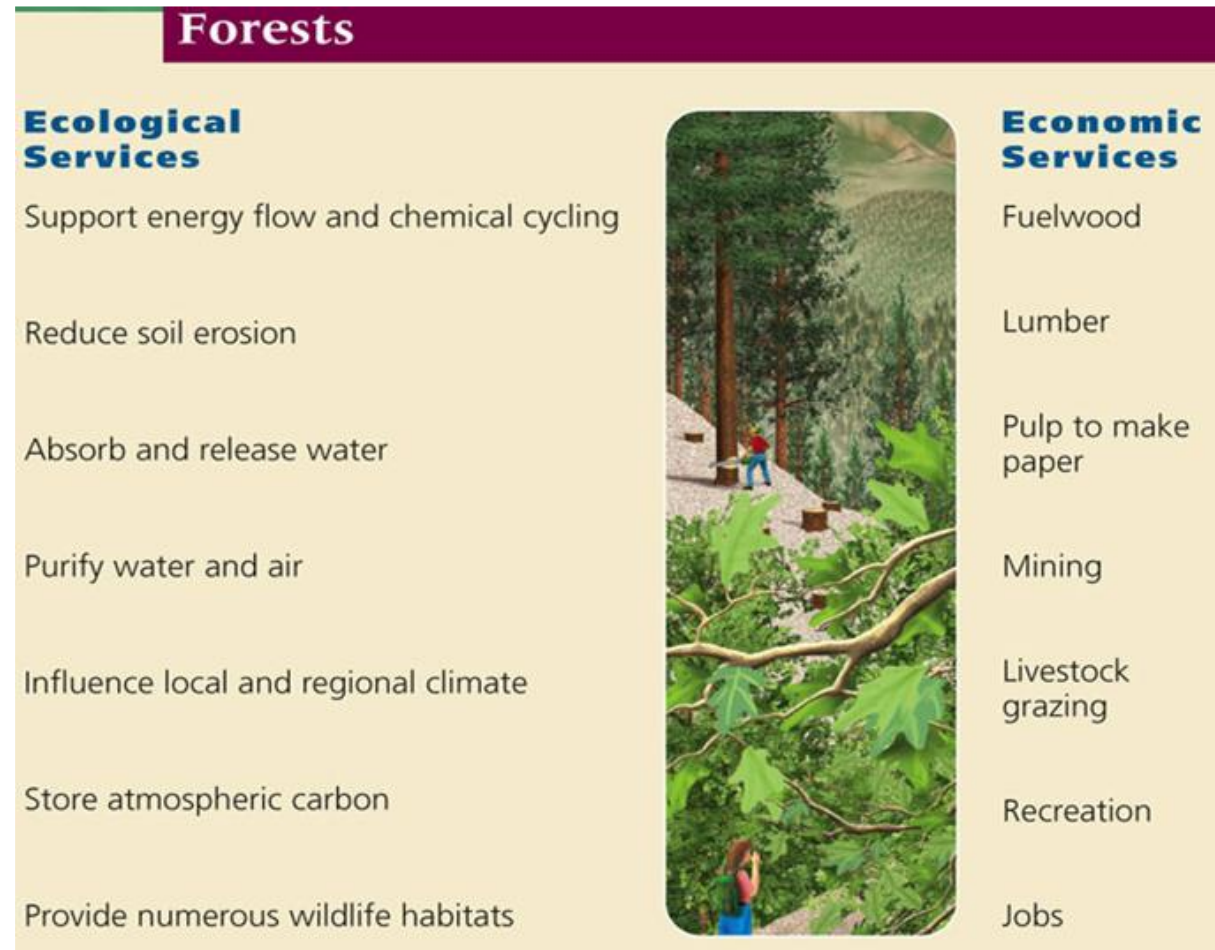


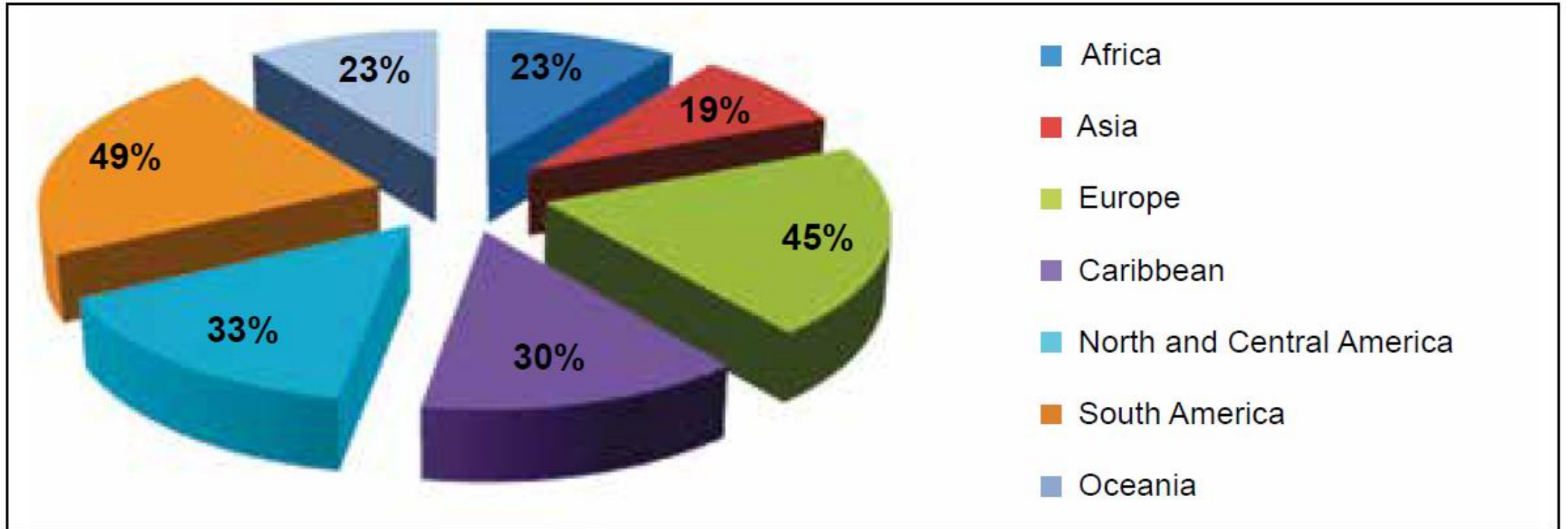
Forest Fire Disaster

Ecological Services

Forest ecosystems provide ecological services far greater in value than the value of raw materials obtained from forests.

Only for your information





Forest Area by Region (%) 2011

Only for your information

- Fire is a chemical reaction
