

Report of the Workshop on “Enhancing Participatory Weather and Water Level Observation in Kerala”

Organised by: Kerala State Disaster Management Authority (KSDMA)

Dates: 15 & 16 October 2025

Venue: Pazhassi Raja College, Wayanad



Kerala State Emergency Operations Centre (KSEOC)
Kerala State Disaster Management Authority (KSDMA)
Observatory Hills, Vikas Bhavan P.O
Thiruvananthapuram, Kerala – 695033

Executive Summary

The Kerala State Disaster Management Authority (KSDMA) organised a two-day workshop titled *“Enhancing Participatory Weather and Water Level Observation in Kerala”* on 15 and 16 October 2025 at Pazhassi Raja College, Wayanad. The workshop was conducted with the objective of strengthening the Participatory Weather Monitoring Network in Kerala by promoting standardised, scientific, and coordinated weather and water level observations through active stakeholder participation.

The workshop brought together independent weather observers, academic institutions, students, volunteers, civil society organisations, start-ups, and representatives from key government departments. The programme focused on addressing existing challenges such as non-uniform observation practices, partial non-adherence to India Meteorological Department (IMD) standards, inconsistencies in observation timing, and gaps in data-sharing mechanisms.

The inaugural session set the context by emphasizing the importance of people-centric weather observation systems for disaster risk reduction in Kerala. This was followed by a panel discussion on the Kerala Model of participatory weather observation, which highlighted the complementary roles of official agencies, academia, and civil society in building a reliable and inclusive monitoring ecosystem.

Technical sessions conducted by IMD experts and other stakeholders provided insights into IMD’s weather services, standard observation practices, the operational possibilities of the proposed Wayanad weather radar, and the application of participatory observation models such as the Wayanad Disaster Management Suite. Sessions on LoRaWAN-based weather and UV monitoring, KaWaCHaM early warning systems, and case studies from citizen-led initiatives demonstrated the practical integration of technology, community participation, and disaster preparedness.

A hands-on training session on weather observation strengthened the technical capacity of participants, while detailed discussions were held on the conceptual design and requirements of a unified data portal for participatory weather and water level observations. Based on these deliberations, KSDMA proposed to take forward the development of a standardised platform to facilitate seamless data sharing and integration with official systems.

On the second day, participants undertook a field visit to the KaWaCHaM warning system site at Meppadi and the Mundakkai–Chooralmala disaster-affected areas, providing practical exposure to early warning mechanisms and field-level disaster risk management practices.

Overall, the workshop reinforced the importance of standardised participatory weather observation in strengthening disaster preparedness and risk reduction in Kerala, and laid the foundation for enhanced collaboration, capacity building, and the development of a unified observation and data-sharing framework.

1. Background and Objectives

The Kerala State Disaster Management Authority (KSDMA) organised a two-day workshop titled “*Enhancing Participatory Weather and Water Level Observation in Kerala*” with the objective of strengthening the Participatory Weather Monitoring Network in the State. The workshop formed part of KSDMA’s continued efforts to promote people-centric weather observation systems and enhance weather literacy for effective disaster risk reduction.

Kerala has witnessed the emergence of multiple participatory and institutional weather observation initiatives involving government departments, academic institutions, civil society organisations, independent observers, and technology partners. While these initiatives have significantly enhanced spatial coverage and local-level observations, challenges persist due to non-uniform observation practices, partial non-compliance with IMD standards, lack of synchronised observation timings, and inconsistencies in data sharing.

The workshop aimed to address these challenges by bringing together key stakeholders for technical deliberations, capacity building, and consultations. A key outcome envisaged was progress towards standardisation of observation practices and initiation of discussions on the development of a unified digital platform for participatory weather and water level data integration, on the lines of the Wayanad Disaster Management Suite model.

2. Overview of the Workshop

The workshop was conducted over two days. The first day focused on inaugural proceedings, panel discussions, technical sessions, case studies, hands-on training, and stakeholder consultations. The second day was devoted to a field visit to operational early warning system sites and disaster-affected areas to provide participants with practical exposure to field-level disaster risk management systems.

