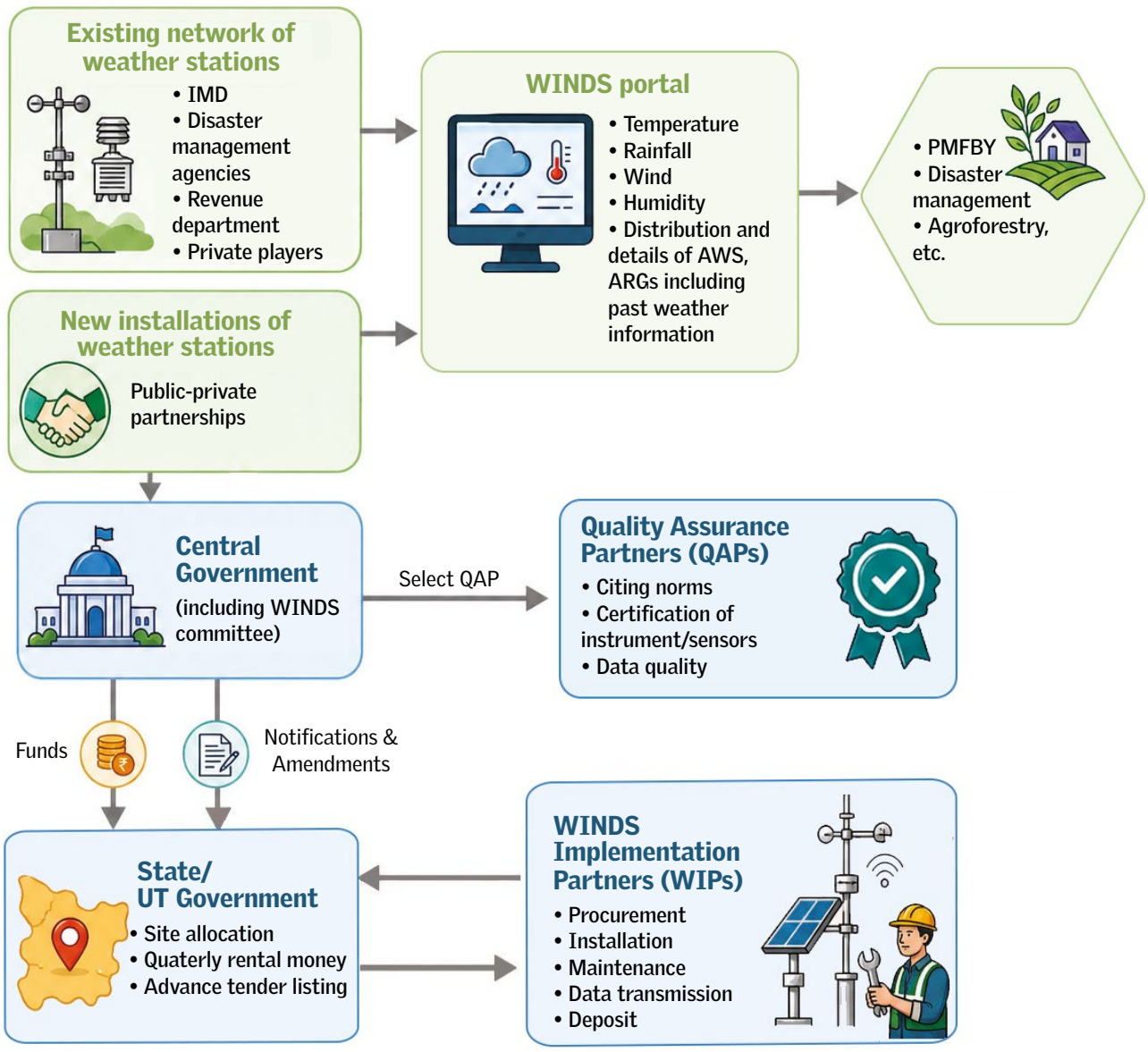
In July 2023, the Department of Agriculture & Farmers Welfare (DA&FW), Ministry of Agriculture & Farmers Welfare (MoA&FW), came up with the Weather Information Network and Data System (WINDS) scheme to strengthen weather data infrastructure in the country and provide quality data at a single digital platform.[26]

The scheme primarily aimed to support yield estimation and claim settlement processed in the Pradhan Mantri Fasal Bima Yojana (PMFBY). In the future, the weather data generated is also expected to inform other aspects such as disaster management, agro-forestry, etc.