- Combustion.....that converts a fuel and oxygen into carbon dioxide and water.
- It is an exothermic reaction, therefore, produces heat.
- When fuel burns, it reacts with oxygen releasing heat and generating combustion products (gases, smoke, embers, etc.). This process is also known as oxidation.

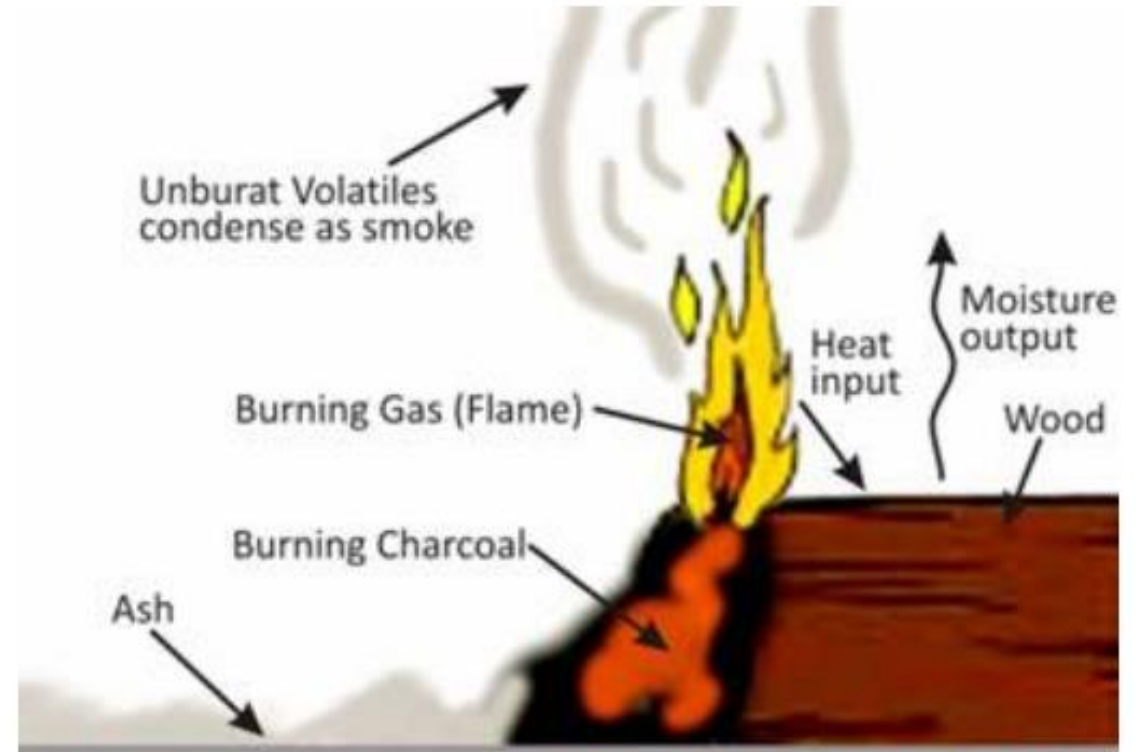
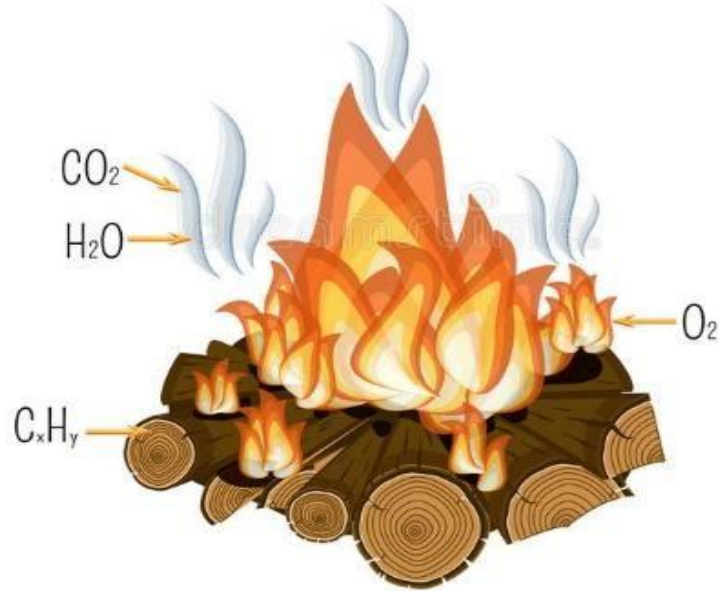
What is forest fire?

