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Forest Fires in India – A Synopsis

At a Glance

- Forest Fire has benefits in terms of clearing the forest floor and paving way for regeneration of grass, herbs and saplings, but these are marginal when compared to the huge losses linked to it.
- Land conversion for agriculture and poor forest management are the main drivers behind the increase of forest fire.
- The regions facing frequent occurrences of forest fires may affect forest strata, cause soil erosion, land degradation, variation in temperature and climate conditions, affect wildlife and cause other serious impacts.
- There is a lot of difference between the causes of forest fires with respect to the global scenario and the Indian scenario.
- Unlike in the west, forest fire occurrence in India is more of anthropogenic in nature than natural.
- In India, severe fires occur in many forest types particularly dry deciduous forest, while evergreen, semi-green and temperate forests are comparatively less prone
- The Government of India has taken many initiatives with regard to the management of Forest Fires through its agencies like National Disaster Management Authority and Forest Survey of India.
- Escalation of support from State and National Agencies in addition to post fire restoration and rehabilitation is required for proper management of forest fires.

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Introduction¹

Forest Fires have long been an integral part of the forest environment and have played an important role in shaping the forest ecosystems, their conservation and management. Although fire has benefits in terms of clearing the forest floor and paving way for regeneration of new grass, herbs and saplings, yet these are marginal when compared to the huge losses linked to it. Over the years, forest fire occurrences across the globe have engulfed vast tracts of forest land besides resulting in soil degradation, change in climate conditions and adverse impacts on ecology.

Global Scenario

The Global Forest Resource Assessment (GFRA)² and other scientific studies have reported that the wild lands including forest areas are increasingly facing difficult fire weather conditions, extended fire seasons and large fires influenced by climate change, which is likely to have immense costs in terms of loss of biodiversity, ecosystem services, human well-being, livelihoods and national economies.

Causes of Forest Fire

A. *Environmental Factors*

- Persistent hotter and drier weather due to climate change.
- Meteorological Factors such as lack of precipitation, high wind speeds, low humidity and very high temperatures.

B. *Human factors*

- Land conversion for agriculture and poor forest management are the main drivers behind the increase of forest fire. World Wildlife Fund (WWF) International in its 2020 Report has estimated that humans are responsible for around 75% of all wildfires and much of the increase in fire incidents can be directly linked to human actions.
- Human Carelessness like Camp Fires, Sparks from vehicle exhaust and throwing Burning Bidi/Cigarettes *etc.*

Impacts of Forest Fires: -

The regions facing frequent occurrences of forest fires may affect forest strata, cause soil erosion, land degradation, variation in temperature and climate conditions, affect wildlife and cause other serious impacts. Forest fire occurrences are the major cause of forest degradation and other changes.

¹<https://fsi.nic.in/forest-report-2021>

²<https://fsi.nic.in/forest-report-2021> page 116

Indian Scenario

Forest fires are a regular phenomenon in our country. The forest fire season in the country is normally from November to June.

In India, severe fires occur in many forest types particularly dry deciduous forests, while evergreen, semi-green and temperate forests are comparatively less prone.

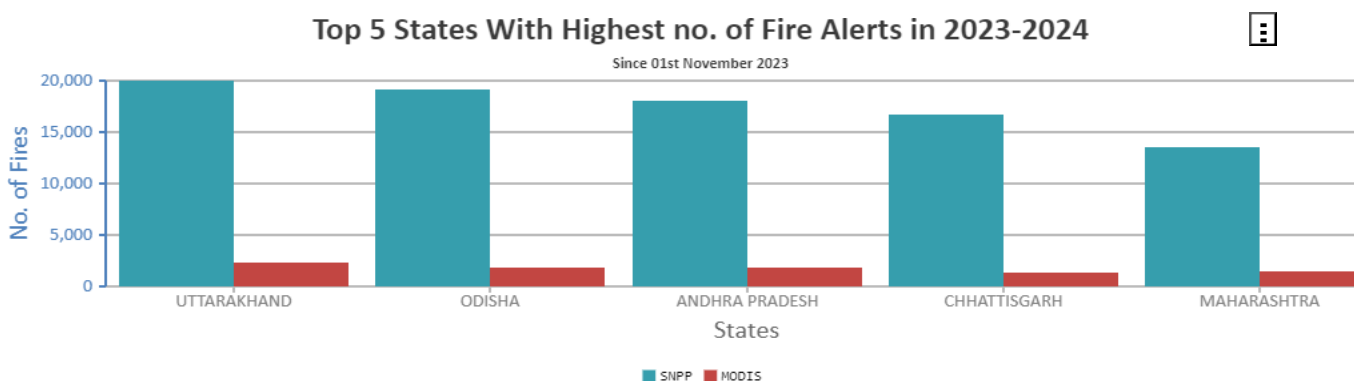
More than 36% of the country's forest cover has been estimated to be prone to frequent forest fires. Nearly 4% of the country's forest cover is extremely prone to fire, whereas 6% of forest cover is found to be very highly fire prone. Every year large areas of forests are affected by fires of varying intensity and extent. Based on the forest inventory records, 54.40% of forests in India are exposed to occasional fires, 7.49% to moderately frequent fires and 2.40% to high incidence levels while 35.71% of India's forests have not yet been exposed to fires of any real significance. (Precious forest resources including carbon locked in the biomass is lost due to forest fires every year, which adversely impact the flow of goods and services from forests.)³