Day One of the workshop was conducted at the auditorium of Pazhassi Raja College, Pulppally. Accommodation arrangements for the delegates were made at Harithagiri Hotel, Kalpetta, and Hotel Vrindavan. Transportation facilities were arranged by the programme committee for the movement of delegates between the workshop venue, accommodation facilities, and field visit locations.

The Hazard Analyst, DDMA Wayanad, along with his team, played a key role in coordinating logistics and arranging the necessary facilities for the smooth conduct of the programme.

In total, around 125 delegates participated in the workshop, including NCC student volunteers from Pazhassi Raja College. Participants comprised independent weather observers, representatives from academic institutions, start-ups, government departments, Aapda Mitra and

Civil Defence volunteers, and students. The delegates were selected through an online application process, which was widely circulated through the official website and social media platforms of KSDMA. The shortlisting of participants and overall coordination of the programme were carried out with the active involvement of the Hazard Analyst (Environment) and the concerned Multi-Tasking Officers (MTOs).

The venue was selected considering its strategic relevance, including its identification by IMD for the installation of a new weather radar. The entire programme on Day One was live streamed through the official YouTube channel of the Kerala State Disaster Management Authority (KSDMA) to enable wider participation and outreach. The recording of the live stream is publicly accessible and available at the following link: <https://www.youtube.com/live/xv34q4iTuhY?si=mXEZl7av0Ky7-b3v>



3. Inaugural Session

The inaugural session was held on 15 October 2025 and marked the formal commencement of the workshop. The session began with a welcome address by Shri Augustine M.J., Deputy Collector (Disaster Management), who outlined the rationale of the workshop and highlighted the importance of participatory weather observation in a disaster-prone state like Kerala.

The session was chaired by Dr. Sekhar L. Kuriakose, Member Secretary, KSDMA, who emphasised the role of citizen science and collaborative observation networks in complementing official weather monitoring systems. The workshop was formally inaugurated (online) by Dr. Jeevan Babu, IAS, Commissioner, Disaster Management, who underlined the need for reliable, standardised, and timely weather data to support decision-making during disaster events.



Felicitation addresses were delivered by Dr. Neetha K. Gopal, Director, IMD Thiruvananthapuram; Rev. Fr. George Kalayil, Chief Executive Officer, Pazhassi Raja College; Rev. Fr. Chacko Chelamparambath, Bursar, Pazhassi Raja College; and Shri Abdul Bari, Principal, Pazhassi Raja College. The speakers highlighted the importance of institutional collaboration, scientific rigour, and community participation in strengthening weather observation systems.

The inaugural session concluded with a vote of thanks delivered by Shri Fahad Marzook, Hazard Analyst, KSDMA.

4. Panel Discussion: Participatory Weather Observation and Disaster Risk Reduction – The Kerala Model

Following the inaugural session, a panel discussion on *Participatory Weather Observation and Disaster Risk Reduction – The Kerala Model* was conducted to examine how community-led weather observations can be strengthened, standardised, and integrated into official disaster management and decision-making systems. The session was moderated by Dr. Sekhar L. Kuriakose, Member Secretary, KSDMA.

Dr. Sekhar L. Kuriakose set the context of the discussion by emphasising that knowledge generation in weather and climate sciences fundamentally begins with systematic observation and measurement. He highlighted the importance of reliable observations in transforming data into actionable knowledge and outlined the expectations from both the panel members and the audience. The moderator stressed the need for collective reflection on how participatory observations can be made scientifically robust and operationally useful.

Dr. Neetha K. Gopal, Director, India Meteorological Department (IMD), spoke on the importance of standards in weather observation. She elaborated on global standard practices followed in meteorological observations and explained why standardisation is essential for ensuring data credibility and comparability. She highlighted how community-generated data, when collected following prescribed standards, can meaningfully contribute to official observation networks and also to national and global weather and climate data systems.



