

## **Forest Fire in Malaysia**

### **Its Management and Impact on Biodiversity**

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By the end of year 2000, an estimated 19.93 million hectares of forest cover 60.7% of Malaysia's total land area, with the forested area higher in Sabah and Sarawak than in Peninsular Malaysia. Of the total, 18 million hectares are classified as Inland Dipterocarp Forests, commonly referred to as evergreen rainforests. The generally high temperature and moist conditions in the natural forests that give rise to a high rate of litter decomposition, contributes to the low occurrence of large-scale forest fires in Malaysia.

In the last three decades however, large tracts of forestlands have been planted to monoculture crops. Some 1.65 million hectares of rubber and 2.62 million hectares oil palm have been established, posing higher fire risks than the natural forests. Also logging activities in the natural forests produce a lot of waste, thereby increasing flammable material, and the opening of canopies reduces the water retention capacity of the forests, which thus become more susceptible to fire. In human settlements located close to forests, where land is cleared through burning for agriculture, fire breaks out often into the natural forests.

Recent forest fires and the resultant atmospheric pollution in Malaysia and throughout Southeast Asia have throughout light the importance of forest fire and smoke management. The worst forest fire reported was in Sabah, Malaysia in 1983 - 1985, where over one million hectares of mostly logged-over forests were burnt, and the cause attributed to the severe drought (El Niño effect) then.

Forest Biological Diversity Tropical forests are estimated to cover only about 7%, or approximately 9 million sq km of the Earth's land surface, yet contain at least 50% of all species (Myers, 1988). In this context, the four-layered rainforest of Malaysia is among the top ten mega-diversity sites, and accounts for about one-third of the world's flowering plants under the International Union for Conservation of Nature and Nature Conservation (IUCN) - World Conservation Union classification.

Estimates show that Malaysia has 14,500 species of flowering plants, of which 8,000 flowering plants are found in Peninsular Malaysia. Of the 8,000, some 2,650 are tree species with 890 reaching harvestable sizes of at least 45 cm diameter at breast height (dbh). Of the 890 species, 408 have been marketed internationally under the Malaysian Grading Rules. For the non-flowering plant species such as fungi, algae, bryophytes and lichens, which are also important components of forests, further research work is needed to estimate their number. Parris and Latiff (1996) estimated about 1,159 fern species. Many forest plant species provide an extremely wide range of useful products relied on by both urban and rural people, in particular forest dwellers. Other than as a source of wood utilized worldwide and still predominantly harvested from the various forest types, many of the presently cultivated plants have been selected from the wild and have become food sources for the world populations (Zakri and Latiff 1996). Indigenous people in tropical countries rely on wild and traditionally cultivated plant species for their needs. Of the estimated 250,000 species of plants, only about 3,000 species are regarded as food sources; many more species are believed to have high potential either as food or medicinal sources. At the Malaysia-Brunei border, the vegetation consists of beach, mangrove, riparian, mixed dipterocarp, heath, and secondary forests, all rich in terms of species, genetic and ecosystem diversity; any degradation Of such forests would be a great loss to tropical diversity. However, only heath and secondary forests are more prone to forest fires as they are comparatively drier in certain months of the year.

#### **Impact of Forest Fires on Biodiversity**

##### ***Peninsular Malaysia***

No major fire has been documented in the natural forests, except some isolated outbreaks in pine plantations in the 1970s and Acacia mangium plantations in the 1980s. Estimates reveal that about 1,100 hectares of Pine and Acacia plantations were burned in the 1970s and 1980s. However, since the early 1990s, when the Forestry Departments in Peninsular Malaysia enhanced the documentation of forest fire incidence in the Permanent Reserved Forests (PRFs), about 1,232 fires were reported from 1992 to 1998. Records show that the most number of fire (333) occurred in 1994, of which 84% was attributed to land clearing for farming.

Most forest fires occurred during the prolonged annual dry spells between January to March, and June to

August. Fires occurred sporadically in the natural forests, and more frequently in the secondary and peat swamp forests, the gelam forests on raised sand beaches on the east coast, and in forest plantations.

### **Sabah**

Reported incidences of forest fires were more severe in Sabah than in Peninsular Malaysia. The worst fire recorded happened from 1983 to 1985, affecting an area of about one million ha in mostly logged-over forests. This was attributed to the severe drought caused by the El Niño phenomenon.

Most fires are caused by human activities during prolonged hot and dry weather. Reports show that logged-over areas were the most affected by fire and that the fires stopped upon reaching the undisturbed forest.

### **Sarawak**

In Sarawak, fire incidences have not become a major concern because only small areas within forest plantations were affected. There have been no major forest fires in the natural forests except in 10998 when fire started in the peat swamp and secondary forests in the outskirts of Miri town. Forest fires also took place in a hill forest concession area in Southeastern Sarawak, bordering Indonesia.

