



# GAMBUT

ASEAN Peatland Forests Project Malaysia Component  
Special Publication



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# Foreword

The objective of this special publication is to highlight the successes of the Malaysia Component of the Association of Southeast Asian Nations (ASEAN) Peatland Forests Project (APFP). These successes, which are documented briefly in the following pages, have been brought about by the tremendous effort that has been put in by all of the project partners involved in the project since it first began in 2010. These various project partners include the various Government agencies, NGOs, private sector, as well as the local communities living around the APFP pilot site in Selangor. Special mention must also be given to the Selangor State Government and our corporate partners, who have generously committed substantial resources towards the co-funding of the project.

"Gambut", the title of this publication, is the Bahasa Malaysia term for peat soil. I am certain that through this project, the term "Gambut" will be thought of in an increasingly positive light. Rather than associating it with wasteland, forest fires and haze (which we now have much greater capabilities to prevent and to deal with), I am happy to note that through the strong public awareness component of this project, many more now see peatlands as an invaluable resource; one which provides invaluable ecosystem services that are so important for both the local communities that depend on it for their basic needs including water, food, and fibre, as well as in terms of its role as a carbon sink, so critical for our future survival on earth.

This publication has been written for easy reading, with emphasis on minimising the amount of text and technical details, while supplementing it with photos and diagrams that help to tell our story. I hope you will enjoy reading it and hopefully bring away some inspiration and new ideas from it.

Thank you

**DATO' PROF. DR. HJ. ABD. RAHMAN BIN HJ. ABD. RAHIM**  
DIRECTOR-GENERAL OF FORESTRY DEPARTMENT  
PENINSULAR MALAYSIA

# 7 THINGS YOU NEED TO KNOW ABOUT PEAT & PEATLANDS

## 1. What is peat?

Peat is a type of soil that is composed of at least 65% partially decayed organic matter derived from dead and decaying plant materials under high water saturation conditions.

## 2. How is peat formed?

Peat is formed when plant material, usually in wet areas, is unable to fully decay because of acidic and anaerobic conditions.

## 3. What are peatlands?

Peatlands are wetland ecosystems characterised by accumulation of peat.

## 4. Why are peatlands important?

Peatlands support unique biodiversity, mitigate flood as well as provide a critical economic resource for the local communities living in and around them. As the world's single largest land-based carbon sink, peatlands also play a key role in regulating the global climate. Although covering just 3% of the world's land area, peatlands store more carbon than all of the vegetation on earth.

## 5. What types of peatlands are there?

Half of the world's wetlands is made up of peatlands. Examples of peatland ecosystem include bogs, moors, mires, permafrost tundra and peat swamp forests.

## 6. How much of the world's tropical peatlands are in Southeast Asia?

The most recent estimate puts this figure at 56%. Peatlands are found in all ASEAN Member States, but are more extensive in Indonesia, Malaysia, Brunei Darussalam and Thailand.

## 7. Where are peatlands found in Malaysia?

Peatlands cover around 8% of the total land area of Malaysia. Sarawak has the largest area of peatlands in the country, while significant areas of peatlands are found in a number of other states, in particular Sabah, Pahang, Selangor, Johor and Perak.

# The APFP

The Association of Southeast Asian Nations (ASEAN) Peatland Forests Project (APFP) entitled "Rehabilitation and Sustainable Use of Peatland Forests in South-East Asia" is a four (4) year project that aims to demonstrate, implement and scale up integrated management of peatlands in Southeast Asia.

Launched in 2009, the project's overall objective is to promote sustainable management of peatlands in Southeast Asia in order to sustain local livelihoods by reducing poverty, reducing the risk of fire and associated haze, and contributing to global environmental management, particularly biodiversity conservation and climate change mitigation.

The global environmental objectives are to reduce the rate of degradation of peat swamp forests and support their rehabilitation to maintain biodiversity, carbon storage and climate regulation functions.

The APFP consists of five (5) components, i.e. a Regional Component that focuses on developing a strong framework for partnership between all ASEAN member countries; as well as four (4) Country Components for Indonesia, Malaysia, the Philippines and Viet Nam.

The ASEAN Secretariat is the executing agency for APFP while the GEC provides technical support for overall management and implements the regional component. The project is funded by the Global Environment Facility (GEF) through the International Fund for Agricultural Development (IFAD), with co-funding from participating countries and the European Union.

## The Malaysia Component of the APFP

The objective of Malaysia Component of the APFP is to promote sustainable management and rehabilitation of peatlands in Malaysia through capacity building, improved inter-sectoral management and demonstration of best management practices at a selected pilot site. The component continues from previous projects carried out in the country which used a multi-stakeholder approach to address the main issues pertaining to peatland management.

The pilot site selected was the southern section of the North Selangor Peat Swamp Forest (NSPSF). The site spans 4,000 ha, of which 2,000 ha falls within the Raja Musa Forest Reserve (RMFR) under the management of the Selangor State Forestry Department, while the remaining 2,000 ha sits within alienated land managed by Selangor

Government-Linked Companies, i.e. Selangor Agriculture Development Corporation (SADC) and Kumpulan Darul Ehsan Berhad (KDEB).

A grant sub-agreement for the Malaysia Component of the APFP was signed between the Government of Malaysia and the ASEAN Secretariat on the 15<sup>th</sup> of April 2010.

With the signing of the sub-agreement, the Malaysia Component, funds totaling USD880,000 from the International Fund for Agriculture Development (IFAD) and the Global Environment Facility (GEF) were made available. A trust account was set up by the Ministry of Finance, Malaysia in October 2010 to administer this fund.

The Forestry Department Peninsular Malaysia (FDPM) is the APFP National Project Executing Agency for Malaysia.

The original project period was four (4) years (2010-2013), with an extension period of one (1) year to 2014.

Based on the overall APFP framework, the project framework for the Malaysia Component includes a total of 28 main activities arranged under 11 outputs and four (4) outcomes.

In implementing the Malaysia Component of the APFP, all of the relevant agencies involved in areas relating to peatland management were brought together under two (2) main platforms, i.e. the National Peatland Steering Committee (NPSC) chaired by the Secretary General of the Ministry of Natural Resources and Environment (NRE) and the National Peatland Working Committee (NPWC) chaired by the Director-General of Forestry Peninsular Malaysia.

### Project Outcomes and Outputs of the Malaysia Component

<b>OUTCOME 1</b>	<b>CAPACITY AND INSTITUTIONAL FRAMEWORK FOR SUSTAINABLE PEATLAND MANAGEMENT IN MALAYSIA STRENGTHENED</b>
OUTPUT 1.1	Policy and planning framework for peatland management strengthened at national level.
OUTPUT 1.2	Capacity for sustainable peatland management in Selangor strengthened to support the up-scaling of good peatland management practices.
OUTPUT 1.3	Peatland Education Centre at pilot site (NSPSF) established as a focus for educational and awareness activities.
OUTPUT 1.4	Component technically supported.
<b>OUTCOME 2</b>	<b>THE DEGRADATION OF PEATLANDS IN MALAYSIA DUE TO FIRES MINIMISED</b>
OUTPUT 2.1	Status and trends of Malaysian peatlands determined.
OUTPUT 2.2	Degradation of peatlands by fire in Selangor reduced.
OUTPUT 2.3	Guidelines for integrated peatland management developed and promoted.
<b>OUTCOME 3</b>	<b>BEST MANAGEMENT PRACTICES AT SELECTED DEMONSTRATION SITES IDENTIFIED AND PRACTISED</b>
OUTCOME 3.1	Sustainable management options for peatlands showcased through demonstration sites.
OUTCOME 3.2	Integrated management strategies for NSPSF and buffer zone adopted.
OUTCOME 3.3	Rehabilitation of degraded peat swamp forest demonstrated in RMFR and adjacent buffer zone.
<b>OUTCOME 4</b>	<b>GUIDELINES FOR SELECTED SECTORS RELATING TO PEATLAND MANAGEMENT PREPARED AND ADOPTED</b>
OUTPUT 4.1	Sustainable economic activities in buffer zone of NSPSF enhanced.

# Saving a swamp

The effort to rehabilitate and conserve the North Selangor Peat Swamp Forest



For its wealth of valuable timber trees such as the Meranti bakau (*Shorea uliginosa*) and Ramin melawis (*Gonystylus bancanus*), the North Selangor Peat Swamp Forest (NSPSF) has had a long history of commercial logging; one that stretches back to the 1940s.

A variety of methods including laterite tracks, railways and canals were used by generations of loggers over the decades, in an attempt to find the best way to transport timber out of this inhospitable, water-logged environment.

In the latter years, floating the logs out in specially-excavated canals became the preferred method. Between 1980 and 2000, around 500 km of canals were dug throughout the NSPSF. At the time, it was not quite understood just how much of an impact these canals would have on the forest.

## Fire and water

The differential pressure created by the canals served to draw out water from the surrounding peat soils, thus lowering the water table and drying out the peat. Forest fires became the norm in these areas during each dry season from the early 1990s onwards.

Usually sparked by land clearing activities in and around the peat swamp, the fires would spread along the canals, sometimes extending up to 700 metres on each side. Large quantities of debris left on the forest floor, remnants of past logging activities served to further fuel the fires.

In the fire-affected areas, large meadows of low-lying shrubs, in particular the hardy *lallang* (*Imperata cylindrica*) soon emerged in place of the forest trees due to the repeated burning. In all, around 6,500 ha in the southern part of Raja Musa Forest Reserve (RMFR) has been severely

degraded by fire linked to the canals. Around 3,500 ha of this area is now covered in *lallang*.

## Land grabs

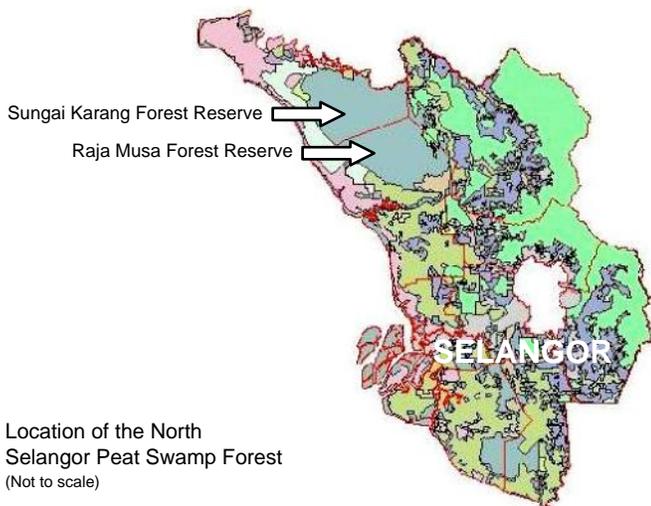
The forest edges were especially vulnerable to encroachment by illegal settlers hungry for land as well as unscrupulous conmen out to make a quick buck by selling off parcels of the degraded land through false pretense to unwitting buyers.

Between the late 1990s and mid 2000s, both local villagers and outsiders alike were setting up farms and even constructing dwellings on the previously burnt areas, or at new clearings that they had set fire to themselves.

Most severely affected was the southeast section of the RMFR, where around 1,000 ha of peatlands had been left utterly degraded by a combination of fire, settlements and illegal agriculture development.

## The turning point

For about half a decade, intensive logging had been carried out at NSPSF with little or no control. The area was then zoned as a State Land Forest, that did not come under the purview of the Selangor State Forestry Department, until 1990 when two forest reserves, i.e. the Raja Musa Forest Reserve (23,486 ha) and the Sungai Karang Forest Reserve (50,106 ha) were gazetted following the recommendation of the World Bank-funded North-West Selangor Integrated Agricultural Development Project. Completed in 1983, the project called for the protection of NSPSF, as it is a vital water source for the Tanjung Karang granary area.



Location of the North Selangor Peat Swamp Forest (Not to scale)

Coincidentally, the first conservation plan for the NSPSF was also produced in 1990. Based on what was probably the first proper biological and hydrological field studies done in NSPSF, the plan was developed by WWF-Malaysia in collaboration with Universiti Malaya, Forest Research Institute Malaysia (FRIM) and the Asian Wetland Bureau.

A more comprehensive Integrated Management Plan for NSPSF (2001-2010) was produced 10 years later following a four-year assessment. It was at around this time that the construction of new canals was finally stopped.

However, the real the turning point came in 2008. After a series of ad hoc actions undertaken since 1990, in 2008 the new Selangor State Government acknowledged the severity of damage that had been done to the NSPSF as well negative impact that this had on the State. The Selangor State Government declared a 25-year moratorium on logging, not just in NSPSF but for the entire State.

Now with the full support of the State, a massive exercise was undertaken to remove the illegal settlements and farms from the NSPSF - over 500 illegal settlers were evacuated from RMFR in December 2008. Access roads into the forest were barricaded to prevent further encroachment.



Following this, rehabilitation efforts began in earnest. The Selangor State Government through the Selangor State Forestry Department (Selangor SFD) collaborated with the Global Environment Centre (GEC) to carry out the Raja Musa Forest Reserve Rehabilitation Programme.

