

Disaster Management

CHAPTER-8

Forest Fire

Definition & Concept :-

Forest fire means a fire burning uncontrolled on lands covered wholly or in part by timber, brush, grass, grain or other flammable vegetation.

It is the most common hazard in forests.

Forest fire may be caused due to natural or man made reasons.

Wildfire is a general term which includes forest fires, grassland fires, bushfires, brush fires and any other vegetation fire in countryside areas.

Wildfires occur in every naturally ~~and spontaneously~~ but continent ~~exp~~ except Antarctica.

They can occur naturally and spontaneously, but many are caused by humans, accidentally or deliberately.

Natural fires are generally started by lightning, with a very small percentage started by spontaneous combustion of dry fuel such as sawdust and leaves.

Forest fire Damages In India :-

FOREST FIRE: THE INDIAN SCENARIO

5.1 Introduction

India constitutes one of the mega bio-diversity zones of the world, abundant with unique and diversified floral and faunal wealth. With 6, 92,027 square kilometers of forest cover, India is one of the richest areas of bio-diversity in the world. Including environmental benefits, the forests of the country are economically also very rich. If we take the example of conifers only, India has about 1.7 mh of productive conifer forest, with various valuable timber species i.e. *fir*, *spruce*, *deodar*, *kail*, *teak*, *sal* and *chir pine*. Estimated growing stock of these forests is over 200 million cubic meters, the monetary value of which comes to be more than Rs. 40,000 to 60,000 millions (Bahuguna, 1999). In the country, with about 17 percent of the world human and 18 percent of cattle population, forests meet nearly 40 percent of the energy and 30 percent of the fodder needs. It is estimated that about 270 million tons of fuel wood, 280 million tons of fodder, over 12 million cubic meters of timber and a large quantity of Non-Timber Forest Produces (NTFPs) are removed from the forests annually. Due to increasing population pressure need, this exemplary land ecosystem of the world is struggling for its survival. Increasing human interference in the natural forest ecosystem has also tremendously increased the forest fire incidences. Forest fire is one of the causative factors, which periodically covers large forest areas destroying timber, other properties and wild life etc. The ecosystems are under severe threat due to recurrent fires, which is attributed to the forest degradation, soil erosion, reduced productivity etc. Every year one or other part of the forests in India is facing the agony in the cruel hands of mankind by putting fire intentionally or

3.8.2 Natural causes

Natural causes, that originate the Forest Fire, can be summarized as follows: -

- Lightning during thunderstorms may lead to the occurrence of forest fires. Many forest fires start from natural causes such as lightning which set trees on fire. Periodic lightning induced fires have been recorded throughout history from India, Southeastern and Central United States, Australia, Finland and Eastern and Southern Africa (Kaushik, 2004). Natural or prescribed fire sometimes may become a potential hazard to the forest by causing damage to vegetation and wildlife, and releasing huge amount of particulate and gaseous pollutants into the atmosphere.
- In dry season, friction leading to sparks by rolling stones in the mountainous areas may lead to forest fires. This occurs only when there is considerable combustible material present on the floor. Even small sparks are enough to generate a fire, which may be fanned by strong winds. A devastating forest fire taking lives of four innocent ladies in Gwar village, located 40 km towards north-east from Rudraprayag district of Uttarakhand in February 2001 is an example of such fire. In this region there was no winter rainfall from December, 2000 and thus there was lack of moisture both in the soil and air, resulting in less decomposition of senescent leaves. The dry grass worked as a fuel, fast blowing wind supplied oxygen in plenty resulting in speedy spread of

FOREST FIRE DISASTER MANAGEMENT

fire and according to the villagers falling of hard quartzite stones produced sparks which ignited the fuel.

- In bamboo areas, forest fires may occur by the rubbing together of clumps of dry bamboos.
- Volcanic eruptions also lead to forest fires naturally.