3.1 DATA COLLECTION FRAMEWORK

The operational guidelines of WINDS are laid out in WINDS Manual, 2023. A WINDS committee—comprising members from different departments, such as the IMD, ISRO, Department of Agriculture at the centre, and of a few states—oversees the overall execution and monitoring of the WINDS scheme. The Mahalanobis National Crop Forecast Centre functions as the secretariat of this committee.[27] Insurance companies are also a stakeholder in this scheme.

Figure 3: Data collection in WINDS



Source: Developed by the research team of this report based on research inputs

3.1.1. Public-private partnership

WINDS, through the public-private partnership (PPP) approach, aims to install an Automatic Rain Gauge (ARG) in each gram panchayat and Automatic Weather Station (AWS) in each block/ tehsil in the country. It also plans to integrate existing infrastructure

of the IMD, various state governments, and other public and private technical organisations.[28]

For new installations of weather stations, a memorandum of understanding (MoU) is signed between the respective state department of agriculture and the private company that has won the tender and is now a WINDS implementation partner (WIP) for a period of five years (extendable to seven). The responsibility of conducting a survey of allocated site, installation of weather station and its maintenance is with the WIP. In a similar process, a Quality Assurance Partner (QAP) would be selected by the Government of India, through the WINDS Committee *(*see *Figure 3: Data collection in WINDS).*

3.1.2 Financial arrangement

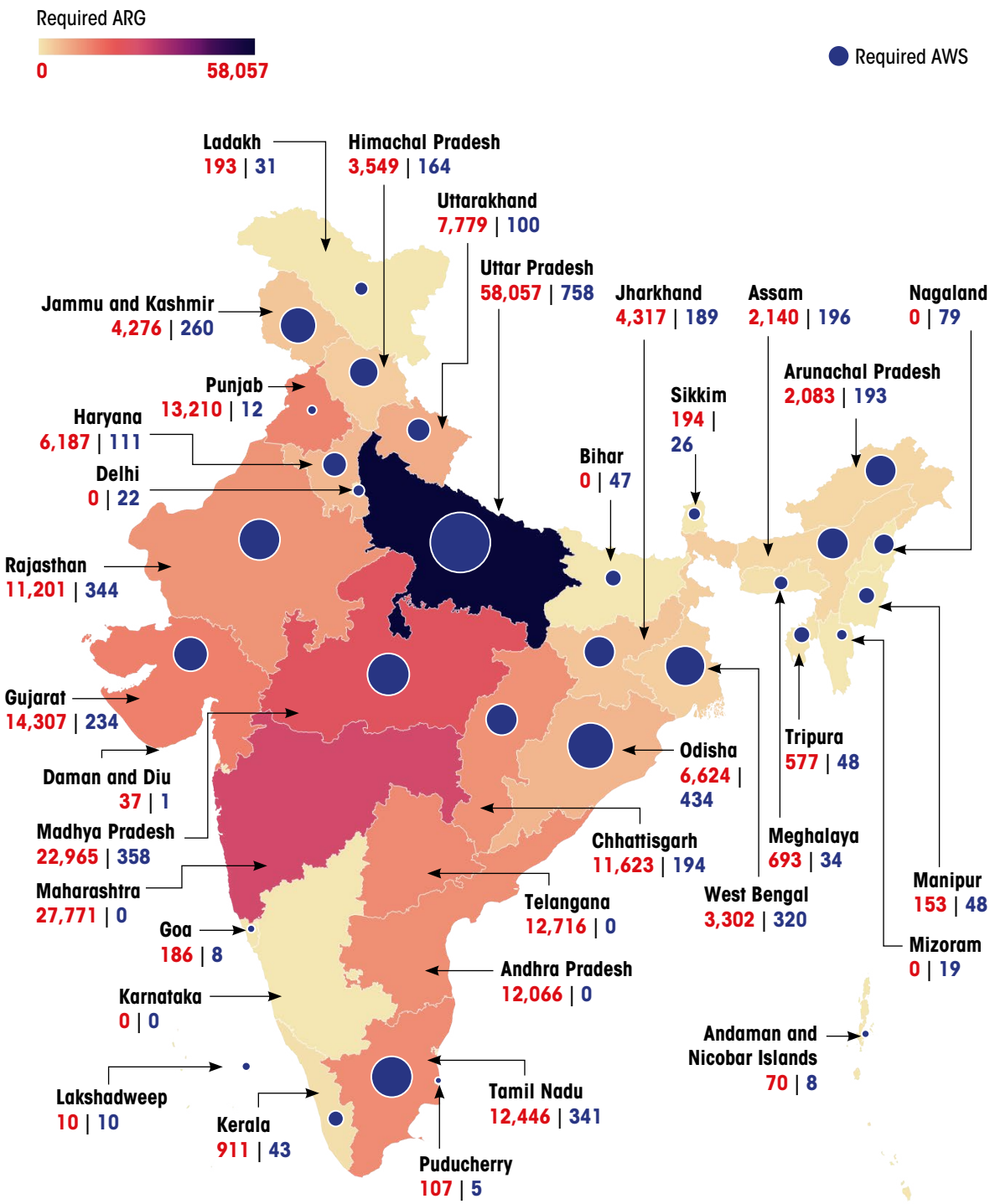
The budget for WINDS is allocated from the Fund for Innovation and Technology (FIAT) established under the Pradhan Mantri Fasal Bima Yojana (PMFBY), for technology improvement in insurance scheme. The approved budget for the FIAT in January 2025 was Rs 824.77 crore.[29]