- Forest fires are not new to the world; they have burned across the earth for millions of years.
- Forest fire is generally the uncontrolled fire in an area of combustible vegetation in the forest.
- When a fire burns out of control it is known as wild fires, bush fires.
- Forest fire may be defined as an unclosed and freely spreading combustion that consumes the natural fuels. Combustion is another word for fire.
- Each year millions of hectares of the world's forests are consumed by fire, which results in enormous economic losses because of burnt timber; degraded real estate; high costs of suppression; damage to environmental, recreational and amenity values; and loss of life.

- As per the latest state of forests report of the Forest Survey of India the actual forest cover of India is 19.27%.
- About 90% of the forest fires in India are created by humans.
- The normal fire season in India is from the month of February to mid June.
- Forest fires are a major cause of degradation of India's forests.
- 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.
- 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.

Only for your information

Combustion reaction



- Wood is considered a solid biomass fuel, which means that it is made up of living matter.
- Wood fuel breaks down chemically when it is heated into a mixture of flammable gases and char.
- Cellulose and hemicellulose mostly form flammable gases when they are heated.
- The lignin is what mostly forms the char.
- Generally, the hotter the fire and the smaller the pieces of wood, the more flammable gases are produced. Whereas, the lower the temperature and the larger the pieces of wood, the more char is produced. That is why in a very hot fire, there will be less charred trees left standing because more of the original tree matter will have combusted and turned into gases.

Fire consists of four parts i.e. gas, flame, heat and smoke.

Fire Gas:

These are the gases created by the combustion process (ie., gases given off by the materials involved in the fire). They are invisible to the naked eye, but they exist. carbon monoxide (CO), carbon dioxide (CO₂), some hydrocarbons and hydrogen (H₂).

Flame:

This is the light given off by the burning gas. As long as the three essential ingredients, fuel, oxygen, and heat are there, it can be seen.

Heat:

This is the part of the fire that one feels as warmth. A normal fire usually burns at around 1,100° C. The heat generated by the reaction is what sustains the fire. The heat of the flame will keep remaining fuel at ignition temperature. The flame ignites gases being emitted, and the fire spreads.

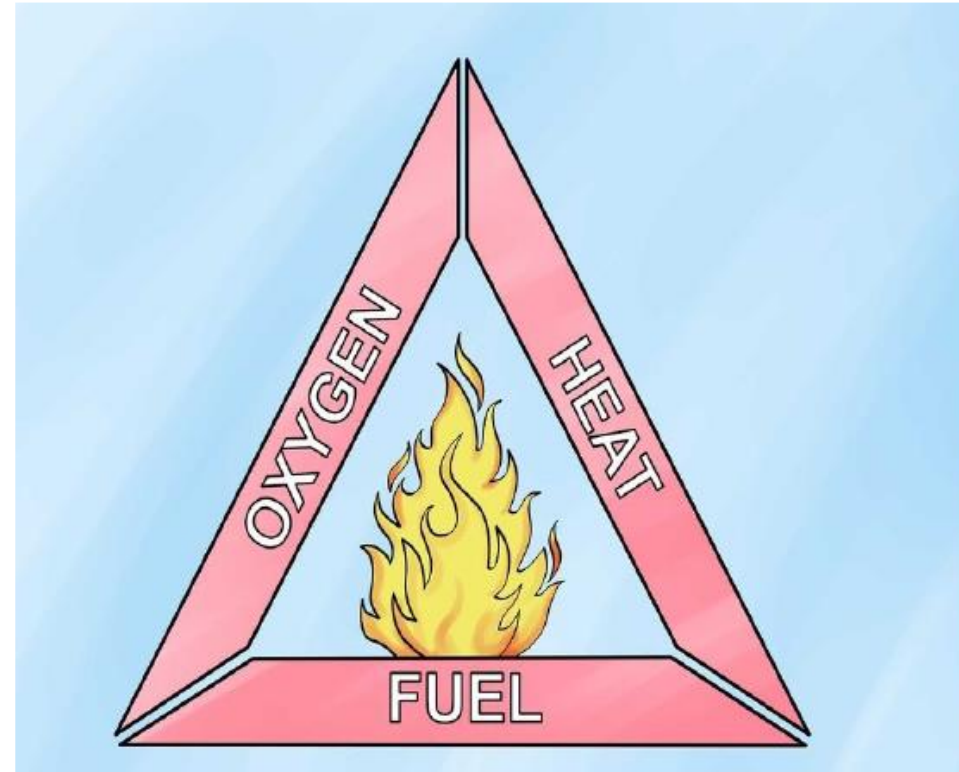
Smoke:

Smoke is a harmful vapor cloud mixed with a fine powder of solid particles and some gases. The solid particles in smoke create breathing and viewing problem during fire. Smoke is generally a mix of fine solid particles, droplets of H₂O and other liquids; the smoke you see coming off of a fire is this tar and the water, which is escaping as steam.

Requirements for a Fire

- Fuel-wood or other plant material
- Oxygen-air is the main supply
- Heat Source-sparks, lightning, cigarettes

During summer, when there is no rain for months, the forests become littered with dry leaves and twinges, which could burst into flames ignited by the slightest spark.



- A fire happens when you have a combination of three things. So, here we have the fire triangle. You have the fuel, air and heat.....if these three combines together, you will have a forest fire.
- Therefore, to have a forest fire you need a fuel. So, if there is an area that does not have any fuel, then you would not have a fire in that area. If you are able to cut the air supply, there will not be a fire in that area, and if you are able to reduce the temperature, there will not be a fire in the area.

There are a number of reasons both natural and man-made, but typically what we find is that most of the for most of the forest fires are occurring because of man-made reasons. So, let us have a look at the causes of forest fires.

Natural causes of forest fire

- Lightning
 - Volcanic eruption
 - Rubbing of dry bamboo
 - Friction of rolling stone
- The natural causes include lightning; so, if there is a lightning strike, then it might lead to the start of a fire. Though this is a bit difficult because typically lightning happens together with rains and so, when you have the fuel that is wet, it does not ignite.
 - But, in certain circumstances we do have situations where lightning has resulted in forest fires. If there is a volcanic eruption, that can burn the trees and start a forest fire.

Neither of the following pages are to mug up line by line, but for your understanding and should read them all minutely. So no separate annotation on every pages

Deliberate anthropogenic causes

- Shifting cultivation
- Flushing growth of tendu leaves
- To have growth of grasses
- Rivalry with forest department
- Encroachment
- To conceal illicit felling

Accidental anthropogenic causes

- Personal rivalry (accidental)
- Cleaning for road (accidental)

- Most of the forest fires are caused by man-made factors both deliberate as well as accidentally. Now, why would somebody deliberately want to add fire to the forest?
- Well, a common reason is shifting cultivation. There are certain communities that clear up the forest, cut the trees, then burn those trees. They do burn trees, because, ash is generated and that ash has all the minerals. Since, ash that is full of minerals it acts as a fertilizer, it will help grow their agricultural crops. As you know, minerals are very important for both the plants and the animals. When they are burning these trees, it is possible that the fire might even spread to larger areas.
- Similarly, in the case of those communities those are pastoralist, they too burn the grasses so that new grass comes up. And, this new grasses are very soft – suitable for animal consumption. So, people set a fire to the forest deliberately to have a new growth of grass.

- To collect certain forest produce, typically a non-timber forest produce like in the days of mahua collection or tendu collection, people get into the forest, and there might be some people who smoke beedis. If by mistake they threw the still lighted beedi into the forest it leads to the start of a forest fire.
- Flushing is for the growth of tendu leaves. Tendu is a very important non-timber forest produce, and its leaves are used for a number of purposes, mostly for the manufacture of beedis.
- In order to get good quality of tendu leaves, localites prefer to go for flushing. In flushing, people cut the branches of a small size tendu tree to make it in a bush like fashion (flushing of new leaves) and then they set fire on the debris that have been generated in this process. But even a minute negligence might results in a large-scale forest fire.

Stubble burning

- After paddy is harvested in mid and late October, the fields are left with a stubble of stalks about two feet high. Because the sowing cycle for wheat begins in late October, farmers have very little time to prepare their fields – so, they typically set fire to the stubble, and then clear the residue.
- In case, there is any amount of wind activity, even a small amount of fire can start burning the forest. It follows that people did not want to burn the forest, but as in act as an accident, as a part or of the process of burning the crop residues, they have started a fire in the forest.
- Stubbles are hard, can't be used as the fodder for the grazing animals.....that's the reason that these are burnt and produces so much pollution.
- Stubbles can be converted into fodder, but for getting the same fodder, a farmer has to pay to the fodder maker, who uses his machinery and tractor to convert stubble into fodder.

- Another reason is rivalry with the forest department. For instance, if somebody has done poaching of wild animals and the forest department goes and catches this person; puts him in the jail and when this person comes out, because he is bearing a grudge against the forest department, there have been cases in which this person would deliberately set fire to the forest. So, the personal rivalry against the forest department is also one of the reasons.