## Relentless greening

The aim of the Raja Musa Forest Reserve Rehabilitation Programme, which began in December 2008, is to rehabilitate over 1,000 ha of degraded forest in the south-eastern part of RMFR.

The rehabilitation programme, which is currently in its second phase, leverages on partnerships with the various stakeholders, in particular the local community, adjacent landowners and government agencies. The corporate sector, volunteer organisations and general public are roped in to provide financial and volunteer support.

The programme includes a range of linked actions, the most important being "rewetting" or restoring of the level of the water table by stemming the flow of water in the canals. Other important activities include forest fire monitoring, prevention and response.

The first phase of the programme spanned over two years, up to November 2010. The second phase of the programme was initiated the following month, when the Selangor SFD and GEC signed a Memorandum of Understanding to continue supporting community-based forest conservation and rehabilitation in Selangor, with focus on RMFR.

The programme has yielded perhaps the most intense and concerted replanting effort that the country has ever seen - in a span of five years, over 9,000 volunteers planted more than 250,000 saplings in the rehabilitation site.



(continued from page 5)

## Beyond the future

The efforts to rehabilitate NSPSF are already showing results - incidences of wild fires have been greatly reduced, no new cases of encroachment have been detected, and natural regeneration is now taking place in areas where the water table has been restored.

Perhaps most significantly, there is now much greater resources

available and higher level of stakeholder involvement. The Selangor SFD has mobilised its Fire Patrol Team to detect and respond to illegal encroachment and fires. The local community has been organised and motivated to join in the fight to save the peatlands.

This important peatland ecosystem is now the focus of intensive

rehabilitation and conservation under the the Malaysia Component of the APFP. With the momentum gained from the tremendous efforts undertaken by all parties under the APFP, the future holds great promise for the NSPSF.

## World Wetlands Day 2013

World Wetlands Day was celebrated at the Raja Musa Forest Reserve on the 23<sup>rd</sup> of February 2013. Held here for the second year in a row, the event was hosted by the Selangor State Government, via the Selangor State Forestry Department (Selangor SFD) and Kuala Selangor District Council (MDKS) in collaboration with the Global Environment Centre (GEC). The highlight of the event was the launch of the peatland fire prevention and control campaign themed "No Peat Fire, No Haze" by Selangor Executive Councillor for Tourism, Consumer Affairs and Environment YB Elizabeth Wong Keat Ping.



As a token of appreciation for their efforts, the Director-General of Forestry Peninsular Malaysia, YBhg. Dato' Prof. Dr. Hj. Abd. Rahman bin Hj. Abd. Rahim presented the agencies and organisations involved in firefighting operations at NSPSF with certificates of excellence.

A firefighting demonstration was held to showcase latest firefighting equipment and techniques. There was also an exhibition on the conservation of NSPSF, which included booths by the Selangor SFD, GEC, Sahabat Hutan Gambut Selangor Utara (SHGSU), MDKS, Fire and Rescue Department and the Department of Wildlife and National Parks (DWNP). Three hundred volunteers from various sectors including the SHGSU and Peatland Forest Rangers, government agencies, local land owners and plantations, corporate sponsors and the general public helped to plant 500 saplings on a 2 ha plot as well as constructed two (2) check dams.

## Outer boundary demarcation in progress

A common issue faced in relation to illegal encroachment is that the boundaries of forest reserves (and other types of reserves) are not clearly demarcated on the ground. This can be a source of contention, where adjacent land owners encroach into the reserves, either knowing or unknowingly.

Clearly demarcated borders are therefore crucial to prevent this from happening. However, boundary surveys and marking exercises are costly to do.

In order to prevent this ambiguity at NSPSF, the Selangor State Forestry Department appointed a contractor to carry out boundary demarcating exercise, which included installation of signboards, along a 50 km stretch of the NSPSF border. Half of this, i.e. 25 km was completed in 2013, with the remaining portion expected to be completed in 2014.

A similar exercise has been carried out for the Kuala Langat Selatan Forest Reserve, involving a 19.3 km stretch along its boundaries.

## Virtual Peatland Education Centre launched

An outdoor "Virtual Peatland Education Centre" was established at the rehabilitation site in Raja Musa Forest Reserve (RMFR) under the SEApeat programme. The centre was launched in conjunction with the World Wetlands Day celebrations in February 2011. Consisting of a simple roof structure fitted with toilets and interpretation material, the centre serves as a focal point to facilitate on-site learning as well as volunteer activities. APFP funds were subsequently used to enhance the facilities of the centre.



## Royal support for peatland conservation



The Raja Muda of Selangor, Duli Yang Teramat Mulia Tengku Amir Shah ibni Sultan Sharafuddin Idris Shah graced a tree planting event at Raja Musa Forest Reserve in August 2013.

In his speech, His Royal Highness underlined the importance of inculcating environmental awareness among the youth, and the great responsibility borne by educators to instill this awareness at the primary, secondary and tertiary education levels.

His Royal Highness urged all parties, including the local community, NGOs and private sector to lend a hand to the government in conserving and protecting the peat swamp forest. To commemorate the occasion, His Royal Highness planted a Mersawa paya (*Anisoptera marginata*).

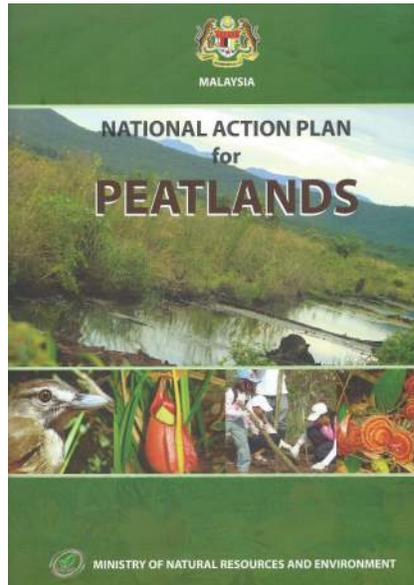
A total of 600 saplings of the pioneer peatland species Tenggek burung (*Euodia ridleyi*) were planted at the event by 200 volunteers from a number of organisations, including Sahabat Hutan Gambut Selangor Utara and Peatland Forest Rangers.



## National Wetlands Policy to be revised

The National Wetlands Policy was adopted in 2004. A workshop to review the policy was held in September 2011 in Kuala Selangor. A full revision of the policy will be conducted in tandem with the upcoming study to revise the National Policy on Biological Diversity.

Other policies relevant to peatlands include the National Physical Plan 2005, National Agricultural Policy 2003, National Policy on the Environment 2002, National Policy on Biological Diversity 1998 and the National Forestry Policy 1978 (Revised 1993).



## National Action Plan for Peatlands adopted

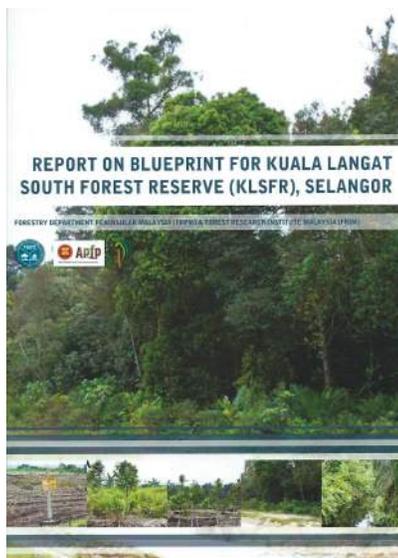
The National Action Plan for Peatlands was adopted by Malaysian Cabinet in May 2011. A total of 1,500 copies and 100 CDs of the plan was published, including both English and Bahasa Malaysia versions and distributed to the relevant government agencies for implementation.

The plan's implementation will be monitored by the Ministry of Natural Resources and Environment (NRE) and reported to the National Peatland Working Committee on a half-yearly basis.

## Selangor Action Plan for Peatlands and Blueprint for Kuala Langat South Forest Reserve

A Selangor Action Plan for Peatlands is now being formulated by the Forest Research Institute Malaysia (FRIM), using the National Action Plan for Peatlands as a template. A series of stakeholder consultation workshops have been held to obtain inputs from the relevant stakeholders. This document will be the first State-level action plan for peatlands to be published in Malaysia.

In addition, FRIM has also formulated a blueprint for the Kuala Langat South Forest Reserve. The blueprint outlines the various actions to be undertaken towards rehabilitating and protecting the Kuala Langat peat swamp forest.



## Manuals for agriculture on peatlands



Peat is not a suitable soil type for most agriculture crops. Common problems associated with agriculture on peatlands include soil subsidence and acidic soil conditions. Poor agriculture practices on peat soil can be detrimental to the environment, foremost being practices that result in peat fires and release of carbon into the atmosphere.

However, good agriculture practices can be applied to agriculture areas already situated on peat soil. In this, two publications have been

produced to provide guidance for incorporating such good practices in palm oil plantations. Best Management Practices (BMP) guidelines for oil palm on peatlands were published by the Malaysian Palm Oil Board (MPOB) in 2011 and the Roundtable of Sustainable Palm Oil (RSPO) in 2012.

In addition, the Department of Agriculture (DOA) under the APFP Smart Partnership programme initiated the preparation of guidelines for agriculture on peat soils.

# Integrated Management Plan for NSPSF (2014-2023)

The study to review the Integrated Management Plan (IMP) for NSPSF began in end 2013.

While the original IMP for NSPSF (2001-2010) was produced in 2001 following a four-year study, the revised IMP will be produced in a much shorter time-frame, i.e. within eight (8) months. This is possible because sufficient information on NSPSF is already available from recent surveys, such as the NSPSF Scientific Biodiversity Expedition 2013.

As the NSPSF is now essentially a conservation area (in that logging operations and illegal agriculture activities have ceased), the revised IMP is expected to focus on three

main areas, i.e. the rehabilitation, prevention of forest fires and management of buffer zones.

As far as the buffer zones are concerned, a key challenge is to effectively engage the private land owners in adjacent areas. In this, initial discussions have already been conducted with a number of corporate neighbours, including the Selangor Agriculture Development Corporation, Kumpulan Darul Ehsan Berhad and Sime Darby Plantations.

Finally, the revised IMP is expected to further cement the role of the local community in the protection and management of the NSPSF.



# Replanting

Over 250,000 trees were planted in a 150 ha site over the project period; an exercise that involved thousands of individuals including students, local communities, government servants and corporate figures.

The strategy for tree planting was to use fast-growing species that were tolerant to open areas. After around three (3) years, these pioneer species would then provide sufficient shade to enable other more valuable peat swamp species to grow.

The Mahang (*Macaranga pruinosa*) is the most common species used for replanting, as it is a pioneer species that colonises open areas in peatlands. Other pioneer species that are commonly planted to provide shade cover include Tenggek burung (*Euodia ridleyi*) and Kelat paya (*Syzgium campanulatum*).

Tree planting proved to be a useful activity to help build awareness and galvanise public support for peatland conservation.

This high participation is to be particularly commended as it has indirectly resulted in far greater knowledge about the project and raised awareness on the importance of the peatlands and the need to protect them.

## Manual on peatland rehabilitation

A manual on peat swamp rehabilitation for Malaysia was published by the Forest Research Institute Malaysia (FRIM) and APFP in early 2014.

The manual is based on the latest findings from research and development into various technical aspects of peatland rehabilitation in Malaysia, in particular restoration of peat swamp ecology and forest cover.





## Corporate partners

One of the most visible successes of the rehabilitation of the pilot site was the mobilisation of strong public and corporate support.

A number of corporate companies extended their support to rehabilitation efforts following initiatives by the Global Environment Centre (GEC) to develop Corporate Social Responsibility (CSR) partnerships under the SEAPEAT project and subsequently the APFP.

The employees of the various CSR partners lent a helping hand by planting trees, building check dams, maintaining saplings, as well as visiting Sahabat Hutan Gambut Selangor Utara (SHGSU) activities.

Similarly, rehabilitation and fire prevention efforts in the pilot site have received substantial financial support from the Selangor State Government as well as the private sector, in particular Bridgestone (M) Sdn. Bhd. and HSCB Bank Malaysia Berhad.

CSR partners for the project include:

Bridgestone Tyres (M) Sdn. Bhd.  
 HSBC Bank Malaysia Berhad  
 FedEx Malaysia / United Worldwide  
 Timberland Lifestyle Brand Malaysia Sdn. Bhd.  
 Denso (M) Sdn. Bhd.  
 Petco Group  
 Somy EMCS (Malaysia) Sdn. Bhd.  
 MGPA (M) Sdn. Bhd.  
 SKALI Sdn. Bhd.

# Partners in the buffer zone



A key ingredient for the success of any ecosystem management and rehabilitation is the co-operation of all stakeholders, including the various land owners and land managers.

An example of this in the pilot site is the excellent progress that has been made as a result of the close partnership that has been developed with the Selangor Agriculture Development Corporation (SADC), a State Government-Linked Company that manages the State-owned land bank adjacent to Raja Musa Forest Reserve.