Representing the academic perspective, **Dr. M.G. Manoj** from CUSAT discussed the process of transforming raw observations into knowledge. He emphasised that basic sensitisation and primary understanding are essential for individuals involved in weather measurements. He underlined the need for standardised instruments and suggested observation density norms, indicating finer spatial resolution for mountainous regions and comparatively larger grids for plains. He proposed integrating weather observation into school-level projects, assigning unique identification numbers to rain gauges maintained by community volunteers, and ensuring proper maintenance and periodic training. He also suggested that gamification of weather observation activities could help attract student participation.

Shri C.K. Vishnudas from the Hume Centre for Ecology and Wildlife Biology shared the experience of initiating community engagement for weather and climate observation in Wayanad. He explained how volunteers were mobilised and rain gauges distributed, leading to the generation of long-term datasets. He highlighted the development of zonation and gridded datasets and the collaboration with DDMA Wayanad through the Disaster Management Suite. He emphasised capacity building, awareness generation, and the ongoing expansion of the network, while also pointing out the need to transition towards automated sensors and IoT-based devices for measurements.

Shri Abhilash Joseph, independent weather observer and researcher, shared his personal journey into weather observation and research. He discussed the linkages between weather variability and mental health and stressed that weather observation should not be viewed solely as the responsibility of government departments, but also as a collective responsibility of the public. He

highlighted emerging employment opportunities linked to weather expertise, including consultancy roles in sectors such as construction and film production. He suggested the preparation of simple and accessible guidelines for the public by IMD and emphasised the importance of conducting such convenings regularly to sustain engagement. He appreciated the initiative taken by KSDMA in creating a common platform for diverse stakeholders.

Shri Krishna Prakash Master, a long-term volunteer observer, shared his experience of measuring rainfall for over three decades. He described how he began his observations using a simple, self-made rain gauge and reflected on how consistent measurement helped him better understand natural processes. He explained his association with the Malappuram Rain Trackers group and highlighted the value of long-term, committed observation at the community level.

Shri Rajeevan K., Meteorologist, KSDMA, shared his experience both as an end user of weather data and as an official working at the interface between IMD and independent weather observers. He highlighted the operational importance of reliable local-level data and the role of coordination and communication in bridging official and participatory observation systems.

Shri Augustine M.J., Deputy Collector, DDMA Wayanad, shared administrative experiences of using participatory weather data for disaster preparedness and response. He explained how micro-level rainfall information, which at times challenged conventional assumptions, proved valuable in decision-making. He shared an instance where advance use of such data enabled early precautionary evacuation in a landslide-prone panchayat, resulting in zero casualties. He also explained how this information supported dam management decisions and enhanced preparedness at the district level.



During the discussion, participants highlighted the need for affordable and low-cost rain gauges and explored possibilities for collaboration with institutions such as IRTC and ICFOSS. Experiences from river basin monitoring initiatives in the Periyar and Chalakudy basins were discussed, with references to lessons learned during the 2018 floods.

The panel discussion concluded with a shared understanding on the importance of standardisation, institutional collaboration, capacity building, and sustained engagement to strengthen participatory weather observation as a critical component of disaster risk reduction in Kerala.

5. Technical Session 1

The post-lunch technical sessions on Day 1 were structured into two segments, focusing on operational meteorology, observation standards, emerging technologies, and digital decision-support systems. The first segment was moderated by Fahad Marzook, while the second segment was moderated by Ms. Geethu S.S., KSDMA.

- **IMD's Weather Services**

The session commenced with a presentation by Dr. Neetha K. Gopal, Scientist-F and Head, India Meteorological Department, Thiruvananthapuram. She traced the history of weather observation in India and the evolution of IMD as the national agency responsible for meteorological observations, forecasting, and early warnings. The presentation highlighted the mandate and role of IMD, with specific reference to disaster risk reduction and public safety.