Encroachment

- Another reason is encroachment. So, encroachment is the activity in which people try to grab up the lands that belong to the forest department, set fire on the vegetation cover to clean up the area.
- In large areas comprising Himalyan foothills known as Terai, farmers are known for encroaching into forest areas and expanding their possession of land. Acres of land belong to forest deptt are encroached upon by local land mafias.
- There are umpteen number of cases in which tigers, elephants or leopards are coming in direct conflict with the human. In Haridwar and adjoining herds of elephants are often seen blocking the highway as their habitat has shrunk due to encroachment by the human.
- Thousands of farmhouses owing large tract of land often running into hundreds of acres have come up of late adjacent to buffer zones of the forest.
- Uttarakhand fire is classic example of human encroachment on forest land.

Fires set by poachers are a top cause of habitat degradation

- Poaching of wild animals and forest fire have been a major concern in many countries.
- Poaching has a huge imbalance in the ecosystem - many endangered species are now on the brink of extinction.
- The poachers set fire in an area which is far away from the target area, where actually they would like to carry out their illegal activities. The moment fire is spotted, the concerned authority (all the officers and the staff) rushes to the site to control the fire.
- Since, all the staff are concentrated to put out the fire, the persons or the poachers are doing hunting in the other site of the forest and this activity will go unnoticed.

Charcoal production for cooking and heating

- Charcoal is used as a domestic fuel for cooking and heating in many developing countries.
- It is the most popular barbecue fuel throughout the world.
- Charcoal production as one of the main drivers of deforestation and forest degradation
- Charcoal production is done through a method called pyrolysis of biomass at low temperatures and with slow heating rates. Pyrolysis is defined as the irreversible chemical change brought about by heating the biomass in the absence of oxygen. During pyrolysis, biomass undergoes a sequence of changes and normally yields a black carbonaceous solid, called charcoal, along with a mixture of gases and vapors.

Impact of forest fire

i) Loss of valuable timber resources - Forest fires cause indispensable loss to timber and deteriorate its quality. Valuable timber species like *teak*, *sal*, *chir*, *deodar*, *sheesam*, rosewood etc. are adversely affected by fire. Although in older crops the trees develop thick bark, which protect them from small fires; intense fires may destroy them too. During fire incidences, most of the pine forests experience the surface fire, while some other may experience more damaging crown fire also; while eucalyptus appears to suffer more than the indigenous species and the effects of fires are apparent in reduced stocking per hectare and lower yields at maturity.

ii) Loss of wildlife habitat and depletion of wildlife - Forests are the habitat of many wild animals. Wildfire along with killing wild animals also destroys their habitat and thus makes their survival at stake. Forest fire dramatically impacts the animal life. Animals are first to lose their lives due to heat generated. Eggs of birds and insects are destroyed due to fire impact. Some animals have a natural threat warning system and usually migrate from the danger areas. The birds also save themselves by migration, but their eggs are usually destroyed. Such migration of birds and the animals in normal condition is not permanent and they return back when the conditions are normalized.

iii. Carbon sequestration potential - Trees act as carbon sinks when they absorb carbon dioxide from atmosphere and build up the same in the form of wood. Hardwood contains 48 percent of carbon in the form of cellulose and wood and it is estimated that 2.2 tones of wood are required to sequester one ton of carbon. Burning of the vegetation release hundreds of years of stored carbondioxide (CO₂) into the atmosphere, and thus results into permanent destruction of important sink of carbon dioxide.

Global warming and forest fire

- Drier condition increases the occurrence of drought. Hence fire seasons are becoming more extreme and widespread across the globe, increasing the impact of forest fires.
- The incidence of forest fires in the country is increasing and more area is burned each year.
- When vegetation burns, the resulting release of stored carbon increases global warming. The more fires, the more carbon dioxide released the more warming -- and the more warming, the more fires.
- The very fine soot, known as black carbon, that is released into the atmosphere by fires also contributes to warming.
- First, fire releases large quantities of carbon into the atmosphere through the combustion of plant material and surface soil organic matter. Second, fire-killed vegetation decomposes over time emitting carbon. Third, the vegetation on newly burned sites may not absorb as much carbon from the atmosphere as the decaying vegetation emits, or as much as the pre-fire vegetation absorbed, for several years or decades after a fire.
- Fires are thus an important part of the global carbon cycle, with increased fire frequency generally causing a net reduction in biospheric carbon storage.

iv. Soil erosion and silting of the reservoirs

- Because of the fire, the cover of vegetation over the soil is now lost and so, the soil is now lying bare. therefore, wind and water will very easily be able to erode this soil.
- Soils move along the streams and then it will get into our reservoir, and it will start silting the reservoir like silting of dams.
- Silting reduces water retention capacity of flow-regulated river floodplains also reinforces catastrophic inundations, in particular where the active floodplains are limited through artificial dikes for flood protection.
- Siltation negatively impacts ecosystems in many ways. Excessive silt clogs gills, and smothers eggs and nests. It can bury habitat aquatic insects need for survival, which impacts organisms up the food chain that eat these insects for survival.

