



**KEMENTERIAN TENAGA, SAINS, TEKNOLOGI,
ALAM SEKITAR DAN PERUBAHAN IKLIM**
MINISTRY OF ENERGY, SCIENCE, TECHNOLOGY, ENVIRONMENT & CLIMATE CHANGE



PEATLAND FIRE PREVENTION PROGRAMME

TO MITIGATE HAZE IN MALAYSIA

PEATLAND FIRE

Peatland fires are one of the main environmental problems in Malaysia and South East Asia. Fire occurrences in peatland happen every year, especially during drought seasons (southwest monsoon). Burning of peatland produces dust, ash and smoke across the country. This situation is a serious problem as it will have bad implications for society and the environment.

SOURCE OF FIRES

- **Land clearing for agricultural activities on peatland:** traditional methods usually involve drainage and “slash and burn”;
- **Unsystematic drainage system:** by draining out peat water and land clearing for plantations, road and housing construction, high impact infrastructure, mining, agriculture, and others;
- **Cigarette butts and campfire:** wind as fueling factor of fire spread;
- **Degraded peatland condition:** due to lack of vegetation cover to maintain wetness and humidity of peatland areas; and
- **Recreational activities** such as camping, fishing, etc. also contribute to peatland fires.

Climate and weather are the supporting factors of large-scale peatland fire during drought season. Dryness and lack of moisture are the main parameters for peatland fire. From May to September, Malaysia experiences the southwest monsoon whereby a combination of dry weather and winds contribute to spreading and uncontrolled peatland fires especially during periodic El-Niño induced drought. Open burning may spread and cause extensive fires, particularly during the dry season.



EFFECTS OF PEATLAND FIRE AND OPEN BURNING



The air becomes polluted due to an increase in solid particles or dust especially small particles (PM2.5) and other pollutants which cause smoke haze;



Decreased visibility can be harmful to road users, airplanes and ships;



An increase in medical cost and adverse effects on health (asthma, bronchitis, allergies, pneumonia, eye pain and even heart disease) especially for infants, children, the elderly and asthmatic patients;



Decline of the tourism industry affects the economy and foreign exchange;



Disrupted learning and teaching process due to closing of schools;



Reduced agricultural productivity and disrupted daily activities;



Forest and biodiversity destruction; and



Property destruction and economic losses.

PEATLAND PROFILE

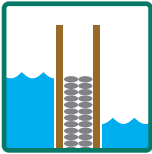
- It is formed by the deposition of organic matter (roots, branches, wood, etc.) that occurs slowly (over thousands of years).
- The organic matter content is more than 65% of total dry soil weight with thickness of more than 50cm.
- The depth of peat varies depending on the area. Generally, peat near the edge of the peatland is shallower than in the middle (peat dome).
- This partially decomposed organic material makes peat water acidic (pH 3-5) and brown or black in colour.

10% ORGANIK MATTER

90% WATER

In its natural condition, peat swamp composition is consist of 10% accumulated organic matter and 90% water.

THE IMPORTANCE OF PEATLAND:



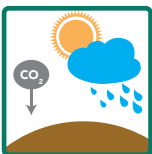
Water Regulator

Peat consists of approximately 90% water. The function of water storage helps to maintain water levels and act as a flood control and water supply system for communities as well as downstream ecosystems.



Biodiversity Conservation

A peat swamp forest supports biodiversity and provides food resources, water, and a habitat for plants, birds, mammals, fishes, and many others.



Carbon Storage and Climate Regulator

A healthy peat swamp forest can accumulate carbon actively, offsetting (to some extent) carbon emissions from fossil fuels.



Livelihood

Local communities living within the peatland vicinity often derive considerable benefits from the peatland goods and services provided. It includes non-timber forest products such as fish, *mengkuang* leaves, *palas* leaves, fruits, medicinal plants, and ornamental plants that support and contribute significantly to the socio-economic of the locals. Besides that, peatland areas can be cultivated with other crops such as vegetables if managed well.