Sarawak's forest fire management is distributed among three main agencies: the Sarawak Forestry Department (forest fire protection measures and rehabilitation of burned areas); the Sarawak Natural Resources and Environmental Board (implementation of regulation under the Natural Resources and Environment Ordinance); and the Fire and Rescue Department of Malaysia (fire suppression).

### **1998 Fire Incidence**

In 1997/98, Malaysia experienced one of the most severe forest fire episodes in history as a result of prolonged dry seasons following the El Niño phenomenon. Incidences of forest fires were reported in almost all states, which was unprecedented. Forest fires consumed the most in Sabah, accounting for 73% of the total land area. Table 1 provides a summary of the number of hectares burned during the period.

In terms of forest type, the peat forests suffered the most, with 63,331 (98%) ha burned in 1998 (Table 2). Land clearing for agriculture was identified as the most likely cause of most of the forest fires.

### **Prevention, Protection and Enforcement Measures**

Forest Protection Considerations Protection considerations may include soil, water and fire protection as well as protection of the residual stand from damage. Generally, logging or timber harvest planning in multiple-use forests should consider public safety and protection of the environment. Public relations considerations require special attention for the protection of streams or rivers from siltation and debris, preservation of potential camping and picnic sites along streams and providing buffer zones in recreational forests. In the monitoring and evaluation of forest management and timber certifications, Criterion 3 (Forest Ecosystem Health and Condition) of the Malaysian Criteria, Indicators, Activities and Standards of Performance (MC&I) requires that states (Forest Management Units or FMUs for Peninsular Malaysia) assess the identification as well as severity of damage caused by human activities and natural causes including fires. The certification process also includes assessing the availability and implementation of procedures covering the use of chemicals in the forests and fire management in the respective FMUs.

**Table 1. Areas affected by Forest Fires in 1998 by State**

Location	Area (Hectares)	Probable Causes
Kelantan	605	Snapped electrical transmission lines and land cleaning by farmers
Selangor	255	Land clearing by farmers and disposed cigarettes
Perak	100	Hunting and other unknown causes
Johor	56	Campers and other unknown causes
Kedah	41	Land clearing by farmers

Toranganu	1,315	Land clearing by farmers and other unknown causes
Pahang	427	Land clearing by indigenous people and local farmers nearby, and other unknown causes
Sabah	47,500	Land clearing by local farmers
Sarawak	14,200	Land clearing by local farmers
<b>Total</b>	<b>64,499</b>	

Note: From unpublished reports of Forestry Departments, FRIM and Fire and Rescue Department Malaysia

**Table 2. Area of Forest Type burned in 1998**

Forest Type	Area (Hectares)	Probable Causes
Peat Forest	63,331	Land clearing by farmers and indigenous people, hunting and other unknown causes
Secondary Forest	432	Land clearing by farmers and other unknown causes
Degraded Heat Forest	310	Land clearing by farmers
Heath Forest	250	Unidentified
Logged-over forest	120	Unidentified
Forest plantation	26	Snapped electrical transmission lines, cigarettes and other unknown causes
Montane forest	15	Camper
Coastal swamp forest	15	Clearing by fishing villagers
<b>Total</b>	<b>64,499</b>	

### National Forest Fire Action Plan

As a result of the dense haze episode in 1994 and the outbreaks of forest fires in 1994/95 and 1997/98, the Government of Malaysia took note of the limited forest fire fighting capability in controlling major fires. The Government thus proposed a National Contingency Plan to Combat Forest and Plantation Fires in Malaysia that aims to:

- Establish an immediate and coordinated response system on forest and plantation fires;
- Enhance response with the existing resources in terms of equipment, manpower and training;
- Alleviate or minimize the adverse impact on the environment resulting from forest and plantation fires; and
- Establish an early warning system to alert the relevant authorities at national and regional levels.

In view of the destructive nature and spontaneity of forest fires, a mechanism for immediate response by all relevant agencies was put in place to reduce the negative impacts such as loss of property and environmental degradation. In 1998, the Government of Malaysia directed the National Disaster Coordinating Committee to include forest fires under its jurisdiction in addition to its existing responsibilities for flood, urban fires and industrial and other natural disasters. This was followed with a draft Standard Operating Procedure (SOP) for forest and plantation fires that will be implemented as soon as possible. The SOP was formulated in line with the Malaysian National Haze Action Plan, which is a component of the ASEAN Regional Haze Action Plan. Among others, the draft SOP provides guidelines relating to the responsibilities of various government agencies and chains of command in response to large-scale forest fires.

