STANDARD OPERATING PROCEDURE (SOP)
(TROPICAL MOIST DECIDUOUS FORESTS)

4.1 Introduction

Tropical Moist Deciduous Forests are common in areas where rainfall is 1000 to 2000 mm with a dry season of three to four months. Dominant trees are deciduous, lower storey trees are usually evergreen. The trees shed their leaves in winter months, again become flushed in March-April. These forests comprise 17.65%of India's forest types (ISFR 2019). These forests are widely distributed covering both in southern and northern states, including Tamil Nadu, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Bihar, West Bengal, Odisha, and Uttarakhand.

Andaman Moist Deciduous forest: There is typically a somewhat irregular top story of predominantly deciduous trees about 40 m or more in height, many of the trees being of very large girth and heavily buttressed. Beneath these trees is a rather definite second story of numerous species including some evergreens, though most are deciduous, and there is a fairly complete shrubby evergreen undergrowth, including patches of bamboo. Climbers are heavy and often include canes. Distribution throughout the Andaman Islands covering nearly half their total area. Important species occurring in this forest type include *Pterocarpus dalbergiodes, Terminalia bialata, Terminalia procera, Canarium euphyllum, Tetra nudiflora, Chukrasia velutina* etc.

Southern Tropical Moist Deciduous Forests: These forests occur in all parts of southern India which have moderate rains. The important areas where this sub group of forest occurs are Jabalpur, Mandla forest division of Madhya Pradesh, Raipur of Chhattisgarh, Dangs forest division in Gujarat, Kolaba and Thanna division in Maharashtra, Kanara and Mangalore division in Karnataka, Coimbatore and Tirunilvelli division in Tamil Nadu and Nilambur and Wynad divisions of Kerala. This subgroup is economically very important. This contains valuable forests of *Tectona grandis*.

North Indian Tropical Moist Deciduous Forests: Moist deciduous forests occur throughout northern India except in the dry north west region. This group forms important forest areas of Uttar Pradesh, Uttarakhand, Bihar, Odisha, Madhya Pradesh, Assam and other north eastern states. The mean annual temperature lies between 21^0C to 13^0C. The highest temperature varies from place to place but it rises more than 45 C at many places. The annual rainfall varies from 1000 to 2000 mm. *Shorea robusta* is the most important species in this sub-group.

The majority of forest fire incidences in India are reported especially for tropical dry deciduous forests, followed by tropical moist deciduous and tropical semi-evergreen forests, with just a handful of reports from the remaining forest group.

During the summer period, the atmospheric temperature increases, making the forest floor more vulnerable because of dry leaves. Leaf shedding is a continuous process that makes field management difficult, even though preliminary fire lines are maintained and adequate steps are taken to avoid any fire occurrence. Despite efforts by the field staff, it is observed that forest fires are rampant in the case of a dry spell of summer and are aggravated if rainfall is poor in a particular year. The majority of the forest fires are the result of human neglect. A casual throwing away of a smoldering bidi, cigarette butt or a spark from a picnicker's open hearth in a desiccated forest, causes a fire in summer. Such fires start on the ground due to dry litter and then flames up due to strong winds, engulfing vast tracts of forest ashes thereby causing extensive damage.

Forest fire management stands at three different levels, including pre-fire (preparatory planning to fire control), during fire (fire spread and control planning) and post-fire (mitigation, damage assessment and restoration planning).Detection, prevention, suppression and post-fire management are important steps in the management of forest fire. This can be achieved by developing a Standard Operating Procedure (SOP) to control/mitigate forest fires in Tropical moist deciduous forests. This SOP has identified specific activities that the field units or ground staffs are expected to provide and the standards that must be met in managing forest fires. This SOP also defined roles, responsibilities and operational procedures for respective Divisional units, range units and firefighting teams.

4.2 Review Literature

The literature on fires in Indian forests shows that they play a vital role throughout the country. They have been mentioned throughout scientific forestry as a major cause of the degradation of forests. Very few empirical studies have been done on the reasons for these fires, and in most cases, their origin remains unclear.

Forest fire is one of the prominent factors, especially in tropical seasonal forests, that have a variety of consequences on ecosystem composition, structure and function depending upon the type of fire, fire intensity, and fire frequency. Forest fire incidences have been increasing in the last few decades, especially in tropical moist forests raising concerns for forest restoration and management since the inhabiting plants in these forest communities largely lack adaptive strategies. Anthropogenic activities such as the extraction of non-timber forest products, maintenance of grassland for livestock, hunting and agricultural activities are the main causes of forest fires, especially in tropical moist deciduous forest.

The impacts of fire are likely to vary in moist deciduous forest types as compared to dry deciduous forests, owing to the fire frequencies and intensity, as the climatic conditions and species composition of moist deciduous forests are different from dry deciduous forests. Further, humid tropical forests need comparatively long fire-free periods to regenerate, and the lack of fire-resistant plant traits, structure and species composition of the forest might dramatically change following a fire. Forest fire incidents in India are generally more frequent during the months of February to June and are typically ground fires.

Most of our existing knowledge about fires is based on a very thin layer of empirical research and scientific certainty. Given the scale at which forest fires occur in India, their impact on the vegetation, and also given the large gap between the legal framework and the actual practices of local forest management, we think it would be timely to study the matter in greater depth. We need to study the theoretical relations surrounding fires with scientific methodology to manage forest fires. This includes understanding forest vegetation dynamics in relation to the fire regime, the role fire plays in the provision of ecosystem services, and the social background behind fire applications. This will help us to understand the behaviour of local forest dwellers and to plan landscape-level forest fire management accordingly.

Distribution of tropical moist deciduous forests in India is shown in Table-4.1.

Table 4.1: Distribution of Tropical Moist Deciduous Forests in India

State/UT	Area in sq. km.
Andhra Pradesh	1,733.76
Arunachal Pradesh	940.31
Assam	7,077.05

Bihar	452.01
Chhattisgarh	22,624.29
Goa	941.90
Gujarat	2,453.23
Himachal Pradesh	210.65
Jharkhand	638.22
Karnataka	8,495.96
Kerala	2,551.28
Madhya Pradesh	6,570.52
Maharashtra	16,859.08
Manipur	4,451.11
Meghalaya	9,826.21
Mizoram	5,897.13
Nagaland	4,899.37
Orissa	22,380.01
Sikkim	260.78
Tamil Nadu	1,777.36
Telangana	50.30
Tripura	3,216.21
Uttar Pradesh	2,949.30
Uttarakhand	5,251.60
West Bengal	1,481.05
A & N Islands	553.52
D&N and D&D	175.08
Total	**134717.29**

(Source: ISFR, 2023)

4.3 Methodology

4.3.1 Identification of Fire Prone States

Based on the report published by MoEF&CC (2018) and Indian State Forest Report (2021), top 20 districts in term of total number of forest fire detected as well as total area affected for the period of 13 years (2003-2016) were taken to select the fires prone districts in India. Other criteria including accessibility to collect field data, repeated forest fire events were also taken to identify the fire prone districts from the list of top 150 districts identified by National Disaster Management Authority, New Delhi. A total of 19 States and 28 districts have been identified to collect the data for the preparation of Standard Operating Procedure (Table-4.2). Identified fire prone districts were finalized after discussion with forest officials of various states in a consultation workshop organised by ICFRE- Forest Research Institute in November, 2023.