3.4 Forest fire – as management tool

Although fire has been the primary agent of deforestation, yet as a natural process it serves an important function in maintaining the health of certain ecosystems. The traditional view of fire as a destructive agent requiring immediate suppression has given way to the view that fire can and should be used to meet land management goals under specific ecological conditions. For decades, controlled burning has been used as a genuine forest management measure in the developed countries. In western countries, especially Britain, U.S.A., Canada etc. controlled fires are burnt at intervals of 10-12 years to maintain uniform growth. In South and Southeast Asia, including India, “Slash and Burn” method of farming is used by the tribals of hilly areas, in which they cut down and burn small areas of the forest and use the cleared land for cultivation. This method of burning offers them not only the cheapest means to clear the forest, but also supplies free fertilizers in the form of ash from the burnt vegetation on limited scales.

Most of the limited fires are very useful and essential for good

FOREST FIRE AND ITS IMPACTS

natural forest development and regeneration. Many cultures have stories about great fire creatures and recognize fire as a part of nature. The Egyptians believed story of a brightly colored bird named the *Phoenix*, which lived for as long as 600 years! At the end of its life the *Phoenix* would burn itself in a fire. The new *Phoenix* would then live for another 600 years. Fire was a way for the *Phoenix* to renew itself.



Natural resource managers use fires as a means to renew the natural environment. To protect natural resources and keep the environment healthy, managers study an area and write a fire prescription for that area. A prescription indicates when trained professionals ignite fire or how long a fire ignited by lightning will be allowed to burn. A prescription may include the information that how wet fuels must be, the maximum speed wind may be blowing or the highest outside temperature. Fire managers

suggest exact fire prescriptions before burning is allowed. These fire prescriptions are based on weather, moisture content of the fuels, and how the fire can be lighted (ignition patterns).

3.7 Types of forest fire

Forest fires are not always same; they may differ, depending upon its nature, size, spreading speed, behavior etc. Basically forest fires can be sub grouped into four types depending upon their nature and size –

3.7.1 Surface fires

Surface fire is the most common forest fires that burn undergrowth and dead material along the floor of the forest. It is the type of fire that burns surface litter, other loose debris of the forest floor and small vegetation. In general, it is very useful for the forest growth and regeneration. But if grown in size, this fire not only burns ground



Fig.-3.2: Surface Fire

flora but also results to engulf the undergrowth and the middle storey of the forest. Surface fires spread by flaming combustion through fuels at or near the surface- grass, dead and down limbs, forest needle and leaf litter, or debris from harvesting or land clearing. This is the most common type of fire in timber stand of all species. It may be a mild, low-energy fire in sparse grass and pine needle litter, or it may be a very hot, fast moving fire where slash, flammable under story shrubs or other abundant fuel prevails. A surface fire if spread may burn up to the taller vegetation and tree crowns as it progresses (Fig.-3.2).

3.7.2 Underground fires

The fires of low intensity, consuming the organic matter beneath and the surface litter of forest floor are sub-grouped as underground fire. In most of the dense forests a thick mantle of organic matter is found on top of the mineral soil. This fire spreads in by consuming such material. These fires usually spread entirely underground and burn for some meters below the surface.

This fire spreads very slowly and in most of the cases it becomes very hard to detect and control such type of fires. It may continue to burn for months and destroy vegetative cover of the soil. The other terminology for this type of fire is *Muck fires*.

3.7.3 Ground fires

These fires are fires in the sub surface organic fuels, such as duff layers under forest stands, Arctic tundra or taiga, and organic soils of swamps or bogs. There is no clear distinction between underground and ground fires. The smoldering underground fire sometime changes into ground fire. This fire burns root and other material on or beneath the surface i.e.



