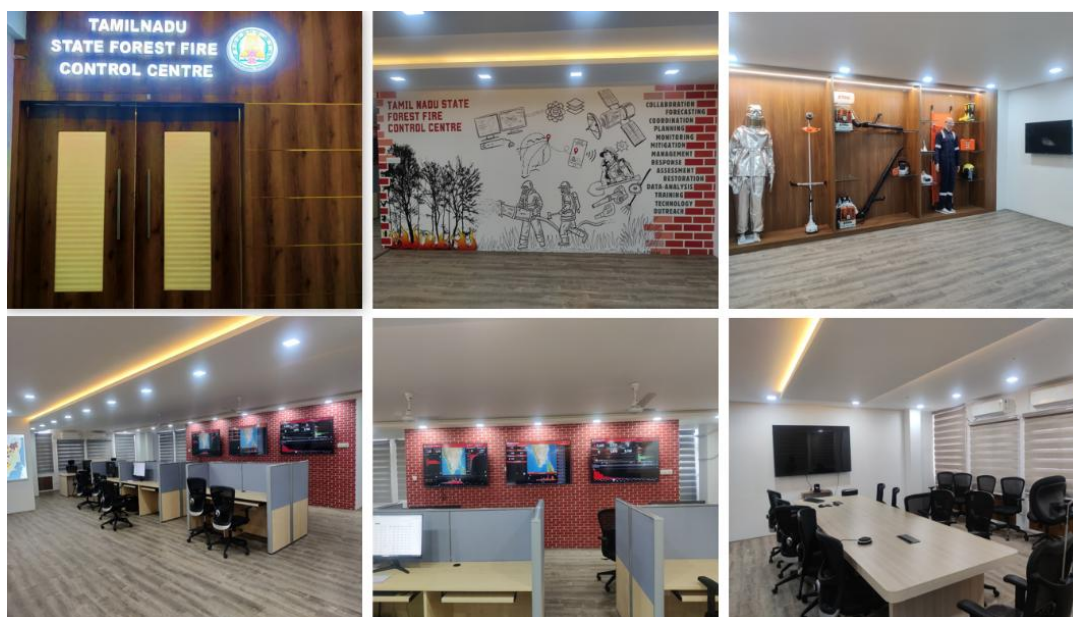# IMPACT REPORT ON ESTABLISHMENT OF TAMIL NADU STATE FOREST FIRE CONTROL CENTRE

1. Establishment of TNSFFCC and Its Institutional Role

The Tamil Nadu State Forest Fire Control Centre (TNSFFCC) was formally instituted in 2024 under the financial assistance of the NABARD scheme as part of the Tamil Nadu Forest Department's commitment to modernizing its forest fire management strategies. Functioning under the Protection and Vigilance Wing of the Principal Chief Conservator of Forests, the TNSFFCC has been designed to act as the nerve centre of all forest fire prevention, monitoring, and management operations in the state. This initiative marks a crucial institutional milestone in Tamil Nadu's conservation history, aligning state-level forest management efforts with national mandates from the Forest Survey of India (FSI) and the Ministry of Environment, Forest and Climate Change (MoEFCC).
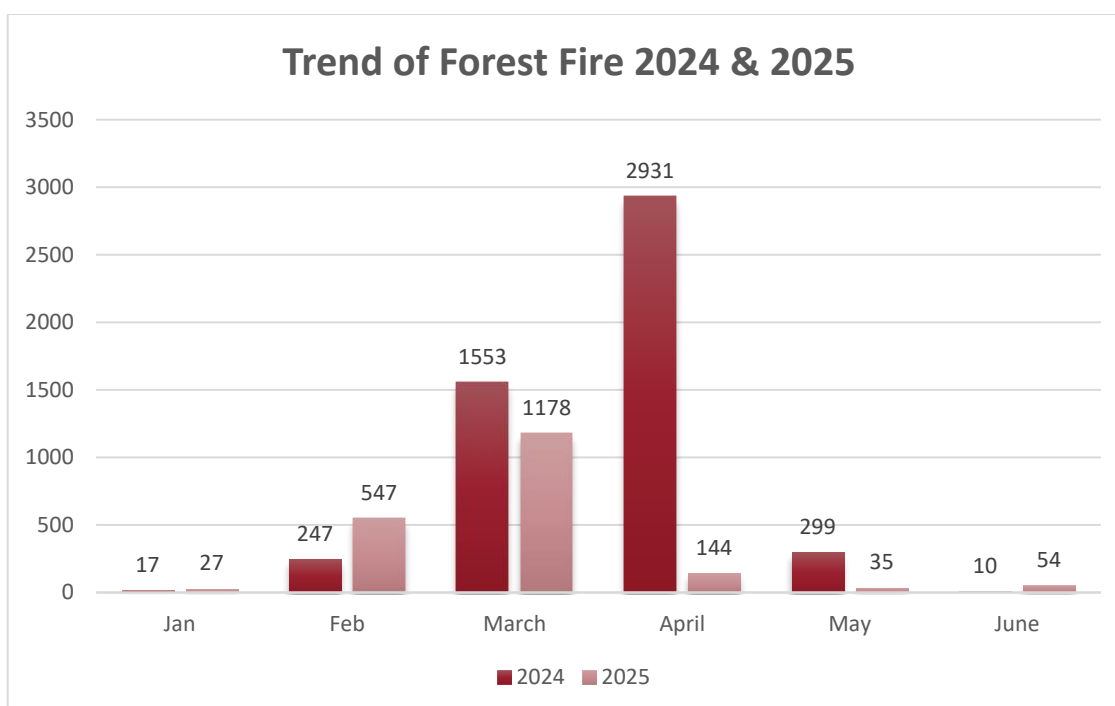
TNSFFCC operates as a central coordinating authority overseeing 34 District Forest Fire Control Centres (DFFCCs) distributed across Tamil Nadu. These district centres serve as decentralized operational units working under the direction and technical support of TNSFFCC. Together, this network ensures seamless information flow and operational command from the state-level control room to the ground-level forest ranges and beats. The TNSFFCC is tasked with receiving real-time satellite-based fire alerts, coordinating district responses, managing spatial data analysis, evaluating fire vulnerability, issuing public communications, and facilitating post-fire assessments. Its strategic importance has been further underlined through its role as the primary liaison with central agencies such as FSI and NRSC, thereby integrating Tamil Nadu's forest fire response within national frameworks.