Table 4.2: List of selected fire prone districts along with their respective State

Sl. No.	State	District
1.	Andhra Pradesh	Alluri Sitharama Raju
	Andhra Pradesh	Prakasham
2.	Arunachal Pradesh	West Kameng
3.	Assam	Karbi Anglong
4.	Chhattisgarh	Bijapur
5.	Gujarat	Dangs
6.	Himachal Pradesh	Sirmaur
7.	Jammu And Kashmir	Udhampur
8.	Jharkhand	West Singhbhum
9.	Karnataka	Uttara Kannada
10.	Kerala	Idukki
11.	Madhya Pradesh	Balaghat
	Madhya Pradesh	Chhindwara
	Madhya Pradesh	Betul
12.	Maharashtra	Gadchiroli
	Maharashtra	Chandrapur

13.	Meghalaya	West Khasi Hills
14.	Mizoram	Lunglei
	Mizoram	Aizawl
15.	Odisha	Kandhamal
	Odisha	Koraput
16.	Tamil Nadu	Nilgiris
	Tamil Nadu	Teni
17.	Telangana	Khammam
	Telangana	Adilabad
18.	Uttar Pradesh	Pilibhit
19.	Uttarakhand	Pauri Garhwal
	Uttarakhand	Almora

4.3.2 Identification of Fire Prone Forest Types

A total of five Forest Types including semi- evergreen forests, moist deciduous forests, dry deciduous forests, subtropical broad leaved forests and subtropical pine forests have been identified for this study (Table-4.3). These forest types were identified on the basis of frequency of occurrence of forest fire, area affected by forest fire and number of forest fire detected. Then, selected forest types were discussed with officials of NDMA/FSI, PCCFs, and organizations/universities such as GB Pant National Institute of Himalayan Environment, IIT Roorkee, HNB Garwal University etc. which are dealing with forest fire in a Consultation Workshop organized by ICFRE- Forest Research Institute.

Table 4.3: List of Forest Types Identified for the Study

Major Groups	Forest Types
Tropical Forests	1. Semi- Evergreen Forests 2. Moist Deciduous Forests 3. Dry Deciduous Forests
Montane Sub-Tropical Forests	4. Sub Tropical Broad Leaved Forests 5. Sub Tropical Pine Forests

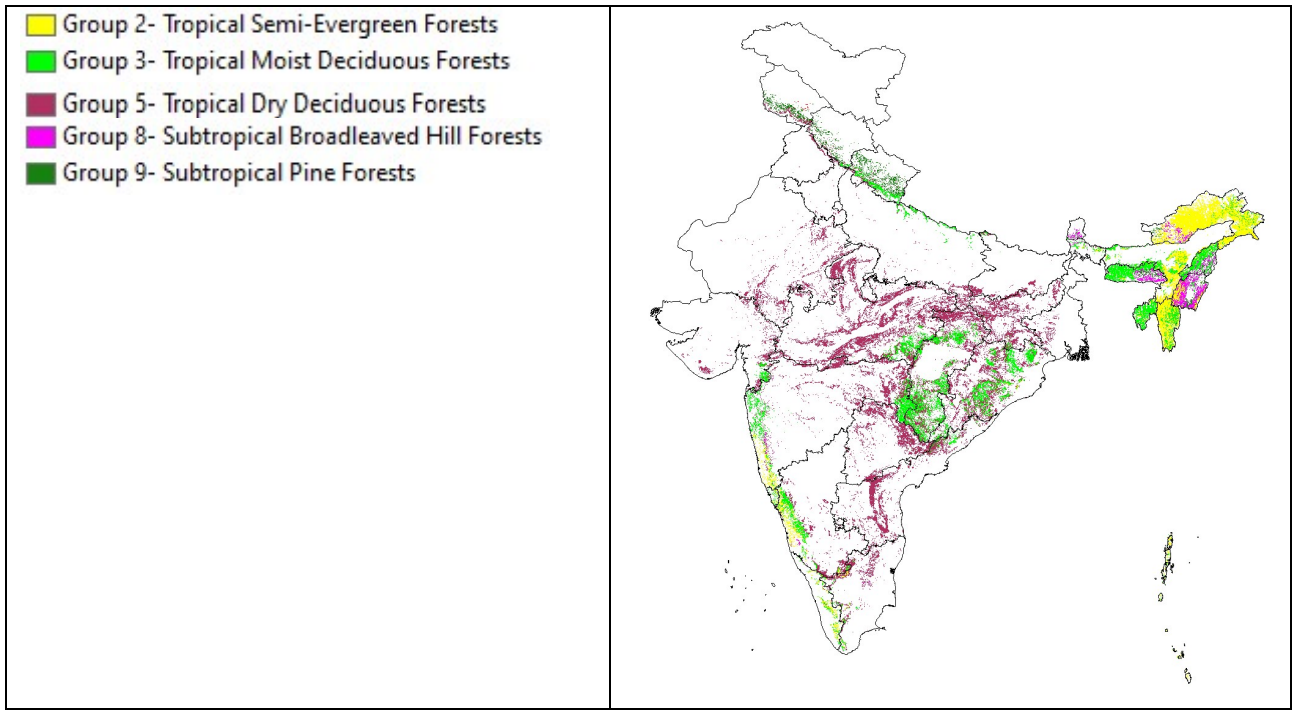

Fig. 4.1: Forest Type Distribution in the Selected States

4.3.3 Identification of Fire Prone Forest Division in Selected Districts

After selection of forest fire prone district based on criteria (frequency of occurrence of forest fire, number of forest fire detected and area affected by forest fire) given in MoEF&CC (2018), Indian State Forest Report (2021) and then finalized the identified forest fire prone Division in ICFRE- FRI Consultation Workshop. Selected forest fire prone Division was visited by the team of ICFRE- FRI to collect data/information on forest fire events which were recorded during previous fire seasons in respective Forest Division.

4.3.4 Identification of Fire Prone Range in Selected Forest Division

After identification and selection of forest fire prone division by the team of ICFRE- FRI. A team of ICFRE- FRI visited the office of selected forest fire prone forest division. A meeting was conducted with the Divisional Forest Officer (DFO) of respective divisions to finalized forest fire prone two ranges in a forest division. Divisional Forest Officer suggested name of two forest fire prone ranges based on past 10 years events of forest fire. Then team of ICFRE- FRI finalized

suggested range on the basis of occurrence of forest fires and area affected by forest fire after reviewing *Fire Action Plan* of respective forest division.

4.3.5 Identification of Village in the Selected Fire Prone Range

After identification and selection of forest fire prone two forest ranges by the team of ICFRE-FRI. A team of ICFRE- FRI visited the range office of selected forest ranges. A meeting was conducted with the Range Forest Officer (RFO) of respective range to select ten villages in a range. Range Forest Officer suggested name of forest fringe villages where forest fires events were reported in nearby forest. Then ICFRE- FRI team finalized the suggested names of ten villages on the basis of occurrence of forest fires and area affected by forest fire after reviewing *Forest Fire Control & Management Action Strategies* of respective range.

4.3.6 Data collection in the Selected Village of the Respective Fire Prone Range

A questionnaire was prepared by ICFRE- FRI to collect the information on forest fire from the selected forest fringe villages. Prepared questioner was discussed with the senior officers of selected forest fire States and Nodal officer of forest fire along with leading institute in the field of forest fire management such as National disaster Management Authority (NDMA), Indian Institute of Technology (IIT) and National Institute of Disaster Management (NIDM). ICFRE-FRI team visited the each selected village along with officials of respective forest range. A meeting was organized with the group of forest fringe villagers of different age group i.e., 25-60 years to collect the information on existing tools, cause of forest fire, strategies adopted by the people to manage/control forest fire as per attached questionnaire in Annexure-I.

Plate 4.1: Data collection from different forest fringe village of Koraput District, Odisha

4.3.7 Data collection from Range Units in Selected Fire Prone Range

A questionnaire was prepared by ICFRE- FRI to collect the information on forest fire from the selected Forest Department. Prepared questioner was discussed with the higher officers of selected forest fire States and Nodal officer of forest fire along with leading institute in the field of forest fire management such as National disaster Management Authority (NDMA), Indian Institute of Technology (IIT) and National Institute of Disaster Management (NIDM).