Dr. Neetha elaborated on IMD's observational network in Kerala, explaining the spread of surface and upper-air stations across the State and their importance in capturing regional weather variability. She outlined IMD's forecasting services, including short-range, medium-range, and extended-range forecasts, and their applications for disaster management agencies and line departments. The

Mausam mobile application and IMD's official website, along with relevant contact mechanisms, were introduced as key public interfaces for accessing forecasts and warnings. Special emphasis was placed on the crowdsourcing feature of the Mausam platform and how citizen-generated observations can complement official datasets. The session concluded by underlining the need for continued collaboration between IMD, disaster management authorities, academic institutions, and community observers.

- **Standards and Practices in Surface Weather Observation**

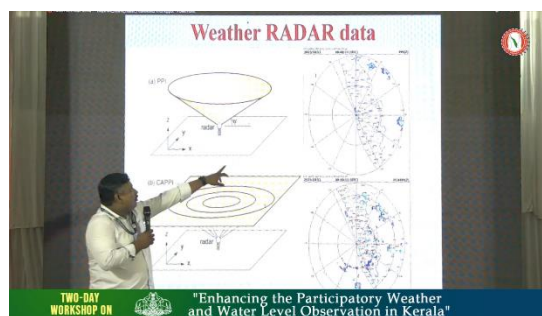
This was followed by a technical presentation by Shri V. Gopakumar and Shri V.P. Devasia, IMD, focusing on surface and upper-air observations. The speakers explained the importance of standardised and long-term meteorological data for climatological analysis, forecasting accuracy, and policy-relevant decision-making. They detailed the standard requirements for establishing a meteorological observatory, including site selection, exposure norms, and observation protocols.

The session introduced the components of a surface observatory and discussed key meteorological elements such as rainfall, temperature, pressure, wind, and humidity, along with the corresponding measurement instruments. Particular attention was given to rainfall measurement, covering precipitation standards and the types of rain gauges used by IMD. The speakers also explained temperature and pressure measurements, as well as wind observations using anemometers, stressing the need for adherence to IMD-prescribed standards to ensure data usability and national-level integration.



- **Possibilities of Weather Radar in Kerala**

The third presentation in this segment was delivered by Shri Vigin Lal F., Scientist-D, IMD, on the role and potential of weather radars in Kerala. The session explained why radar observations are important, particularly for real-time monitoring of intense rainfall, thunderstorms, and severe weather events. Different types of weather radars were introduced, with a focused discussion on the proposed X-band radar at Wayanad.



Shri Vigin Lal described how weather radar works, its core components and operational principles, and the advantages of radar-based observations in complex terrain. The rationale for locating a radar at Wayanad was explained in detail, highlighting its expected impact on improving rainfall monitoring, nowcasting, and early warning capabilities for landslide- and flood-prone regions of the Western Ghats. The session concluded with an interactive question-and-answer discussion.



6. Technical Session 2

The second technical session was moderated by Ms. Geethu S.S., KSDMA, and focused on participatory observation systems, IoT-based monitoring, and integrated warning platforms.

- **Disaster Management Suite – Wayanad**

Shri Jaseem Hafiz M., National Informatics Centre (NIC), Wayanad, presented the Disaster Management Suite (DM Suite), covering both the web portal and mobile application. He explained the key activities of Wayanad DDMA supported through the platform and demonstrated how LSG-wise rainfall averaging is carried out using the system.



The presentation highlighted the generation of rainfall-based alerts through the DM Suite, the functionality of the dashboard, and the use of the platform for DM Club management. The session also explained data collection through the mobile application, including practical guidance on how field-level users can effectively utilise the application and portal for reporting and monitoring.

- **LoRaWAN Network and IoT Initiatives of ICFOSS**

This was followed by a presentation by Ms. Gopika T.G., Research Assistant, Open IoT, ICFOSS. She introduced ICFOSS and provided an overview of Internet of Things (IoT) concepts relevant to environmental monitoring. The session explained the architecture of the LoRaWAN gateway, the use of Grafana for data visualisation, and the concept of LoRaWAN mesh networks for expanding coverage.