|							
KANCHIPURAM	CUDDALORE	CHENNAI	DHARMAPURI	CHENGALPATTU	PERAMBALUR	NAMAKKAL	NILGIRIS
HOSUR	ERODE	COIMBATORE	CHENGALPATTU	NAGAPATTINAM	MADURAI	KANNIYAKUMARI	KARUR
ARIYALUR	TIRUNELVELI	THOOTHUKUDI	THENI	PUDUKOTTAI	TIRUPATTUR	VELLORE	VILLUPURAM
THANJAVUR	SALEM	SIVAGANGAI	RAMANATHAPURAM	TIRUPPUR	TIRUVARUR	TRICHY	TIRUVALLUR	TIRUVANNAMALAI

2. Reduction in Forest Fire Incidents and Large Fire Events

Following the establishment of TNSFFCC, a significant transformation has occurred in the scale, frequency, and containment of forest fire incidents across the state. While the overall number of fire detections has seen a rise, primarily driven by climatic variations such as extended dry spells, delayed monsoons, and increasing ambient temperatures, the capacity to mitigate and manage these fires has improved considerably. In 2024, Tamil Nadu recorded a total of 218 Large Forest Fires (LFFs), which was a notable increase from 156 such events in 2023 and a more than 171% increase from the 80 incidents reported in 2022. However, despite this surge, the effective containment and rapid response strategies ensured that a majority of these fires did not escalate in severity or duration.

Trend of Forest Fire 2024 & 2025

Month	2024	2025
Jan	17	27
Feb	247	547
March	1553	1178
April	2931	144
May	299	35
June	10	54

By comparison, the data from 2025 provides compelling evidence of the impact achieved within just one year of TNSFFCC's operation. As of May 2025, the total number of forest fire detections in Tamil Nadu stood at 2023 a significant decline from 2024. Among these, only 112 incidents were classified as Large Forest Fires by FSI. This sharp reduction in both overall fire alerts and large-scale fire events is directly attributed to the streamlined functioning and improved coordination between the TNSFFCC and the DFFCCs. Quick field-level mobilization and real-time decision-making supported by technological tools and clearly defined workflows have transformed fire response capabilities. The containment of fires before escalation and the reduction in large-scale incidents underscore a major achievement in Tamil Nadu's forest fire management within just one year of institutional strengthening.