Vulnerability of India's forests to fires

Unlike in the west, forest fire occurrence in India is more of anthropogenic in nature than natural. People in India generally visit forest areas for collection of fuel wood and other non-timber products and inadvertently cause forest fires. Deciduous and dry forests of the lowlands and the coniferous forests in the lower and middle elevations are regularly burnt. With a large variety of biogeographically related features and climatic conditions prevailing within a specified region, high diversity of forest ecosystems results in different fire regimes and as such set forth different parameters for estimation of vulnerability.

Insufficient information and knowledge on fire vulnerable regions could make management imperatives more difficult in these areas. These conditions may lead to deferment of a comprehensive mitigation and adaptation framework. Hence, it is important to undertake vulnerability assessment studies in these areas to primarily aid the creation of an effective and efficient forest fire management plan as well as to optimize the use of available resources.

<https://fsiforestfire.gov.in/index.php>



³<https://fsi.nic.in/forest-fire-activities>

Major Initiatives of the Government of India with regard to the Management of Forest Fires: -

(A) National Disaster Management Authority (NDMA)⁴

The National Disaster Management Authority (NDMA), under the Ministry of Home Affairs, is the apex body mandated to lay down the policies, plans and guidelines for disaster management. Important initiatives taken towards coordinating the work related to mitigation and management of Forest Fires:

- a. **Common Alert Protocol (CAP):** Under the CAP, a standard message format which contains all the relevant details like type of hazard, Intensity, duration, area of impact and actions to be taken are clearly defined.
- b. **Awareness Generation:** A list of dos and don'ts has also been prepared by NDMA and has been shared with all the forest fire prone States.
- c. **Research on Forest Fires:** NDMA has undertaken studies to understand forest fire management within India as well as globally. A study to document indigenous forest fire management practices across India has been initiated in collaboration with the Forest Research Institute, Dehradun.
- d. **Management of Active Forest Fire:** The massive forest fire that break outs often cover multiple States. In order to manage these forest fires, the National Disaster Recovery Force (NDRF) have engaged in dousing the active fires.

(B) Ministry of Environment, Forest and Climate Change(MoEF&CC)⁵

The Ministry of Environment, Forest and Climate Change (MoEF&CC) is the nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes.

National Action Plan on Forest Fires (NAPFF)

The National Action Plan on Forest Fires was formulated by the MoEF&CC, in 2018 with the objective of revamping the forest fire management within the country. The plan aims to minimize forest fires from taking place by informing, enabling and empowering forest fringe communities, and also incentivizing them to work in tandem with the State Forest Departments (SFDs). This Plan also aims at substantially reducing the vulnerabilities of forests across the diverse forest ecosystems in the Indian subcontinent against fire hazards and enhancing the capabilities of forest and other personnel and institutions in fighting fires, use of technology and speeding up recovery after a fire event.

⁴<https://www.ndma.gov.in/>

⁵<https://moef.gov.in/>

Initial Risk Management Framework

- ❖ Forest fire management includes process of planning, preventing, controlling fire and fighting fires to protect people, property and forest resources.
- ❖ The objective of this framework is to minimize forest fires by informing, enabling and empowering forest fringe communities and incentivizing them to work in tandem with the State Forest departments.
- ❖ The framework intends to substantially reduce the vulnerability of forests across the diverse forest ecosystems in the country against fire hazards.