ICFRE- FRI team visited selected forest range and discussed with officials of respective forest range to collect the information on existing tools, cause of forest fire, strategies adopted by the staff to manage/control forest fire as per attached questionnaire in Annexure-II. Combined information of all the ranges of particular forest division was also collected from the office of Divisional Forest Officer.

Plate 4.2: Data collection from forest staff and the villagers of Jeypore Forest Division, Odisha

4.4 Major Causes of Forest Fire in Tropical Moist Deciduous Forest

ICFRE- FRI team collected the information on major causes of forest fires in Tropical Moist Deciduous forests. These causes of forest fire were recorded from the forest fringe villagers and State Forest Department through a field visit. The recorded causes of forest fire are given as:

- Deciduous nature of the forest
- Mostly Anthropogenic reasons linked to socio-economic and livelihood issues
- Leave shedding of sal trees during the summer season, and prone to fire.
- The local practice of "Podu" (Slash-and-burn agriculture) cultivation in Odisha
- Local festival like "Bento Shikar in Odisha
- Burning of agricultural residues
- Throwing of 'Bidi/Cigarettes carelessly
- Burning of bushes under the trees for collection of NTFP like 'Mahul (*Madhuca longifolia*)', 'Char (*Buchanania lanzan*)' Sal (*Shorea robusta*), Tamarind (*Tamarindus indica*) seeds etc.
- Even setting of fire in forest just for fun shake ignoring the consequences
- Burning of residues after harvesting the Pole crop of 'Eucalyptus Species' grown in Private Plots
- Collection of Red Weaverant nests from the sal forest
- Cultivation of broom grass

Plate 4.3: Leave shedding of Sal trees during the summer season are prone to fire

Plate 4.4: Slash-and-burn cultivation or locally called as Poduchasa in Odisha

Plate 4.5: Cultivation of corn (Makka) near the forest area

Plate 4.6: Farmers increasingly resorting to the practice of setting fire to the straw of corn (Makka) in the fields

Plate 4.7: A tract of burnt farm land in the Koraput district of Odisha

Plate 4.8: Burning of residues after harvesting the Pole crop of 'Eucalyptus Species' grown in Private Plots causes forest fire

Plate 4.9: Burning of trees by the villages in the farmer's field near forest causes forest fire

Plate 4.10: Burning of trees by the villages in the farmer's field near forest causes forest fire

Plate 4.11: Burning and cleaning of bushes under the Mahul trees for the collection of 'Mahul (*Madhuca longifolia*) flower and seed causes forest fire

Plate 4.12: Burning and cleaning of bushes under the tamarind trees for the collection of 'Tentuli' (*Tamarindus indica*) fruits

Plate 4.13: Burning of young exposed shoots of the Kendu plant (*Diospyros melanoxylon*) for the production of fresh, green, good-quality leaves for bidi rolling

Plate 4.14: Burning of bushes under the tree for the collection of Charkoli (*Buchanania lanzan*) fruit and seed

Plate 4.15: Burning of Red Weaver ant (Patanga) nests inside Sal forest for collection of egg

Plate 4.16: Careless cooking with fires by visitors leads to forest fires

Plate 4.17: Burning broom grass crop residues in fields leads to forest fire

Plate 4.18: Chaitra Rituals of Tribals of Koraput Odisha. As part of their Chaitra festival rituals, people belonging to Kondh, Paraja, Didayi, Bonda, Koya, Durura, Bhumiya, Bhotra, Pentia and Soura tribes and other primitive communities go on hunting sprees. The tribals set fire in forest to drive wild animals out so that they can hunt them. This is called as "Benta Shikar," or the hunting ritual

4.5 Pre Fire Season Activities

Fire season in Tropical Moist Deciduous forests start from March to May every year in India. Pre fire season activities include creation and maintenance of fire lines, Temporary forest fire prevention machans, awareness programme, and installations of hoardings etc. are shown in Table 4.4. These are given under following sub heads:

- Demarcation of Fire Prone Area in a Forest Division
- Preparation of Fire Action Plans of Fire Prone Areas
- Creation/Maintenance of Fire Lines
- Control Burning Practices
- Soil Moisture Conservation works
- Management of Weeds
- Establishment of Watch Towers
- Awareness Programmes
- Establishment of Master Control Room (MCR)
- Establishment of Fire Crew Stations
- Establishment of Forest Weather Stations (FWS)
- Establishment of Forest Fire Danger Rating System (FDRS)
- Training and Capacity Building for Fire Station Fire Fighters
- Mock drills for Forest Fire Fighting and Medical Emergency
- Constitution of Forest Fire Committee
- Role of Community in Forest Fire Management

4.5.1 Demarcation/Mapping of Fire Prone Area in a Forest Division

Forest officials will prepare or demark those areas inside the forest where the occurrence of forest fire is reported frequently. This process should be carried out at the level of zonation based on beats or sections, considering three key attributes: frequency of fire occurrences, area affected, and associated losses. The identified zones should be communicated to field units before the start of the fire season. This data can be prepared with the help of Remote Sensing & GIS or ground truthing. This activity should start from August onwards and should be completed by September of every year by all the field units of fire prone areas.

4.5.2 Preparation of Fire Action Plan of Fire Prone Areas

Fire action plan of fire prone areas shall be prepared well in advance by the respective Forest Divisions. It should be based on the fire prone areas mapping and as per actual field requirements. This activity should start from August onwards and should be completed by September of every year by all the field units of fire prone areas. Fire Action Plan should be prepared to minimize forest fires from taking place by informing, enabling and empowering forest fringe communities and may be incentivizing them to work in tandem with the forest departments. This will substantially reduce the vulnerabilities of forests against fire hazards, enhancing the capabilities of forest and other personnel and institutions in fighting fires, and speed up recovery after a fire event.

At Division Level

- The Divisional Forest Officer / In-charge of the Forest Division will be responsible for following works:
- Organizing Coordination meetings with District level fire officers and other concerned departments.
- Preparation of fire prevention & reclamation Plan and supervise the implementation of the approved plan.
- Action for filling of vacant positions in fire risk forest Beats & Sections before onset of fire season.
- Procurement of fire fighting equipment's and tools required for strengthening the base level.
- 24 X 7 fire prevention control room at division headquarters in charge of an officer of Deputy Ranger/ Forester rank with staffs and equipment's. Ensure Registration of official Mobile no with FSI website (http:// www.fsi.org.in) for getting fire alert message and set up effective two way communication network. Contact number of control room should be displayed at Beat, Section and Range offices.
- Make Incentive provision for VSS & public informants.
- Monitor & review fire control operation on weekly basis in the Division.
- Ensure timely submission of fire occurrence report.

At Range Level

The Range Officer / In charge of the Range will be responsible for following works:

- Monitor and supervise the works like maintenance of fire line, selection of firefighting squads members well in advance of the fire season.
- Repair to forest roads, maintenance of boundary & compartment lines, select site to set up camps, construction of Machans and decide on fire fighting squad members well in advance of fire season
- Organising monthly meetings of VSS during fire season, organise public awareness programmes, proper display of sign boards / banners on proper places. He must have regular interaction with VSSs.
- Deploy staff and squad members on strategic points with specific duty and chalk out their movement to cover fire sensitive forest areas.
- Organising mock drill training for Forester, Forest Guard, Squad and VSS members with assistance of fire service personnel for effective fire control. Maintain Duty Register and log Book for fire squads and staff.
- Conduct enquiry into each fire affected forest area, assess the loss, verify the action taken by the staff to control fire and submit report
- Recommend names of VSS, informants and squad members for incentives and awards.