LFF Incidents in TN
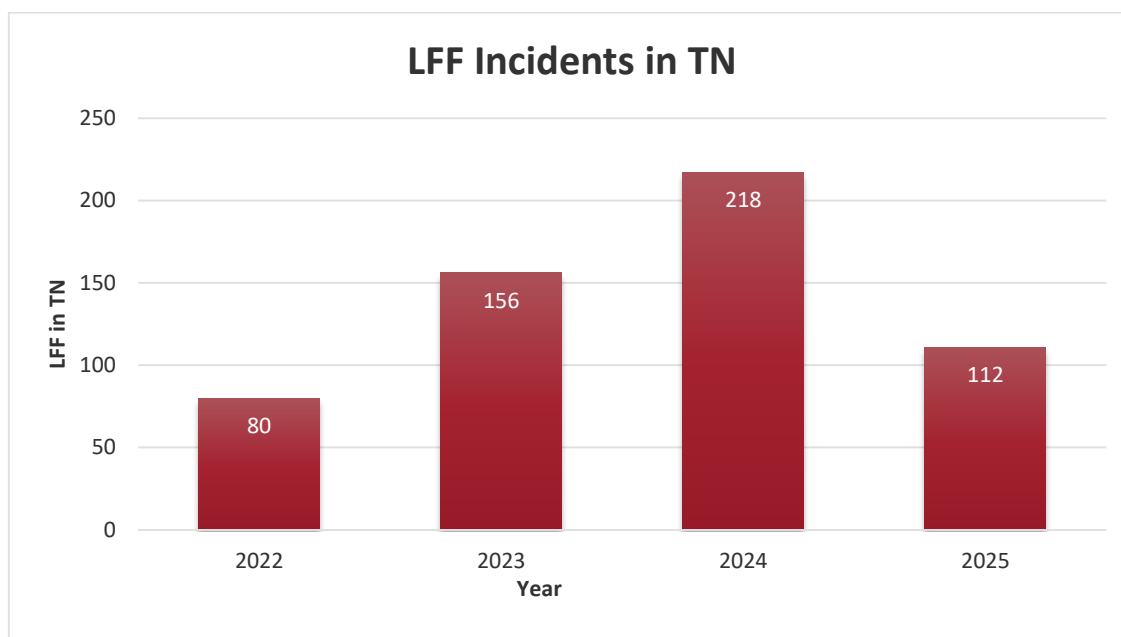
Fire Season	No of FSI Fire Alerts for Tamil Nadu	Total No of FSI Fire Alerts (all states)	Percentage of Fire alerts from FSI for TN to the total fire alerts reported in all states
Nov 2019 to June 2020	1555	146950	1.06
Nov 2020 to June 2021	1422	398774	0.36
Nov 2021 to June 2022	1206	253008	0.48
Nov 2022 to June 2023	2342	206403	1.13
Nov 2023 to June 2024	4084	202580	2.01
Nov 2024 to June 2025	2023	192396	1.05

3. Enhanced Operational Responsiveness

A cornerstone of TNSFFCC's impact has been the dramatic reduction in response time to forest fire alerts, which has been achieved through the integration of advanced technologies

and systemic process reforms. Prior to the establishment of the centre, fire alerts would take considerable time to be validated and actioned upon due to fragmented communication channels and manual data handling. Post-establishment, the TNSFFCC instituted a real-time alert dissemination mechanism, primarily through the Tamil Nadu Forest Fire Management Information System (TNFFMIS), which synchronizes satellite-based alerts with mobile and web-based platforms accessible to field officers. From the below table, it was clearly observed the reduction in response time due to the full operational capabilities of TNSFFCC.

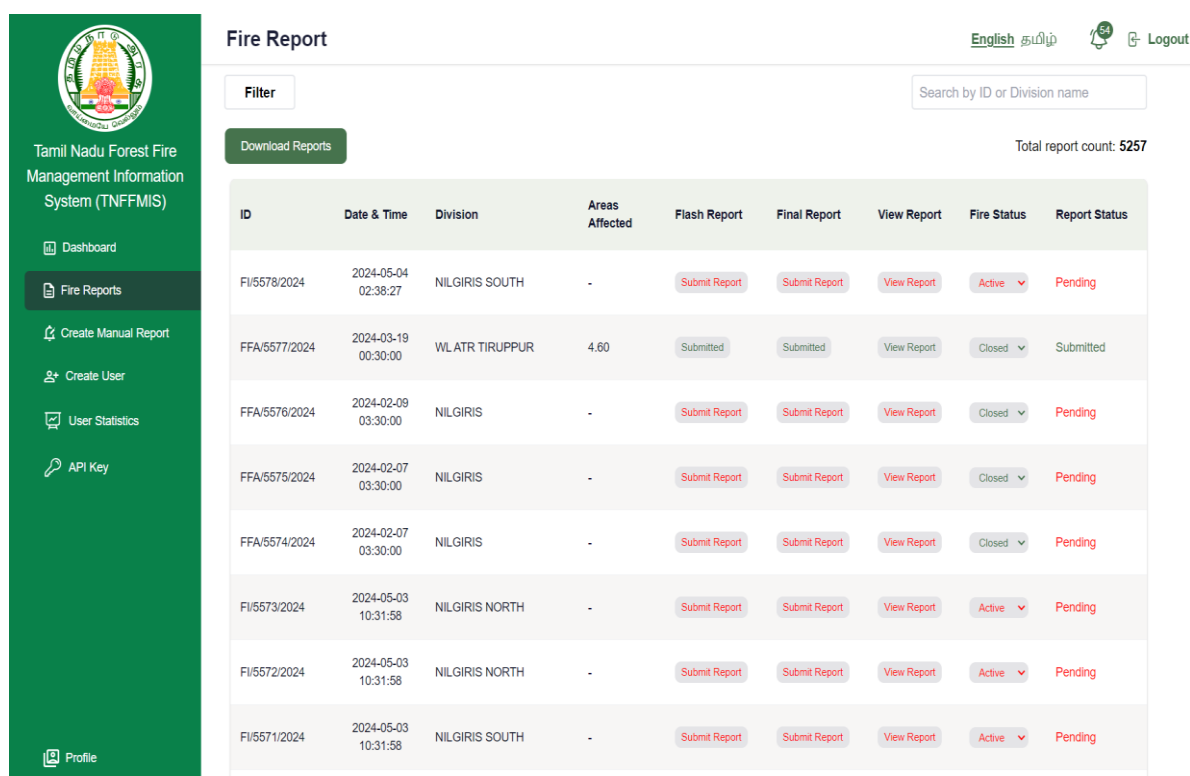| Response Time	Doused Percentage	
	2024	**2025**
Less than 24 hours	69	95
Less than 2 days	19	4.4
Less than 3 days	9	0.5
Less than 4 days/ more	3	0.1