In previous years, poor water management, in particular the practice of constructing canals and a lack of fire

prevention protocols in the SADC portion of the NSPSF had led to drainage of peat soils and fire outbreaks.

Following an outbreak in 2012, SADC took concrete steps to reduce the risk of fire within its area. As shown in the picture above, a clay bund was constructed between the developed and undeveloped land, to raise the height of the water table in the fire prone degraded area. This structure was the first ever clay bund constructed in the region.

In addition, SADC established its own fire response team, together with SOPs

and protocols. SADC also provided assistance to the Selangor State Forestry Department for the rehabilitation of the adjacent forest areas that were damaged as a result of the 2012 fire.

More importantly, SADC is now devising long-term development strategies that will avoid drainage of peatlands and reduce fire risk.

Note:

*Other key partners in the NSPSF buffer zone are Kumpulan Darul Ehsan Berhad (KDEB) and Sime Darby Plantations.*



## Check dam design guideline

The Department of Irrigation and Drainage (DID) has published a guideline on the design of check dams to raise the water levels in order to prevent peat fires.

Funded by the APFP, the guideline was developed following a review of DID's existing technical guideline on the subject as well as from the agency's vast experience in the subject, having constructed numerous check dams in peatlands throughout Malaysia.



## Plugging the leaks in NSPSF

It is estimated that over 500 km of canals have been excavated in NSPSF. First constructed for logging and then later on for agriculture purposes, these canals have disrupted the peatland ecosystem by lowering the water table and consequently drying out the peat soil, thus making the peat more prone to fire.

The blocking of these canals to reduce the outflow of water and hence maintain the water table is thus an important component in the effort to rehabilitate the NSPSF as well as to reduce the risk of forest fires.

Canal blocking efforts here through the construction of check dams began in 2005, thanks to the

collaborative efforts of the Selangor State Forestry Department (Selangor SFD) and Global Environment Centre (GEC). In the initial years, many different of materials and designs were experimented with to construct the check dams.

In recent years however, a standard design has been adopted for blocking the major canals. Utilising timber poles and gunny sacks filled with peat soil, these structures were adopted as they were relatively effective, low-cost and could be easily built by volunteers without heavy machinery.

To date, over 850 check dams have been constructed in NSPSF with the help local community

group Sahabat Hutan Gambut Selangor Utara (SHGSU), CSR partners and volunteer groups. However, with a lifespan of around two years, these type of check dams are essentially just a short-term measure.

With more funds now available from the APFP and corporate partners, a number of more durable structures have been installed. These include two (2) concrete check dams built in 2012 with technical assistance from the Department of Irrigation and Drainage (DID), two (2) check dams funded by the Department of Environment (DOE) in 2013 and a clay bund by the Selangor Agricultural Development Corporation (SADC) in 2013.

# Friends of peatlands

The community-based organisation Sahabat Hutan Gambut Selangor Utara (SHGSU) or Friends of the North Selangor Peat Swamp Forest was launched on the 18<sup>th</sup> of February 2012 at the State-level World Wetlands Day celebrations in Selangor.

Formally registered under the Registrar of Societies, SHGSU membership is open to Malaysian citizens aged 18 years and above who live close by to the NSPSF. The society has over 100 members now from four villages, i.e. Kampung Ampangan, Kampung Bestari Jaya, Kampung Raja Musa and Kampung Sri Tiram Jaya.

SHGSU is a vital cog in the ongoing effort to conserve of the North Selangor Peat Swamp Forest (NSPSF), as it provides a platform for collaboration between the local community and the government as well as other stakeholders including the private sector and NGOs.

Since its inception, SHGSU has worked closely with the Forestry Department Peninsular Malaysia (FDPM), Selangor State Forestry Department (Selangor SFD), the Global Environment Centre (GEC), Kuala Selangor Land and District Office and Kuala Selangor District

Council (MDKS) to mobilise the local community and other partners in various activities geared towards rehabilitating and conserving the NSPSF.

Among the core activities undertaken by SHGSU are monitoring and fighting peat fires, planting trees, managing tree nurseries, conducting awareness programmes, as well as developing sustainable small business to support the local community.

SHGSU also conducts regular motorcycle patrols to prevent illegal incursions into Raja Musa Forest Reserve (RMFR). The organisation is not an enforcement body, but merely serves as the eyes and ears for the authorities and advises the public about the regulations, especially against land encroachment, hunting, fishing and open burning.

SHGSU members have started to take on more proactive roles in firefighting. Some of them battled fatigue during the Muslim fasting month in 2012 and 2013 to fight and suppress peat fire incidences.

For updates on SHGSU's activities, visit their Facebook page: [sahabathutangambut \(SHG\)](#)





## Local community fights fire

A peatland fire prevention and control campaign was launched in conjunction with the World Wetlands Day 2013 celebrations held at Raja Musa Forest Reserve (RMFR) on the 23<sup>rd</sup> of February 2013. The campaign was launched by Selangor Executive Councillor for Tourism, Consumer Affairs and Environment, YB Elizabeth Wong Keat Ping.

With the tagline "No Peat Fire, No Haze", the campaign aims to promote community-based peatland forest fire prevention and management at RMFR.

One of the main community-based activities undertaken under this campaign is patrolling by local community group Sahabat Hutan Gambut Selangor Utara (SHGSU).

Since March 2013, SHGSU members have carried out weekly patrols along

the boundaries of RMFR to monitor for any occurrence of peatland fires. The patrol team consists of four members who ride along the boundaries of the forest reserve on motorcycle, looking out for signs of fires within the reserve as well as in the adjacent buffer zones.

In addition, the patrol teams record the height of the water table and update the Fire Danger Rating System (FDRS) signboards that have been placed along the boundaries of RMFR during each patrol.

The community patrolling programme has already proved to be effective. Between April and June 2013, five small peatland fires were detected by the SHGSU patrols, together with Selangor State Forestry Department (Selangor SFD) and GEC staff. All of these fires were caused by land clearing for

agriculture in the adjacent buffer zone.

Because they were detected early, the fires were successfully suppressed with minimal damage, through the efforts of the Selangor SFD, Fire and Rescue Department, SHGSU and GEC.

SHGSU's forest fire patrols will be carried out on a weekly basis, from March to October each year.

Aside from SHGSU, other key partners involved in the campaign include the Selangor SFD, Kuala Selangor District Council (MDKS), Global Environment Centre (GEC), Kuala Selangor Land and District Office, Fire and Rescue Department, Malaysian Civil Defence Department, Department of Environment, Selangor Agricultural Development Corporation (SADC) and Kumpulan Darul Ehsan Bhd.

# Nurturing green entrepreneurs



Apart from firefighting and other voluntary activities, alternative livelihood development is another key area in the ongoing community engagement efforts undertaken by the Forestry Department Peninsular Malaysia, in cooperation with Selangor State Forestry Department (Selangor SFD) and Global Environment Centre (GEC) with the local communities via Sahabat Hutan Gambut Selangor Utara (SHGSU).

## Seedling buyback programme

This initiative is focused on the seedling buyback programme, where SHGSU members set up nurseries funded by APFP to supply seedlings for rehabilitation activities.



Small grants and training are given to participants to enable them collect wild seedlings as well as set up and manage their own nurseries. Saplings are then purchased from these nurseries for tree planting activities. To date, 16 community nurseries have been established.

## Other business initiatives



The local community, the women in particular, are encouraged to venture into handicrafts. A number of activities, including visits to the National Academy for Handicrafts in Rawang as well as the National Handicraft Centre in Kuala Lumpur, have been organised to arouse interest in this cottage industry.

## Ecotourism



Ecotourism initiatives at the North Selangor Peat Swamp Forest (NSPSF) is still in the early stages, with just a single ecotourism outfit, i.e. the Sg. Sireh Homestay now operating in the area. Situated on the downstream section of Sg. Tenggi, the blackwater river that flows through NSPSF, the homestay outfit organises a number of activities on the blackwater river, including kayaking and fishing as well as jungle trekking.

Kayak paddles and life jackets were supplied to the Sg. Sireh Homestay under the APFP. Further development of ecotourism in the NSPSF is being encouraged under the APFP.

# Peatland Forest Rangers

The Peatland Forest Ranger Programme was established by the Global Environment Centre (GEC) in 2011 with support from HSBC and European Union. The aim is to educate and engage school children in the conservation efforts of peatlands, in particular the North Selangor Peat Swamp Forest (NSPSF).

The programme is targeted mainly at secondary schools located close to the NSPSF. Forty secondary school students from four (4) schools around Batang Berjuntai were recruited as the first batch of Peatland Forest Rangers.

At present, a total of 210 students from five (5) schools in the vicinity of NSPSF have signed up as Peatland Forest Rangers, i.e. from SMK Raja Muda Musa, SMK Rantau Panjang, SMK Sultan Sulaiman Shah, SMK Vokasional

Bestari Jaya and SK Rantau Panjang. This will be increased to 468 students from six (6) schools by mid-2014.

The Peatland Forest Ranger programmes in each of the schools are formally registered under the Ministry of Education and Kuala Selangor Education District office through the GEC.

Although still a relatively new programme, numerous activities are organised for the Peatland Forest Rangers, particularly by Sahabat Hutan Gambut Selangor Utara (SHGSU) in collaboration with the Selangor State Forestry Department (Selangor SFD), GEC as well as the authorities of the respective schools.

*Note:*

*The APFP will be supporting the Peatland Forest Ranger Programme in the next phase of funding.*



# Lifelong learning

The APFP has placed a high priority on providing sufficient opportunities for the various stakeholders to expand their knowledge and skills by participating in various study tours and training workshops.

Within Malaysia, study tours have been organised by Forestry Department Peninsular Malaysia (FDPM) and its partners to various peatland sites within Malaysia as well as sites in other ASEAN countries such as Viet Nam, Indonesia, Philippines and Thailand.



Study tours conducted under the APFP:

1. Visit to RMFR (2011: 15 persons)
2. BMP Palangkaraya, Kalimantan Tengah (Nov 2011: 3 persons)
3. Peer learning programme on BMP to Thailand (Apr 2012: 6 persons)
4. Technical visit to SEPPSF, Pahang (Jul 2012: 20 persons)
5. Study tour to Klias Peatland Centre of Excellence, Sabah (Sept 2012: 20 persons)
6. Study tour on "Best Management Practice" to UMTNP, Viet Nam (3-6 Dec 2012: 8 persons)
7. Study tour to Riau, Sumatera (27-30 Mac 2013: 13 persons)
8. Peer learning programme to Banjarmasin, Kalimantan, Indonesia (17-20 Jun 2013: 4 persons)
9. Study tour to Loagan Bunut NP, Sarawak (27 Jun 2013: 25 persons)
10. Technical visit to Maludam NP (21-22 October 2013: 22 persons)

(Total persons involved: 136)





Trainings workshops conducted under the APFP Malaysia Component:

1. TOT on peat assessment & management (3-6 Oct 2011)
2. FDRS Interpretation (12-13 Oct 2011)
3. FDRS and Forest Fires Workshop (19-21 Sept 2012)
4. Awareness workshop with local community at Homestay Sg. Sireh organised by Selangor SFD and SHGSU (1-3 Oct 2013)
5. Regional FDRS workshop (28 Oct – 1 Nov 2013)
6. Demonstration of degraded peatland rehabilitation techniques (5-7 Feb 2014)

A total of 305 participants from 40 government agencies, public sector, research institutions and NGOs from 10 ASEAN Countries were involved in the training activities.

Various training programmes have been organised to enhance the skills of the various stakeholders, including government agencies, private sector, research institutions, non-government organisations (NGOs) and community based organisation (CBO), namely Sahabat Hutan Gambut Selangor Utara (SHGSU).

# The NSPSF Scientific Biodiversity Expedition 2013



## Expedition trails/sites:

- 1 Forest rehabilitation area
- 2 Forest fire area
- 3 Sg. Tengi trail
- 4 Western trail
- 5 Good condition forest
- 6 Restoran Rimba trail
- Canal
- Compartment

The NSPSF Scientific Biodiversity Expedition 2013 brought together Malaysia's scientists and naturalists to document the biological diversity of the North Selangor Peat Swamp Forest (NSPSF).

A total of 100 researchers from 18 organisations, including universities, government agencies and NGOs took part in the expedition. The expedition was divided into two phases, with each phase spanning two weeks. Phase 1 was held from 15<sup>th</sup> to 25<sup>th</sup> May 2013 while Phase 2 was held from 24<sup>th</sup> June to 6<sup>th</sup> July 2013.

Six trails were prepared beforehand by the Selangor State Forestry Department (Selangor SFD) to provide the researchers access to the various parts of the peat swamp complex.

The Kuala Selangor Nature Park (KSNP) was used as the main base camp for most of the expedition period.