Forest Survey of India

Forest Survey of India (FSI), established on June 1, 1981, is a premier national organization under the Union Ministry of Environment and Forests and is responsible for assessment and monitoring of the forest resources of the country on a regular basis. Forest Fire Studies of Forest Survey of India (FSI) is playing a pivotal role in forest fire monitoring in the country since 2004 when satellite data-based alerts of near real time detection of active forest fires were started.

Forest Fire Management Initiatives of Forest Survey of India

Forest fire management initiatives of Forest Survey of India cover the following areas:

- ***Near Real-Time Forest Fire Monitoring-***

Forest Survey of India (FSI) has been alerting State Forest Departments towards forest fire incidences detected at least six times in 24 hours. The process of fire signal dissemination at country level has been in operation since 2004 and has received an overwhelming response at states levels. From the feedback received from SFDs, it has been found that the detected forest fires are correct on more than 95% points.

- ***Large Forest Fire Monitoring –***

Forest fires, if undetected and not extinguished on time, may turn into large forest fires that cause wide spread destruction. Timely information and tracking of such large fire events help in devising strategies for planning and resource mobilization for their effective containment, thereby minimizing losses.

To assist the State Forest Departments (SFDs) in effective management of large forest fire events, a satellite based automated system of monitoring Large Forest Fire (LFF) was developed and launched in 2019. The objectives of this programme are as under:

- Continuous monitoring and tracking of large forest fires in near real-time.
- Timely containment of such fires by SFDs.
- Escalation of alerts to higher level for timely additional support from agencies such as District Administration, State Disaster Management Authority (SDMA), National Disaster

- Management Authority (NDMA), Armed Forces etc.
- Development of a National Large Forest Fire Database for future planning especially in development of State Crisis Management Plans and Working Plans.
- For planning of burnt area restoration programmes.
- Once the candidate large fire is detected, it is continuously monitored using data from subsequent satellite passes as long as the fire is active. The program scans the area for additional three days after its inactivity to detect dormant fires, if any, restarting in the same area again.

- ***Early Warning Alert based on Forest Fire Danger Rating System-***

Pre-Fire warnings about potential forest fire situation in an area are useful for taking timely preventive measures to avoid their occurrence and related losses.

- ***FSI Van Agni Geo-portal-***

The Portal provides user-friendly interactive viewing where the user can view forest fire related data (forest fires, large forest fire events tracking etc. along with other thematic layers such as Forest administrative boundaries, Forest cover, Forest type, Fire prone forest area and FWI based fire danger rating etc.). This Portal serves as a single point source for the information related to forest fires in India.

- ***Identification of Fire Prone Forest Areas-⁶***

Frequency of detected forest fires in an area over a period of time indicates proneness of the area to forest fires. According to the study conducted by the Forest Survey of India the following facts have been noticed:

- * As per the long-term trend analysis performed by FSI, nearly 10.66% area of Forest Cover in India is under extremely to very highly fire prone zone.
- * States under North-Eastern Region, showed the highest tendency of forest fire and these states fall under extremely to very highly forest fire zone.
- * States like Mizoram, Tripura, Meghalaya and Manipur in the North-Eastern Part of India exhibit the highest forest fire probability in terms of its frequency of event occurrence.
- * Parts of Western Maharashtra, Southern part of Chhattisgarh, Central part of Odisha and few parts of Andhra Pradesh, Telangana and Karnataka are showing patches of extremely and very highly fire prone zones.
- * FSI carries out a study based on spatial analysis of forest fire points detected by FSI to identify fire prone forest areas in the country. Extent of forest cover under different fire prone classes is also determined for each State/UT.

⁶<https://fsi.nic.in/focus-areas>

- *Sharing of WMS (Web Map Service) and WFS (Web Feature Service) services*-⁷

FSI creates and shares Web Map Service (WMS) and Web Feature Service (WFS) of near real time monitoring of forest fires, large forest fires and Fire Weather Index (FWI) based danger rating on demand basis to the State Forest Department. States such as Uttarakhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Telangana etc. are utilizing these services effectively. North Eastern Space Applications Centre (NESAC), Shillong is also using this service for the entire North-Eastern States.