The TNFFMIS system processes alerts received from MODIS and SNPP-VIIRS satellite sensors and ensures that registered users, including field-level forest staff and divisional officers, receive fire detection alerts on their mobile devices and dashboards almost immediately. Along with these, ArcGIS platform was also utilized for better monitoring and visualization of ground-level information. As a result, field teams are now able to respond to incidents faster, initiate suppression measures more effectively, and document their interventions in real-time. These systemic improvements have collectively ensured that the average time between alert receipt and on-site response has been shortened to less than an hour in most cases.

4. Fire Incident Tracking and Report Submission

The comprehensive fire incident tracking framework introduced by TNSFFCC has standardized the process of documentation and response monitoring across all forest divisions. The Tamil Nadu Forest Fire Management Information System (TNFFMIS) now serves as the single-point repository for all fire-related data, facilitating both transparency and accountability in forest fire management. Upon receiving an alert, field officers are required to submit a Flash Report through the TNFFMIS mobile application, documenting initial observations including GPS coordinates, fire size, suspected cause, and immediate suppression activities. Once the fire is doused, a Final Report is submitted, which contains detailed information on the area affected, photographic and video evidence, suppression techniques used, and the resources mobilized.

This two-tier reporting mechanism not only facilitates a chronological understanding of each fire incident but also populates division-wise dashboards that display metrics such as number of fires, area burnt, response time, and pending reports. By systematizing the reporting process, the TNSFFCC has enabled faster reviews, better resource planning, and data-driven evaluations of each division's preparedness and response efficiency. Moreover, the dashboard interface has empowered senior administrators to monitor active fires and ensure follow-up actions are timely and effective.

## 5. Technological Tools and Resource Mobilisation

One of the defining features of the TNSFFCC initiative has been the integration of technology and field-level resource optimization in forest fire management. Recognizing the limitations

of traditional methods, the centre has deployed a range of modern tools including satellite-based fire detection systems, GIS-based vulnerability mapping, thermal drones, and wireless communication kits. These technologies have been instrumental in pre-fire planning, real-time surveillance, and post-fire assessment.

The use of drone technology, particularly thermal drones, has gained traction in high-risk divisions such as Kodaikanal, Coimbatore, Salem, and Namakkal, where dense forest cover and terrain complexity make ground surveillance challenging. These drones facilitate the detection of hidden hotspots and fire lines, enabling fire crews to act proactively. Simultaneously, the GIS team at TNSFFCC has conducted a multi-variable analysis encompassing topography, fuel load, and human proximity to identify the most fire-prone beats and ranges, thereby enabling focused interventions.