The cost of implementation of the WINDS is borne by the central government, with 90 per cent share in the first year, followed by 80 per cent, 60 per cent and 50 per cent in subsequent years (apart from north-eastern and Himalayan states). The baseline year for this arrangement is the year when the government released the scheme—2023. Therefore, states that join the scheme at a later stage have to pay more funds.

3.1.3 Status: WINDS implementation

The total estimated new installations are 2,39,750 ARG and 4,637 AWS across states and union territories in India. There are ten states or UTs wherein more than 10,000 ARG are to be installed and 15 states or UTs with more than 100 AWS planned (see *Map 1: State-wise weather installations required*).

Map 1: State-wise weather installations required



Source: WINDS manual

Till March 2026, the WINDS portal captured data from only 14,097 installations (ARG+AWS).

WINDS is currently operational in only a few states. As of October 2025:

- Ongoing surveys or installations (six states/UT): Uttar Pradesh, Kerala, Odisha, Himachal Pradesh, Assam, and Puducherry
- WIPs selected (four states): Rajasthan, Uttarakhand, Maharashtra, and Chhattisgarh
- WIP selection process ongoing (two states): Madhya Pradesh and Jharkhand
- GAP analysis ongoing (two states): Tamil Nadu and Haryana

WINDS implementation in Uttar Pradesh

The state of Uttar Pradesh has 75 districts, 826 blocks, and about 57,695 gram panchayats. It is the fourth largest state with an area of 240,928 square kilometres. As per WINDS, 308 AWS and 55,570 ARG are required in the state[30, 31] *(see Table 2: Existing and required ARG and AWS in Uttar Pradesh).*

Table 2: Existing and required ARG and AWS in Uttar Pradesh

	Established by Revenue board	Established by IMD	Installations required as per WINDS	Total
AWS at blocks	450	68	**308**	826
ARG at Gram Panchayat	2000	132	**55570**	57702

Source: Official document shared by UP state agriculture department

Skymet Weather Services Pvt. Ltd and Obel Systems Pvt. Ltd are the two selected WIPs, which are given the contract to install similar number of weather stations. However, Obel System Pvt. Ltd is facing some legal issues regarding the performative deposit and has not yet been allowed to move forward *(see Table 3: Distribution of AWS and ARG within WIPs).*

Table 3: Distribution of AWS and ARG within WIPs

Skymet Weather Services Pvt Ltd	39 districts (cluster 1) total 157 AWS and 27,487 ARG
Obel Systems Pvt. Ltd	36 districts (cluster 2) total 151 AWS and 28,083 ARG

Source: Official document shared by UP state agriculture department

The tender budget of installations is about Rs 800 crore, which is evenly spread between the two WIPs. This cost is split between central and state government as per the WINDS manual. With an appeal from the state agricultural department, the central government has shifted the baseline year to 2024–25, as the required information for a state to carry out WINDS had not been shared at the time.