Budget Allocation⁸

Details of fund released to State/UT's under Centrally Sponsored Forest Fire Prevention & Management Scheme during the last two years and till date: -

S. No.	States	2021-22 Amount Released	2022-23 Amount Released	2023-24 Amount Released (as on 20.11.2023)
Other States				
1	Andhra Pradesh	0.00	0.00	-
2	Bihar	0.00	0.3962	1.428
3	Chhattisgarh	1.4055	0.00	0.732
4	Gujarat	0.998	0.00	0.707
5	Goa	0.5730	0.00	0.180
6	Haryana	0.00	0.00	0.175
7	Himachal Pradesh	1.1617	1.1329	1.808
8	Jharkhand	1.3615	0.0169	0.478
9	Karnataka	1.5733	0.8738	0.528
10	Kerala	3.6288	4.4431	3.540
11	Madhya Pradesh	0.00	6.3548	7.750
12	Maharashtra	0.00	3.9599	-
13	Odisha	8.3983	3.3880	1.471
14	Punjab	0.00	0.00	0.367
15	Rajasthan	1.2721	0.3347	0.507
16	Tamil Nadu	2.3890	0.00	2.894
17	Telangana	0.00	0.00	1.526
18	Uttar Pradesh	1.1179	0.00	0.440
19	Uttarakhand	3.5436	1.3393	3.379
20	West Bengal	1.3273	0.00	-
	Total	28.75	22.2396	27.916
NE & Sikkim				
1	Assam	0.00	0.00	-
2	Arunachal Pradesh	0.8977	1.9812	1.981
3	Manipur	0.8653	1.0661	1.066
4	Meghalaya	0.00	0.3817	0.467
5	Mizoram	0.8719	0.3087	0.481

⁷<https://fsi.nic.in/focus-areas>

⁸<https://sansad.in/ls/questions/questions-and-answers>

6	Nagaland	0.6452	0.2882	2.883
7	Sikkim	0.8973	0.4791	0.964
8	Tripura	0.8226	0.4748	0.476
	Total	5.00	4.9798	8.320
Union Territories				
1	A & N Islands	0.00	0.60	-
2	Chandigarh	0.5072	0.00	0.0497
3	D & N Haveli	0.00	0.00	-
4	Daman & Diu	0.00	0.00	-
5	Jammu & Kashmir	0.00	0.00	-
6	Lakshadweep	0.00	0.00	-
7	New Delhi	0.00	0.00	-
8	Pondicherry	0.00	0.4340	-
	Total	0.5072	1.034	0.0497
	Grand Total	34.2572	28.2534	36.2867

The Way Forward

For the proper management of forest fires, it is imperative that the following practices should be adopted.

- **Creation of Forest Fire line** to prevent fire through removal of forest litter all along the forest boundary. This line prevents fire breaking into the forest from one compartment to another.
- **Creating Firebreaks:** Generally, the fire spreads only if there is a continuous supply of fuel (Dry vegetation) along its path. The best way to control a forest fire is therefore, to prevent it from spreading, which can be done by creating firebreaks in the shape of small clearings of ditches in the forests.
- **National Forest Fire Knowledge Network** must be established to cover all dimensions of forest fire in the country. Such a network must be tuned to the felt need of all stakeholders, including forest fire managers, policy makers and planners, decision makers, community etc.
- **Capacity Building:** There is an urgent need for enhancing the capacity of forest guards at the best levels in terms of training, workforce, equipment etc. to enable them to effectively deal with forest fires.
- **Separate Division for Forest Fire Management,** which could deal exclusively with the forest fire issue needs be established for proper and timely intervention.
- **Promote Forest Fire Research and Technology Innovations:** The research institutes are needed to do research in developing appropriate techniques in getting prior information about forest fire, detecting it, and suitable mechanism to suppress it.
- **Strengthening Collaboration:** Necessary collaboration is required with organisations involved in generating early warning about forest fire. Meteorological Departments and other national and international sources providing weather related information may be collaborated to get prior

information about the temperature and rainfall situation which are the main deciding factors for forest fires.

- **Community awareness**, regarding the cause and the negative effects of forest fires should be enhanced.

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