In terms of equipment, Tamil Nadu Forest Department has procured and deployed an extensive inventory of fire-fighting gear under modernization schemes. This includes leaf blowers, power saws, water misters, rucksacks, fireproof clothing, GPS devices, and safety kits. Furthermore, 5,452.71 km of fire lines were constructed in 2024 alone, which function as physical barriers to prevent the lateral spread of fires. These investments have collectively enhanced the resilience and responsiveness of the state's fire-fighting apparatus.
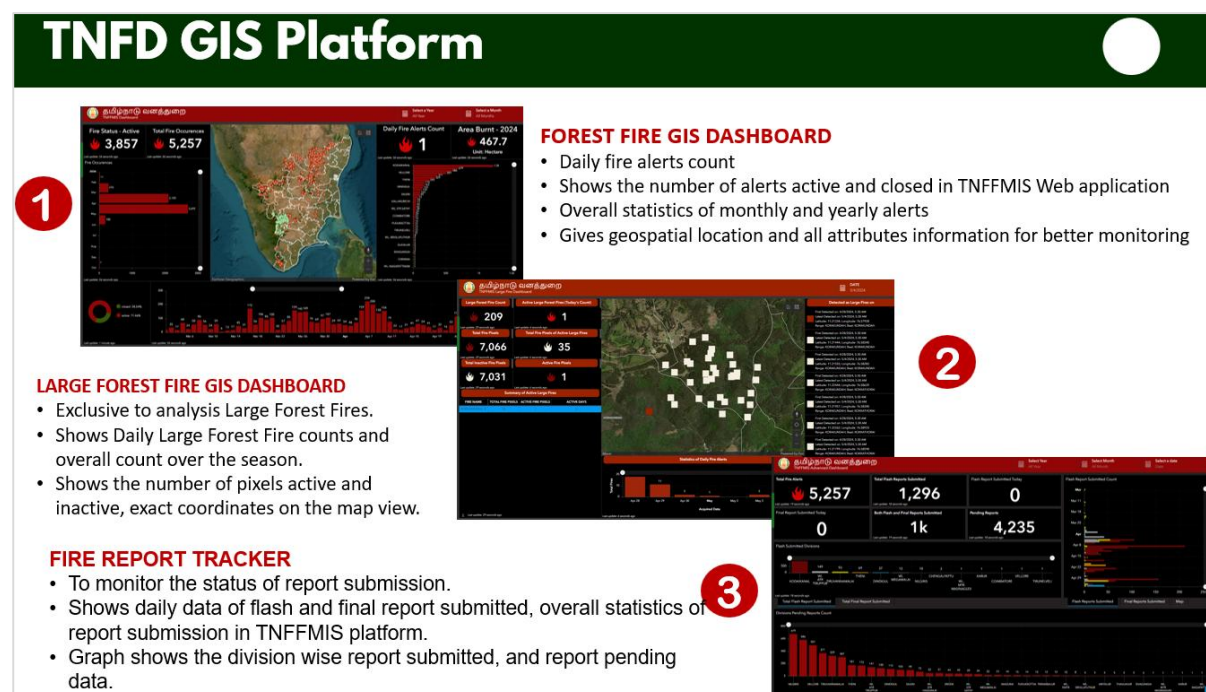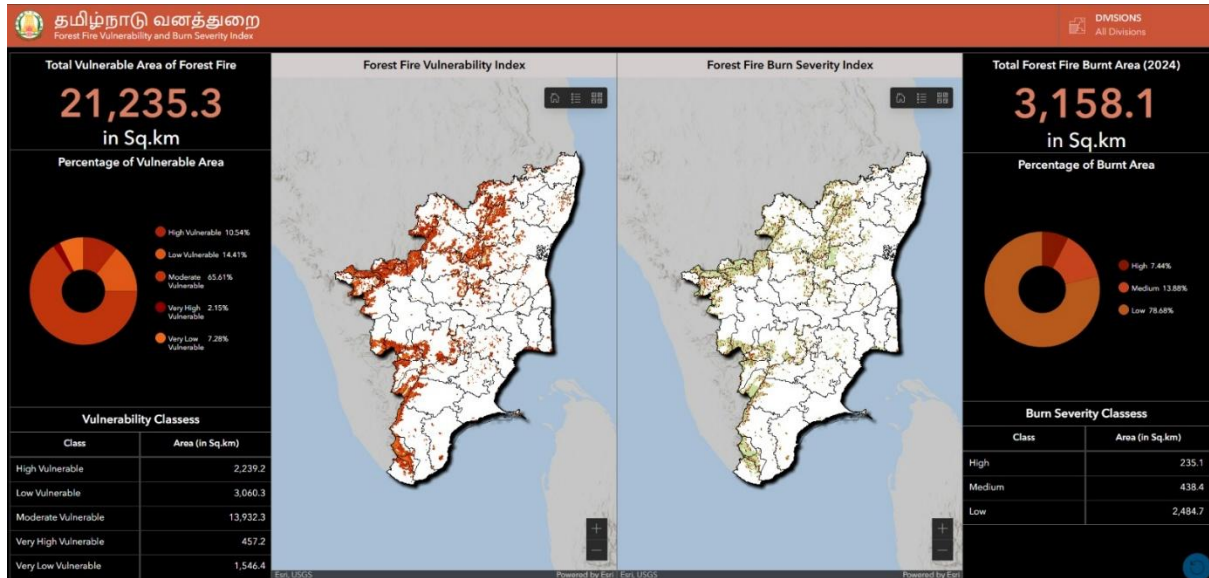
In addition to these resources, a dedicated survey form was developed for systematic fire line data collection, and a comprehensive dashboard was created to support visualization, monitoring, and decision-making. This dashboard integrates fire detection points with nearby fire line data in a unified map view, enabling field staff to quickly identify the closest fire lines in relation to active fire locations. This streamlined interface significantly enhances ground-level dousing operations by improving situational awareness and response coordination.
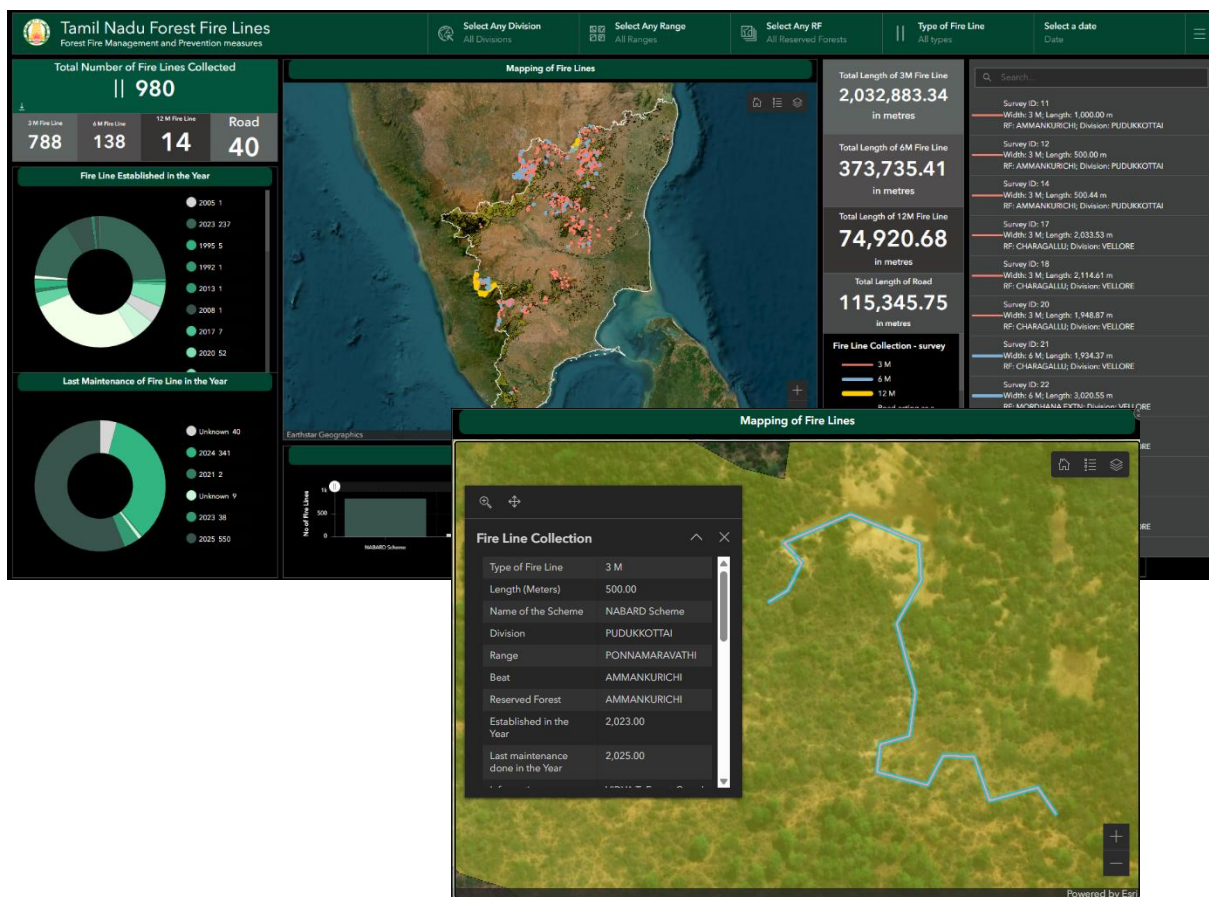
6. Community Engagement and Capacity Building