### Note:

*The Selangor Scientific Biodiversity Expedition 2013 was jointly organised by the Forestry Department Peninsular Malaysia, the Selangor State Forestry Department, Malaysian Nature Society under the Asean Peatland Forest Project (APFP).*

*The findings from the expedition will form the scientific basis that will guide the formulation of the second Integrated Management Plan for NSPSF as well as the Selangor State Action Plan for Peatlands.*

Organisation	Research topics
UPM	1. Fish diversity in NSPSF 2. The Southern Pied Hornbill of Sg. Panjang, Sabak Bernam 3. Orchid diversity in NSPSF 4. Diversity of macrofungi in NSPSF 5. An inventory of useful plants in NSPSF
USM	1. Population study of freshwater halfbeak in NSPSF
UKM	1. A camera trap study of mammals in NSPSF 2. The Odoata of NSPSF
UM	1. Mosses of Raja Muda Forest Reserve 2. Arachnofauna and Odonata assemblages of NSPSF 3. Flora of NSPSF
UMT	1. Fish diversity around NSPSF
UNISEL	1. Phylogenetic relationships among Brigidae in NSPS 2. Diversity and distribution of blackwater fishes in NSPSF 3. A preliminary assessment of avian diversity at Raja Musa
University of Nottingham (Malaysia campus)	1. Seasonal variation in Dissolved Organic Carbon (DOC) concentrations within NSPSF
Monash University (Malaysia campus)	1. A study of peat depth at NSPSF 2. Microbial activity in peat of NSPSF
FDPM	1. Spiders of NSPSF 2. Ecotourism potential of NSPSF
Terengganu SFD	1. Higher plants and medicinal plants of NSPSF
Department of Fisheries	1. Fish fauna assemblages and distribution patterns in NSPSF
FRIM	1. A brief flora survey of NSPSF
SIRIM	1. Fungi associated iwth NSPSF
GEC	1. The socio-economic importance of peat swamp forest to the local communities around Raja Musa Forest Reserve 2. Floristic composition / above ground biomass of NSPSF and its correlation to peat depth
Putrajaya Botanic Gardens, Putrajaya Corporation	1. Flowering plants of NSPSF
MNS	1. Developing a preliminary checklist of birds of NSPSF 2. Fireflies in NSPSF

## Significant findings



The expedition yielded some notable discoveries. Two (2) new records for Selangor, i.e. the *Bulbophyllum curtisii* (**Photo 1**) and *Pomatocalpa spicata* were discovered by orchid specialist Assoc. Prof. Dr. Rusea Go and her team from Universiti Putra Malaysia (UPM).

Dr. Choong Chee Yen of Universiti Kebangsaan Malaysia (UKM) found NSPSF to be rich in Odonata (dragonflies and damselflies). 47 species were discovered, with a good number of these, such as the *Podolestes*

*buwaldai* (**Photo 2**) being peatswamp specialists.

A camera trapping study by a team from UKM and the Copenhagen Zoo found wild boar to be the most common species captured, followed by mouse deer. While densities of tapirs (**Photo 3**), sunbears and leopards were found to be low, the presence of juveniles was a promising indication that the respective populations are breeding. However, there was no sign of endangered wetland specialists, the flat headed cat and false gharial.

Most of the fish genera found in a survey by Dr. Noor Amal and his team from UPM were commercially valuable ornamental fishes, such as Puntius, Rasbora and Trichogaster. Several IUCN listed endangered species were identified, including the Selangor Red Betta (*Betta livida*) (**Photo 4**) and *Parosphromenus harveyi*.

Dr. Yong Kien Thai of Universiti Malaya (UM) found a new country record of mosses for Malaysia. The *Calymperes cougiense* (**Photo 5**) was formerly only known to islands eastwards from Papua New Guinea.

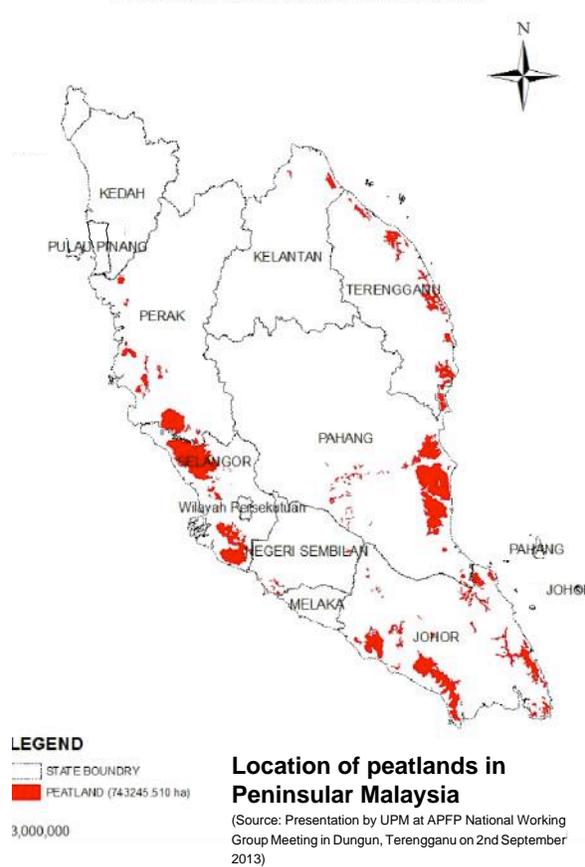
## Seminar on the expedition

A one day seminar was held on the 28<sup>th</sup> of November 2013 in Shah Alam, Selangor to discuss the findings of the NSPSF Scientific Biodiversity Expedition 2013. A total of 20 papers and six (6) posters were presented. 120 participants from various government agencies, NGOs, CBOs, universities and private companies attended the seminar.

The seminar was officiated by the Director-General of Forestry Peninsular Malaysia YBhg. Dato' Dr. Prof. Dr. Hj. Abd. Rahman bin Hj. Abd. Rahim, while the sessions were moderated by the Director of the Forest Management Division of FDP, Mr Koh Hock Lye and the MNS President, Prof. Dr. Maketab Mohamed respectively.



# Profiling Malaysia's peatlands

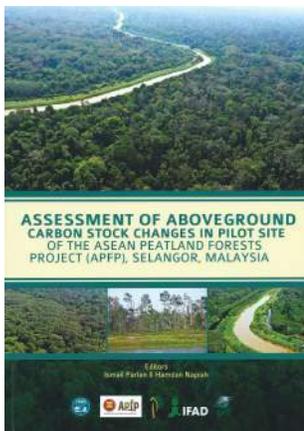


Where are all our peatlands? How much of our peatlands are under forest, agriculture or other non-forest land use? The existing Malaysian Wetlands Directory that was produced in 1987 includes a profile of peatland sites, but this publication focused on all types of wetlands.

In order to answer these questions, Universiti Putra Malaysia's (UPM) Faculty of Forestry collaborated with the Forestry Department Peninsular Malaysia (FDPM) and the Department of Agriculture (DOA) under the APFP Smart Partnership programme to identify and profile each of Malaysia's peatland sites. The main objective of this project is to fill the existing data gaps for each known peatland site in order to establish a complete picture of peatlands in the country.

As a result of the project, each peatland site now has its own profile. The profiles include key data and figures as well as digitised landuse maps.

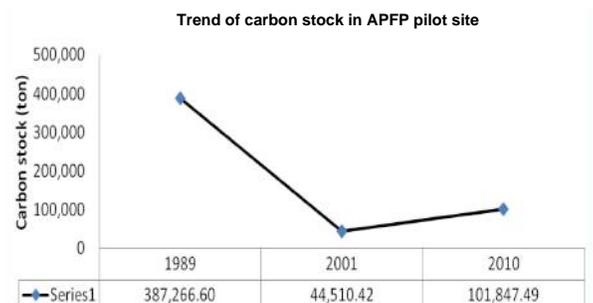
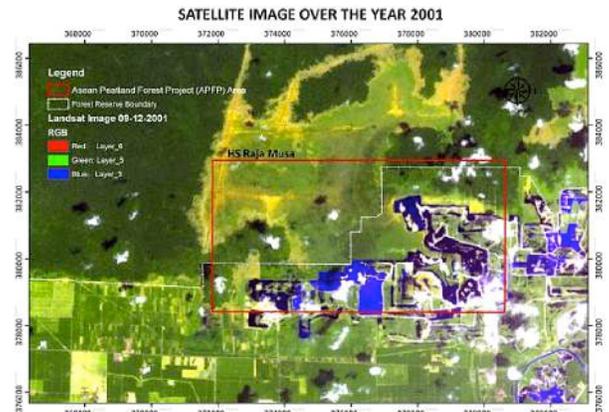
## Assessment of aboveground carbon stock changes in pilot site



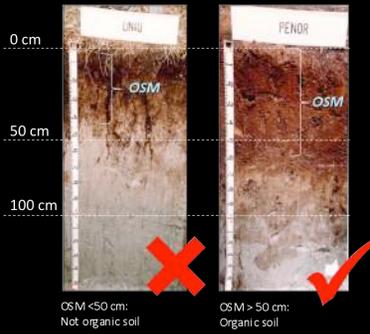
An assessment of changes in above-ground carbon stock in the pilot site at North Selangor Peat Swamp Forest (NSPSF) was conducted by the Forest Research Institute Malaysia (FRIM).

The assessment was done by analysing satellite images taken over three (3) decades, i.e. in 1989, 2001 and 2010. The study found that around 342,756 tonnes of above-ground carbon was lost from the pilot site between 1989 and 2001, due to a series of forest fires that occurred within this period. However, the above-ground carbon increased by 57,337 tonnes in the next decade (between 2001 and 2010), a clear sign that there was significant forest regeneration during this period.

The findings of the assessment was presented at the Workshop on Enhancing Sustainability of Forest Practices held in Bogor, Indonesia in June 2012.



# Classifying organic soil



1.

Soils are divided into two major groups, i.e. organic soil and mineral soil.

2.

“Organic soils” are those that contain organic soil matter (OSM) in more than half of the upper 100cm of the soil profile.

4.

Organic soil can be further classified according to depth, i.e. Shallow (50-100cm); Moderately deep (100-300cm) and Deep (>300cm).

3.

Organic soil is further categorized as “peat” or “muck” depending on the amount of organic material present. Soils with more than 65% organic material are classified as “peat” while soils with between 35-65% organic material is classified as “muck”

5.

Three types of OSM are recognized based on the fibre (plant tissue) content of the soil, i.e. “fibric”, “hemic” and “sapric”.

Source: Organic or Peat Soil (Definitions, Soil Classification and Extent). Presentation by DOA at APFP National Working Group meeting in Dungun, Terengganu on 2<sup>nd</sup> October 2013

# Peat soil correlation tour

Soil type and conditions are critical factors in agriculture development, especially in peatland areas. The Department of Agriculture (DOA) is the main agency providing technical guidance on soil classification, evaluation and management in Malaysia.

Under the APFP Smart Partnership programme, the DOA organised a number of Soil Correlation Tours to various sites such as Banting, Selangor; Cameron Highlands, Pahang (highland peat); Dungun, Terengganu and Muar, Johor.

The tours focused on the classification, evaluation and management of peat soils for agriculture.

Participants who attended the tours were mainly from government agencies including the Ministry of Natural Resources and Environment (NRE), Department of Irrigation and Drainage (DID), Minerals and Geoscience Department (JMG), District and Land Offices, as well as a number of non-government and private sector representatives.

**NOTE:**

DOA has also conducted a number of other activities under the APFP, including hosting a technical workshop to improve guidelines for the development of peat for food crops as well as setting up a one-acre demonstration plot for food crops.



# What is the FDRS?

The Regional Haze Action Plan initiated by the Environment Ministers of ASEAN in response to the 1997 haze disaster called for the implementation of a monitoring and early warning system for forest fires.

As a result, the Fire Danger Rating System (FDRS) for South East Asia was developed, with technical expertise provided by the Canadian Forest Service (CFS) in collaboration with the Canadian International Development Agency (CIDA).

The responsibility for operating the FDRS was handed over to the Malaysian Meteorological Department (MMD) in September 2003. MMD has been producing daily Fire Danger Ratings ever since, both for South East Asia as a whole, as well as for Malaysia in particular.

The FDRS supplies vital information to help authorities prevent or suppress fire occurrences before they spread out of control. The system does this by producing a set of maps

that indicate where fires are likely to start as well as how they may behave, such as their intensity and direction of spread.

The maps are produced based on meteorological and "fuel" factors that influence fire behaviour. The meteorological factors used (temperature, relative humidity, rainfall and wind speed) are measured at meteorological stations throughout South East Asia, while the "fuel" factors used (vegetation and soil) are based on land use and soil maps.

