

Forest Fires

Introduction

At the global level, forest fires are common in Australia, Western Cape of South Africa, the hills of South Asia and the forested areas of the United States and Canada. Fires are particularly prevalent in hot and dry summer or during droughts when fallen branches, leaves, grasses and scrub become highly flammable.[1] Forest fires also happen also due to lightning, human carelessness, slash-and-burn farming, arson, volcano eruption, pyroclastic cloud from active volcano, and underground coal fire. Heat waves, droughts, and cyclical climate changes such as El Niño may increase the risk of these fires.

Historically, there have been some major forest fires events, which made considerable impacts on lives and properties. For example, in October 1994, around 3 million people were affected by forest fire in Indonesia. Again, in 1997, two hundred people were killed due to a huge forest fire in Indonesia.[2] From October through November 1997, fires in Indonesia and the resulting haze spread as far the Philippines to the north, Sri Lanka to the west, and northern Australia to the south. As per the estimates of the Indonesian government, around 750,000 ha areas were affected.[5] In 2007, forest fire killed more than 50 people in Greece.

The forest fire records since 1900 AD showed many catastrophic forest fires affecting large number of human population all over the world. The world's greatest forest fires disaster in terms of people affected are presented in Table 8.1.

Table 8.1: Ten most catastrophic forest fires (1900-2007) (Source: EMDAT)

Country	Date	Total Affected
Indonesia, Forest fire	Oct 1994	30,00,000
Macedonia FRY, Forest fire	Jul 2007	10,00,000
United States, Scrub/grassland fire	21-10-2007	640,064
Argentina, Forest fire	22-01-1987	152,752
Portugal, Forest fire	Jan 2003	150,000
Paraguay, Forest fire	Sep 2007	125,000
Russia, Forest fire	20-07-1998	100,683
China P Rep, Forest fire	May 1987	56,313
Nepal, Forest fire	Mar-92	50,000
Myanmar, Forest fire	11-04-1981	48,588

Vulnerability of Forest fire in South Asia

The South Asia region stretches from the tropical evergreen forests of Sri Lanka and India in the south to the mountain forests up to the tree line, or alpine forests, in the Himalayas in the north. As in continental and insular Southeast Asia, a large variety of biogeographic features and climatic conditions within the region have shaped a high diversity of forest ecosystems and other wooded land with different fire regimes and vulnerabilities. The deciduous, seasonally dry forests of the lowlands and the coniferous (pine) forests in the higher elevations are regularly burned. According to an assessment of the Forest Protection Division of the Ministry of Environment and Forests, Government of India, 3.73 million ha of forests are affected by fires annually in India. The incidence of forest fires in Bangladesh is considered to be insignificant. The teak forest of the Chittagong Hill Tracts in the south experience fires that are set intentionally by the Jhumias (hill people) for cultivating the land for agriculture. In the case of Bhutan, forest fires are considered one of the biggest threats to the forest resources. Conifer (pine), mixed conifer, broadleaf with conifer, plantations and degraded forests, which cover approximately 40 per cent of the total forest area, are most susceptible to frequent forest fires. The forest fire incidence is normally high during the dry winter months. Freezing temperatures and lack of rainfall are responsible for drying of perennial grasses, and increasing wind velocity quickens the drying process, thereby making the grass covered area flammable. Nepal is yet another South Asian country highly vulnerable to the forest fires.

Fire is a common feature in forests in the hills and mountains in South Asia. The causes of forest fire may be many but a high proportion of these fires are attributed to man-made reasons, either deliberately or accidentally. Forests are widely distributed in South Asia but most of them start degrading. Along with various factors, forest fires are a major cause of degradation of South Asian forests. The degraded forest is one of the major causes of flash flood and landslides. The forest fire is more catastrophic when it extends to nearby communities. Forest fires in South Asia are mostly experienced during the early summer months from March to June. However, the extent and type varies from place to place.

In 2007, there was no major incidence of forest fires in the region. Some of the minor incidences of forest fires in 2007 are summarized below:

Forest fire in Himachal, India (2007)

In June 2007, forest fire destroyed hundreds of hectares of forest in Himachal Pradesh. The fire gutted almost 2,000 hectares of the reserve forest area in Shimla and Solan Districts of the state. In Himachal, forest fires are an annual phenomenon. The forests catch fire in the summers and the fire season starts from April 15.

In June 2007, the State Forest Department has decided to implement the satellite-based Indian Forest Fire Response and Assessment System. The system, developed by the National Remote Sensing Agency (NARSA) will provide fire alerts to the department in 'near real-time' on the basis of satellite data received from the moderate resolution imaging spectra radiometer (MODIS). It captures both visible and infrared wavelengths to help detect forest fires. The system uses a contextual algorithm that exploits the strong emission of mid-infrared and thermal radiation from the fire for detection. To accurately locate the site of fire, the system provides satellite imagery, besides latitude and longitude.

Establishment of Indian Forest Fire Response and Assessment System (INFFRAS)

Recently, India has put in place the Indian Forest Fire Response and Assessment System (INFFRAS) at the National Remote Sensing Centre (NRSC), Govt. of India, to facilitate forest fire monitoring and management. The INFFRAS has been set up to preliminarily carry out: (a) Active Forest Fire Monitoring (b) Burnt Area Assessment using multi-temporal satellite data sets, (c) fire burnt area progression monitoring and (d) ecological damage assessment due to forest fires. INFFRAS has been providing fire-related inputs to the user departments in terms of fire information overlaid with value-added services such as forest administrative boundaries, vegetation type burnt, proximity to the villages, etc. for the past four years. INFFRAS can be accessed on the web at <http://www.nrsa.gov.in/rsgisweb/forestfires/dailyforestfires.html>.

During the forest fire season of 2007, INFFRAS was put to use to provide daily fire alerts using Moderate Resolution Imaging Spectro-radiometer (MODIS) onboard American satellites TERRA/AQUA and DMSP-OLS satellite data. MODIS data is received at NRSA Earth Station at Shadnagar. As part of ISRO-NASC/NOAA collaborative effort, DMSP (Defence Meteorological

Satellite Programme) Operational Line scan System (OLS) night time data is collected. The unique capability to detect low levels of visible and near-infrared (VNIR) radiance at night is used to detect active fire locations and is further edited to reject the false alarms caused due to various factors. After generating the fire locations, value additions to the generated fire products such as masking with forest cover, overlaying of point vectors on infrastructure theme, etc. are usually carried out (Figure 6.1). Time required for the whole process of generating active fire location will be around 2 hours after receiving satellite data and the products are disseminated by email to the concerned nodal officers and through web updates. In addition to the fire alert products, INFFRAS also provides forest departments with satellite remote sensing and GIS-based inputs for preparatory planning for fire control, damage and recovery assessment and mitigation planning (www.nrsa.gov.in).

References

1. Annual Disaster Statistical Review, The Number and Trends 2007, Centre for Research on the Epidemiology of Disasters (CRED), www.cred.be
2. www.rainforests.mongabay.com <http://www.moa.gov.bt/moa/downloads/downloads/Fire%20Management%20Coordination.pdf>