The TNSFFCC has placed significant emphasis on fostering community participation and building local capacities to create a holistic forest fire management system. Understanding that forest-adjacent communities are both stakeholders and first responders in many fire scenarios, the department has rolled out several initiatives to enhance community awareness, preparedness, and involvement. Over 5,200 individuals have registered for the Forest Survey of India's SMS alert system, allowing them to receive near real-time fire updates and coordinate with local forest officials.

Village Forest Committees (VFCs) have been actively involved in conducting awareness drives, maintaining firebreaks, and assisting in frontline fire suppression efforts. The Tiruvannamalai Model stands out as a best practice where community leaders were empowered to take ownership of fire prevention through structured engagement with the Forest Department. In parallel, training sessions, mock drills, and equipment handling workshops have been regularly organized for forest guards, students, and volunteers to build their capacity in managing fire emergencies. These community-focused strategies have enhanced trust, reduced response times, and created a sense of shared responsibility in protecting forest resources.

7. Visits to TNSFFCC and Knowledge Sharing

Orora Tech GmbH, a Munich-based startup specializing in space-based wildfire intelligence, visited the Tamil Nadu State Forest Fire Control Centre (TNSFFCC) to engage in a knowledge

exchange on advanced wildfire management solutions. The Orora Tech team explored the operational frameworks and technological tools employed by TNSFFCC, sharing insights into their proprietary wildfire detection and monitoring platform. Their solution leverages data from over 25 satellites and integrates AI-driven analytics to provide near-real-time detection of wildfires, even in remote areas. Key features include early detection of fires as small as 4×4 meters, real-time monitoring, fire spread prediction, and post-fire damage assessment. The platform's capabilities align with TNSFFCC's objectives of enhancing situational awareness and response times in forest fire management. This collaborative interaction underscored the potential for integrating advanced satellite-based technologies into Tamil Nadu's forest fire control strategies, fostering a synergistic approach to wildfire mitigation and ecosystem preservation.