At Section Level

- The Section Forester /Section in charge will be responsible for the following works:
- Prepare detail map showing fire prone area, route chart to those sites and available water sources
- Execution and supervision of fire control measure works (maintenance and creation of Fire Line, compartment and boundary line) in fire prone areas well in advance.
- Organising VSS meetings on regular basis and encourage members to take appropriate steps for control of fire as a Convenor.
- Safe custody of fire fighting equipment's and kits from range office.
- Receiving fire alert messages from VSS, range office & division control room on a day to day basis, ensure entry into a register and pass on to Beat Guard.

- Arrange labour, hire of vehicle and provide logistic support to fire fighting squads.
- Action taken report with details of area fire affected with GPS survey and damage to flora and fauna (photographs) to be submitted within 48 hours.
- Keeping close contact with local Fire Service Station for information and technical guidance.
- Expeditious steps to initiate legal action against culprits with due procedure and adequate evidence.
- Ensure all equipment's required for fire fighting have been supplied to all Forest Guards, VSS members, fire fighting squads and are in working condition.

At Beat Level

- Beat Forest Guard / In charge of the Beat will be responsible for following works:
- Well acquainted with area, map, topography , routes and fire risk areas of his jurisdiction.
- Make regular patrolling in forest areas and interaction with locals. He will provide his mobile no. to local ward member/ Sarpanch/ Important local villagers and request them for providing the information about forest fire promptly.
- Receive messages from control room, range office, section forester and VSS on fire occurrence, record in log book / register.
- Submit weekly report ensuring forest area not affected by fire due to his effort.
- Submit the area affected by forest fire on daily basis to Section Forester and Range Officer.
- Make frequent night halts in interior pockets of his jurisdiction.

4.5.3 Creation/ Maintenance of Fire Lines

Forest Divisions will ensure the creation and maintain of existing fire lines for the prevention and spread of the forest fires from one place to another place. The National Disaster Management Authority (NDMA) website distinguishes between two types of fire lines: *Kachha* or covered fire lines and *Pucca* or open fire lines. Kachha fire lines involve clearing undergrowth and shrubs while preserving trees to decrease the amount of available fuel. Conversely, Pucca fire lines are clear-cut areas that create a barrier between forest compartments or blocks to contain potential fire spread. The length and breadth of the fire line are variable and from 3-10

meters. In old reserve forests, the compartment boundary was also demarcated as a clear-felled strip of fire lines. Besides such artificial fire lines, forest roads, paths, natural streams, etc. also act as fire lines for the advancing forest fires. The activities including creation of fire lines, removal of weeds/grass and vegetation from the existing fire lines should start from **November** and should be completed by **December** of every year.

Plate 4.19: Fire lines are created inside the forest to prevent the spread of forest fire

Plate 4.20: Fire lines are created inside the forest to prevent the spread of forest

Plate 4.21: Creation of Fire lines inside the forest to prevent the spread of forest fire

Plate 4.22: Fire lines inside the forest prevent the spread of forest fire

4.5.4 Soil Moisture Conservation Works

Extensive soil moisture conservation (SMC) works including check dams, rock check dams, Loose Boulder Check Dams (LBCD), contour trenches and gully plugs etc. should be proposed or renewed or repaired or constructed in fire prone area. These check dams are stronger and less expensive than their cement counterparts. Plantation around the dam provides protection from damage and soil erosion. These dams are effective for big drains and can absorb the flowing debris. Such water bodies will not only provide water for firefighting teams but also will improve the moisture regime of the area. The activities, including repair or construction of soil moisture conservation bodies in fire prone areas should start from **October** and should be completed by **February** of every year.

Plate 4.23: Creation of a check dam inside the forest

Plate 4.24: Creation of check dam inside the forest

Plate 4.25: Creation of Loose Boulder Check Dams (LBCD) inside forest

Plate 4.26: Creation of Soil & Moisture Conservation tranches inside forest

Plate 4.27: Creation of water body inside forest

4.5.5 Establishment of Watch Towers

A large forest area can be monitored through the established watch tower with 24-hour facility for watchers in forest fire prone areas. This is the most effective way for early detection of active forest fires by monitoring forest area from fire lookout towers, especially in fire-sensitive areas of forest. Temporary forest fire prevention mancha prepared with bamboo and brushwood. Each 10 km interval of the forest boundary along the RF and PRF boundary and prominent fire vulnerable areas has been selected and watchers deputed from where at least 300 to 400 ha of the forest area can be visible. Monitoring of forest fire through watch tower by the staff will be started from mid-**February** to mid-**June** i.e., fire season.

Plate 4.28: Establishment of Watch Towers (Temporary machans) for firefighting squad

4.5.6 Establishment of Communication Networks

Beats or sections lacking mobile network coverage should be identified during fire-prone area mapping. A reliable wireless communication system should be established in these areas before the fire season. All the communication channels including wireless network, mobile phones etc. should be checked and kept in readiness.

4.5.7 Awareness Programmes

The extraction of non-timber forest products, maintenance of grassland for livestock, agricultural activities are the main causes of forest fires, especially in tropical moist deciduous forest.

Forest Department extensive awareness programs and workshops should be conducted by targeting the groups responsible for forest fires. The target group here can include school and college students, women folk who go to forest areas to collect fuelwood and fodder, community leaders and village elders, farmers who work in the vicinity of forests, and tribals and nomads living in and around forest areas. Society and local people should be educated about the ill effects of forest fire and negative impact on their health as well as health of forest ecosystem.

- Mass awareness Programmes at Division/Range/Section level involving all line departments, VSS members, Volunteers, Organisations etc.
- Publishing of awareness messages in local News Papers, Public Spaces, hoardings showing acts, rules, punishments should be strictly followed. FIR should drawn against offender when ever noticed in the field.
- VSS/G.Ps will be strengthened and motivated to prevent and combat forest fire. Preventive and mitigative Fire Control measures will be included in the GP meetings.
- Awards to be given to “Zero Fire VSS” in Public Meetings to encourage and motivate the Villagers.
- Special drive to be taken up for vulnerable / Podu areas. Local Leaders / Disharis / Headmen to be involved for awareness.
- Awareness will be created amongst farmers against burning of agricultural residue in fields.
- “Foot Patrolling “will be carried out in the FIRE PRONE areas involving local youth and organisations for awareness creation.
- Training for combating forest fire to be given to the FD staff / NCC / NSS / Volunteer groups of youth during January.

- Street dance / Songs / Plays to be exhibited in public places involving local artists and theatre groups.
- Publication of Dos and Don'ts with respect to Forest Fires to be done in all local Odia Newspapers and Hoardings will be exhibited in public places.

The activities including extensive awareness programs, workshops, installation of hoardings, wall paintings and distribution of printing materials on forest fires should start from **January** onwards and to be continued till **onset of monsoon** of every year.

