

# Fiery Foe

The phrase 'Spreading like Wildfire,' is a much-used idiom rooted in a fearsome truth – that Wildfires really do move swiftly...at a rate of up to 23 kph, burning everything in their path.

Dry grass burns fast (below)



between low-level vegetation and tree canopies. Vines that entwine trees may also encourage ladder fires.

A Wildfire (also known as bush fire, forest fire, grass fire, hill fire, peat fire, vegetation fire, and wild-land fire depending on the type of vegetation that is burning) is, as its name implies, a fire that occurs in the bush (collective term for scrub, woodland or grassland). Wild fires are different from other fires in the huge sizes they can attain, by their swiftness and their ability to suddenly change direction. Wildfires can jump gaps such as roads and rivers.

moving, but have a higher heat output and can smoulder for days.

■ **Crownfire:** This is fire in the canopy of the trees. Depending on the density of the suspended material, canopy height, and canopy continuity, it is possible for this type of fire to jump, from treetop to treetop, ahead of the ground fire.

■ **Groundfires:** These are fuelled by the dry combustible material on the ground. These typically smoulder and can burn slowly for days to months. Example, peat fires in Indonesia.

■ **Crawling or Surface fires:** These burn low-lying vegetation such as leaf, woody- litter, debris, etc.

■ **Ladderfires:** These burn materials

## Igniting the Fire

- Fallen or clashing power lines
- Lightning (accounting for about half of all cases in Australia)
- Volcanic eruptions
- Sparks from rock fall/coal seam fires

## Fire!!

There are very few words that have the dramatic impact of the word "Fire!!" There is no sound more chilling than the sound of a Fire Engine rushing with its siren on full blast. For a minute everything freezes as people stop and stare. Hollywood blockbusters have been made on the theme of towering infernos...or fires in skyscrapers. Although wildfires occur on every continent except Antarctica, spare a moment to think of countries that face this fiery foe on a regular basis. So much so, that they even have different terms to express exactly what sort of a fire it is.

■ **Spotting:** This is ignition of new fires by sparks/embers blown by wind. Spotting can occur up to 10-30 kilometres downwind from the fire front.

■ **Grassfires:** These are fast moving, of low to medium intensity, but may smoulder for long. Grassfires often occur in dry season that follow periods of good rainfall. The abundant growth (now dry), fuels the fire.

■ **Bushfires:** These are generally slower



Raging Forest Fire

## Natural Hazards

- Accidental (sparks from power tool/cigarette but etc) sparks from slash and burn cultivation practice.
- Droughts/Low humidity create favourable conditions.
- Arson

### The Fire Rages

The fire intensity and the speed of the bushfire depend on ambient temperature, amount of inflammable material present, moisture, wind speed and slope angle. Forested areas cleared by logging encourage the growth of grasses, which are potential fuel, when dry. Also, abandoned roads overgrown by vegetation sometimes act as fire corridors.

- The greater the fuel load, the hotter and more intense the fire.
- Smaller pieces (called flashy fuels) such as dry and loosely stacked dry twigs, undergrowth litter, dry grass and branches burn quickly.
- Tree trunks do not burn as easily but trees that contain natural oil such as the Eucalyptus trees promote burning.
- Inflammable material concentrated with adequate spacing burns faster as compared to heavily compacted or scattered material.
- Generally, the fire spreads faster uphill.
- Fire going downhill advances more slowly.
- The speed of an advancing fire front doubles with every 10 degree increase in slope.
- When a fire progressing downhill hits the bottom of the slope, the height of the flame can quadruple.
- The width of a fire front also influences the rate of spread.
- Lines of fire longer than 100 metres, perpendicular to the prevailing wind, reach their potential rate of spread immediately.
- Wind drives fire by blowing the flames towards fresh material, bringing it to ignition point and also, by ensuring continuous supply of oxygen.



Eucalyptus trees promote burning.



Crown Fire

Helicopter spraying water to control fire (right)

- Wind speed threshold is ~12 to 15km/h. Below this level, fires with heavy fuel loads burn slowly. However, even a slight increase in wind speed above this threshold results in a significant increase in advancement.
- Change in wind speed and direction can widen the forward edge of a fire.
- The higher the temperature the more likely it is that a fire will start or continue to burn.
- Dry air promotes a greater intensity fire than moist air. Plants become more flammable at low humidity.
- Wildfires have a rapid forward rate of spread (FROS) and can move as fast as 10.8 kilometres per hour in forests and 23 kilometres per hour in grasslands.
- Wildfires can also burn in the opposite direction of the main front by backing.
- Fire intensity is usually higher during daytime hours.

### Triggering More Havoc

- Especially large wildfires may affect air currents and lead to tornado-like conditions.
- The intense heating of the air produces massive up-drafts and creates pyrocumulous or fire clouds.
- These clouds can either help put out a fire or help it to grow. Sometimes, the atmospheric moisture condenses and falls as rain, extinguishing the fire. However, if the fire is huge, the cloud grows in to a type of cumulonimbus cloud that generates lightning strikes that can start other fires.
- Wildfires often follow the air currents over hills and through valleys.



### Putting Out the Fire

- Dropping huge amounts of water and fire retardants (colloquially called Sky Jello or Mud) from the air.
- Creating Control Lines (areas cleared of all combustible material). These lines can be produced by bulldozing or even burning away the flammable material in a controlled manner. The idea is that when the bushfire crosses the Control Line the lack of flammable material will cause it to die out.
- In rural Thailand they throw sand on the fire and beat it with sticks and palm fronds.
- In China silver iodide is used to encourage snowfall.

### Don't Feed the Fire

It is reported that the majority of people lose their lives in bushfire because of poorly timed and poorly planned last minute evacuation. It would be best if they:

- Used flame-resistant materials for all construction.
- Minimized the amount of stored fuel
- Constructed firebreaks
- Kept fire-fighting equipment handy.

Dr Sukanya Datta  
Scientist NISCAIR posted to Director General's  
Technical Cell, CSIR HQ  
Email: [sukanya@csir.res.in](mailto:sukanya@csir.res.in)