Five FDRS maps are updated daily on the MMD website:

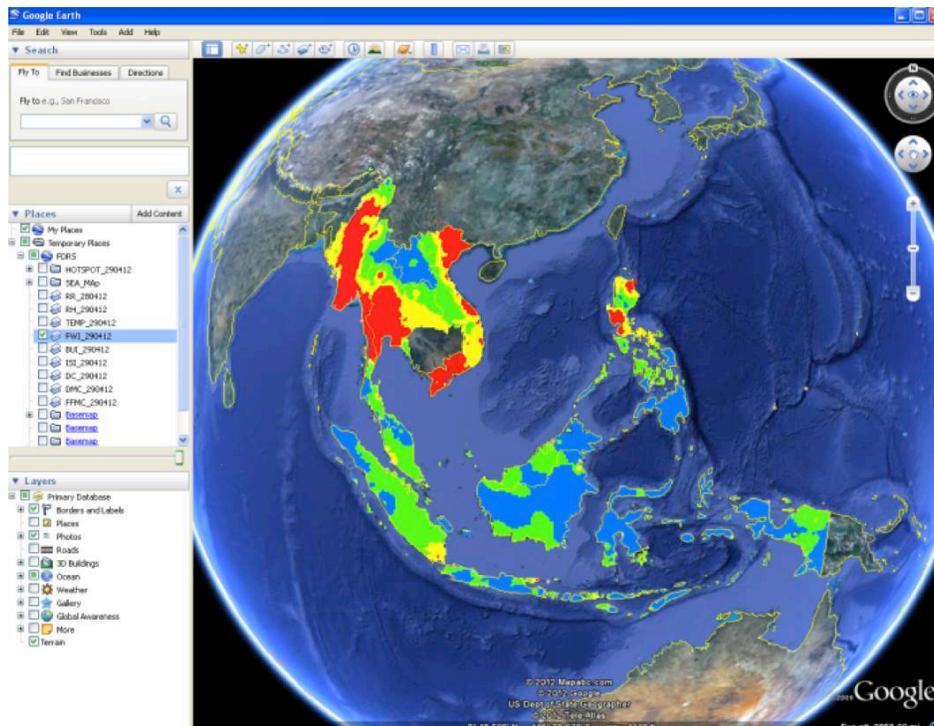
- **Fine Fuel Moisture Code (FFMC):** Indicates moisture content in "fine fuels" such as grass and bushes. Shows the potential for forest to start. Useful for monitoring grassland and scrub.
- **Duff Moisture Code (DMC):** Indicates moisture content of organic layer and medium sized

woody material. Useful for monitoring degraded peatlands.

- **Drought Code (DC):** Indicates moisture content of peat or compacted organic material. Useful for monitoring forest peat.
- **Initial Spread Index (ISI):** Indicates the rate of fire spread and difficulty of control in grasslands.
- **Build Up Index (BUI):** Indicates the amount of fuels available for combustion (a combination of DMC and DC).
- **Fire Weather Index (FWI):** Indicates fire intensity and fire hazards (a combination of all of the above maps).

The FDRS maps are also produced in formats that can be viewed in Google Earth to make it easier for monitoring teams to correspond the locations on the maps with actual sites on the ground.

For further information, visit [www.met.gov.my](http://www.met.gov.my)



## Fine-tuning the FDRS

At the 11<sup>th</sup> Meeting of the Sub-Regional Ministerial Steering Committee on Transboundary Haze Pollution in February 2011, Malaysia was requested to expand its efforts to fine-tune the FDRS through initiating a pilot project.

The MMD, together with the Department of Environment (DOE), Department of Irrigation and Drainage (DID), Forestry Department Peninsular Malaysia (FDPM) and Global Environment Center (GEC) worked together to prepare an action plan for this pilot project, with specific focus on Selangor. The main aim was to enhance the accuracy of the FDRS outputs by identifying all of the peat soils in Selangor, as well as to expand the meteorological inputs for these areas.

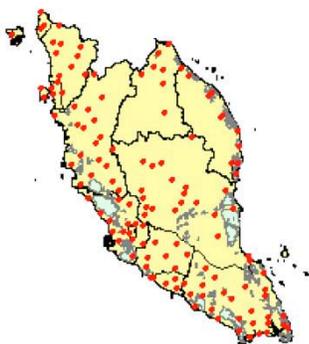
In order to increase the meteorological inputs, DID provided rainfall data from all of its nearby weather stations, while MMD and DOE contributed towards the purchase of additional Automated Weather Stations (AWS), increasing the total number of AWS from an initial 39 to 168.

One AWS was installed by MMD at the Sime Darby Tennamaram Estate, to facilitate real-time weather monitoring at the pilot site in NSPSF.

The fine-tuning of the FDRS for Selangor was completed, field-tested and verified in late 2011. This improved system, which has also been updated to incorporate Google Earth technology, has since been expanded to Malaysia and other ASEAN countries.

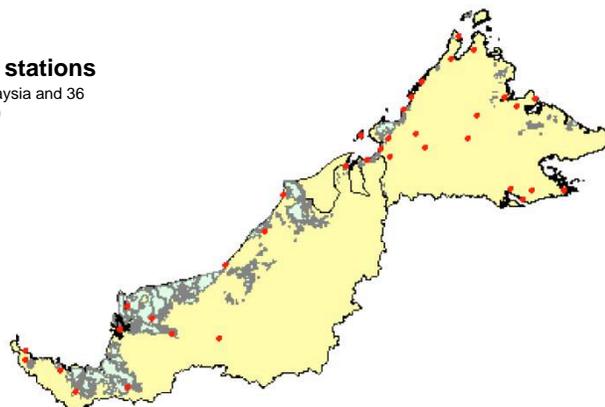
FDRS signage has been placed at strategic locations around the NSPSF to inform local communities of fire risk conditions. The signage are updated daily by the forestry staff and local community group Sahabat Hutan Gambut Selangor Utara (SHGSU) based on the FDRS prediction obtained from the MMD website.

The FDRS is set to be further enhanced in the near future, with the incorporation of updated open-sourced software from Canada. This will include increasing the short-term forecasting capabilities from the current three (3) days to seven (7) days.



### Automated weather stations

(132 stations in Peninsular Malaysia and 36 stations in Sabah and Sarawak)





# Fire hazard map for NSPSF

Universiti Putra Malaysia (UPM) and the Global Environment Centre (GEC) have recently developed a fire hazard model for NSPSF under the APFP Smart Partnership programme. The model is based on a weighted linear combination index, which incorporates seven (7) parameters, i.e. Road, Canal, Settlement, Forest Type, Landuse, Soil and Fire Hotspot (2008-2013).

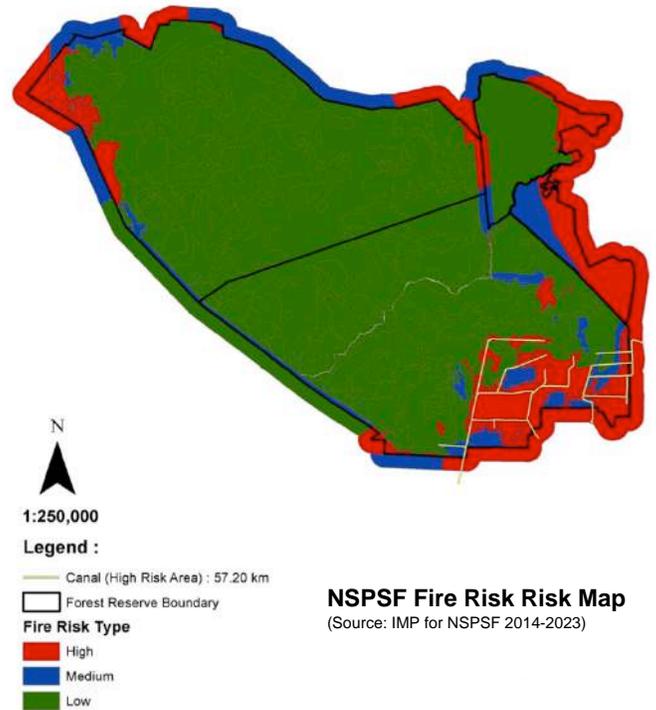
A set of "hazard indexes" are formulated for each parameter, based on the relative likelihood of fire occurring in relation to that parameter.

For example, areas nearer to roads are assigned a higher

score in the Road Distance Hazard Index, based on the assumption that fires are most likely in these areas.

The parameters are then weighted based on their relative importance, and the sum total of the seven (7) weighted parameters will give the fire hazard risk. All of these calculations are done using Geographic Information System (GIS).

The resulting fire hazard risk map produced by the model shows most of the NSPSF has moderate fire risk, while a significant portion of the area, especially along the western northwest to southeast edges have high risk of fires.



(1) Methods for extinguishing forest fires



(2) Equipment for suppressing forest fires

## Booklets on peatland firefighting

Two booklets relating to fighting peatland fires have been published by the Forestry Department Peninsular Malaysia (FDPM).

The first booklet is a pictorial guide on seven key methods to that may be used to fight peat forest fires. The second provides an introduction to the proper equipment and safety gear required for peatland firefighting.

# Demonstration sites

Three demonstration sites were adopted under the APFP to showcase good management practices for peatlands in the country. They are the South East Pahang Peat Swamp Forest (SEPPSF) in Pahang, Loagan Bunut National Park in Sarawak and Klias Peninsular in Sabah.

These three sites were previously the focus of the five year Peat Swamp Forest Project undertaken by the Government of Malaysia, together with the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF). The objective of the project, which began in 2002, was to promote the conservation and sustainable use of peat swamp forests in Malaysia.

## Loagan Bunut National Park

Centered around Sarawak's largest freshwater lake, the 100 km<sup>2</sup> Loagan Bunut National Park was gazetted as a protected area in January 1990. The lake itself is one of the most unusual aquatic systems in the country, as it is drained almost completely during dry spells, which occur between two and four times a year. This unique hydrological regime has created a remarkable food chain that supports a variety of aquatic and terrestrial animals as well as human communities.

The Berawan fishermen of Loagan Bunut use a unique method of catching fish as they enter and leave lake into the Bunut river. Known as the Selambau, this technique involves the use of huge scoop nets to catch the migrating fish. The nets are mounted on large rafts that can be rotated according to the direction of the current. Fish are scooped up as they leave the lake and kept alive in submerged bamboo cages until they can be transported to the market.



A number of activities were carried out here by the Sarawak Forest Corporation (SFC) under the APFP. These include a Selambau adoption programme, in which selected Selambaus were refurbished as environmentally friendly models for tourists and local communities to visit, a peatland management outreach programme targeted at local communities and managers of plantations in the surrounding areas, installation of new signboards on park rules, a roadshow in Miri to raise public awareness on Loagan Bunut and peatland conservation in general, as well as a study trip to Sungai Sireh homestay in Selangor to enable the local community to learn more about peat swamp ecotourism.

## South East Pahang Peat Swamp Forest

The South East Pahang Peat Swamp Forest (SEPPSF) is the largest intact peat swamp forest complex (160,000 ha) remaining on mainland Asia. Most of the SEPPSF is situated within four Permanent Reserved Forests (PRF), which are surrounded by a matrix of roads, plantations, farms and Orang Asli settlements. While the forest within the PRFs is still relatively intact, fragmentation and conversion outside the PRFs present a threat to the ecological integrity and hydrological functions of the peat swamp forest complex.

In order to address the various issues, the SEPPSF Integrated Management Plan was published in 2008, following a lengthy stakeholder consultation process. The plan sets out, among others, zoning plan, management actions, a management framework, and a monitoring strategy. The plan has been endorsed by the Pahang State Planning Committee and the State Executive Council (EXCO), as well as incorporated into the Pekan District Local Plan.

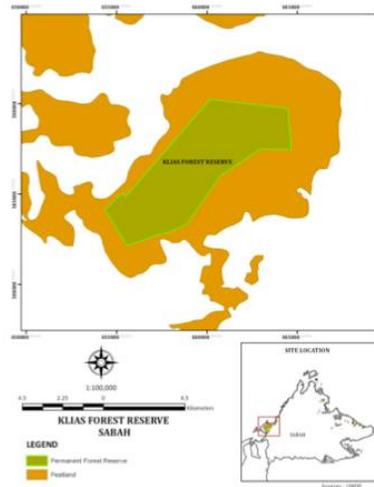
One of the short-term actions outlined in the plan is the preparation of guidelines on the prevention and management of forest fires in the SEPPSF. The Pahang State Forestry Department has now developed these guidelines with funds made available through the APFP. The guidelines include a compilation of relevant information such as fire risk maps, landuse plans, coordinates of settlements and details of all relevant stakeholders. Accompanying awareness materials, including posters, brochures and signboards have also been produced together with the guidelines.



(continued from previous page)

## Klias Peninsula

The Klias Peninsula, which is located on the coast of southwestern Sabah, contains four different natural habitats, i.e. coastal mangrove forest, nipa swamp, freshwater swamp forest and peat swamp forest, which are interspersed with cultivated areas, scrub and grassland. Most of the peat swamp forest here fall within Class I Protection Forests, i.e. the Klias Protection Forest Reserve and Binsuluk Protection Forest Reserve.



Over 20 villages surround the forest. The main economic activities in these areas are subsistence farming and cash crops. The mangroves downstream are important breeding and nursery grounds for fishes, shrimps, prawns and crabs.

Fire linked to land clearing for agriculture in adjacent areas is a significant threat to the peat swamp forest. Soil subsidence due to the network of canals that were previously constructed for agriculture and logging is an issue here.