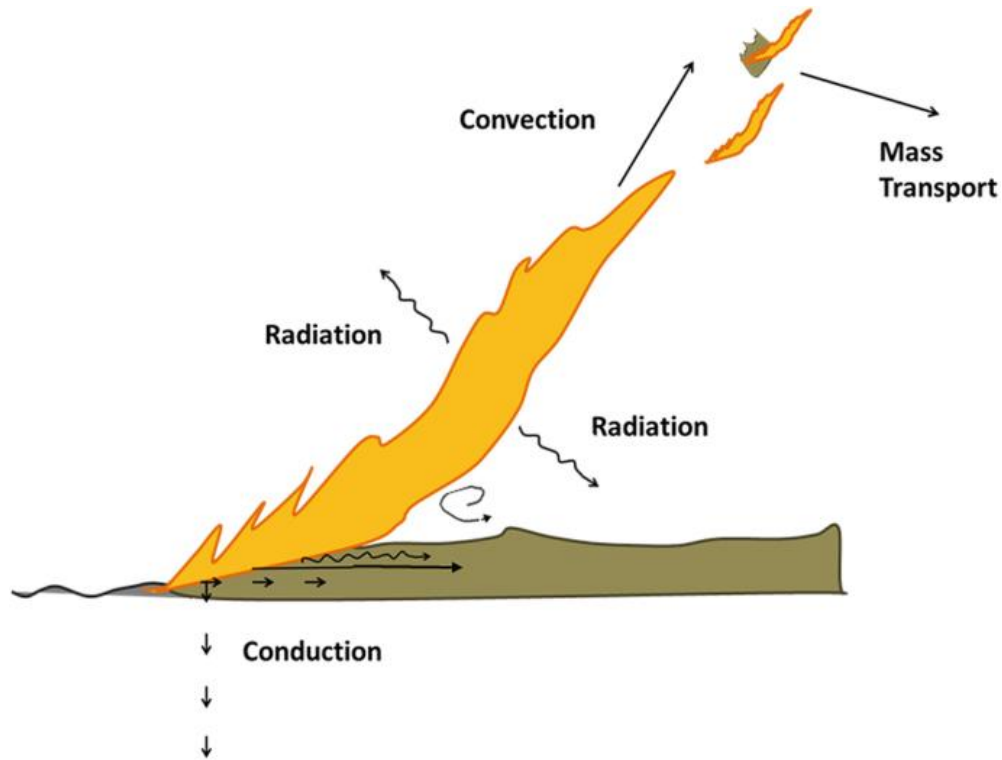
Loss of livelihoods of those who are dependent on the forest.

- There will be loss of life and property, and also loss of livelihoods especially of people, who are dependent on the forest.
- People pay a visit to a national park/sanctuaries every year. So, the tourists that are visiting are also sustaining the local economy, because people are getting jobs in the form of tourism operators; in the form of gypsy drivers; in the form of guides; in the form of people in the hospitality sector (hotels, restaurants, home stays).

Is A Forest Fire Always A Disaster?

- Soil heating due to fire changes its chemical, physical and microbial properties. The direct chemical changes during soil heating and combustion of soil organic matter lead to a massive volatilization of simple nitrogenous compounds, mainly nitrate and ammonium and to some extent sulphur, phosphorus, and other ions depending on the fire intensity and temperature.
- But at the same time, fire transforms soil nitrogen bound in organic substances into ammonium, a form readily available to either plants or subsequent microbial nitrification. The increase in ammonium and nitrate concentrations in many ecosystems has also been reported as a result of fire incidences. This increase in the availability of nutrients (nitrogen, phosphorous and other mineral nutrients) is certainly beneficial for the vegetation and enhances its growth.
- Prescribed burning is used as a way to put the fire back into a specific unit of land i.e. ecosystem. Fallen trees and limbs left to rot on the forest floor decay at a very slow rate.
- In fact, large logs can take more than hundred years to decompose. This process is aided by the numerous species of bacteria, insects, and wildlife that live in the decomposing materials.
- All this rotting is one way through which nature recycles nutrients back into the soil. Pine needles decompose very slowly. It takes more than a year for ten percent of the pine needles to decay. As a result, year after year, pine needles continue to build up until they are eliminated by fire. In brief, natural recycling is a very lengthy and time-consuming phenomenon in forest.

- Severe fires occur in many forest types particularly dry deciduous forest, more than 36% of the India's forest cover has been estimated to be prone to frequent forest fires. Evergreen forests with broad leaves of dry areas and conifer forest are more susceptible to fire in general.
- while evergreen, semi-evergreen and montane temperate forests are comparatively less prone. In deciduous forests of temperate region, as a result of heavy rainfall and dampness and relatively high humidity, fire is very occasional and less damaging. Tropical rain forests choked in fog and continuously drenched by mists and down pours are least affected by fires.