The ongoing collaboration between KSDMA and ICFOSS was highlighted, along with a demonstration of existing ICFOSS products related to weather and UV monitoring. The presentation also introduced new initiatives, including projects on air-quality monitoring and open-drone platforms, indicating future possibilities for integrated hazard monitoring.



- **KaWaCHaM – Kerala Warnings, Crisis and Hazard Management**

The final presentation was delivered by Ms. Geethu S.S., focusing on KaWaCHaM (Kerala Warnings, Crisis and Hazard Management). She outlined the objectives of KaWaCHaM, particularly in strengthening institutional capacities and technical facilities for early warning dissemination. The session covered the siren network, the decision-support system, and mechanisms for alert generation and dissemination.

She demonstrated the KaWaCHaM dashboards, explained how the system functions end-to-end, and introduced the citizen portal, emphasising community involvement as a core pillar of the platform. The session concluded with a discussion on how KaWaCHaM integrates official data streams with community-based inputs to enhance last-mile connectivity in early warning systems.



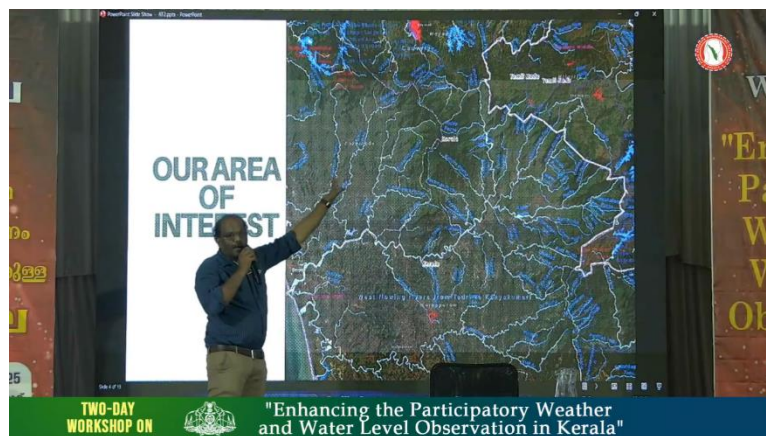
7. Case Studies Session

Case Studies / Success Stories

The case study session highlighted diverse community-driven and technology-enabled weather and hazard monitoring initiatives from across Kerala, showcasing how local knowledge, volunteerism, and innovation can strengthen disaster risk reduction.

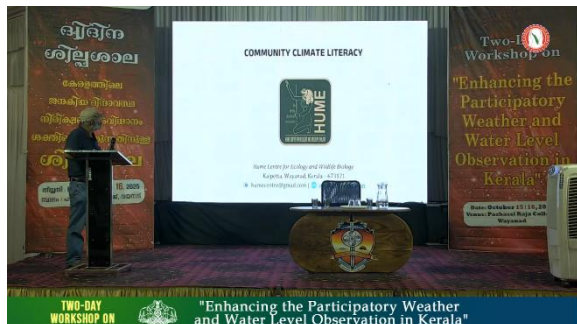
- **Raintrackers Malappuram**

Mr. Surjith presented the journey of Raintrackers Malappuram, beginning with the genesis of the idea to document and understand rainfall variability at the local scale. He explained what the group does and has accomplished so far, including systematic rainfall observations and dissemination of local insights. The presentation covered their areas of interest, the role of volunteers, and key initiatives undertaken by the group. Coordination mechanisms with government agencies were highlighted, along with future plans to expand coverage and strengthen data credibility.



- **Hume Centre for Ecology and Wildlife Biology**

Mr. Vishnudas shared the experience of the Hume Centre for Ecology and Wildlife Biology, detailing how their journey began with a focus on ecological research and disaster-prone



landscapes. He discussed the identification of landslide-susceptible areas using grid-based approaches, the establishment of an observation network, and extensive community engagement. The session explained volunteer sustenance strategies, methods of data collection and visualisation, and communication of critical information to DDMA

Wayanad. Topics such as cumulative rainfall monitoring, land-use patterns in Wayanad and their disaster implications, rainfall zonation, community mobilisation, and expansion of their network were also covered.

