

Fires in Nature



Of all natural hazards, the most insidious is drought. However, for some countries such as Australia and United States, droughts have not led to starvation, but to spectacular fires as tinder-dry forests ignite, grasslands burn and eucalyptus bushland erupts in flame. Fire hazard is the most common hazard, which is present in all areas of life. Most combustible materials are stored in a normal atmosphere, which contains oxygen, and so the risk of fire is then due to the possibility of an ignition source.

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light, and various reaction products.

- Three elements are required to start and sustain fire: (1) oxygen, (2) fuel, and (3) heat.
- To start a fire, source of ignition such as a spark, flame and high temperature are needed.
- Diagram for understanding the necessary ingredients for most fires. The fire extinguishes by removing anyone of the elements in the fire triangle



A wildfire, wildland fire is an uncontrolled fire in an area of combustible vegetation occurring in forest areas. Depending on the type of vegetation present, a wildfire can also be classified more specifically as a **brush fire**, bushfire (in Australia), **desert fire**, **forest fire**, **grass fire**, **hill fire**, **peat fire**, **vegetation fire**, or **veld fire**. Many organizations consider wildfire to mean an unplanned and unwanted fire, while wildland fire is a broader term that includes prescribed fire as well as wildland fire use. Fire hazards are significantly increased with hotter dry seasons, which add to the frequency, and the intensity, of bush and forest fires, creating a greater hazard to life, limb and property. Wildfires can cause damage to property and human life, although naturally occurring wildfires may have beneficial effects on native vegetation, animals, and ecosystems that have evolved with fire.

Common fire related hazards

1. Residential and market area fire
2. Industrial and mining area fire
3. Wild fire

The main factors of fire -

1. Residential and market area fire-

- a. Electricity – neglect or misuse of wiring can lead to short circuits
- b. Kitchen fires from unattended cooking, grease fires/chip pan fires
- c. Combustible storage areas with insufficient protection
- d. rubbish and waste material – fire is likely to spread through accumulated waste
- e. smoking – carelessly discarded cigarette butts or lit matches are one of the major causes of fire
- f. Household appliances - clothes dryers, curling irons, hair dryers, refrigerators, freezers, boilers
- g. Electrical wiring in poor condition
- h. Personal ignition sources - matches, lighters



2. Industrial and mining area fire

- a. Electrical systems that are overloaded, poorly maintained or defective
- b. Combustible storage areas with insufficient protection
- c. Combustibles near equipment that generates heat, flame, or sparks
- d. Equipment that generates heat and utilizes combustible materials
- e. Flammable liquids and aerosols
- f. Flammable solvents (and rags soaked with solvent) placed in enclosed trash cans
- g. Fireplace chimneys not properly or regularly cleaned

- h. Heating appliances - fireplaces, wood-burning stoves, furnaces, boilers, portable heaters, solid fuels
- i. Hot engines
- j. Chimneys that concentrate creosote
- k. Leaking/ defective batteries
- l. Electronic and electrical equipment



3. Wild fire

- a. Dry session and storm threat
- b. Lightening
- c. Slash and burn clearing
- d. Volcanic eruption

90% of wildfires are caused by human activity. Human acts of carelessness such as leaving campfires unattended and negligent discarding of cigarette butts result in wildfire disasters every year. Accidents, deliberate acts of arson, burning of debris, and fireworks are as well other substantial causes of wildfires.



Consequences

Fire release two major component- heat and smoke

Heat causes burning of things and resources and smoke causes suffocation and disable the visibility

- Environmental impact
 - Disruption of natural environment, ecosystem and biodiversity- Animals lose their lives. It is sad but true fact that birds, squirrels, rabbits, and other wildlife animals are no longer a part of this great earth.
 - Pollution and damage of natural resources.
 - The soil in the area of the wildfire has been completely destroyed.
 - Large amounts of smoke is released into the air which makes it difficult to breathe and also causes air pollution.
 - The loss of animals has the ability to also create extinction for certain animals and other creatures of the forest.
- Health impact
 - Loss of human resource by death - human lives are also lost in fires. Typically people who are fighting the fire who lose their lives trying to save others.
 - Threat on human resource by injury and disability- Ash and smoke can cause serious health problems to humans who suffer from allergies and other medical problems. This same smoke and ash has the ability to permanently damage the lungs and the throat.
 - Impact on mental health
- Socio economic impact
 - Loss of livelihood system- Incomes and jobs are lost for workers in the agricultural field whose field crops and animals were destroyed by the wildfire. When people are out of work the economy suffers which makes it difficult to recover.
 - Property damage
 - Financial loss- Burn and damage of property, industry, resources etc.
 - Poverty, famine
 - Migrate population
 - Infrastructural damage and loss- road connectivity, school, hospital etc damage

Classification of Forest Fire

Forest fire can broadly be classified into three categories;

- Natural or controlled forest fire.
- Forest fires caused by heat generated in the litter and other biomes in summer through carelessness of people (human neglect) and
- Forest fires purposely caused by local inhabitants.

Types of Forest Fire

There are two types of forest fire i) Surface Fire and ii) Crown Fire

- ***Surface Fire-***

A forest fire may burn primarily as a surface fire, spreading along the ground as the surface litter (senescent leaves and twigs and dry grasses etc) on the forest floor and is engulfed by the spreading flames.

- ***Crown Fire-***

The other type of forest fire is a crown fire in which the crown of trees and shrubs burn, often sustained by a surface fire. A crown fire is particularly very dangerous in a coniferous forest because resinous material given off burning logs burn furiously. On hill slopes, if the fire starts downhill, it spreads up fast as heated air adjacent to a slope tends to flow up the slope spreading flames along with it. If the fire starts uphill, there is less likelihood of it spreading downwards.

Management

A. Goals:

1. life protection
2. Protection of natural resources
3. Property protection
4. Protection of operation

B. Strategies:

1. Fire management strategies in residential area and industrial area:

- Conduct preliminary analysis on residential fire prevention
- Plan escape and sheltering for housing and dormitory
- Regularly inspect buildings and equipment
- Improve the behaviors of fire usage and household appliances
- Build employee awareness and training programs
- Promote the installation of individual fire alarm system
- Ensure all work equipment protects against catching fire or overheating
- Improve the installation of grille
- Ignition sources should be eliminated or isolated
- proper storage of flammable liquids
- Confine smoking to designated areas
- Periodically check electric connectivity
- Be careful with explosive materials, and ensure only trained professionals are in the area where they are being used
- Do not overload outlets

2. Forest fire management:

This plan proposes to introduce a well-coordinated and integrated fire-management programme that includes the following components:

- **Prevention of human-caused fires** through education and environmental modification. It will include silvicultural activities, engineering works,

people participation, and education and enforcement. It is proposed that more emphasis be given to people participation through Joint Forest Fire Management for fire prevention.

- **Fire Forecasting**-Predictive Services provides information about fire weather, fire danger/fuels, and intelligence/resource status information that fire managers need to anticipate significant wildfire activity and determine where to position firefighters, engines, aircraft and other wildfire suppression assets to respond to it.
- Prompt detection of fires through a well coordinated network of observation points, efficient ground patrolling, and communication networks. Remote sensing technology is to be given due importance in fire detection. For successful fire management and administration, a National Fire Danger Rating System (NFDRS) and Fire Forecasting System are to be developed in the country.
- Fast initial attack measures.
- Vigorous follow up action.
- Introducing a forest fuel modification system at strategic points.
- Firefighting resources.
- Integrated forest protection

Each of the above components plays an important role in the success of the entire system of fire management. Special emphasis is to be given to research, training, and development