Generally, there are three ways that heat can travel:

- radiation,
- conduction, and
- convection.

- Forest Fires can be broadly divided into three categories.

1. Surface Fire: Surface fire begins at the surface. It spreads along the ground. It burns the dry leaves and grasses on the forest floor. In general, it is very useful for the forest growth and regeneration. But if grown in size, this fire not only burns ground flora but also results to engulf the undergrowth and the middle storey of the forest. A surface fire if spread may burn up to the taller vegetation and tree crowns as it progresses.

2. Crown Fire: In Crown fire, the crown of shrubs and trees burn. It is generally sustained by the surface fire - these fires are invariably ignited by surface fires. Crown fire is the most unpredictable fires that burn the top of trees and spread rapidly by wind. 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.

3. Ground fire - These fires are fires in the sub surface organic fuels, such as duff layers under forest stands. This fire burns root and other material on or beneath the surface. Ground fires burn underneath the surface by smoldering combustion and are more often ignited by surface fires. They are more damaging than surface fires, as they can destroy vegetation completely.

These fires are often hard to detect and are the least spectacular and slowest moving. Fighting such fire is very difficult. 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.

Pyrocumulonimbus (fire-induced thunderstorm) :

- Firestorm is known to have extremely large fire that creates and sustains its own wind system.
- A firestorm is a conflagration which attains such intensity that it creates and sustains its own wind system. It is most commonly a natural phenomenon, created during some of the largest bushfires and wildfires.
- Fire creates heat and smoke. The heated air from the fire rises rapidly, creating what is called an updraft. Air from the surrounding area rushes in to fill the empty space.
- Since now there is more and more supply of oxygen and so, the burning is getting more intense and intense. Therefore, firestorm has a self-sustaining wind system that intensifies the fire.
- As the smoke and heated air from the fire rise, water that is already in the atmosphere plus that has evaporated from vegetation also rises up and will eventually cool and condense in the upper atmosphere. This forms a pyrocumulus cloud ("fire clouds") or, if large enough, pyrocumulonimbus ("fire storm") clouds. These are hot, dense, dark clouds full of soot and ash. They carry pollutants.
- The moisture can fall as precipitation.

Fuels for forest Fire

Among the three components required for fire, the basic necessity to initiate and continue a forest fire is the presence of suitable fuel. Forest fire has different kind of fuels. The important among them are as follows:

a) Ground fuels

Ground fuel involves all the combustible material below the loose litter of the surface. The materials which constitutes the ground fuels can be summarized as follows- various decayed stages of the humus, trees, shrubs and roots, muck and peat.

b) Surface fuels - All the combustible material on the forest floor is included in surface fuels. This type of fuel is the most common type of fire fuels. This may include - tree leaves and the fine litter, grasses, weeds, ferns and the other herbaceous plants, brush, seedlings and saplings of trees, fine deadwood on the forest floor, large logs and stumps. These fuels ignite very readily and provide the basic combustible material for the forest fires.

c) Aerial fuels

All the combustible dead or live material located in the under storey and above the forest canopy is included in this type of fuels. These fuels are separated from the ground by more than a meter.

Suppression of Forest Fire

- A forest fire behaves according to the environment in which it burns. Factors in the environment affecting fires or fuels, whether and topography. Once the fire begins it will continue to burn if heat, oxygen and more fuel are supplied – these 3 elements make up a fire triangle
- In order to suppress a fire, eliminating one or more of the fire triangle elements is required
- Hence fire fighters need to conduct their work by reducing combustion temp to cool fire through the use of water, foam retardant or dirt.
- Cutting of the oxygen supply through the use of water, retardant or dirt or using a beater to starve it.
- Removing fuel by clearing duff, grass, a swath of trees and brush, leaves, and tree branches, twigs ahead of the advancing fire.
- The additional factors like fuel characteristics, weather and topography do have an impact the 3 major elements of the fire triangle and affect how a fire behaves.
- Fuel characteristics – fuel is an ever changing variable in the fire environment and must be addressed in any fire behaviour forecasts. Fuel, loading, availability, horizontal continuity, vertical arrangement, size and shape, moisture content, chemical content, fuel bed depth, live fuel to dead fuel ratio – have a profound effect on the fire behaviour.
- Fire fighters have to recognize and judge the characteristics of fuels such as fine fuels, dead or rotten fuels, dense fuels

Prescribed burn

- Prescribed burns are fires that are ignited under controlled conditions by well-equipped professionals who have extensive training.
- Fire has been used for thousands of years as a management tool.
- Reducing “fuels” in a controlled manner helps prevent high intensity “crown” fires from destroying the plantation. A prescribed burn can help prevent a destructive wildfire.
- These burns are scheduled for a time when the fire will not pose a threat to the public or to fire managers. In addition, forest conditions should call for a controlled burn and weather conditions
- In addition, fire can be rejuvenating. It returns nutrients to the soil in the ashes of vegetation that could otherwise take years to decompose. And after a fire, the additional sunlight and open space in a forest can help young trees and other plants start to grow.
- Some plants, such as certain pine species, require fire before the cones or fruits containing the seeds can release them. These cones or fruits need fire to melt a resin that holds the seeds inside. As a result, without fire these species cannot reproduce.