Plate 4.29: Mass awareness Programme at Division/Range/Section level

Plate 4.30: Mass awareness Programmes at range level

Plate 4.31: Fire awareness meeting at range level

Plate 4.32: Fire awareness meeting with Van Suraksha samiti

Plate 4.33: Creation of Van Suraksha Samiti (VSS)

Plate 4.34: Forest fires prevention poster and slogans inside fire fire-affected area

4.5.8 Establishment of Master Control Room (MCR)

MCR is to be established at Division level with the following duties and responsibilities:

i. The phone number of all the officers and employees of State Forest Department, police department, Health Department, Fire Brigade and the public representatives such as Gram Pradhan's, social leaders should be maintained in offices and crew stations so that they can be contacted immediately when needed for assistance.

ii. Details of all the related crew stations and command areas should be kept in place; also, the route details for all these should be kept in the premises for information.

iii. Information about the daily safety works and forest fire safety should be kept in the premises.

iv. Calculating the Fire Danger Rating Index and releasing the information bulletin every day at 2 pm and providing the task details to each and every range/crew stations.

v. Deploying the forest fire security team to the fire spot quickly to help the local staff and respective crew station employees and workers in case of any fire accidents.

vi. As per the need the food materials, water and other amenities should be supplied to the other fire security teams. Also, a medical kit should be kept to help any injured employee or worker.

vii. To establish linkages among the different agencies like Gram Sabha, block level administrative (BDO), police officials and other Government and Non-Government agencies by compiling daily, weekly, monthly meeting reports to receive the needed assistance during emergency. Also providing the report of the results obtained after the fire incidents.

viii. Evaluating and effective monitoring of the forest fire accidents and recording the causes of the accidents.

ix. To inform the media and people representatives about the effective steps being taken by the division for the Forest fire protection.

x. Maintaining all the records. After the fire period is over, the process of investigating and analyzing the fire accidents should be ensured.

4.5.9 Establishment of Fire Crew Stations

Appropriate number of fire crew stations should be established to combat and monitor the events of forest fire in forest fire prone area. Each forest fire crew station should have a staff of minimum of **4-5 people** in case of sensitive zone and **10-20 people** in case of most sensitive zone, who should have all types of fire extinguishing equipment. Each fire crew station should have a vehicle to mobilize the fire crew team from fire crew station to active forest fire point. Apart from this, all the crew members should be trained which are to be posted at fire crew station through joint mock drill by selecting suitable fire prone site before starting the fire season. A joint mock drill for forest fire fighting should be organized, involving the concerned Divisional Forest Officers (DFOs), the Revenue Department personnel, the Fire and Rescue Department, and the District Medical Officer. In the event of a large fire, trained personnel from all departments should actively participate in firefighting efforts. Additionally, schools in the area should be engaged, with teachers and students educated on fire prevention measures so they can assist forest staff when needed. Fire drills should be conducted in key locations on a rotational basis.

The activities including mock drill, testing of fires equipment/tools and training should be completed by **January** of every year.

4.5.10 Establishment of Forest Weather Stations (FWS)

Forest Weather Stations at range level can be established in fire prone areas to monitor climate conditions and to prevent occurrence of forest fires through weather analysis of respective forest type. These weather stations would be equipped with sensors for temperature, humidity, wind speed, wind direction, precipitation, etc., and would be capable of monitoring weather conditions in real time. By analyzing this data, the likelihood of fire spread can be assessed. A team of expert members will monitor/track daily or weekly weather data for temperature, humidity, and wind speed which would help in assessing fire risks and guide fire prevention strategies. Forest Weather Stations establishment works can be completed before starting of fire season in fire prone areas.

4.5.11 Establishment of Forest Fire Danger Rating System (FDRS)

The Forest Fire Danger Rating System will enable State Forest Department to assess the fire risk for a specific area, either for the current day or the following day. It will indicate conditions that represent the potential for a fire to ignite, spread, and demand suppression efforts over a wide region. The system will integrate the current and anticipated conditions of key fire danger factors into one or more qualitative or numerical indices, reflecting the fire protection requirements of a given area.

4.5.11.1 Components of the Fire Danger Rating System

Forest Fire Danger Rating System will include following components:

4.5.11.1.1 Establishment of Base Station

Appropriate number of Base Stations can be established for a division as per the fire prone zonation. The Base Station should be equipped with a wireless set and weather station. Wireless set is to send and receive information from crew station, Master Control Room, and other sources. The weather station should comprise of rain gauge for measuring precipitation along with instruments for measuring Humidity, Temperature and Dew Point.On daily basis, Base station should record the weather parameters of forest fire prone areas and send it to the MCR by 12:00 Noon for calculating the Fire Danger Rating Index and Fire Danger Levels for all the Base Stations. On receival of the Fire Danger Levels (Nil, Moderate, High and Extreme), the Base Station should immediately pass on and alert the respective Crew Stations to act.

4.5.11.1.2 Weather Data Collection

The FDRS relies heavily on real-time meteorological data. Therefore, Base Stations should record following weather parameters:

- **Temperature:** High temperatures dry out vegetation, making it more flammable.
- **Relative Humidity:** Lower humidity increases the likelihood of fire ignition as dry air extracts moisture from fuels.
- **Wind Speed and Direction:** Wind can spread fires quickly by carrying embers and intensifying flames.

- **Precipitation:** Rainfall helps dampen fuels, reducing fire risk, while extended dry periods increase fire danger.
- **Dew Point**

4.5.11.2 How the Fire Danger Rating System Works

4.5.11.2.1 Data Input and Processing

Weather data (temperature, humidity, Dew point, and precipitation) is fed into the established formula for calculating the Fire Danger Rating Index. In modern FDR systems, automated weather stations and satellite-based sensors continuously provide real-time data. Weather data (temperature, humidity, and precipitation) is fed into the established formula for calculating the Fire Danger Rating Index. In modern FDR systems, automated weather stations and satellite-based sensors continuously provide real-time data.

FIRE DANGER RATING INDEX

A simple Fire Danger Rating Index developed by Nesterov (1949) should be used in MCR. The Fire Danger Rating Index is based on the following parameters.

1. Days without rains.
2. Dry bulb temperature.
3. Dew point temperature (Calculated from relative humidity & temperature)

$$N=\varepsilon(ti-Di) \times t + W$$

Where, i = 1, N= Nesterov Index, t=Temperature °C

W= Number of days since the last rainfall > 3 mm, D= Dew point temperature °C

The Index requires daily observation of **temperature, humidity & precipitation**. The difference between the daily temperature and dew point temperature is multiplied by temperature and cumulatively added over the days since the last rainfall. The system is divided into the following Fire Danger Levels:

FIRE DANGER LEVELS	
0-300	Nil
301-1000	Moderate
1001-4000	High
4001+	Extreme

For calculating the Fire Danger Levels on the basis of recorded temperature, humidity and precipitation, along with detailed illustrations kindly refer to the following spreadsheet in the following link:

LINK: ***https://drive.google.com/drive/folders/13JfYSkEePjdTYWry7lUqV0HatBqHgImB***

These Fire Danger Levels are qualitative and simplistic for on ground Crew Station staff and communicated to all the Base Stations. On receival of the Fire Danger Levels (Nil, Moderate, High and Extreme), the Base Station should immediately pass on and alert the respective Crew Stations to act.

- This data is processed to assess current conditions and predict near-future scenarios.

It is also suggested that till such time the Forest Department is unable to set up the departmental FDRS, they can follow FDRS developed by FSI on **VAN AGNI GEOPORTAL**.

4.5.11.2.2 Fire Danger Classes

The processed data is used to assign a fire danger rating, typically divided into different levels:

- **Nil (Green):** If the Fire Danger Rating Index is between 0 and 300.
- **Moderate (Yellow):**If the Fire Danger Rating Index is between 301-1000.
- **High (Pink):**If the Fire Danger Rating Index is between 1001-4000.
- **Extreme (Red):**If the Fire Danger Rating Index is above 4001

A Fire Danger Class should be given to each base station based on the FDRI value. These ratings should be displayed on public signage, websites, and apps to inform the general public and relevant authorities.

4.5.11.2.3 Fire Danger Map

Many fire danger rating systems generate fire danger maps, which visually depict areas of varying fire risk using color-coded zones like Least Sensitive, Sensitive, and Most Sensitive. These maps are vital for fire authorities and land managers to allocate resources and focus on high-risk areas.