Further, a team from the Kerala Digital University visited the TNSFFCC in April 2025 to gain first-hand insight into Tamil Nadu's forest fire management ecosystem. During their visit, the team explored the operational infrastructure of the centre and studied the Tamil Nadu Forest Fire Management Information System (TNFFMIS), ArcGIS-based dashboards, and real-time monitoring systems. The visit culminated in a comprehensive knowledge-sharing session with the GIS and fire response teams at TNSFFCC. This interaction proved highly insightful, fostering mutual understanding and highlighting opportunities for adopting similar models in other states, particularly those with ecologically sensitive forest zones.

The TNSFFCC has emerged as a hub for inter-institutional collaboration and capacity building through various study tours, workshops, and consultations. Notably, in April 2025, a delegation from the Tamil Nadu Forest Department visited the National Remote Sensing

Centre (NRSC) in Hyderabad to explore advanced satellite-based detection systems, assess data validation protocols, and initiate technical collaborations. During this visit, scientists from NRSC demonstrated enhanced fire alert mechanisms that could deliver actionable data within 30 to 60 minutes and offered integration support for embedding these services within TNFFMIS.

Presentations were exchanged between the two agencies, with Tamil Nadu showcasing its dashboard-based approach and NRSC providing insights into AI/ML applications for fire spread modelling. The discussions also highlighted the importance of incorporating wind dynamics and terrain features in vulnerability assessments. These cross-learning opportunities have played a critical role in continuously evolving the operational standards of TNSFFCC and positioning Tamil Nadu as a model state for forest fire management.

8. Workshops, Achievements and Institutional Strengthening

Tamil Nadu has actively participated in several regional and national workshops aimed at enhancing the operational and technical capacities of the Tamil Nadu State Forest Fire Control Centre (TNSFFCC). These workshops have provided valuable exposure to advanced tools and methodologies in forest fire management, including real-time data integration, GIS-based fire risk assessment, and drone-assisted surveillance. Officers from various levels, including divisional forest officers, assistant conservators, and GIS specialists, have engaged in sessions focused on modern firefighting equipment, mobile-based reporting systems, and community-based fire mitigation strategies. These participations have significantly contributed to the upskilling of personnel and the strengthening of institutional frameworks within TNSFFCC.

1. **National Workshop on Forest Fire and Its Challenges – New Delhi (24.10.2024)**

   The TNSFFCC participated in the National Consultative Workshop on Forest Fire and Its Challenges, jointly organized by the Ministry of Environment, Forest and Climate Change (MoEFCC) and the National Disaster Management Authority (NDMA). Representing Tamil Nadu, the TNSFFCC delivered a comprehensive presentation on the state's integrated forest fire response strategy. The session highlighted Tamil Nadu's emphasis on Disaster Risk Reduction

   (DRR) through advanced GIS tools, interactive dashboards, and a multi-tiered Forest Fire Control Centre network. The delegation also showcased community-driven models like the "Friends of Forest" initiative, underlining the importance of local engagement in wildfire mitigation.

2. **National Workshop on Redesigning Forest Firefighting Tools and Equipment – IIFM Bhopal (21-22 November 2024)**

   At the National Workshop on Redesigning Forest Firefighting Tools and Equipment held in collaboration with IIFM Bhopal and NDMA, TNSFFCC emphasized the need for innovations in fire response technology. Topics discussed included water-efficient fire suppression

   systems, sustainable fire retardants like suppression balls, custom all-terrain vehicles (ATVs), and the expansion of UAV capabilities. The TNSFFCC also advocated for AI-driven assessments and resource mapping as essential components of future-ready fire management systems. These discussions reinforced Tamil Nadu's commitment to bridging technological gaps through research, development, and public-private partnerships.

3. Regional Workshop on Forest Fire Prevention and Management – Thiruvananthapuram (29-30 January 2025)

At the Regional Workshop held in Thiruvananthapuram by MoEF&CC and IIFM Bhopal, TNSFFCC presented a data-rich analysis of Tamil Nadu's forest fire landscape. The presentation covered sensitivity mapping, fuel load estimation, diurnal and seasonal patterns, and human-forest interface risks. The deployment of a fully digital, paperless MIS portal and mobile application was also showcased, illustrating the shift towards real-time, on-ground data capture and incident reporting. The role of artificial intelligence in early warning systems and post-fire assessment was discussed, reinforcing Tamil Nadu's position at the forefront of adaptive, tech-driven forest fire management.