- All fire fighters have to know what weather conditions will prevail for the next 48-72 hours in their initial attack area and how these conditions will affect fire behaviour. Fire fighter monitors the whether (wind, relative humidity, temperature etc) at all times to make safe and effective fire fighting decisions.
- Wind is a major controlling factor that determines rate and direction of spread, and shape of fire. Wind speed affects the rate of spread of a fire and therefore its intensity. Higher wind speeds tilt the flames forward to pre-heat the fuel ahead of the fire and push the fire along increasing the rate of spread.
- Humidity - Relative humidity is commonly used to describe the moisture content in the air. It directly affects the moisture content of dead fine fuels, and thus how readily they burn. High temperatures and low relative humidity produce low fuel moisture contents that may result in severe fire behaviour.
- Temperature - Temperature affects fire behaviour indirectly through influence on fuel moisture content and local wind formation. As air temperature increases, relative humidity decreases and fine fuel moisture content decreases. Also, the higher the temperature of the fuel the more easily it will reach ignition temperature.

- Topography is the lay of the land – the slope, aspect and undulations that gives terrains its character.
- Terrain affects the speed at which a fire can travel. For example, fire moves much faster upslope than downslope.
- The rule of thumb is that fires travel twice as fast for every 10 degrees of slope uphill, and proportionately slower downhill (flame heights and fire intensity also significantly increase).
- Fast-moving forest fires can spread at speeds of up to 10 km/h which is faster than most people can run for more than a few minutes.
- Therefore, fire fighters should consider the topography in the planning process.

- ❑ During forest fires, firefighters often face the problem of having to lay hoses right up to the source of the fire. In the case of forest fires, firefighting turbines reduce water consumption by using a nozzle. The nozzles on the turbine atomize the water into fine water mist, which covers a more significant area using less water. The water mist also cools very effectively (has a high cooling effect) and can fight fires faster.
- ❑ A red stuff sold under the brand name Phos-Chek is applied as a fire retardant. Firefighters usually disperse it by plane to create barriers to advancing flames. It's a mixture that's mostly water, about 10 percent commercial fertilizer like ammonium polyphosphate, and dyes.
- ❑ Basically the ammonium polyphosphate reacts with the cellulose in plants and wood so that it releases water vapor as it heats up, creating a lower-temperature burn that's less prone to flaring and expanding.

- The Ministry of Environment and Forests, Government of India, has prepared a National Master Plan for Forest Fire Control.

Mitigation measures : In Indian administrative structure and DM Act, 2005, The Incident response system (IRS) organization as follows:

- Responsible Officers (RO) is to activate IRTs on receipt of any early warning of the disasters
- In case a disaster occurs without any warning, the local IRT will respond and contact RO for further support.
- Incident Commander (IC) - who manages the incident through IRTs
- Information & Media Officer (IMO)
- Safety Officer (SO) and Liaison Officer (LO) - to maintain proper coordination between the National, State, District, sub-division and tehsil and block levels in activating support for response.
- In case, a disaster occurs without any warning, the local IRT will respond and contact RO for further air support, if needed.

While prevention and suppression are the responsibilities of the state government. The constitution of Ministry of Environment and Forests (MoEF) and the formulation of National Forest Policy in 1988 are milestones in the fire fighting history of India. MoEF has six regional offices in the country acting as coordinating offices with the state forest departments. These offices may be used to regulate forest fire management activities and for this separate wing may be established, exclusively to look after forest fire. The National Master Plan for Forest Fire Control and National Forest Fire Prevention and Control Guidelines are some of the initiatives which the Ministry has taken up to manage the fire.

Management :

A. Long-term objectives

- Prevention of human-caused fires through education. It will include civil cultural activities, engineering works, people participation (The Panchayats, local bodies, *Mahila Mandals*, NGOs etc.), and education and enforcement.
- Remote sensing technology is to be given due importance in fire detection.
- Construct a number of observation towers.
- For successful fire management and administration, a National Fire Danger Rating System (NFDRS) and Fire Forecasting System are to be developed in the country.
- All the preventive measures should be taken in advance before the fire season starts.
- Introduce a series of communication systems (for example: Early Warning System, Emergency Response System, etc.)

B. Short-term specific objectives

- Organise seminars and workshops for local people
- Organise conservation congress for students.
- Develop a Fire Atlas for the country
- Fire fighting drills should be arranged

To reduce fire damage:

- PRESCRIBED BURNING : SETTING CONTROLLED SURFACE FIRES - Small and controlled fires in the form of prescribed burning are very essential and useful. Fire is the best process to intensify this natural process. Faster recycling occurs during a fire and gases are released into the atmosphere in the form of smoke.

○ PREVENTION

Prevention of Forest Fire :

- ✓ Act according to the instructions from Forest Department.
- ✓ Arrange special patrolling in forests during dry seasons.
- ✓ Employees of forest department should be trained for extinguishing forest fire