A field centre, site office, rest house and jetty were built here in 2002 under the 8<sup>th</sup> Malaysia Plan to support the UNDP/GEF Peat Swamp Forest Project. An important recommendation that came out from the project was to develop the tourism potential of the peninsula, which offers a combination of rare biodiversity and wilderness values, recreational opportunities and cultural experiences.

## BMP for peatland management

The Forest Research Institute Malaysia (FRIM) conducted a study to document experiences and lessons learnt from peatlands management in Malaysia.

The study sought to identify examples of Best Management Practices from five sites, i.e. the Kuala Langat and North Selangor peat swamp forests in Selangor, the South East Pahang Peat Swamp Forest in Pahang, Loagan Bunut National Park in Sarawak and the Klias Peninsula in Sabah.

The five sites provided a diverse sample of innovative management actions by the respective management authorities to cater to the various land uses, administrative structures and threats at various peat swamp sites in the country.

The study, which included a literature review, site visits and stakeholder consultation, began in April 2013 and was completed in April 2014.

## Peatland sites to be considered for ASEAN Heritage Parks nomination

Since signing the ASEAN Heritage Parks declaration in 1984, ASEAN member states have declared certain national parks and reserves as ASEAN Heritage Parks based on their uniqueness, diversity and outstanding values, in order for their importance as conservation areas to be appreciated both in the regional and international context. ASEAN Heritage Parks have been defined as "Protected areas of high conservation importance, preserving in total a complete spectrum of representative ecosystems of the ASEAN region."

There are 33 ASEAN Heritage Parks spread across the ASEAN nations at present. Three (3) of these are found in Malaysia, i.e. Kinabalu Park, Gunung Mulu National Park and Taman Negara.

APFP Malaysia organised a meeting to discuss the potential for expanding the number of ASEAN Heritage Parks in Malaysia in Kuching, Sarawak on the 22<sup>nd</sup> of October 2013. The meeting was attended by technical agencies involved in peatland management in the country as well as the National Expert of APFP Viet Nam to share his experience in obtaining ASEAN Heritage Park status for U Minh Thuong National Park in 2013.

A significant outcome of the meeting was that the Forest Department Sarawak is now considering the option of nominating Loagan Bunut National Park and Maludam National Park.

Sites	Size (ha)	Legal Status	Local Communities	Threats
Kuala Langat (Selangor)	7,390	Permanent Reserved Forest	Villagers outside the Permanent Reserved Forest	<ul style="list-style-type: none"> <li>Forest fire</li> <li>Encroachment for agriculture</li> </ul>
North Selangor (Selangor)	76,000	Permanent Reserved Forest	Villagers outside the Permanent Reserved Forest	<ul style="list-style-type: none"> <li>Forest fire</li> <li>Encroachment for agriculture</li> </ul>
South East Pahang (Pahang)	230,256	Permanent Reserved Forest	Orang Asli communities outside the Permanent Reserved Forest (roaming areas within the PRF)	<ul style="list-style-type: none"> <li>Forest fire</li> <li>Poaching of wildlife</li> <li>Illegal logging?</li> <li>Encroachment for agriculture</li> </ul>
Loagan Bunut (Sarawak)	10,736	National Park	Berawan communities outside and within the National Park	<ul style="list-style-type: none"> <li>Land conflict (Native Customary Rights)</li> <li>Encroachment for land development</li> <li>Illegal felling</li> <li>Poaching of wildlife</li> </ul>
Klias Peninsular (Sabah)	3,630	Permanent Forest Estate (Class I Protection Forest)	Villagers outside the Permanent Forest Estate	<ul style="list-style-type: none"> <li>Forest fire</li> <li>Encroachment for agriculture</li> </ul>

## Raising awareness

As part of the community engagement process, the Forestry Department Peninsular Malaysia, Selangor State Forestry Department and GEC embarked on a campaign to raise awareness on peatlands. The main target groups were the local community as well as other key stakeholders.

The campaign included five (5) awareness activities and public talks on the conservation and sustainable use of peatlands.

- Kg. Bestari Jaya, Kuala Selangor (22<sup>nd</sup> of September 2011)
- Kg. Sungai Kelambu, Banting (27<sup>th</sup> of September 2011)
- Kg. Bestari Jaya, Kuala Selangor (15<sup>th</sup> of September 2012)
- Kg. Ampangan, Tanjung Karang (31<sup>th</sup> of October 2012)
- Forest Compartment 100, Raja Musa Forest Reserve (28<sup>nd</sup> February 2013)

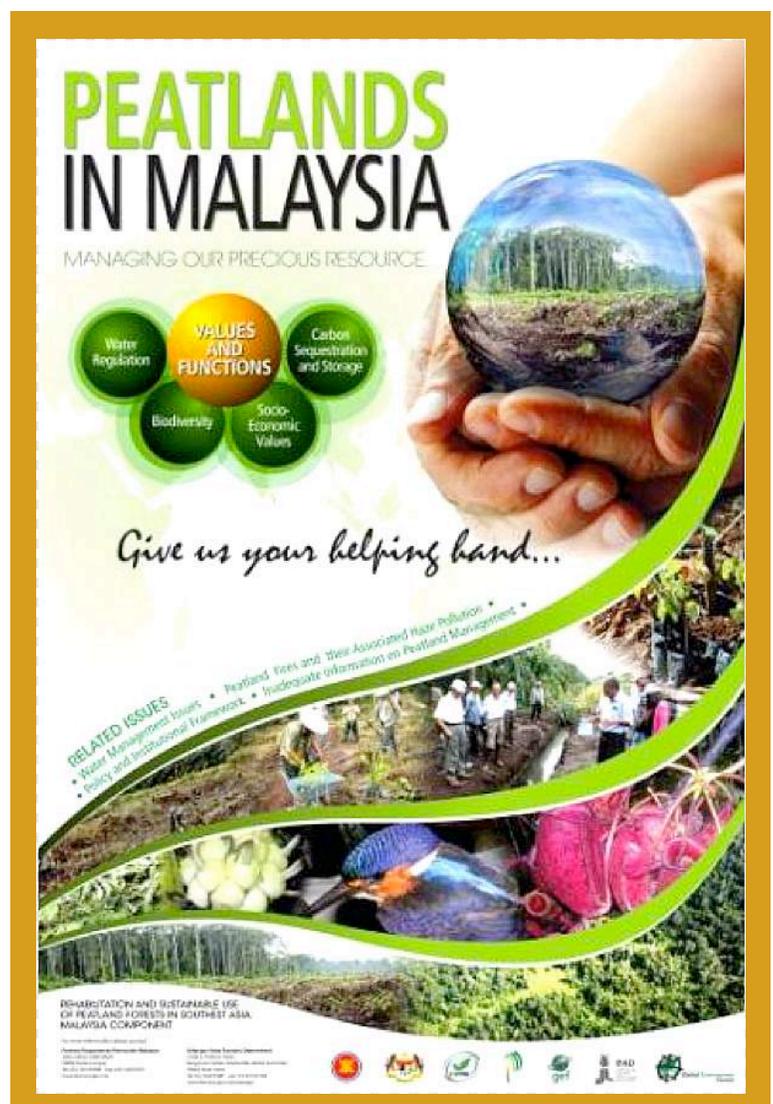
The campaign also included tree planting activities for Selangor State Government agencies at the pilot site in Raja Musa Forest Reserve.



## Awareness Material

Seven types of awareness materials were produced both in Bahasa Malaysia and English. These include the National Action Plan on Peatlands, a video documentary, posters (on peatlands and forest fires) and two booklets on forest fires. Four pamphlets were produced on peatlands, forest fire control, rehabilitation of Raja Musa Forest Reserve (RMFR) and Sahabat Hutan Gambut Selangor Utara (SHGSU).

Additional publicity items produced include T-shirts, caps and bags.





# Media coverage

The Malaysia Component of the APFP received good coverage over the project duration, in both the print and internet media. Seven articles on APFP-related stories or events such as CSR activities and the annual World Wetlands Day celebrations have been highlighted in various newspapers, including The Star, The Sun, The Malaysian Reserve and the Selangor Times. These articles and events have also appeared in various website and blogs.

In addition, articles relating the APFP have been published in two magazines, i.e. the Malayan Naturalist and the International Peatland Society.

The project was featured in two documentaries, i.e. Haze over Asia (National Geographic Channel) and Sahabat Hutan Gambut (screened on the 9<sup>th</sup> of October 2012 on NTV7).

## Enlisting local help to protect vulnerable peatlands.

By MING YEW CHOONG  
[mia02green@india.com.my](mailto:mia02green@india.com.my)

In the past, the people have mainly counted on the government to supply manpower and resources to protect forest and wildlife. This model has had only limited success in forest, by either way, more are still left as scars from determined trespassers. It seems that conservation that involves locals is the way to go.

Take, for example, Selangor's Raja Musa Forest Reserve Conservation Programme, which is a collaboration between the state forestry department and Global Environmental Centre (GEC), a Malaysia-based non-governmental organisation working on conservation of natural resources and climate change issues.

Other than the support of the state government, one key area of the programme is the involvement of the local community in not only protecting the forest, but also in having, using and equipping it. The volunteers call themselves Friends of the North Selangor Peat Forest. The largely peatland forest reestablished around 7,000ha, which is about the size of Singapore.

The creation of the group drew from lessons learned in protecting the Kuala Gula mangrove sanctuary in Perak. In 2007, GEC had worked with the community there to establish the Friends of Mangrove reestablishment, protect and manage the Kuala Gula mangrove. Since the formation of the group, there has been discernible changes in the quality of the reestablishment back to local fisherman and forestry efforts.

### Nurturing the forest

GEC is reestablishing more than 1,000ha of degraded forest within and adjacent to the Raja Musa forest, which lies between central Selangor and Gopeng, Selangor. About 3,000ha has been degraded by logging, encroachment by cash crop farmers and fires. Last year, fires affected more than 400ha inside and outside the forest reserve.

Phase 1 of the programme took place between December 2008 and November 2010 and was marked by many community tree-planting activities. Some 2,000 volunteers planted more than 30,000 seedlings in 600ha of land.

Malaysia has about 1.5-6 million hectares of peat swamp forests, with more than 70% in Sarawak, less than 20% in Peninsular Malaysia, and the remainder in Sabah. Some 500,000ha of peat swamp remain in Selangor and the North Selangor block, consisting of the Sungai Karang and Raja Musa Forest Reserves, is the second largest block of contiguous peat swamp in the peninsula.

Peat is defined as a soil type consisting of at least 65% organic matter, typically derived from partially decayed leaves, stems and roots of plants that have accumulated in a water-saturated environment over the absence of oxygen. The peat layer can be a thick 20-20m over 100 years, compressed peat can reach 1m thick.

Tree planting at Raja Musa will help reduce the amount of carbon dioxide (CO<sub>2</sub>) in our atmosphere.

# Friends of the forest



Leading a hand: To make the water table level in the Raja Musa Forest Reserve, volunteers lay sandbags to block up a main trade canal.



Large tracts of Selangor's Raja Musa Forest Reserve have been degraded by logging, encroachment by cash crop farmers and fires in the past. Now, the local community has been roped in to help protect the area.

There is then less need to get things from the forest or to disturb them. Forest burning means no return on the area will be degraded in time, so all these reestablishment and management activities are actually beneficial for them," said Faizal.

The creation of the Friends of the North Selangor Peat Forest is one good example of community involvement in sustainable peatland management and peatland conservation. The programme that is promoted by the ASEAN Peatland Forest Project-SEA peat project ([www.asiapcp.net](http://www.asiapcp.net)), initiated in 2010, the project aims to improve environmental awareness, education and conservation of peat swamp forests in South East Asia. In Malaysia, the Raja Musa forest was chosen as the pilot site.

### People power

It is not only those who have a direct stake in agriculture who care about the forest. Syamsul Rizali and his wife Neer Hazrat Mohd Hashim, both 23 and from Kampung Bharu Jaya, are enthusiastic members of the volunteer group.

"When we were young, we had no idea what peatland was, other than the blackish water seen in its vicinity. We did not know about the combustibility of peat, but we are now. We are GEC's approach of education, and our challenge now is how to attract more villagers to learn about peat. We still have a lot of work to do in order to attract more," said Syamsul, who sells school reference books for a living.

Azmi Md Zaki, 24, is another enthusiastic volunteer. "When I was a kid, peat never entered my vocabulary. We just were around playing and we breathe in the taken land rivers. But when GEC came to the village to teach us the benefits of the people in caring for peatland, I became aware, and my interest grew from there on," said the company administration officer.

Group chairman Sufian Razali, 55, revealed that illegal tractors in the Raja Musa forest is now under control on account of regular monitoring by parish in the forest, conducted by villagers who are well employed or retired. "We will not tolerate anybody about the no burning, no fishing, and no open burning policies. There are now 'custodians' who challenge us. In these cases, we will go down the details and file a report. Our job is only to advise, not to give orders," he is protecting the forest through the risk reduction education, awareness and training programme.