4. Workshop on Forest Fire prevention and Management – Naya Raipur (20.12.2024)

At the Regional Workshop held in Raipur by Chattisgarh Forest Department, TNSFFCC presented a detailed presentation on best practices in Forest Fire Management in Tamil Nadu.

5. Achievements

On the occasion of the International Day for Biological Diversity, the Tamil Nadu State Forest Fire Control Centre (TNSFFCC) was honoured with a prestigious award by the Hon'ble Forest Minister for its exemplary contribution to forest fire management in the state. The recognition specifically acknowledged the establishment of a state-of-the-art Forest Fire Control Centre in Chennai and the development of the Tamil Nadu Forest Fire Management Information System (TNFFMIS). This comprehensive system utilizes advanced GIS-based analytics at the forest beat level, encompassing fire sensitivity mapping, terrain and human risk modelling, forest-type-specific fuel risk assessments, and real-time data visualization tools for strategic interventions. A landmark achievement under this initiative has been the operationalization of 34 District Forest Fire Control Centres across Tamil Nadu, significantly enhancing response efficiency and field coordination. The recognition

underscores the state's leadership in deploying scientific tools and institutional frameworks for proactive forest fire prevention and management.

6. **Institutional Strengthening**

The centre has also advocated for the establishment of divisional fire control centres in high-risk regions such as Kodaikanal, Hassanur, and Udhagai, arguing that such units would decentralize operations and provide faster response capabilities. These proposals have been backed by fire detection data from FSI, which consistently flagged these areas as vulnerable. The emphasis on proactive planning, backed by scientific data and field-level feedback, has allowed the TNSFFCC to design and implement targeted strategies that are both scalable and sustainable. Several trainings were also conducted for the field level staffs.

9. Recommendations and Future Scope

Looking ahead, the Tamil Nadu Forest Department is keen to strengthen the operational capacity of TNSFFCC through a series of targeted initiatives. These include establishing new divisional fire control centres in highly sensitive areas, expanding drone coverage, and integrating artificial intelligence tools to predict fire spread dynamics in varying terrains. Moreover, there is a recognized need to develop wind parameter models and automate resource allocation based on real-time fire alerts. Community incentive programs to encourage early fire reporting and the establishment of fire lines before the start of the fire season have also been proposed.

Tech to play major role in detecting, fighting fires in Nilgiris forests

Furthermore, a comprehensive feedback loop involving daily status reporting of LFFs, post-fire regeneration tracking, and ground-truth validation will be institutionalized to improve adaptive management.

In addition, the Forest Department should prioritize the implementation of an Integrated UAV-UGV (Unmanned Aerial Vehicle and Unmanned Ground Vehicle) initiative to further advance fire management capabilities. This integrated approach proposes the deployment of UAVs for high-resolution thermal imaging, aerial surveillance, and hotspot detection in rugged or inaccessible forest terrains. Complementing this, UGVs can be equipped for ground-level operations such as carrying fire retardants, transporting equipment, or assisting with mop-up operations in hazardous zones where human entry may be unsafe. The synergy between aerial and terrestrial autonomous systems will provide a more comprehensive fire response, enabling better data collection, reducing response times, and enhancing the safety of field personnel. Pilot trials in vulnerable divisions are recommended before scaling across
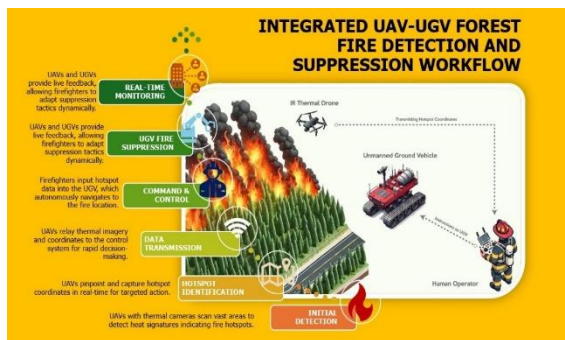
the state. These forward-looking measures are intended to transition Tamil Nadu's forest fire response from a reactive to a predictive and preventive paradigm.

In addition to these efforts, a comprehensive proposal was submitted to both the National Disaster Management Authority (NDMA) and the State Disaster Management Authority (SDMA) outlining strategies for enhancing forest fire management across Tamil Nadu. The proposal addresses various aspects of capacity building, technology integration, and infrastructure development.

10. Conclusion

The establishment and operationalization of the Tamil Nadu State Forest Fire Control Centre (TNSFFCC) have fundamentally reshaped the way forest fires are managed in the state. From rapid alert dissemination and reduced response times to advanced geospatial analytics and robust community engagement, the impact of TNSFFCC has been both transformative and measurable. While the environmental conditions contributing to forest fires have become more severe, the state has responded with agility, innovation, and strategic foresight. With continued investments in technology, infrastructure, and human capital, TNSFFCC is well-positioned to emerge as a national exemplar in sustainable and scientific forest fire management.