Research and Education

As one of nature's wonders full of unique flora and fauna, a peat swamp ecosystem is able to record changes of vegetation/plant and climate in the peat layers. This will help in understanding the peatland ecosystem changes.

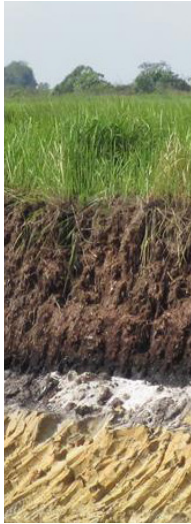


Ecotourism and Recreation

Peat swamp forest has the potential to be promoted as the recreational activity area such as fishing, jungle trekking, and ecotourism destination. Ecotourism can contribute to the growth of the local economy with the development of basic facilities and an increase in number of visitors.



PEAT LAYERS:



- Vegetation
- Ground surface
- Peat
- Mineral soil

Peatland area plays an important role in hydrological cycle, acting as a 'giant sponge' and capable to absorb and store a significant amount of water.



PEATLAND MATURITY LEVEL:



FIBRIC: >66%
Brown in colour, with a large part of the organic matter has yet to decay and easily identified. The soils density is very low (<0.1 g/cc) and has high water holding capacity.

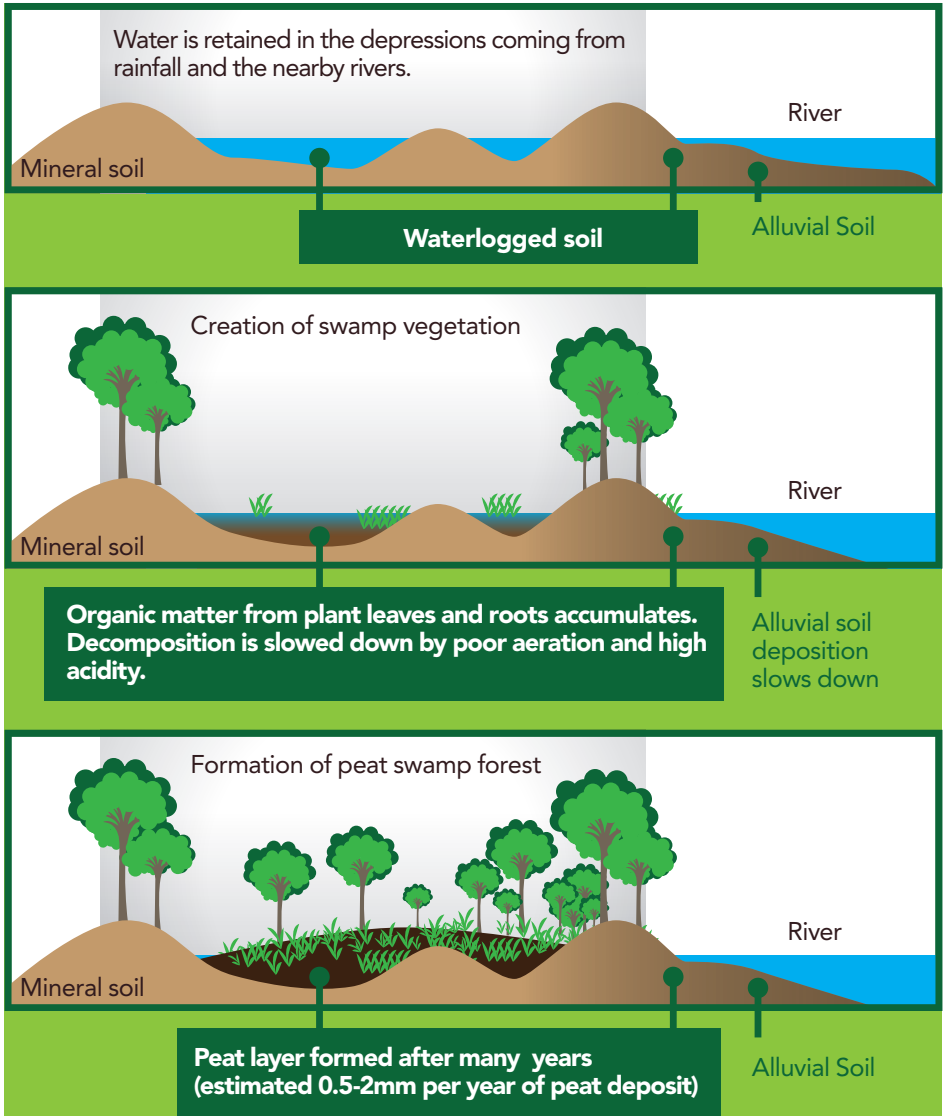


HEMIC: 33-66%
Intermediate between Fibric and Sapric.



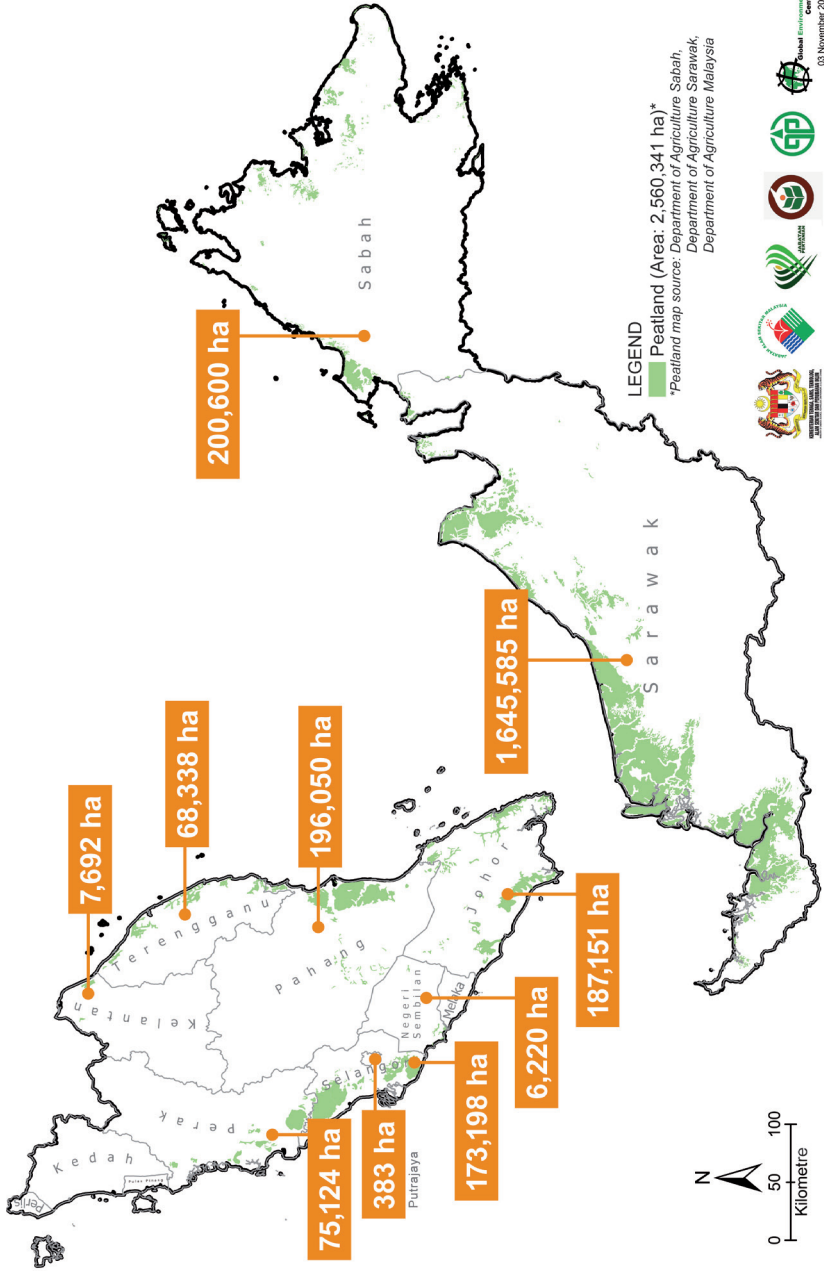
SAPRIC: <33%
Dark in colour, with decayed organic matter. The soils density is higher (>0.2 g/cc) and has lower water holding capacity.