The payment of about Rs 400 crore to a WIP is to be released per quarter over a period of five years (with a total of 18 quarters). About 20 per cent of the total payment is to be paid in advance to the WIP, who is required to deposit about Rs 10 crore as a security.

The average cost of AWS and ARG installation with the civil work is around Rs 2 lakhs and Rs 1.3 lakh respectively. Installation cost of 157 AWS and 27,487 ARG therefore comes out to be Rs 360 crore. As of December 2025, only 13 ARGs had been installed by Skymet in the state.

AWS installed in Lucknow

Image credit: CSE

By the same time, the state government had selected sites for 11,846 ARG and 88 AWS. Upon awarding the tender to the WIP, survey and installations were to start and completed within three months. The location for the new installations is allocated on government land given by the state governments to the WIPs. However, often sites allocated by the state governments are being rejected by WIPs as they do not fulfil the criteria mentioned in the WINDS manual for installation. No quality assurance partner (QAP) has been onboarded yet.

WINDS implementation in Kerala

With 14 districts, around 150 blocks and 940 gram panchayats, Kerala requires 911 ARG and 43 AWS.

Table 4: Existing and required ARG and AWS in Kerala

	Blocks	Panchayat	Existing network (IMD)		Required network	
Kerala			ARG	AWS	ARG	AWS
	152	941	30	109	**911**	**43**

Source: WINDS manual

INGEN Technologies, a subsidiary of Weather Risk Management Services Pvt. Ltd (WRMS), is the WIP for the five-year implementation plan (2024–2029), with an allocated budget of about Rs 16 crore. WRMS, incubated at IIT Kanpur in 2004, currently has operations across 22 states in India. It sells localised weather data to companies, helps compute weather-based insurance packages for farmers, and calculates risk to crops from weather anomalies.[32] No quality assurance partner (QAP) has been on-boarded yet in the state.

3.2 DATA SHARING FRAMEWORK

3.2.1 WINDS manual

The WINDS manual, 2023 mentions few clauses which suggest certain aspects of data collection and sharing as part of the WINDS scheme. However, based on stakeholder interactions, there are specific insights which also highlight gaps and possibilities *(see Table 5: Stakeholder concerns on relevant clauses in the WINDS manual).*