- **Meenachil River Rain Monitoring Initiative**

Mr. Eby Emmanuel presented the work of the Meenachil River Protection Council, explaining how the initiative started with a focus on river conservation and flood preparedness. The presentation highlighted river water-level marking, the role of volunteers, and watershed-based planning and observations. He elaborated on data collection methods, volunteer motivation strategies, and the use of mobile applications for data recording and dissemination.



- **Metbeat Weather**

Mr. Jamshad K. shared his personal journey of how a media professional became a weather communicator, describing the evolution of Metbeat Weather and the Kerala Weatherman Facebook Page. He emphasised the importance of language and simplicity in communicating weather information and discussed approaches for localising forecast messages to improve public understanding and response.



- **Startup Innovation in Weather Monitoring**



Mr. Akhil Babu introduced IoTRICKS, a startup working on low-cost monitoring solutions. He presented “Vrishti”, a prototype low-cost weather monitoring system, explaining its design philosophy and potential applications for community-level observations.

8. Discussion and Practical Exposure

The session concluded with an open discussion, followed by hands-on experience with weather instruments and measurements, conducted under the technical guidance of IMD experts. This practical exposure helped participants better understand observation techniques and instrumentation. With this, Day 1 activities were formally concluded.



9. Day 2 – Field Visit

Day 2 featured a field visit to the Mundakkai–Chooralmala disaster-affected areas. The trip commenced at 9:00 AM, with participants first visiting the impacted locations. The field visit was guided by Mr. Arun Peter, District Hazard Analyst, who explained the disaster scenario, damage patterns, and on-ground experiences. Revenue officials from the village office accompanied the team and provided additional local context.

The group later visited the KaWaCHaM siren installation at Meppadi School, where the functioning and role of the KaWaCHaM siren network in early warning dissemination were

explained. The field trip concluded at 3:00 PM, followed by the distribution of certificates to all participants, marking the successful completion of the programme.

10. Key Takeaways / Future Plan

- A common web platform will be developed for sharing and displaying data measured by different stakeholders. With the support of the National Informatics Centre (NIC) and Kerala State IT Mission, KSDMA will develop a common web portal for all stakeholders to enter their data at standardised observation times. Mandatory registration of each instrument will be ensured, with a unique identification number assigned to every instrument. General guidelines will be jointly prepared by IMD and KSDMA for community volunteers and departmental officials to ensure standard measurement practices. Online and offline training programmes will be conducted, and training modules and instructional videos will be made available through the web portal. Data will be displayed in the portal with the assigned unique ID, and ownership details of the volunteer or organisation will also be shown. The data will be integrated with KSDMA's KaWaCHaM decision support system. Refresher training programmes will be conducted twice a year for all registered volunteers. Additional river gauges and temperature sensors are required. Automated observation systems will be installed in remote locations, and data from these systems will also be incorporated into the portal.
- KSDMA and the Forest Department will collaborate to prepare and implement a comprehensive project for installing weather stations across forest ranges of the State.
- Enhancement of the participatory observation network across the State.
- Promotion of start-ups engaged in the manufacture of low-cost and standardised meteorological instruments.
- Establishment of school- and college-based weather observatories and science projects.
- Collaboration between ICFOSS and IRTC for low-cost instrument production and distribution.
- Establishment of a permanent platform comprising participatory weather observers, community leaders, citizen scientists, NGOs, academics, and government officials. This platform shall be convened at least once every year.

11. Conclusion

The workshop successfully facilitated dialogue, capacity building, and knowledge exchange among diverse stakeholders involved in weather and water level observation in Kerala. It reinforced the importance of standardisation, scientific practices, and institutional collaboration in strengthening participatory monitoring networks. The deliberations and field exposure provided a strong foundation for advancing coordinated observation systems and for initiating the development of a unified data-sharing platform under the guidance of KSDMA.