4.5.11.2.4 Digital Forest Fire Monitoring

When the fire danger rating reaches a certain level, early warning systems may trigger public alerts through various platforms, such as television, radio and social media. Mobile application can be developed and used by the forest staff to log the status of various forest fire incidents to State Level Database. These logs should include time stamped and geo tagged images. Officials can log in to a portal and view a dashboard with summary reports automatically generated from

this database. The local public should also be granted access to the mobile application to report fire incidents. To ensure access and functionality, users must register on the app.

4.5.11.2.5 Pre-Determined Actions taken according to the Fire Danger Rating Index

i. When the Fire Danger Index is Minimum/Nil

When the fire danger index is minimum then following actions should be taken by the crew stations:

1) Conduct regular maintenance and necessary repairs of all fire-fighting tools and equipment to ensure they are in optimal working condition.

2) Organize awareness meetings in local villages, civil areas, and Van Panchayats.

3) Affix all the torn posters. Write forest safety slogans on the walls at various places in the region.

4) Inform Gram Pradhan's, Regional Panchayat members, other public representatives including the Patwaris, and Tehsildars about the safety of their critical areas and their responsibilities in Forest Fire Protection.

5) All the Panchayats where combustible materials are stored in huge quantities should be informed about the safety. The meetings should be conducted to provide them technical knowledge and steps to be taken accordingly by them when incident occur.

6) Engage with local community-based groups such as Self half group (SAG) and Van Suraksha samiti (VSS) to seek their support in maintaining forest safety.

7) Review and investigate past fire incidents to determine causes and take corrective measures to avoid recurrence.

ii. When the Fire Danger Index is Moderate

When the fire danger index is moderate then following actions should be taken by the crew stations:

1. Carry out systematic cleaning and controlled burning along designated fire lines, routes and highways to prevent the spread of fire.
2. Inform the local groups such as Self Help Group (SHG), Van Suraksha Samiti (VSS), and other security committees to remain alert at the areas such as old plantation, critical areas and at the places where the accidents have taken place in the past.

3. Different schools under the area should be contacted and the teachers and students are addressed for fire protection so that they may help the forest staffs when needed.
4. Fire drills should be conducted at all important areas in rotation.

iii. When the Fire Danger Index is High

When the fire danger index is high then following actions should be taken by the crew stations:

1. Continuous patrolling and fire drills should be compulsorily conducted every day.
2. All the local people should be contacted and are informed about the increased fire index so they stay alert to prevent fire.
3. People residing in nearby areas who have vehicles (taxi or car) should be contacted in prior and are convinced to be ready to help the crew stations with their vehicle in any emergency.
4. The written information about fire index should be issued to all Gram Pradhan's and Patwaris, describing their roles and responsibilities in preventing the fire accidents in their respective area.

iv. When the Fire Danger Index is Extreme

When the fire danger index is extreme then following actions should be taken by the crew stations:

1. The actions done in case of high fire danger index should be repeated and in addition all the critical areas falling under the command area should be patrolled day & night compulsorily.
2. As per the need in the crew stations additional work force should be arranged in prior.
3. Facility of additional rented taxis and vehicles as per the need in the area should be kept at the disposal of the crew station beforehand.

4.5.12 Training and Capacity Building for Fire Station Fire Fighters

Training programs should be conducted, and firefighters at the fire station should undergo certified courses offered by various institutes.

4.5.13 Mock Drills for Forest Fire Fighting and Medical Emergency

Mock drills simulating emergency forest-fire fighting situations should be conducted prior to the fire season. Apart from the State Forest Department, the drills should involve the concerned line departments at the district level, including the Revenue Department personnel, the Fire and Rescue Department, and the District Medical Officer. The DDMA should also be involved in the said exercises for advanced preparedness. Firefighting team may sustain serious injury from active fire during the firefighting due to dehydration (body water loss), suffocation and burning of skin (body contact with active fire) etc. A mock drill on medical emergency related to forest fire can be practiced (such as CPR, artificial respiration) by organizing a mock drill by medical officers of respective forest division in the month of January of every year. Insurance coverage can also be provided for crew station members.

4.5.14 Constitution of Forest Fire Committee

4.5.14.1 State Level Forest Fire Committee (SLFFC)

A State Level Forest Fire Committee (SLFFC) will review the progress of District Level Forest Fire Committee (DLFFC) in the month of November/December for pre fire season activates and in the month of July/August for post fire season activities completed by the DLFFC.

State Level Forest Fire Committee (SLFFC) will be organized under the chairmanship of Chief Secretary. Following will be members of SLFFC:

- Chief Secretary – Chairperson
- Principal Secretary (Forest) – Member
- Principal Secretary (Home) – Member
- Principal Secretary (Panchyati Raj) – Member
- Principal Secretary (Rural Work Department) – Member
- Principal Secretary (Health) – Member
- Principal Secretary (Education) – Member
- Secretary (Disaster Management) – Member
- Principal Chief Conservator of Forest/HoFF - Member Secretary

Other departments may be co-opted as per requirement. The role of the proposed SLFFC would be to ensure effective coordination among the different related departments and their active participation in the control and management of forest fire.

4.5.14.2 District Level Forest Fire Committee (DLFFC)

DLFFC will review the progress of forest fire action plan prepared by respective members of the committee in the month of November (pre fire season), June (during fire season) and August (post fire season) of every year.

District Level Forest Fire Committee (DLFFC) will be organized under the chairmanship of Chief Conservator of Forest. Following will be members of DLFFC:

- Chief Conservator of Forest (CCF)- Chairperson
- District Magistrate (DM) – Member
- Senior Superintendent of Police (SSP)– Member
- Chief Medical Officer (CMO) – Member
- District Disaster Management Officer– Member
- Nodal Officer Forest Fire - Member
- Deputy Conservator of Forest (DCF)- Member Secretary

Other departments may be co-opted as per requirement. The role of the DLFFC would be to ensure following:

- ✓ Implementation of Forest Fire Action Plan
- ✓ Availability of resources (vehicle/manpower/tools/source of water) with Forest Departments/line departments
- ✓ Medical facilities available for fire fighting team (FFT)
- ✓ Awareness programme/capacity buildings conducted by Forest Department (FD)

District Level Forest Fire Committee (DLFFC) will forward the information to State Level Forest Fire Committee (SLFFC) in Format III in the first week of November and July of every year.

4.5.15 Role of Community in Forest Fire Management

In India, Joint Forest Management (JFM) Committees have been established at the village level to involve people in forest protection and conservation. The JFMC is also known by different

names in different States, such as Forest Protection Community (FPC), Village Forest Committee (VFC), Van Sanrakshan Samiti (VSS), Van Panchayat Samiti (VPS) and Eco-Development Committees (EDCs) etc. Currently, there are over 1,18,000 JFMCs protecting roughly 22.93 million hectares of forest land, involving around 14.5 million families (MoEF&CC, 2010). The Committees also have been given responsibilities to protect the forests from fires.

Panchayat should be involved by respective Forest Division in plantation activities and beating/dousing of active forest fire in nearby forest areas. Forest Department will carry out capacity building of local forest fringe villagers through training/mock drill, provisioning firefighting equipment for forest fire prevention and management.

A resource assessment mapping should be carried out by the Range Forest Officer along with the Panchayat Pradhan as per the attached Proforma-I and II. The resource assessment should include details of water sources in and around the forest fringe villages along with vehicles, manpower, tools etc.