Table 5: Stakeholder concerns on relevant clauses in the WINDS manual

Clause in the WINDS manual	Stakeholder concerns
'Government of India (GoI) shall facilitate the operationalisation of AWS/ARG network under WINDS with private player participation on the basis of 'renting of data' i.e., final payment shall be linked to the data received at the WINDS portal, maintained by DA&FW. Data generated from AWS/ARGs under WINDS shall be directly sent to the WINDS portal as per the data and information sharing policy of WINDS.'	• The ownership of the installed equipment rests with WIP. • The payment to be made by the government is subject to the quality of the data generated. The average monthly rent for AWS data is Rs 3,000 and for ARG data is Rs 2,500. • There is no clarity on data sharing after five years (or seven years), as the WIP needs to share data only for the contract duration. • As of March 2026, the data and information sharing policy—which was proposed to be developed in the WINDS manual—is not yet ready. It creates a gap in interpretation of this and other clauses, dependent on the upcoming policy.
'The WIPs can explore the commercial potential of the weather data generated through AWS/ARG network installed and maintained by them under WINDS.'	• One of the potential ways in which private WIP can use this raw data is to feed into their own numerical weather models/modelling, thereby generating a hyperlocal forecast, which can be sold to end-users like farmers or companies of other sectors. They can also create weather-based advisories based on this forecast to sell these. • Another way is to sell this data (raw or in a desired format) to another forecasting company or any other company or organisation in a sector for which the data/forecast is useful.
'However, WIPs shall not provide any data to any entity specifically restrained by the GoI. Further, data of stations/area notified by the IMD or any other Government body as classified, shall also not be shared by the WIPs. The same shall be described in the data and information sharing policy of WINDS, to be notified separately by the WINDS Committee.'	• There is a possibility that the WIP can still share the forecast or any other product generated from this data, if not the raw data. • As of March 2026, the data and information sharing policy—which was proposed to be developed in the WINDS manual—is yet not ready. It creates a gap in interpretation of this and other clauses, dependent on the upcoming policy.
'The GoI and the State/UT Governments shall have the liberty to use the data generated under WINDS for public purposes, including but not limited to, implementation of welfare and development schemes, research and development works, developing weather advisory/agro-meteorological advisory, disaster management or for any other purpose involving larger public interest through Central/State/UT Government bodies or any other public institution including IMD, etc.'	• So far, it appears that the sole purpose of this data is to help PMFBY. There seems to be some discussion around developing an integrated platform (beyond WINDS) to bring all weather data on one portal.
'The WINDS data shared by GoI with any entity shall not be used for any other purpose or shared with any third party or monetised by such entities.'	• The Government of India wants to be sure about who uses this data and how it is utilised. It aims to prevent situations wherein the data shared by any other entity may be misinterpreted or misused. The GoI also prefers to retain control over its dissemination.
'The weather data generated through AWS/ARG network under WINDS shall be hosted on an access-controlled WINDS portal and shall be shared with the concerned stakeholders, free of cost, as per the data and information sharing policy of WINDS, to be notified separately by the WINDS Committee.'	• Data on the WINDS portal can be accessed by individuals free of cost. However, it is not available in the format which an intermediary can utilise.

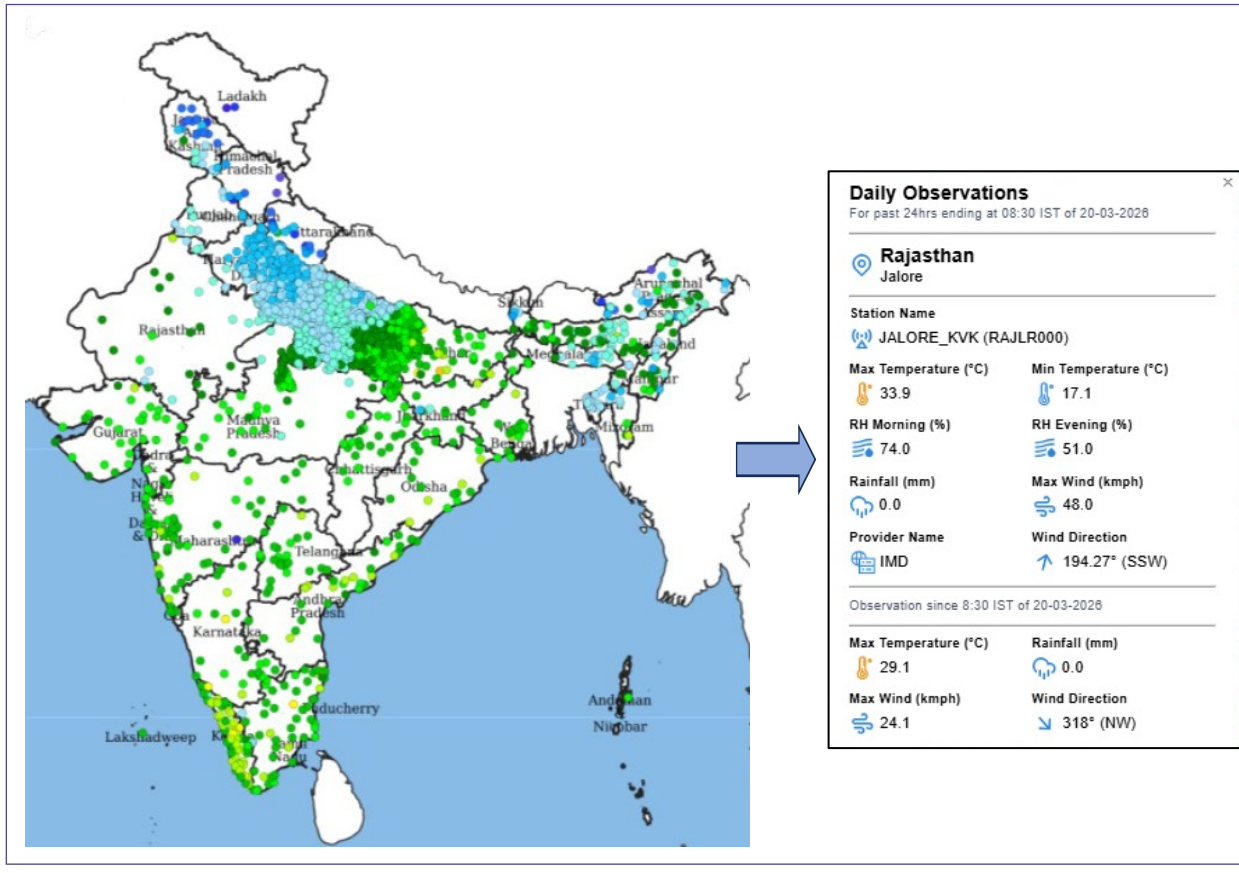
Source: Developed by the research team of this report based on information in WINDS manual and stakeholder interaction