### Peatlands were enormous amounts of CO<sub>2</sub> but when burnt, whether in a field, forest and other fields as well, the CO<sub>2</sub> is released back into the atmosphere. Fire does not generally destroy peatland peat forests as the ground is too hot for peatland that has been disturbed, especially by accelerated drainage operations made canals, then can weaken lower as the natural water table has been significantly lowered.

A few more decades of logging, the Raja Musa forest is vulnerable to land conversion as well. This occurred a few 10 years ago. Peatland also enter the business of using abandoned logging tracks and other paths created by illegal settlers. Encroachment made GEC's programme to clear the degraded peat will catch fire.

Peatland fires and have are the most serious environmental problems in Ampang, impacting the health and livelihood of thousands of people.

### In 2007, South-East Asia was seriously affected by fire and drought. In 11 states, the fire season is said to be the longest in 100 years.

In December 2009, a memorandum of understanding was signed between GEC and the state forestry department to support reestablishment of peatland forest. The initiative has recently been backed from the Group through the 'Save Selangor' fund.

GEC now has the control of our villages - Kampung Bharu Jaya, Kampung Seri Teratai and Kampung Raja Musa. It is now under control on account of regular monitoring by parish in the forest, conducted by villagers who are well employed or retired. "We will not tolerate anybody about the no burning, no fishing, and no open burning policies. There are now 'custodians' who challenge us. In these cases, we will go down the details and file a report. Our job is only to advise, not to give orders," he is protecting the forest through the risk reduction education, awareness and training programme.

## Saving the peatlands

The largest peat swamp forest complex in Selangor is under threat. Three organisations have decided to do something to save it for future generations. ELLY FAZANIZA visits the Raja Musa Forest Reserve to find out what is being done.

Early one morning in the Raja Musa Forest Reserve peatlands, about 20 people would rise into the mist to plant 1,000 seedlings of 'bungkus buring', a local plant species considered to be an important part of the swamp's ecosystem.

It was not an easy task but three organisations - namely the state government of Selangor, HSBC Bank (M) Ltd and Global Environment Centre (GEC) - felt this was perhaps the only way to conserve the endangered peatlands of Selangor.

The Raja Musa Forest Reserve and Sungai Karang Forest Reserve covers an area of 73,302 ha, which is part of the North Selangor Peat Swamp Forest.

According to GEC's website, the peatlands had been under siege due to man-made calamities including long-term unregulated logging, illegal land clearing for agriculture, plantation crops and settlements, and encroachment activities in the forest reserve - which led to detrimental environmental hazards such as haze and forest fires.

In response to the dire situation in the peatlands, GEC signed an MOU with the Selangor Forest Department in December 2010 to initiate a community-based programme.

In 2011 HSBC Bank joined the rehabilitation effort, and pledged RM300,000 to the GEC for three years.

"through the establishment of Sahabat Hutan Gambut, the relationship between the government, private sector, NGOs and the local community will be strengthened to deal with pressing peat swamp forest issues".

The Sahabat Hutan Gambut project's focus is to give the villagers involved in its replanting project. They are then given assistance to gain additional income while giving them a sense of empowerment to preserve their natural heritage.

GEC's Forest and Biodiversity Programme project officer Hyrul Izwan said: "Under a special scheme, we encourage the identified villages to submit their proposals to set up their own nurseries to plant 'bungkus buring'. We will then provide a start-up capital for each village.

"For example, Kampung Bharu Jaya has been allocated RM1,000 to begin its nursery project."

The three other participating villages - Kg Raja Musa, Kg Seri Teratai and Kg Kg Sireh in Kuala Selangor area - were chosen because they are located around the peat swamp area.



Ampangan in Tanjung Karang, we get a different perspective on peatland's rehabilitation programme.

On the outskirts of the village, farmers' meadows had been used in mud, planting paddy seedlings.

Alu Bakar of Kampung Ampangan said that paddy production in certain areas was influenced by the peatland's acidic level.

"We discovered that paddy stalks could grow in clay soil are longer compared with those planted in peat soil," he said.

On the outskirts of the village, farmers' meadows had been used in mud, planting paddy seedlings.

Alu Bakar of Kampung Ampangan said that paddy production in certain areas was influenced by the peatland's acidic level.

only to find the species unsuitable for the peat water's high acidity.

sinarharian • ISIN 20 FEBRUARI 2012

Hubungi Skaud Kuala Selangor:  
Azliana Mohamad Azaman - 019-6689950/ 019-3371066

KUALA SELANGOR 41

# Usaha pulih hutan ambil masa

*Hutan simpan diceroboh perlu tempoh lama untuk kembali keadaan asal*

**BESTARI JAYA** - Usaha untuk memulihkan semula hutan simpan terutamanya Hutan Simpan Raja Musa yang sebelum ini diceroboh untuk tujuan pertanian memerlukan tempoh yang lama. Pembaritu Exco Pelancongan, Hal Ehwal Pengguna dan Alam Sekitar, Lee Kim Sin berkata, hutan seluas 1,000 hektar daripada 23,000 hektar yang terjejas itu memakan masa hampir lima hingga 10 tahun meskipun Kerajaan Negeri sudah mengambil alih tanah yang diceroboh sejak 2008 lalu.

Menurutnya, sudah menjadi polisi Kerajaan Negeri untuk memastikan kawasan hutan simpan yang diterokai sebelum ini dipulihkan semula secara berperingkat dan

anugerah alam yang tidak ada di negeri lain.

"Keurukan tanah lembap yang terdapat pada hutan paya gambut berbeza berbanding hutan lain dan boleh menjadi tumpuan kajian penyelidikan dalam dan luar negara," katanya ketika rasmi sambutan Hari Tanah Lembap Sedunia 2012 di Hutan Simpan Raja Musa.

Hadir sama, Pengarah Jabatan Perhutanan Selangor, Yusoff Muda, Pengarah Global Environment Centre (GEC), Faizal Parish, Yang Dipertua Majlis Daerah Kuala Selangor (MDKS), Noraini Roslan dan Pengurus Korporat HSBC Bank Malaysia Berhad, Koo Yi Lin.

Difahamkan, sebanyak RM20 juta diperuntukan un-



Kim Sin (kiri) menanam pokok bersama Faizal (dua, kiri) dan Noraini sebagai simbolik perasmian Hari Tanah Lembap Sedunia 2012 di Hutan Simpan Raja Musa.

kata, program pemuliharaan Hutan Simpan Raja Musa adalah program kerjasama

nya, melibatkan pelbagai tindakan lain termasuk mengawal kebakaran, pemuliharaan paras air semula jadi bagi menggalakkan pertumbuhan semula dan kerja penanaman 100,000 anak pokok tenggek buang melibatkan 250 sukarelawan, pelajar dan penduduk.

"GEC berjaya mengumpul lebih 4,000 sukarelawan melalui aktiviti penanaman pokok dan menanam 40,000 anak pokok di kawasan seluas 80 hektar sejak 2008 lalu, kita turut mendapat sokongan HSBC, International Funds for

Agricultural Development (IFAD), Global Environment Facility (GEF) dan European Union," katanya.

Dalam program sama, Sahabat Hutan Gambut (SHG) dilancarkan bagi menyokong penglibatan masyarakat setempat dalam Program Pemuliharaan Hutan Simpan Raja Musa dan mengadakan perkongsian tanggungjawab agensi kerajaan dan badan bukan kerajaan (NGO) dalam menguruskan ekosistem hutan paya gambut.

Program Renjer Hutan Tanah Gambut turut dilancarkan sebagai program pendidikan alam seloiar yang dimulakan GEC untuk memupuk kesedaran kepada pelajar sekolah yang terlibat iaitu Sekolah Menengah Kebangsaan (SMK) Raja Muda Musa, SMK Rantau Panjang, SMK Sultan Sulaiman Shah dan SM Teknik Kuala Selangor.

# the swamp

Corporations and residents is needed to  
Musa Forest Reserve in Kuala Selangor. >2&3



## Villagers tapping the peat swamp potential



**Cottony soft:** The cotton fibre from the bursting pods of the kapok tree is used to make mattresses and pillows.

THE boat ride along the irrigation canal in Kampung Sungai Sireh, Tanjung Karang, Selangor, was refreshing and visitors could ask the boatman to stop and take a stroll along the lush edge of the forest.

The waters of the peat swamp in the Sungai Karang forest reserve was the colour of black coffee.

Stepping foot into the idyllic Kampung Sungai Sireh was almost a shock for the senses of a person born and bred in the urban jungles of Kuala Lumpur.

Just across the two-lane road from the Sungai Sireh homestay base, there was nothing but the long stretch of water with greenery as far as the eye can see.

A gust of wind brought a small shower of soft cotton fibres from the pods of the kapok tree by the road and the effect was mesmerising.

"Yes, once in a while it 'snows' in Sungai Sireh," quipped the boatman who was watching us with interest as we went around picking up the fallen pods.

The fibre has long been used as stuffing material for mattresses and pillows in villages.

**We even have a small cafe and internet facilities. Our main attraction is the padi fields and those who come here can get a feel of what the farmers do here.**

-ABU BAKAR MOIN

Local resident Abu Bakar Moin, 51, started the homestay programme in his village in 1995 and there are more than 40 homes registered now.

There is a spacious common area and dining hall that can accommodate large groups of people who want to experience life in the rice-growing community.

"We even have a small cafe and internet facilities. Our main attraction is the padi fields and those who come here can get a feel of what the

farmers do here," he said.

Abu Bakar is now one of the committee members of the newly-formed Friends of Peatland Forest, of which Sungai Sireh was one of the chosen communities.

"Most of us grew up here but have no knowledge of the peat swamp forest or how important it is for our community. We never even realised that destroying the forest would mean affecting the source of water for our padi fields," he said.

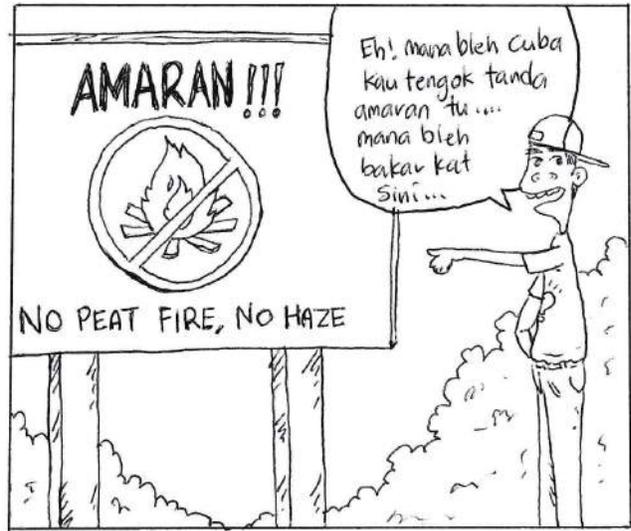
By joining in the programme initiated by the Global Environment Centre, he said they were now armed with valuable knowledge that they could share with visitors who go on boat rides, kayaking or jungle-trekking in the forest reserve.

"A lot of people here know the area in and out because they were involved in logging activities that have cost us our natural resources. Some of them are now helping out as guides or boatmen and their knowledge of the area is a great asset to the homestay programme," he said.

Those interested in the Sungai Sireh homestay can contact 019-346 7372.

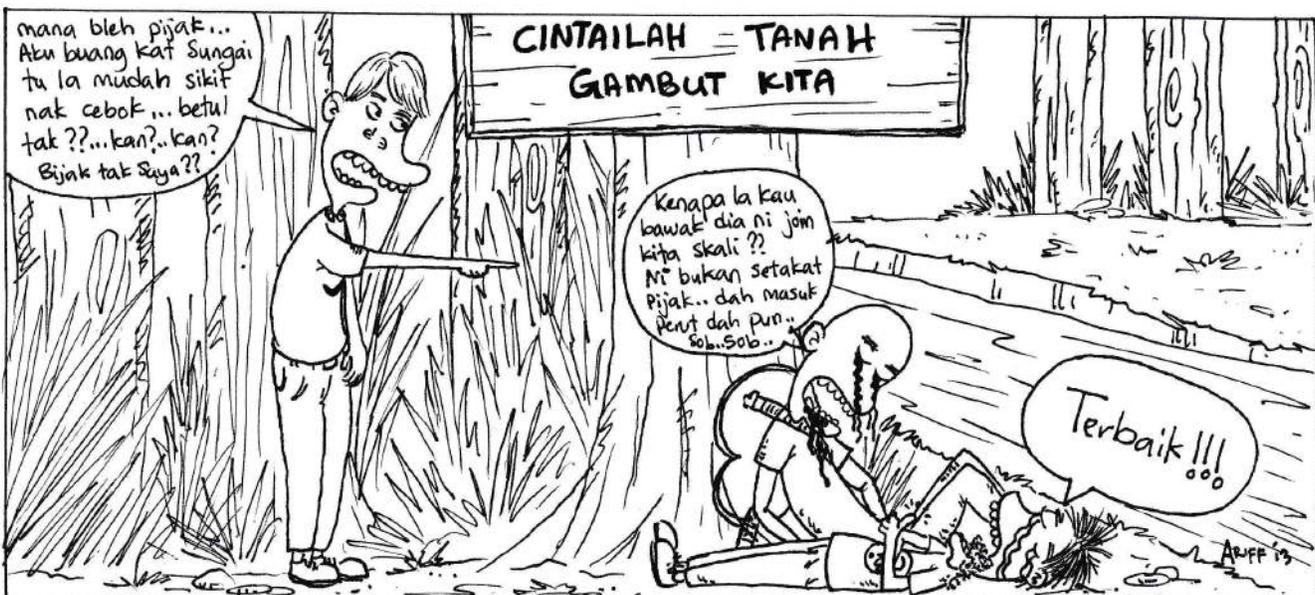
# GAMPUT

IDEA OLEH :  
JABATAN PERHUTANAN  
SEMENTANJUNG MALAYSIA  
SEKSYEN HUTAN TANAH LEMBAG.