### Levels of Forest Fire Management

Forest fires are normally reported either by the public or through routine monitoring by relevant agencies such as the Department of Environment, the Police Air Wing, the Forestry Department, and the Fire & Rescue

Department. Depending on the extent and severity of the forest fires, which are assessed according to the categories described below, responsibility for the management of forest fires rests on the Disaster Management Committees formed at the district, state, and national levels. Membership for each committee and the chains-of-command are given in the SOP guidelines.

**Level 1** - Forest fires that can be effectively dealt with by the local Fire and Rescue Department and other relevant agencies; no risk of spreading to other districts.

The District Disaster and Rescue Management Committee, headed by the District Officer, manage these forest fires. It is tasked specifically to mobilize government mechanisms and manpower to combat large-scale forest fires at the district level. Members include District level agencies or officers such as the Fire and Rescue Department, Police Department, Health Officer, Engineer, Forest Officer, Local Chief of Civil Defense, Officers from the National Parks and Wildlife Department, the Information Department, and other relevant organizations.

**Level 2** - More serious forest fires that affect more than one district, with the possibility of spreading further and threatening property and life, the extent of forest fire beyond the capacity of the District Disaster Committee.

A state level Disaster Management Committee chaired by the State Secretary is formed and comprises departments similar to the District committee. A Monitoring Centre is also established to monitor and provide immediate assistance when necessary.

**Level 3** - More complex fires escalating from Level 2 and affecting more than one State; these fires cause disruption to the daily activities of the public, and may require assistance from the central agencies and even from international organizations.

When fires escalate to Level 2 and 3, committees are similarly formed at the state and national levels. A National Disaster Monitoring Centre is established to coordinate efforts by relevant agencies to combat fire and to provide assistance needed from the Federal Government. At the ground level, a local area control post is established to coordinate activities among different government agencies and to implement directives given by the disaster committee. A 24-hour operations room is also established to receive and monitor the fire fighting activities. Designated officials from the relevant agencies man both the control post and operation room with specific duties listed in the guidelines.

### **Responsible Agencies**

The SOP also provides guidelines relating to the functions and responsibilities of various government agencies, among which are:

**National Security Division** - serves as Secretariat to the National Disaster Committee and coordinates forest fire fighting efforts and training for all relevant agencies.

**Royal Malaysian Police** - reports forest fires through routine air surveillance; establishes control posts at the site of forest fires; ensures public order and safety of property, and carries out investigation, if necessary.

**Fire and Rescue Service Department** - carries out fire suppression and control; ensures safety of all personnel and the public; provides aerial fire suppression services when required; carries out information gathering and post-fire reporting, and provides training to other agencies and voluntary bodies.

**Armed Forces** - provide personnel, transportation and machinery when needed; offer medical, engineering, and transportation services; assist in search and rescue mission, and give air ambulance service for emergency transportation.

**Forestry Department** - provides personnel in ground fire suppression; assists in search and rescue operation; gives technical assistance relating to conditions of the forest, topography, forest, ecotypes, sources of water, etc.; helps in the assessment and post-fire evaluation; offers equipment and transportation, and secures assistance from logging companies, if needed.

**Public Works Department** - provides machinery, equipment and engineering expertise; offers temporary accommodation for fire fighting personnel as well as for victims of the fire, and coordinates all engineering and civil works.

**Department of Environment** - serves as the first agency to receive report on fire incidence through its air surveillance unit and through public information; carries out enforcement of law against open burning; monitors air quality index; provides information to the public as well as directly to the relevant agencies, and serves as coordinating agency for early detection of forest fire and haze occurrences.

**Meteorological Services Department** - provides meteorological information to the public as well as relevant agencies for early warning of potential of forest fires, and assists in weather forecast during large-scale forest fires.