3.2.2 WINDS portal

The WIP is expected to send data generated from AWS and ARG directly to the WINDS portal. The QAP is to undertake a third-party quality assessment of the AWS/ARG network and the resulting data, as per the quality protocols defined.

The WINDS portal provides real-time data from AWS, ARG, and, in some states Agro-AWS (which additionally measures soil conditions) and is publicly accessible to all. Additionally, it also gives access to data from previous days[33] *(see Map 2: Data display on the WINDS portal).* This portal is constantly being updated. For example, information like the number of AWS/ARG in a state is no longer available.

Map 2: Data display on the WINDS portal



Source: WINDS portal

3.3 GAPS AND POSSIBILITIES IN DATA COLLECTION AND SHARING

Data and information sharing policy is yet to be developed and notified

First and foremost, the data and information sharing policy mentioned in the WINDS manual, 2023 has yet to be developed and notified. A response obtained under the Right to Information Act from the Ministry of Agriculture and Farmers Welfare, dated February 3, 2026 suggests that the policy is "under formulation" and "as the policy is under development, the minutes of meeting will be scheduled following the development of the same".

There is a clear delay in the development of this policy and its notification, even as the WINDS infrastructure is being set up and the data is being shared on the WINDS portal. Additionally, no subcommittee for the same has been formulated yet.

Clauses in the WINDS manual can be misinterpreted in the interim

In the event of the delay in the data and information sharing policy, certain clauses (as mentioned above) are applicable until the desired policy is notified. These clauses contain certain open ends that may be subject to varying interpretations, that affect the access, accountability, quality, and ownership of the data generated under the WINDS scheme.

Several such examples are highlighted in the table above *(see Table 5: Stakeholder concerns on relevant clauses in the WINDS manual).*

Limited number of WINDS implementation partners

Stakeholders have highlighted that the eligibility criteria specified by the WINDS committee for WIPs is such that large players can apply, despite some recent amendments. In addition, stakeholders

highlighted they could not access tenders in the public space. As observed in states such as Uttar Pradesh and Kerala, there are only one or two WIPs in the entire state, which also helps them in accessing weather data of a large or entire part of state.

There are also concerns highlighted about the overall profits accruing to big companies from data that is intended to serve the public good. These concerns arise in two ways: first, as part of the money received by the government as rent; and second, through the commercial monetisation of the generated data. The latter may directly or indirectly impact the affordability of this data (meant for public good) for end-users, such as farmers.