FORMATION OF PEATLAND



DISTRIBUTION OF PEATLANDS IN MALAYSIA

Malaysia has 2.56 million hectares of peatlands covering about 7.7% of the country's land making the peatlands the most extensive wetland ecosystem.



INTRODUCTION TO PEATLAND FIRE PREVENTION PROGRAMME TO MITIGATE HAZE

The Peatland Fire Prevention and Management Programme in Fire-Prone Peatland Area to Mitigate Haze was initiated in 2009 by the Department of Environment (DOE) then under the Ministry of National Resources and Environment (NRE). The programme is still managed by the DOE but now under the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC). Under the programme, five types of infrastructure have been developed which include Check Dams (CD), Tube Well (TW), Watch Tower (WT), Retention Pond (RP) and Water Pipeline (WP) to prevent and control fire occurrences in peatland fire-prone areas in seven states i.e. Johor (J), Kelantan (K), Pahang (P), Sabah (S), Sarawak (SA), Selangor (SE) and Terengganu (T).



DEVELOPMENT OF INFRASTRUCTURE TO PREVENT FIRE IN PEATLAND AREAS



Check Dam (CD) is a block constructed across drainage canal/waterway to:

- Restore the hydrologic system of peatlands by increasing the water level and below ground water level.
- Control and slow down peat water discharge from peatland area.
- Retain water in drainage to provide a water supply source during fire fighting operations by the firefighters and relevant agencies.

Number of CD built according to states:





Number of TW built according to states:

Tube Well (TW) is a deep well that:

- Produces water source from the underground aquifer using a submersible pump or pump engine.
- Wetting or flooding a dry and burned peatland area for rewetting purpose.
- Increase water level in drains or nearby pond to provide a source of water supply during a fire extinguishing operation.



Number of WT built according to states:

Watch Tower (WT) is a stable structure built with a height of 20-30m above land surface level to monitor and observe using binocular with a 360° view of the surrounding area of peatland.



Number of RP built according to states:

Retention Pond (RP) is a pond that stores and supplies water to be readily available during fire extinguishing and wetting of peatland areas that start to dry during hot season. The pond receives water through either rainwater or pumping water from a nearby drain or tube well (TW).



Number of WP built according to states:

Water Pipeline (WP) is a High Density Polythylene Pipe (HDPE) through which water is pumped, which is an innovative approach to:

- Prevent, control and reduce the risk of fire at degraded peatland areas especially during drought and extreme hot seasons.
- Channel water pumped from the water reservoir such as mine or abandoned pond into the fire-prone areas.



NEW INITIATIVES TO PREVENT AND CONTROL PEATLAND FIRE



Clay dyke is a vertical clay layer installed in the peat to prevent lateral drainage. It is built at the same level as the peatland to maintain optimum water level, wetness and reduce water seepage from peatlands in the long term.



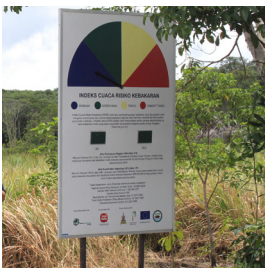
Piezometer is a small sized tube well, which is used to measure below ground water level in peat soil.

Periodic measurement and monitoring of the below ground water level in the piezometer is carried out to monitor the reduction of water level in peat during hot and dry seasons; where the peat soil has high fire risk.



Drone and monitoring team

The use of remote controlled drones for monitoring is cost effective and easy to deploy. It should be accompanied by a special monitoring team so that the monitoring activities can be implemented regularly.