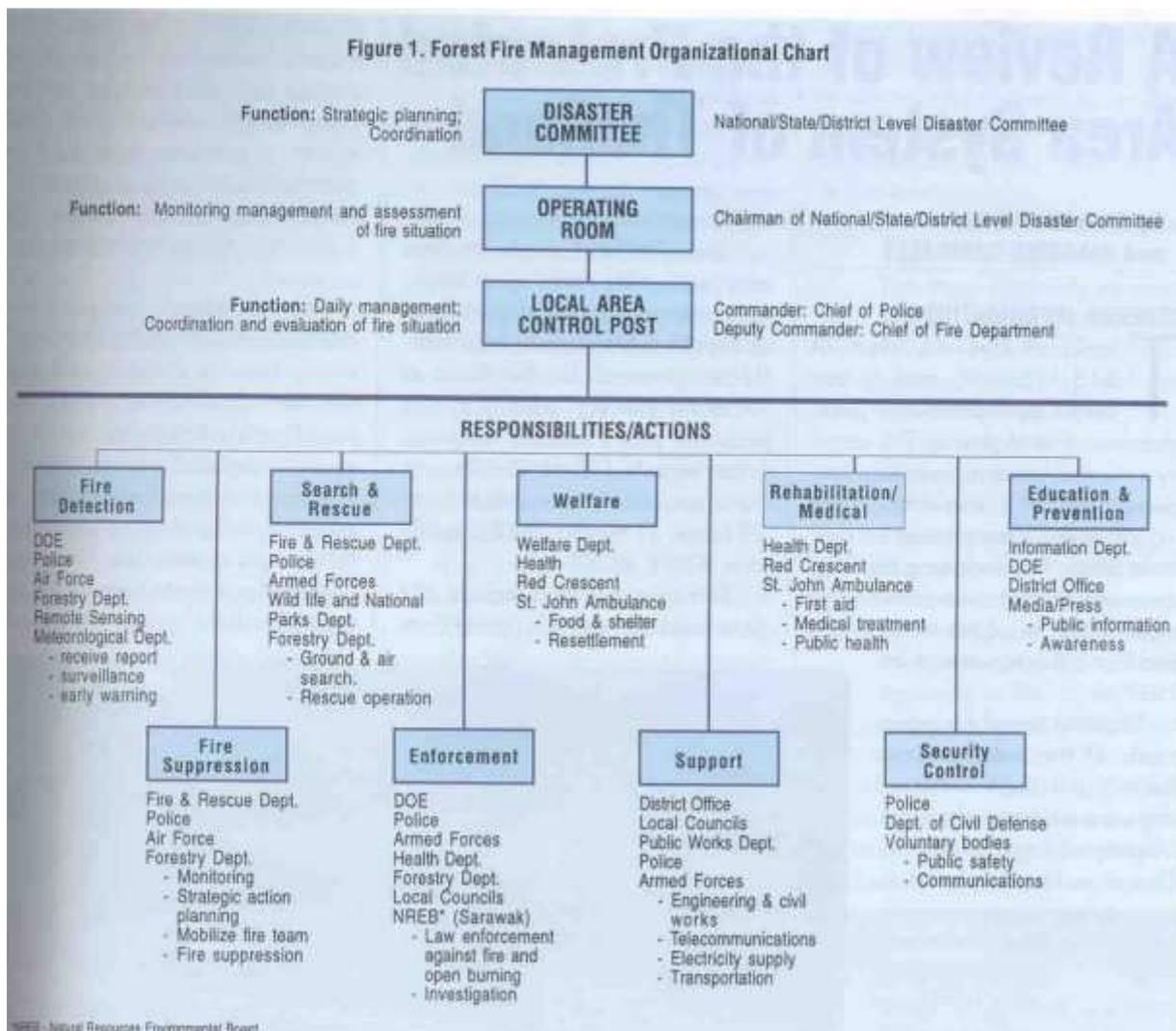
**Malaysian Remote Sensing Centre** - receives and evaluates real-time information on incidence of forest fires through satellite imagery, and cooperates with international agencies through exchange of satellite information in assisting early detection of forest fires in Malaysia as well as around the region.

**Wildlife and National Parks Department** - provides information on endangered wildlife affected by the forest fires and assists in the translocation of affected species, their safety, and rehabilitation of habitat, if necessary

**Social and Welfare Department** - establishes temporary shelter for affected fire victims; provides immediate assistance in terms of food, shelter, medical and subsistence allowance for affected fire victims; and facilitates registration of fire victims for government aids.

**St. John Ambulance Malaysia and Malaysian Red Crescent Society** - assists the Welfare Department in the administration of the shelter, aids the Health Department in providing emergency medical care, and organizes volunteers to provide first-aid to fire victims and as fire fighters.

The overall organization charting the agencies responsible in forest fire fighting and management is shown in **Figure 1**.



## Conclusion

Although large-scale forest fires are relatively new to Malaysia, their increasing recurrence and intensity requires effective prevention and control methods as well as improvement in the capacity and capability of Malaysia to readily respond to these occurrences. Thus the Government of Malaysia mandated the Malaysian Fire and Rescue Department as the main agency responsible for combating and managing forest fires. The Department has been allocated a substantially bigger financial budget in the last few years, mainly to purchase additional forest fire equipment including two helicopters for rescue and "water bombing".

To further enhance concerted efforts at various levels, the proposed SOPs would ensure effective coordination among all relevant agencies in effectively responding to the management and control of forest fire occurrences in Malaysia. Regionally, or even internationally, there is a need to enhance or strengthen present and future cooperation with other ASEAN countries towards concerted efforts to improve techniques and skills in forest fire management, through exchange of information and training programs.

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