Quality of incoming data from WINDS could be a concern

As per the WINDS committee, the raw surface observation data generated under the WINDS is also to be shared with the IMD for calibration and processing. However, stakeholders have expressed potential concerns about the quality of this data. These concerns stem from factors such as the installations of these stations not being in line with global standards and the non-appointment of QAPs to check quality of data. Most importantly, the IMD should be convinced by the quality of this data generated, as they will be able to use it for several good public purposes going forward; for example, in generating more accurate hyperlocal weather forecasts and advisories.[34, 35]

CONCLUSION AND WAY AHEAD

A robust ecosystem for weather data collection and sharing—supported by a sound policy framework and effective on-the-ground implementation—will be extremely critical for India, considering its climate diversity and the impact it may have due to varying adaptive capacities across different sectors and populations. This is particularly critical for agriculture due to a high degree of vulnerability of the Indian farmers, most of whom are smallholders.

The existing system is improving and is stronger than before; however, certain gaps remain to be addressed. With new and upcoming policies and infrastructure which is being developed, there is a scope of timely improvement. Considering that the two different ecosystems assessed in this report—IMD and WINDS— are led by different ministries yet exhibit linkages and interdependence, the following set of broad principles for the way forward pertain to both and should be considered.

IMD should be responsible for ensuring the quality and integration of weather data generated in the country.

- *IMD should be closely involved in ensuring the quality of WINDS data generated,* though the WINDS scheme is led by the Union Ministry of Agriculture and Farmers Welfare. Quality data includes aspects such as the location of weather stations and reporting of data generated.

- *IMD should also lead integration of all weather data,* such as data generated through WINDS scheme and beyond.

- *The Ministry of Earth Sciences, through the IMD, should be assigned overall responsibility* with the final authority, on

matters related to both the quality and integration of weather data generated in the country.

- Dissemination of such data can be led by different ministries, along with their respective local counterparts and collaborators.

Accurate and timely weather data should reach end-users, like farmers and citizens, at no cost.

- *Access to data for public good.* Data collected under the WINDS scheme using public funds, as well as data generated by the IMD or any other government agency at the national or state level, should reach end-users, like citizens and farmers, in a timely manner. This should be the case even if intermediaries are involved such as in the case of WINDS data. There should be no "data divide" or "information asymmetry" due to pricing of products like forecasts and advisories generated from this weather data. The upcoming 'data and information sharing policy' of the WINDS, should ensure this provision.

- *IMD, at the central level and through its regional and local centres, should continue to strengthen its efforts to improve the accuracy of weather data.* This includes improving ground-level infrastructure and indigenous data sources, use of which should be encouraged instead of relying on open-source data that may not support accurate hyperlocal forecasts.

- *The IMD should also ensure the timely dissemination of alerts, warnings, and forecasts for farmers* to safeguard their productivity and livelihoods, which should be the end goal for an agrarian economy like that of India.

- *The issue of cost barrier on the historical data sets of the IMD, as well as the access control on real-time data, needs to be addressed by the IMD.* While the concerns related to security or misuse by intermediaries should be recognised, they should not result in pricing structures that restrict access barrier for end-users. A balanced approach is essential.

- *IMD should put together the guidance it follows, related to data and information sharing and put out in the public domain,* such as done in the case of SOP for weather forecasts and alerts.

The upcoming 'data and information sharing' policy as per the WINDS manual should secure farmers' interests.

- *The Ministry of Agriculture and Farmers Welfare should expedite the development and notification of this policy.* In consultation with relevant stakeholders and close involvement of IMD, the upcoming policy should ensure generation of quality data which should be integrated with other such data in country. The policy should also ensure that the private players or intermediaries do not misuse this data or monetise it in a way that jeopardises the interest of farmers, whether directly or indirectly.

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Weather data serves as a critical socioeconomic driver in India, bridging the gap between scientific observation and ground-level decision-making for different stakeholders, particulary in agriculture. Given India's immense micro-climatic variations, the volume of data generated is enormous.

This report assesses the ecosystem of weather data collection and dissemination, focusing on the frameworks of the Ministry of Earth Sciences (MoES) and the Weather Information Network and Data System (WINDS) scheme, while identifying key gaps and outlining pathways for strengthening the system going forward.

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