Fire Danger Rating System (FDRS) is an early warning system for peatland fire prevention by analyzing current weather conditions which then interpreted into an index using colour code i.e. red, yellow, green and blue. The system includes indicators like Initial Spread Index (ISI), Build Up Index (BUI) and Fire Weather Index (FWI).

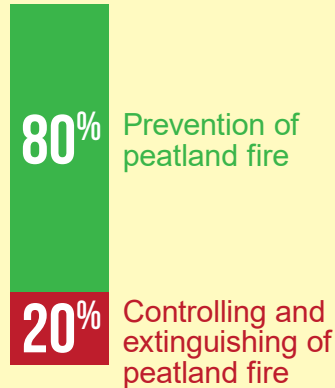
PEATLAND FIRE MANAGEMENT CONCEPT

The **80:20 Prevention Concept** refers to the ratio of 80% effort for prevention of fire while the ratio of 20% for controlling and extinguishing. This requires coordination in the implementation of the peatland fire management concept by adopting the “prevention is better than cure” practice. Key prevention measures include rewetting or raising water level in peatlands, blocking drainage, rehabilitating peat swamp forests, active patrolling and community engagement etc. At the early stage of controlling and extinguishing operation; every cost, workforce, facilities, and others are required to be efficiently applied to quickly address fire occurrence in a short amount of time to prevent the spread of fire or large fire scale. As a result, duration and cost of fire extinguishing can be reduced including workforce, maintenance of fire extinguishing equipment and other related.

CURRENT



PARADIGM TRANSITION



ABLE TO REDUCE...



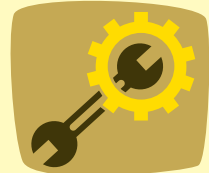
Duration of fire extinguishing



Expenditure Cost



Workforce



Maintenance Cost



The **Peatland Fire Management Cycle** is structured based on the disaster management cycle. The cycle is used to plan and respond to the fire prevention and control of peatland at the local or even the national level. This cycle includes four main components which are Prevention, Preparedness, Response, and Recovery.



STANDARD OPERATING PROCEDURE (SOP) TO IMPLEMENT PEATLAND FIRE PREVENTION PROGRAMME TO MITIGATE HAZE



The revised Malaysian Standard Operating Procedure (SOP) has been developed to enhance the coordination, implementation and, enforcement of peatland fire prevention actions systematically in fire-prone peatland areas to mitigate haze in Malaysia. The SOP preparation takes account of the views of every implementing agency and stakeholders in restructuring the Peatland Fire Prevention Programme.



MASTER PLAN FOR FIRE-PRONE PEATLAND MANAGEMENT IN MALAYSIA 2021-2030



Master Plan for Fire-Prone Peatland Management in Malaysia 2021-2030 has been prepared to plan and design a strategy to address the challenges of fire-prone peatland management as well as prevent local or transboundary haze. Under the Master Plan, management, planning and development system for fire-prone peatland areas emphasise on inclusive implementation, governance, coordination and smart partnership. A scientific, technical and ecosystem approach should be adapted at every stage of federal, state and local planning.



HOT WEATHER

AVOID OPEN BURNING AT PEATLAND AREAS

Everyone is advised not to conduct open burning at peatland areas or let their land/premises be encroached by an irresponsible party that can lead to peatland fires whether on purpose or accidentally.

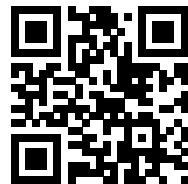
According to Section 29(A) of the Environmental Quality Act 1974, those convicted of carrying out open burning are subject to a fine not exceeding RM 500,000 or imprisonment for a term not exceeding five years or both. A maximum compound of RM 2,000 can also be imposed under the Section.

The public is encouraged to cooperate in extinguish small fires and report any cases of open burning or fires to the Fire and Rescue Department at 999 and the Department of Environment (DOE) at toll-free 1-800-88-2727.





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