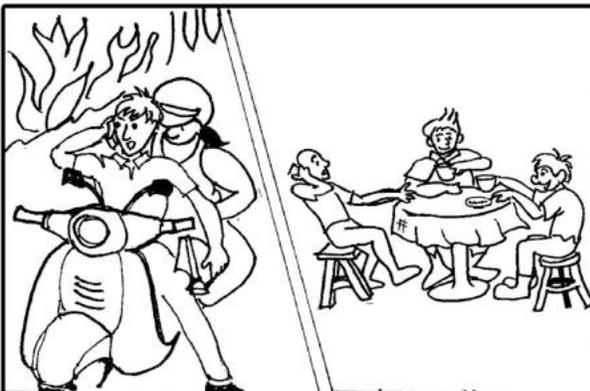
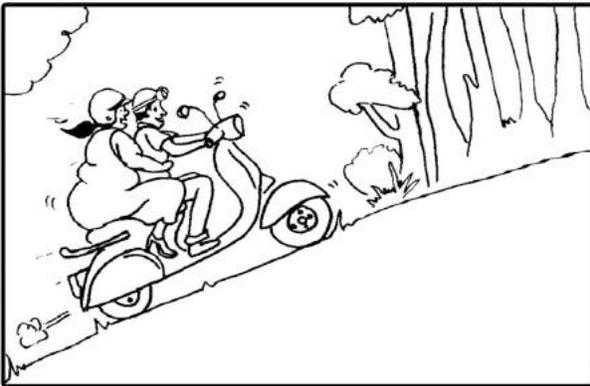
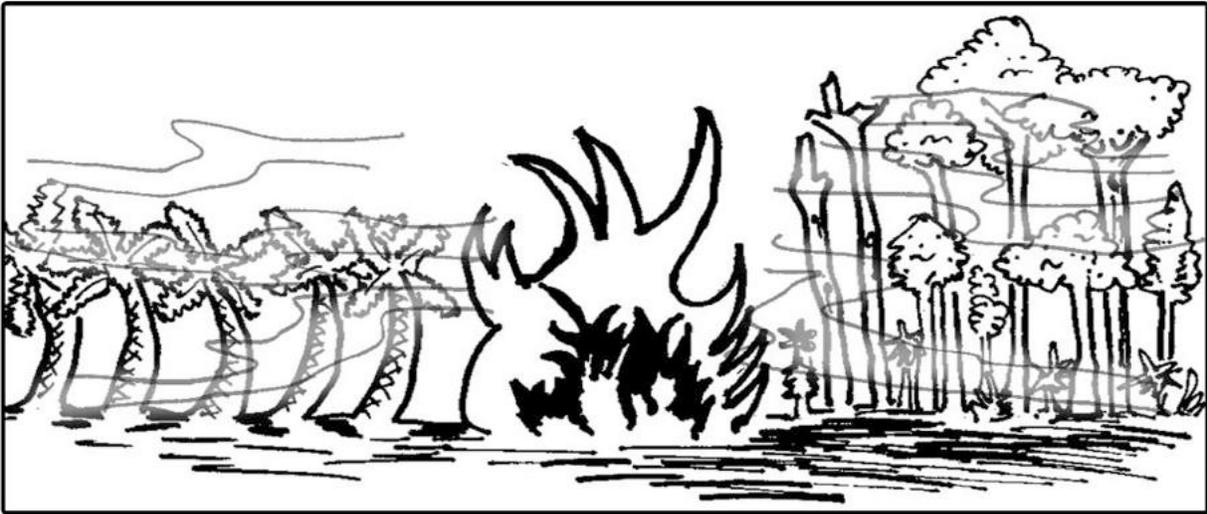


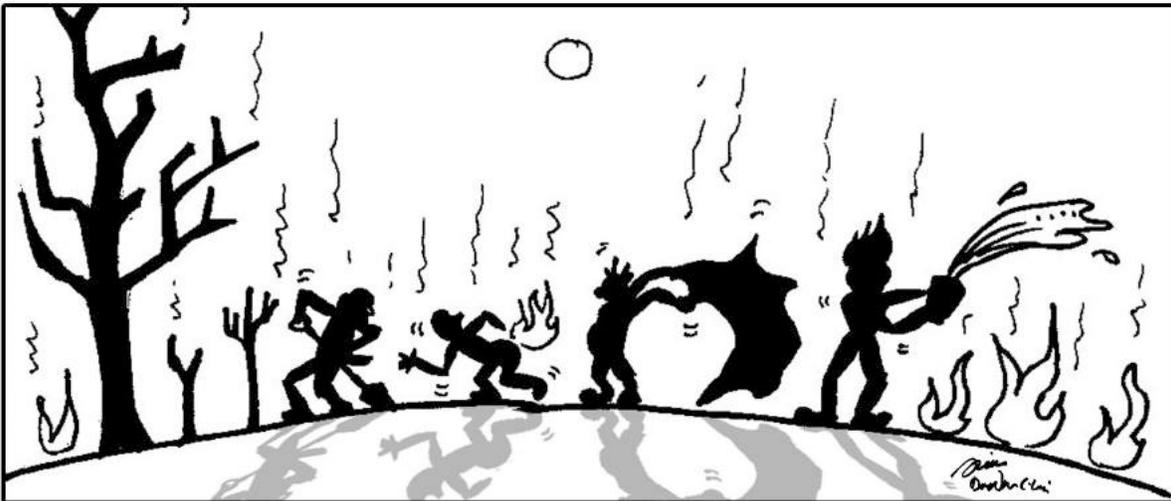
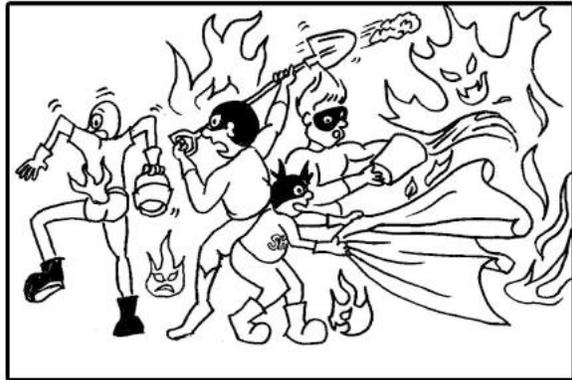
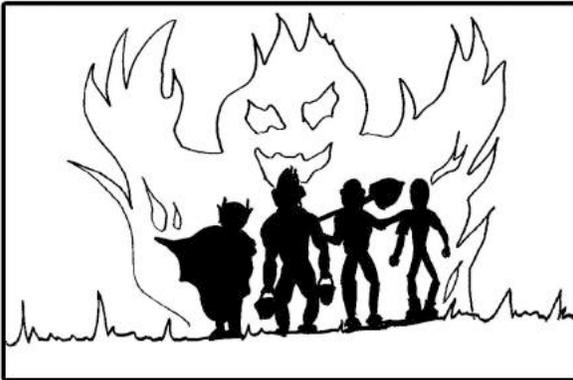
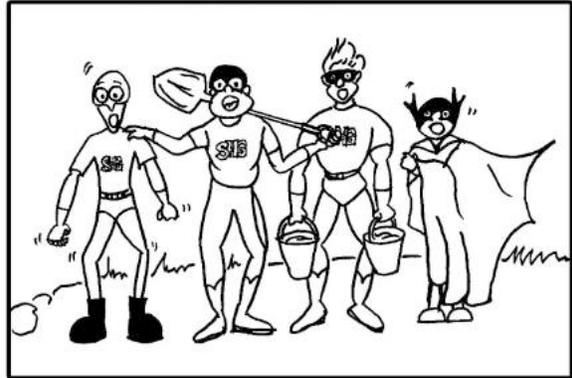
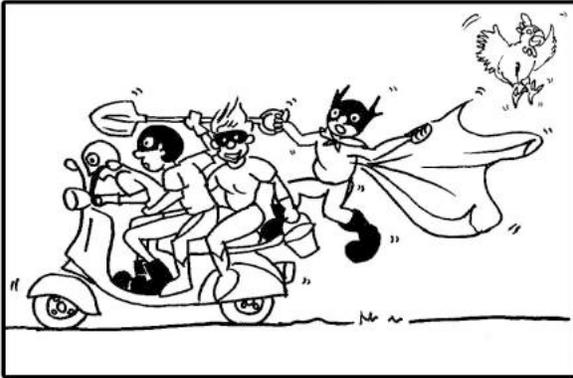
# GAMBUS

IDEA OLEH :  
 JABATAN PERHUTANAN  
 SEMENANJUNG MALAYSIA  
 SEKSYEN HUTAN TANAH  
 LEMBAB



# FOREST FIRE FIGHTERS





Dedicated to all of the professional and volunteer fire-fighters who risk their health and safety to save Malaysia's peatswamps

# Photos of events











# Photos from the NSPSF Scientific Biodiversity Expedition



# ASEAN PEATLAND FORESTS PROJECT (APFP) MALAYSIAN COMPONENT (2010-2014)

Project by:



Country Focal Point:



National Project Executing Agency:



Government Partners/  
Co-Funders:



Institutional Partners:



Government linked companies / Private sector Partners:



Non Government Organisation / Community Based Organisation Partners:



Global Environment Centre



*Thank You*

**FOR YOUR SUPPORT & ASSISTANCE**

## Abbreviations

APFP	ASEAN Peatland Forest Project
ASEAN	Association of Southeast Asian Nations
AWS	Automatic Weather Station
BMP	Best Management Practices
CBO	Community based organisation
CFS	Canadian Forest Service
CIDA	Canadian International Development Agency
DOE	Department of Environment
DTCP	Department of Town and Country Planning
DWNP	Department of Wildlife and National Parks
EXCO	Executive Committee
FDPM	Forestry Department Peninsular Malaysia
FDRS	Fire Danger Rating System
FORFIS	Forest Fire Information System
FRIM	Forest Research Institute Malaysia
GEC	Global Environment Centre
GEF	Global Environment Facility
GIS	Geographic Information System
IMP	Integrated Management Plan
IPB	<i>Institut Pertanian Bogor / Bogor Agriculture Institute</i>
JMG	Minerals and Geoscience Department
KDEB	Kumpulan Darul Ehsan Berhad
Kg.	<i>Kampung / Village</i>
KLH	<i>Kementrian Lingkungan Hidup / Ministry of Environment Indonesia</i>
KSNP	Kuala Selangor Nature Park
MDKS	<i>Majlis Daerah Kuala Selangor / Kuala Selangor District Council</i>
MMD	Malaysian Meteorological Department
MNS	Malaysian Nature Society
MPOB	Malaysian Palm Oil Board
NGO	Non government organisation
NPSC	National Peatlands Steering Committee
NPWC	National Peatlands Working Committee
NRE	Ministry of Natural Resources and Environment
NSPSF	North Selangor Peat Swamp Forest
RMFR	Raja Musa Forest Reserve
RSPO	Roundtable of Sustainable Palm Oil
SADC	Selangor Agriculture Development Corporation / <i>Perbadanan Kemajuan Pertanian Selangor (PKPS)</i>
SEAPeat	Sustainable Management of Peatland Forests in Southeast Asia
SFC	Sarawak Forest Corporation
SFD	State Forestry Department
SEPPSF	South East Pahang Peat Swamp Forest

SHGSU	<i>Sahabat Hutan Gambut Selangor Utara / Friends of North Selangor Peat Swamp Forest</i>
SIRIM	Standard and Industrial Research Institute of Malaysia
SK	<i>Sekolah Kebangsaan / National School</i>
SMK	<i>Sekolah Menengah Kebangsaan / National Secondary School</i>
UKM	<i>Universiti Kebangsaan Malaysia</i>
UM	<i>Universiti Malaya</i>
UMT	<i>Universiti Malaysia Terengganu</i>
UNDP	United Nations Development Programme
UNISEL	<i>Universiti Selangor</i>
UPM	<i>Universiti Putra Malaysia</i>
USM	<i>Universiti Sains Malaysia</i>





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