4.6 During Forest Fire Season Activities

It includes detection and management of active forest fire during the fire season. These activities are given under following sub heads (as shown in Table 4.4):

- Deployment of Fire Watchers
- Mobilization of Firefighting Team
- Escalation Matrix
- Real Time Monitoring of Forest Fire Alerts
- Beating or Dousing Active Forest Fire
- Post Beating or Dousing Active Forest Fire Activities
- Precautions taken by Forest Staff or Local People during Fire Beating or Dousing
- Reporting and Record Keeping

4.6.1 Deployment of Fire Watchers

There should be increased surveillance by the appointment of an adequate number (as per fire severity and occurrence of forest fire) of firewatchers during the months of February, March, April, May, and June, which used to be the practice earlier. This will help in frequently patrolling in forest fire prone areas by the fire watchers/forest officials during the fire season. Forest firefighters, from DFOs to fire watchers, should be registered with the FSI alert system. Drones

can be used for monitoring forest fires, and training should be provided for their operation. Drones play a crucial role in firefighting operations by providing aerial surveillance. With real-time data and visuals, drones capture the dynamic nature of fires, allowing accurate assessment of size, spread, and behavior. High-resolution cameras on drones help firefighters make informed decisions on resource allocation, evacuation, and firefighting strategies. Additionally, thermal drones detect hotspots and locate trapped individuals. This information helps prioritize efforts, deploy resources effectively, and potentially save lives by identifying those in need of immediate rescue.

4.6.2 Mobilization of Fire Fighting Team

A forest fire fighting team of 4-5 members will reach at the site of active fire. This firefighting team will keep with them wireless, firefighting kit, leaf blower, water bottle and food packets. A medical safety kit having emergency medicines suggested by the medical officer during mock drill on fire related emergencies must be kept with them. After reaching at the active fire site, firefighting team will start beating or dousing forest fire with the help of equipments/tools available in firefighting kit.

Plate 4.35: Deployment of Fire Watchers at fire protection mancha

4.6.3 Real Time Monitoring of Forest Fire Alerts-Response

Key Features of Odisha Forest Fire Management System:

Forest Fire Alerts are received from NRSC-Forest Survey of India through direct API. Automatic Geo-Data processing in OFMS Server and fire alerts sent to Smartphone of beat level forest officials as per their geographical jurisdiction. Offline navigation to fire alert point, data collection with geo tagged pictures and action taken using OFMS mobile application.

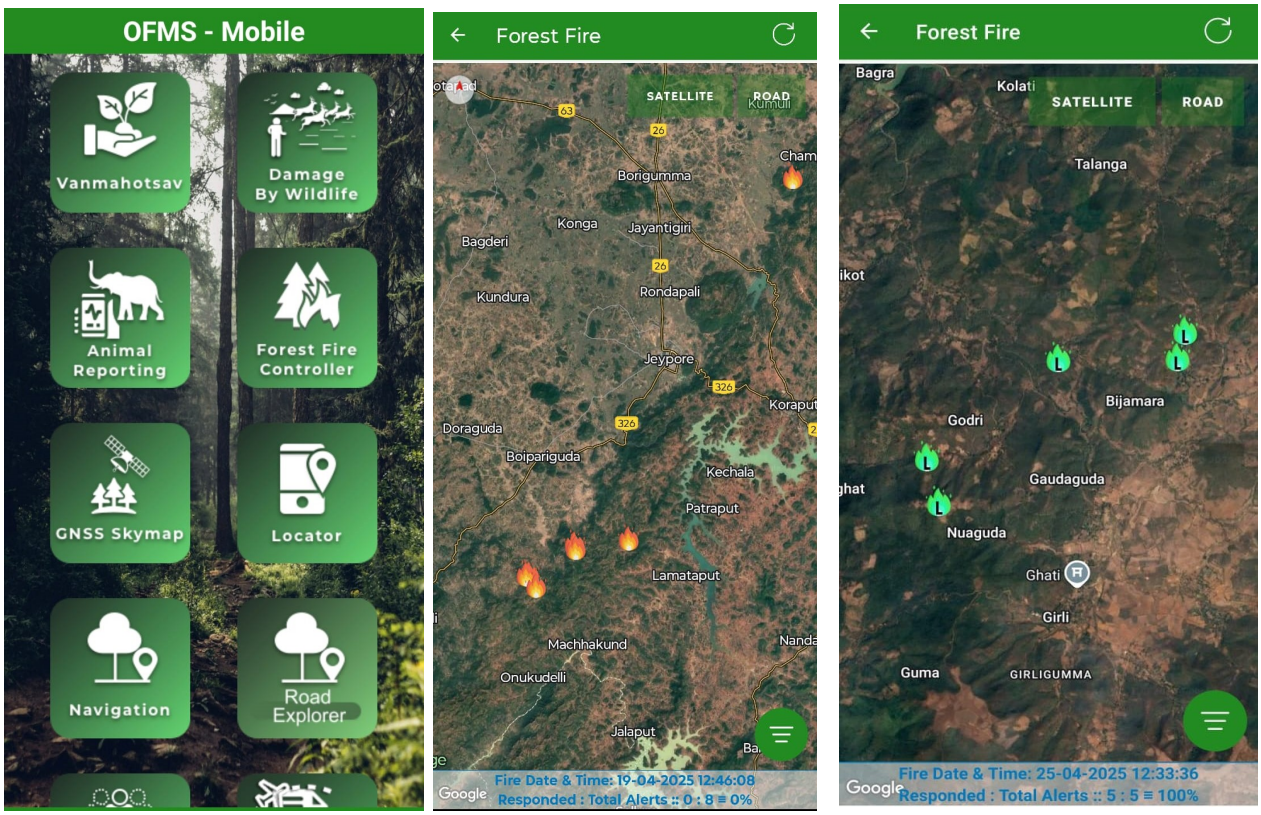

Fig. 4.2: Forest Fire Alerts are received from NRSC-Forest Survey of India

4.6.4 Escalation Matrix

There are two types of forest fires occur in tropical dry deciduous forests viz., surface fire and ground fire.

Surface Fires: Surface fire is the most common type of forest fire in the tropical dry deciduous forests. Surface fires occur on or near the ground and burn surface litter, grasses and regeneration. As it runs on the ground surface it requires continuous contact with the ground and fuel material lying on the forest floor. Surface fires are generally not very severe but they burn

the seedlings and thus recurring surface fires affects the regeneration of forests and proliferates invasion and spread of unpalatable weed plants.

Ground fires: Ground fires burn mostly in decayed roots below ground and in the duff layer. The duff layer is made up of compacted dead plant materials such as leaves, bark, needles, and twigs. Ground fires are sustained by glowing combustion (without flames) and can go undetected for a long time because they produce little to no smoke and spread slowly.

To enhance effectiveness and ensure coordination in firefighting efforts, the chain of command established by the National Disaster Management Authority (NDMA) should be followed. This includes coordination with the District Disaster Management Authority (DDMA), State Disaster Management Authority (SDMA), State Disaster Response Force (SDRF), National Disaster Response Force (NDRF), and the Indian Air Force (IAF).

Forest fire situations can be divided into following five levels based on severity, duration, and assigning specific roles to corresponding administrative units in tropical moist deciduous forests.

All forest fires categorized by the FSI Forest Fire Alert System (Large Forest Fires Monitoring Programme) as Large Forest Fires are to be included for the purpose of this chain of escalation:

Level 1 (Forest Beat/Range): All active surface fires should be managed by the frontline staff of respective range at this level. The response here should focus on the suppression of all active surface fires occurring in the beat or range.

Level 2 (Forest Division): When fires escalate to large forest fires and it continues until 3 days. At this level, the emphasis should be on suppression of active surface fires at forest division level by involving the frontline staff of respective forest division.

Level 3 (District Disaster Management Authority) (DDMA): The DDMA should be involved in forest fire suppression efforts when a large fire persists for 4-6 days or in cases of crown fires lasting up to 2 days. SDRF should be called if such fires continue in Protected Areas.

Level 4 (State Disaster Management Authority/State Disaster Response Force): The SDMA/SDRF should be mobilized when large forest fires extend beyond 6 days or when crown fires persist for more than 2 to 4 days. NDRF should be called if such fires continue in Protected Areas. The Indian Air Force (IAF) may also be involved at this stage, depending on ground realities.