Fig.-3.3: Ground Fire

burns the herbaceous growth on forest floor together with the layer of organic matter in various stages of decay. They are more damaging than surface fires, as they can destroy vegetation completely. Ground fires burn underneath the surface by smoldering combustion and are more often ignited by surface fires. Thus a ground fire consumes the organic material beneath the surface litter of the forest floor. A true ground fire spreads by a slowly smoldering edge with no flame and little smoke. These fires are often hard to detect and are the least spectacular and slowest moving. Fighting such fire is very difficult (Fig.-3.3).

3.7.4 Crown fires

Crown fire is the most unpredictable fires that burn the top of trees and spread rapidly by wind. In most of the cases these fires are invariably ignited by surface fires. This is one of the most spectacular kinds of forest fires which usually advance from top to down of trees or shrubs, more or less interdependent of surface fires. In dense conifer stands with a brisk wind, the crown fire may race ahead of the supporting

surface fire (Fig.-3.4). Since it is over the heads of ground force it is uncontrollable until it again drops to the ground, and since it is usually fast moving, it poses grave danger to the fire fighters becoming trapped and burned.



Fig.-3.4: Crown Fire

3.7.5 Firestorms

Among the forest fires, the fire spreading most rapidly is the firestorm, which is an intense fire over a large area. As the fire burns, heat rises and air rushes in, causing the fire to grow. More air makes the fire spin violently like a storm. Flames fly out from the base and burning ember spew out the top of the fiery twister, starting smaller fires around it. Temperatures inside these storms can reach around 2,000 degrees Fahrenheit (Fig.3.5).



Fig.-3.5: Fire storm

Along with nature and behavior, the forest fires can also be categorized according to human management action. On this basis, fires in forest may be categorized as *management ignited fires* and *prescribed natural fires*. Management ignited prescribed fires are ignited in order to meet a land management plan objectives, such as debris removal or wildlife

habitat improvement. Prescribed natural fires are those that are allowed to burn under an approved plan and preserve the natural role of fires in the ecosystem. Besides these, the fire may further be categorized based on their peculiar behaviour. There is specialized vocabulary used by the wild fire community for describing different types of fire behavior.

3. Community involvement in fire management planning across jurisdictions

In the United States, for the most part, public lands are the property of the people, managed by government agencies. Although the role of the general public in decision making for public land management has been growing since the passage of major legislation that required public comment, such as the National Environmental Policy Act (1970) and the National Forest Management Act (1976), most public land management efforts are hardly participatory or responsive to public input. Usually, federal and state-level government agencies involve the public in new forms of decision-making processes only because they are required to by law. Sometimes agency staff hope that by involving people in some steps of planning, opposition will be voiced early enough to allow for adjustments in proposed activities, and law suits filed by citizens can be avoided. The motivation in such cases is political exigency rather than recognition of the potential value of local experience, expertise and collaboration. Yet in many arenas of public land management, the people who live in the vicinities of these lands are potentially significant actors. Consider the case of wildfire management.

Local citizens are not normally involved in fire suppression planning or pre-fire decision-making processes. The suppression of large wildfires incurs enormous costs, often in the tens of millions of dollars. On public lands, firefighting agencies go into a para-military attack mode. When a fire reaches a certain size and rate of spread, or goes beyond local capacity for suppression, national strike teams are brought in from outside the area. While local line officers, e.g. USFS District Rangers

Community Involvement:-

Needs of Fire Management :-

The role of fire in the world's vegetation is mixed. In some ecosystems natural fires are essential to maintain ecosystem dynamics, biodiversity and productivity.

Fire is also an important and widely used tool to meet land management goals. Most fires are caused by people.

Controlled burns can minimize insects and disease and improve the habitat for threatened and endangered animal species.

Prescribed burns provide key nutrients to soil, which help trees and vegetation flourish.

These controlled forest fires also open up the tree canopy to allow sunlight into the forest.

ASSIGNMENT QUESTION

- Q.1. What is forest fire? [2]
2. Listout the forest fire zones in India. [2]
3. Forest What are the damages in forest fire in India? [5]
4. Describe the types of forest fire. [5]

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