Level 5 (National Disaster Response Authority/National Disaster Response Force): NDRF should be involved when large forest fires continue for more than 10 days, or there are multiple large forest fires in a forest division or across a state or Union Territory. Crown fires lasting beyond 4 days may also require involvement of NDMA. At this stage, Indian Air Force may also be involved.

4.6.5 Beating or Dousing Active Forest Fire

A team of 4/5 members will start beating or dousing active fire with the help of available tools when the wind is blowing slowly.

If the wind is blowing at high speed, two to three team members will extinguish the active fire using available green twigs, fire brooms, jhapa, and fire beaters. Meanwhile other members will start to clean or sweep the forest floor in the form of a linear strip of width of one meter from a distance of 15-20 meters from beating point. Fuel load from forest floor can be swiped with the help of fire raker, fire broom, panja and leaf blower.

Sometimes active fire could not be stopped with the help of cutting fire line in the form of linear strip. Then, counter fire practice could be adopted to control active fire.When the active fire will reach at these points then due to non-availability of fuel it will stop further spreading out.

If intensity of active fire is very high, then forest official should also involve help from local people to control forest fire through above detailed methods.

Plate 4.36: Beating of active fire with green branches

4.6.6 Post Beating or Dousing Active Forest Fire Activities

Once active fire has been doused completely then, the firefighting team will ensure that all other inflammable materials including twigs, branches and fallen woods are doused completely. This can be ensured with the help of fire beater by beating the burnt area. If any smoking materials lying on burnt area smoldering, then it should be doused out completely with the help of fire beater. This will prevent further spreading of forest fire from burnt area.

4.6.7 Precautions Taken by Forest Staff or Local People during Fire Beating or Dousing

Intensity of forest fire may be increased or decreased during beating or dousing active forest fire. Therefore, it is necessary to take proper precautions during controlling or dousing active forest fire. These are given as:

- Wearing of fire proof dress including globs, goggles, boots etc. by firefighting team
- Availability of drinking water for the firefighting team
- Availability of first aid facilities including ambulance
- Ensure beating distance from fire beating point to avoid dehydration
- Knowledge of alternate path inside the forest during emergency
- Availability of active or functional communication channels in case of any emergency

4.6.8 Reporting and Record Keeping

Formats should be developed and utilized in the field for daily, weekly, and monthly reporting (attached in Annexure-III).

4.7 Post Forest Fire Season Activities

Post fire activities play an important role in restoration and assessment of fire affected areas etc. are shown in Table 4.4. These activities are given under following sub heads:

- Burnt Area Assessment
- Restoration of Fire Affected Areas
- Post restoration Monitoring of Fire Affected Areas
- Award to best performing Van Suraksha Samiti/JFMCs/Van Panchayat

4.7.1 Burnt Area Assessment

Range Forest Officer will collect information on the entire fire incident in their particular range. Range Forest Officer will assess the area and damage caused by forest fire. Assistant Conservator of Forest (ACF/SDO) will prepare a report on area by forest fire and will submit this report to Divisional Forest Officer (DFO) immediate after suppression of each forest fire events during the fire season. This report would be reviewed by Divisional Forest Officer. Divisional Forest officer will authenticate/finalize this report before submitting it to PCCF & HoFF office within a month after receiving this report from Sub Divisional Officer.

4.7.2 Restoration of Fire Affected Areas

Assistant Conservator of Forest (ACF/SDO) will collect information of all the fire affected sites for all the respective ranges. Divisional Forest Officer will assess the damage caused by forest fires in the Division. Divisional Forest Officer will submit a detailed report of assessment either range wise or combined report to Conservator of Forest (CF). If considerable damage to existing flora has taken place, then respective Forest Division shall take suitable actions to restore the burnt area through appropriate schemes such as plantations or plantation of fire-resistant species, restoration models, silvicultural practices, SMC works and enclosure the area for naturally regeneration etc.

4.7.3 Post Restoration Monitoring of Fire Affected Areas

Range Forest Officer will prepare a map of fore affected sites with the help of concerned range staff. All the recorded site will be mapped using appropriate software or with the help of GIS

technology. Yearly data including GPS location, area (burnt or un-burnt) in hectare, name of beat/compartment will be recorded separately in a prescribed data collection format. The prepared date shall be uploaded on FSI portal or respective Division portal by the office staff of DFO. These all above activities will be ongoing throughout the year and frequent monitoring of restored sites will continued to till 03 years.

4.7.4 Award to best performing JFMCs/Van Panchayat

Van Panchayats (VP) are autonomous local institutions controlling forests in India. Van Panchayats are responsible for protect and develop forests including awareness campaign, control burning practices and conservation and improvement of forests. Award should be given to best performing works in management and control of forest fire by JFMCs/Van Panchayat every year.

4.8 Calendar for Pre Fire, During Fire and Post Fire Activities

Table 4.4: Calendar for Pre Fire, During Fire and Post Fire Activities

SN	Particulars	Month	Action to be taken
	PRE FIRE ACTIVITIES		
1.	Demarcation of Fire Prone Area in a Forest Division	August-September	Divisional Forest Officer
2.	Preparation of Fire Action Plans of fire prone areas and review by state fire committee	August-September	Divisional Forest Officer
3.	Creation/Maintenance of Fire Lines	November- December	Divisional Forest Officer
4.	Control Burning Practices	December – January	Range Forest Officer
5.	Soil Moisture Conservation works	October – February	Range Forest Officer
6.	Management of Weeds	October– November	Range Forest

			Officer
7.	Establishment of Watch Towers	February onwards to till ending of fire season	Divisional Forest Officer
8.	Establishment of Communication Networks	Before January	Divisional Forest Officer
9.	Awareness Programmes	January onwards & to be continued till onset of monsoon	DFO/Range Forest Officer
10.	Establishment of Master Control Room	Before February	Divisional Forest Officer
11.	Establishment of fire crew stations	January	Divisional Forest Officer
12.	Establishment of Forest Weather Stations (FWS)	By January	Divisional Forest Officer
13.	Establishment of Forest Fire Danger Rating System (FDRS)	By January	Divisional Forest Officer
14.	Training and Capacity Building for Fire Station firefighters	January- February	Divisional Forest Officer
15.	Mock drill for firefighting and medical emergency	By January	Divisional Forest Officer
16.	Constitution of Forest Fire Committee	-	-
17.	Role of Community in Forest Fire Management	January onwards & to be continued till onset of monsoon	Divisional Forest Officer
DURING FIRE ACTIVITIES			
18.	Deployment of Fire Watchers	February-July	Beat Incharge
19.	Mobilization of firefighting team	February-July	Range Forest Officer
20.	Escalation Matrix	February-July	Divisional Forest

			Officer
21.	Beating or dousing active forest fire	February-July	Beat Incharge/Range Forest Officer
22.	Post beating or dousing active forest fire activities	February-July	ACF/Ranger Forest officer
23.	Precautions taken by forest staff or local people during fire beating or dousing	February-July	Range Forest Officer
24.	Reporting and Record Keeping	February-July	ACF/Range Forest Officer
POST FIRE ACTIVITIES			
25.	Burnt Area Assessment	Immediate after suppression of each event of forest fire	Assistant Conservator of Forest/Divisional Forest Officer
26.	Restoration of fire affected areas	July-September	Divisional Forest Officer
27.	Post restoration monitoring of fire affected areas	Up to 03 years	Range Forest Officer
28.	Award to best performing VSS/JFMCs/Van Panchayat	December	Divisional Forest Officer

* These activities are indicative and can be customized by the State Forest Departments based on actual field conditions

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